CIRHR ACCESSIBLE RAMP AND UNIVERSAL WASHROOM

CENTRE FOR INDUSTRIAL RELATIONS AND HUMAN RESOURCES - 121 ST. GEORGE STREET, TORONTO

01 A0.1 MAIN ENTRANCE ON ST GEORGE STREET

A.D.	AREA DRAIN	N/A	NON-APPLICABLE
AFB	ACOUSTIC FIRE BATT INSUL	N.I.C.	NOT IN CONTRACT
A.F.F.	ABOVE FINISH FLOOR	N.T.S.	NOT TO SCALE
A.F.R.	ABOVE FINISH RAMP	OBC	ONTARIO BUILDING CODE
A.C.T.	ACOUSTIC CEILING TILE	O.C.	ON CENTRE
ALUM	ALUMINUM	O.D.	OUTSIDE DIAMETER
A/P	ACOUSTIC CEILING PANEL	P.H.	PANIC HARDWARE
A.V.	AUDIO VISUAL	PL	PLATE
B.F.	BARRIER FREE	P.LAM	PLASTIC LAMINATE
BH	BULK HEAD	PREFIN	PREFINISHED
BLDG	BUILDING	P.T.	PRESSURE TREATED
BN	BULLNOSED	PT	PAINT FINISH
C.B.	CONCRETE BLOCK	PTD	PAPER TOWEL DISPENSER
CH	COAT HOOK	R/A	RETURN AIR
CLG	CEILING	R.D.	ROOF DRAIN
C.J.	CONTROL JOINT	REINF	REINFORCED
CONC	CONCRETE	RV'L	CONTINUOUS 13mm REVEAL
CONT	CONTINUOUS	RM.	ROOM
CS	CONVENIENCE SHELF	R.O.	ROUGH OPENING
CPT	CARPET	RUB	RUBBER BASE
CT(A)	CHANGE TABLE (ADULT)	RWL	RAIN WATER LEADER
C.T.	CERAMIC TILE	S.D.G.	SEALED DOUBLE GLAZING
C/W	COMPLETE WITH	SD	SOAP DISPENSER
D.F.	DRINKING FOUNTAIN	SGL	SECURITY GLASS
ECS	EMERGENCY CALL SYSTEM	SIM	SIMILAR
EJ	EXPANSION JOINT	SMOKE	SMOKE DETECTOR
EXIST.	EXISTING	SND	SAN. NAPKIN DISPOSAL
FDN	FOUNDATION	SNV	SAN. NAPKIN DISPENSER
F.E.	FIRE EXTINGUISHER	SOG	SLAB ON GRADE
F.R.	FIRE RATED	S.S.	STAINLESS STEEL
FRR	FIRE RESISTANCE RATING	STL	STEEL
FGB	FOLDING GRAB BAR	STN	STAIN FINISH
FTG	FOOTING	STR	STRUCTURE
GFCI	GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLE	SUSP	SUSPENDED
		T.G.	TEMPERED GLASS
GL	GLAZING	TPD	TOILET PAPER DISPENSER
GB	GRAB BAR	T/O	TOP OF
GYP.BD.	GYPSUM BOARD	TYP	TYPICAL
GWG	GEORGIAN WIRED GLASS	U.N.O.	UNLESS NOTED OTHERWISE
H.M.	HOLLOW METAL	U/S	UNDERSIDE
H.B.	HOSE BIB	VB	VAPOUR BARRIER
HDWD	HARDWOOD	VCT	VINYL COMPOSITE TYLE
H.S.S.	HOLLOW STEEL SECTION	V.O.J.	VERIFY ON JOBSITE
HT.	HEIGHT	W/	WITH
I.D.	INSIDE DIAMETER	W/R	WASHROOM
INSUL.	INSULATED	WD.	WOOD
INS.	INSULATION	WHC	WOOD HOLLOW CORE
LX	LIGHT FIXTURE	WNDW	WINDOW
M	MIRROR	WPG	WATERPROOFING
MTL.	METAL	WSC	WOOD SOLID CORE

MH	DENOTES	MANHOLE	
WMH	"	WATER MANHOLE	
HMH	"	HYDRO MANHOLE	
BMH	"	BELL MANHOLE	
CB	"	CATCH BASIN	
FH	"	FIRE HYDRANT	
WV	"	WATER VALVE	
GV	"	GAS VALVE	
HW	"	HAND WELL	
GM	"	GAS METER	
MP	"	METAL POLE	
CLS	"	CONCRETE LIGHT STANDARD	
MLS	"	METAL LIGHT STANDARD	
ATS	"	AUTOMATIC TRAFFIC SIGNAL	
ICV	"	IRRIGATION CONTROL VALUE	
G	"	GUTTER	
SC	"	SIAMESE CONNECTION	
SL	"	SPOT LIGHT	
CI	"	COLUMN	
B	"	BOLLARD	
PM	"	PARKING METER	
CR	"	CENTRE ROAD	
FF	"	FINISHED FLOOR	
	"	DECIDUOUS TREE	
	"	CONIFEROUS TREE	
	"	BUSH	
	"	CONCRETE	
	"	GRAVEL	
	"	STONE	
	"	BRICK	
	"	CONCRETE TILES	
	"	FLAGSTONE	

UNDERGROUND SERVICES
THE LOCATION OF UNDERGROUND SERVICES SHOWN ON THIS PLAN IS ONLY APPROXIMATE AND IS FOR PLANNING AND DESIGN PURPOSES ONLY.
THIS INFORMATION MUST NOT BE ASSUMED TO BE COMPLETE OR UP-TO-DATE.

THE UNDERNAMED COMPANY AND EACH UTILITY ACCEPTS NO RESPONSIBILITY FOR ANY CLAIMS OR LOSSES DUE TO IMPROPER USE OF THE INFORMATION SHOWN HEREON AND EACH UTILITY MUST BE CONTACTED FOR AN ON-SITE LOCATE PRIOR TO ANY EXCAVATION.

UNDERGROUND SERVICES
UNDERGROUND SERVICE LOCATES WERE PERFORMED BY MULTIVIEW LOCATES. UNDERGROUND ENGINEERING SERVICES REPORT CORRESPONDING TO THEIR STAKEOUT MUST BE READ IN CONJUNCTION WITH THIS SURVEY.

LOCATES MUST BE OBTAINED PRIOR TO ANY CONSTRUCTION.

— B — — — — B — — — — —	BELL TELEPHONE LINE
— FO-TV — FO-TV — FO-TV — FO-TV — FO-TV —	FABRIC OPTIC & TV LINE
— H — — — — H — — — — —	HYDRO LINE
— W — — — — W — — — — —	WATER LINE
— ST — — — — ST — — — — —	STORM LINE
— GM — GM — GM — GM — GM — GM —	GAS-MAIN LINE
— GS — GS — GS — GS — GS — GS —	GAS-SERVICE LINE
— TV — TV — TV — TV — TV — TV —	TV LINE
— SW — SW — SW — SW — SW — SW —	SANITARY LINE
— H-TV — H-TV — H-TV — H-TV — H-TV —	HYDRO & TV LINE
— B — — — — B — — — — —	UNKNOWN LINE
— FW — FW — FW — FW — FW — FW —	FIRE LINE

05 A0.1 LEGENDS - ABBREVIATIONS & SITE

DRAWING LIST

ARCHITECTURAL
A0.1 COVER SHEET
A0.2 O.B.C. MATRIX & BUILDING KEY PLANS
A0.3 SURVEY
A1.1 SITE PLAN (EXISTING)
A1.2 SITE PLAN (PROPOSED)
A2.1 PARTIAL PLANS
A3.1 INTERIOR ELEVATIONS
A3.2 INTERIOR ELEVATIONS & DOOR DETAILS
A3.3 ELEVATIONS - RAMP
A3.4 ELEVATIONS - RAMP
A3.5 RESERVED
A3.6 RESERVED
A3.7 ELEVATIONS - STONE RESTORATION
A3.8 ELEVATIONS - STONE RESTORATION
A3.9 ELEVATIONS - STONE RESTORATION
A4.1 DETAILS - RAMP
A4.2 DETAILS - RAMP & STAIR
A4.3 DETAILS

STRUCTURAL
S1.1 RAMP FOUNDATION PLAN
S2.1 RAMP DETAILS
S2.2 RAMP DETAILS

CIVIL
CV-1 GRADING & SERVICING

LANDSCAPE
L-1 LANDSCAPE PLAN & DETAILS

MECHANICAL
M0.1 MECHANICAL LEGEND & DRAWING LIST
M1.1 RAMP - DEMOLITION & NEW WORK - BASEMENT
M1.2 RAMP - NEW WORK - LEVEL 1 - MECHANICAL
M2.1 WASHROOM - DEMOLITION & NEW WORK - MECHANICAL
M3.1 MECHANICAL SPECIFICATIONS
M3.2 MECHANICAL SPECIFICATIONS
M3.3 MECHANICAL SPECIFICATIONS
M3.4 MECHANICAL SPECIFICATIONS
M4.1 RAMP - SCHEDULE & DETAILS
M4.2 WASHROOM - SCHEDULE & DETAILS

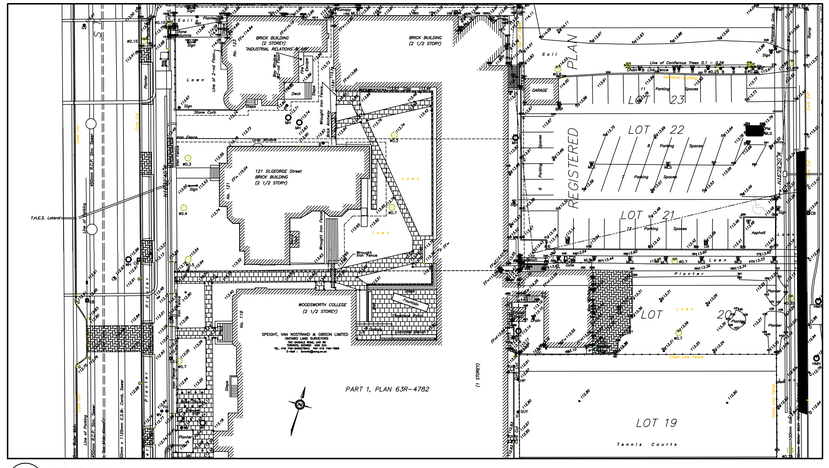
ELECTRICAL
E0.1 ELECTRICAL LEGEND & DRAWING LIST
E0.2 ELECTRICAL SPECIFICATION I - WASHROOM
E0.3 ELECTRICAL SPECIFICATION II - WASHROOM
E0.4 ELECTRICAL SPECIFICATION III - WASHROOM
E1.0 ELECTRICAL SITE PLAN
E2.0 LIGHTING LEVEL 1 - DEMOLITION & NEW WORK
E2.1 LIGHTING LEVEL 1 - DEMOLITION & NEW WORK
E3.0 BASEMENT POWER LAYOUT - DEMOLITION & NEW WORK
E3.1 POWER LEVEL 1 - DEMOLITION & NEW WORK
E4.0 SINGLE LINE DIAGRAM - EXISTING
E4.1 SINGLE LINE DIAGRAM - NEW WORK
E6.0 ELECTRICAL TYP. DETAILS & LUMINAIRE SCHEDULE

02 A0.1 DRAWING LIST

XX / AX.X SECTION REFERENCE
XX / AX.X BUILDING ELEVATION REFERENCE
XX / AX.X ELEVATION REFERENCE
XX / AX.X SECTION DETAIL REFERENCE
XX / AX.X PLAN DETAIL REFERENCE
000 CONSTRUCTION ASSEMBLY TAG
RM. NAME ### ROOM TAG
CEILING HEIGHT

POURED CONCRETE
STONE VENEER
BRICK VENEER
METAL DECK
METAL STUD & FURRING
BATT INSULATION
RIGID INSULATION
SPRAY FOAM
VAPOUR BARRIER
GYPSUM WALL BOARD
SOLID WOOD
EXISTING MATERIAL
X GRID LINE
D# DOOR TAG
W# WINDOW/SCREEN TAG

03 A0.1 LEGEND - SYMBOLS



06 A0.1 KEY PLAN 1:500

CLIENT:
UNIVERSITY OF TORONTO

FACILITIES & SERVICES
INFRASTRUCTURE PLANNING AND IMPLEMENTATION
255 McCAUL STREET, LEVEL 4
TORONTO, ONTARIO, CANADA
M5T 1W7

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ARCHITECT:
+VG ARCITECTS

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CONTACT:
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pfrenguelli@plusvg.com

CONSULTANTS:

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176 SPEEDVALE AVE W
GUELPH, ONTARIO, CANADA
N1H 1C3
T: 519.763.2000 x242
W: https://tacomaengineers.com/

CONTACT:
GERRY ZEGERIUS
gerryz@tacomaengineers.com

MECHANICAL & ELECTRICAL:
QUASAR CONSULTING GROUP
250 ROWNTREE DAIRY ROAD
WOODBRIDGE, ONTARIO, CANADA
L4L 9J7
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MICHEAL HUGHES (MECH.): micheal.hughes@quasarcg.com

CIVIL:
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555 INDUSTRIAL DRIVE, SUITE 201
MILTON, ONTARIO, CANADA
L9T 5E1
T: 905.567.8678
W: https://mgm.on.ca/

CONTACT:
MATT STAIRS
mstairs@mgm.on.ca

LANDSCAPE:
SNOW LARC LANDSCAPE ARCHITECTURE LTD
2069 CONCESSION 2
UXBRIDGE, ONTARIO, CANADA
L9P 0G8
T: 416.770.0446
W: https://snowlarc.com/

CONTACT:
STEPHANIE SNOW
stephanie@snowlarc.com

04 A0.1 PROJECT TEAM

REVISIONS

NO.	DATE	PARTICULAR
01	23.03.31	ISSUED FOR 95% CD (WC)
02	23.04.28	ISSUED FOR 100% CD (WC)
03	23.06.13	ISSUED FOR 50% CLIENT REVIEW
04	23.07.28	ISSUED FOR 95% CLIENT REVIEW
05	23.09.29	ISSUED FOR CLIENT REVIEW
06	24.04.09	ISSUED FOR FINAL REVIEW
07	24.05.24	ISSUED FOR PERMIT
08	24.06.07	ISSUED FOR TENDER

All dimensions and measurements must be checked and verified by the General Contractor

NOTES:

KEY PLAN:

CLIENT:
UNIVERSITY OF TORONTO

PROJECT:
22250 & 22251

CIRHR ACCESSIBLE RAMP & UNIVERSAL WASHROOM

CENTRE FOR INDUSTRIAL RELATIONS & HUMAN RESOURCES (CIRHR)
121 ST. GEORGE ST., TORONTO, ONTARIO

ORIGINAL PAGE SIZE ARCH D - 24" x 36"

KEY TO DETAIL LOCATION:
A - DETAIL NO.
B - DETAIL NO. ORIGIN

+VG ARCHITECTS
THE VENTIN GROUP LTD

ONTARIO ASSOCIATION OF ARCHITECTS
CHRISTOPHER JOHN HALL
LICENCE 5396

TRUE NORTH

NOTED

COVER SHEET

A0.1

DRAWN BY : ?

CHECKED BY : ?

Filename: C:\Users\pfren\Desktop\22251 CIRHR\Wd-Curent\ 22250 51 - A0.1.dwg

Plot Date: Jun 06, 2024 - 4:01pm By: pfren

Firm Name:
+VG Architects (Toronto) Ltd.
72 Stafford Street, Suite 200, Toronto, Ontario
M6J 2R9
T: 416-588-6370
F: 416-588-6327

Certificate of Practice Number:
3356

Name of Project:
CIRHR UNIVERSAL WASHROOM

Address:
121 ST GEORGE ST., TORONTO, ON

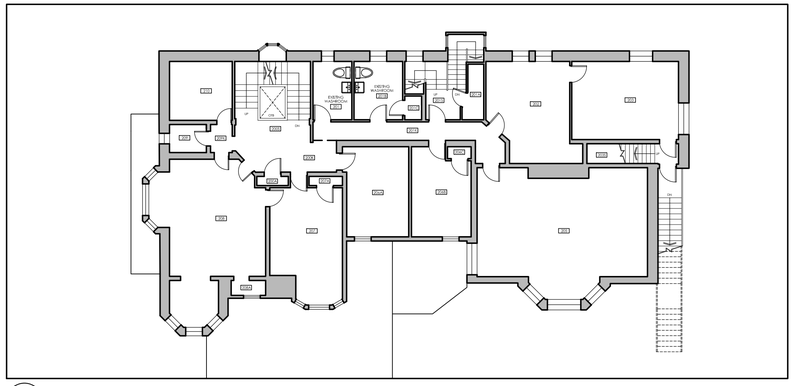
The Architect noted above has exercised responsible control with respect to design activities. The Architect's seal number is the architect's BCDN

PROJECT DESCRIPTION:			O.B.C. REFERENCE
			PART 3
MAJOR OCCUPANCY(s):	A2 – NON-RESIDENTIAL COLLEGE BUILDING		3.1.2.1.(1)
BUILDING AREA (m^2) (FOOTPRINT):	GROUND LEVEL:	373.4 sq.m. (4,020 sq.ft.)	1.1.3.2
GROSS AREA (m^2):	TOTAL GFA:	1,325.5 sq.m. (14,268 sq.ft.)	
	AREA OF RENOVATION		
	INTERIOR GROUND FLOOR	10.3 sq.m. (111 sq.ft.)	
	EXTERIOR RAMP AND STAIR	78.5 sq.m. (845 sq.ft.)	
	TOTAL	88.8 sq.m. (956 sq.ft.)	
NUMBER OF STOREY'S	ABOVE GRADE: 3, BELOW GRADE: 1		3.2.1.1 & 1.1.3.2
HEIGHT OF BUILDING (m):	14.0m		
NUMBER OF STREETS/ ACCESS ROUTES:	TWO STREETS		3.2.2.10 & 3.2.5.5
BUILDING CLASSIFICATION:	ASSEMBLY – GROUP A, DIVISION 2		3.2.2.20
SPRINKLER SYSTEM:	NO		
STANDPIPE:	NO		3.2.9.1(1)(c)
FIRE ALARM:	EXISTING		3.2.4
WATER SERVICE/ SUPPLY IS ADEQUATE:	HYDRANT PROVIDED WITHIN 45m OF BUILDING		3.2.5.7.(2) 3.2.5.16 (2)
HIGH BUILDING:	NO		3.2.6

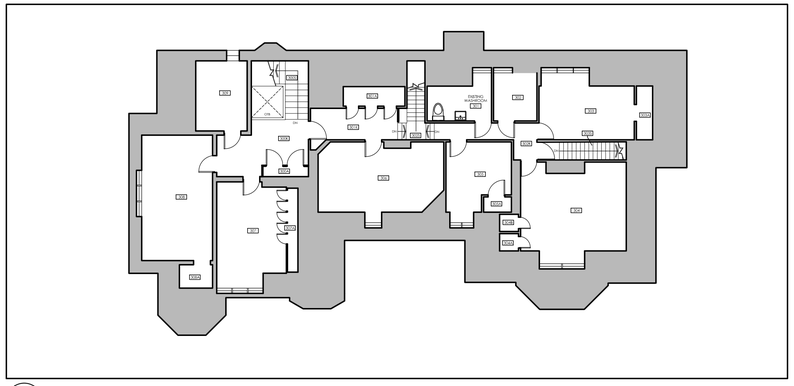
PROJECT DESCRIPTION:		O.B.C. REFERENCE
		PART 3
CONSTRUCTION:	COMBUSTIBLE	3.2.2.24
MEZZANINE(S):	N.A.	
TOTAL OCCUPANCY LOAD: BASED ON: TABLE 3.1.17.1	N.A.	3.1.17.1. (C)
PLUMBING FIXTURES (EXISTING):	MALE WASHROOMS 3 EXISTING FEMALE WASHROOMS 3 EXISTING TOTAL 6	3.7.4.3. (15) PLUMBING FIXTURES FOR ASSEMBLY OCCUPANCIES "THE NUMBER OF WATER CLOSETS REQUIRED FOR NON-RESIDENTIAL COLLEGE BUILDINGS SHALL BE AT LEAST ONE FIXTURE FOR EACH 100 MALES AND ONE FIXTURE FOR EACH 75 FEMALES."
PLUMBING FIXTURES (PROPOSED):	MALE WASHROOMS 2 EXISTING FEMALE WASHROOMS 2 EXISTING UNISEX (1x2) 2 PROPOSED TOTAL 6	
BARRIER-FREE DESIGN:	YES	
HAZARDOUS SUBSTANCE:	NO	
SERVICE SPACES:	NO	
TRAVEL DISTANCE TO:	SINGLE EGRESS DOOR FROM ROOM OR SUITE ONLY WHERE OCCUPANT LOAD IS 59 OR LESS PERSONS	EGRESS DOORS: O.B.C. – 3.3.1.5(a)
	MORE THAN ONE EGRESS DOOR FROM ROOM OR SUITE: MAX. TRAVEL DISTANCE = 15m	EGRESS DOORS: O.B.C. – 3.3.1.6
	MAX. TRAVEL DISTANCE = 45m	EXIT DOORS: O.B.C. – 3.4.2.5(1)(c)
FIRE EXTINGUISHERS:		O.B.C. – 3.2.5.17
UNPROTECTED OPENINGS:		O.B.C. – 3.2.3
BUILDING FACE:	EXPOSED BUILDING FACE: N/A	PERMITTED MAX.% OPENINGS: N/A PROPOSED MAX.% OPENINGS: N/A
REQUIRED FIRE RESISTANCE RATING (FRR): HORIZONTAL ASSEMBLIES FRR (HOURS):		DESCRIPTION:
FLOORS: ROOF: MEZZANINE:	REFER TO PART 11 BUILDING CODE MATRIX N/A N/A	EXISTING GROUND FLOOR
FRR OF SUPPORTING MEMBERS:		DESCRIPTION:
FLOORS: ROOF: MEZZANINE:	REFER TO PART 11 BUILDING CODE MATRIX REFER TO PART 11 BUILDING CODE MATRIX N/A	EXISTING CONCRETE COLUMNS AND BEAMS CONCRETE STRUCTURE AND CONCRETE FLOOR SLABS
GENERAL NOTES:		

Ontario Building Code Data Matrix – Part 11 Renovation of Existing Building				O.B.C. REFERENCE
				PART 11
11.2	EXISTING BUILDING CLASSIFICATION:	DESCRIBE EXISTING USE: GROUP A, DIV. 2 CONSTRUCTION INDEX: HAZARD INDEX: ☑ NOT APPLICABLE (NO CHANGE OF MAJOR OCCUPANCY)		11.2.1 TABLE 11.2.1.1.A CONSTRUCTION INDEX TABLE 11.2.1.1.C HAZARD INDEX
11.3	ALTERATION TO EXISTING BUILDING IS:	BASIC RENOVATION ☑ EXTENSIVE RENOVATION ☐		11.3.3.1 11.3.3.2
11.4	REDUCTION IN PERFORMANCE LEVEL:			11.4.2
		STRUCTURAL:	☑ NO ☐ YES	11.4.2.1
		BY INCREASE IN OCUPANT LOAD:	☑ NO ☐ YES	11.4.2.2
		BY CHANGE OF MAJOR OCCUPANCY:	☑ NO ☐ YES	11.4.2.3
		PLUMBING:	☑ NO ☐ YES	11.4.2.4
		SEWAGE-SYSTEM:	☑ NO ☐ YES	11.4.2.5
11.4	COMPENSATING CONSTRUCTION:	STRUCTURAL:	☑ NO ☐ YES (EXPLAIN)	11.4.3 11.4.3.2
		INCREASE IN OCCUPANT LOAD: EXISTING OCCUPANT LOAD – 506 OCCUPANT LOAD FOLLOWING RENOVATIONS – 506	☑ NO ☐ YES (EXPLAIN)	11.4.3.3 PART 11
11.4	COMPENSATING CONSTRUCTION:	CHANGE OF MAJOR OCCUPANCY:	☑ NO ☐ YES (EXPLAIN)	11.4.3.4
		PLUMBING:	☑ NO ☐ YES (EXPLAIN)	11.4.3.5
		SEWAGE SYSTEM:	☑ NO ☐ YES (EXPLAIN)	11.4.3.6
11.5	COMPLIANCE ALTERNATIVES PROPOSED:	☑ NO ☐ YES (GIVE NUMBER(S))		11.5.1
11.5	ALTERNATIVES MEASURES PROPOSED:	☑ NO ☐ YES (EXPLAIN)		11.5.2

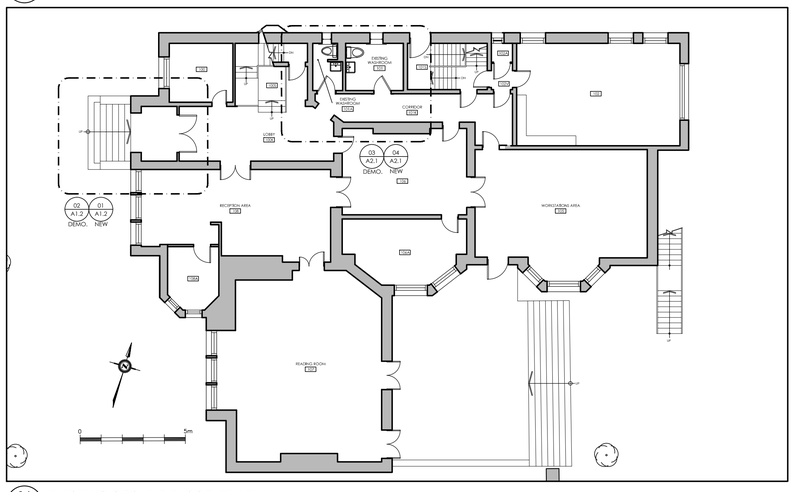
01 A0.2 O.B.C. MATRIX



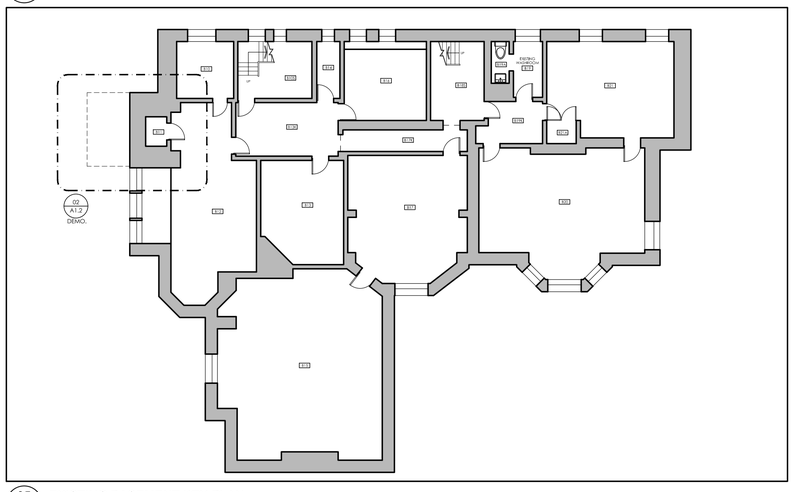
02 A0.2 EXISTING SECOND FLOOR KEY PLAN
N.T.S.



03 A0.2 EXISTING THIRD FLOOR KEY PLAN
N.T.S.



04 A0.2 EXISTING GROUND FLOOR KEY PLAN
N.T.S.



05 A0.2 EXISTING BASEMENT KEY PLAN
N.T.S.

REVISIONS

NO.	DATE	PARTICULAR
01	23.03.31	ISSUED FOR 95% CD
02	23.04.28	ISSUED FOR 100% CD
03	23.06.13	ISSUED FOR 50% CLIENT REVIEW
04	23.07.28	ISSUED FOR 95% CLIENT REVIEW
05	23.09.29	ISSUED FOR CLIENT REVIEW
06	24.04.09	ISSUED FOR FINAL REVIEW
07	24.05.24	ISSUED FOR PERMIT
08	24.06.07	ISSUED FOR TENDER

NOTES:

All dimensions and measurements must be checked and verified by the General Contractor

KEY PLAN:

CLIENT:
UNIVERSITY OF TORONTO

PROJECT:
22250 & 22251

CIRHR ACCESSIBLE RAMP & UNIVERSAL WASHROOM

CENTRE FOR INDUSTRIAL RELATIONS & HUMAN RESOURCES (CIRHR)
121 ST. GEORGE ST., TORONTO, ONTARIO

ORIGINAL PAGE SIZE ARCH D - 24" x 36"

KEY TO DETAIL LOCATION:
A - DETAIL NO.
B - DETAIL NO. ORIGIN

+VG ARCHITECTS
THE VENTIN GROUP LTD

ONTARIO ASSOCIATION OF ARCHITECTS
CHRISTOPHER JOHN HALL
LICENCE
5986

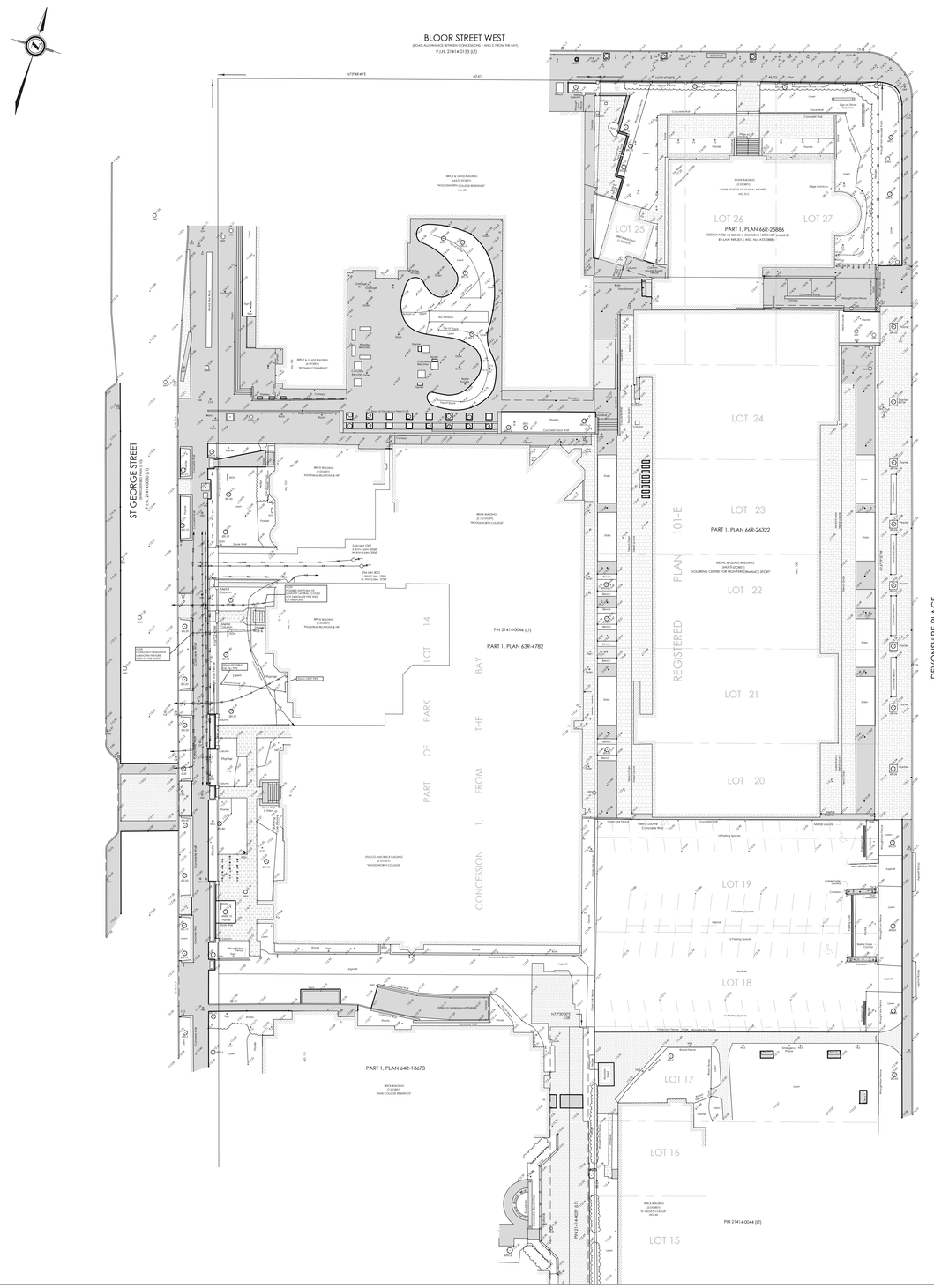
TRUE NORTH

OBC MATRIX AND BUILDING KEY FLOOR PLANS

A0.2

DRAWN BY : ?
CHECKED BY : ?

Filename: C:\Users\pfren\Desktop\22251 CIRHR Wd-Current\22250 S1 - A0.1.dwg
Plot Date: Jun 06, 2024 - 4:01pm By: pfren



TOPOGRAPHIC SURVEY OF
LOTS 11 - 27
REGISTERED PLAN 101E AND
PART OF PARK LOT 14
CONCESSION 1, FROM THE BAY
CITY OF TORONTO

SPEIGHT, VAN NOSTRAND & GIBSON LIMITED
ONTARIO LAND SURVEYORS
2019

METRIC
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

BOUNDARY NOTE
BOUNDARIES ARE COMPILED FROM REGISTRY OFFICE RECORDS

ELEVATION NOTE
ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM THE CITY OF TORONTO BENCHMARK No. 12219740239, (also known as CT-259. PUBLISHED ELEVATION = 166.704 metres.

UPDATE NOTE
PLAN UPDATED AUGUST 2020 TO INDICATE ADDITIONAL TOPOGRAPHIC DATA ON ST. GEORGE STREET AND LANE WEST OF ST. HILDA'S COLLEGE

SURVEYOR'S CERTIFICATE
I CERTIFY THAT :
1. THE SURVEY WAS COMPLETED ON MAY 3, 2019

DATE : MAY 9, 2019

LES RUDNICKI
ONTARIO LAND SURVEYOR

SPEIGHT, VAN NOSTRAND & GIBSON LIMITED
ONTARIO LAND SURVEYORS
210 GIO DIAZ ROAD, UNITS 5 & 6
TORONTO, ONTARIO M2H 2C4
TEL. 416 749 DVNG(7864) FAX 416 749-7866
E-MAIL: toronto@svng.on.ca

DRAWN :	E. D. / A. T.	FILE NAME :	A190119.DWG
CHECKED :	L. R.	PLOT SCALE :	MET.1=0.25
JOB No. :	190-0119	PLOTTED :	
REF., No. :	26-101E	UPDATED :	

01 / A1.3 OVERLAID TOPOGRAPHIC & UTILITY SURVEYS ca. 2019 (CROPPED, REFERENCE ONLY)
1:400 (1:250 NATIVE)

REVISIONS

NO.	DATE	PARTICULAR
01	23.06.13	ISSUED FOR 50% CLIENT REVIEW
02	24.06.07	ISSUED FOR TENDER

NOTES:

KEY PLAN:

CLIENT:
UNIVERSITY OF TORONTO

PROJECT:
22250 & 22251

CIRHR ACCESSIBLE RAMP & UNIVERSAL WASHROOM

CENTRE FOR INDUSTRIAL RELATIONS & HUMAN RESOURCES (CIRHR)
121 ST. GEORGE ST., TORONTO, ONTARIO

ORIGINAL PAGE SIZE ARCH D - 24" x 36"

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SURVEYS (REFERENCE ONLY)

A1.3

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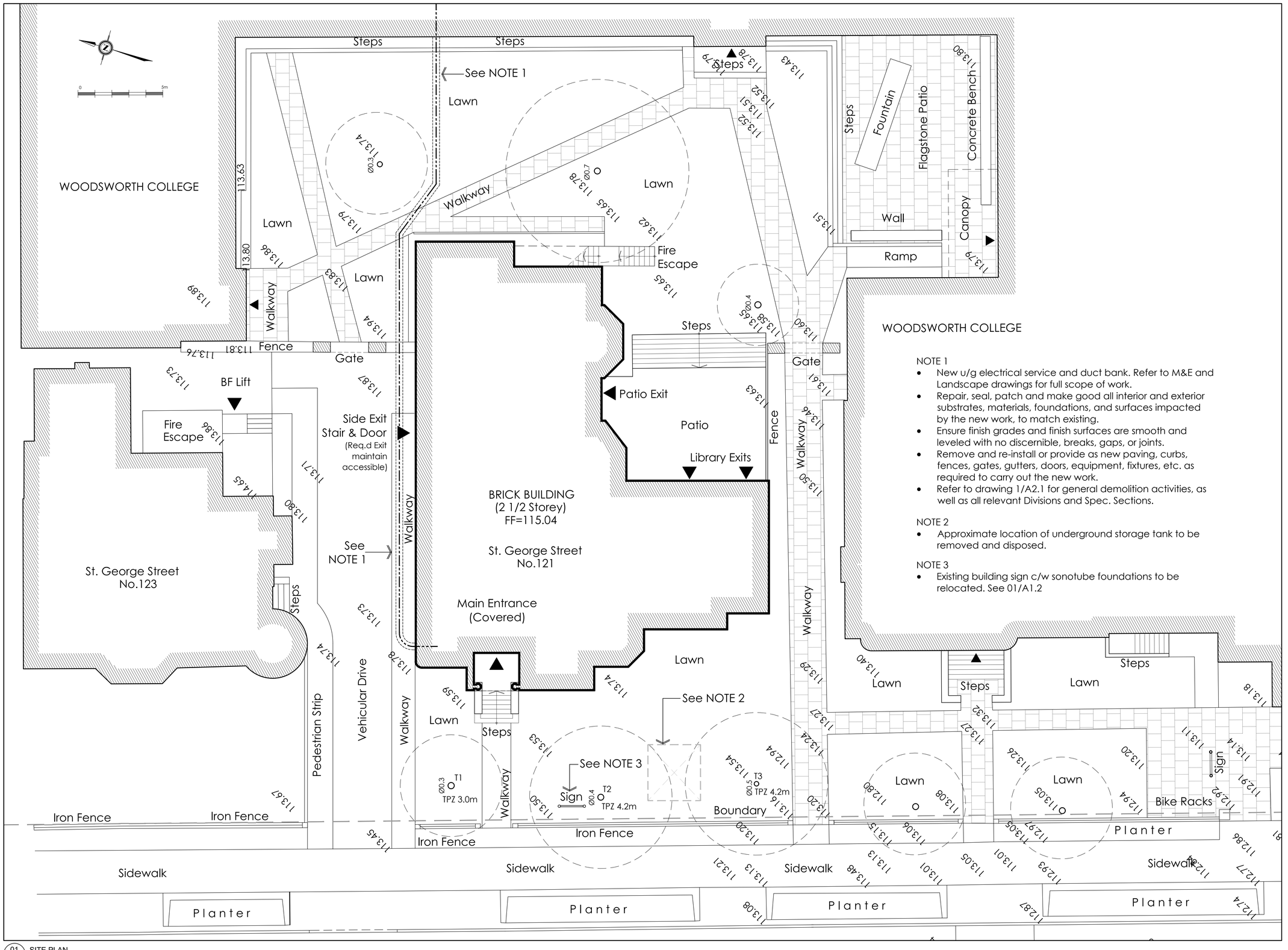

NOTE 1
- New u/g electrical service and duct bank. Refer to M&E and Landscape drawings for full scope of work.
- Repair, seal, patch and make good all interior and exterior substrates, materials, foundations, and surfaces impacted by the new work, to match existing.
- Ensure finish grades and finish surfaces are smooth and leveled with no discernible, breaks, gaps, or joints.
- Remove and re-install or provide as new paving, curbs, fences, gates, gutters, doors, equipment, fixtures, etc. as required to carry out the new work.
- Refer to drawing 1/A2.1 for general demolition activities, as well as all relevant Divisions and Spec. Sections.

NOTE 2
- Approximate location of underground storage tank to be removed and disposed.

NOTE 3
- Existing building sign c/w sonotube foundations to be relocated. See 01/A1.2

01 A1.1 SITE PLAN 1:200

REVISIONS

NO.	DATE	PARTICULAR
01	23.06.13	ISSUED FOR 50% CLIENT REVIEW
02	23.07.28	ISSUED FOR 95% CLIENT REVIEW
03	23.09.29	ISSUED FOR CLIENT REVIEW
04	24.04.09	ISSUED FOR FINAL REVIEW
05	24.05.24	ISSUED FOR PERMIT
06	24.06.07	ISSUED FOR TENDER

NOTES:

All dimensions and measurements must be checked and verified by the General Contractor

KEY PLAN:

CLIENT:
UNIVERSITY OF TORONTO

PROJECT:
22250 & 22251

CIRHR ACCESSIBLE RAMP & UNIVERSAL WASHROOM

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121 ST. GEORGE ST., TORONTO, ONTARIO

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THE VENTIN GROUP LTD

ONTARIO ASSOCIATION OF ARCHITECTS
CHRISTOPHER JOHN HALL
LICENCE
5396

TRUE NORTH

SITE PLAN

A1.1

DRAWN BY : ?
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Plot Date: Jun 06, 2024 - 4:18pm By: pfren
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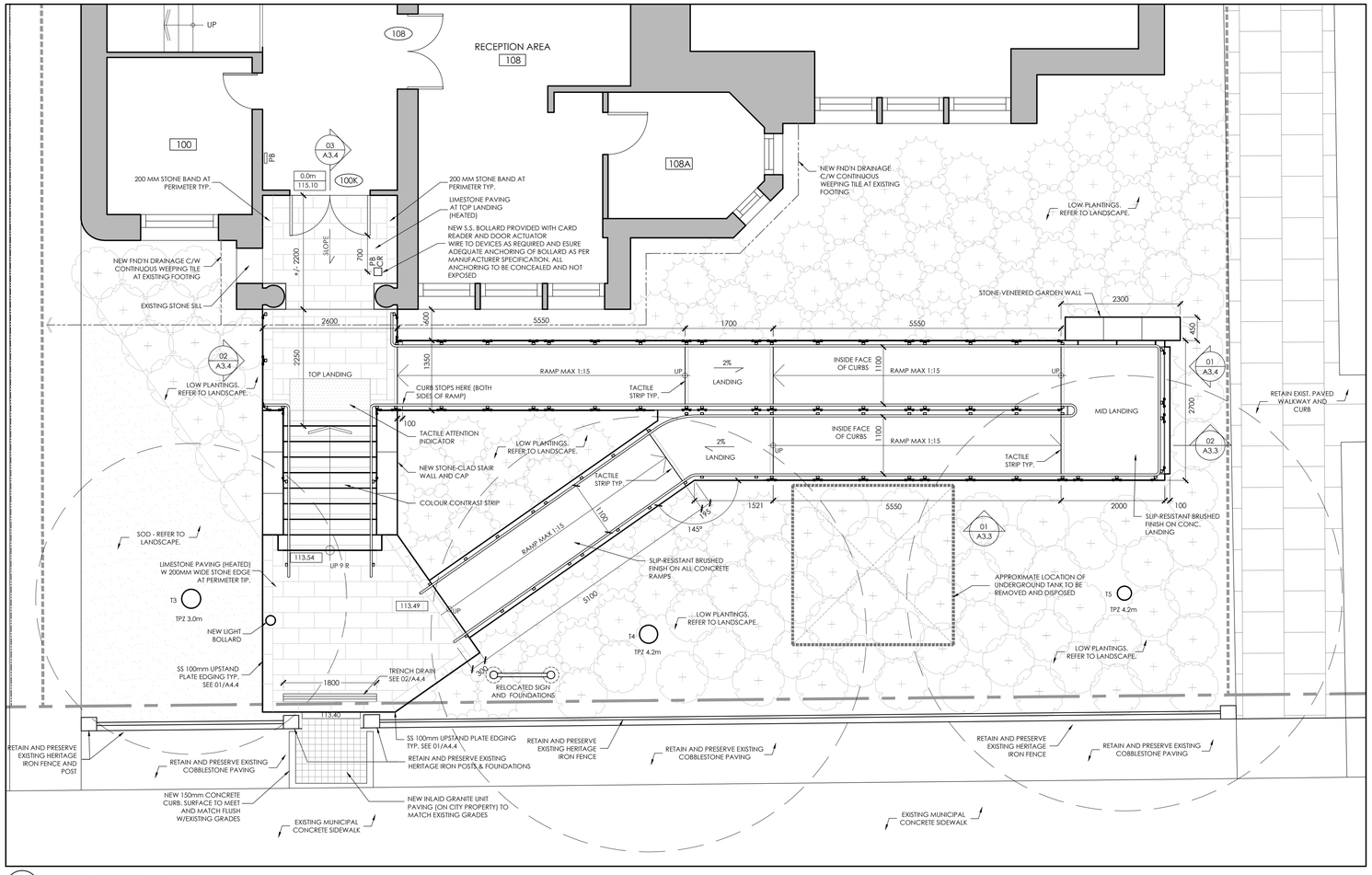
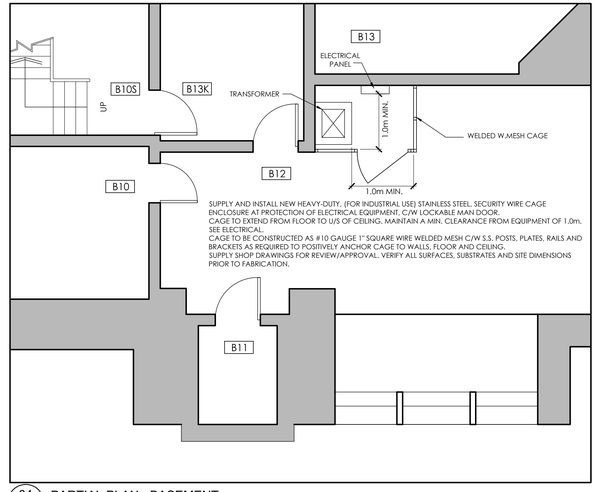
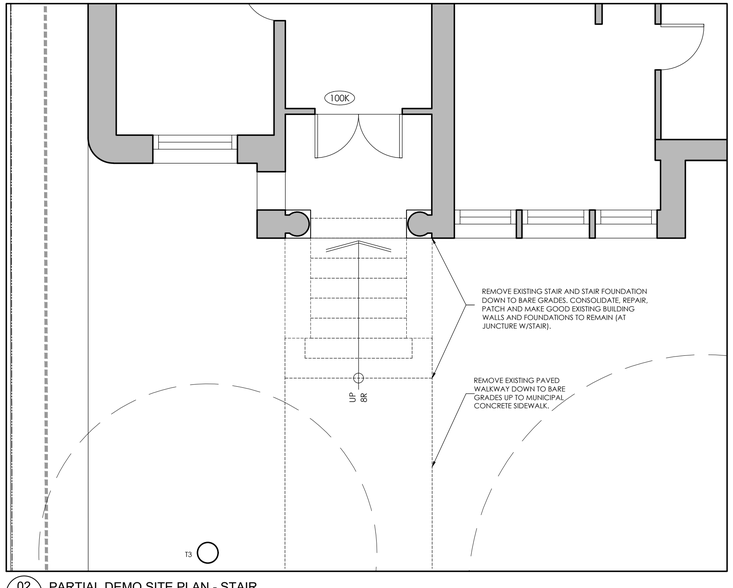


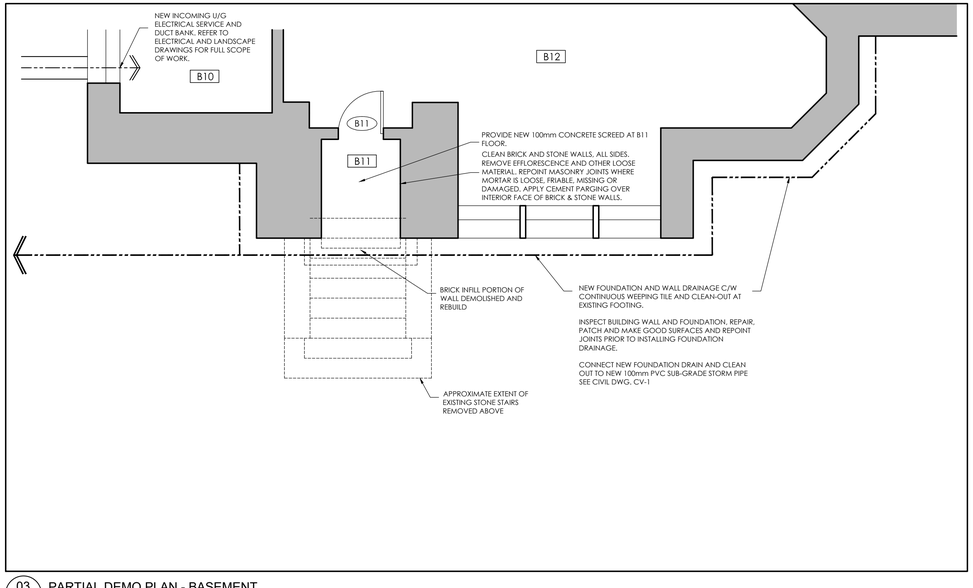
01 A1.2 PARTIAL SITE PLAN - RAMP 1:50



04 A1.2 PARTIAL PLAN - BASEMENT 1:50



02 A1.2 PARTIAL DEMO SITE PLAN - STAIR 1:50



03 A1.2 PARTIAL DEMO PLAN - BASEMENT 1:50

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THE VENTIN GROUP LTD

ONTARIO ASSOCIATION OF ARCHITECTS
CHRISTOPHER JOHN HALL
LICENCE
5386

TRUE NORTH

SITE PLAN - RAMP

A1.2

DRAWN BY : ?

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GENERAL DEMOLITION NOTES:

1. VERIFY ALL CONDITIONS IN THE FIELD AND NOTIFY ARCHITECT IMMEDIATELY OF ANY DISCREPANCY BETWEEN DRAWINGS AND EXISTING CONDITIONS.
2. PREVENT MOVEMENT OR SETTLEMENT OF EXISTING/ADJACENT STRUCTURAL ELEMENTS. PROVIDE BRACING / SHORING AS REQUIRED TO MAINTAIN THE STRUCTURAL INTEGRITY OF ALL BUILDING ELEMENTS.
3. COORDINATE ALL REMOVALS WITH DESIGNATED SUBSTANCES REMOVALS.
4. ALL DEMOLITION TO BE COORDINATED WITH AND IN ACCORDANCE WITH CURRENT REGULATIONS, CODES, LAWS AND AUTHORITIES HAVING JURISDICTION.
5. CONTRACTOR IS RESPONSIBLE FOR DISPOSAL OF DEMOLISHED MATERIAL EXCEPT WHERE NOTED OTHERWISE.
6. ALL EXISTING LIFE SAFETY DEVICES, INCLUDING BUT NOT LIMITED TO, FIRE ALARM MANUAL PULL STATIONS, FIRE ALARM BELLS OR HORNS, FIRE DETECTORS, EMERGENCY BATTERY UNITS, REMOTE EMERGENCY LIGHTING HEADS, EXIT SIGNS, AND ASSOCIATED WIRING SHALL NOT BE DISCONNECTED AT ANY TIME OR REMOVED, AT NO TIME SHALL ANY FIRE ALARM COMPONENT BE TAMPERED WITH OR MOVED DURING THE DEMOLITION PHASE OF THE WORK. DURING DEMOLITION OF WALLS OR OTHER DUST PRODUCING ACTIVITIES, THE CONTRACTOR SHALL COVER ALL LIFE SAFETY DEVICES TO PREVENT DUST FROM DAMAGING THE DEVICES. REMOVE PROTECTIVE COVERINGS AT THE END OF EACH WORK DAY OR WHEN DUST PRODUCING WORK IS COMPLETED BEFORE THE END OF THE DAY. TAKE EXTREME CARE WHEN REMOVING PARTITIONS THAT CONTAIN SUCH LIFE SAFETY DEVICES.
7. REFER ALSO TO STRUCTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION ACTIVITIES.
8. SAW CUT AND REMOVE FLOOR AS REQUIRED FOR PROVISION OF NEW PLUMBING SUPPLY AND DRAINAGE. (SEE ALSO MECHANICAL DRAWINGS). PATCH AND MAKE GOOD SUBSTRATES, LEVEL SURFACES WITH LIGHT-WEIGHT CONCRETE TOPPING TO ENSURE SMOOTH FLOOR TRANSITIONS

SPECIFIC ACTIVITIES:

Walls:

1. REMOVE EXISTING PARTITIONS / CONCRETE BLOCK WALLS SHOWN DOTTED.
2. REMOVE EXISTING WINDOW AND FRAME NOTED.
3. REMOVE EXISTING DOOR AND FRAME NOTED.
4. REMOVE ALL EXISTING WASHROOM ACCESSORIES. CLEAN WASHROOM ACCESSORIES AND PROTECT FOR TRANSPORT. HAND WASHROOM ACCESSORIES OVER TO OWNER FOR FUTURE RE-USE. PATCH & MAKE GOOD AT RETAINED WALLS.
5. REMOVE EXISTING MILLWORK NOTED.
6. REMOVE & SALVAGE EXISTING TRIM (INCLUDING ALL BASEBOARDS, FRAMES, AND WAINSCOTTING) AT DEMOLITION LOCATIONS. SALVAGED TRIM IS TO BE HANDED OVER TO OWNER IF NOT REUSED IN PROJECT.

Ceilings:

1. REMOVE DECORATIVE CIRCULAR CEILING GRILLE AND PROTECT FOR RE-USE.
2. REMOVE GYPSUM BOARD CEILINGS & PERIMETER BULKHEADS THROUGHOUT ROOM NOTED. DISCONNECT AND REMOVE EXISTING FIXTURES. REFER TO MECHANICAL AND ELECTRICAL DRAWINGS.
3. REMOVE EXISTING FIXTURES AND ACCESS PANELS. PATCH & MAKE GOOD EXISTING PLASTER & LATHE CEILING TO 45 MIN FIRE RATING AT U/S OF JOISTS TYPICAL.

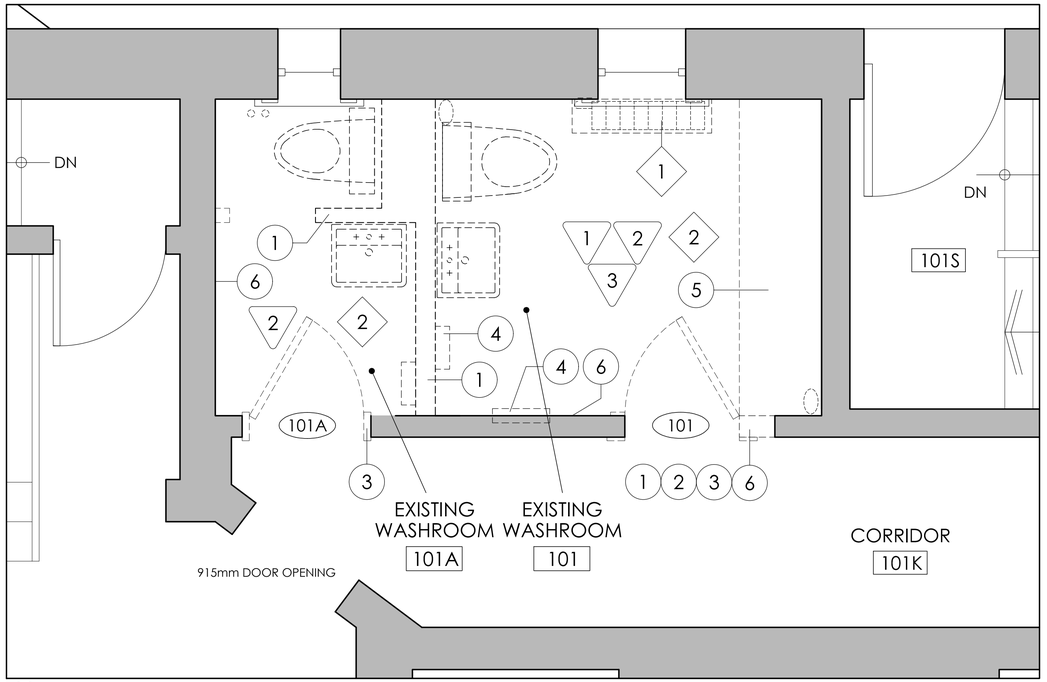
Floors:

1. REMOVE RADIATOR BASE. PATCH & MAKE GOOD.
2. REMOVE EXISTING FLOOR FINISH AND BASE THROUGH-OUT FLOOR AREA. PATCH AND MAKE GOOD ANY OPENINGS THROUGH FLOOR WHERE SERVICES ARE REMOVED. SALVAGE BASE MATERIAL FOR REUSE.

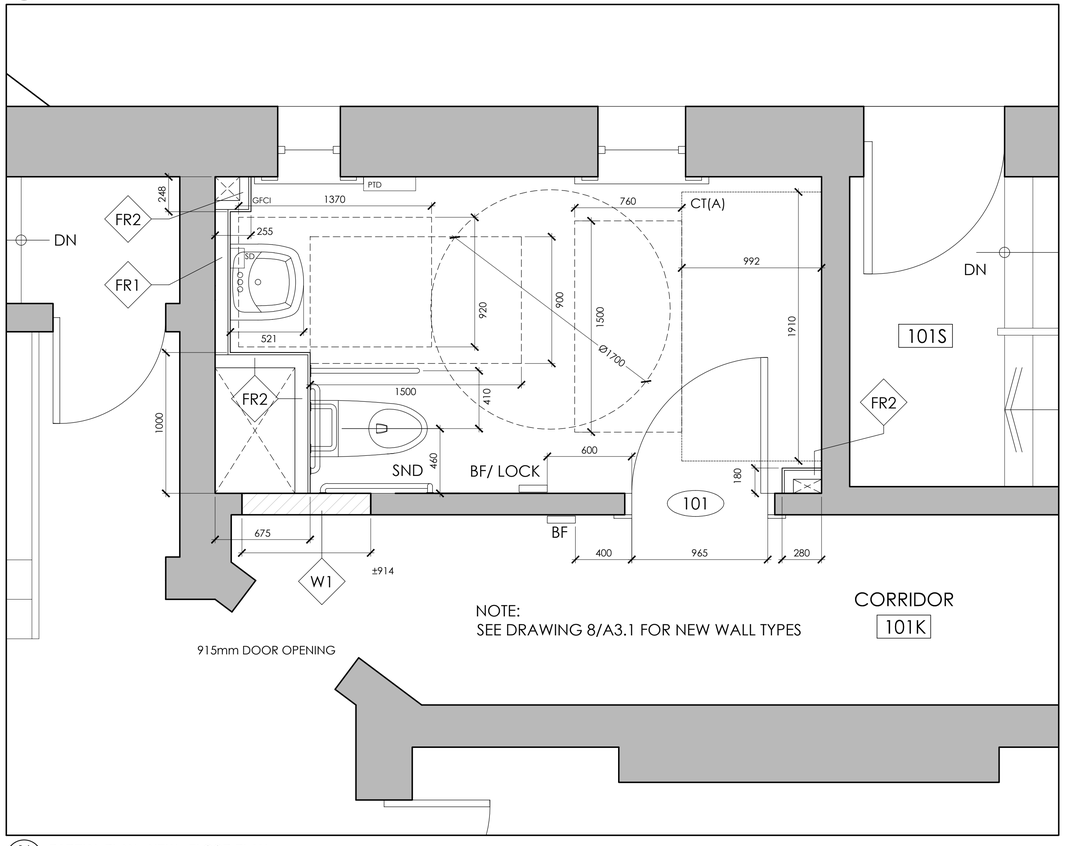
LEGEND:

- EXIST. WALLS TO REMAIN
- EXIST. TO REMOVED
- EXIST. DOOR TO BE REMOVED
- EXIST. WINDOW & FRAME TO BE REMOVED
- NEW GYPSUM BOARD CEILING AND ASSOCIATED CEILING'S SUSPENSION SYSTEMS AS REQ.D FOR GWB FINISH, M&E EQUIPMENT AND FIXTURES (NEW AND TO REMAIN)
- NEW PLYWOOD HOARDING
- (X) WALL AND FURNISHING DEMOLITION ACTIVITY
- (X) FLOOR FINISHES AND BASE DEMOLITION ACTIVITY
- (X) CEILINGS AND ROOF STRUCTURE DEMOLITION ACTIVITY

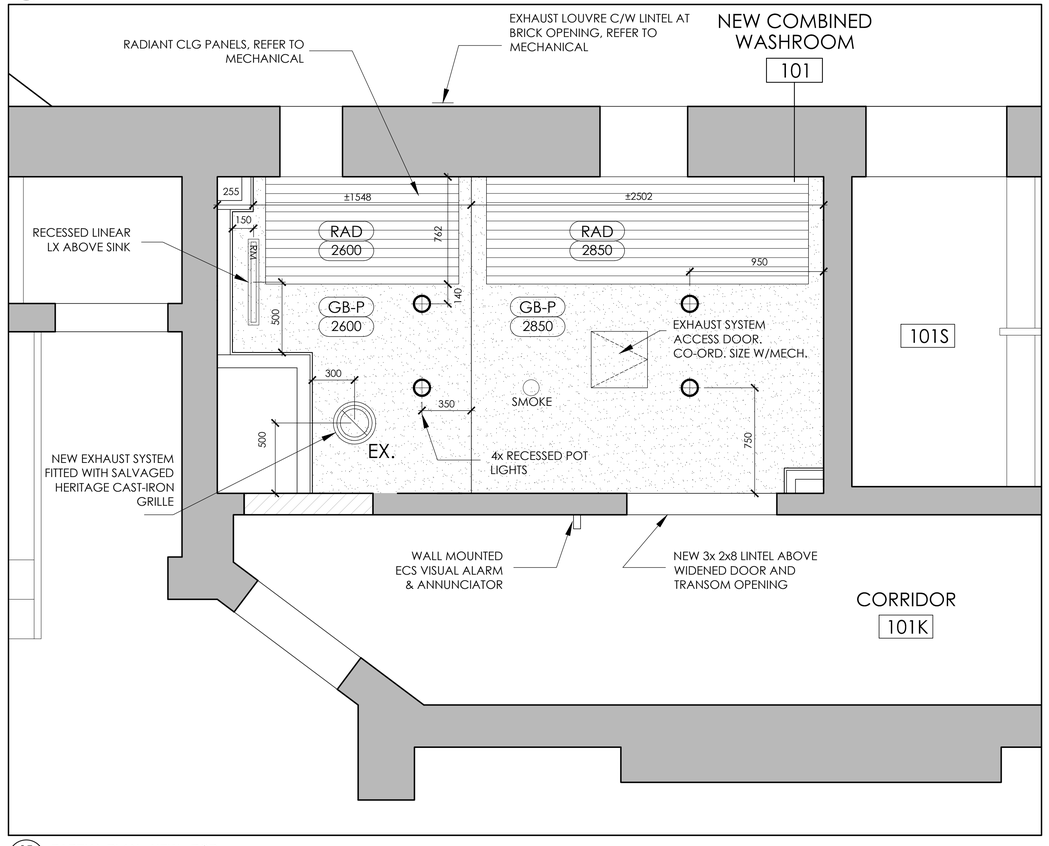
01 A2.1 DEMOLITION NOTES
N/A



03 A2.1 PARTIAL PLAN - DEMOLITION
1:50



04 A2.1 PARTIAL PLAN - NEW - FLOOR PLAN
1:50



05 A2.1 PARTIAL PLAN - NEW - RCP
1:50

REVISIONS

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KEY PLAN:

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PROJECT:
22250 & 22251

CIRHR ACCESSIBLE RAMP & UNIVERSAL WASHROOM

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ONTARIO ASSOCIATION OF ARCHITECTS
CHRISTOPHER JOHN HALL
LICENCE
5396

TRUE NORTH

NOTED

PARTIAL PLANS

A2.1

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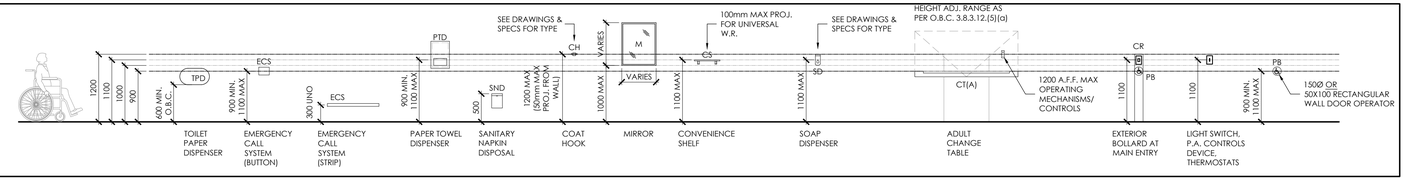
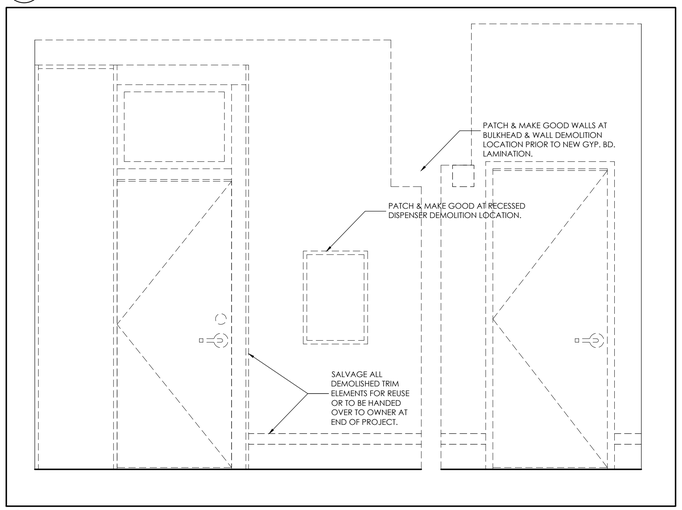
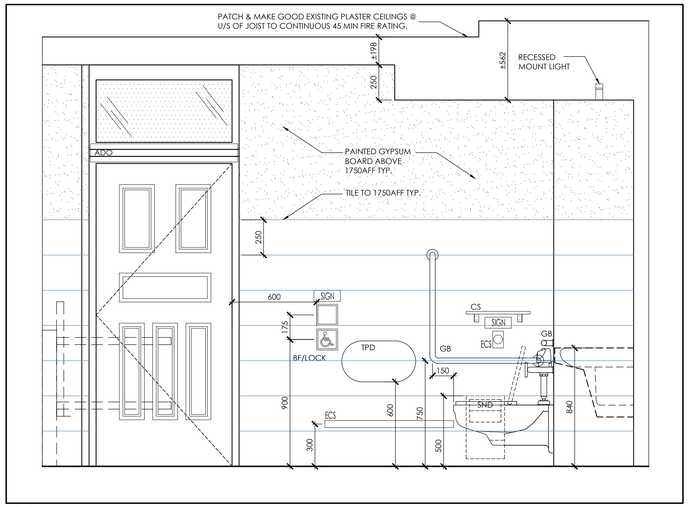
NOTE:
HEIGHTS SHALL BE CONFIRMED (IN ACCORDANCE W/ THE LATEST APPLICAIBLE O.B.C., UNIVERSITY, AND CITY STANDARDS) PRIOR TO ROUGH-IN & INSTALL. SEE TYPICAL B.F. WATER CLOSET, URINAL, LAVATORY AND/OR SHOWER LAYOUT DIAGRAMS FOR ADDITIONAL ACCESSORY LOCATION & MOUNTING INFORMATION. FOR ALL OTHER MOUNTING HEIGHTS NOT SPECIFIED HERE, PLEASE SEE RESPECTIVE PLANS AND INTERIOR ELEVATIONS FOR MORE INFORMATION. REFER TO SPECIFICATIONS FOR FIXTURE AND/OR ACCESSORY TYPE IN ALL ROOMS, TYP.



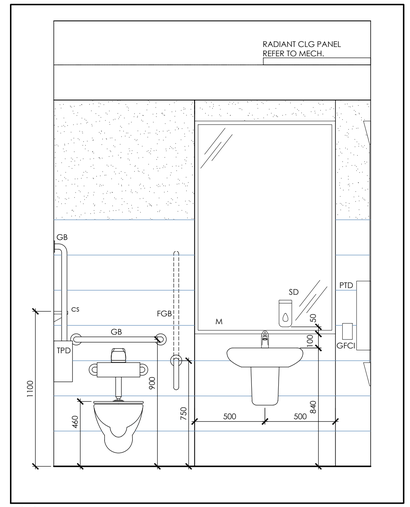
01 A3.1 TYPICAL BARRIER FREE MOUNTING HEIGHTS FOR WASHROOM ACCESSORIES
1:50



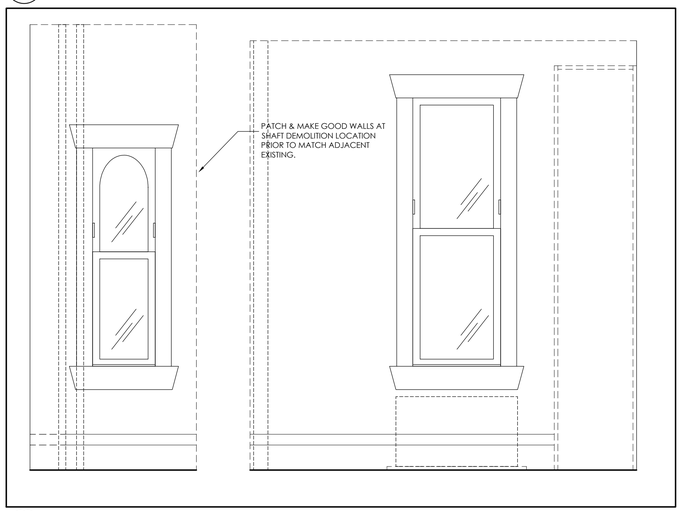
02 A3.1 INTERIOR ELEVATION - DEMO - SOUTH
1:20



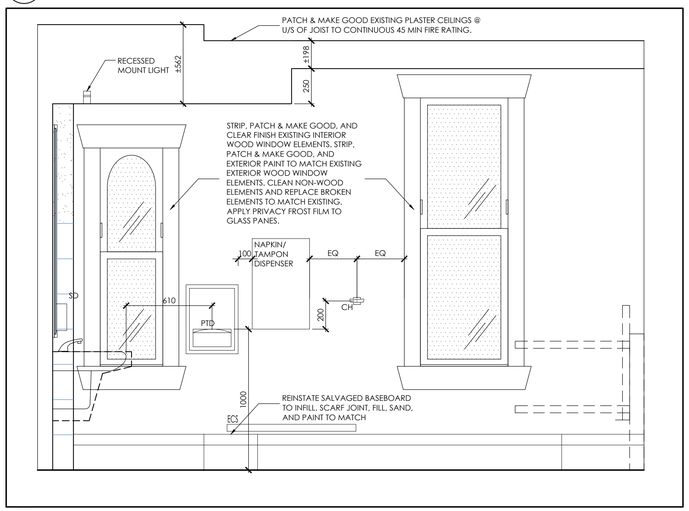
03 A3.1 INTERIOR ELEVATION - NEW - SOUTH
1:20



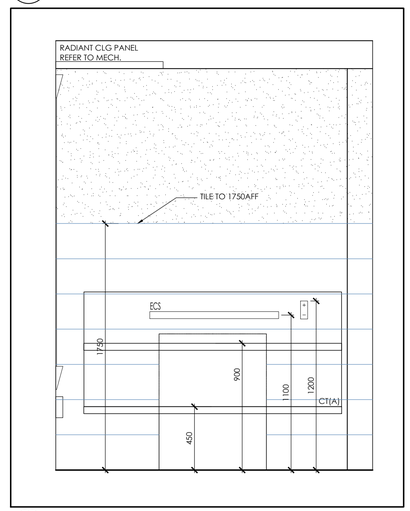
04 A3.1 INTERIOR ELEVATION - NEW - WEST
1:50



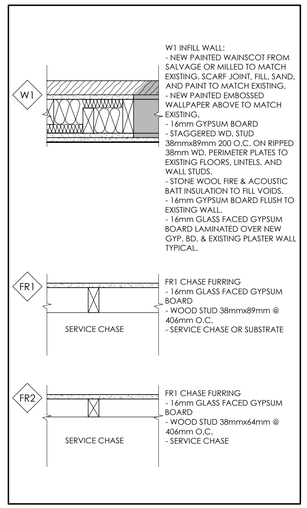
05 A3.1 INTERIOR ELEVATION - DEMO - NORTH
1:20



06 A3.1 INTERIOR ELEVATION - NEW - NORTH
1:20



07 A3.1 INTERIOR ELEVATION - NEW - EAST
1:50



08 A3.1 WALL TYPES
1:10

REVISIONS

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CHRISTOPHER JOHN HALL
LICENCE
5396

INTERIOR ELEVATIONS, WALL TYPES, MOUNTING HEIGHTS

A3.1

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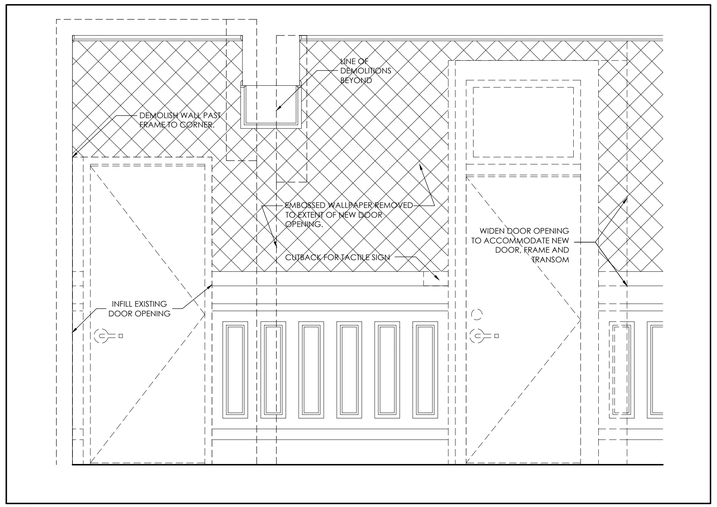
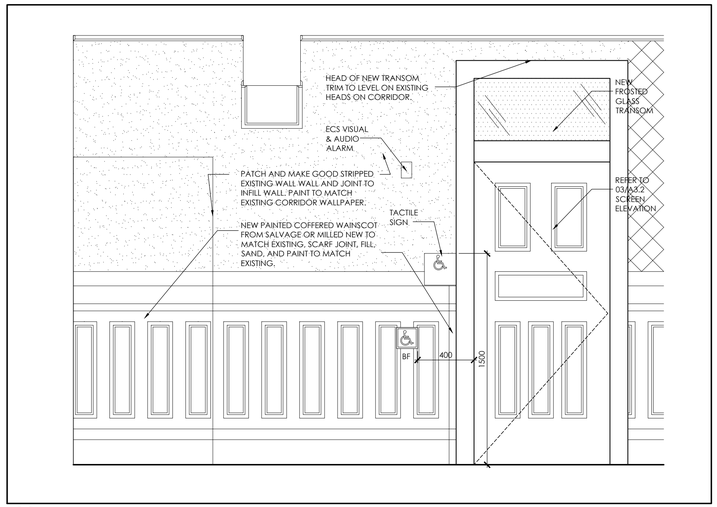
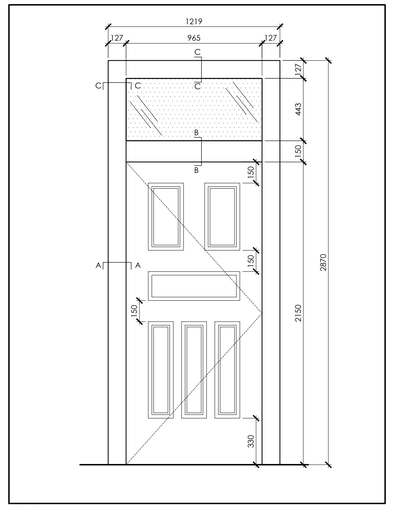


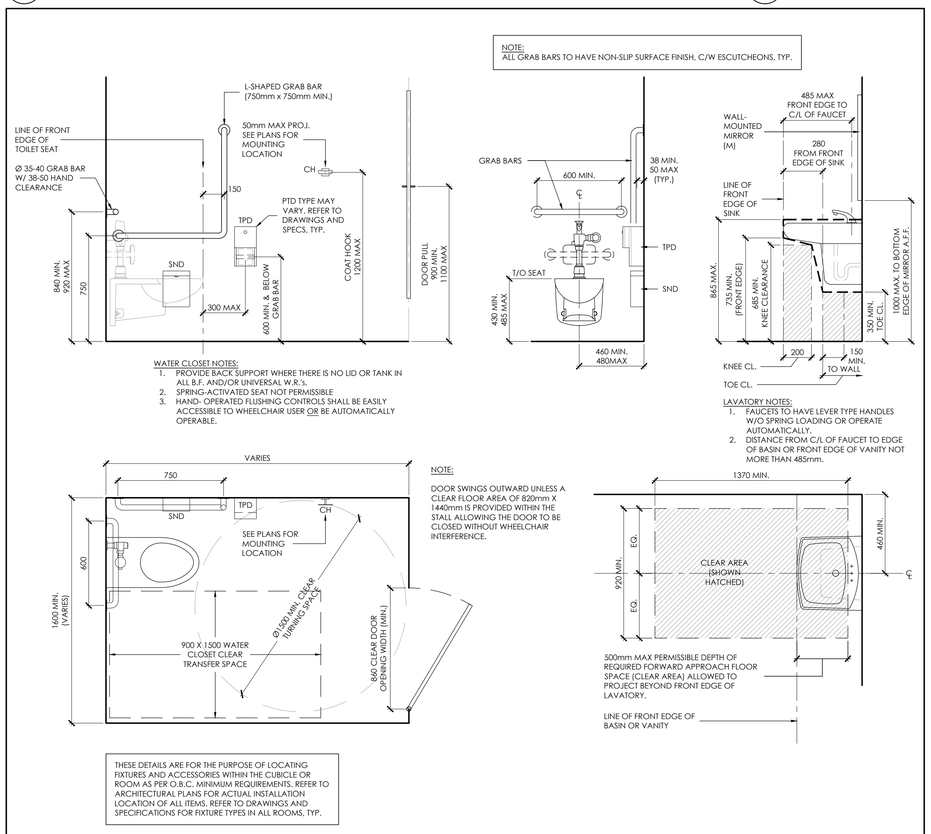
01 A3.2 INTERIOR ELEVATION - DEMO - NORTH (CORRIDOR)
1:20



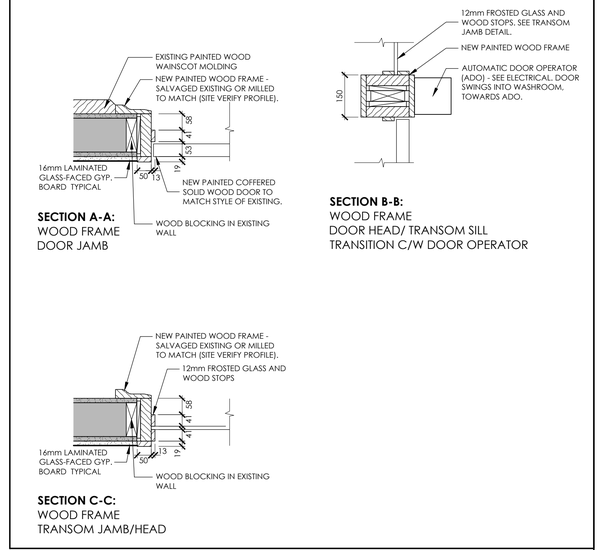
02 A3.2 INTERIOR ELEVATION - NEW - NORTH (CORRIDOR)
1:20



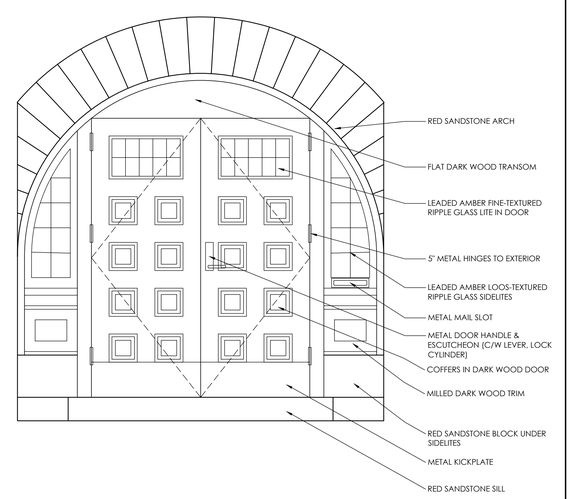
03 A3.2 CORRIDOR SCREEN ELEVATION
1:20



05 A3.2 TYPICAL OBC BF WASHROOM MINIMUM DETAILS
1:20



04 A3.2 FRAME DETAILS
1:10



06 A3.2 DETAIL - DOOR ELEVATION - EXISTING ENTRANCE
1:20

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CHRISTOPHER JOHN HALL
LICENCE
5396

NOTED

INTERIOR ELEVATIONS & DOOR DETAILS

A3.2

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CHECKED BY : ?

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01 A3.3 ELEVATION - RAMP - WEST
1:50

02 A3.3 ELEVATION - RAMP - WEST SECTION
1:50

REVISIONS

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ONTARIO ASSOCIATION OF ARCHITECTS
CHRISTOPHER JOHN HALL
LICENCE
5396

NOTED

RAMP ELEVATION & SECTION

A3.3

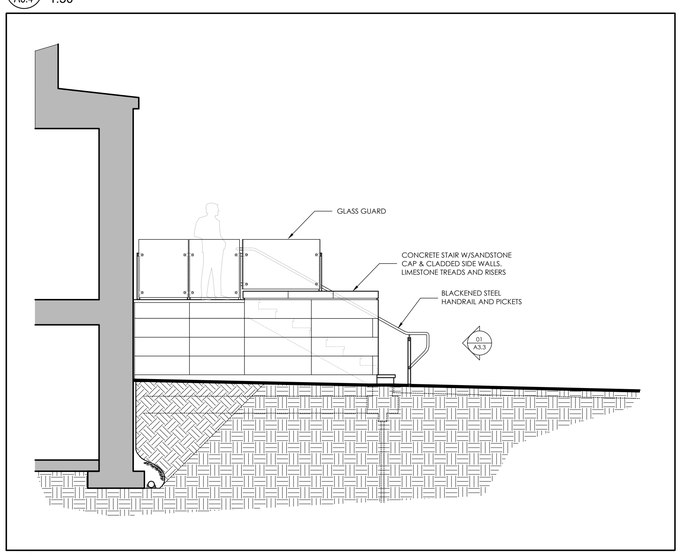
DRAWN BY : ?

CHECKED BY : ?

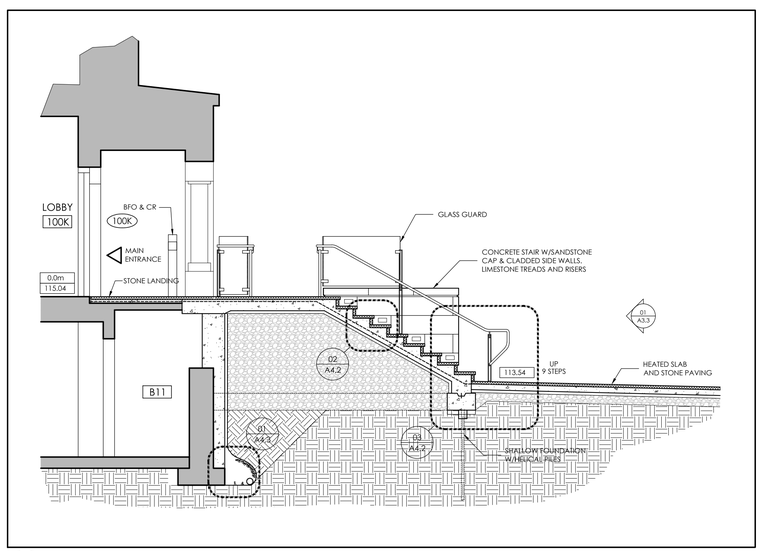
Plot Date: Jun 06, 2024 - 7:43pm By: pfren

Filename: C:\Users\pfren\Desktop\22251 CIRHR Wd Current\22250 51 - A2.dwg

01 A3.4 ELEVATION - RAMP - SOUTH
1:50



02 A3.4 SECTION - FRONT ENTRY - NORTH
1:50



03 A3.4 SECTION - FRONT ENTRY - NORTH
1:50

REVISIONS

NO.	DATE	PARTICULAR
01	23.06.13	ISSUED FOR 50% CLIENT REVIEW
02	23.07.28	ISSUED FOR 95% CLIENT REVIEW
03	23.09.29	ISSUED FOR CLIENT REVIEW
04	24.04.09	ISSUED FOR FINAL REVIEW
05	24.05.24	ISSUED FOR PERMIT
06	24.06.07	ISSUED FOR TENDER

NOTES:

KEY PLAN:

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UNIVERSITY OF TORONTO

PROJECT:
22250 & 22251

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RAMP & STAIR - ELEVATIONS & SECTION

A3.4

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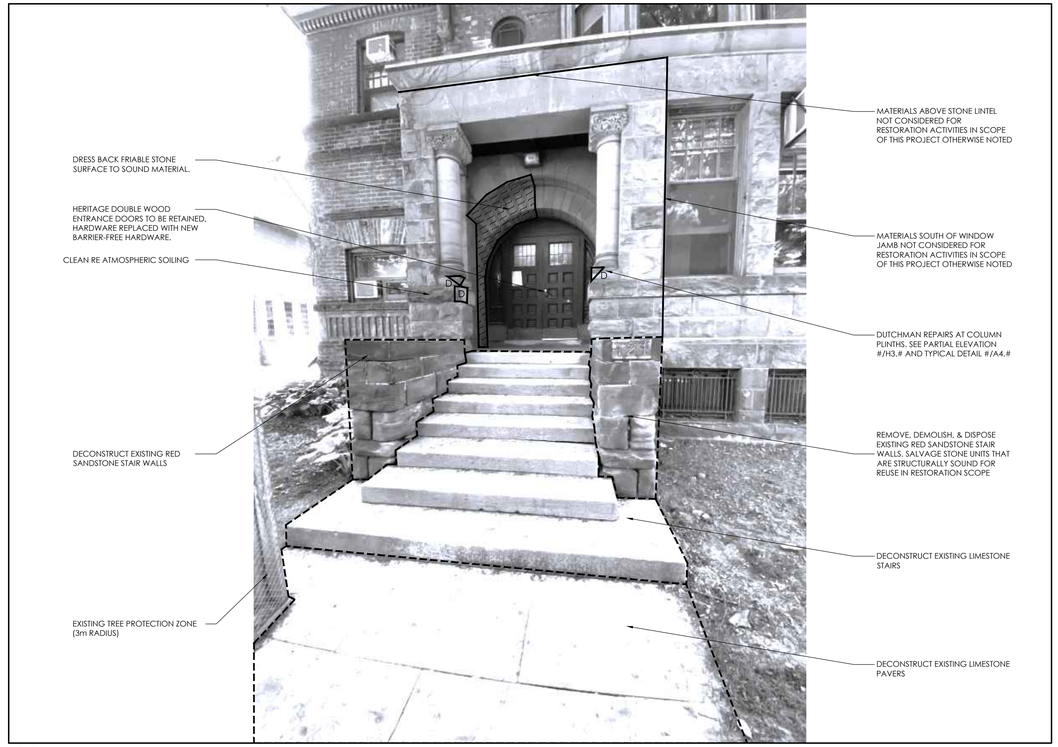
01 A3.7 RESTORATION ELEVATION - B11 BASEMENT
NTS



02 A3.7 RESTORATION ELEVATION - FRONT ENTRY - WEST
NTS

03 A3.7 RESTORATION ELEVATION - SOUTH OF EXISTING STAIRS
NTS

LEGEND - REPAIRS

- HEAVY ATMOSPHERIC SOILING (OR SIMILAR) - REMOVE
- DRESS BACK FRIABLE STONE SURFACE TO SOUND MATERIAL.
- EFFLORESCENCE - REMOVE
- BIOLOGICAL SOILING - REMOVE
- MASONRY REBUILD
- WOOD ELEMENT REBUILD
- YELLOW BRICK BAND AT GRADE
- EXPOSED TOP OF RUBBLE STONE FOUNDATION
- EXISTING LOUVRE OR VENT HOLE
- (S) SEALANT REMOVAL - REPLACE
- (PT) PAINT - REMOVE
- (A) EXISTING ANCHOR - REMOVE
- (F) EXISTIING VOID - FILL WITH MORTAR RENDER
- (MR) MASONRY REBUILD
- (FR) FLASHING REPAIR
- DX EXISTIING DUTCHMAN - REPLACE
- MC MAJOR CRACK TO BE PINNED/FILLED
- (D) DUTCHMAN
- STONE REPLACEMENT

GENERAL NOTES:
100% CLEANING OF ALL ELEMENTS WITH SOAP & WATER PRECEDING COMMENCEMENT OF ALL OTHER ACTIVITIES.
100% CLEANING OF ALL ELEMENTS WITH SOAP & WATER FOLLOWING COMPLETION OF ALL OTHER ACTIVITIES.
100% REMOVAL OF BIOLOGICAL SOILING WITHIN RESTORATION AREA
100% REPOINTING OF ALL EXTERIOR MORTAR JOINTS.

A3.7 RESTORATION LEGEND
NTS

REVISIONS

NO.	DATE	PARTICULAR
01	23.07.28	ISSUED FOR 95% CLIENT REVIEW
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ELEVATIONS - STONE RESTORATION

A3.7

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01 A3.8 RESTORATION ELEVATION - FRONT ENTRY - NORTH HIGH
NTS

02 A3.8 RESTORATION ELEVATION - FRONT ENTRY - NORTH LOW
NTS

03 A3.8 RESTORATION ELEVATION - FRONT ENTRY - NORTH PLINTH & COLUMN
NTS

04 A3.8 RESTORATION ELEVATION - FRONT ENTRY - SOUTH PLINTH & COLUMN
NTS

REVISIONS

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ELEVATIONS - STONE RESTORATION

A3.8

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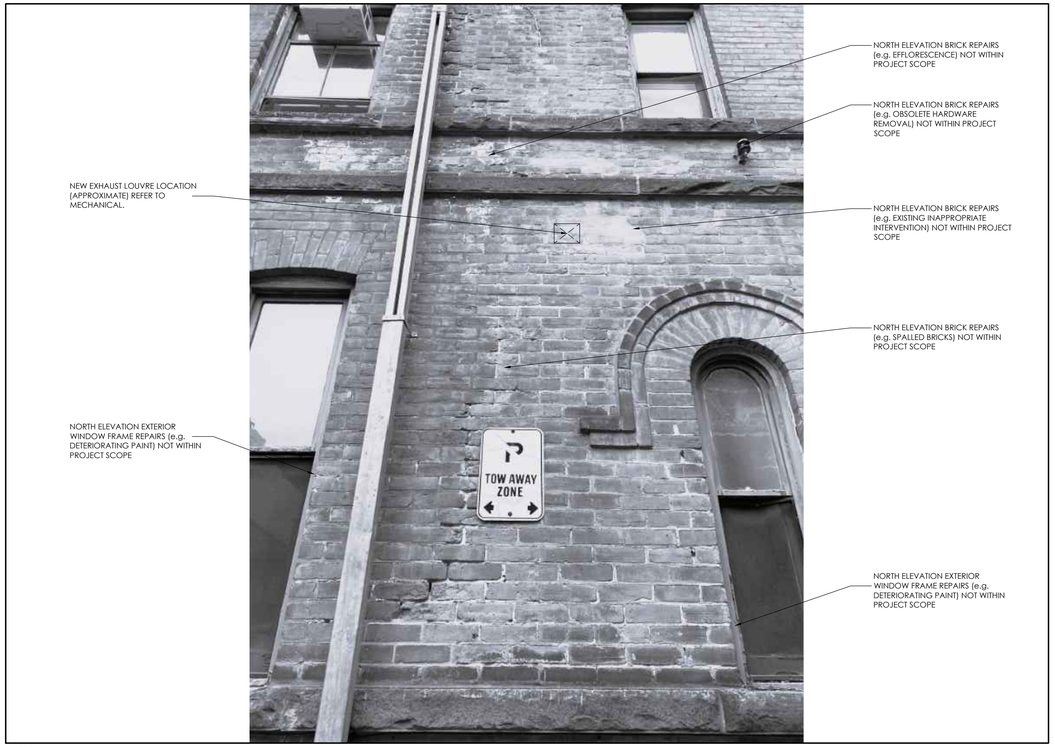
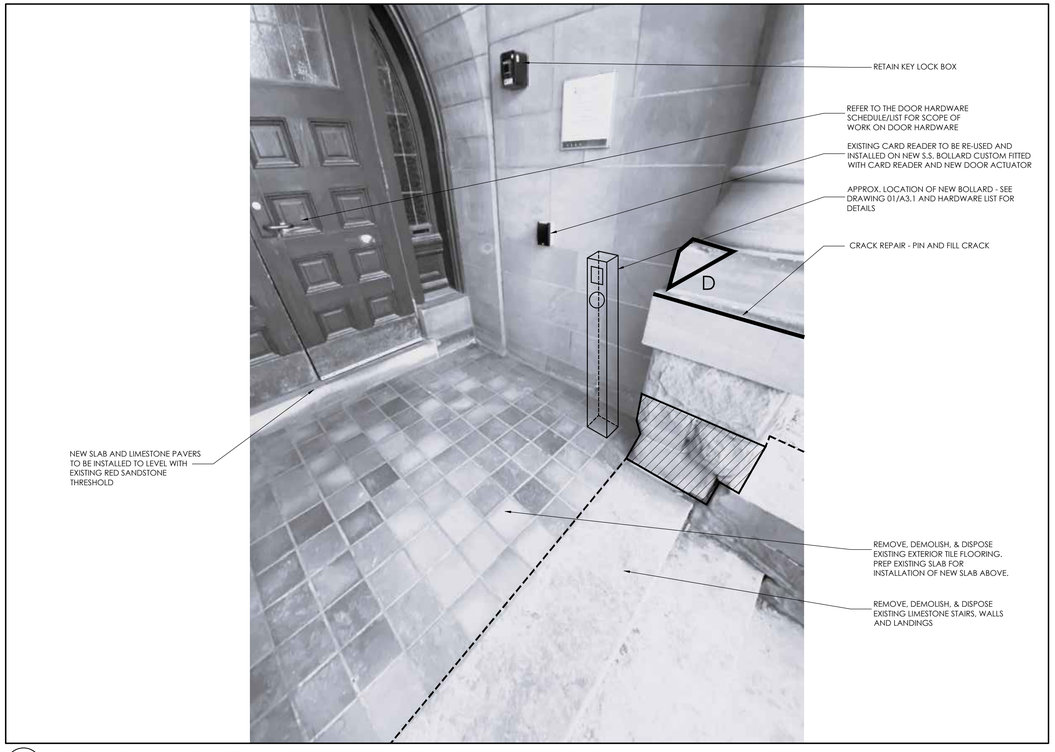
01 A3.9 RESTORATION ELEVATION - MASONRY ARCH AT ENTRY DOOR D100K
NTS



01 A3.8 NORTH ELEVATION - LOUVRE LOCATION
NTS

02 A3.9 RESTORATION ELEVATION - NORTH LANDING AT ENTRY DOOR D100K
NTS



03 A3.9 RESTORATION ELEVATION - SOUTH LANDING AT ENTRY DOOR D100K
NTS

REVISIONS

NO.	DATE	PARTICULAR
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ELEVATIONS - STONE RESTORATION

A3.9

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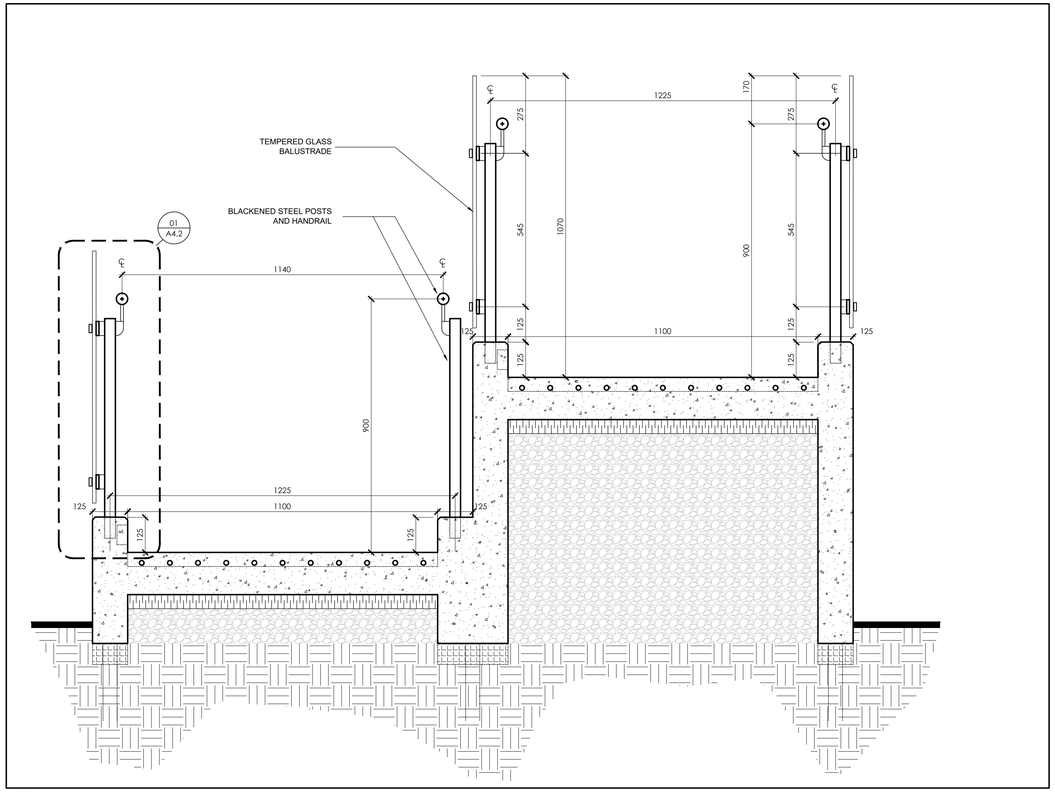
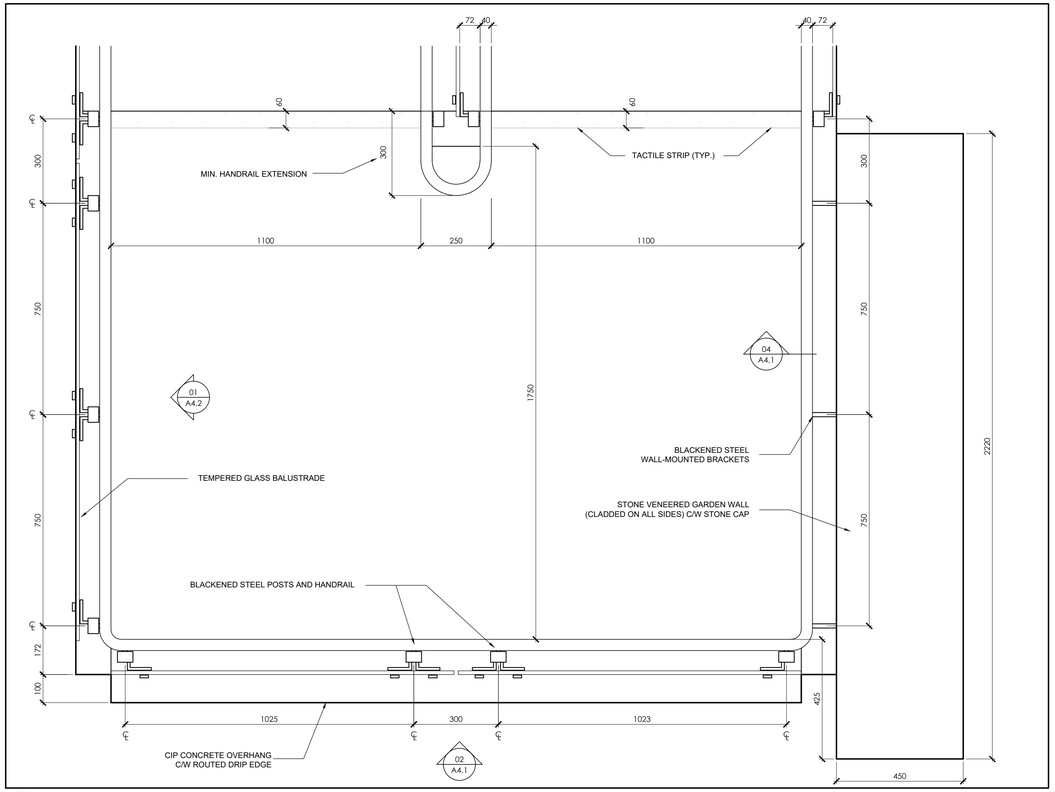
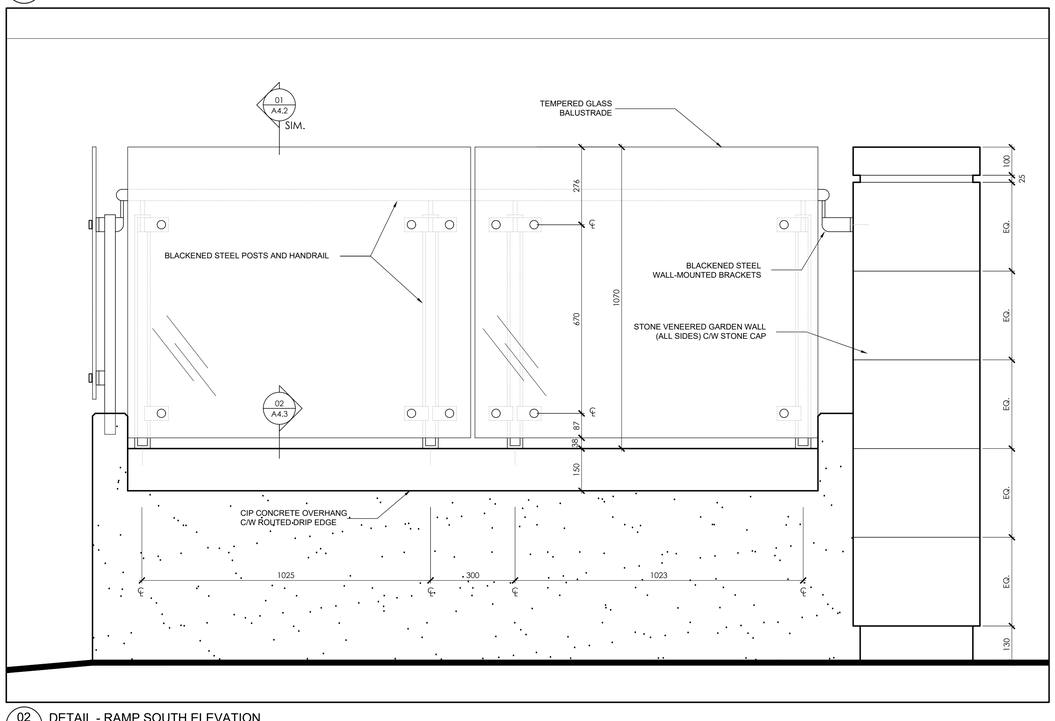


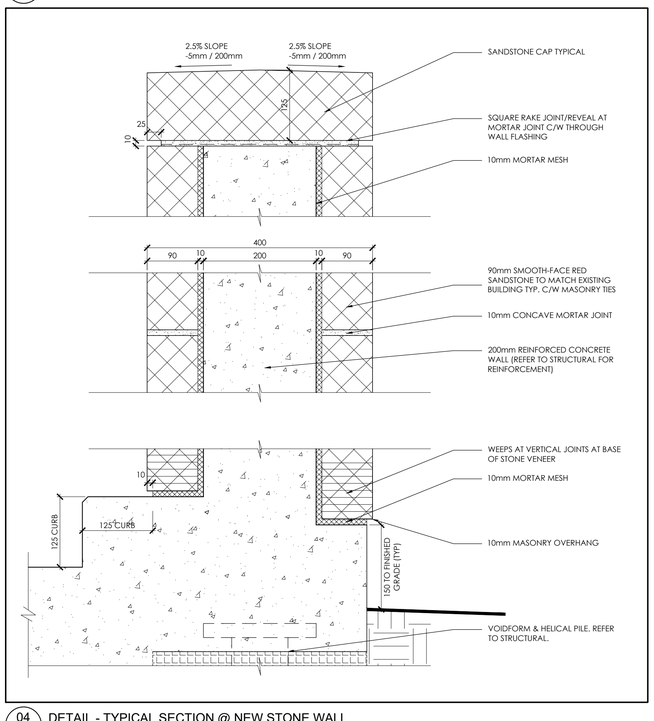
01 A4.1 DETAIL - RAMP SECTION
1:10



03 A4.1 PARTIAL PLAN - RAMP MID-LANDING
1:10



02 A4.1 DETAIL - RAMP SOUTH ELEVATION
1:10



04 A4.1 DETAIL - TYPICAL SECTION @ NEW STONE WALL
1:5

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TRUE NORTH

NOTED

DETAILS - RAMP

A4.1

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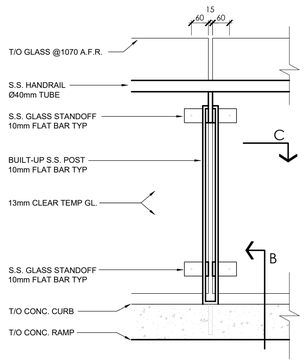

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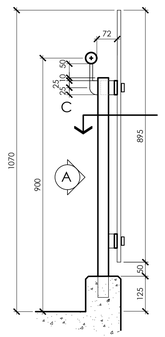

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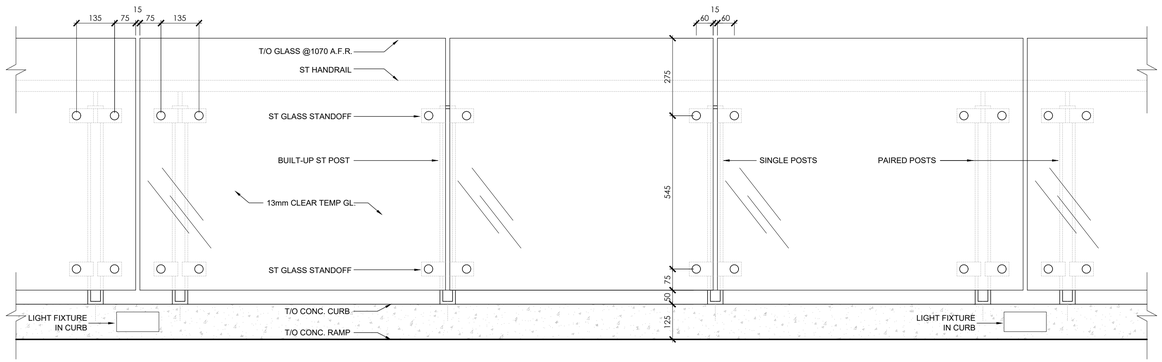

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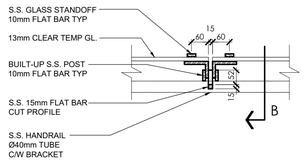
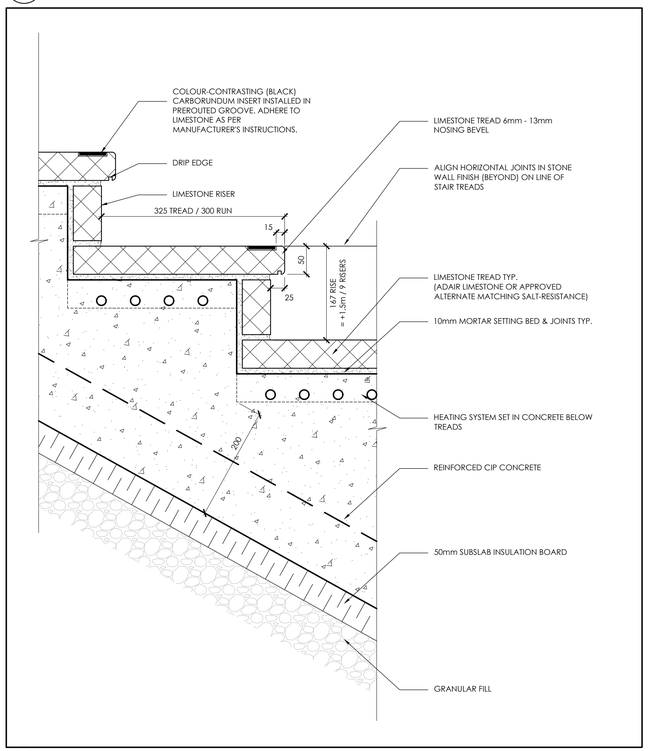
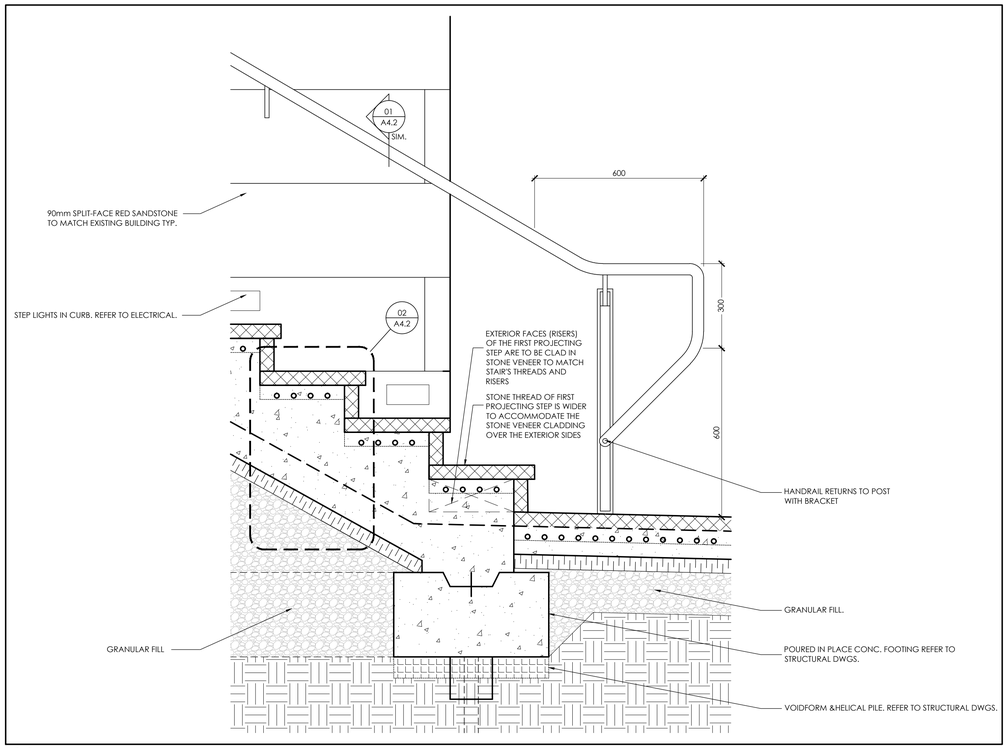


Section "C"

01 A4.2 DETAIL - RAMP - GLASS GUARD TYPICAL
1:10



02 A4.2 DETAIL - STAIR - TYPICAL STAIR SECTION
1:5



03 A4.2 SECTION DETAIL - FOOT OF STAIR
1:10

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NO.	DATE	PARTICULAR
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DETAILS - RAMP & STAIR

A4.2

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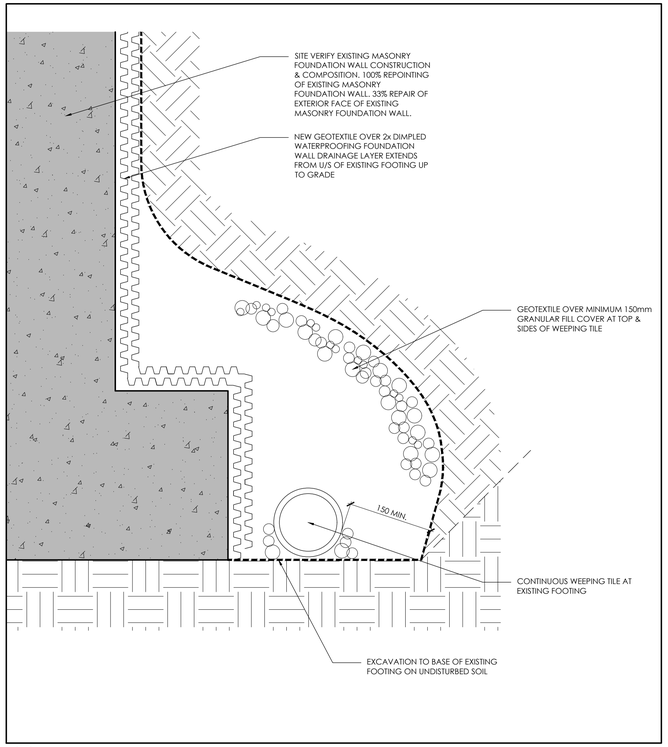
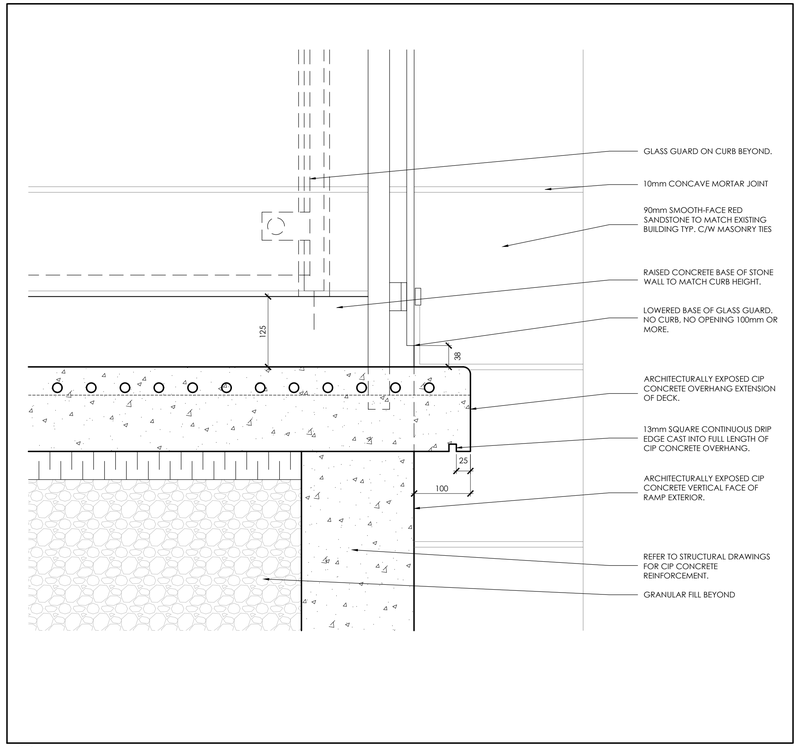
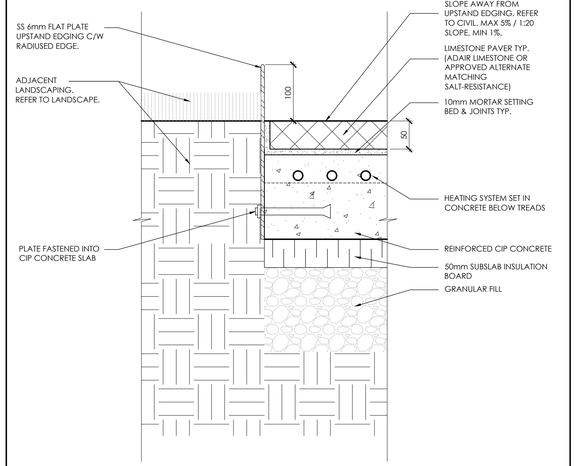


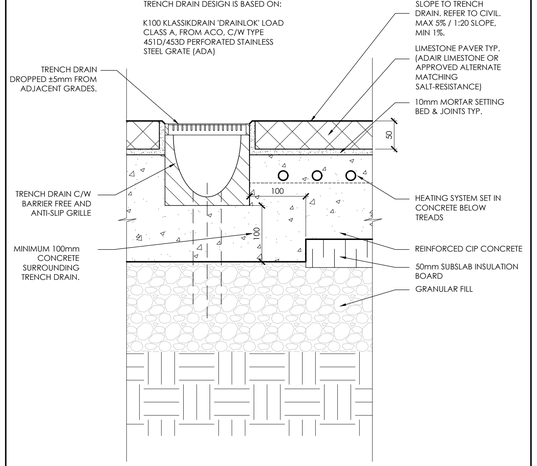
01 A4.3 DETAIL - FOUNDATION - NEW WEEPING TILE AT EXISTING FOOTING
1:5



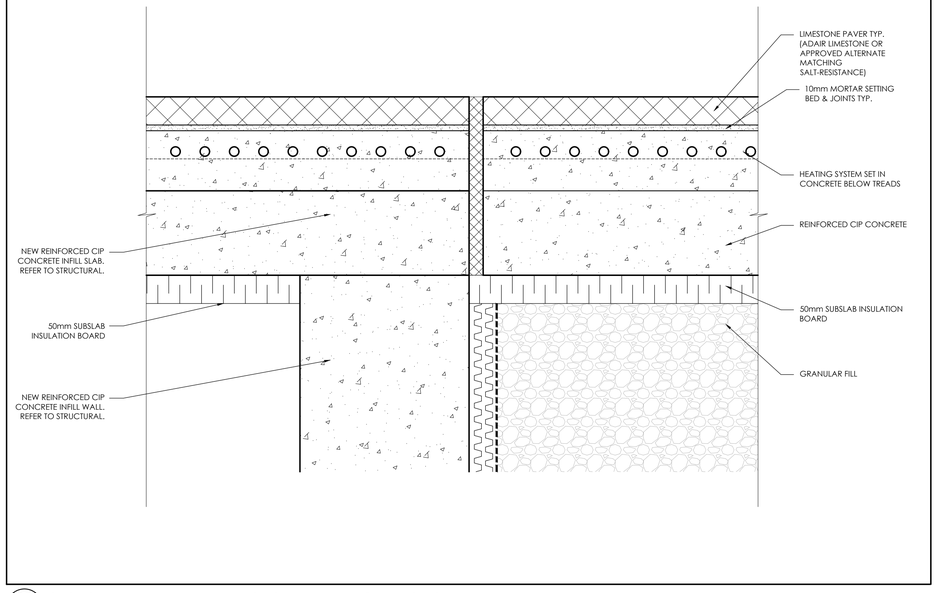
02 A4.3 DETAIL - RAMP - DRIP EDGE AT SWITCHBACK
1:5



03 A4.3 SECTION DETAIL - LANDSCAPE EDGING
1:5



04 A4.3 SECTION DETAIL - TRENCH DRAIN
1:5



05 A4.3 SECTION DETAIL - INFILL LANDING TO NEW LANDING TRANSITION
1:5

REVISIONS

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GENERAL NOTES:

1. UNLESS NOTED OTHERWISE ON THE DRAWINGS, THE FOLLOWING NOTES SHALL GOVERN.
2. ALL WORK ON THIS PROJECT SHALL CONFORM TO THE ONTARIO BUILDING CODE AS IN EFFECT JANUARY 2022 (OBC 2012 r2022), ANY LOCAL REGULATIONS AND BYLAWS, AND THE CURRENT OCCUPATIONAL HEALTH AND SAFETY ACT (OHSA) AND CURRENT REGULATIONS FOR CONSTRUCTION PROJECTS. ALL CODES AND STANDARDS SHALL BE THOSE REFERENCED IN OBC 2012 r2022.
3. ALL STANDARDS ARE TO BE THE YEAR, EDITIONS, DOCUMENT NUMBERS, ETC AS PER OBC 2012 r2022 DIVISION B, 1.1.3.1.2. WHERE DISCREPANCIES EXIST BETWEEN OUR DRAWINGS AND 1.1.3.1.2, THE TABLE SHALL GOVERN UNLESS NOTED OTHERWISE.
4. THIS SET OF DRAWINGS SUPERCEDES AND REPLACES ALL PREVIOUS DRAWINGS.
5. READ THESE DRAWINGS IN CONJUNCTION WITH ALL RELATED CONTRACT DOCUMENTS AND ARCHITECTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS.
6. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND MEASUREMENTS AT THE SITE AND VERIFY ALL DIMENSIONS GIVEN ON THE STRUCTURAL DRAWINGS WITH THE ARCHITECTURAL DRAWINGS. REPORT TO THE ENGINEER ANY DISCREPANCIES OR UNSATISFACTORY CONDITIONS WHICH MAY ADVERSELY AFFECT THE PROPER COMPLETION OF THE PROJECT BEFORE PROCEEDING WITH THE WORK.
7. IF ANY STRUCTURAL DISCREPANCIES ON THE DRAWINGS EXIST, THE MOST STRINGENT SHALL APPLY.
8. DRAWINGS ARE NOT TO BE SCALED.
9. CONSTRUCTION AND SHOP DRAWING REVIEW MUST BE PROVIDED AS PER CODE.
10. SUBMIT SHOP DRAWINGS AS PER TABLE 1. SHOP DRAWINGS SHALL BE CERTIFIED BY A PROFESSIONAL ENGINEER WHERE REQUIRED AND REVIEWED BY THE CONTRACTOR FOR DIMENSIONAL CORRELATION WITH THE DRAWINGS AND FIELD CONDITIONS PRIOR TO SUBMITTING TO TACOMA ENGINEERS. FABRICATION OF ELEMENTS ON SHOP DRAWINGS MAY NOT PROCEED UNTIL SHOP DRAWINGS HAVE BEEN REVIEWED AND APPROVED BY TACOMA ENGINEERS. REVIEW OF SHOP DRAWINGS IS FOR GENERAL CONFORMANCE TO THE DESIGN CONCEPT ONLY. REVIEW SHALL NOT BE CONSTRUED AS RELIEVING THE CONTRACTOR OF RESPONSIBILITY FOR MAKING THE WORK ACCURATE AND IN CONFORMITY WITH THE PROJECT DOCUMENTS. WHERE THERE IS A DISCREPANCY BETWEEN THE SHOP DRAWINGS AND THE PROJECT DOCUMENTS, THE PROJECT DOCUMENTS SHALL GOVERN.
11. CONSTRUCTION LOADINGS SHALL NOT EXCEED THE SPECIFIED DESIGN LOADS INDICATED ON THE DRAWINGS. THE CONTRACTOR SHALL MAKE ADEQUATE PROVISION FOR CONSTRUCTION LOADS AND TEMPORARY BRACING TO KEEP STRUCTURE PLUMB AND IN TRUE ALIGNMENT AT ALL PHASES OF CONSTRUCTION. ANY BRACING MEMBERS SHOWN ON THE DRAWINGS ARE REQUIRED FOR THE FINISHED STRUCTURE AND MAY NOT BE SUFFICIENT FOR ERECTION PURPOSES.
12. OBC 2012 r2022 DIVISION C SECTION 1.2.2 REQUIRES GENERAL REVIEW OF THE CONSTRUCTION BY THE DESIGN PROFESSIONAL. TACOMA ENGINEERS SHALL BE GIVEN A MINIMUM OF 48 HOURS NOTICE AT (519)763–2000 (GUELPH) OR (705) 735–1875 (BARRIE) BY THE CONTRACTOR FOR THE FOLLOWING REQUIRED CONSTRUCTION REVIEWS:
    A. FOUNDATIONS – PRIOR TO POURING FOOTINGS AND FOUNDATION WALLS.
    B. FINAL FRAMING – UPON COMPLETION OF ALL STRUCTURAL ELEMENTS.
13. RETAIN A CERTIFIED INDEPENDENT TESTING OR INSPECTION COMPANY FOR TESTING & INSPECTION FOR THE ITEMS IN TABLE 2.
14. THE DESIGN, REVIEW AND CERTIFICATION OF SECONDARY BUILDING ELEMENTS (THOSE ELEMENTS NOT SPECIFICALLY INCLUDED IN THESE DRAWINGS) IS THE RESPONSIBILITY OF THE PROJECT ARCHITECT. ELEMENTS INCLUDE BUT ARE NOT LIMITED TO ARCHITECTURAL FEATURES, NON–LOADBEARING INTERIOR WALLS, INTERIOR PARTITIONS, WINDOWS, DOORS, MASONRY VENEERS, CLADDING, AND SUPPORTS FOR MECHANICAL SYSTEMS.

TABLE 1: SHOP DRAWING SUBMITTALS

ITEM	REQUIRED SUBMITTAL?	ENGINEER'S STAMP REQ'D?	NOTES
CONCRETE MIX DESIGN	YES	NO	
REINFORCING STEEL	YES	NO	
HELICAL PILES	YES	YES	
MISC. METAL (INCLUDING GUARDS & HANDRAILS)	YES	YES	
MASONRY VENEER TIES	YES	NO	
GLASS ACTING AS A GUARD	YES	YES	
SHORING (SPECIFY FOR WHAT)	YES	YES	SUPPORT OF WALLS FOR BACKFILL

TABLE 2: REQUIRED TESTING & INSPECTION

RESULTS SHALL BE SUBMITTED DIRECTLY TO TACOMA ENGINEERS FROM THE TESTING COMPANY, FOR REVIEW

ITEM	REQ'D	NOTES
HELICAL PILE CAPACITY	YES	BY PILE ENGINEER
CONCRETE COMPRESSIVE TESTS	YES	MIN. 3 TEST, SEE CONCRETE NOTES
CONCRETE AIR ENTRAINMENT	YES	
CONCRETE SLUMP	NO	

STRUCTURAL DESIGN LOADS:

1. STRUCTURAL DESIGN IS TO OBC 2012 r2022 PART 4.
2. DESIGN LOADS ARE UNFACTORED UNLESS NOTED OTHERWISE.
    A. CLIMATIC DESIGN DATA (TORONTO):
        Snow Load — Ss = 0.9 kPa; Sr = 0.4 kPa
        Wind Pressure — q(1/50) = 0.44 kPa
        Seismic Data — Sa(0.2) = 0.249; Sa(0.5) = 0.126; Sa(1.0) = 0.063; Sa(2.0) = 0.029; Sa(5.0) = 0.007; Sa(10.0) = 0.003; PGA = 0.16; PGV = 0.099
    B. BUILDING IMPORTANCE CATEGORY = Normal
    C. WIND — Importance Factor: Iw ULS = 1.0; Iw SLS = 0.75
    D. FLOOR LOADS: OCCUPANCY (LIVE) = 4.8 kPa (100 psf); DEAD LOAD = 150 CONCRETE + 50 TOPPING = DL = 4.72 kPa (98.6 psf)
3. GUARDS DESIGN LOADS: TO OBC 4.1.5.14. (1)(c), (2) TO (6).
4. HANDRAIL DESIGN LOADS: TO OBC 4.1.5.14.(7).

FOUNDATIONS:

1. ALL FOOTINGS SHALL BE FOUNDED IN ACCORDANCE WITH RECOMMENDATIONS OF THE GEOTECHNICAL REPORT: BBM–23006811–a2 BY EXP SERVICES INC. DATED JULY 6, 2023. GEOTECHNICAL INVESTIGATION FOR PROPOSED ACCESSIBLE RAMP 121 GEORGE STREET, TORONTO, ONTARIO.
2. LOCATE ALL FOOTINGS AND PIERS CENTRALLY UNDER COLUMNS AND WALLS UNLESS NOTED OTHERWISE.
3. PLACE FOOTINGS WHICH ARE EXPOSED TO FREEZING WEATHER A MINIMUM OF 1200mm (48") BELOW FINISHED GRADE UNLESS SPECIFIED OTHERWISE.
4. MAINTAIN UNSUPPORTED SIDES OF EXCAVATION ONLY IF SAFE INCLINATION OF THE SIDES OF THE EXCAVATION IS PROVIDED IN ACCORDANCE WITH THE SOIL ENGINEERS RECOMMENDATIONS. IF REQUIRED, ERECT, MAINTAIN, AND REMOVE A SUPPORTING SHORING SYSTEM ALONG THE SIDES OF THE EXCAVATION, DESIGNED BY A PROFESSIONAL ENGINEER, IN ACCORDANCE WITH THE SOILS REPORT AND OHSA.
5. PROTECT SOIL FROM FREEZING ADJACENT TO AND BELOW ALL FOOTINGS.
6. BACK FILL AGAINST FOUNDATION WALL IN SUCH A MANNER THAT THE LEVEL OF BACKFILLING ON ONE SIDE OF THE WALL IS NEVER MORE THAN 450mm (18") HIGHER THAN THE LEVEL ON THE LOWER SIDE OF THE WALL, EXCEPT WHERE TEMPORARY SUPPORT FOR THE WALL IS PROVIDED OR WALLS ARE DESIGNED FOR SUCH UNEVEN PRESSURES.
7. SHOULD UNDERGROUND WATER BE ENCOUNTERED, PROVIDE DEWATERING FACILITIES TO KEEP WATER LEVEL BELOW FOOTINGS. REFER TO SOIL ENGINEERS RECOMMENDATIONS FOR REMEDIAL MEASURES.
8. LATERAL EARTH PRESSURE FACTORS:
    DENSITY = 20.4 kN/m3
    q = 2.4 kPa or 4.8 kPa or 12.0 kPa (VARIES BY LOCATION)
    Ko = 0.50 (FOUNDATION WALLS)
    Ka = 0.35 (RETAINING WALLS AND CURBS NOT SUPPORTED AT THE TOP)
    FRICTION COEFFICIENT = 0.35
9. DO NOT BACKFILL FOUNDATION WALLS WITH BELOW–GRADE SPACE UNTIL THE UPPER / GROUND FLOOR FRAMING IS IN PLACE, AND IF PRECAST, GROUTED FOR 3 DAYS.

CONCRETE

1. ALL REINFORCED CONCRETE ELEMENTS ARE DESIGNED IN ACCORDANCE WITH CAN/CSA–A23.3.
2. CONCRETE WORK SHALL CONFORM TO CAN/CSA–A23.1,2,3 FOR MATERIALS AND WORKMANSHIP.
3. CLASSES OF CONCRETE SHALL BE PLACED IN THE LOCATIONS NOTED:

CLASS OF CONCRETE	LOCATION
C–1	EXTERIOR STRUCTURALLY REINFORCED SLABS
F–2	EXTERIOR WALLS, COLUMNS AND PIERS

CLASSES OF CONCRETE SHALL HAVE THE FOLLOWING MIX REQUIREMENTS:

CLASS OF CONCRETE	STRENGTH	W/C RATIO	AIR ENTRAINMENT	CHLORIDE ION
C–1	35 MPa (56 DAYS)	0.40	5% TO 8%	<1500 COULOMBS AT 91 d
F–2	25 MPa	0.55	4% TO 7%	

ADJUST AIR ENTRAINMENT PERCENTAGE FOR AGGREGATE SIZE BASED ON A23.1 TABLE 4.

4. CONCRETE DESIGN IS BASED ON THE ABOVE MIX REQUIREMENTS. PHYSICAL PROPERTIES (SLUMP, AGGREGATE SIZE, ETC.) TO SUIT INSTALLATION (BY OTHERS) AND SHALL NOT AFFECT REQUIREMENTS SPECIFIED.
5. ALL CONCRETE TO BE TESTED SHALL BE TESTED BY A C.S.A. CERTIFIED CONCRETE TESTING LABORATORY. CONTRACTOR TO PROVIDE COPIES OF TESTING REPORTS TO TACOMA ENGINEERS. NOT LESS THAN ONE STRENGTH TEST SHALL BE MADE FOR EACH 100 m³ OF CONCRETE WITH AT LEAST THREE TESTS FOR EACH CLASS OF CONCRETE USED, PER DAY.
6. USE HIGH FREQUENCY VIBRATION TO PLACE ALL CONCRETE.
7. ALL CONCRETE SHALL BE KEPT MOIST DURING THE FIRST THREE DAYS OF CURING.
8. TAKE ADEQUATE MEASURES TO PROTECT THE CONCRETE FROM EXPOSURE TO FREEZING TEMPERATURES AT LEAST SEVEN DAYS AFTER CONCRETE PLACEMENT. COLD WEATHER PROTECTION IS REQUIRED FOR ALL CONCRETE PLACED WHERE IT IS FORECASTED THAT THE TEMPERATURE WILL DROP BELOW 5°C WITHIN 24 HOURS OF PLACEMENT. PROTECTION PROVIDED, INCLUDING INSULATED TARPS, POLY COVERED STRAW, SUPPLEMENTAL HEAT AND/OR CHEMICAL ADMIXTURES, IS TO BE SUFFICIENT TO MAINTAIN A MINIMUM CURING TEMPERATURE OF 10°C FOR 3 DAYS.
9. INSTALL V–NOTCH CONTROL JOINTS AT A MAXIMUM SPACING OF 24 TIMES THE WALL THICKNESS, IN BOTH SIDES OF ALL WALLS. CUT 50% OF THE HORIZONTAL REINFORCEMENT AT CONTROL JOINT LOCATIONS.
10. FINISH EXPOSED CONCRETE WORK AS PER ARCHITECTURAL DRAWINGS.
11. WHERE CONCRETE BEARS ON STEEL BEAMS, WELD 15M x 300mm (12") LONG DOWELS AT 1200mm (4'–0") O.C. TO CENTER OF TOP OF BEAM.
12. DO NOT ADD WATER TO CONCRETE ON SITE.
13. FOR UNREINFORCED WALLS, PROVIDE 2–15M BARS AROUND ALL WINDOWS AND DOOR OPENINGS EXTENDING 600mm (2'–0") BEYOND THE CORNERS OF THE OPENINGS.
14. CALCIUM CHLORIDE OR ANY ADMIXTURE FORMULATION CONTAINING CHLORIDE SHALL NOT BE USED IN CONCRETE CONTAINING REINFORCEMENT, OR IN CONCRETE CLASSIFICATIONS S–1, S–2, OR C–1, C–2, OR FOR PARKING STRUCTURES, FLOORS RECEIVING DRY–SHAKE METALLIC HARDENERS, OR CONCRETE CONTAINING EMBEDDED ALUMINUM. USE ONLY IN DOSAGES LESS THAN 2% BY WEIGHT OF CEMENT.
15. REBAR CHAIRS (BAR SUPPORTS) ARE TO BE OF PRECAST CONCRETE, PLASTIC OR STEEL. WOOD, CLAY BRICK AND CONCRETE BLOCK IS NOT ACCEPTABLE. STEEL CHAIRS MAY NOT BE USED IN CORROSIVE ENVIRONMENTS, INCLUDING PARKING GARAGES.
16. DO NOT HARD TROWEL OR MACHINE TROWEL AIR ENTRAINED CONCRETE SLABS, BECAUSE IT CAN LEAD TO DELAMINATING AND BUSTERING.

REINFORCING STEEL:

1. ALL REBAR SHALL BE DEFORMED BARS CONFORMING TO G30.18 WITH A MINIMUM YIELD STRENGTH OF 400 MPa.
2. REINFORCING STEEL SHALL BE FABRICATED BY A SUPPLIER EXPERIENCED IN BAR BENDING. ALL BEND DIAMETERS SHALL CONFORM TO CAN/CSA–A23.1.
3. ALL REBAR SHALL BE DETAILED, FABRICATED AND PLACED IN ACCORDANCE WITH THE REINFORCING STEEL R.S.I.O. MANUAL OF STANDARD PRACTICE 2018.
4. MAINTAIN THE FOLLOWING CLEAR CONCRETE COVER TO REINFORCEMENT (U.N.O.):
    A) 40 mm (1.5") FOR CONCRETE PLACED IN FORMWORK FOR 15M OR SMALLER BARS.
    B) 50 mm (2") FOR CONCRETE PLACED IN FORMWORK FOR 20M OR LARGER BARS.
    C) 65 mm (2.5") FOR SLAB ON GRADE, TOP OF SLAB TO TOP LAYER OF STEEL.
    D) 75 mm (3") FOR CONCRETE PLACED AGAINST THE EARTH (BOTTOM OF FOOTINGS).

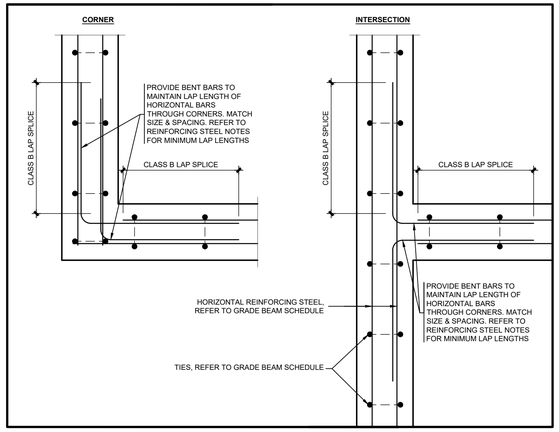
    CHAIRS SHALL BE USED TO MAINTAIN THE SPECIFIED CONCRETE COVER.
5. MINIMUM REBAR TENSION LAP LENGTH (25 MPa, NORMAL DENSITY, NON COATED BARS) SHALL BE CLASS B SPLICES AS LISTED BELOW. MULTIPLY BY 1.3 FOR HORIZONTAL REBAR WITH MORE THAN 300mm (12") BELOW THE LAP, EXCEPT IN WALLS.
    A) 450 mm (18") FOR 10M BARS
    B) 600 mm (24") FOR 15M BARS
    C) 750 mm (30") FOR 20M BARS
    D) 1200 mm (48") FOR 25M BARS
    E) 1400 mm (56") FOR 30M BARS
6. LAP ALL HORIZONTAL BARS AT CORNERS WITH BENT DOWELS MEETING THE MINIMUM LAP REQUIREMENTS IN BOTH DIRECTIONS.
7. SEE MASONRY NOTES FOR MASONRY REBAR TENSION LAP LENGTHS.

CONCRETE SLABS ON GRADE:

1. PLACE SLAB ON 150mm (6") GRANULAR FILL COMPACTED TO 98% SPDD FOUNDED ON NATIVE SOILS OR APPROVED ENGINEERED FILL, UNLESS NOTED OTHERWISE (REFER TO SOIL ENGINEERS REPORT FOR RECOMMENDATIONS).
2. SEE ARCHITECTURAL DRAWINGS FOR RECESSES AND DEPRESSIONS IN SLAB ON GRADE AND MAINTAIN SLAB THICKNESS INDICATED ON STRUCTURAL DRAWINGS IN ALL CASES.
3. CONCRETE FLOORS SHALL BE COVERED WITH PLASTIC AND KEPT MOIST FOR THE FIRST THREE (3) DAYS OF CURING.
4. INSTALL SAW–CUTS TO A MINIMUM OF 1/4 THE SLAB DEPTH IN THE FLOOR SLAB WITHIN 24 HOURS OF POUR. THE MAXIMUM CENTER/CENTER SPACING FOR SAW–CUTS SHALL BE 24 TIMES THE DEPTH UNLESS NOTED OTHERWISE.
5. WHERE SLAB ON GRADE IS USED TO TIE THE TOP OF A WALL RETAINING EARTH, THAT WALL SHALL BE ADEQUATELY SHORED UNTIL THE SLAB HAD BEEN PLACED AND ATTAINED 75% OF ITS DESIGN STRENGTH.

MASONRY VENEER (BRICK, STONE AND CONCRETE BLOCK):

1. MASONRY SHALL CONFORM TO CSA S304.1 "DESIGN OF MASONRY STRUCTURES" AND CAN/CSA–A371 "MASONRY CONSTRUCTION FOR BUILDINGS".
2. PROTECT ALL WORK FROM FROST DAMAGE IN ACCORDANCE WITH RECOMMENDED PRACTICES AS PUBLISHED BY THE INTERNATIONAL MASONRY ALL WEATHER COUNCIL.
3. MASONRY UNITS USED AS AN EXTERIOR VENEER SHALL BE NON–LOAD BEARING AND INSTALLED WITH A FULL BED OF TYPE "N" MORTAR, , WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3.5 MPa.
4. MINIMUM BRICK STRENGTH SHALL BE 55 MPa (CLAY), 20 MPa (CONCRETE).
5. VERTICAL CONTROL JOINTS SHALL BE INSTALLED IN ALL WALLS AT 7.6m (25'–0") O.C. MAXIMUM, UNLESS NOTED OTHERWISE. LOCATE JOINTS AT CORNERS OF WALLS, EDGES OF LARGE OPENINGS AND OTHER PLACES WHERE MOVEMENT IS REQUIRED AND CRACKING IS LIKELY TO OCCUR.
6. INSTALL SUITABLE DAMP COURSE FLASHING WITH WEEPHOLES AT 800mm (32") O.C. REPAIR ANY AND ALL DAMAGE TO FLASHING.
7. MASONRY TIES SHALL CONFORM TO CAN/CSA–A370 "CONNECTORS FOR MASONRY". STAINLESS STEEL TIES ARE REQUIRED FOR MASONRY MORE THAN 13m (42'–6") ABOVE GRADE. HOT DIP GALVANIZED TIES ARE REQUIRED FOR MASONRY LESS THAN 13m (42'–6") ABOVE GRADE. OTHER CORROSION PROTECTION REQUIREMENTS ALSO APPLY FOR STONE.
8. MASONRY TIES SHALL BE SPACED NO MORE THAN 600mm (24") VERTICALLY AND AT THE LESSER OF 800mm (32") HORIZONTALLY (BLOCK OR CONCRETE) OR AT EVERY STUD (WOOD AND STEEL STUDS). MASONRY TIES SHALL ALLOW INDEPENDENT VERTICAL MOVEMENT OF VENEER AND SUPPORTING STRUCTURE AND SHALL BE APPROVED BY TACOMA ENGINEERS. REDUCE SPACING AROUND OPENINGS AND AT TOP AND BOTTOM OF WALLS AS PER CAN/CSA–A370.



1 S1.1 **PLAN DETAIL** - TYPICAL CORNER & INTERSECTION REINFORCING
SCALE 1:10

HELICAL PILE SCHEDULE

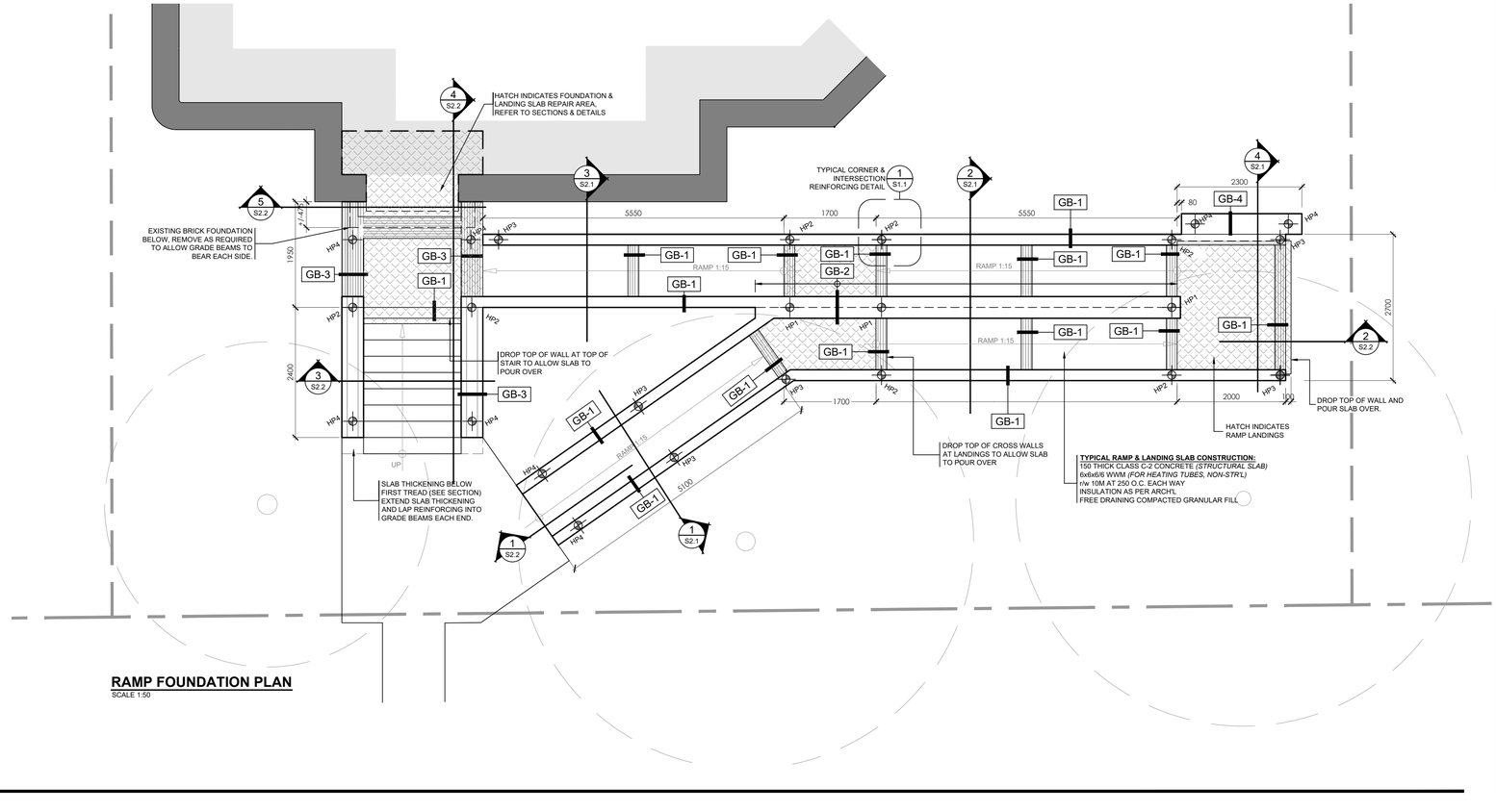
MARK	VERTICAL FACTORED LOAD	HORIZONTAL FACTORED LOAD
HP1	175 kN	13 kN
HP2	100 kN	7 kN
HP3	75 kN	5 kN
HP4	50 kN	3 kN

NOTES:
1. HELICAL PILE AND PILE CAP DESIGN BY OTHERS FOR THE LOADS NOTED IN THE SCHEDULE ABOVE.
2. SUBMIT HELICAL PILE AND PILE CAP SHOW DRAWINGS TO TACOMA ENGINEERS FOR REVIEW.
3. SUBMIT INSTALLATION SIGN OFF LETTER TO TACOMA ENGINEERS. LETTER TO BE STAMPED BY A P.ENG LICENSED IN THE PROVINCE OF ONTARIO.
4. POSITIVE VALUES ARE ACTING DOWN.

GRADE BEAM SCHEDULE

MARK	SIZE	REINFORCING
GB-1	200 WIDE	3 - 15M BOTTOM CONT.
	HEIGHT VARIES	2 - 15M TOP CONT.
		15M SKIN REINF. AT 300 O.C. MAX. EACH FACE
		10M CLOSED STIRRUPS AT 250 O.C.
GB-2	400 WIDE	4 - 15M BOTTOM CONT.
	WIDTH STEPS &	4 - 15M MID. CONT.
	HEIGHT VARIES	2 - 15M TOP CONT.
		15M SKIN REINF. AT 300 O.C. MAX. EACH FACE
		10M CLOSED STIRRUPS AT 250 O.C.
GB-3	380 WIDE x 400 DEEP	3 - 20M BOTTOM CONT.
GB-4	SEE SECTIONS	SEE SECTIONS

NOTES:
1. PROVIDE 75 CONCRETE COVER TO U/S OF REINFORCING STEEL PLACED AGAINST SOIL, U.N.O.
2. REFER TO WALL SCHEDULE FOR DOWELS REQUIREMENTS FROM WALL ABOVE.



RAMP FOUNDATION PLAN
SCALE 1:50

PROJECT NORTH

No.	Date	Issued for / Revision:
1	JULY 28 2023	95% CLIENT REVIEW
2	NOV 2 2023	95% CLIENT REVIEW
3	MAY 24 2024	PERMIT
4	JUNE 7 2024	TENDER

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LICENSED PROFESSIONAL ENGINEER
G. T. ZOSE LEVIS
100155538
June 5, 2024
TE-41141-22
PROVINCE OF ONTARIO

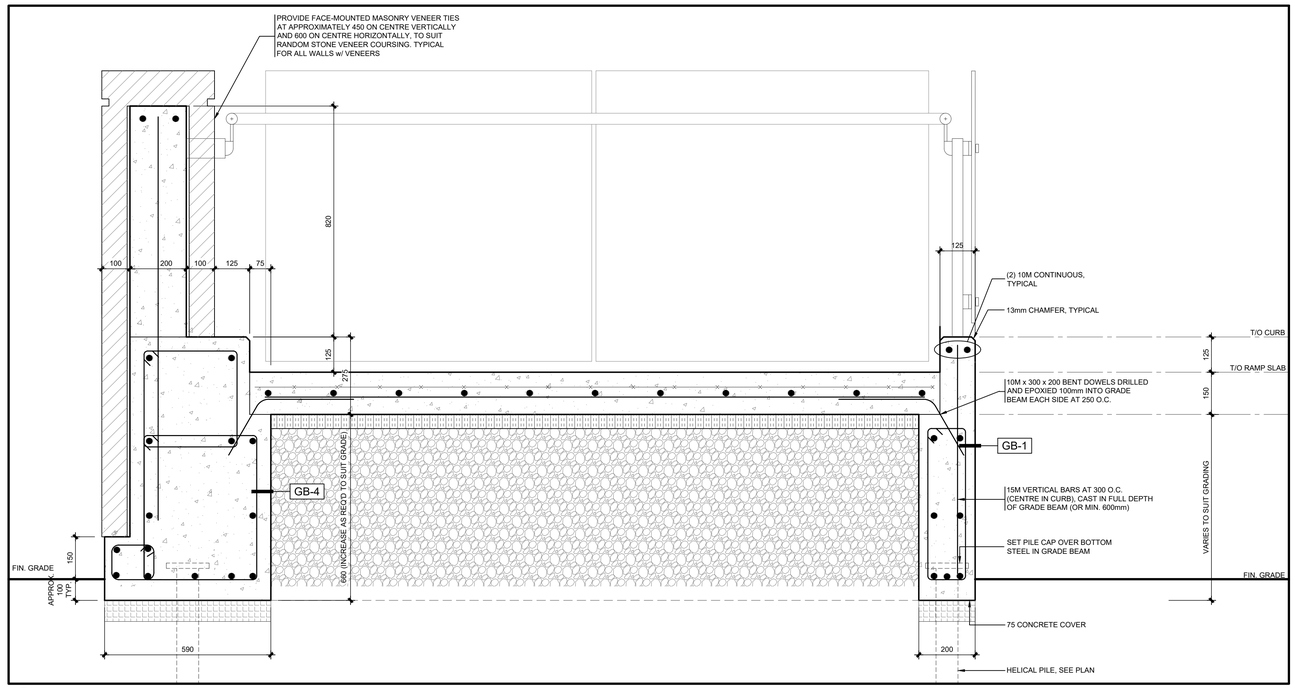
+VG ARCHITECTS THE VENTIN GROUP LTD

C.I.R.H.R. RAMP
121 ST. GEORGE ST. TORONTO, ON

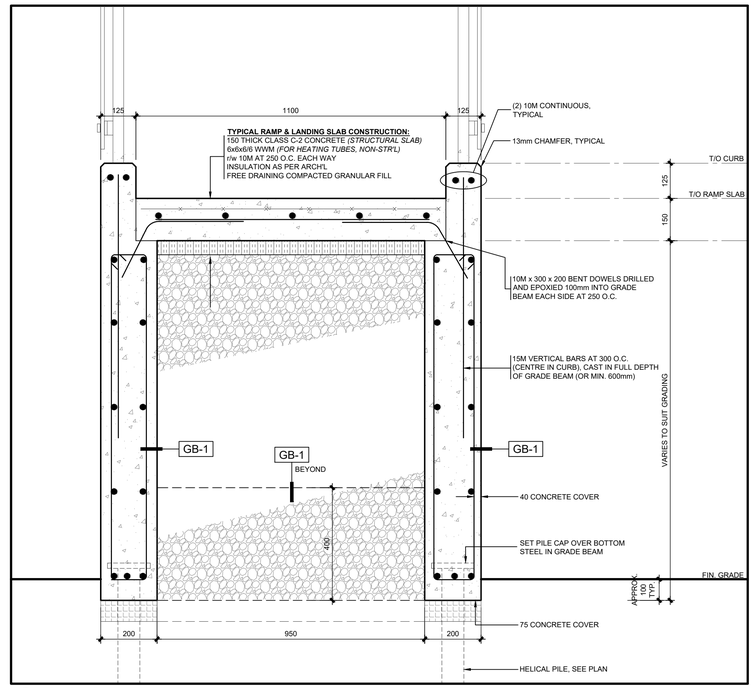
RAMP FOUNDATION PLAN

Project No.	Drawn By:
TE-41141-22	JDH

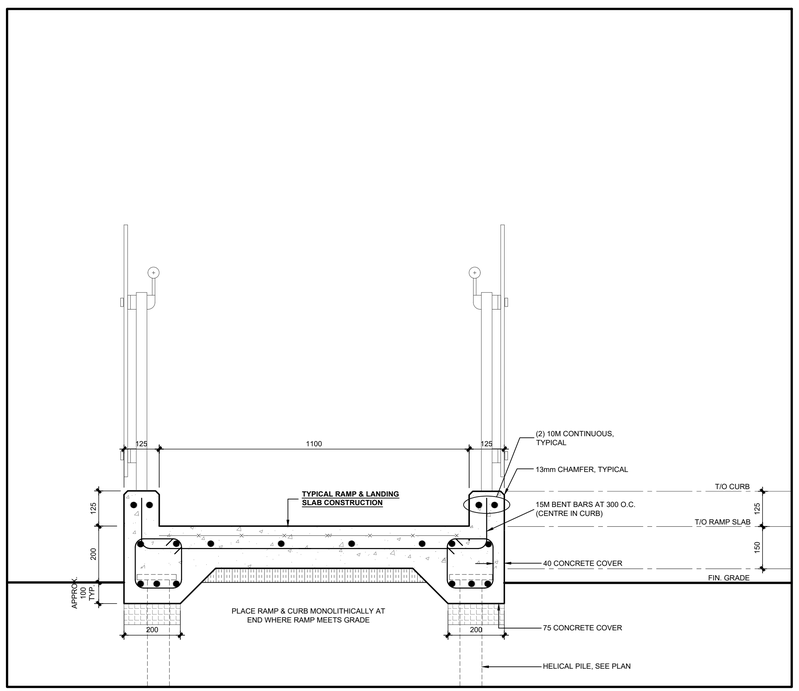
S1.1



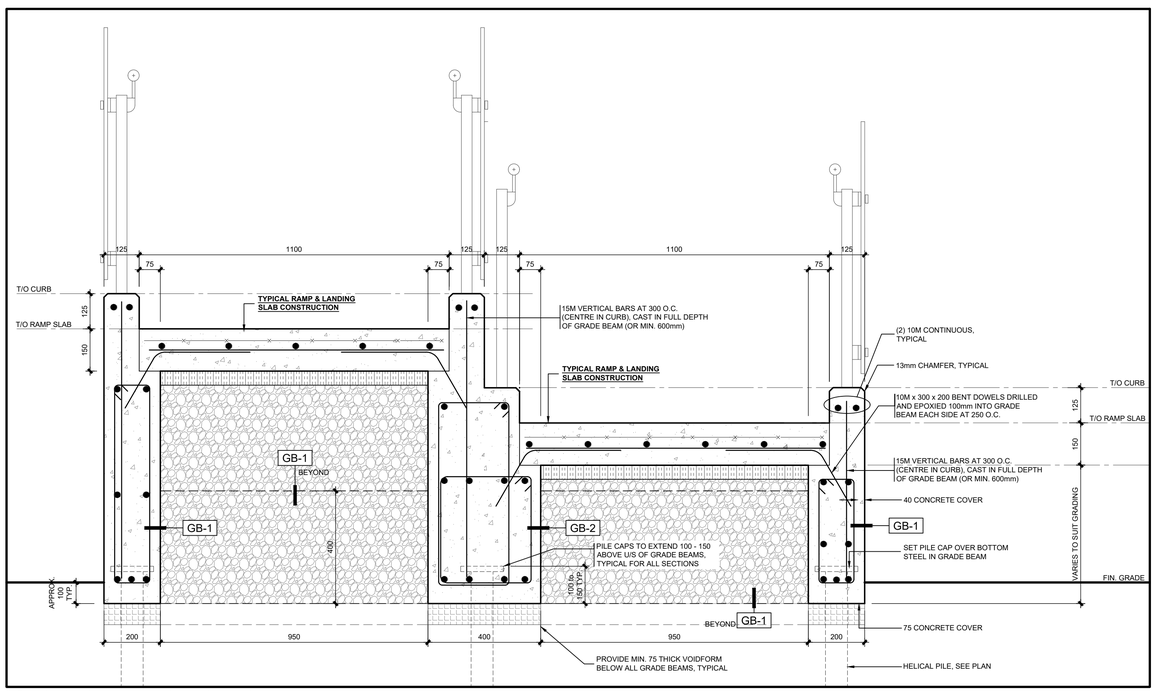
4 S2.1 **SECTION - MID LANDING**
SCALE 1:10



3 S2.1 **SECTION - UPPER RAMP**
SCALE 1:10



1 S2.1 **SECTION - LOWER RAMP**
SCALE 1:10



2 S2.1 **SECTION - RAMP SWITCHBACK**
SCALE 1:10

No.	Date	Issued for / Revision:
1	JULY 28 2023	95% CLIENT REVIEW
2	NOV 2 2023	95% CLIENT REVIEW
3	MAY 24 2024	PERMIT
4	JUNE 7 2024	TENDER

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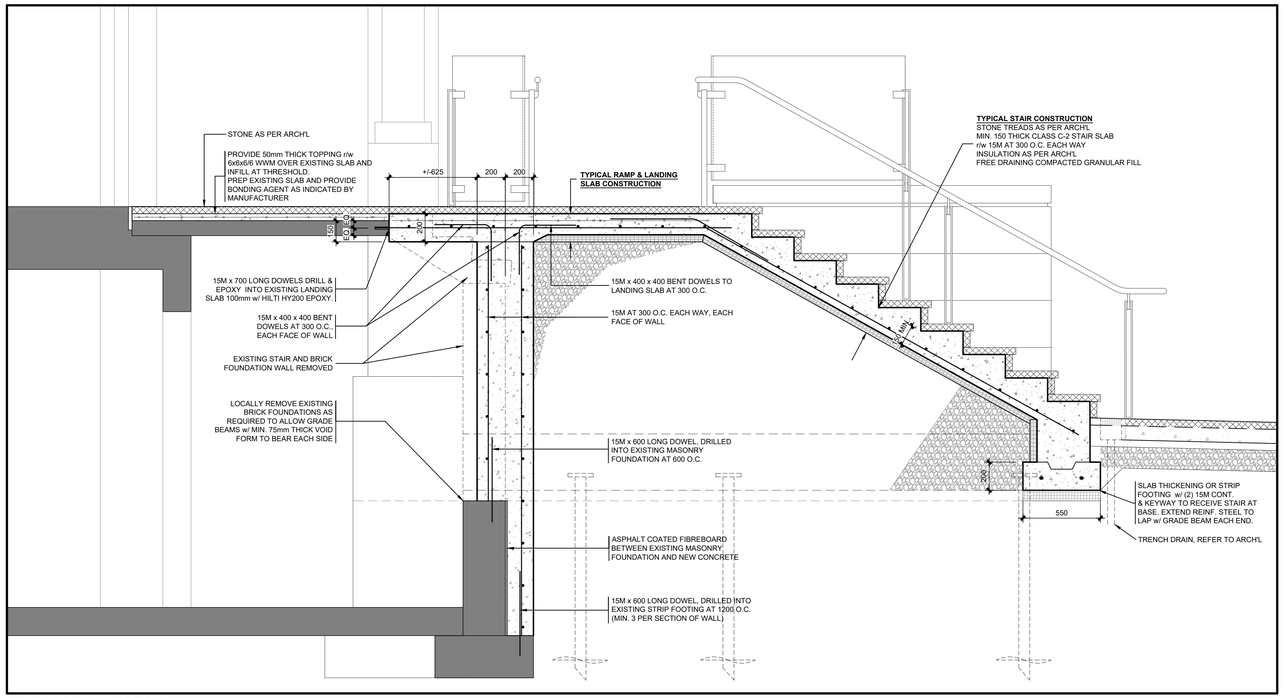
C.I.R.H.R. RAMP
121 ST. GEORGE ST. TORONTO, ON

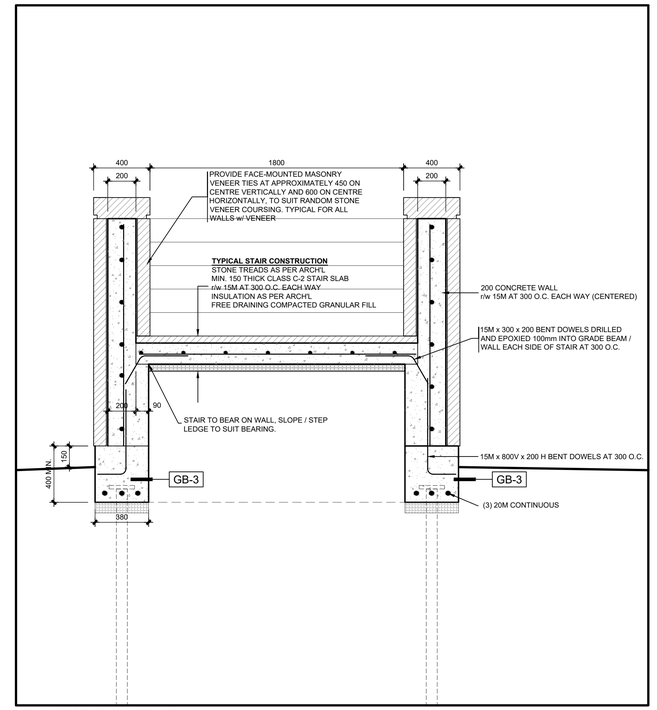
RAMP DETAILS

Project No.	Drawn By:
TE-41141-22	JDH

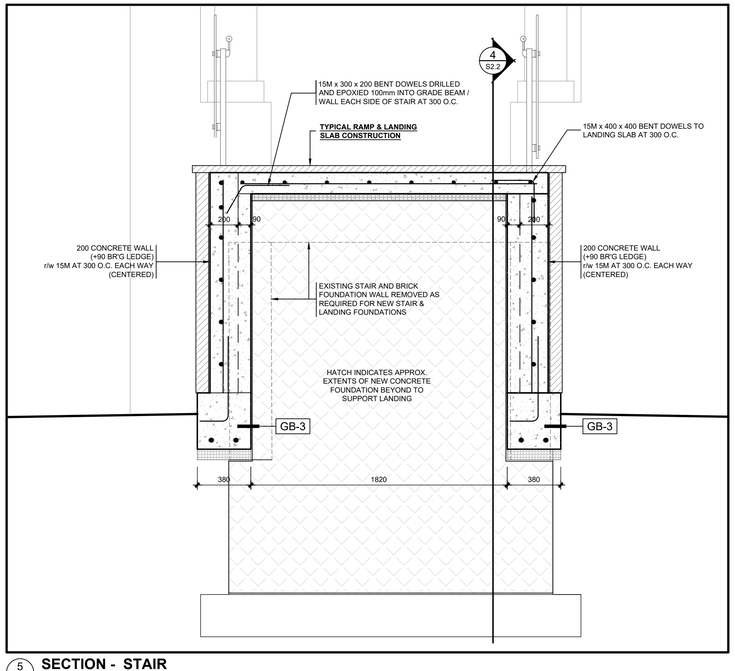
S2.1



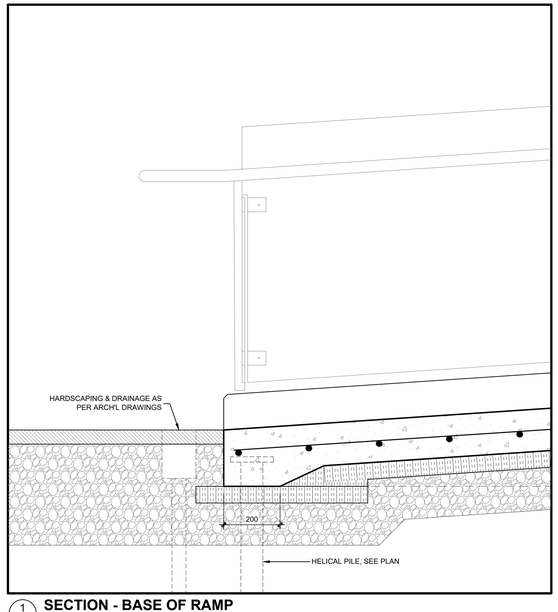
4 S2.2 **SECTION - STAIR**
SCALE 1:20



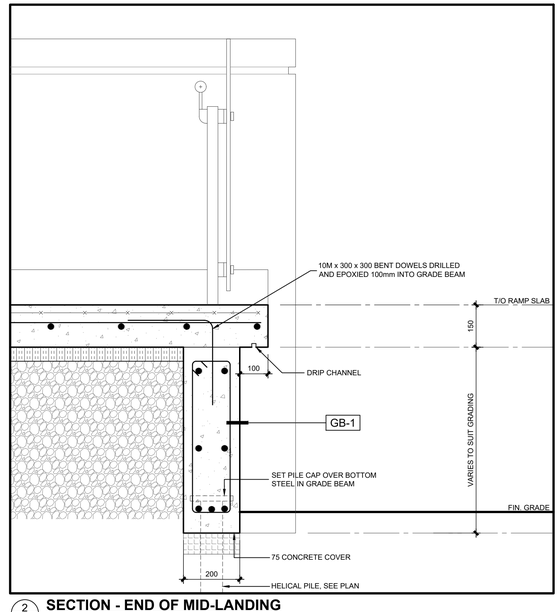
3 S2.2 **SECTION - STAIR**
SCALE 1:20



5 S2.2 **SECTION - STAIR**
SCALE 1:20



1 S2.2 **SECTION - BASE OF RAMP**
SCALE 1:10



2 S2.2 **SECTION - END OF MID-LANDING**
SCALE 1:10

No.	Date	Issued for / Revision:
1	JULY 28 2023	95% CLIENT REVIEW
2	NOV 2 2023	95% CLIENT REVIEW
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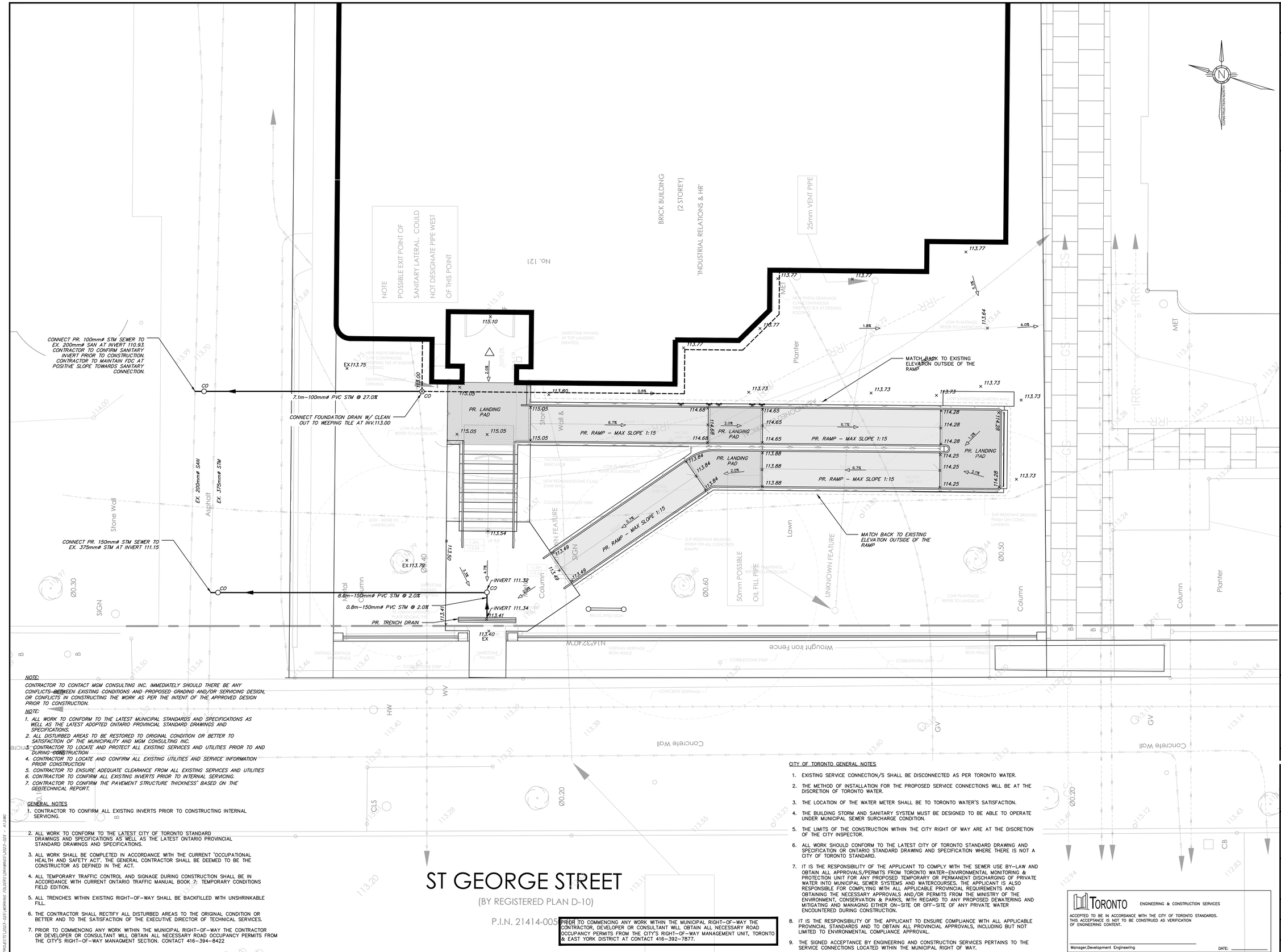
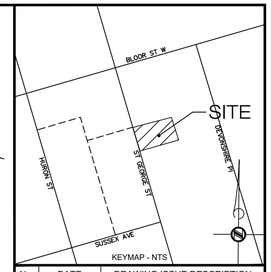
RAMP DETAILS

Project No.	Drawn By:
TE-41141-22	JDH

S2.2





No.	DATE	DRAWING ISSUE DESCRIPTION
1.	2023 07 27	ISSUED TO CLIENT
2.	2023 09 28	ISSUED FOR CLIENT REVIEW
3.	2023 10 20	ISSUED FOR CLIENT REVIEW
4.	2024 04 08	ISSUED FOR CLIENT REVIEW
5.	2024 05 10	ISSUED FOR CLIENT REVIEW
6.	2024 05 24	ISSUED FOR PERMIT
7.	2024 06 10	ISSUED FOR TENDER

LEGEND

- 185.12 – PROPOSED GRADE ELEVATION
- 192.80 EX – MATCH EXISTING GRADE
- 2.0% – PROPOSED SLOPE
- – PROPOSED STORM SEWER
- CO – PROPOSED CLEAN–OUT

BENCHMARK:

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.
BOUNDARIES ARE COMPILED FROM REGISTRY OFFICE RECORDS
ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM THE CITY OF TORONTO BENCHMARK No. 12197405258, also known as CT–259. PUBLISHED ELEVATION = 166.334 metres.

CONSULTANTS:

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Consulting Engineering & Project Management
400 Bronte Street South
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www.mgm.on.ca

CLIENT:

VG ARCHITECTS

PROJECT:

CIRHR U OF T
121 ST. GEORGE STREET
TORONTO, ON

DRAWING:

GRADING AND SERVICING

DRAWN BY:	CHECKED BY:	JOB CAPTAIN:
SS	AK	AK
SCALE: 1:50	PROJECT NO.: 2023-025	SHEET NO.: CV-1
CURRENT ISSUE: 7	CURRENT REV: 6	

NOTE:
CONTRACTOR TO CONTACT MGM CONSULTING INC. IMMEDIATELY SHOULD THERE BE ANY CONFLICTS BETWEEN EXISTING CONDITIONS AND PROPOSED GRADING AND/OR SERVICING DESIGN, OR CONFLICTS IN CONSTRUCTING THE WORK AS PER THE INTENT OF THE APPROVED DESIGN PRIOR TO CONSTRUCTION.

NOTE:

1. ALL WORK TO CONFORM TO THE LATEST MUNICIPAL STANDARDS AND SPECIFICATIONS AS WELL AS THE LATEST ADOPTED ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS.
2. ALL DISTURBED AREAS TO BE RESTORED TO ORIGINAL CONDITION OR BETTER TO SATISFACTION OF THE MUNICIPALITY AND MGM CONSULTING INC.
3. CONTRACTOR TO LOCATE AND PROTECT ALL EXISTING SERVICES AND UTILITIES PRIOR TO AND DURING CONSTRUCTION
4. CONTRACTOR TO LOCATE AND CONFIRM ALL EXISTING UTILITIES AND SERVICE INFORMATION PRIOR CONSTRUCTION
5. CONTRACTOR TO ENSURE ADEQUATE CLEARANCE FROM ALL EXISTING SERVICES AND UTILITIES
6. CONTRACTOR TO CONFIRM ALL EXISTING INVERTS PRIOR TO INTERNAL SERVICING.
7. CONTRACTOR TO CONFIRM THE PAVEMENT STRUCTURE THICKNESS' BASED ON THE GEOTECHNICAL REPORT.

GENERAL NOTES

1. CONTRACTOR TO CONFIRM ALL EXISTING INVERTS PRIOR TO CONSTRUCTING INTERNAL SERVICING.
2. ALL WORK TO CONFORM TO THE LATEST CITY OF TORONTO STANDARD DRAWINGS AND SPECIFICATIONS AS WELL AS THE LATEST ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS.
3. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE CURRENT 'OCCUPATIONAL HEALTH AND SAFETY ACT'. THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
4. ALL TEMPORARY TRAFFIC CONTROL AND SIGNAGE DURING CONSTRUCTION SHALL BE IN ACCORDANCE WITH CURRENT ONTARIO TRAFFIC MANUAL BOOK 7: TEMPORARY CONDITIONS FIELD EDITION.
5. ALL TRENCHES WITHIN EXISTING RIGHT–OF–WAY SHALL BE BACKFILLED WITH UNSHRINKABLE FILL.
6. THE CONTRACTOR SHALL RECTIFY ALL DISTURBED AREAS TO THE ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE EXECUTIVE DIRECTOR OF TECHNICAL SERVICES.
7. PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL RIGHT–OF–WAY THE CONTRACTOR OR DEVELOPER OR CONSULTANT WILL OBTAIN ALL NECESSARY ROAD OCCUPANCY PERMITS FROM THE CITY'S RIGHT–OF–WAY MANAGMENT SECTION. CONTACT 416–394–8422

ST GEORGE STREET

(BY REGISTERED PLAN D-10)

P.I.N. 21414-0055

PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL RIGHT–OF–WAY THE CONTRACTOR, DEVELOPER OR CONSULTANT WILL OBTAIN ALL NECESSARY ROAD OCCUPANCY PERMITS FROM THE CITY'S RIGHT–OF–WAY MANAGEMENT UNIT, TORONTO & EAST YORK DISTRICT AT CONTACT 416–392–7877.

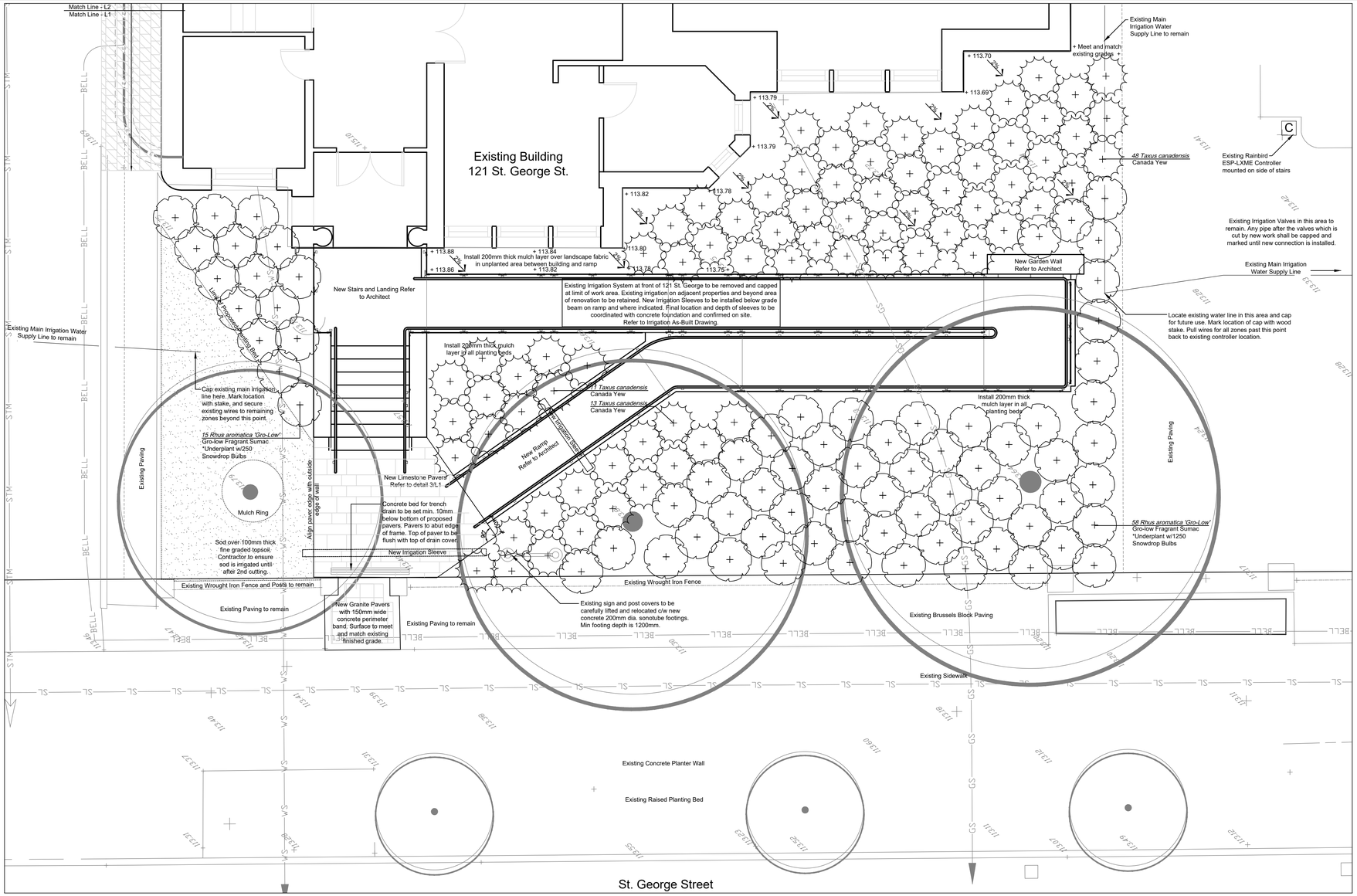
CITY OF TORONTO GENERAL NOTES

1. EXISTING SERVICE CONNECTION/S SHALL BE DISCONNECTED AS PER TORONTO WATER.
2. THE METHOD OF INSTALLATION FOR THE PROPOSED SERVICE CONNECTIONS WILL BE AT THE DISCRETION OF TORONTO WATER.
3. THE LOCATION OF THE WATER METER SHALL BE TO TORONTO WATER'S SATISFACTION.
4. THE BUILDING STORM AND SANITARY SYSTEM MUST BE DESIGNED TO BE ABLE TO OPERATE UNDER MUNICIPAL SEWER SURCHARGE CONDITION.
5. THE LIMITS OF THE CONSTRUCTION WITHIN THE CITY RIGHT OF WAY ARE AT THE DISCRETION OF THE CITY INSPECTOR.
6. ALL WORK SHOULD CONFORM TO THE LATEST CITY OF TORONTO STANDARD DRAWING AND SPECIFICATION OR ONTARIO STANDARD DRAWING AND SPECIFICATION WHERE THERE IS NOT A CITY OF TORONTO STANDARD.
7. IT IS THE RESPONSIBILITY OF THE APPLICANT TO COMPLY WITH THE SEWER USE BY–LAW AND OBTAIN ALL APPROVALS/PERMITS FROM TORONTO WATER–ENVIRONMENTAL MONITORING & PROTECTION UNIT FOR ANY PROPOSED TEMPORARY OR PERMANENT DISCHARGING OF PRIVATE WATER INTO MUNICIPAL SEWER SYSTEMS AND WATERCOURSES. THE APPLICANT IS ALSO RESPONSIBLE FOR COMPLYING WITH ALL APPLICABLE PROVINCIAL REQUIREMENTS AND OBTAINING THE NECESSARY APPROVALS AND/OR PERMITS FROM THE MINISTRY OF THE ENVIRONMENT, CONSERVATION & PARKS, WITH REGARD TO ANY PROPOSED DEWATERING AND MITIGATING AND MANAGING EITHER ON–SITE OR OFF–SITE OF ANY PRIVATE WATER ENCOUNTERED DURING CONSTRUCTION.
8. IT IS THE RESPONSIBILITY OF THE APPLICANT TO ENSURE COMPLIANCE WITH ALL APPLICABLE PROVINCIAL STANDARDS AND TO OBTAIN ALL PROVINCIAL APPROVALS, INCLUDING BUT NOT LIMITED TO ENVIRONMENTAL COMPLIANCE APPROVAL.
9. THE SIGNED ACCEPTANCE BY ENGINEERING AND CONSTRUCTION SERVICES PERTAINS TO THE SERVICE CONNECTIONS LOCATED WITHIN THE MUNICIPAL RIGHT OF WAY.

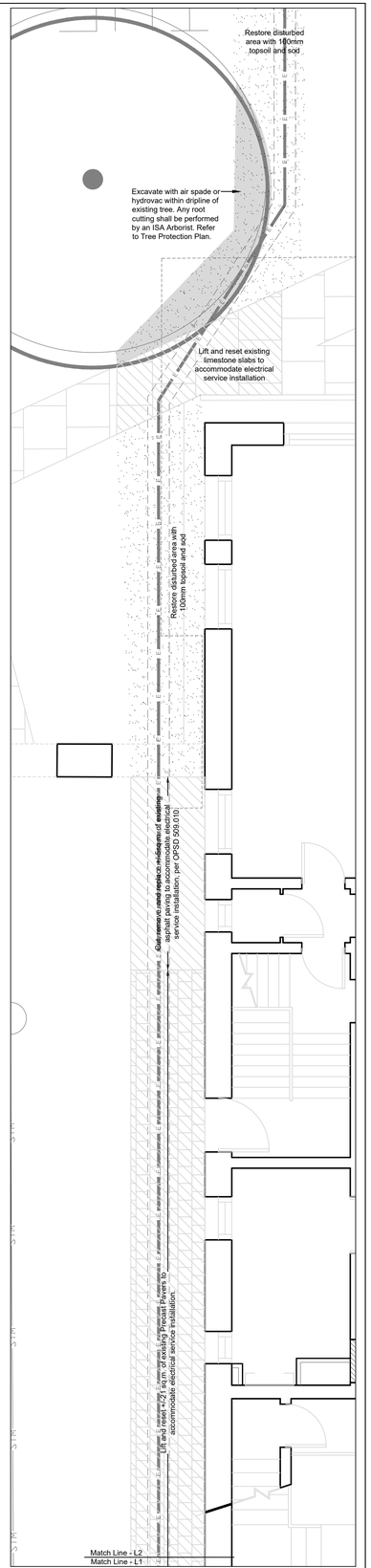
TORONTO ENGINEERING & CONSTRUCTION SERVICES

ACCEPTED TO BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS. THIS ACCEPTANCE IS NOT TO BE CONSTRUED AS VERIFICATION OF ENGINEERING CONTENT.

Manager,Development Engineering DATE:



St. George Street Frontage



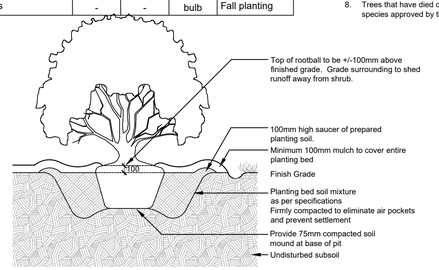
Rear Courtyard

Plant List

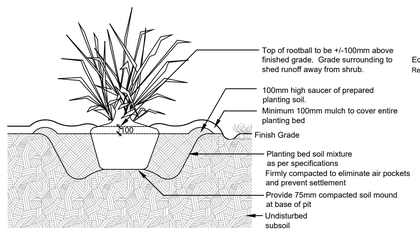
Qty.	Botanical Name	Common Name	Height	Spread	Size	Remarks
Shrubs						
73	*Rhus aromatica 'Gro-Low'*	Gro-Low Fragrant Sumac	300	300	3 gal	Spreading
83	*Taxus canadensis*	Canada Yew	300	300	3 gal	Spreading
Bulbs						
1500	*Galanthus nivalus*	Snowdrops	-	-	bulb	Fall planting

Tree Preservation

1. Refer to the Tree Protection Plan and Arborist Report by Cohen and Masters for tree preservation information and required pre and post construction treatments for existing trees.
2. All existing trees which are to remain shall be fully protected with hoarding erected beyond the drip line to the satisfaction of the City of Toronto Urban Forestry Department, prior to construction.
3. Groups of trees and other existing vegetation are to be protected with hoarding around the entire area. Areas within the protective fencing shall remain undisturbed and shall not be used for the storage of building materials or equipment. Protective snow fencing may be removed briefly during construction operations to accommodate new work within the drip line and then replaced immediately after. Hand dig around root zone. Do not store materials or equipment on roots of vegetation.
4. No rigging cables shall be wrapped around or installed in the trees and surplus soil, equipment, debris or materials shall not be placed over the root systems of the trees within the protective fencing. No contaminants will be dumped or flushed where feeder roots of trees exist.
5. The contractor shall take every precaution necessary to prevent damage to the vegetation to be conserved.
6. Where limbs or portions of trees are removed to accommodate construction, they will be removed in accordance with accepted arboricultural practice.
7. Where root systems of protected trees adjacent to construction are exposed or damaged, they shall be neatly trimmed and the area backfilled with appropriate material to prevent desiccation.
8. Trees that have died or have been damaged beyond repair shall be removed and replaced at the contractor's expense with trees of a size and species approved by the City of Toronto Forestry Dept.

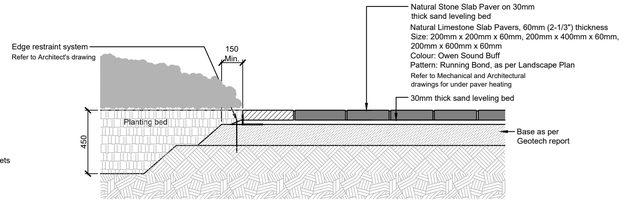


1 L1 Typical Shrub N.T.S.



2 L1 Typical Perennial N.T.S.

Natural Stone Slab Notes:
1. Fill all joints with sand.
2. Do not use sealer on natural stone slabs.
3. Edge retraint to be installed wherever pavers abut soft/non-rigid surface materials.



3 L1 Limestone Slab Paving N.T.S.

Legend

- Existing Deciduous trees to remain
- Proposed Large Multistem Shrub
- Proposed Shrubs, perennials/ ornamental grass
- Proposed Sod over 100mm topsoil

Notes

Base Information

1. Base information taken from: Ventin Group +VG drawing Site Plan - Ramp, dated: April 9, 2024.
2. These drawings shall not be used for construction purposes unless signed by the landscape architect.
3. Notes apply to all drawings.
4. Report discrepancies between drawings and existing conditions to landscape architect prior to commencement of site work.
5. Drawings are the property of the landscape architect and must be returned upon request.
6. Obtain necessary permits prior to commencement of work.
7. Access to site to be limited to designated routes.
8. Make good all damage resulting from work carried out under this contract at no extra cost to the owner.
9. The location of underground services shown on this plan is only approximate and is for planning and design purposes only. Locate existing site services prior to commencement of site work. Hand dig near all underground services.
10. Distances shown on this plan are in metres and can be converted to feet by dividing by 0.3048.
11. All dimensions shown on the plant list and details are in millimeters.
12. Do not scale drawing.

Revision/Issue:

No.	Date	Particular
1.	Sept. 28/23	Issued for Client Review
2.	June 7/24	Issued for Permit / Tender

Client
University of Toronto / +VG Architects

Project Title
Snow Larc Project No. 22-16

CIRHR Accessible Ramp & Universal Washroom

Centre for Industrial Relations & Human Resources (CIRHR)
121 St. George St., Toronto, Ontario

Sheet Title
Landscape Plan and Details

Drawing Status
Tender

Professional Seal

North

Scale 1:50 (Plan)
0 0.5 1.0 1.5 2.0m

Project Number
22-16

Drawing Number
L1 OF 1

Snow Larc
Landscape Architecture Ltd.
2089 Concession 2, Uxbridge, ON L9P 0G8 | www.snowlarc.com| ph. 416-770-0446

DRAWN BY : SS CHECKED BY : SS

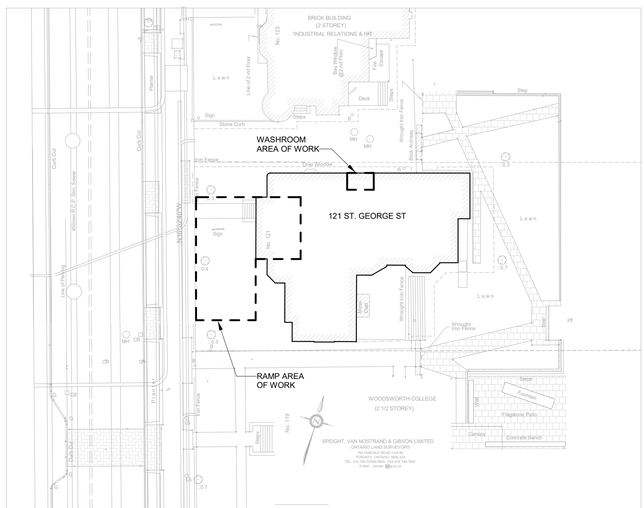
Plot Date: May 08, 2024 - 3:34pm By: Stephanie Filename: C:\Users\Stephanie\OneDrive - Snow Larc\Snow Larc Projects\2022 Projects\22-16 Uoft 121 StGeorge\Drawings\Comp\2216-L1.dwg

PLUMBING

SYMBOL	DESCRIPTION
SAN	SANITARY DRAINAGE - ABOVE GROUND
SAN	SANITARY DRAINAGE - UNDERGROUND
SAN(AR)	SANITARY DRAINAGE (ACID RESISTANT) - ABOVE GROUND
SAN(AR)	SANITARY DRAINAGE (ACID RESISTANT) - UNDERGROUND
STM	STORM DRAINAGE - ABOVE GROUND
STM	STORM DRAINAGE - UNDERGROUND
PD	PUMPED DISCHARGE
	DOMESTIC COLD WATER SUPPLY
	DOMESTIC HOT WATER SUPPLY
	DOMESTIC HOT WATER RECIRC.
TW	TEMPERED WATER
AWV	ACID RESISTANT VENT
V	VENT
G	GAS
RO	REVERSE OSMOSIS PIPING
ISO	RADIO ISOTOPE DRAIN
CA	COMPRESSED AIR
RT	RUNNING TRAP
	P-TRAP
ES-1	EMERGENCY SHOWER
EW-1	EYE WASH
CO	CLEANOUT IN FLOOR/BELOW GRADE
CO	CLEANOUT IN CEILING
HB	HOSE BIBB
NFHB	NON FREEZE HOSE BIBB
G	SINGLE GAS OUTLET
G	DOUBLE GAS OUTLET
CA	COMPRESSED AIR OUTLET
RH	ROOF HYDRANT
GH	GROUND HYDRANT
RD	ROOF DRAIN
CFRD	CONTROL FLOW ROOF DRAIN
VTR	VENT THROUGH ROOF
RWL	RAIN WATER LEADER
TSP	TRAP SEAL PRIMER
	SCUPPER DRAIN
MH	MANHOLE
CB	CATCH BASIN
TD	TRENCH GRATE & FRAME
AD	AREA DRAIN
FFD	FUNNEL FLOOR DRAIN
FD	FLOOR DRAIN
HD	HUB DRAIN
FS	FLOOR SINK
FRD	FLOOR DRAIN - FLUSHING RIM
M	WATER METER ASSEMBLY
G	GAS METER
	BACK WATER VALVE
BFP	BACKFLOW PREVENTER
"WC-1"	DENOTES FIXTURE TYPE PER SPECIFICATION

HEATING & COOLING PIPING

SYMBOL	DESCRIPTION
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
HGR	HEATING GLYCOL RETURN
HGS	HEATING GLYCOL SUPPLY
HTWR	HIGH TEMPERATURE HEATING WATER RETURN
HTWS	HIGH TEMPERATURE HEATING WATER SUPPLY
HTGR	HIGH TEMPERATURE HEATING GLYCOL RETURN
HTGS	HIGH TEMPERATURE HEATING GLYCOL SUPPLY
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
CHR	CHILLED WATER RETURN
CHS	CHILLED WATER SUPPLY
CHGR	CHILLED GLYCOL RETURN
CHGS	CHILLED GLYCOL SUPPLY
CNDR	CONDENSATE DRAIN
PC	PUMPED CONDENSATE
REFR	REFRIGERANT GAS
REFS	REFRIGERANT LIQUID
LPS	LOW PRESSURE STEAM
LPC	LOW PRESSURE CONDENSATE
HPS	HIGH PRESSURE STEAM
HPC	HIGH PRESSURE CONDENSATE
V	VENT
ST-V	STEAM VENT
GEOS	GEO-EXCHANGE SUPPLY
GEOR	GEO-EXCHANGE RETURN
FOS	FUEL OIL SUPPLY
FOR	FUEL OIL RETURN
FOV	FUEL OIL VENT
FOO	FUEL OIL OVERFLOW
	UNION
	MANUAL AIR VENT
	AUTOMATIC AIR VENT
	EXPANSION COMPENSATOR
	EXPANSION LOOP
	PIPE ANCHOR
	PIPE GUIDE
	PIPE SLEEVE
	STEAM CONDENSATE TRAP
BBH- #	BASEBOARD HEATER
RP- # - XXX	RADIANT PANEL TYPE - HEAT OUTPUT
CUH	CABINET UNIT HEATER
UH	UNIT HEATER



2 KEYPLAN
SCALE:1 : 350

CONTROLS

SYMBOL	DESCRIPTION
SF	SUPPLY FAN
RF	RETURN FAN
EF	EXHAUST FAN
H/C	HEATING COIL
C/C	COOLING COIL
P/C	PRE-HEAT COIL
	FILTERS
	HUMIDIFIER
	AIRFLOW / FLUID DIRECTION
MD	MOTORIZED DAMPER
	MANUAL ISOLATION DAMPER
MCC	MOTOR CONTROL CENTRE
LDU	LOCAL DISPLAY UNIT
CONTROLLER	MANUFACTURER SUPPLIED EQUIPMENT CONTROLLER
STARTER	MOTOR STARTER
VFD	VARIABLE FREQUENCY DRIVE
NO	NORMALLY OPEN
NC	NORMALLY CLOSED
	NORMALLY CLOSED CONTACT
	NORMALLY OPEN CONTACT
FS	FLOW SWITCH
LS	LEVEL SWITCH
TS	TEMPERATURE SWITCH
PS	PRESSURE SWITCH
DP	DIFFERENTIAL PRESSURE SWITCH
DS	DOOR SWITCH
NC	ACTUATOR NORMALLY CLOSED DE-ENERGIZED POSITION
NO	ACTUATOR NORMALLY OPEN DE-ENERGIZED POSITION
	ACTUATOR FAIL OPEN POSITION
	ACTUATOR FAIL CLOSED POSITION
FL	ACTUATOR FAIL LAST POSITION
	TWO-POSITION ACTUATOR
	MODULATING ACTUATOR
P	PRESSURE SENSOR
DP	DIFFERENTIAL PRESSURE SENSOR
VS	VELOCITY SENSOR
VP	VELOCITY PRESSURE SENSOR
H	HUMIDITY SENSOR
T	TEMPERATURE SENSOR
OS	OCCUPANCY SENSOR
CO	CARBON MONOXIDE SENSOR
CO2	CARBON DIOXIDE SENSOR
NOx	DIESEL NITROGEN OXIDE SENSOR
O2	OXYGEN SENSOR
AS	AIRFLOW STATION
GS	GAS SENSOR (GENERAL)
GDP	GAS DETECTION & ALARM PANEL
ZVB/AP	ZONE VALVE BOX & ALARM PANEL
	VISUAL INDICATOR ALARM
	AUDIBLE INDICATOR ALARM
BAS	BUILDING AUTOMATION SYSTEM
AI	ANALOG INPUT
AO	ANALOG OUTPUT
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
AP	BAS ADJUSTABLE SET POINT
BV	BACNET VARIABLE
HOA	HAND-OFF-AUTO
	CONTROL WIRING

GENERAL

SYMBOL	DESCRIPTION
	EXISTING TO REMAIN
	EXISTING TO BE DEMOLISHED
R	EXISTING TO BE REMOVED FOR RELOCATION
R	EXISTING RELOCATED IN NEW WORK
	NEW WORK
CTE	CONNECT TO EXISTING
	AIRFLOW / PIPE FLOW DIRECTION
	PIPE TURNING DOWN
	PIPE TURNING UP
	PRESSURE REDUCING VALVE
T	ROOM THERMOSTAT
H	ROOM HUMIDISTAT
	PUMP
	CONTROL VALVE - TWO WAY
	CONTROL VALVE - THREE WAY
	ISOLATION VALVE
	BALANCING VALVE
	CHECK VALVE
	STRAINER - OVER 50MM WITH VALVED FLUSHING DRAIN
	PIPE BRANCH OFF TOP
	PIPE BRANCH OFF BOTTOM
	RELIEF VALVE
	PRESSURE GAUGE
	TEMPERATURE GAUGE
CAP	CAP
	SOLENOID VALVE
	FUSIBLE LINK VALVE
	HEAT TRACING

MECHANICAL DRAWING LIST

DRAWING #	DRAWING NAME
M0.1	MECHANICAL LEGEND & DRAWING LIST
M1.1	RAMP - DEMOLITION & NEW WORK - BASEMENT - MECHANICAL
M1.2	RAMP - NEW WORK - LEVEL 1 - MECHANICAL
M2.1	WASHROOM - DEMOLITION & NEW WORK - MECHANICAL
M3.1	MECHANICAL SPECIFICATIONS
M3.2	MECHANICAL SPECIFICATIONS
M3.3	MECHANICAL SPECIFICATIONS
M3.4	MECHANICAL SPECIFICATIONS
M4.1	RAMP - SCHEDULE & DETAILS
M4.2	WASHROOM - SCHEDULE & DETAILS
M4.3	CONTROL SEQUENCES & LAN ARCHITECTURE

REVISIONS

No.	DATE	DESCRIPTION
1	2023-02-27	ISSUED FOR COORDINATION
2	2023-03-31	ISSUED FOR 95%CD
3	2023-06-06	ISSUED FOR 50%CD
4	2023-06-22	ISSUED FOR 90%CD
5	2023-07-28	ISSUED FOR 95%CD
6	2023-09-28	ISSUED FOR CLIENT REVIEW
7	2024-05-24	ISSUED FOR PERMIT
8	2024-06-07	ISSUED FOR TENDER

NOTES:

KEYPLAN:

CLIENT:
CLIENT: UNIVERSITY OF TORONTO

PROJECT:
ED-22-703-08

CIRHR UNIVERSAL WASHROOM

CENTRE FOR INDUSTRIAL RELATIONS & HUMAN RESOURCES (CIRHR)
121 ST. GEORGE ST., TORONTO, ONTARIO

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QUASAR CONSULTING GROUP
250 ROWNTREE DAIRY RD, WOODBRIDGE, ON
TEL: 905-507-0800
WEB: WWW.QUASARCG.COM

+VG ARCHITECTS
THE VENTIN GROUP LTD

SCALE:
As indicated

MECHANICAL LEGEND & DRAWING LIST

M0.1

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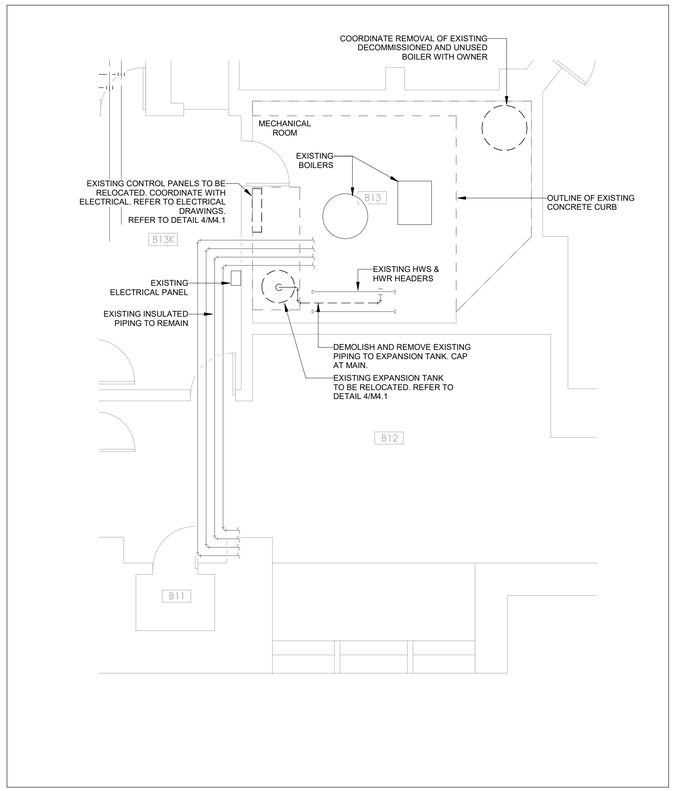
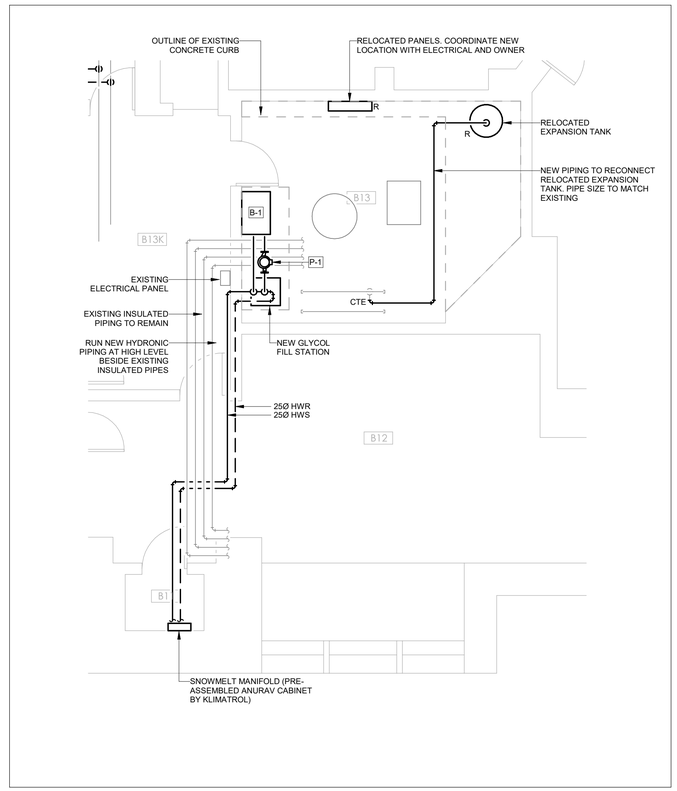


1 MECHANICAL BASEMENT - DEMOLITION

SCALE: 1 : 50



2 MECHANICAL BASEMENT - NEW WORK

SCALE: 1 : 50

GENERAL NOTES:

1. DO NOT SCALE THE DRAWINGS, AND DO NOT USE THE DRAWINGS FOR PREFABRICATION WORK.
2. THE MECHANICAL DRAWINGS ARE PERFORMANCE DRAWINGS, DIAGRAMMATIC, AND SHOW APPROXIMATE LOCATIONS OF EQUIPMENT AND CONNECTING SERVICES. ANY INFORMATION REGARDING ACCURATE MEASUREMENT OF THE BUILDING ARE TO BE TAKEN ON SITE.
3. FLOOR PLAN DRAWINGS SHALL BE READ IN CONJUNCTION WITH SCHEMATIC DRAWINGS, DETAIL DRAWINGS.

DEMOLITION NOTES:

1. WHERE MECHANICAL SERVICES AND/OR EQUIPMENT ARE INDICATED TO BE DEMOLISHED AND REMOVED, MECHANICAL CONTRACTOR SHALL REMOVE ASSOCIATED INSULATION, HANGERS, VALVES, ACCESSORIES, DIFFUSERS, GRILLES, ETC. CAP SERVICES AS REQUIRED. CAP AND SEAL ALL REDUNDANT OPENINGS IN DUCTS
2. WHERE MECHANICAL EQUIPMENT HAVING ELECTRICAL CONNECTIONS IS SHOWN TO BE DEMOLISHED, COORDINATE WITH GENERAL CONTRACTOR AND ELECTRICAL DIVISION TO DISCONNECT AND MAKE SAFE THE POWER SUPPLY/CONNECTION. ENSURE THAT LIVE ELECTRICAL CONNECTIONS/WIRE ARE NOT LEFT ABDANDONED OR UNPROTECTED AT ANY TIME.
3. THE MECHANICAL CONTRACTOR SHALL VISIT THE SITE TO VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING BID. THIS SHALL BE DONE IN ORDER TO CONFIRM THAT EQUIPMENT AND SERVICES CAN BE INSTALLED AS SHOWN ON DRAWINGS AND THAT ADDITIONAL COSTS ARE INCLUDED IN BID TO FACILITATE INSTALLATION. IT IS THE CONTRACTORS RESPONSIBILITY TO NOTIFY THE ENGINEERS OF ANY DISCREPANCIES, OMISSIONS, AND INTERFERENCES. CONTRACTOR SHALL PROVIDE INTERFERENCE DRAWINGS TO CONSULTANT FOR REVIEW AND DIRECTION.
4. ALL MECHANICAL SERVICES ARE TO REMAIN UNLESS NOTED OTHERWISE. EXISTING DUCT WORK TO REMAIN UNLESS NOTED OTHERWISE.
5. REPLACE BROKEN OR DAMAGED DUCTS.
6. COORDINATE WITH BASE BUILDING PRIOR TO START OF WORK.

HVAC NOTES:

1. HYDRONIC PIPING SHALL BE MINIMUM 20Ø (3/4"Ø) UNLESS OTHERWISE NOTED
2. DIFFUSERS AND GRILLES ARE SHOWN FOR QUANTITY AND GENERAL LOCATION. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS.

REVISIONS

No.	DATE	DESCRIPTION
1	2023-06-06	ISSUED FOR 50%CD
2	2023-06-22	ISSUED FOR 90%CD
3	2023-07-28	ISSUED FOR 95%CD
4	2023-09-28	ISSUED FOR CLIENT REVIEW
5	2024-05-24	ISSUED FOR PERMIT
6	2024-06-07	ISSUED FOR TENDER

NOTES:

All dimensions and measurements must be checked and verified by the General Contractor

KEYPLAN:

CLIENT:

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ED-22-703-08

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SCALE:
1 : 50

RAMP - DEMOLITION & NEW WORK - BASEMENT - MECHANICAL

M1.1

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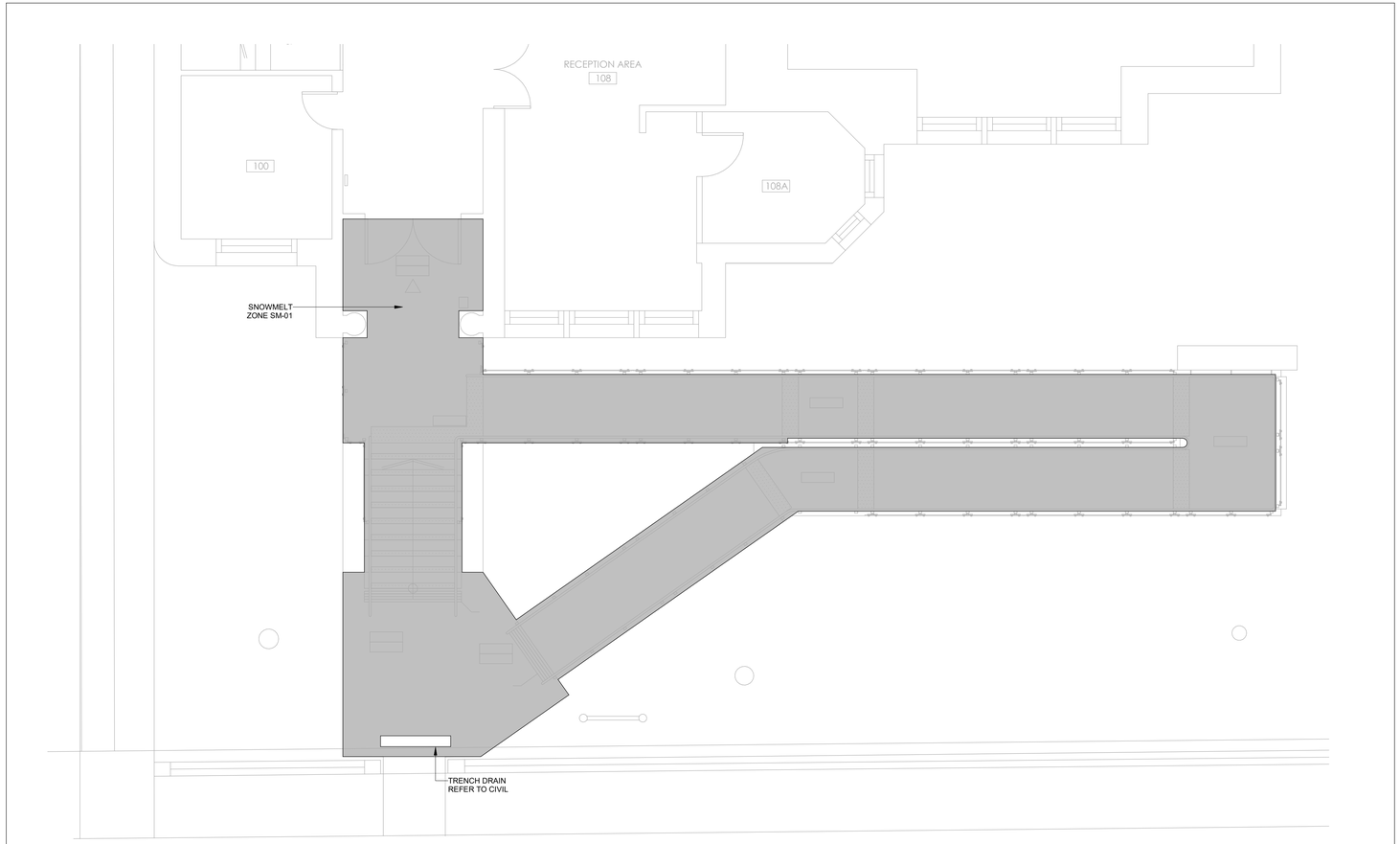

1 MECHANICAL LEVEL 1 - NEW WORK

SCALE: 1 : 50

GENERAL NOTES:

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3. FLOOR PLAN DRAWINGS SHALL BE READ IN CONJUNCTION WITH SCHEMATIC DRAWINGS, DETAIL DRAWINGS.

DEMOLITION NOTES:

1. WHERE MECHANICAL SERVICES AND/OR EQUIPMENT ARE INDICATED TO BE DEMOLISHED AND REMOVED, MECHANICAL CONTRACTOR SHALL REMOVE ASSOCIATED INSULATION, HANGERS, VALVES, ACCESSORIES, DIFFUSERS, GRILLES, ETC. CAP SERVICES AS REQUIRED. CAP AND SEAL ALL REDUNDANT OPENINGS IN DUCTS
2. WHERE MECHANICAL EQUIPMENT HAVING ELECTRICAL CONNECTIONS IS SHOWN TO BE DEMOLISHED, COORDINATE WITH GENERAL CONTRACTOR AND ELECTRICAL DIVISION TO DISCONNECT AND MAKE SAFE THE POWER SUPPLY/CONNECTION. ENSURE THAT LIVE ELECTRICAL CONNECTIONS/WIRE ARE NOT LEFT ABDANDONNED OR UNPROTECTED AT ANY TIME.
3. THE MECHANICAL CONTRACTOR SHALL VISIT THE SITE TO VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING BID. THIS SHALL BE DONE IN ORDER TO CONFIRM THAT EQUIPMENT AND SERVICES CAN BE INSTALLED AS SHOWN ON DRAWINGS AND THAT ADDITIONAL COSTS ARE INCLUDED IN BID TO FACILITATE INSTALLATION. IT IS THE CONTRACTORS RESPONSIBILITY TO NOTIFY THE ENGINEERS OF ANY DISCREPANCIES, OMISSIONS, AND INTERFERENCES. CONTRACTOR SHALL PROVIDE INTERFERENCE DRAWINGS TO CONSULTANT FOR REVIEW AND DIRECTION.
4. ALL MECHANICAL SERVICES ARE TO REMAIN UNLESS NOTED OTHERWISE. EXISTING DUCT WORK TO REMAIN UNLESS NOTED OTHERWISE.
5. REPLACE BROKEN OR DAMAGED DUCTS.
6. COORDINATE WITH BASE BUILDING PRIOR TO START OF WORK.

HVAC NOTES:

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REVISIONS

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SCALE:
1 : 50

M1.2

RAMP - NEW WORK - LEVEL 1 - MECHANICAL

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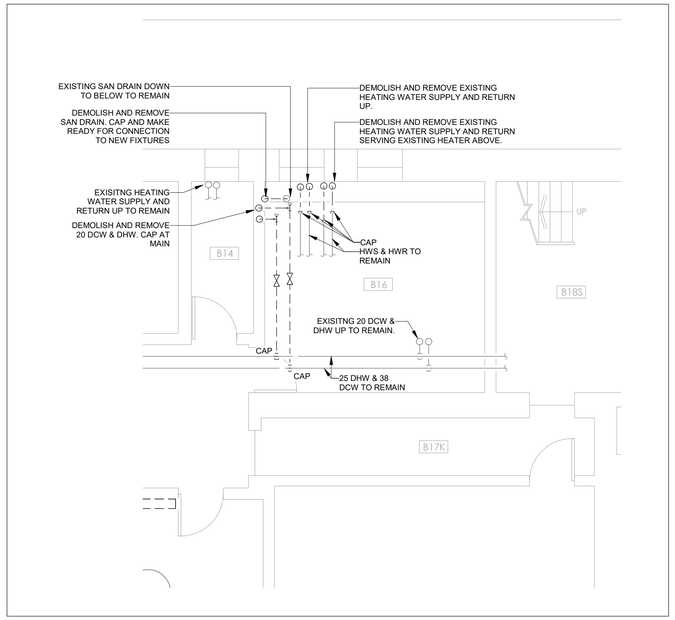
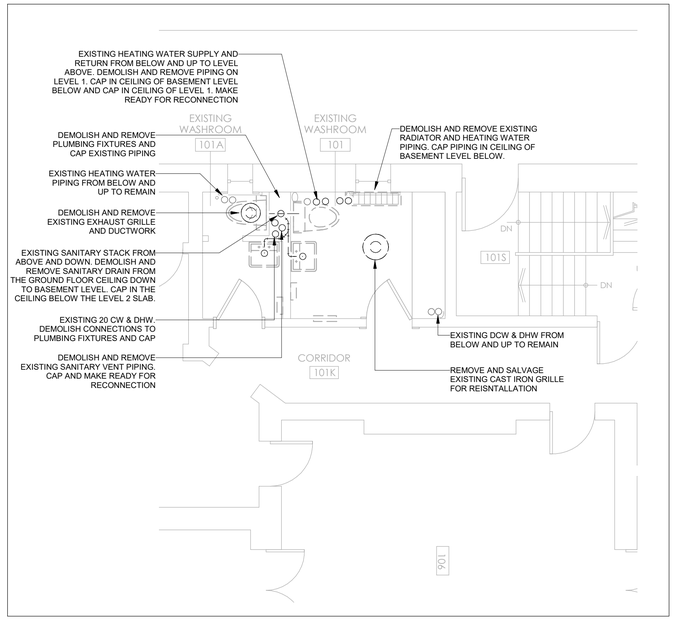


1 MECHANICAL BASEMENT - DEMOLITION

SCALE: 1 : 50



2 MECHANICAL LEVEL 1 - DEMOLITION

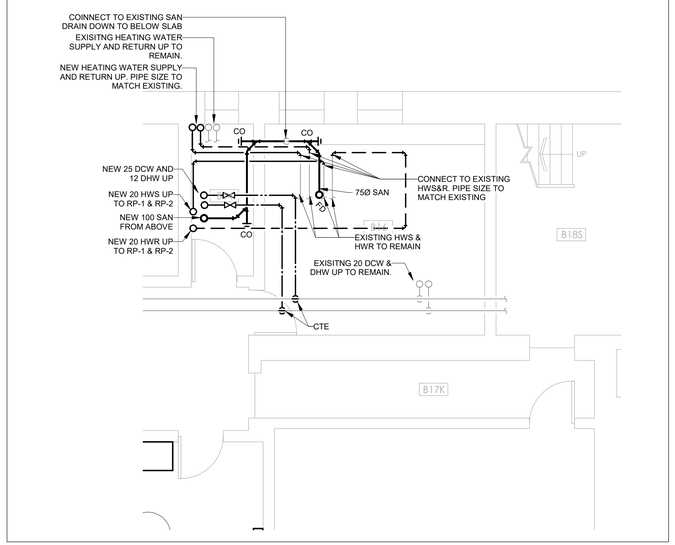
SCALE: 1 : 50

GENERAL NOTES:

1. DO NOT SCALE THE DRAWINGS, AND DO NOT USE THE DRAWINGS FOR PREFABRICATION WORK.
2. THE MECHANICAL DRAWINGS ARE PERFORMANCE DRAWINGS, DIAGRAMMATIC, AND SHOW APPROXIMATE LOCATIONS OF EQUIPMENT AND CONNECTING SERVICES. ANY INFORMATION REGARDING ACCURATE MEASUREMENT OF THE BUILDING ARE TO BE TAKEN ON SITE.
3. FLOOR PLAN DRAWINGS SHALL BE READ IN CONJUNCTION WITH SCHEMATIC DRAWINGS, DETAIL DRAWINGS.

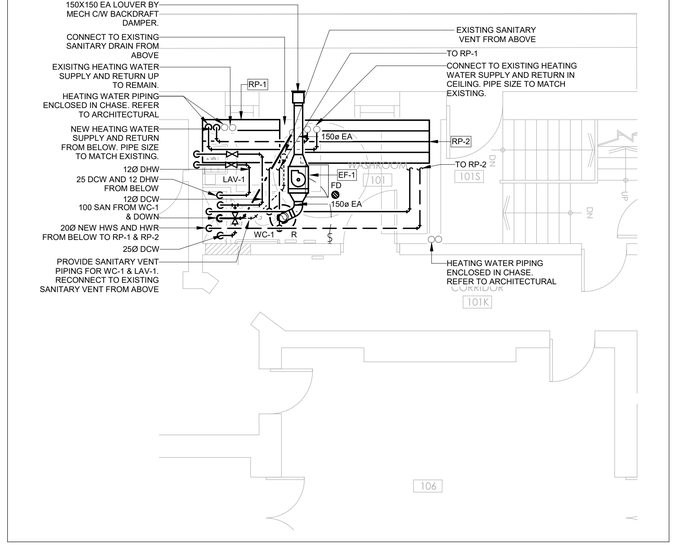
DEMOLITION NOTES:

1. WHERE MECHANICAL SERVICES AND/OR EQUIPMENT ARE INDICATED TO BE DEMOLISHED AND REMOVED, MECHANICAL CONTRACTOR SHALL REMOVE ASSOCIATED INSULATION, HANGERS, VALVES, ACCESSORIES, DIFFUSERS, GRILLES, ETC. CAP SERVICES AS REQUIRED. CAP AND SEAL ALL REDUNDANT OPENINGS IN DUCTS
2. WHERE MECHANICAL EQUIPMENT HAVING ELECTRICAL CONNECTIONS IS SHOWN TO BE DEMOLISHED, COORDINATE WITH GENERAL CONTRACTOR AND ELECTRICAL DIVISION TO DISCONNECT AND MAKE SAFE THE POWER SUPPLYCONNECTION. ENSURE THAT LIVE ELECTRICAL CONNECTIONS/WIRE ARE NOT LEFT ABDANDONED OR UNPROTECTED AT ANY TIME.
3. THE MECHANICAL CONTRACTOR SHALL VISIT THE SITE TO VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING BID. THIS SHALL BE DONE IN ORDER TO CONFIRM THAT EQUIPMENT AND SERVICES CAN BE INSTALLED AS SHOWN ON DRAWINGS AND THAT ADDITIONAL COSTS ARE INCLUDED IN BID TO FACILITATE INSTALLATION. IT IS THE CONTRACTORS RESPONSIBILITY TO NOTIFY THE ENGINEERS OF ANY DISCREPANCIES, OMISSIONS, AND INTERFERENCES. CONTRACTOR SHALL PROVIDE INTERFERENCE DRAWINGS TO CONSULTANT FOR REVIEW AND DIRECTION.
4. ALL MECHANICAL SERVICES ARE TO REMAIN UNLESS NOTED OTHERWISE. EXISTING DUCT WORK TO REMAIN UNLESS NOTED OTHERWISE.
5. REPLACE BROKEN OR DAMAGED DUCTS.
6. COORDINATE WITH BASE BUILDING PRIOR TO START OF WORK.



3 MECHANICAL BASEMENT - NEW WORK

SCALE: 1 : 50



4 MECHANICAL LEVEL 1 - NEW WORK

SCALE: 1 : 50

PLUMBING AND DRAINAGE NOTES

1. ALL DRAINAGE PIPING SIZED AT 75Ø OR SMALLER SHALL BE SLOPED AT 2% UNLESS OTHERWISE NOTED.
2. ALL DRAINAGE PIPING SIZED AT 100Ø OR LARGER SHALL BE SLOPED AT 1% UNLESS OTHERWISE NOTED.
3. PROVIDE FULL VENTING SYSTEM IN ACCORDANCE WITH THE PLUMBING OR BUILDING CODE. COORDINATE ALL VENTS AND TERMINATION POINTS.
4. ALL EQUIPMENT SHALL BE INSTALLED IN ACCODANCE WITH MANUFACTURER'S RECOMMENDATIONS.
5. ALL FLOOR DRAINS SHALL BE PROVIDED COMPLETE WITH TRAPS AND TRAP PRIMERS
6. DOMESTIC COLD AND HOT WATER SHALL BE MINIMUM 19Ø (3/4"Ø) UNLESS OTHERWISE NOTED.
7. PROVIDE ISOLATION VALVES AT ALL RISERS AND AT THE CONNECTION TO EACH FIXTURE OR EQUIPMENT.

HVAC NOTES:

1. HYDRONIC PIPING SHALL BE MINIMUM 20Ø (3/4"Ø) UNLESS OTHERWISE NOTED.
2. PROVIDE ISOLATION VALVES AT ALL RISERS AND AT THE CONNECTION TO EACH EQUIPMENT.
3. PROVIDE CONTROL VALVE AND FLOW BALANCING VALVE AT EACH EQUIPMENT.
4. DIFFUSERS AND GRILLES ARE SHOWN FOR QUANTITY AND GENERAL LOCATION. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS.

REVISIONS

No.	DATE	DESCRIPTION
1	2023-02-27	ISSUED FOR COORDINATION
2	2023-03-31	ISSUED FOR 95%CD
3	2023-06-06	ISSUED FOR 50%CD
4	2023-06-22	ISSUED FOR 90%CD
5	2023-07-28	ISSUED FOR 95%CD
6	2024-05-24	ISSUED FOR PERMIT
7	2024-06-07	ISSUED FOR TENDER

NOTES:

All dimensions and measurements must be checked and verified by the General Contractor

KEYPLAN:

CLIENT:

CLIENT: UNIVERSITY OF TORONTO

PROJECT:

ED-22-703-08

CIRHR UNIVERSAL WASHROOM

CENTRE FOR INDUSTRIAL RELATIONS & HUMAN RESOURCES (CIRHR)
121 ST. GEORGE ST., TORONTO, ONTARIO

ORIGINAL PAGE SIZE: ARCH D - 24" x 36"

QUASAR CONSULTING GROUP
250 ROWNTREE DAIRY RD, WOODBRIDGE, ON
TEL: 905-507-0800
WEB: WWW.QUASARCG.COM

+VG ARCHITECTS - THE VENTIN GROUP LTD

SCALE:
1 : 50

WASHROOM - DEMOLITION & NEW WORK - MECHANICAL

M2.1

DRAWN BY: Author CHECKED BY: SM

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00 PROCUREMENT AND CONTRACTING REQUIREMENTS

00 30 00 – AVAILABLE INFORMATION

1.0 EXISTING CONDITION INFORMATION
1.1 Review with Owner if existing drawings are available for review. The Consultant does not warrant them for accuracy nor for completeness, and it remains the Contractor's responsibility to verify field conditions inferred from such materials.

2.0 EXISTING HAZARDOUS MATERIAL INFORMATION
2.1 Review with Owner if existing Designated Substance Survey (DSS) report is available for review.

00 70 00 – GENERAL CONDITIONS

1.0 INTENT
1.1 Include all material, labour, equipment, and plant construction as necessary to make a complete installation as shown and specified hereinafter.
1.2 The organizational structure of the Specifications does not imply how the work is assigned to various design disciplines, trades, or subcontractors. The MasterFormat numbering system is not intended to determine which particular elements of the project manual are prepared by a particular discipline. Similarly, it is not intended to determine what particular work required by the project manual is the responsibility of a particular trade. It shall be the Contractor's responsibility to ensure that the systems specified hereafter are complete and operative.

2.0 DRAWINGS AND SPECIFICATIONS
2.1 The drawings and specifications are complementary each to the other, and what is called for by one, is to be binding as if called for by both.
2.2 Should any discrepancy appear between the drawings and specifications which leaves the Contractor in doubt as to the true intent and meaning, a ruling is to be obtained from the Consultant in writing before submitting Tender. If this is not done, the maximum, the most expensive alternate or option, will be provided in Base Tender Bid.
2.3 The drawings provide design intent, and are not to be used to measure or quantify material. Contractor is to coordinate installation of work so as to meet the design intent.

00 73 00 – SUPPLEMENTARY CONDITIONS

1.0 GENERAL
1.1 The requirements of the Supplementary General Conditions apply to this Specification as though written in full herein.
1.2 Refer to Architectural drawings for exact location of dimensioned equipment and devices.
1.3 Refer to Architectural drawings for additional notes which complement these specifications.

2.0 HEALTH AND SAFETY REQUIREMENTS
2.1 Be responsible for the safety of workers and the equipment on the project in accordance with all applicable safety legislation passed by federal, provincial, and local authorities governing construction safety. The more stringent regulations prevail.

01 GENERAL REQUIREMENTS

01 10 00 – SUMMARY

1.0 SUMMARY OF WORK
1.1 The scope of this project includes converting two existing washrooms to one universal washroom.
1.2 Work includes demolition of existing, reconfiguration, and new facility services to suit changes.
1.3 Space reconfiguration including partition modifications and associated revisions to facility services.

01 31 00 – PROJECT MANAGEMENT AND COORDINATION

1.0 PROJECT COORDINATION
1.1 Read specifications and drawings of other trades, and conform with their requirements before proceeding with any work specified here as related to other trades. Cooperate with all other trades on the job, so that all equipment can be satisfactorily installed, and so that no delay is caused to any other trades.
1.2 Prior to fabrication and installation of equipment, ensure that such items can be installed as indicated without interference with the structure, or the work of other trades. If any materials are fabricated or installed prior to the investigation and reaching of a solution to the possible interference problems, necessary changes shall be made at the Contractor's expense.
1.3 Provide code or manufacturer required clear space for servicing, disassembly, and removal of equipment and components.

2.0 FACILITY SERVICES COORDINATION
2.1 Maintain all operational building services; shutdown of services shall only take place as authorized by base building and request to be in writing.
2.2 Co-ordinate with Property Management for scheduling of all work required to be done after office hours and weekends, i.e., drilling through slab, power shutdowns, interfacing to life safety systems, etc. all costs involved, including work to be done by the Property Management's approved fire alarm and life safety systems contractor, etc., shall be at Tenant Contractor's expense.

01 33 00 – SUBMITTAL PROCEDURES
1.1 Before delivery to site of any item of equipment, submit shop drawings complete with all data, pre-checked by the Contractor and stamped accordingly, for review by the Consultant. Indicate project name on each brochure or sheet, make reference to the number and title of the appropriate specification section, and provide adequate space to accommodate the Consultant's review stamp(s).
1.2 Submit shop drawings to the Consultant in electronic (PDF) format, as coordinated after award of contract. Where submittals are derived from digital originals, to ensure maximum quality and legibility, do not print and rescan documents; submittals made as such will be immediately rejected.
1.3 Submit a schedule of shop drawings within one week after award of contract. Group submittals by specification division as appropriate.
1.4 Submit Material Safety Data Sheet (MSDS) for all applicable products.

01 40 00 – QUALITY REQUIREMENTS

1.0 PERMITS AND FEES
1.1 Obtain and pay for all Permits and fees required for the execution and inspection of the Work and pay all charges incidental to such Permits. Submit to the Authority Having Jurisdiction the necessary number of drawings and specifications for examination and approval prior to commencement of work.
1.2 Arrange and pay for any special inspection of equipment specified if and when required.

2.0 CODES AND STANDARDS
2.1 Comply with current regulations of all applicable provincial and municipal codes and regulations, including, but not limited to, the Ontario Building Code, and the requirements of any Authorities Having Jurisdiction (AHJ).
2.2 Comply with other standards as related to each trade.

3.0 REFERENCES
3.1 Health Canada / Workplace Hazardous Materials Information System (WHMIS), Material Safety Data Sheets (MSDS).
3.2 Ontario Building Code.

4.0 QUALITY ASSURANCE
4.1 Qualifications: Work to be carried out by qualified, licensed tradespersons or apprentices in accordance with Authorities Having Jurisdiction.
4.2 Only first class workmanship will be accepted, not only in regards to durability, efficiency and safety, but also in regards to neatness of detail. Present a neat and clean appearance on completion. Any unsatisfactory workmanship will be replaced at no extra cost.
4.3 Conform to the best practices applicable to the type of work. Install all equipment and systems in accordance with manufacturers' recommendations, and consistent with the general requirements of the specification.

5.0 FIELD QUALITY CONTROL
5.1 Carry out tests in presence of Owner, or designated representative.
5.2 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
5.3 Manufacturer's Field Services
.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports.

6.0 INSPECTIONS
6.1 Furnish a Certificate of Acceptance from Inspection Department on completion of work.
6.2 The Consultant will carry out inspections and prepare deficiency lists for action by the Contractor, during, and on completion of the Project.

01 50 00 – TEMPORARY FACILITIES AND CONTROLS
1.1 Contractor shall assume responsibility for any disruption caused by his forces to operational building services. Should temporary connections be required to maintain services during the work, supply and install all necessary equipment. Repair any system damaged during the execution of the work.

01 60 00 – PRODUCT REQUIREMENTS

1.0 GENERAL
1.1 Products certified by a recognized testing agency accredited by the Standards Council of Canada, and bear a certification mark from that agency, for example the CSA certification mark, cUL listing, or ULC listing. Where certified or listed material and equipment is not available, obtain special approval from Authority Having Jurisdiction before delivery to project site, and submit the approval to the Consultant.
1.2 Products described in this specification are considered to be the minimum standard of acceptance.
1.3 All materials to meet flame spread rating requirements of all Authorities Having Jurisdiction.

2.0 SUBSTITUTION OF SPECIFIED EQUIPMENT
2.1 "Approved equal" shall be defined as an alternate approved by the Consultant.
2.2 If during the Tender bid process, the bidding Contractor wishes to substitute the specified equipment for an "approved equal", the bidding Contractor must submit Shop Drawings to the Consultant before the Tender close, for approval. If no substitution request is made, the as-specified equipment is that to be provided.

3.0 PRODUCT STORAGE AND HANDLING REQUIREMENTS
3.1 Store all equipment and materials in dry locations.

01 70 00 – EXECUTION REQUIREMENTS

1.0 EXAMINATION AND PREPARATION
1.1 Prior to submitting Tender, the Contractor shall carefully examine the Site and ascertain all conditions which affect the Work.
1.2 No extras will be allowed for work resulting from conditions that would have been evident upon a thorough examination of electrical closets, rooms and ceiling spaces, whether exposed or not.
1.3 Verify location and sizes of existing services prior to making new connections to ensure that the existing systems have adequate capacities to accommodate new loads.

2.0 EXECUTION
2.1 Location of Outlets
.1 The Consultant reserves the right to change the location of outlets to within 3 m (10 feet) from the point indicated on the drawings without extra charge, providing the Contractor is advised before installation is made.
2.2 Mounting Heights: where not dimensioned on the architectural or interior designer's drawings, the centreline of the device or operating control as follows:
.1 Thermostats: 1200 mm (47 inch) AFF (Above Finished Floor).
.2 Light switches: 1100 mm (43 inch) AFF.
.3 Exact dimensions to be provided and approved by Consultant prior to any rough-in.
.4 Any mounting heights not specified are to be coordinated with the Consultant prior to installation.

3.0 CUTTING AND PATCHING
3.1 The Contractor will be responsible for all cutting and patching required for the installation.
3.2 Structural members are not to be cut without the consent of the Consultant.
3.3 Restore finishes to match existing surroundings.

4.0 CLEANING AND WASTE MANAGEMENT
4.1 The Contractor and associated sub trades, at all times during construction, is to keep the site free of all debris, boxes, packing, etc., resulting from performance of the Work.
4.2 At the completion of this Work, the installation is to be left in a clean and finished condition.
4.3 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
4.4 Remove and dispose off-site, all materials removed, abandoned, and not to remain, designated for salvage, or be re-used in an appropriate manner acceptable to local authorities having jurisdiction, specifically equipment and materials considered hazardous to the environment, unless otherwise noted to be turned over to the Owner or to the Landlord.

5.0 STARTING AND ADJUSTING
5.1 Conduct acceptance tests to demonstrate that the equipment and systems meet the specified requirements. Tests may be conducted as soon as conditions permit, and consequently the Contractor is to make all changes, adjustments, or replacements required as the preliminary tests may indicate prior to the final tests. Tests are as specified in various sections of the specifications.
5.2 Carry out tests in the presence of the Consultant. Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of Project. The Contractor shall be in charge of the plant during tests. The Contractor shall assume responsibility for damages in the event of injury to the personnel, building, equipment, and shall bear all costs for liability, repairs, and restoration in this connection. Submit test results.
5.3 Test new and interfaced systems for proper operation to ensure that the quality and reliability of the base building system is not altered or reduced.

01 77 00 – CLOSEOUT PROCEDURES

1.0 BUILDING PERMIT COMPLIANCE
1.1 Prior to requesting the Consultant's letter "Review of General Conformance" for submission to the municipal building department to allow occupancy, the following items must be complete and submitted to the Consultant, as applicable:
.1 General
.1 Submit all applicable inspection reports from Authorities Having Jurisdiction.
.2 Continuity of fire separations at service penetrations must be complete.
.3 All seismic restraint requirements must be complete.
.2 Fire Protection
.1 Contractor must confirm that all fire extinguishers have been installed.
.2 Provide Fire Inspector's clearance for fire pump and main sprinkler room.
.3 Provide NFPA 14 certificate for standpipe system.
.4 Provide NFPA 13 certificate for sprinkler system.
.3 Plumbing
.1 Confirmation that municipal plumbing inspector has reviewed the work and notes no deficiencies.
.4 HVAC
.1 Contractor must certify the availability of minimum ventilation from air supply system.
.2 Contractor must certify that HVAC control interlocks with life safety systems (e.g. fire alarm) are operational.
1.2 If any of the above items have not been completed at the time of Consultant's Inspection, and the letter of "assurance of professional field review and compliance" cannot be issued, any costs for subsequent Inspections will be charged to the Contractor.

2.0 SUBSTANTIAL PERFORMANCE
2.1 Prior to requesting Substantial Performance Inspection, the following items must be complete and submitted to the Consultant, as applicable:
.1 General
.1 Project record drawings must be submitted to Consultant for review.
.2 Maintenance manuals must be submitted to Consultant for review.
.2 HVAC
.1 Air Balancing report.
.2 Hydronic Balancing report.
2.2 If any of the above items have not been completed at the time of the Substantial Performance Inspection, and the Substantial Performance certificate cannot be issued, any costs for subsequent Inspections will be charged to the Contractor.

3.0 OPERATION AND MAINTENANCE (O&M) MANUALS
3.1 Submit three hard copies in 3-ring binder, and one soft copy in searchable PDF format of O&M Manual to the Consultant for review.
3.2 O&M Manuals to include:
.1 As-Built Drawings (AutoCAD and PDF format)
.2 Testing and Commissioning Reports
.3 Inspection Certificates
.4 Verification Reports and Certificates for all life safety systems.
.5 HVAC and Plumbing
.1 Valve charts
.2 HVAC balancing reports
.6 Warranties
.7 Training records
.8 Operation and Maintenance procedures.
.9 Reviewed shop drawings of all new equipment (arranged by Specification section number)

4.0 PROJECT RECORD DOCUMENTS
4.1 Record Drawings
.1 Maintain a drawing on Site, complete with red-line record of all revisions. Provide exact dimensions and routing of below-grade or below-slab services. Indicate the following:
.1 HVAC and Plumbing
.1 All pipe routing.
.2 Coordinate access to Consultant's AutoCAD files.
.3 Complete record drawings accurately marked up in red ink must be submitted for review. Once reviewed, prepare as-built drawings in a neat manner, showing all deviations in work as per site red-line drawing.
4.2 AutoCAD as-built drawings
.1 On completion of Work, submit to the Consultant electronic drawings in AutoCAD and PDF format, and one full size hard copy of as-built AutoCAD files.
.2 Submit copies of 'As-Built' record drawings (in AutoCAD format) indicating actual circuits used and equipment installed on site and final unconditional certificate of approval from ESA and Building Inspection Department to Landlord.

5.0 WARRANTIES
5.1 Submit a written guarantee to the Owner for one year from the date of acceptance. This guarantee shall bind the Contractor to correct, replace or repair promptly any defective equipment workmanship without cost to the Owner.
5.2 Provide extended warranties as specified.

07 THERMAL AND MOISTURE PROTECTION

07 80 00 – FIRE AND SMOKE PROTECTION

1.0 FIRESTOPPING
1.1 Provide approved firestopping material to maintain integrity of fire separations.
1.2 Manufacturers: 3M, AD Fire Protection, Hilti, or approved equal.
1.3 Before starting any work on site, submit detailed shop drawings to the Consultant for review and comments. Include the following information:
.1 Manufacturer's technical product data and installation instructions for each specific type and location of penetration; certification that proposed firestopping materials and assemblies comply with CAN4-115-M.
.2 For each specific type and location of penetration, provide installation instructions from a recognized independent testing agency.
.3 Mark penetration types and locations on set of white prints. At completion of project, transfer this information to "as-built" drawings.

08 OPENINGS

08 31 00 – ACCESS DOORS AND PANELS

1.0 ACCESS DOORS
1.1 Provide access doors for new and existing concealed valves, dampers, junction boxes, equipment, etc.
1.2 Access doors to match wall and ceiling finishes.
1.3 Use recessed type access doors in gypsum ceilings.
1.4 Provide access doors wherever equipment, valves, dampers, control devices, etc., are concealed behind walls or inaccessible ceilings.
1.5 Access doors flush to edge of frame, concealed continuous hinge with screwdriver operated cam latch. Door construction to be minimum 14 gauge with 16 gauge frame. Fire-rated door construction to be a minimum 20 gauge insulated door with 16 gauge frame. Insulation thickness to provide required rating.
1.6 Size doors to allow adequate operating/maintenance clearance for devices. Body entry: 600 mm x 600 mm (24 inch x 24 inch). Hand entry: 300 mm x 300 mm (12 inch x 12 inch), unless noted otherwise.
1.7 Acceptable manufacturers: Acudor model as per assembly, or equal by LeHage:
.1 Concealed plaster: PS-5010
.2 Concealed drywall: DW-5015
.3 Existing drywall: DW-5040
.4 Fire-rated: FW-5050/FB-5060 to match assembly.

08 91 00 – LOUVERS

1.0 MANUFACTURERS
1.1 Price Industries Inc. DE439 or DE635, 100 mm (4") or 150 mm (6") deep (to suit wall thickness) factory assembled stationary, drainable, louvres sized as indicated on drawings, each AMCA water penetration and air performance certified, constructed of welded, extruded, alloy 6063-T5 aluminum with drainable blades, mounting and securing hardware to suit the application, and 12 mm (½") mesh aluminum birdscreen in an aluminum frame
1.2 Manufacturers: Construction Specialties, E.H. Price, Reversomatic, Ruskin, Ventex.

22 PLUMBING

22 01 00 – OPERATION AND MAINTENANCE OF PLUMBING

1.0 VIDEO PIPING INSPECTIONS
1.1 Provide video inspection of existing sanitary and storm piping prior to start of work, and after plumbing piping cleaning. Submit to Consultant on request.

2.0 PLUMBING PIPING CLEANING
2.1 Power wash and flush sanitary and storm piping prior to substantial completion.

22 05 00 – COMMON WORK RESULTS FOR PLUMBING

1.0 REFERENCES
1.1 Ontario Building Code, Division B, Part 7 – Plumbing.

2.0 COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT
2.1 Provide low voltage step-down transformers as required for all electronic controls, including but not limited to plumbing fixtures.

3.0 SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING
3.1 Use schedule 40 steel pipe sleeves through concrete structural members, floor slabs. For sleeves through other construction - drywall, tiles, masonry, etc., use minimum 22 gauge galvanized steel construction.
3.2 For all conduits passing through foundation walls, use link-seal pre-engineered mechanical seals between sleeves and pipes.
3.3 Provide sleeves for all pipes which pass through walls and floors.
3.4 Provide sleeves for insulated pipe large enough to permit free movement of pipe without crushing the insulation.
3.5 Provide sheet metal framing around ducts through masonry walls in exposed areas to ensure a clean finish around ducts.
3.6 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M+AMDT-MAR-78. Provide firestopping material and install within annular space between pipes, insulation, and adjacent fire separation.

4.0 GENERAL DUTY VALVES FOR PLUMBING
4.1 Gate Valves:
.1 NPS 2 and under, soldered:
.1 Class 125, 860 kPa, bronze body, screw in bonnet, solid wedge disc.
.2 Acceptable material: Milwaukee 1169, Crane 1324-300 psi, Jenkins 813.
4.2 Ball Valves:
.1 NPS 2 and under, soldered:
.1 To ANSI b16.18, Class 150.
.2 Bronze body, chrome plated brass ball, PTFE teflon adjustable packing, brass gland and PTFE teflon seat, steel lever handle, with NPT to copper adaptors.
.3 Acceptable material: Milwaukee BA, Crane, Jenkins, Victaulic 722 (threaded), or PL300 (push to connect)
.4 Isolating ball valves: Crane no. 9302, Crane no. 9322, or approved equal.
4.3 Isolate equipment, fixtures and branches with gate butterfly ball valves.
4.4 Provide shut-off valves or screwdriver stops on water supplies to all plumbing fixtures.

5.0 HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
5.1 Install tubing close to building structure to minimize furring, conserve headroom and space. Group exposed piping and run parallel to walls.
5.2 Isolate copper pipes from hangers/clamps/metal wall studs with electrolytic action tape.
5.3 Install chrome plated escutcheon plates at all exposed pipe penetrations through walls and ceilings.
5.4 Tie wire or perforated metal strap hangers: not accepted.
5.5 Concrete Inserts
.1 Use inserts placed in pre-drilled holes. Do not use powder driven inserts or self-drilling inserts. Before drilling holes, accurately locate all reinforcing bars in the affected areas using an electro-magnetic locator.
.2 Do not drill through or otherwise damage reinforcing bars. If reinforcing is encountered, the inserts must be relocated. Ensure that hole diameter, depth of penetration, spacing, etc., are in strict accordance with the insert manufacturer's recommendations for the specific insert type and load condition.
5.6 Floor supports:
.1 Provide a 150 mm (6 inch) high concrete housekeeping pad for floor mounted plumbing equipment, such as pumps and tanks.
5.7 Buried piping:
.1 Lay in well compacted washed sand in accordance with AWWA class B bedding.
.2 Bend tubing without crimping or constriction. Minimize use of fittings, by using long lengths.
.3 Install buried tubing in protective conduit.

6.0 VIBRATION CONTROLS FOR PLUMBING PIPING AND EQUIPMENT
6.1 Provide spring with elastomeric washer hangers for ceiling suspended equipment, and accessories.

7.0 IDENTIFICATION FOR PLUMBING SYSTEMS
7.1 Identify all equipment with engraved phenolic nameplates, secured in place with rivets. For valve tags, install with chain.
7.2 Identify piping in accordance with applicable standards.
7.3 Identify piping in accordance with ASME A13.1.

8.0 FACILITY DRAINAGE PIPING CLEANOUTS
8.1 Finished areas – Jay R. Smith 4000 NB, equal by Precision Plumbing Products, or equal by Zurn.

22 07 00 – PLUMBING INSULATION

1.0 PIPING INSULATION
1.1 Insulate all domestic hot and cold water piping with pre-molded low pressure glass fibre pipe insulation. Install vapour barrier on cold and hot water piping. Seal joints of vapour barrier. Provide PVC jacketing on all exposed insulated piping.
1.2 Insulation R-values and insulation thicknesses in accordance with ASHRAE 90.1-2013, or later version if called for by AHJ.

22 08 00 – COMMISSIONING OF PLUMBING

1.0 TESTING
1.1 Test piping to maintain test pressure without loss for 4 h.
1.2 Hydraulically test domestic cold water piping at 1-1/2 times system operating pressure or minimum 860 kPa, whichever is greater.

2.0 BALANCING
2.1 Balance recirculation system using circuit balancing valves. Mark settings and record on as built drawings on completion.

3.0 DISINFECTION
3.1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction.

22 09 00 – INSTRUMENTATION AND CONTROL FOR PLUMBING

1.0 CONTROL WIRING
1.1 250 volt rated, minimum #18 AWG stranded multiconductor cable, FT6/CMP rated.
1.2 Provide all control wiring in conduit regardless of voltage in accordance with Division 26.
1.3 Control wiring may be hung from J-Hooks when installed in accessible ceiling spaces.

22 10 00 – PLUMBING PIPING

1.0 PIPING INSTALLATION
1.1 Vent piping in accordance with Ontario Building Code and authorities having jurisdiction.
1.2 Provide trap seal primer piping to traps at floor drains.
1.3 Cut square, ream and clean tubing and tube ends, clean recesses of fittings and assemble without binding.
1.4 Assemble all piping using fittings manufactured to ANSI standards.
1.5 Install tubing close to building structure to minimize furring, conserve headroom and space. Group exposed piping and run parallel to walls.
1.6 Connect to fixtures and equipment in accordance with manufacturer's instructions unless otherwise indicated.
1.7 Pipe equipment drains to nearest drain.
1.8 Buried tubing:
.1 Lay in well compacted washed sand in accordance with AWWA class B bedding.
.2 Bend tubing without crimping or constriction. Minimize use of fittings, by using long lengths.
.3 Install buried tubing in protective conduit.

22 11 00 – FACILITY WATER DISTRIBUTION

1.0 DOMESTIC WATER PIPING
1.1 Type L hard copper to ASTM B75M.
1.2 Copper pipe fittings: screwed, flanged, or soldered:
.1 Tin-Antimony 95/5 solder to ASTM B32.
.2 Cast copper fittings: to ANSI B16.18.
.3 Wrought copper fittings: to ANSI/ASME B16.22.

2.0 FITTINGS
2.1 Bronze pipe flanges and flanged fittings, class 150 and 300: to ANSI B16.24.
2.2 Cast bronze threaded fittings, class 125 and 250: to ANSI/ASME B16.15.
2.3 Cast copper, solder type: to ANSI b16.18.
2.4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.

3.0 JOINTS
3.1 Rubber gaskets, 1.6mm (01⁄16in) thick: to ANSI/AWWA c111/a21.11.
3.2 Bolts, nuts, hex head and washers: to ASTM a307, heavy series.
3.3 Solder/brazing: lead free silver solder.
3.4 Teflon tape: for threaded joints.
3.5 Grooved mechanical joints (alternate):
.1 The grooves and gaskets must be installed according to manufacturer's installation instructions. The groove must be clean and true. The gasket seat pipe surface must be free of indentations, roll marks and projections.
.2 The gaskets shall be standard type ehp -34°C (-30°F) to 120°C (250°F) and 300 psig (2065 kPa). Gaskets suitable for use with 40% ethylene glycol or of a grade suitable for the intended service.
.3 The couplings shall consist of two ductile iron housing segments cast with offsetting angle-pattern bolt pads to provide rigidity. Installation-ready, for direct stab installation without field disassembly, with grade EHP gasket rated to +120°C, (250°F) (Victaulic style 607.
.4 Fittings shall be wrought copper conforming to ANSI B16.22 or bronze casting conforming to ANSI B16.18, Victaulic copper-connection.
.5 Valves - grooved end valves may be used as part of the mechanical joint system.

4.0 DOMESTIC WATER PIPING SPECIALTIES
4.1 WHA (Water Hammer Arrestor) Precision Plumbing Products 'SC' series, equal by Precision Plumbing Products, or equal by Zurn.
4.2 Backflow Preventers: to CSA B64 series and for operation in continuous pressure applications.
.1 Body: Bronze for 2" and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for 2-1/2" and larger.
.2 End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
.3 Basis of Design: Watts Series 009 for 50 mm (2 in) and smaller, or equal by Febco.
.4 Accessories:

REVISIONS

No.	DATE	DESCRIPTION
1	2023-03-31	ISSUED FOR 95%CD
2	2023-06-06	ISSUED FOR 50%CD
3	2023-06-22	ISSUED FOR 90%CD
4	2023-07-28	ISSUED FOR 95%CD
5	2023-09-28	ISSUED FOR CLIENT REVIEW
6	2024-05-24	ISSUED FOR PERMIT
7	2024-06-07	ISSUED FOR TENDER

All dimensions and conditions must be checked and verified by the General Contractor

NOTES:

KEYPLAN:

CLIENT:
CLIENT: UNIVERSITY OF TORONTO

PROJECT:
ED-22-703-08

CIRHR UNIVERSAL WASHROOM

CENTRE FOR INDUSTRIAL RELATIONS & HUMAN RESOURCES (CIRHR)
121 ST. GEORGE ST., TORONTO, ONTARIO

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+VG. ARCHITECTS
THE VENTIN GROUP LTD

SCALE:
N.T.S.

MECHANICAL SPECIFICATIONS

M3.1

DRAWN BY: Author
CHECKED BY: Checker

Plot Date: 6/6/2024 4:54:54 PM
Autodesk Docs://ED-22-703 - UofT Accessibility Improvement/ED-22-703 - QCG ME Model_R22.rvt

.1 Valves: Ball type with threaded ends on inlet and outlet of NPS 2 and smaller; outside screw and yoke gate-type with flanged ends on inlet and outlet of NPS 2-1/2 and larger.
.2 Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

22 13 00 – FACILITY SANITARY SEWERAGE

1.0 SANITARY WASTE AND VENT PIPING
1.1 Above Ground - DWV Copper or cast iron.
1.2 Below Ground - PVC, or ABS.

2.0 SANITARY WASTE PIPING SPECIALITIES
2.1 Manufactured by Jay R. Smith, or Precision Plumbing Products, or Zurn:
.1 TSP (Trap Seal Primer) Precision Plumbing Products #PO-500
.2 CO (cleanout finished area) Smith 4000 NB
.3 HD (Hub Drain) Smith 2005A-3580-P
.4 F/FD (Funnel Floor Drain) Smith 2005A-3591-P
.5 FD "X" (Floor Drain) Smith 2630-H-NB-P
.6 FD (Floor Drain) Smith 2005A-P

22 42 13 – COMMERCIAL WATER CLOSETS, URINALS, AND BIDETS

1.0 "WC-1" BARRIER FREE WATER CLOSET
1.1 American Standard 3351101.020 Toilet - AFWALL® MILLENNIUM™ FloWise®, Toilet, Wall-hung with wall outlet, Toilet operates in the range of 4.2 to 6.0 LPF (1.1 - 1.6 GPF), White finish Vitreous china, EverClean® antimicrobial surface, Elongated bowl, Concealed trapway design, Direct-fed siphon jet flush action, 38 mm (1-1/2") top spud, 254 x 305 mm (10" x 12") water surface area, Fully-glazed 54 mm (2-1/8") trapway, Condensation channel,
1.2 Centoco 1500TSTSCCFE-001 Seat - FAST-N-LOCK, For elongated bowl, Open front, Heavy duty, Polypropylene, Toilet seat, Less seat cover, Plastic commercial check hinges, and Stainless steel hinge pin, Specified in White finish, The bolt and nut material shall be stainless steel, Dimensions:32 mm (1-1/4") high, 473 mm (18-5/8") long, 368 mm (14-1/2") wide
1.3 Sloan SL-G2-8111-1.28 Flush Valve - G2 Optima Plus® Automatic no-touch Exposed Water closet flushometer, High Efficiency 4.8 LPF (1.28 GPF), 38 mm (1-1/2") spud coupling For top spud toilet, Battery powered, constructed from Semi-red brass, Polished chrome finish, Chloramine resistant PERMEX® synthetic rubber diaphragm, Infrared sensor with multiple-focused, lobular sensing fields for high and low target detection, Sensor located on engineered metal cover with replaceable lens window, Courtesy Flush® electrical override button, Flush tube for 292 mm (11-1/2") rough-in, Adjustable tailpiece, 25 mm (1") I.P.S. screwdriver Bak-Chek® angle control stop with free spinning vandal-resistant stop cap, Dual-filtered fixed bypass, Sweat solder adapter kit with cover tube, High back pressure vacuum breaker, 25 mm (1") supply pipe, Cast wall flange with set screw, No external volume adjustment, Four (4) AA-size alkaline batteries included, "Low battery" flashing LED, 103 - 552 kPa (15 - 80 PSI) operating water pressure,
1.4 Watts ISCA-101-L/R-M11 Carrier - Industry Standard single Horizontal adjustable Closet Carrier, Tiling frame, patented compression seal faceplate assembly, epoxy coated cast iron, epoxy coated cast iron, with incremental measurements embossed onto legs to easily adjust height of carrier to most commonly used fixture requirements, epoxy coated cast iron, Plated hardware, neoprene bowl gasket, adjustable ABS nipple, integral test cap, 51 mm (2") no hub vent connections, 102 mm (4") no hub waste, Adjustable for standard and wheelchair height, chrome cap nuts, required minimum space is 292 mm (11-1/2")

22 42 16 – COMMERCIAL LAVATORIES AND SINKS

1.0 "L-1" WALL-HUNG LAVATORY
1.1 Basin:
.1 American Standard Murro 0955001EC.020 0059020EC.020, Wall-hung Lavatory, Vitreous china, EverClean® antimicrobial surface, White finish, Single hole centerset, Rear overflow, Faucet ledge with recessed self-draining deck, For concealed arm or wall support, Vitreous china shroud/knee contact guard with EverClean (0059020EC), Bowl Dimensions: 394 mm (15-1/2") long, 540 mm (21-1/4") wide, 127 mm (5") deep
1.2 McGuire 155A Fixture Drain - Straight drain, Cast brass, Chrome-plated finish, Open grid PO plug
1.3 McGuire LFBV170 Supplies
1.4 McGuire 8872C P-Trap
1.5 Faucet:
.1 Delta 590T1150 Battery Operated handsfree 'no-touch' faucet, Deckmount Hi-Rise Spout with Integral Sensor, Surface Mount Control Box, H2Optics® technology, Chrome plated one piece CAST Hi-Rise spout with integral sensor, Adjustable sensing range and timeout, Vandal Resistant 0.5gpm (1.9 L/min) Laminar Outlet, Solenoid and Controller in Surface Mount Housing,
1.6 Thermostatic Mixing Valve:
.1 Lawler 1070-87500 point of use thermostatic water mixing valve, nickel plated bronze body, temperature adjusting spindle, 10 mm (3/8 inch) inlet and outlet FNPT connection, integral checks, offer temperature range between 95°C (203°F) and 46°C (114.8°F). Set valve temperature at 46°C (114.8°F).
1.7 Carrier:
.1 Watts CA-411-CA-481 Floor mounted concealed arm lavatory carrier, Leveling screws and basin locking device, upper tie rod, and plated hardware., required minimum space is 89 mm (3-1/2")

23 HEATING, VENTILATING, AND AIR CONDITIONING

23 01 00 – OPERATION AND MAINTENANCE OF MECHANICAL SYSTEMS

1.0 VERIFICATION OF OPERATION OF EXISTING SYSTEMS
1.1 Verify correct operation of all existing Mechanical systems intended to be reused or reinstated as part of the work. Inform Consultant immediately upon discovery of inoperative Mechanical systems.
1.2 Prior to start of construction, measure the existing air flow rate from all air outlets. Submit balancing report to the Consultant for review.

2.0 HVAC AIR-DISTRIBUTION SYSTEM CLEANING
2.1 Perform vacuum pressure duct cleaning of all existing ducts to be reused, including main supply and return ducts, branch ducting, and exhaust ducting.
2.2 Clean new and existing to be re-used grilles and diffusers, to eliminate dirt, dust, and fingerprints.

3.0 OPERATION AND MAINTENANCE OF DECENTRALIZED MECHANICAL EQUIPMENT
3.1 Clean existing Mechanical equipment that is to be reused, including convectors, heaters, etc.

23 05 00 – COMMON WORK RESULTS FOR MECHANICAL

1.0 REFERENCES
1.1 Ontario Building Code, Division B, Part 6 – HVAC.

2.0 COMMON MOTOR REQUIREMENTS FOR MECHANICAL EQUIPMENT
2.1 Provide starters for all equipment, i.e. pumps, fans, etc.
2.2 Provide low voltage step-down transformers as required for all electronic controls.
2.3 Group individual starters and controls where possible.

3.0 SLEEVES AND SLEEVE SEALS FOR PIPING
3.1 Use schedule 40 steel pipe sleeves through concrete structural members, floor slabs. For sleeves through other construction - drywall, tiles, masonry, etc., use minimum 22 gauge galvanized steel construction.
3.2 For all conduits passing through foundation walls, use link-seal pre-engineered mechanical seals between sleeves and pipes.
3.3 Provide sleeves for all pipes which pass through walls and floors.
3.4 Provide sleeves for insulated pipe large enough to permit free movement of pipe without crushing the insulation.
3.5 Provide sheet metal framing around ducts through masonry walls in exposed areas to ensure a clean finish around ducts.
3.6 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M+AMDT-MAR-78. Provide firestopping material and install within annular space between pipes, ducts, insulation, and adjacent fire separation.

4.0 METERS AND GAUGES FOR HVAC PIPING
4.1 Thermometers: Winters Instruments or Weiss Instruments.
4.2 Pressure Gauges: Winters Instruments or Weiss Instruments

5.0 GENERAL DUTY VALVES FOR HVAC
5.1 Isolating ball valves: Crane or equal.
5.2 Circuit setting valves: Bell & Gossett, or equal, and be suitably sized for required flows.
5.3 Isolating ball valves: Crane (Jenkins), Dezurick, Bell & Gossett, or equal.
5.4 Circuit setting valves: 2 ½" and larger: Dezurick Series 100 or equal, complete with measuring ports and memory stops, and be suitably sized for required flows.
5.5 Gate valves 65mm (2 ½") and larger:
.1 Butterfly type: Jenkins Fig. 2232EL iron body lug type with bronze disc, EDPM liner, lever, flanged ends.
.2 Gate type: Jenkins Fig. 454 having iron body and bronze trim, solid wedge discs, OS&Y with rising stem, flanged ends.
5.6 Check valves: Swing check type 65 mm (2 1/2") and larger: Iron body flanged, Jenkins #587, Crane #373, Toyo #435JA, Kitz 78.
5.7 Strainers: Mueller or Sarco, inline type c/w 304 stainless steel baskets, rated at 125 psi

6.0 HANGERS AND SUPPORTS FOR MECHANICAL SYSTEMS
6.1 Tie wire or perforated metal strap hangers will not be accepted.
6.2 Concrete Inserts
.1 Use inserts placed in pre-drilled holes. Do not use powder driven inserts or self-drilling inserts. Before drilling holes, accurately locate all reinforcing bars in the affected areas using an electro-magnetic locator.
.2 Do not drill through or otherwise damage reinforcing bars. If reinforcing is encountered, the inserts must be relocated. Ensure that hole diameter, depth of penetration, spacing, etc., are in strict accordance with the insert manufacturer's recommendations for the specific insert type and load condition.
6.3 Pipe Hangers and Supports
.1 Manufacturers: Anvil International, Crane, Adsco, or approved equal.
.2 Hangers for Pipe Sizes 50 mm and Over: Carbon steel, adjustable, clevis.
.3 Hanger Rods: Hot-dipped galvanized steel threaded both ends, threaded one end, or continuous threaded.
.4 Upper attachments for existing concrete:
.1 Provide any additional supports required from existing concrete construction for any piping or equipment by drilling same and installing expansion anchors. Do not install in uncured concrete.
.2 Vibration Applications:
.1 Provide any additional supports required from existing concrete construction for any equipment subject to vibration by drilling same and installing chemical epoxy adhesive threaded rod anchors.
.2 Do not install in uncured concrete.
.3 Do not use explosive drive pins in any Section of Work without obtaining prior approval.
.5 Pipe Attachment
.1 Hot or cold suspended piping, including conduits, where horizontal movement is 25 mm (1 in) or less and middle attachment (rod) is longer than 300 mm (12 inches):
.1 For steel or cast iron, use adjustable clevis to MSS SP-69, type 1, ULC listed.
.2 For copper to 6 inch nominal size, use adjustable clevis; carbon steel, copper plated.
.2 Suspended hot piping, steel or copper, with horizontal movement in excess of 25 mm (1 in) hot steel piping with middle attachment (rod) 300 mm (12 in) or less. Pipe roller to MSS SP-69, type 43.
.3 Bottom supported hot piping, steel and copper. Pipe roller stand (adjustable) to MSS SP-69, type 46.
6.4 Saddles and Shields
.1 Cold piping NPS 1 1/4 to NPS 24: Protection shield with foam glass or high density insulation with uninterrupted vapour barrier between pipe and shield, to MSS SP-69, type 40.
.2 Hot piping NPS 1 1/4 to NPS 24: Protective saddle with insulation between saddle and pipe, to MSS SP-69, type 39A or 39B.

7.0 VIBRATION ISOLATION
7.1 Provide spring with elastomeric washer hangers for ceiling suspended equipment, duct work, and accessories.

8.0 IDENTIFICATION FOR MECHANICAL
8.1 Identify all equipment with engraved phenolic nameplates, secured in place with rivets. For valve tags, install with chain.
8.2 Identify Mechanical piping and systems in accordance with applicable standards.

9.0 TESTING, ADJUSTING, AND BALANCING FOR MECHANICAL
9.1 General
.1 Submit balancing reports to Consultant for review.
9.2 Air Systems:
.1 Employ the services of a licensed independent balancing company to balance the air systems to achieve the airflow shown, and submit a complete report. Acceptance of balancing and report will be subject to on site verification.
.2 Provide all necessary balancing of volume dampers as shown on drawing. Balance the air system(s) to air volumes shown. Submit a copy of balancing report to the Consultant. Air balancing must be performed by a firm who is a member of NEBB (National Environmental Balancing Bureau). All balancing to be completed and dampers locked in place. Comfort balancing to be completed one week after facility is operational.
.3 Balance each air handling system, and air quantities per outlet listed in the balancing report. Clean or replace filters and leave systems in clean operating condition.
.4 Test and balance air system such that air quantities at each outlet, grille and register are within 5% of design figures. Adjust fan speeds, splitter and balancing dampers to achieve these results. Prepare and submit a final balancing report for review by Consultant.
.5 Testing and balancing of air handling systems shall be under supervision of qualified personnel. Balancing and testing shall be performed by trained personnel with records kept of each trial balance for supervision and review.
.6 If spot checking systems reveals actual air quantities do not agree with air balance report, this Section will be called upon to completely rebalance systems until satisfactory, without extra remuneration.
9.3 Hydronic Systems:
.1 Provide all necessary hydronic balancing. Balance the hydronic system to the flow requirements shown. Submit a copy of the balancing report to the Consultant. Hydronic balancing must be performed by a firm who is a member of NEBB (National Environmental Balancing Bureau). Lock circuit setters in place once hydronic balancing is completed.

23 07 00 – MECHANICAL INSULATION

1.0 INSULATION R-VALUES IN ACCORDANCE WITH ASHRAE 90.1-2013.

2.0 ACOUSTIC INSULATION FOR DUCTS
2.1 Provide where indicated, and in all return air transfer ducts.
2.2 12.7 mm (1/2 inch) thick internal lining, c/w factory applied black acrylic polymer coating, having flame spread rating of 25 or less and smoke development classification of 50 or less.
2.3 Johns Manville Permacote Linacoustic standard/HP or equivalent.
2.4 Seal all cut edges to avoid any airborne fibres.

3.0 THERMAL INSULATION FOR DUCTS
3.1 Blanket or rigid thermal insulation on indoor as follows unless otherwise indicated:
.1 Insulate full length of fresh air supply ducts.
.2 Insulate first 3 m (10 foot) of exhaust or ERV ducts from exterior wall or roof.
.3 Insulate full length of supply and return ducts that are routed through a non-conditioned space.
.4 Thermal insulation is not required on supply and return ducts confined within a conditioned space (including return plenum ceilings).
.5 Acoustically lined interior ducts need not to be thermally insulated.
.6 Use rigid insulation and drywall type corner beads in areas where insulation is easily susceptible to damage.
3.2 Insulation: foil faced, flame spread rating of 25 or less, smoke development classification of 50 or less.
3.3 Thermal insulation: 38 mm (1-1/2 inch) thick blanket mineral fiber or 25.4 mm (1 inch) thick rigid mineral fiberboard for warm air ducts.
3.4 Thermal insulation for cold air ducts: 38.1 mm (1-1/2 inch) thick rigid insulation, or 50.8 mm (2 inch) thick blanket mineral fibre.
3.5 Vapour-retarder membrane shall be installed with insulation on cold, dual-temp and fresh air supply ducts.
3.6 Acceptable blanket mineral fiber: Johns Manville microlite duct wrap type 100, or equivalent.
3.7 Acceptable rigid mineral fiberboard: Johns Manville 800 series spin-glass type, or equivalent.
3.8 Seal all joints with ULC listed self-adhesive insulation tape for indoor ducts and insulation.
3.9 Use rigid insulation and drywall type corner beads in areas where insulation is easily susceptible to damage.
3.10 Cover exterior ductwork insulation with 1.016mm (0.04 inch) thick aluminum jacket (forming the double skin). Form all longitudinal seams along the bottom. Ensure that aluminum jacket is fastened with secure, watertight, mechanical connections. Apply exterior grade sealant at all seams.
3.11 For exposed ductwork in interior areas, cover insulation with canvas and lagging cement.

4.0 THERMAL INSULATION FOR PIPING, GENERAL
4.1 Insulation R-values in accordance with ASHRAE 90.1-2013.
4.2 Insulation type in accordance with related sections.

5.0 BASIC PIPE INSULATION (PRE-MOLDED)
5.1 Sectional fibreglass pipe insulation in pre-molded sections 900 mm (36") long, split and ready for application with a maximum "K" factor of 0.035 at 24 degrees C mean temperature and capable of use in service temperatures from -40 degrees C to 260 degrees C. Insulation complete with factory applied vapour seal jacket of vinyl coated foil craft laminated with reinforcing of open mesh glass fibre.
5.2 Provide jacket for exposed insulated pipe. Recovering jacket treated cotton fabric, ULC listed with lagging adhesive. PVC jacket, 0.015 mil white in colour. Installation in accordance with manufacturer's solvent weld adhesive. Junctions between fittings and jacketing sealed with white silicone.
5.3 Provide pre-molded fitting covers to suit insulated fitting.

23 08 00 – COMMISSIONING OF MECHANICAL

1.0 CLEANING AND FLUSHING OF HYDRONIC SYSTEMS.
1.1 On completion, clean complete heat pump loop piping in Project space using Ferroquest 345 or equal cleaner for at least eight hours at 37.8°C (100°F). Flush out each system, opening and cleaning each scale pocket and strainer. System must be flushed out before filling with clean water. Provide portable pump for flushing and filling.
1.2 During cleaning operation, disconnect hydronic equipment and use the hose connections used to bypass water around each unit. Operate heating boilers to maintain 30°C (86°F) system water temperature in systems. DO NOT EXCEED 43°C (109°F). See equipment manufacturers printed instructions for further information and guidance.
1.3 The supplier of the base building chemical treatment equipment and chemicals shall supervise the entire cleaning and flushing operation of all the systems. Coordinate with base building.
1.4 Ensure the system is flushed of all sand, gravel and filings before cleaner is added.
1.5 Ensure the proper strength of cleaner is added and circulated for the prescribed time.
1.6 Ensure system is thoroughly flushed again before chemicals are added.
1.7 Ensure the proper dosage of chemicals is added.
1.8 Provide written report to Consultant when cleaning is completed. Advise Consultant and Owner at least 48 hours prior to cleanout so same can be witnessed. Carry out all work in accordance with base building requirements.

2.0 TESTING
2.1 Operate system to full capacity and verify proper, safe efficient operation of all parts and each complete system. Oil motors and grease bearings before operating equipment.
2.2 When work is complete and system is in operation, adjust valves, belt drives, controls, dampers and thermostats so that there is even distribution of cooling, heating and ventilation air throughout. Turn over to Owner necessary keys, handles, and operating devices for each system.

23 09 00 – INSTRUMENTATION AND CONTROL FOR MECHANICAL

1.0 CONTROL WIRING
1.1 250 volt rated, minimum #18 AWG stranded multiconductor cable, FT6/CMP rated.
1.2 Provide all control wiring in conduit regardless of voltage in accordance with Division 26.
1.3 Control wiring may be hung from J-Hooks when installed in accessible ceiling spaces.

23 09 93 – SEQUENCE OF OPERATION FOR MECHANICAL CONTROLS

1.0 TEMPERATURE
1.1 Maintain 72 degree F temperature in all continuously occupied spaces.

23 21 00 – HYDRONIC PIPING AND PUMPS

1.0 GENERAL
1.1 Submittals
.1 Submit shop drawings/product data sheets for all products specified in this section except piping and unions.
.2 Submit motor product data sheets and certified performance curves with all pump shop drawings.
1.2 Closeout Submittals
.1 Submit with delivery of each unit a copy of factory inspection and test report, and include a copy of each report with O&M Manual project closeout data.
.2 Submit a site inspection and start-up report from manufacturer's representative as specified in Part 3 of this section.
.3 Prior to Substantial Performance of the Work, submit a spare seal flush line filter for each pump equipped with a seal flush line.
1.3 Quality Assurance
.1 Pump motors are to comply with requirements of Section 20 05 00 – Common Work Results for Mechanical.

2.0 PRODUCTS
2.1 Pipe, Fittings, and Joints
.1 Black Steel - Screwed Joint
.1 Mild black carbon steel, Grade B, ASTM A53, complete with Class 125 cast iron threaded fittings to ANSI/ASME B16.4, and screwed joints.
.2 Black Steel - Welded Joint
.1 Mild black carbon steel, Grade B, ASTM A53, mill or site bevelled, complete with factory made seamless carbon steel butt welding fittings to ASTM A234, Grade WPB, with long sweep pattern elbows unless otherwise specified, and welded joints.
.3 Soft Copper Pipe
.1 Type "L" seamless soft copper to ASTM B77.
.4 Hard Copper - Solder Joint
.1 Type "L" hard drawn seamless copper to ASTM B88, complete with wrought copper fittings to ANSI B16.22, and 95% tin / 5% Antimony solder joints.
2.2 Piping Unions
.1 Screwed Piping
.1 Malleable iron, ground joint, bronze or brass to iron or bronze to bronze seat screwed unions and union elbows with a minimum pressure rating of 1725 kPa (250 psi) steam at 260°C (500°F).
.2 Flanged Piping
.1 Forged carbon steel slip-on type raised faced welding flange unions to ASTM A105, 150 lb. Class for steel pipe, and slip-on type 150 lb. Class bronze flanges for copper pipe.
2.3 Shut-Off Valves
.1 Ball Type
.1 Class 600, 4140 kPa (600 psi) WOG rated full port ball valves, each complete with a forged brass or bronze body and cap, blowout-proof stem, solid forged brass chrome plated ball, "Teflon" or "PTFE" seat, threaded ends, and removable lever handle.
.2 Manufacturers:
.1 Toyo Valve Co. Fig. 5044A;
.2 Watts Industries (Canada) Inc. #FBV-3;
.3 Kitz Corp. Code 58;
.4 Victaulic Co. of Canada Ltd. Series 722;
.5 Apollo Valve #77-100.
.2 Butterfly Type
.1 Cast ductile iron, lug body style, 1200 kPa (175 psi) rated butterfly valve, each complete with a neck to permit 50 mm (2") of insulation above the flange, a field replaceable EPDM seat, ductile iron disc, stainless steel shaft with EPDM seal, a lever handle for valves to and including 150 mm (6") diameter, a handwheel and gear type operator for valves larger than 150 mm (6") diameter, and each suitable for bubble-tight dead end service with valve closed and either side of connecting piping removed.
.2 Manufacturers:
.1 DeZurik of Canada Ltd., Figure No. 632;
.2 Victaulic Co. of Canada Ltd. Vic-300 MasterSeal or AGS Vic-300;
.3 Apollo Valve 143 Series;
.4 Watts Industries (Canada) Inc. #BF-03;
.5 Kitz Corp. 6112 Series;
.6 Toyo Valve Co. 918DESL/G2.
2.4 Swing Check Valves
.1 Bronze - Screwed
.1 Class 125, 1380 kPa (200 psi) WOG rated horizontal swing check valves, each complete with a "Y" pattern bronze body, hinged brass disc, easy access screw-in cap, and screwed ends.
.2 Manufacturers:
.1 Toyo Valve Co. Fig. 236;
.2 Nibco #T-433;
.3 Kitz Corp. Code No. 22.
.2 Steel - Grooved Ends
.1 Victaulic Co. of Canada Ltd. Series 716, 779 or W715 grooved end carbon steel check valves suitable for mounting horizontally or vertically.
.3 Cast Iron - Screwed and Flanged
.1 Cast iron, bronze trim, 1380 kPa (200 psi) rated swing check valves, each complete with a bronze disc and seat, malleable iron hinge, bolted cover, and screwed or flanged ends as required.
.2 Manufacturers:
.1 Toyo Valve Co. Fig. 435A;
.2 Watts Industries (Canada) Inc. #F-511;
.3 Kitz Corp. Code No. 78.
2.5 Wafer Check Valves
.1 Threaded lug body type, full bore, ANSI Series 150, 1965 kPa (285 psi) rated at 38°C (100°F), non-slam wafer check valves, each complete with a carbon steel body, stainless steel discs, a shaft, springs, disc stop and thrust bearings constructed of type 316 stainless steel, and seat materials to suit the application. The inside diameter of the valve must equal the inside diameter of the connecting pipe.
.2 Manufacturers:
.1 Gulf Valve Co. "WAFER CHECK";
.2 Watts Industries (Canada) Inc. Series ICV-125;
.3 The Metraflex Co. Style CVXX.
2.6 Drain Valves
.1 Minimum 2070 kPa (300 psi) WOG rated, 20 mm (¾") diameter straight pattern bronze ball valves, each complete with a threaded outlet suitable for coupling connection of 20 mm (¾") diameter hose, and a cap and chain.
.2 Manufacturers:
.1 Toyo Valve Co. Ltd. Fig. 5046;
.2 Watts Industries (Canada) Inc. #B-6000-CC;
.3 Kitz Corp. Code No. 68AC;
.4 Apollo Valves #78-104-01.
2.7 Circuit Balancing Valves
.1 Screwed or flanged as required, globe style, non-ferrous circuit balancing valves designed to facilitate precise flow measurement, precision flow balancing, and positive shut-off, complete with capped and valved drain connection, and valved ports for connection to a differential pressure meter.
.2 Manufacturers:
.1 Equal to Victaulic Co. of Canada Ltd. (Tour & Anderson) Series 787 screwed, Series 788 flanged, and 789 grooved end, and Series 78K "Koil Kit" valves.
2.8 Radiator Shut-Off and Balancing Valves
.1 Heavy pattern, straight, 1750 kPa (250 psi) rated at 120°C (250°F) bronze radiator valves, each complete with composition disc, spring loaded packing, and union. Equip inlet valves with a handle for shut-off. Equip outlet valves with a lockshield for shut-off and balancing.
.2 Manufacturers:
.1 Dahl Brothers Canada Ltd. #11042 and #13013;
.2 Spirax Sarco Ltd. Type R.
2.9 Pressure Relief Valves
.1 ASME tested, rated, and certified, bronze or cast iron bronze fitted, 1725 kPa (250 psi) rated pressure relief valves, each capable of relieving full output of equipment it is associated with, and each factory set at 415 kPa (60 psi) unless otherwise specified.
.2 Manufacturers:
.1 ITT Bell & Gossett 3301/4100, or 790/1170;
.2 Dresser Industries "CONSOLIDATED";
.3 Spirax Sarco Ltd. SVI Series;
.4 McDonnell & Miller Models 250 and 260;
.5 Conbraco 10-600 Series;
.6 Watts Industries (Canada) Inc. 174A or 740.
2.10 Air Vents
.1 Manual Air Vents
.1 Equal to Conbraco 27 Series, 3.2 mm (⅛") diameter with a key handle.
.2 Automatic Air Vents
.1 Float actuated air vents, each complete with a semi-steel body and cap, a stainless steel float assembly and seat, and a neoprene head.
.2 Manufacturers:
.1 Spirax Sarco Ltd., Type 13 W for system working pressures to 1035 kPa (150 psi), 13 WH for system working pressures greater than 1035 kPa (150 psi);
.2 Armstrong International Inc. No. 1-AV.
2.11 Strainers
.1 Cast iron wye shaped strainers, minimum 890 kPa (125 psi) rated and complete with a removable type 304 stainless steel screen with perforations sized to suit the application, and, for strainers 50 mm (2") diameter and larger, a blowdown pipe connection tapping.
.2 Manufacturers:
.1 Spirax Sarco Ltd. Type IF-125 screwed or Type AF-250 flanged;
.2 Toyo Valve Co. Ltd. Fig. 380A screwed or Fig. 381 flanged;
.3 Victaulic Co. of Canada Style 732 or W732 "Vic-Strainer";
.4 Armstrong International Inc. A1 Series;
.5 Watts Industries (Canada) Inc. #77SCI;
.6 Mueller Steam Specialty Products Model 11M screwed or Model 758 flanged.
2.12 Air Separators
.1 Vortex type vertical air separator with side tangential inlet and outlet connections, a top air outlet connection, and bottom drain connection. Separator is to be constructed of cast iron or fabricated steel for a pressure of 1105 kPa (160 psi) at 180°C (350°F) in accordance with Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code.
.2 Manufacturers:
.1 S.A. Armstrong Ltd. Model "VA";
.2 ITT Bell & Gossett "Rolairtrol";
.3 Taco Canada Ltd. "Vortech";
.4 Flo-Fab Inc. "SEP-T" Series.
2.13 Expansion Tanks
.1 Replaceable bladder type, factory pressurized expansion tank with permanent separation of air and water, in accordance with drawing schedule and complete with:
.1 steel pressure tank suitable for a working pressure of 870 kPa (125 psi) at 115°C (240°F), constructed and stamped in accordance with the ASME Code for Unfired Pressure Vessels and complete with a system connection, drain connection, air charging valve, and a red oxide primer finish;
.2 heavy-duty butyl rubber (EDPM) bladder;
.3 tapping for installation of a pressure gauge;
.4 for horizontal tanks only, mounting saddles supplied loose;
.2 Manufacturers:
.1 Hamlet & Garneau Inc. AL Series "Expanflex";
.2 S.A. Armstrong Ltd. Series "AX-V" Series "L";
.3 ITT Bell & Gossett Series "B" (ASME);
.4 Amtrol "Extrol" Series.
.5 Taco (Canada) Ltd. "CBX" Series.
.6 Flo-Fab Inc. "WX-C" Series, "ABT" Series
2.14 Glycol Solution Mixing and Storage Tanks
.1 Package type glycol solution mixing, storage and automatic feed assembly designed to maintain minimum system pressure levels and complete with:
.1 round, polyethylene or polypropylene tank sized to suit system capacity, complete with a solution level scale in litres and Imperial gallons, removable cover, and a welded steel angle stand assembly with legs, pump shelf, and control panel bracket, all factory finished with enamel;
.2 factory pre-piped minimum 1/3 HP, 115 volt, 1-phase rotary bronze gear pump with capacity and pressure differential to suit system requirements, factory wired to control panel, mounted on a shelf integral with steel stand assembly, and complete with shut-off valve and strainer;
.3 tank pressure relief valve with discharge piped back into tank;
.4 tank low level switch;
.5 pressure gauge;

REVISIONS

No.	DATE	DESCRIPTION
1	2023-03-31	ISSUED FOR 95%CD
2	2023-06-06	ISSUED FOR 50%CD
3	2023-06-22	ISSUED FOR 90%CD
4	2023-07-28	ISSUED FOR 95%CD
5	2023-09-28	ISSUED FOR CLIENT REVIEW
6	2024-05-24	ISSUED FOR PERMIT
7	2024-06-07	ISSUED FOR TENDER

All dimensions and related documents must be checked and verified by the General Contractor

NOTES:

KEYPLAN:

CLIENT:
CLIENT: UNIVERSITY OF TORONTO

PROJECT:
ED-22-703-08

CIRHR UNIVERSAL WASHROOM

CENTRE FOR INDUSTRIAL RELATIONS & HUMAN RESOURCES (CIRHR)
121 ST. GEORGE ST., TORONTO, ONTARIO

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SCALE:
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MECHANICAL SPECIFICATIONS

M3.2

DRAWN BY: Author
CHECKED BY: Checker

Plot Date: 6/6/2024 4:54:55 PM
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.6 Honeywell #L404A "Pressurtrol" or equal pipe mounting differential pressure switch with a 100 kPa to 1000 kPa (15 psi to 150 psi) range;
.7 115 volt, 1-phase, factory mounted and pre-wired control panel with an NEMA 2 enamelled steel enclosure, designed to control and operate glycol gear pump either manually or automatically to pump glycol solution into system, and to stop pump and initiate an audible/visual alarm if a low glycol solution level occurs in tank, and complete with;
.1 terminal blocks for power and control wiring connections;
.2 H-O-A switch with green "Power On" indicator light;
.3 120 volt/12 volt control transformer;
.4 low glycol solution level alarm buzzer with silencing switch, an alarm light which remains illuminated until low-level switch is reset, and an alarm push-to-test button;
.5 dry contacts for building automation system alarm annunciation.

.2 Manufacturers:
.1 ITT Bell & Gossett Series GMU;
.2 S. A. Armstrong Ltd. GLA Standard Series;
.3 HG Spec. Inc.

2.15 Glycol
.1 Propylene glycol blended with Nitrite based corrosion inhibitors.

2.16 General Re: Circulating Pumps
.1 Pumps are to be bronze fitted centrifugal pumps in accordance with drawing schedule, each non-overloading under all operating conditions and factory tested at specified operating conditions.

2.17 Horizontal In-Line Pump
.1 Horizontal, lubricated in-line pump as scheduled, complete with:
.1 cast iron casing with flanged in-line pipe connections;
.2 alloy steel shaft with integral thrust collar, copper shaft sleeve, and oil lubricated bronze bearings;
.3 balanced, corrosion resistant steel, cast bronze, or stamped brass impeller;
.4 motor connected to pump by means of a 4-spring coupling with guard;
.5 mechanical seal.
.2 Manufacturers:
.1 S.A. Armstrong Ltd.;
.2 ITT Bell & Gossett;
.3 Grundfos Canada Inc.

3.0 EXECUTION

3.1 Demolition
.1 Perform required hydronic piping system demolition/revision work. Refer to demolition requirements specified in Section 20 05 05 – Selective Demolition for Mechanical.

3.2 Piping Installation Requirements
.1 Provide required hydronic piping. Pipe, unless otherwise specified, is to be:
.1 for pipe sizes up to and including 50 mm (2") diameter, Schedule 40 black steel, screwed, or type "L" hard copper with solder joints or pressure coupled joints;
.2 for pipe 65 mm (2-½") to 300 mm (12") dia. and larger, Standard weight grooved end black steel pipe, 10 mm (0.375") thickness, with grooved end fittings and couplings, or, Standard weight black steel pipe, 10 mm (0.375") thickness, with welding fittings and welded joints;
.3 for short branch connections, 25 mm (1") pipe diameter size and less, to heating equipment where structural obstructions occur and site bending of pipe is advantageous, a single length of type "L" soft copper.
.2 Slope horizontal piping mains to provide a minimum continuous up-grade of 25 mm (1") in 6 m (20') to high points. Slope branch supply and return piping connections to equipment a minimum of 25 mm (1") in 1.2 m (4'). Leave sufficient room at high points for installation and maintenance of air vents.
.3 Install automatic control valves, piping wells and similar piping and/or equipment mounted control components required for automatic temperature control systems supplied as part of the control work. Refer to drawing control diagrams and details.
.4 Connect equipment provided as part of the work of other sections with piping as indicated and/or required. Refer to pipe connection details on drawings.
.5 Provide screwed unions, removable mechanical joint couplings, or weld-on or solder-on flanges in screwed piping at all connections to valves, strainers and similar piping system components which may need maintenance or repair, at equipment connections, in runs of piping exceeding 9 m (30') at 4.5 m (15') regular intervals to permit removal of sections of piping, and wherever else indicated on drawings.
.6 Provide shut-off valves in piping connections to equipment, to isolate piping risers, to isolate other sections of systems as shown, and wherever else indicated on drawings. Valves in piping to and including 50 mm (2") dia. are to be ball type. All other shut-off valves are to be ball or butterfly type unless otherwise specified. Locate valves so they are easily accessible. Wherever possible, install valves at uniform height. Provide chain operators for valves which are inaccessible for operation from floor level.
.7 Provide a check valve in discharge piping of every pump, and elsewhere in piping where shown on drawings. Where check valves are required in vertical piping, ensure they are suitable in all respects for the application. Check valves for vertical in-line and/or base mounted circulating pumps are integral with the discharge accessory.
.8 Provide a drain valve at base of each piping riser, in drain connections to equipment, in low points of horizontal piping, and wherever else shown and/or specified.
.9 Provide circuit balancing valves in piping generally where shown on drawings but with exact locations in accordance with instructions of personnel doing system flow balancing work. Confirm locations prior to installation.
.10 Grooved pipe ends shall be clean and free from indentations, projections and roll marks in the area from pipe end to groove for proper gasket sealing. All couplings will meet Victaulic standards for visual inspection sizes 2" to 12". The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Install in accordance with manufacturer's latest recommendations. A Victaulic factory trained representative shall periodically visit the job site and review the installation for best practices. The installing Contractor shall correct any identified deficiencies. Victaulic product that has been examined and has not met the visual inspection criteria for proper installation must be corrected and re-examined by Victaulic prior to the completion of the project.

3.3 Installation of Pressure Relief Valves
.1 Provide factory set pressure relief valves. Pipe discharge of each water piping relief valve to drain unless otherwise shown or specified.
.2 Pipe discharge of each glycol solution piping relief valve back to system expansion tank or return piping.
.3 Confirm relief valve settings.

3.4 Installation of Air Vents
.1 Provide an air vent in piping mains at all high points, at equipment connections, and wherever else shown and/or specified. Equip each air vent with a ball type shut-off valve. Install vents in 100 mm (4") dia. and larger piping and all vents in mechanical rooms in accordance with drawing detail.
.2 Provide 9 mm (3/8") dia. copper drain piping from each automatic air vent to nearest suitable drain and terminate so discharge is visible. Identify drain piping.

3.5 Installation of Strainers
.1 Provide strainers in piping. Locate strainers so baskets are easily accessible and removable. Clean strainer baskets during and after piping system flushing and cleaning is complete, and before water quantity balancing commences.

3.6 Installation of Air Separator
.1 Provide an air separator in piping and connect with valved inlet and outlet piping.
.2 Extend valved blowdown piping from bottom pipe connection tapping to nearest floor drain location.
.3 Equip top pipe connection tapping with an automatic air vent, and piping as detailed.

3.7 Installation of Expansion Tank
.1 Provide an expansion tank.
.2 Secure horizontal expansion tank in place from structure by means of properly sized galvanized steel hanger rods and support saddles supplied with tank.
.3 Secure tank stand to a concrete housekeeping pad by means of machine bolts.
.4 Connect tank with system piping. Extend a drain line from tank piping and terminate drain line with a drain valve. Provide an air vent.
.5 Provide a water make-up connection line complete with relief valve and pressure gauge and connect to system piping. Terminate make-up piping for connection to domestic cold water piping as part of the work of Section 22 11 00 – Facility Water Distribution. Check relief valve operation and adjust as required.
.6 Check tank air charge and adjust to suit system.

3.8 Installation of Glycol Solution Mixing and Storage Tank
.1 Provide a mixing and storage tank and feed assembly for each glycol solution circulating system.
.2 Secure tank stand to a concrete housekeeping pad. Connect with system piping. Refer to drawing detail.
.3 Fill tank with, unless otherwise specified, a solution of 50% water, 50% propylene glycol, and test solution to confirm proper concentrations.
.4 When installation is complete, test operation of assembly, including alarms, and adjust as required. Adjust pressure switch to suit glycol solution circulating system pressure.

3.9 Installation of Flexible Piping Connections
.1 Provide flexible connections in piping connections to equipment.
.2 Install in accordance with manufacturer's instructions.

3.10 Installation of Circulating Pumps
.1 Provide centrifugal circulating pumps.
.2 Secure base mounted pumps in place on a concrete housekeeping pad. Shim pump baseplate level using metal wedges prior to tightening bolts. When installation is complete and pump-motor alignment has been checked, fill void between pump base and housekeeping pad with KPM Industries Ltd. "In-Pakt" or equal non-shrink grout. Provide flexible connections in pump suction and discharge piping 450 mm (18") from suction and discharge connection accessories.
.3 Secure vertical inline pumps in place in accordance with requirements of drawing detail and provide flexible piping connections in vertical suction and discharge piping approximately 450 mm (18") above suction and discharge connection accessories.
.4 Provide a shut-off valve and suction guide in pump suction piping, and a combination check-balance-shut-off valve assembly in pump discharge piping, installed in accordance with manufacturer's instructions. Remove suction guide start-up strainer screens after piping flushing and cleaning is complete. Combination check-balance-shut-off valve assemblies are to be 150 mm (6") away from pump discharge for discharge piping to 150 mm (6") dia., and 300 mm (12") away from pump discharge for discharge pipe larger than 150 mm (6") dia.
.5 For pumps equipped with seal flush line filters, replace flush line filter cartridge when pipe flushing and cleaning is complete, and hand identified spare filter cartridges to Owner at site.
.6 If circulating pumps are used for piping flushing and cleaning, and pump seal flush line filters are not installed, replace pump mechanical seals when flushing and cleaning is complete.
.7 For equipment/system manufacturer certification requirements, refer to Section 23 05 00 – Common Work Results for Mechanical.
.8 For equipment/system start-up requirements, refer to Section 23 05 00 – Common Work Results for Mechanical.

3.11 Testing, Adjusting and Balancing
.1 When work is complete and equipment is operating as intended, test, adjust and balance water flows in accordance with requirements specified in Section 20 05 93 - Testing, Adjusting, and Balancing for Mechanical Systems, and Section 23 08 00 – Commissioning of Mechanical Systems.

23 31 00 – HVAC DUCTS AND CASINGS

1.0 DUCT WORK
1.1 Unless stated otherwise, duct work shall be rigid galvanized steel. Use 45 degree conical transitions for branch connections.
1.2 Duct layout as shown on plans is to show the design intent. Design drawings should not be used to measure duct lengths or for fabrication. The design drawings are schematic in nature. Contractor shall coordinate duct route and all necessary fittings to accommodate site conditions and to meet the design intent.
1.3 Provide duct work in accordance with SMACNA standards.
1.4 Duct sizes shown on drawings indicate clear inside dimensions.
1.5 Equivalent duct sizes may be substituted in lieu of those shown, in order to avoid interference with structure and other services. Obtain Consultant's review prior to fabrication of ductwork.
1.6 Install all ductwork and piping as high as possible, unless otherwise stated.
1.7 Spin-in duct fittings: SMC 24 gauge or Kerr-Hunt model no. SO-2 complete with balancing damper of size equal to branch duct or diffuser neck diameter.
1.8 Seal all new low pressure ducts, less than 0.5 kPa (2 inches WC) and low pressure modifications to SMACNA seal class "C" using sealant, aluminium tape, or a combination thereof.

2.0 FLEXIBLE DUCTS
2.1 Aluminum flex duct shall be Commercial (Bare) True Flex – Model TF by Peppertree Air Solutions Inc. Flex duct shall be manufactured from a continuous strip of spirally wound 3003 corrugated aluminum, mechanically interlocked to produce an air-tight and leak proof triple seam. ULC-S110 listed as Class 1 air duct connector, Flame Spread Rating of not over 25, Smoke Developed Rating of not over 50.
2.2 Install as one continuous piece. Maximum length not to exceed 1.8 m (6 feet).

23 33 00 – AIR DUCT ACCESSORIES

1.0 VOLUME BALANCING DAMPERS
1.1 Balancing dampers shall be manually operated opposed blade or splitter type. Splitter dampers shall be completed with control rode, pivot bracket, and ball joint fitting with locking set screw.
1.2 Splitter dampers shall be installed on all branch duct connections (or take-offs) from ducts.
1.3 Opposed blade dampers shall be used for all diffuser/grille balancing dampers (where indicated).

2.0 FIRE RATED DAMPERS (FRD)
2.1 Provide fire dampers where shown on drawings and where required by local authorities and codes. Rate fire dampers to match the fire rating of the separation crossed. Provide only labeled dampers, Type 'B' and install as specified in NFPA/CUA 90A.
2.2 Fire Dampers: curtain type with 57.2°C (135°F) fusible ink suitable for horizontal or vertical installation, 1-1/2 hour ULC rating.
2.3 FRD: Ruskin model DIBD2 for duct heights not exceeding 305 mm (12-1/64 inch), and DIBD2 style A for duct heights exceeding 305 mm (12-1/64 inch), or equal.
2.4 Provide duct transition as required.
2.5 Provide access doors at each FRD unless frontal access to FRD is available.

3.0 DUCT ELBOWS AND TURNING VANES
3.1 For low pressure systems: elbow radius of not less than duct width. Barber-Coleman "Airturns", Hart & Cooley "Ducturns", or Ductmate turning vanes shall be provided in elbows of lesser radius in all ductwork.

4.0 FLEXIBLE CONNECTORS
4.1 Flexible connectors to be fire resistant neoprene coated glass fabric. Provide flexible connections at all ducted HVAC units, fans, and where indicated.

23 34 00 – HVAC FANS

1.0 EXHAUST FANS
1.1 Statically and dynamically balanced, constructed in accordance with ACMA, of types and sizes as indicated on drawings.
1.2 Provide flexible connectors between duct work and exhaust fans.
1.3 Provide spring isolators to prevent vibration transfer to structure.
1.4 Refer to HVAC Fans Schedule for specific details.

23 52 13 – PACKAGED BOILER - ELECTRIC

1.0 GENERAL
1.1 Scope
.1 Provide electric hot water boilers as shown.
1.2 Shop Drawings
.1 Submit shop drawings for each boiler showing:
.1 model number,
.2 guaranteed input and output rating performance,
.3 outline dimensions,
.4 power requirements,
.5 water inlet and outlet connection details,
.6 loading points and weights, and
.7 control panel layouts and wiring diagrams.
1.3 Applicable Codes and Standards
.1 CSA B51, Boiler, Pressure Vessel, And Pressure Piping Code, and Ontario Technical Standards and Safety Act, Boilers and Pressure Vessels
.2 Electrical equipment and wiring to conform to Canadian Electric Code.
.3 Boiler package to bear ULC, or CSA label

2.0 PRODUCTS
2.1 General
.1 Shop assembled and tested electric type with heating elements, controls, boiler trim, and jacket.
.1 Standard of Acceptance
.1 Bryan
.2 Caloritec
.3 Precision Boilers
.4 Fulton
2.2 Boiler Requirements
.1 Design conditions
.1 Pressure: 1030 kPa (150 psig).
.2 Temperature: 60 °C (140 °F) return with design system differential of 14°C (25°F).
.3 Capacity (each): refer to equipment schedules
.4 Fluid: 50% by volume Propylene Glycol mixture
.2 Power: 600volt, 60 Hz, 3 phase.
2.3 Boiler
.1 Construction:
.1 Pressure components: ASME Code Section IV with "H" stamp for 1100 kPa (160 psig) at 120°C (250°F),
.2 flange mounted heating elements with nickle/chromium resistance wire embedded in magnesium oxide with incoloy sheath designed for heat density of not more than 82.5 kW/m2 (55 watts/square inch),
.3 shop assembled and skid mounted with integral contactors and heating element controls, main fused disconnect, factory mounted in metal enclosure with hinged lockable doors and wired, and fire tested at factory,
.4 100 mm (4 in) thick fibreglass insulation, with reinforced metal jacket secured with sheet metal screws or stove bolts.
.2 Fitted with:
.1 low water cutoff float type, manual reset, wired to heater control circuit,
.2 temperature and pressure gauges mounted at supply and return connections on boiler,
.3 temperature and pressure relief valve to comply with Code requirements,
.4 operating and high limit aquastats to control normal operation of elements and provide manual reset shut down on high water temperature.
.3 Control panel:
.1 mounted on front of boiler,
.2 CSA standard C22.1 Type 2 enclosure, with hinged door and neoprene dust seal,
.3 progressive sequencing programming relays to equalize heater and contactor use, and SCR control on one heating stage to give infinitely variable capacity control,
.4 wiring to interconnect control switches, and electrical devices on boiler and control panel,
.5 wiring inside panel connected to elements outside panel through numbered terminal strip.
2.4 Factory Installed Insulation and Guards
.1 Provide insulation, jacketing and guards to prevent human contact with any part of boiler assembly that has a surface temperature greater than 70(C (158(F) under operating conditions.
2.5 Painting
.1 Boiler casing: Factory applied hard enamel paint finish.

3.0 EXECUTION
3.1 Installation
.1 Mount units level on housekeeping pad.
.2 Make piping, power and control wiring connections.
.3 Maintain clearances for operation and maintenance.
3.2 Start-Up
.1 Provide services of manufacturer's Service Representative to check installation, start boilers, calibrate controls and instruct Operators.
.2 Check-out operation of safety controls and demonstrate operation of boilers over entire capacity range. Submit written report showing records of water flow, and water temperatures.

23 83 00 – RADIANT HEATING UNITS

1.0 HYDRONIC RADIANT HEATERS
.1 Hydronic Radiant Heaters.
.2 Hot water flat tube panel type direct radiation units with capacities and dimensions as indicated on drawings. Heating capacities and dimensions are based on 54.4°C (130°F) average entering water temperature at a velocity of 0.0762 m/s (0.25 ft/sec) with a 10°C (20°F) temperature drop through tubes and 18°C (65°F) entering air temperature.
.3 Each assembly, factory tested and individually wrapped, complete with:
.1 all welded flattened steel tubes;
.2 tapered thread design pipe connections sized as shown, and a 3.2 mm (¼") diameter air vent tapping;
.3 all required pipe trims;
.4 baked enamel finish with a colour as selected from manufacturer's standard colour range.
.4 Manufacturers:
.1 Runtal North America Inc.;
.2 Panel Radiator Inc.

23 83 16.13 – CEILING MOUNTED RADIANT-HEATING PANELS

1.0 GENERAL
1.1 Related Requirements
.1 Section 23 21 13 – Hydronic Piping.
1.2 Submittals
.1 Submit shop drawings/product data sheets for radiant heating units, including accessories, and any required control wiring schematics.
1.3 Closeout Submittals
.1 Submit a site inspection and start-up report from manufacturer's representative as specified in Part 3 of this section.

2.0 PRODUCTS
2.1 Linear Radiant Ceiling Panels
.1 Continuous linear radiant ceiling panels sized and arranged as shown and scheduled on drawings, complete with:
.1 extruded aluminum panels with aluminum saddles to secure 12 mm (½") diameter type "L" copper piping, non-hardening heat conductive paste between piping and panels, and a white finish factory applied to face of each panel;
.2 cross channel braces in quantities as recommended by panel manufacturer to suit panel length, and end and centre clips;
.3 all required type "L" copper piping return bends and connection fittings.
.2 Manufacturers
.1 Adair Industries "Airtex";
.2 Rosemex Inc;
.3 TWA Panel Systems Inc.;
.4 Sigma Corp.

3.0 EXECUTION
3.1 Installation
.1 Provide linear radiant ceiling panels. Install cross channel braces, end and centre clips in accordance with panel manufacturer's details.
.2 Secure panels in place on T-bars and/or wall channel moulding provided as part of suspended ceiling system work, and provide ceiling hanger wire at 1200 mm (48") centres between structure and cross channel braces.
.3 Interconnect radiant panels by means of 12 mm dia. (1/2") soft copper tubing or connection accessories supplied with panels, as required. Ensure heating piping system has been flushed and cleaned prior to connecting radiant panels.
.4 Personnel handling unprotected panels are to wear clean white gloves to avoid soiling panel face finish.
.5 When installation of the panels is complete, cover the top of active panels with 25 mm (1") thick glass fibre batt insulation.

23 83 16.16 – IN-FLOOR RADIANT-HEATING HYDRONIC PIPING

1.0 GENERAL
1.1 Related Requirements
.1 Section 23 21 13 – Hydronic Piping.
1.2 Submittals
.1 Submit shop drawings and/or product data sheets for following:
.1 cross-linked polyethylene (PEX) floor heating grid tubing, fittings and accessories, manifold assembly, control components and controls;
.2 copies of system manufacturer's loop layout design printouts indicating water flows and temperatures, floor profiles with floor covering(s), and heating outputs;
.3 certified tubing and piping layout and schematic for each system zone;
.4 certified power wiring schematic and a certified control wiring schematic with sequence of operation for each system zone;
.5 letter from system component manufacturer stating system components proposed meet all requirements of the Specification.
1.3 Closeout Submittals
.1 Submit, prior to Substantial Performance of the Work, start-up or test data specified in Part 3 of this section.
.2 Submit letters of installation certification from system manufacturer's representative as specified in Part 3 of this section.
.3 Training attendance records.
1.4 Quality Assurance
.1 Snowmelt heating system is to be installed by journeyman tradesmen with a minimum of 3 years successful installation of PEX radiant floor system components supplied by manufacturer of components.
.2 Prior to installation of system components, meet on-site with system component manufacturer's representative and trades whose work is related to successful installation of system(s) to confirm floor areas involved are ready for tubing installation.
1.5 Warranty
.1 Submit, at Substantial Performance of the Work, a non-prorated transferable repair or replacement warranty in name of Owner, issued by and signed by system component manufacturer covering materials against failure due to defects in material and/or workmanship as follows:
.1 PEX tubing, 25 years;
.2 manifold assemblies, 5 years;
.3 controls and electrical components, 2 years.

2.0 PRODUCTS
2.1 Manufacturers
.1 Klimatrol Ltd;
.2 Uponor Inc.;
.3 Watts Radiant Inc.;
.4 Rehau Inc.
2.2 System Materials
.1 Piping
.1 Material: All snow & ice melt system piping shall be high density cross-linked polyethylene manufactured by REHAU using the peroxide method of cross-linking (PEXa) and with an approved cell classification in accordance with ASTM D3350. Pipe shall conform with ASTM F876 and CSA B137.5, and be certified by CSA or equivalent testing organization.
.2 Temperature and Pressure Ratings: Piping shall be rated for 100 PSIG gauge pressure at 180°F temperature (690 kPa @ 82°C) continuous, and 80 PSIG gauge pressure at 200°F temperature (550 kPa @ 93°C) continuous.
.3 Oxygen Diffusion Barrier: Piping shall have a co-extruded oxygen diffusion barrier capable of limiting oxygen diffusion through the pipe to less than 0.10 mg/l/day at 104°F (40°C) water temperature, in accordance with DIN 4726. Oxygen Diffusion Barrier not required when ferrous (iron or steel) components do not share the same system fluid as the cross-linked polyethylene pipe, such as when separated by a heat exchange device.
.4 Bend Radius: The minimum bend radius for cold bending of the pipe shall be not less than five (5) times the outside diameter. Bends with a radius less than this shall require the use of a bending template as supplied by the pipe manufacturer, and/or hot air.
.2 Fittings
.1 Fittings shall be manufactured of dezincification-resistant brass and shall be supplied by the piping manufacturer as part of a proven cataloged system. Manifold fittings to be compression nut style with split compression ring.
.2 Fittings shall be certified to ASTM F 877, F 2080 and CSA B 137.5 as part of the manufacturer's PEX piping system. Pipe couplings embedded within the thermal mass shall be EVERLOC® cold-expansion compression-sleeve fittings.
.3 Manifolds
.1 Material: Industrial sized distribution manifolds shall be manufactured and be supplied by the piping manufacturer as a proven cataloged part of the manufacturer's system.
.2 For systems up to 10 circuits shall use 1 1/4" stainless steel or machined brass manifolds or for larger flow systems 1 1/2" or 2" Type L Copper. Manifolds shall have pressure gauges, temperature gauges, fill and drain service valves and individual circuits shall be complete with isolation valves.
.4 Snow Ice Melt (SIM) Controls
.1 SIM Control Panel: Microprocessor control in NEMA Type 1 enclosure, 120V/60Hz/1Ph power connection, programmable function heating source activation, signal, floating mixing, analog mixing, primary / secondary pumping, tandem snow/ice detection, warm weather shutdown, exercising, slab protection, idling, energy monitoring, 10A ½ Hp primary pump and system pump relays, 5 A 1/3 hp heating source pump relay. Complete with power "ON" LED, manual reset of glycol solution high temperature limit, manual system activation pushbutton with LED, schematic wiring diagram, and all hardware required for control and connection of the system into the Building automation System via BACnet MSTP, IP compatible.
.2 Automatic silicon brass snow/ice sensor, rated for 15,000 lb. distributed load, 5 conductor electronic sensor with 65' lead to be sleeved back to control, maximum extension 435' using 18 AWG wire and 5-gang PVC junction box, activation through precipitation sensor or integral slab temperature sensor, sensor with integral low voltage trickle charge for freeze protection.
.3 Snow ice sensor shall be installed no less than 10' from building envelope for exposure to precipitation and to mitigate heat migration from foundation walls.
.4 The BACnet SIM snow/ice melting control and snow detector shall be programmable for:
.1 Melting at set point (34 - 44 Deg. F.) when precipitation is detected.
.2 Idling set point (adjustable Off - 70 Deg. F.) for each zone when snow or ice is not detected
.3 Shutting down the system on outdoor ambient temperature rise above set point (34 - 44 Deg. F.)
.4 Shutting down system when outdoor temperature drops below set point (-5 – 10 Deg. F.)
.5 Modulating the temperature input into slab to maintain a maximum temperature differential setting. (25 – 50 Deg. F.)
.6 24V output for mixing control valve and "heat demand"
.7 Remote override enable/disable switch
.5 There shall be one for the all manifolds.
.6 Snow Melt controls and system commissioning shall be provided by KLIMATROL Environmental Systems Ltd.
.5 Accessories
.1 Utilize manufacturer's system installation accessories including: nylon cable binders, pipe sleeves, protective sleeving, pipe cutters, pipe uncoilers and other installation tools and aids and pipe ties.
.6 Performance: As per capacity schedule on drawings

3.0 EXECUTION
3.1 Preparation
.1 Minimum 25mm Hi-40 compressive strength Styrofoam shall be installed under the SIM system to prevent downward heat loss and to increase SIM system response time.
.2 Concrete Slab
.1 Reinforcing wire mesh or rebar, if required by structural design, must be flat and level, with all sharp ends pointing down. Finished grade of the thermal mass must be a minimum of 3/4" (19 mm) above the top of PEX heating pipes and not more than 65mm above the top of PEX heating pipes.
.2 On Structural Concrete: Concrete surface must be clean and free from all construction debris that could potentially damage the pipe. Insulation, if used, to be installed above existing surface. Finished grade of the thermal mass overpour must be a minimum of 3/4" (19 mm) above the top of PEX heating pipes.
.3 Stairs: install tubing parallel to step tread at 3 – 5" spacing, 3 loop runs per tread. Install supply side of the loop within 76mm (3") of the steps edge. Install at a consistent depth below the surface elevation.
.3 Preparation of Space for Manifold Installation: Review drawings and/or design to determine proper locations for manifolds. Manifolds should be installed in a secure location. Manifold must be installed in an area that will allow easy access for supply/return piping as well as future access for maintenance. Ceiling penetrations shall be carefully waterproofed.
3.2 Installation
.1 Provide hydronic snowmelt heating zones and piping manifold assemblies. System installation is to be in strict accordance with manufacturer's instructions.

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4	2023-07-28	ISSUED FOR 95%CD
5	2023-09-28	ISSUED FOR CLIENT REVIEW
6	2024-05-24	ISSUED FOR PERMIT
7	2024-06-07	ISSUED FOR TENDER

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PROJECT:

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MECHANICAL SPECIFICATIONS

M3.3

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.2 Provide a strainer in piping to manifold supply header and clean strainer screen when system balancing is to commence.
.3 Ensure grid tubing has been successfully pressure tested prior to concealment. Be present when covering is being placed over grid tubing to ensure integrity of tubing is not compromised during placement of remainder of floor construction.
.4 Where tubing and/or piping penetrates fire rated construction, carefully coordinate with firestopping work specified in Division 07.
.5 Prior to system flow balancing, ensure all air is purged from system and system operates successfully at design temperatures and pressure for a minimum of 2 days. Supply system manufacturer's software for final balancing flow adjustment settings.
.6 The SIM system should not be put into operation until poured concrete thermal mass has cured a minimum of 28 days, unless otherwise specified and approved by thermal mass supplier. If it is necessary to operate the SIM system to prevent freezing, a maximum flow temperature of 72o F (22°C) must not be exceeded while the thermal mass is curing. After curing, gradually increase the flow temperature by no more than 10oF (6°C) each day until system reaches the required operating temperature

3.3 System Startup
.1 For equipment/system start-up requirements, refer to Section 01 70 00.
.2 For equipment/system manufacturer certification requirements, refer to Section 01 60 00. Ensure system manufacturer inspects grid tubing installation prior to concealment and certifies each zone correct in writing. Submit a copy of each certification letter prior to Substantial Performance of the Work.

3.4 Training
.1 Include for 4 hours of on-site training for 2 groups of 6 people. Training is to be a full review of all components including but not limited to a full operation and maintenance demonstration, with abnormal events.

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MECHANICAL SPECIFICATIONS

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ELECTRIC BOILERS

TAG	MANUFACTURER	MODEL	LOCATION	SERVICE	FLUID	OUTPUT CAPACITY (kW)	ELECTRICAL V/Ph/Hz	WEIGHT (kg)	REMARKS
B-1	PRECISION	PCW1-047B-600-150	BASEMENT MECHANICAL ROOM	RAMP SNOWMELT	50% PG	47.0	600/3/60	272.2	

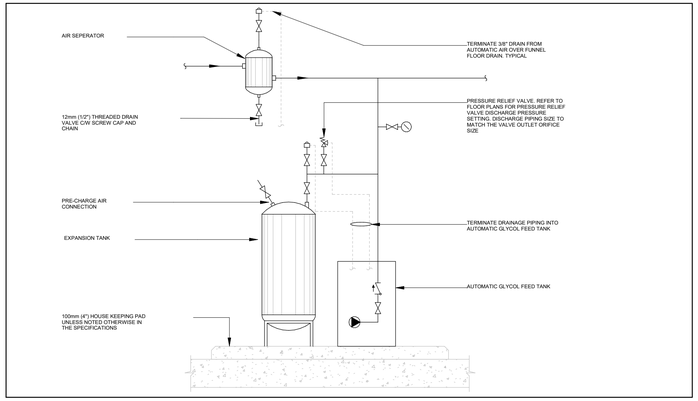
SNOW MELTING HEATING CAPACITY OUTPUT SCHEDULE

ZONE	Manufacturer	TOTAL OUTPUT		FLOW		LGT		EGT		FLUID PRESSURE DROP		Pipe Spacing		AREA		OUTPUT PER AREA		SURFACE TEMPERATURE	
TAG	Klimatrol	(BTUS/H)	(Watts)	(USGPM)	(L/s)	(°F)	(°C)	(°F)	(°C)	(ft.H20)	(kPa)	inches	mm	(FT2)	(m2)	(BTUS/ FT2)	(Watts / m2)	(°F)	(°C)
SM - 01	Klimatrol	131720	38603	12	0.8	140.0	60.0	115.0	46.1	35.00	104.51	6.0	152.4	712	66.1	185.0	583.6	39.0	3.9

- The Klimatrol Snow Melt Systems shall be complete with pump, mixing valve, expansion tank, air purge, glycol assembly, Manifold, PexA piping, snow/slab sensor(s) - No Alternates
- Install snow-ice detector for each zone directed by Klimatrol / exposed to outdoor weather conditions, sleeve sensor cable back to control
- In slab on grade areas lash 5/8" RAUPEX piping to a 6" wire mesh grid at 6' o.c. (Wire mesh provided by General Contractor)
- Minimum 1 1/2" concrete/concrete sand covering over the Raupex pipes.
- Sleeve Raupex across expansion joints and wherever pipe passes out of the slab.
- Install manifolds in serviceable location, ensure cabinets are level and square, purge all air from system when filling / alternate manifold configuration may be necessary as per Klimatrol
- Apply a 68 lb air pressure test to manifolds and pipe field for concrete pours and the duration of building construction
- Contact manufacturer to witness installation and provide inspection report for each area immediately prior to concrete emplacement
- Fill with a 50% glycol (By others), snow melt system shall be filled at the manifold one loop at a time ensuring all air is purged prior to filling next loop. Fill mains last.
- Only Everloc couplers shall be used if pipe splice is required
- Klimatrol shall provide detailed system Loop Design Shop Drawings for submittal and construction. Contractor shall not deviate from approved drawings.

PUMPS

TAG	MANUFACTURER	MODEL	FLOW RATE (L/s)	LOCATION	ELECTRICAL V/Ph/Hz	REMARKS
P-1	GRUNDFOS	UPS 26-150F	0.8	BASEMENT MECHANICAL ROOM	115/1/60	



10 23 21 00.04 AIR SEPARATOR & EXPANSION TANK - GLYCOL
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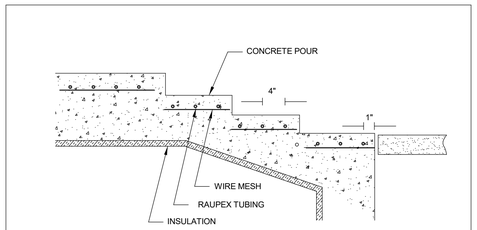
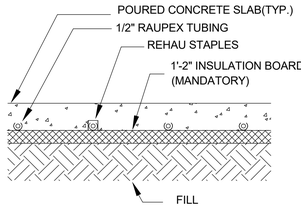


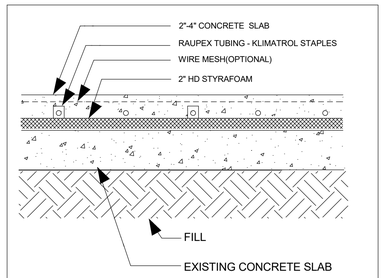
TUBING STAIRS LAYOUT IN POURED CONCRETE
NOT TO SCALE

9 TUBING STAIRS LAYOUT IN POURED CONCRETE
SCALE: N.T.S.



KLIMATROL SLAB GRADE APPLICATION
WITH STAPLES - NOT TO SCALE

8 KLIMATROL SLAB GRADE APPLICATION
SCALE: N.T.S.



7 KLIMATROL DOUBLE POUR APPLICATION
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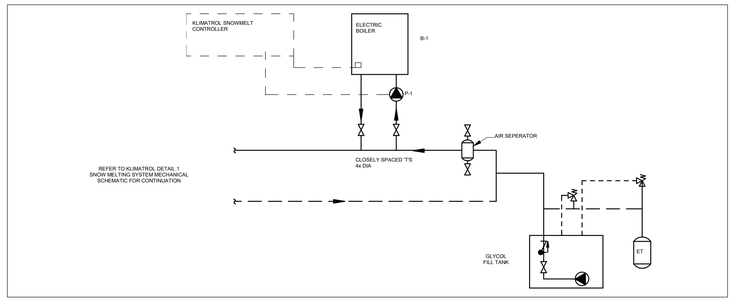

6 HEATING WATER SCHEMATIC
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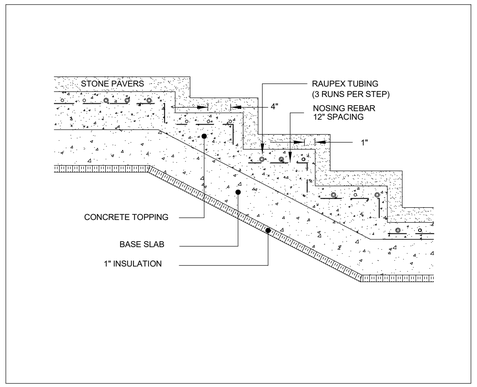
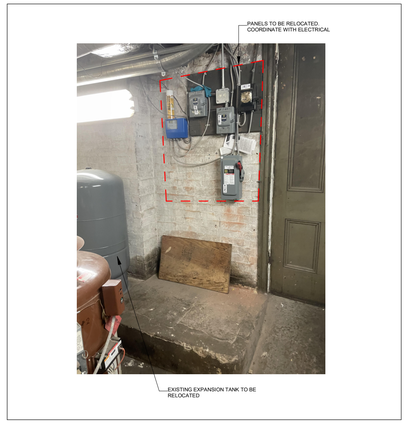
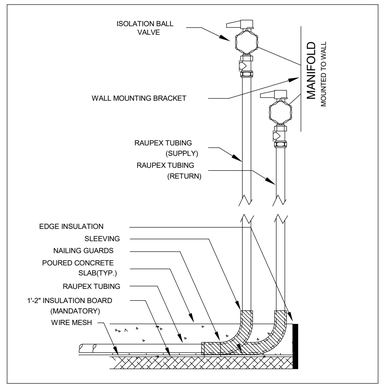


5 TUBING STAIRS LAYOUT FOR STAIRS
SCALE: N.T.S.

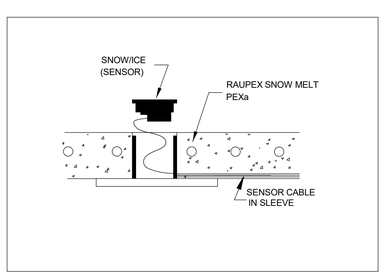


EXISTING EXPANSION TANK AND CONTROL PANEL
SCALE:N.T.S.

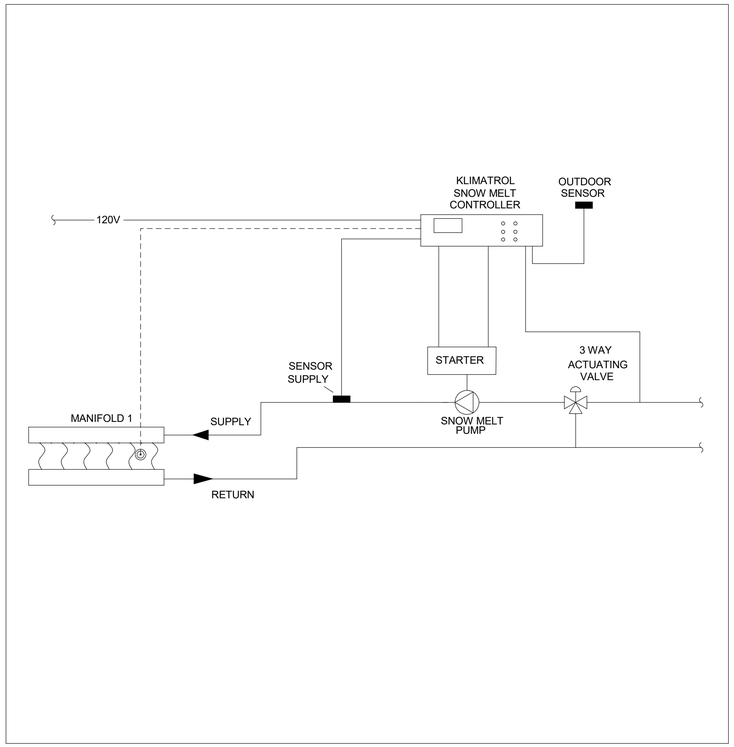
4



3 SLEEVING & NAIL GUARD APPLICATION
SCALE: N.T.S.



2 KLIMATROL SNOW/ICE SENSOR
SCALE: N.T.S.



1 KLIMATROL SNOW MELTING SYSTEM MECHANICAL SCHEMATIC
SCALE: N.T.S.

REVISIONS

No.	DATE	DESCRIPTION
1	2023-06-06	ISSUED FOR 50%CD
2	2023-06-22	ISSUED FOR 90%CD
3	2023-07-28	ISSUED FOR 95%CD
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1 EXISTING RADIATOR
SCALE:N.T.S.

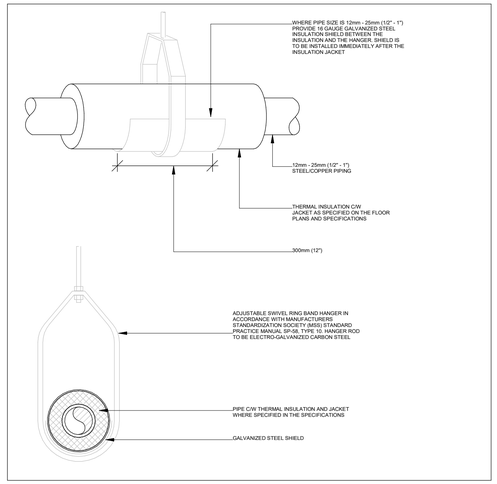
2 EXISTING WASHROOM CEILING
SCALE:N.T.S.

FANS

TAG	MANUFACTURER	MODEL	TYPE	SERVICE	LOCATION	AIRFLOW (L/s)	E.S.P. (kPa)	ELECTRICAL V/Ph/Hz	REMARKS
EF-1	GREENHECK	CSP-A125	INLINE	SAN. EXHAUST	WR 102	45	0.06	115/1/60	LIGHT SWITCH CONTROL. PROVIDE C/W DISCONNECT AND STARTER. C/W BACKDRAFT DAMPER AND HANGERS. FAN START STOP AND FAN STATUS SHALL BE SHOWN ON BAS.

RADIANT CEILING PANEL

TAG	MANUFACTURER	MODEL	LOCATION	MOUNTING CONFIGURATION	LENGTH (mm)	HEATING CAPACITY (kW)	FLUID	FLUID CHARACTERISTICS		NOTES
								E.F.T.(°C)	L.F.T. (°C)	
RP-1	SIGMA	SLC 30-10	WASHROOM	CEILING MOUNTED	1372	0.40	WATER	60	50	TERMOSTATIC CONTROL VALVE AND THERMOSTAT
RP-2	SIGMA	SLC 30-10	WASHROOM	CEILING MOUNTED	2286	0.66	WATER	60	50	TERMOSTATIC CONTROL VALVE AND THERMOSTAT



3 20 05 00.03 PIPING HANGERS AND SUPPORTS
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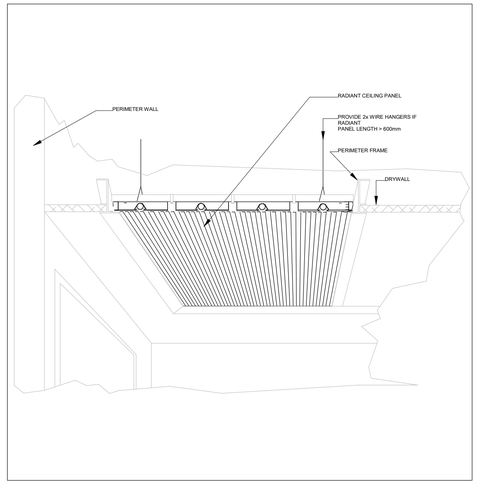
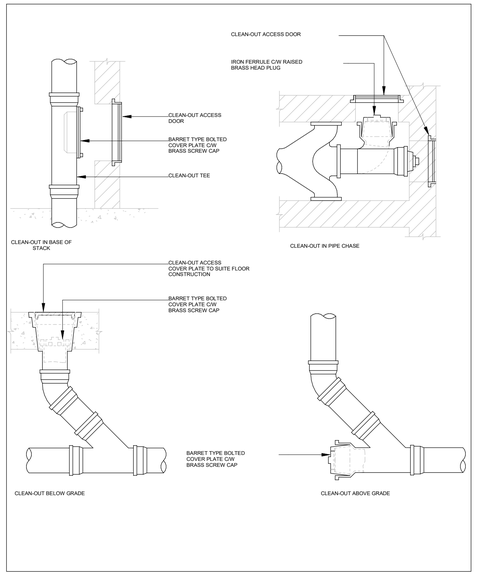


4 23 83 16.13 RADIANT PANEL - T-BAR INSTALLATION
SCALE:N.T.S.



5 22 13 00.02 SAN & STORM WATER CLEANOUTS
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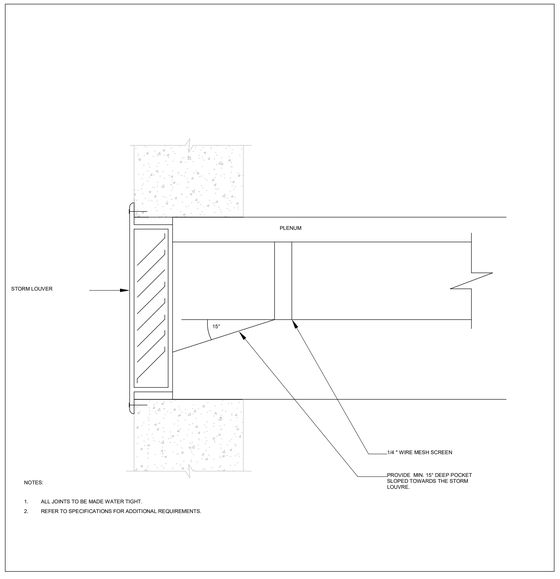

6 DUCTWORK CONNECTION TO STORM LOUVRE
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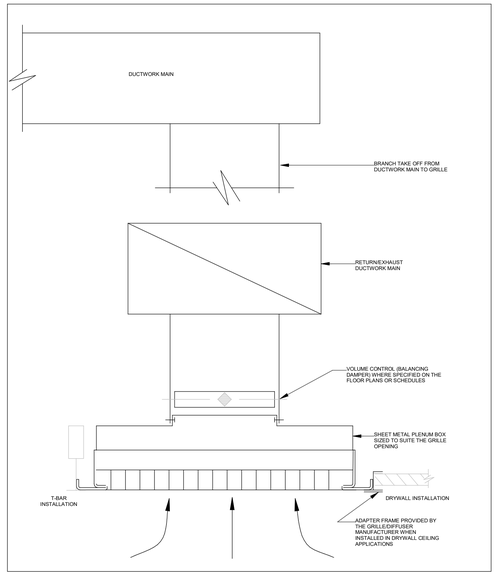

7 23 30 42.02 CEILING MOUNTED GRILLE
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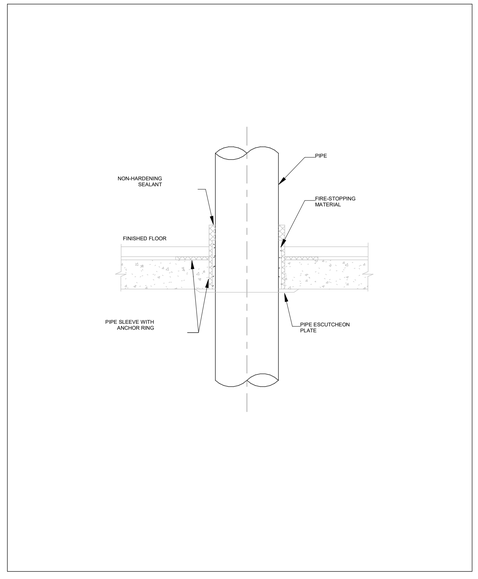

8 PIPE AND DUCT PENETRATIONS WATERPROOF FLOORS
SCALE:N.T.S.

REVISIONS

No.	DATE	DESCRIPTION
1	2023-02-27	ISSUED FOR COORDINATION
2	2023-03-31	ISSUED FOR 95%CD
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WASHROOM - SCHEDULE & DETAILS

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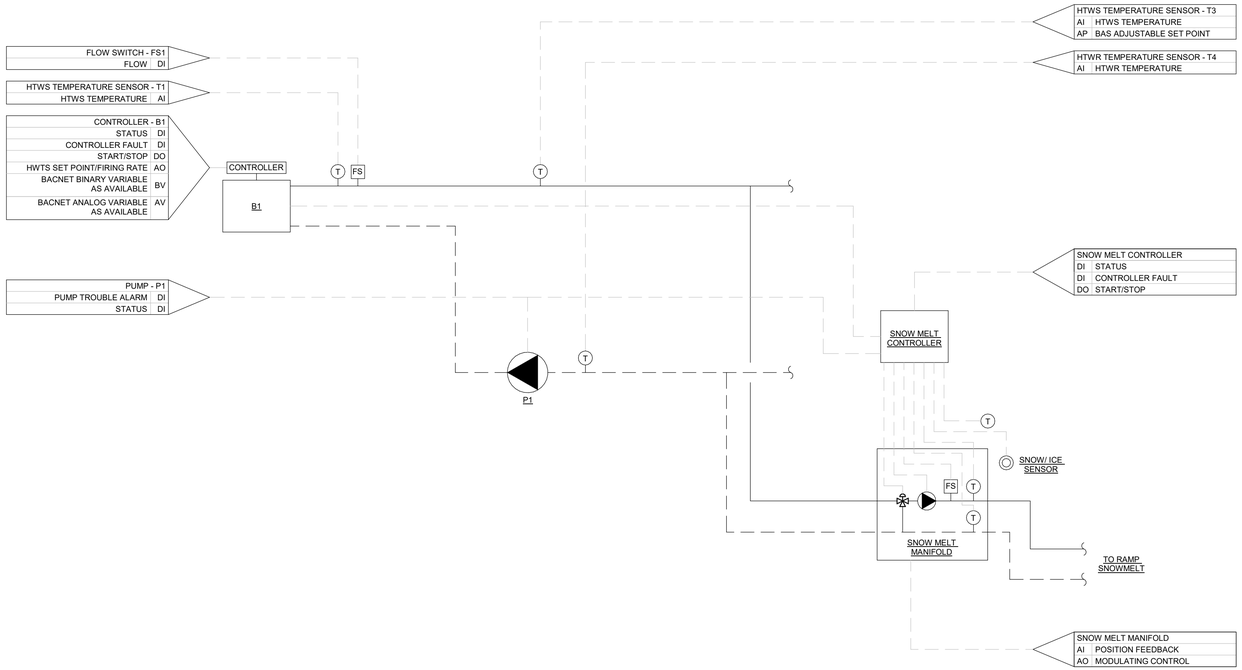


4 SNOW MELT SYSTEM CONTROLS DIAGRAM

SCALE:N.T.S.

SNOW MELT SEQUENCE OF OPERATION:

SNOW ICE MELTING SYSTEM INCLUDES: TEKMAR 090 PRECIPITATION AND SLAB SENSOR, 680 SNOW MELT MELTING CONTROL WITH GLYCOL SUPPLY AND RETURN SENSORS AND OUTDOOR AMBIENT SENSOR. MELTING CONTROL AUTOMATICALLY DETECTS SNOW MELT CONDITIONS AND ENABLES THE SYSTEM, PROVIDED THE ZONE IS NOT IN THE WWSD (WARM WEATHER SHUT DOWN) OR IN THE CWCO (COLD WEATHER CUT OUT) CONDITIONS.

THE 680 CONTROL SHALL BE FULLY BACNET COMPATIBLE.

THE CONTROL CONTINUALLY MONITORS THE 090-MOISTURE DETECTOR FOR THE PRESENCE OF MOISTURE. SNOW MELTING IS ENERGIZED WITH COINCIDENT PRECIPITATION AND OUTDOOR AMBIENT BELOW WARM WEATHER CUTOUT OF ~ 40 DEG.F. AND ABOVE COLD WEATHER CUTOUT ~-10 DEG.F. ONCE MOISTURE IS DETECTED THE *WATER* POINTER IS DISPLAYED ON THE CONTROLLER'S LCD AND THE SNOW MELTING SYSTEM IS ENABLED AND SLAB IS BROUGHT TO MELTING TARGET SET POINT OF ~ 39 DEG.F. AUTOMATIC MELTING DISABLE WILL OCCUR ONCE THE 090 SENSOR IS DRY AND THE *WATER* POINTER ON THE LCD TURNS OFF. THE SLAB TEMPERATURE MUST BE AT LEAST AT THE TARGET TEMPERATURE AND "ADD MELT" 1 HOUR BEFORE THE SYSTEM TURNS OFF.

ONCE THE MELTING MODE IS COMPLETE, OPTIONALLY: THE SNOW MELT OPERATES IN AN "IDLING MODE" MAINTAINING THE SLAB AT A REDUCED SET POINT OF ~23 DEG.F. ALLOWING FASTER RESPONSE TO MOISTURE CONDITIONS. (IDLE MODE MAY BE TURNED OFF FOR ENERGY SAVINGS CAPABILITY OR SET TO 34 DEG.F. FOR CRITICAL CONDITIONS WHERE NO SNOW OR ICE IS ACCEPTABLE.

TEKMAR 680 CONTROLLER WILL MODULATE THE GLYCOL 2-WAY HEX CONTROL VALVE TO MAINTAIN A 39 DEG.F SLAB TEMPERATURE DURING MELTING MODE. THE SUPPLY SENSOR SHALL LIMIT THE MAXIMUM SUPPLY GLYCOL TEMPERATURE TO 135 DEG.F. THE TEKMAR 680 CONTROL USING THE RETURN GLYCOL TEMPERATURE SENSOR SHALL PRIORIITIZE THE 2-WAY MIXING VALVE POSITION TO NOT EXCEED A 50 DEG.F. TEMPERATURE DIFFERENCE BETWEEN SUPPLY AND RETURN TEMPERATURE SENSORS. THIS FEATURE IS TO PROTECT THE CONCRETE SLAB FROM HEATING UP TOO QUICKLY AND ASSOCIATED INTERNAL CONCRETE DIFFERENTIAL HOOP STRESS.
SUPPLY GLYCOL TEMPERATURE SHALL BE MAXIMUM 140 DEG.F WITH DESIGN RETURN TEMPERATURE OF 105
DEG.F. WHEN SLAB MELT OR IDLE TARGET IS REACHED SUPPLY GLYCOL TEMPERATURE WOULD BE REDUCED AS LOW AS 80 DEG.F AND RETURN GLYCOL 50/F RETURN.

SNOW MELT SYSTEM CONTROLLER SETTINGS

Tool Box

Access Level	User/**Installer**	
Temperature Units	C/F	

Set points Menu

Melting Slab Target	39 F	4.0 C
Idling Slab Target	34 F	1.5 C
Storm	28 F	-2 C
Manual Melt Time	12 Hr	
Add Melt	1 Hr	
Sensitivity	Auto	
WWSD (warm weather shutdown)	40 F	5.0 C
CWCO (cold weather cutout)	-10 F	-23 C

System Set up

Application Mode	Mix
Snow Ice Sensor	In-Slab 090
Protect Slab	On
Econo Melt	On
Max Melt Days	Off
Outdoor Sensor	Control

Set up Mixing

Mixing Type	0-10 VDc or Floating
Mix Motor Speed	45 seconds
Mix Maximum Temperature	140 F

BAS Menu

BAS Type	BacNet MSTP
Address	Balance of settings by BAS contractor

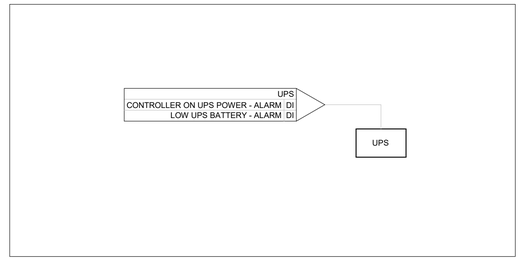
BOILER SEQUENCE OF OPERATION:

OPERATING MODE:

1. THE SYSTEM SHALL BE ENABLED ACCORDING TO THE FOLLOWING MODE:
   - OUTDOOR AIR TEMPERATURE
   - SCHEDULED RUN TIME MODE

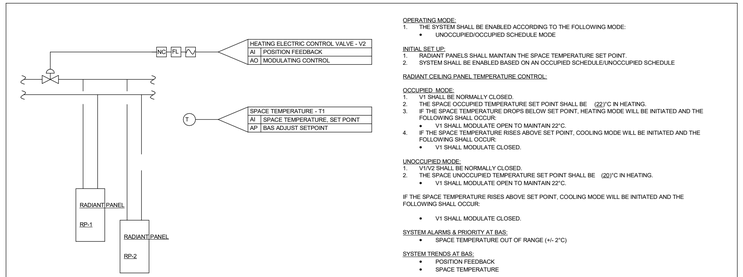
INITIAL SET UP:

1. SYSTEM SHALL BE ENABLED BASED ON AN OUTDOOR AIR TEMPERATURE OF 1.1°C OR LOWER, A SEASONAL TIME SCHEDULE OF (OCTOBER - MARCH), PROVIDE A TEMPERATURE TIME DELAY OF 10 MINUTES PRIOR TO ENABLING PUMP/BOILER.
2. BOILERS SHALL BE ENABLED/DISABLED LOCALLY AT THE CONTROLLER OR REMOTELY THROUGH THE BAS.
3. BOILERS ARE EQUIPPED WITH SAFETIES WHICH INCLUDES A (FLOW SWITCH/HIGH LIMIT TEMPERATURE CUT OUT SWITCH).
4. WHEN THE HWTR IS BELOW (55)'C THE BOILER FIRING RATE SHALL BE RESTRICTED TO ENSURE THE MAXIMUM DIFFERENTIAL TEMPERATURE ACROSS THE BOILER IS KEPT AT 5°C OR LOWER. OTHERWISE THE MAXIMUM DIFFERENTIAL TEMPERATURE ACROSS THE BOILER IS SET (14)°C.



5 UPS CONTROL SCHEMATIC

SCALE:N.T.S.



OPERATING MODE:
1. THE SYSTEM SHALL BE ENABLED ACCORDING TO THE FOLLOWING MODE:
   - UNOCCUPIED/OCCUPIED SCHEDULE MODE

INITIAL SET UP:
1. RADIANT PANELS SHALL MAINTAIN THE SPACE TEMPERATURE SET POINT.
2. SYSTEM SHALL BE ENABLED BASED ON AN OCCUPIED SCHEDULE/UNOCCUPIED SCHEDULE

RADIANT CEILING PANEL TEMPERATURE CONTROL:

OCCUPIED MODE:
1. V1 SHALL BE NORMALLY CLOSED.
2. THE SPACE OCCUPIED TEMPERATURE SET POINT SHALL BE (22)°C IN HEATING.
3. IF THE SPACE TEMPERATURE DROPS BELOW SET POINT, HEATING MODE WILL BE INITIATED AND THE FOLLOWING SHALL OCCUR:
   - V1 SHALL MODULATE OPEN TO MAINTAIN 22°C.
4. IF THE SPACE TEMPERATURE RISES ABOVE SET POINT, COOLING MODE WILL BE INITIATED AND THE FOLLOWING SHALL OCCUR:
   - V1 SHALL MODULATE CLOSED.

UNOCCUPIED MODE:
1. V1/V2 SHALL BE NORMALLY CLOSED.
2. THE SPACE UNOCCUPIED TEMPERATURE SET POINT SHALL BE (22)°C IN HEATING.
   - V1 SHALL MODULATE OPEN TO MAINTAIN 22°C.

IF THE SPACE TEMPERATURE RISES ABOVE SET POINT, COOLING MODE WILL BE INITIATED AND THE FOLLOWING SHALL OCCUR:

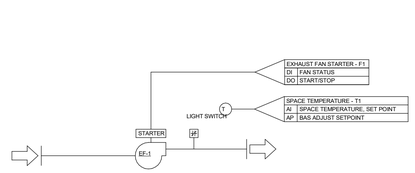
   - V1 SHALL MODULATE CLOSED.

SYSTEM ALARMS & PRIORITY AT BAS:
   - SPACE TEMPERATURE OUT OF RANGE (+/- 2°C)

SYSTEM TRENDS AT BAS:
   - POSITION FEEDBACK
   - SPACE TEMPERATURE

3 RADIANT PANEL CONTROL SEQUENCE

SCALE: N.T.S.



OPERATING MODE:
1. THE SYSTEM SHALL BE ENABLED ACCORDING TO THE FOLLOWING MODE:
   - LIGHT SWITCH CONTROL

INITIAL SET UP:
1. SYSTEM SHALL BE ENABLED BASED ON LIGHT SWITCH CONTROL/ TEMPERATURE SENSOR.
2. FAN SHALL BE ENABLED/DISABLED LOCALLY AT THE STARTER OR REMOTELY THROUGH THE BAS.

FAN CONTROL:
1. CONTROLS SIGNAL SHALL BE DUPLICATED AT THE BAS.
2. FAN SHALL OPERATE AT CONSTANT SPEED.

UNOCCUPIED MODE:
3. THE SPACE UNOCCUPIED TEMPERATURE SET POINT SHALL BE (27)°C IN COOLING & (25)°C IN HEATING.
4. FAN SHALL BE ENABLED IF SPACE TEMPERATURE IS ABOVE SET POINT AND DISABLED WHEN SPACE TEMP. IS BELOW SET POINT.

OCCUPIED MODE:
4. THE SPACE OCCUPIED TEMPERATURE SET POINT SHALL BE (25)°C IN COOLING & (22)°C IN HEATING.
5. FAN SHALL BE ENABLED IF SPACE TEMPERATURE IS ABOVE SET POINT AND DISABLED WHEN SPACE TEMP. IS BELOW SET POINT.

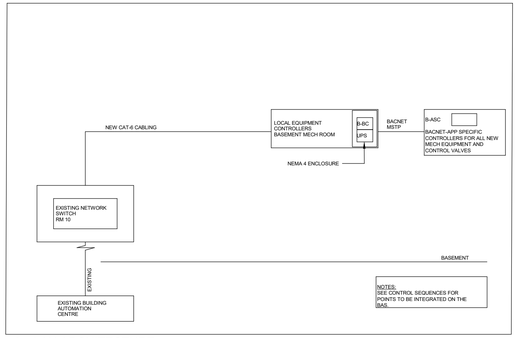
FIRE ALARM MODE:
1. FAN SHALL SHUT DOWN DURING FIRE ALARM.

SYSTEM ALARMS & PRIORITY AT BAS:
   - FAN FAILURE COMMANDED ON/STATUS OFF

SYSTEM TRENDS AT BAS:
   - FAN STATUS
   - EQUIPMENT OPERATING HOURS

2 HVAC - EXHAUST FANS - CONSTANT SPEED FAN - LIGHT SWITCH CONTROL SEQUENCE

SCALE: N.T.S.



1 LAN ARCHITECTURE

SCALE: N.T.S.

REVISIONS

No.	DATE	DESCRIPTION
1	2024-05-24	ISSUED FOR PERMIT
2	2024-06-07	ISSUED FOR TENDER

NOTES:

KEYPLAN:

CLIENT:

CLIENT: UNIVERSITY OF TORONTO

PROJECT:

ED-22-703-08

CIRHR UNIVERSAL WASHROOM

CENTRE FOR INDUSTRIAL RELATIONS & HUMAN RESOURCES (CIRHR)
121 ST. GEORGE ST., TORONTO, ONTARIO

ORIGINAL PAGE SIZE: ARCH D - 24" x 36"

QUASAR CONSULTING GROUP
250 ROWNTREE DAIRY RD, WOODBRIDGE, ON
TEL: 905-507-0800
WEB: WWW.QUASARCG.COM

+VG ARCHITECTS - THE VENTIN GROUP LTD

SCALE:
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CONTROL SEQUENCES & LAN ARCHITECTURE

M4.3

DRAWN BY: Author CHECKED BY: Checker

Autodesk Docs://ED-22-703 - UofT Accessibility Improvement/ED-22-703 - QCG ME Model_R22.rvt

Plot Date: 6/6/2024 4:54:58 PM

UOFT ST. GEORGE CAMPUS ACCESSIBILTY IMPROVEMENT
CENTRE FOR INDUSTRIAL RELATIONS & HUMAN RESOURCES (CIRHR)
121 ST GEORGE ST, TORONTO, ON M5S 2E8

ELECTRICAL SET

ELECTRICAL DRAWING LIST - WASHROOM

DRAWING #	DRAWING NAME
E0.0	TITLE PAGE
E0.1	ELECTRICAL LEGEND & DRAWING LIST
E0.2	ELECTRICAL SPECIFICATION I - WASHROOM
E0.3	ELECTRICAL SPECIFICATION II - WASHROOM
E0.4	ELECTRICAL SPECIFICATION III - WASHROOM
E1.0	ELECTRICAL SITE PLAN
E2.0	LIGHTING LEVEL 1 - DEMOLITION & NEW WORK
E2.1	LIGHTING LEVEL 1 - DEMOLITION & NEW WORK
E3.0	BASEMENT POWER LAYOUT - DEMOLITION & NEW WORK
E3.1	POWER LEVEL 1 - DEMOLITION & NEW WORK
E4.0	SINGLE LINE DIAGRAM - EXISTING
E4.1	SINGLE LINE DIAGRAM - NEW WORK
E6.0	ELECTRICAL TYPICAL DETAILS AND LUMINAIRE SCHEDULE

QUASAR

250 ROWNTREE DAIRY RD.
WOODBRIDGE, ONTARIO
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PROJECT NO.: ED-22-703

REVISIONS

No.	DATE	DESCRIPTION
1	2024-07-03	ISSUED FOR TENDER

NOTES:

LICENSED PROFESSIONAL ENGINEER
JULY 3 2024
T.W. SEDORE
PROVINCE OF ONTARIO

CLIENT:
CLIENT: UNIVERSITY OF TORONTO

PROJECT:
ED-22-703

CIRHR UNIVERSAL WASHROOM

CENTRE FOR INDUSTRIAL RELATIONS & HUMAN RESOURCES (CIRHR)
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THE VENTIN GROUP LTD

SCALE:

TITLE PAGE

E0.0

Plot Date:

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
LINETYPES	
	NEW WORK
	WORK TO BE DEMOLISHED, OR REMOVED
	EXISTING MATERIAL/EQUIPMENT/SERVICES TO REMAIN
	FUTURE WORK (NOT IN SCOPE)
	EXTENTS OF FIRE ALARM ZONE, WET LOCATION, OR OTHER AREA AS NOTED ON PLANS
ABBREVIATIONS	
E	EXISTING TO REMAIN
R	EXISTING TO BE DEMOLISHED/REMOVED
ER	EXISTING IN RELOCATED POSITION
RR	REMOVE AND RELOCATE
C	CEILING MOUNTED CONNECTION
W	WALL MOUNTED CONNECTION
F	FLOOR MOUNTED CONNECTION
℄	CENTRE LINE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
O/C	OVER COUNTER
U/C	UNDER CABINET
U/F	UNDER RAISED FLOOR
CCT	CIRCUIT
CTE	CONNECT TO EXISTING
AFCI	ARC FAULT CIRCUIT INTERRUPTER
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFI	GROUND FAULT INTERRUPTER
IG	ISOLATED GROUND
TL	TWIST LOCK
TR	TAMPER RESISTANT
WG	WIRE GUARD
WP	WEATHER PROOF
EX	EXPLOSION PROOF
HZ	HAZARDOUS LOCATION
R/I	ROUGH-IN ONLY
NIC	NOT IN CONTRACT
SIM.	SIMILAR TO
TYP.	TYPICAL
ABBREVIATIONS - CODES AND STANDARDS	
OBC	ONTARIO BUILDING CODE
OESC	ONTARIO ELECTRICAL SAFETY CODE
OFC	ONTARIO FIRE CODE
ABBREVIATIONS - CEILING TYPES	
ACT	ACOUSTIC CEILING TILE (T-BAR)
EXP	EXPOSED CEILING
OWSJ	OPEN WEB STEEL JOISTS
PCC	PAINTED OR POPCORN CEILING ON EXPOSED CONCRETE
WD	WOOD CEILING
ANNOTATIONS	
CL	CLOSET
WR	WASHROOM
PLUMBING	
PTP	ELECTRONIC TRAP PRIMER
PSC	PLUMBING SENSOR CONTROL (TOUCHLESS FAUCETS)
HVAC	
T	THERMOSTAT OR TEMPERATURE SENSOR
T	TIMER CONTROL
BBH	ELECTRIC BASEBOARD HEATER (BBH)
FFH	FORCED FLOW HEATER
ERV	ENERGY RECOVERY VENTILATOR
HRU	HEAT RECOVERY UNIT
MUA	MAKE-UP AIR UNIT
CONDUIT AND BOXES	
	CONDUIT WITH END BUSHING
	CONDUIT UP
	CONDUIT DOWN
	CONDUIT CONTINUES
JB	JUNCTION BOX
PB	PULL BOX
HH	HAND HOLE
CONNECTIONS TO EQUIPMENT	
DW	DISHWASHER
FR	FRIDGE
MW	MICROWAVE
HD	HAND DRYER. ALLOW UP TO 208V-1PH-20A
	1-PHASE DIRECT CONNECTION OUTLET AS NOTED.
	3-PHASE DIRECT CONNECTION OUTLET AS NOTED.

THIS LEGEND IS GENERIC. ALL SYMBOLS LISTED MAY NOT BE APPLICABLE FOR THIS PROJECT. REFER TO FLOOR PLANS TO DETERMINE USED DEVICES AND EQUIPMENT.

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
	SYSTEM FURNITURE WALL FEED FOR POWER AND TELECOMMUNICATIONS UNLESS NOTED OTHERWISE. 'C' ADJACENT TO SYMBOL DENOTES CEILING FEED, 'F' ADJACENT TO SYMBOL DENOTES FLOOR FEED.
W	ADJACENT TO 3-PHASE DIRECT CONNECTION, DENOTES WALL SYSTEM FURNITURE FEED FOR POWER AND COMMUNICATIONS.
	CONNECTION TO SINGLE PHASE MOTOR, HP (KW) AS NOTED. PROVIDE LOCAL DISCONNECT.
	THREE PHASE MOTOR, HP (KW) AS NOTED. PROVIDE LOCAL DISCONNECT.
LIGHTING CONTROLS REFER TO SPECIFICATIONS AND RESPECTIVE SCHEDULES FOR EXACT REQUIREMENTS	
	SWITCH OR OTHER USER INTERFACE DEVICE AS DESCRIBED ON LIGHTING CONTROLS SCHEDULE.
3W	3-WAY SWITCH
DIM	ADJACENT TO SWITCH, DENOTES DIMMING SWITCH.
K	ADJACENT TO SWITCH, DENOTES KEY SWITCH.
T	ADJACENT TO SWITCH, DENOTES COUNTDOWN TIMER SWITCH
AT	ADJACENT TO SWITCH, DENOTES ASTRONOMICAL TIMER SWITCH
DS	ADJACENT TO SWITCH, DENOTES DOOR SWITCH
PIR	PASSIVE INFRARED SENSOR
DT	DUAL TECHNOLOGY SENSOR
UT	ULTRASONIC SENSOR
OS	SENSOR (TYPE UNKNOWN)
M	ADJACENT TO SWITCH, DENOTES MASTER CONTROL FOR ALL LUMINAIRES IN A ROOM OR SPACE, OR AS NOTED.
	WALL MOUNTED SWITCH/OCCUPANCY SENSOR. PIR DENOTES 'PASSIVE INFRARED', DT DENOTES 'DUAL PASSIVE INFRARED/ULTRASONIC', LINE VOLTAGE TO SUIT CONTROLLED CIRCUIT, OR AS NOTED.
RP	RELAY PANEL
PP	POWER PACK
SC	SCENE CONTROLLER.
P	PHOTOCELL SENSOR.
PC	PHOTOCELL SENSOR. 'PC' DENOTES CLOSED LOOP PHOTOCELL CONTROL, 'PO' DENOTES OPEN LOOP PHOTOCELL CONTROL
	CEILING MOUNTED OCCUPANCY SENSOR. PIR DENOTES 'PASSIVE INFRARED', UT DENOTES 'ULTRASONIC' (OR MICROPHONIC), DT DENOTES 'DUAL TECHNOLOGY', 'OS' DENOTES UNKNOWN TECHNOLOGY.
	WALL MOUNTED OCCUPANCY SENSOR.
DISTRIBUTION EQUIPMENT	
	TRANSFORMER, PLAN VIEW
	SURFACE MOUNTED LIGHTING AND RECEPTACLE PANELBOARD
	RECESSED RECEPTACLE AND LIGHTING PANELBOARD
	DISTRIBUTION PANELBOARD
	DISCONNECT SWITCH
	FUSED DISCONNECT SWITCH
C	CONTACTOR
	LOOSE STARTER. COORDINATE STARTING CHARACTERISTIC WITH EQUIPMENT REQUIREMENTS.
	COMBINATION STARTER.
VFD	ADJACENT TO STARTER, DENOTES VARIABLE FREQUENCY DRIVE
POWER RECEPTACLES AND BOXES	
	120V U-GROUND DUPLEX RECEPTACLE.
	120V U-GROUND DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER TOP OR AS INSTRUCTED ON SITE.
	120V U-GROUND 20A DUPLEX RECEPTACLE.
	120V U-GROUND DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER TOP OR AS INSTRUCTED ON SITE.
	120V U-GROUND DUPLEX RECEPTACLE - AUTOMATICALLY CONTROLLED (ASHRAE 90.1-2013, 8.4.2).
	120V U-GROUND 20A DUPLEX RECEPTACLE - AUTOMATICALLY CONTROLLED (ASHRAE 90.1-2013, 8.4.2).
	120V U-GROUND DUPLEX RECEPTACLE - HALF OF RECEPTACLE AUTOMATICALLY CONTROLLED (ASHRAE 90.1-2013, 8.4.2).
	MANUALLY CONTROLLED SPLIT RECEPTACLE
	120V U-GROUND QUAD RECEPTACLE.
	INDICATES RECEPTACLE COMPLETE WITH ONE TYPE A AND ONE TYPE C USB CHARGING PORTS.
	14-30R RECEPTACLE FOR LAUNDRY DRYER, OR OTHER RECEPTACLE AS NOTED
	14-50R RECEPTACLE FOR ELECTRONIC RANGE, OR OTHER RECEPTACLE AS NOTED. PROVIDE 40A/2P BREAKER TO SUIT..

THIS LEGEND IS GENERIC. ALL SYMBOLS LISTED MAY NOT BE APPLICABLE FOR THIS PROJECT. REFER TO FLOOR PLANS TO DETERMINE USED DEVICES AND EQUIPMENT.

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
	SPECIAL RECEPTACLE. VERIFY OUTLET REQUIREMENTS PRIOR TO ROUGH-IN.
	SPECIAL RECEPTACLE. VERIFY OUTLET REQUIREMENTS PRIOR TO ROUGH-IN.
	FLOOR RECEPTACLE OR RECEPTACLE IN FLOOR BOX (POWER ONLY)
	SERVICE POLE. PROVIDE POWER TO JUNCTION BOX IN CEILING SPACE ABOVE. DEVICES ON POLE AS NOTED ON PLANS.
FB1	ADJACENT TO FLOOR RECEPTACLE, DENOTES FLOOR BOX TYPE
•	ADJACENT TO DEVICE, DENOTES DEVICE CONNECTED TO EMERGENCY POWER
LIGHTING FIXTURES SYMBOLS IN ACCORDANCE WITH IES DCI-3-00 AND IES HB-10-11 WHERE NOT DETAILED OTHERWISE HERE. REFER TO LIGHTING FIXTURE SCHEDULE FOR FURTHER DETAILS AND EXACT FIXTURE REQUIREMENTS.	
	LINEAR LUMINAIRE, SURFACE MOUNTED TO CEILING
	LINEAR LUMINAIRE, RECESSED IN CEILING
	LINEAR LUMINAIRE, SUSPENDED: PENDANT, CHAIN, STEM, OR AIRCRAFT CABLE HUNG TO SUIT APPLICATION, OR AS NOTED IN SCHEDULE. "X", WHEN USED DENOTES POWER FEED LOCATION.
	LINEAR LUMINAIRE, WALL MOUNTED
	AS ABOVE, CONNECTED TO EMERGENCY OR NIGHT LIGHTING CIRCUIT AS INDICATED.
	ROUND OR SQUARE DOWNLIGHT, RECESSED
	RECESSED DOWNLIGHTS, CONNECTED TO EMERGENCY OR NIGHT LIGHT CIRCUIT
	ROUND SUSPENDED LUMINAIRE
	WALL SCONCE OR OTHER WALL MOUNTED LUMINAIRES.
EM	CONNECTED TO EMERGENCY NIGHT LIGHT CIRCUIT (24 HOUR)
CE	CONNECTED TO EMERGENCY CIRCUIT. PROVIDE CUL 924 LISTED SHUNT TRIP RELAY OR EQUAL TO PERMIT CONTROL OF LUMINAIRE WITH ZONING BASED ON LOCAL LIGHTING CONTROLS.
NL	LUMINAIRE CONNECTED TO NON-EMERGENCY NIGHT LIGHT CIRCUIT (24 HOUR)
A, B, Z1, Z2, ETC.	DENOTES ZONING/CIRCUITING ASSIGNMENTS FOR LUMINAIRES AND CONTROLS IN THE SAME SPACE.
EMERGENCY LIGHTING REFER TO EMERGENCY LIGHTING FIXTURE SCHEDULE FOR EXACT FIXTURE REQUIREMENTS.	
	CEILING OR WALL MOUNTED ILLUMINATED EXIT SIGN. SHADED AREA INDICATES ILLUMINATED FACE. PROVIDE DIRECTIONAL ARROWS AS INDICATED ON PLANS.
	CEILING OR WALL MOUNTED ILLUMINATED EXIT SIGN. SHADED AREA INDICATES ILLUMINATED FACE. PROVIDE DIRECTIONAL ARROWS AS INDICATED ON PLANS.
SL	DENOTES 'SELF-LUMINOUS' EXIT SIGN
PL	PHOTOLUMINOUS EXIT SIGN
	EMERGENCY LIGHTING BATTERY UNIT, WITH AND WITHOUT HEADS.
	ONE AND TWO HEAD WALL MOUNTED EMERGENCY LIGHTING REMOTE UNITS.
	ONE AND TWO HEAD CEILING MOUNTED EMERGENCY LIGHTING REMOTE UNITS.
	RECESSED EMERGENCY REMOTE HEAD.
EM	DENOTES 'EMERGENCY"
CCT	CORRELATED COLOUR TEMPERATURE
CRI	COLOUR RENDERING INDEX
EXTERIOR LIGHTING	
	ARM MOUNTED LUMINAIRE ON POLE. DIRECTIONAL ARROW, WHERE INDICATED DENOTES PRIMARY LUMEN ORIENTATION.
	POST TOP LUMINAIRE ON POLE. DIRECTIONAL ARROW, WHERE INDICATED DENOTES PRIMARY LUMEN ORIENTATION.
	LIGHTING BOLLARD. DIRECTIONAL ARROW, WHERE INDICATED DENOTES PRIMARY LUMEN ORIENTATION.
	GROUND MOUNTED FLOOD LIGHT
TELECOMMUNICATIONS	
	SYSTEM FURNITURE FEED.
W	ADJACENT TO SYSTEM FURNITURE FEED, DENOTES WALL SYSTEM FURNITURE FEED FOR COMMUNICATIONS.
F	ADJACENT TO SYSTEM FURNITURE FEED, DENOTES FLOOR SYSTEM FURNITURE FEED FOR COMMUNICATIONS.
C	ADJACENT TO SYSTEM FURNITURE FEED, DENOTES CEILING SYSTEM FURNITURE FEED FOR COMMUNICATIONS (SERVICE POLE OR DROP CORD AS NOTED).
	CABLE TRAY (LADDER TYPE)
	CABLE TRAY (BASKET TYPE)
	WALL MOUNTED DATA (D) OR VOICE (V) OUTLET. PROVIDE 1V AND 1D UNLESS NOTED OTHERWISE.
	WALL MOUNTED VOICE (TELEPHONE) OUTLET. PROVIDE 1V UNLESS NOTED OTHERWISE.

THIS LEGEND IS GENERIC. ALL SYMBOLS LISTED MAY NOT BE APPLICABLE FOR THIS PROJECT. REFER TO FLOOR PLANS TO DETERMINE USED DEVICES AND EQUIPMENT.

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
	WALL MOUNTED DATA OUTLET. PROVIDE 1D UNLESS NOTED OTHERWISE.
	WALL MOUNTED TELEVISION OUTLET.
	VOICE, DATA, OR TV OUTLET AS DESCRIBED ABOVE, MOUNTED ABOVE COUNTER TOP OR AS INSTRUCTED ON SITE.
B	ADJACENT TO COMMUNICATIONS OUTLET, INDICATES BLANK-OFF PLATE.
HDMI	HDMI OUTLET.
AV	AUDIO VIDEO GANG, AS NOTED.
WAP	WIRELESS ACCESS POINT (WIFI)
	AUDIO VISUAL SYSTEM SPEAKER, CEILING MOUNTED.
	AUDIO VISUAL SYSTEM SPEAKER, WALL MOUNTED.
	PUBLIC ADDRESS SYSTEM SPEAKER, CEILING MOUNTED.
	PUBLIC ADDRESS SYSTEM SPEAKER, WALL MOUNTED.
	PUBLIC ADDRESS SPEAKER, WALL MOUNTED HORN SPEAKER.
HS	PUBLIC ADDRESS SYSTEM HANDSET
ACC	PUBLIC ADDRESS SYSTEM ADMIN CONTROL CONSOLE
VOL	PUBLIC ADDRESS SPEAKER VOLUME CONTROL SWITCH.
	INTERCOM
IDC	INSULATION DISPLACEMENT CONNECTION
	CLOCK
MTX	GPS CLOCK SYSTEM MASTER TRANSMITTER
	GPS CLOCK SYSTEM GPS RECEIVER
RTX	GPS CLOCK SSTEM SETTELITE TRANSMITTER (RECEIVER)
	GPS CLOCK SYSTEM RECEIVER SWITCH
ACCESS CONTROL AND DOOR HARDWARE	
CR	CARD READER
DA	DOOR ALARM SOUNDER
DC	DOOR CONTACT
ODC	OVERHEAD DOOR CONTACT
EL	ELECTRIC LATCH
ES	ELECTRIC STRIKE
PTC	ELECTRIC POWER TRANSFER CABLE
PTH	POWER TRANSFER HINGE
KS	KEY SWITCH
ML	ELECTROMAGNETIC LOCK
MLR	MOTORIZED LATCH RETRACTION. PROVIDE 120 V.
REX	REQUEST TO EXIT SENSOR
DL	DOOR LOCK
DR	DOOR RELEASE
	MUSHROOM HEAD PUSH BUTTON FOR 'REQUEST TO EXIT' MAGLOCK RELEASE, OR OTHER PUSH BUTTON AS INDICATED
	BARRIER FREE DOOR OPERATOR PUSH BUTTON
	BARRIER FREE DOOR OPERATOR PUSH BUTTON
WB	TOUCHLESS "WAVE SWITCH" FOR DOOR OPERATOR CONTROL
DB	DOOR BELL C/W SOUNDER AND STROBE
DB	DOOR BELL (SOUNDER ONLY)
INTRUSION DETECTION	
	GLASS BREAK (GB)
MD	MOTION DETECTOR (MD)
KP	KEYPAD (KP)
VIDEO SURVEILLANCE	
	CCTV CAMERA
C/P	CCTV CAMERA, CEILING OR POLE MOUNTED
	CCTV CAMERA, WALL MOUNTED
PTZ	PAN-TILT-ZOOM
DURESS SYSTEM	
DB	DURESS BUTTON (MOUNTED ON UNDERSIDE OF TABLETOP)
DB-W	WALL MOUNTED DURESS BUTTON WITH POLYCARBONATE ANTI-TAMPER COVER
	DURESS SYSTEM STROBE LIGHT
FIRE DETECTION AND ALARM - GENERAL	
CACF	CENTRAL ALARM AND CONTROL FACILITY
FACP	FIRE ALARM CONTROL PANEL
FAAP	FIRE ALARM ANNUNICIATOR PANEL
FAAG	FIRE ALARM ACTIVE ANNUNCIATOR C/W GRAPHIC
FAPG	FIRE ALARM PASSIVE GRAPHIC
DGP	DATA GATHERING PANEL
FAZ	FIRE ALARM ZONE
FSZ	FIRE ALARM SUPERVISORY ZONE
FDSPCP	FIRE DETECTION, SUPPRESSION, AND PRE-ACTION CONTROL PANEL
FDSCP	FIRE DETECTION AND SUPPRESSION CONTROL PANEL
	FIRE ALARM PANEL (FACP, FAAP, FAMP) AS DENOTED ON PLANS

THIS LEGEND IS GENERIC. ALL SYMBOLS LISTED MAY NOT BE APPLICABLE FOR THIS PROJECT. REFER TO FLOOR PLANS TO DETERMINE USED DEVICES AND EQUIPMENT.

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
FIRE DETECTION - INITIATION DEVICES	
	MANUAL PULL STATION (MPS)
LX	WHERE NOTED ADJACENT TO MANUAL PULL STATIONS, DENOTES PULL STATION C/W POLYCARBONATE (LEXAN) COVER.
WG	WHERE NOTED ADJACENT TO MANUAL PULL STATIONS, DENOTES PULL STATION C/W WIRE GUARD COVER.
A	WHERE NOTED ADJACENT TO MANUAL PULL STATIONS, DENOTES MANUAL PULL STATION C/W AUXILIARY CONTACT.
	PHOTOELECTRIC SMOKE DETECTOR
	SAME AS ABOVE, WALL MOUNTED
SA	WHEN ADJACENT TO PHOTOELECTRIC SMOKE DETECTOR, INDICATES RESIDENTIAL SMOKE ALARM
	RESIDENTIAL SMOKE ALARM, 120 VOLT, COMPLETE WITH STROBE. FOR AREAS AS INDICATED ON PLANS BY "CO", PROVIDE INTEGRAL CARBON MONOXIDE DETECTION.
	SAME AS ABOVE, WALL MOUNTED
	DUCT MOUNTED SMOKE DETECTOR
CO	CARBON MONOXIDE DETECTOR
VESDA	VERY EARLY SMOKE DETECTING APPARATUS
BSDT	BEAM SMOKE DETECTOR TRANSMITTER
BSDR	BEAM SMOKE DETECTOR RECEIVER (OR REFLECTOR)
ASD	ASPIRATING SMOKE DETECTOR
EOL	END OF LINE (EOL) DEVICE ON ZONE INITIATION OR SIGNAL CIRCUITS
	HEAT DETECTOR - FIXED TEMPERATURE
	SAME AS ABOVE, WALL MOUNTED
HT	ADJACENT TO HEAT DETECTOR, DENOTES "HIGH TEMPERATURE"
	HEAT DETECTOR - 94 DEGREES C (200 DEGREES F) FIXED TEMPERATURE
	HEAT DETECTOR - 58 DEGREES C (135 DEGREES F) FIXED TEMPERATURE AND RATE OF RISE
	LINEAR HEAT DETECTION CABLE
FS	FLOW SWITCH
FIRE DETECTION AND ALARM - SUPERVISORY DEVICES	
LL	LOW TANK LEVEL
LP	LOSS OF POWER
LT	LOW TEMPERATURE
PS	PRESSURE SWITCH
SV	SUPERVISED VALVE
MON	SUPERVISED VALVE
FIRE DETECTION AND ALARM - SIGNALLING DEVICES	
	FIRE ALARM BELL, WALL MOUNTED.
C	ADJACENT TO BELL OR HORN, DENOTES CEILING MOUNTED.
	FIRE ALARM HORN
M	ADJACENT TO FIRE ALARM HORN, DENOTES 'MINI' HORN
	FIRE ALARM HORN/STROBE, WALL MOUNTED.
EV	FIRE ALARM EVACUATION SPEAKER, CEILING MOUNTED
	FIRE ALARM EVACUATION SPEAKER, COMPLETE WITH STROBE LIGHT, CEILING MOUNTED
EV	FIRE ALARM EVACUATION SPEAKER, WALL MOUNTED
EV	FIRE ALARM EVACUATION SPEAKER COMPLETE WITH STROBE LIGHT, WALL MOUNTED
SS	SILENCE SWITCH
	FIRE ALARM WALL MOUNTED STROBE LIGHT
FIRE DETECTION AND ALARM - VOICE COMMUNICATION DEVICES	
FF	EMERGENCY TELEPHONE FOR FIREFIGHTER'S USE
FIRE DETECTION AND ALARM - OTHER DEVICES	
EOL	END OF LINE DEVICE
WG	WIRE GUARD
DNE	"DO NOT ENTER" SIGN
KS	KEY SWITCH FOR FIREFIGHTER CONTROL OF ELEVATOR RECALL, OR AS NOTED
IM	ISOLATOR MODULE
R	OUTPUT RELAY, FUNCTION AS INDICATED
CM	CONTROL MODULE
MM	MONITOR MODULE
HO	MAGNETIC DOOR HOLDER AND RELEASING DEVICE ("HOLD OPEN")
	FIRE SUPPRESSION RELEASING STATION
	FIRE SUPPRESSION ABORT STATION
SINGLE LINE DIAGRAM	
	AIR CIRCUIT BREAKER
	MOLDED CASE CIRCUIT BREAKER
	DISCONNECT (UNFUSED)
	FUSE
M	METERING CABINET
	TRANSFORMER
	BUS DUCT

THIS LEGEND IS GENERIC. ALL SYMBOLS LISTED MAY NOT BE APPLICABLE FOR THIS PROJECT. REFER TO FLOOR PLANS TO DETERMINE USED DEVICES AND EQUIPMENT.

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
	GENERATOR
	AUTOMATIC TRANSFER SWITCH
	AUTOMATIC TRANSFER SWITCH COMPLETE WITH SINGLE SIDED BYPASS ISOLATION
	AUTOMATIC TRANSFER SWITCH COMPLETE WITH SINGLE SIDED BYPASS ISOLATION
ATS	AUTOMATIC TRANSFER SWITCH
C	CONTACTOR
DP	DISTRIBUTION PANELBOARD
LP	LIGHTING PANELBOARD
MCB	MOBILE CONNECTION BOX
MCC	MOTOR CONTROL CENTRE
MTS	MANUAL TRANSFER SWITCH
RP	RECEPTACLE PANELBOARD
SPD	SURGE PROTECTIVE DEVICE
STS	STATIC TRANSFER SWITCH
SWBD	SWITCHBOARD
TX	TRANSFORMER
UPS	UNINTERRUPTIBLE POWER SUPPLY

ELECTRICAL DRAWING LIST - WASHROOM

DRAWING #	DRAWING NAME
E0.0	TITLE PAGE
E0.1	ELECTRICAL LEGEND & DRAWING LIST
E0.2	ELECTRICAL SPECIFICATION I - WASHROOM
E0.3	ELECTRICAL SPECIFICATION II - WASHROOM
E0.4	ELECTRICAL SPECIFICATION III - WASHROOM
E1.0	ELECTRICAL SITE PLAN
E2.0	LIGHTING LEVEL 1 - DEMOLITION & NEW WORK
E2.1	LIGHTING LEVEL 1 - DEMOLITION & NEW WORK
E3.0	BASEMENT POWER LAYOUT - DEMOLITION & NEW WORK
E3.1	POWER LEVEL 1 - DEMOLITION & NEW WORK
E4.0	SINGLE LINE DIAGRAM - EXISTING
E4.1	SINGLE LINE DIAGRAM - NEW WORK
E6.0	ELECTRICAL TYPICAL DETAILS AND LUMINAIRE SCHEDULE

REVISIONS

No.	DATE	DESCRIPTION
1	2023-03-31	ISSUED FOR 95% CD
2	2023-06-06	ISSUED FOR 50% CD
3	2023-06-22	ISSUED FOR 90% CD
4	2023-07-28	ISSUED FOR 95% CD
5	2023-09-28	ISSUED FOR CLIENT REVIEW
6	2024-04-02	ISSUED FOR COORDINATION
7	2024-05-24	ISSUED FOR PERMIT
8	2024-06-07	ISSUED FOR TENDER
9	2024-07-03	ISSUED FOR TENDER

NOTES:

LICENSED PROFESSIONAL ENGINEER
JULY 3 2024
T.W. SEDORE
PROVINCE OF ONTARIO

CLIENT:
CLIENT: UNIVERSITY OF TORONTO

PROJECT:
ED-22-703

CIRHR UNIVERSAL WASHROOM

CENTRE FOR INDUSTRIAL RELATIONS & HUMAN RESOURCES (CIRHR)
121 ST. GEORGE ST., TORONTO, ONTARIO

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THE VENTIN GROUP LTD

SCALE:

ELECTRICAL LEGEND & DRAWING LIST

E0.1

Plot Date:

00 PROCUREMENT AND CONTRACTING REQUIREMENTS

00 30 00 - AVAILABLE INFORMATION

1.0 EXISTING CONDITION INFORMATION

1.1 Review with Owner if existing drawings are available for review. The Consultant does not warrant them for accuracy nor for completeness, and it remains the Contractor's responsibility to verify field conditions inferred from such materials.

2.0 EXISTING HAZARDOUS MATERIAL INFORMATION

2.1 Review with Owner if existing Designated Substance Survey (DSS) report is available for review.

00 70 00 - GENERAL CONDITIONS

1.0 INTENT

1.1 Include all material, labour, equipment, and plant construction as necessary to make a complete installation as shown and specified hereinafter.

1.2 The organizational structure of the Specifications does not imply how the work is assigned to various design disciplines, trades, or subcontractors. The MasterFormat numbering system is not intended to determine which particular elements of the project manual are prepared by a particular discipline. Similarly, it is not intended to determine what particular work required by the project manual is the responsibility of a particular trade. It shall be the Contractor's responsibility to ensure that the systems specified hereafter are complete and operative.

2.0 DRAWINGS AND SPECIFICATIONS

2.1 The drawings and specifications are complementary each to the other, and what is called for by one, is to be binding as if called for by both.

2.2 Should any discrepancy appear between the drawings and specifications which leaves the Contractor in doubt as to the true intent and meaning, a ruling is to be obtained from the Consultant in writing before submitting Tender. If this is not done, the maximum, the most expensive alternate or option, will be provided in Base Tender Bid.

2.3 The drawings provide design intent, and are not to be used to measure or quantify material. Contractor is to coordinate installation of work so as to meet the design intent.

00 73 00 - SUPPLEMENTARY CONDITIONS

1.0 GENERAL

1.1 The requirements of the Supplementary General Conditions apply to this Specification as though written in full herein.

1.2 Refer to Architectural drawings for exact location of dimensioned equipment and devices.

1.3 Refer to Architectural drawings for additional notes which complement these specifications.

2.0 HEALTH AND SAFETY REQUIREMENTS

2.1 Be responsible for the safety of workers and the equipment on the project in accordance with all applicable safety legislation passed by federal, provincial, and local authorities governing construction safety. The more stringent regulations prevail.

01 GENERAL REQUIREMENTS

01 10 00 - SUMMARY

1.0 SUMMARY OF WORK

1.1 Demolition of existing, reconfiguration, and new facility services to suit changes to Owner's equipment.

1.2 Space reconfiguration including partition modifications and associated revisions to facility services.

01 31 00 - PROJECT MANAGEMENT AND COORDINATION

1.0 PROJECT COORDINATION

1.1 Read specifications and drawings of other trades, and conform with their requirements before proceeding with any work specified here as related to other trades. Cooperate with all other trades on the job, so that all equipment can be satisfactorily installed, and so that no delay is caused to any other trades.

1.2 Prior to fabrication and installation of equipment, ensure that such items can be installed as indicated without interference with the structure, or the work of other trades. If any materials are fabricated or installed prior to the investigation and reaching of a solution to the possible interference problems, necessary changes shall be made at the Contractor's expense.

1.3 Provide code or manufacturer required clear space for servicing, disassembly, and removal of equipment and components.

2.0 FACILITY SERVICES COORDINATION

2.1 Maintain all operational building services; shutdown of services shall only take place as authorized by base building and request to be in writing.

2.2 Co-ordinate with Property Management for scheduling of all work required to be done after office hours and weekends, i.e., drilling through slab, power shutdowns, interfacing to life safety systems, etc. all costs involved, including work to be done by the Property Management's approved fire alarm and life safety systems contractor, etc., shall be at Tenant Contractor's expense.

01 33 00 - SUBMITTAL PROCEDURES

1.1 Before delivery to site of any item of equipment, submit shop drawings complete with all data, pre-checked by the Contractor and stamped accordingly, for review by the Consultant. Indicate project name on each brochure or sheet, make reference to the number and title of the appropriate specification section, and provide adequate space to accommodate the Consultant's review stamp(s).

1.2 Submit shop drawings to the Consultant in electronic (PDF) format, as coordinated after award of contract. Where submittals are derived from digital originals, to ensure maximum quality and legibility, do not print and rescan documents; submittals made as such will be immediately rejected.

1.3 Submit a schedule of shop drawings within one week after award of contract. Group submittals by specification division as appropriate.

1.4 Submit Material Safety Data Sheet (MSDS) for all applicable products.

01 40 00 - QUALITY REQUIREMENTS

1.0 PERMITS AND FEES

1.1 Obtain and pay for all Permits and fees required for the execution and inspection of the Work and pay all charges incidental to such Permits. Submit to the Authority Having Jurisdiction the necessary number of drawings and specifications for examination and approval prior to commencement of work.

1.2 Arrange and pay for any special inspection of equipment specified if and when required.

2.0 CODES AND STANDARDS

2.1 Comply with current regulations of all applicable provincial and municipal codes and regulations, including, but not limited to, the Ontario Building Code, and the requirements of any Authorities Having Jurisdiction (AHJ).

2.2 Comply with other standards as related to each trade.

3.0 REFERENCES

3.1 Health Canada / Workplace Hazardous Materials Information System (WHMIS), Material Safety Data Sheets (MSDS).

3.2 Ontario Building Code.

4.0 QUALITY ASSURANCE

4.1 Qualifications: Work to be carried out by qualified, licensed tradespersons or apprentices in accordance with Authorities Having Jurisdiction.

4.2 Only first class workmanship will be accepted, not only in regards to durability, efficiency and safety, but also in regards to neatness of detail. Present a neat and clean appearance on completion. Any unsatisfactory workmanship will be replaced at no extra cost.

4.3 Conform to the best practices applicable to the type of work. Install all equipment and systems in accordance with manufacturers' recommendations, and consistent with the general requirements of the specification.

5.0 FIELD QUALITY CONTROL

5.1 Carry out tests in presence of Owner, or designated representative.

5.2 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

5.3 Manufacturer's Field Services

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports.

6.0 INSPECTIONS

6.1 Furnish a Certificate of Acceptance from Inspection Department on completion of work.

6.2 The Consultant will carry out inspections and prepare deficiency lists for action by the Contractor, during, and on completion of the Project.

01 50 00 - TEMPORARY FACILITIES AND CONTROLS

1.1 Contractor shall assume responsibility for any disruption caused by his forces to operational building services. Should temporary connections be required to maintain services during the work, supply and install all necessary equipment. Repair any system damaged during the execution of the work.

01 60 00 - PRODUCT REQUIREMENTS

1.0 GENERAL

1.1 Products certified by a recognized testing agency accredited by the Standards Council of Canada, and bear a certification mark from that agency, for example the CSA certification mark, cUL listing, or ULC listing. Where certified or listed material and equipment is not available, obtain special approval from Authority Having Jurisdiction before delivery to project site, and submit the approval to the Consultant.

1.2 Products described in this specification are considered to be the minimum standard of acceptance.

1.3 All materials to meet flame spread rating requirements of all Authorities Having Jurisdiction.

2.0 SUBSTITUTION OF SPECIFIED EQUIPMENT

2.1 "Approved equal" shall be defined as an alternate approved by the Consultant.

2.2 If during the Tender bid process, the bidding Contractor wishes to substitute the specified equipment for an "approved equal", the bidding Contractor must submit Shop Drawings to the Consultant before the Tender close, for approval. If no substitution request is made, the as-specified equipment is that to be provided.

3.0 PRODUCT STORAGE AND HANDLING REQUIREMENTS

3.1 Store all equipment and materials in dry locations.

01 70 00 - EXECUTION REQUIREMENTS

1.0 EXAMINATION AND PREPARATION

1.1 Prior to submitting Tender, the Contractor shall carefully examine the Site and ascertain all conditions which affect the Work.

1.2 No extras will be allowed for work resulting from conditions that would have been evident upon a thorough examination of electrical closets, rooms and ceiling spaces, whether exposed or not.

1.3 Verify location and sizes of existing services prior to making new connections to ensure that the existing systems have adequate capacities to accommodate new loads.

2.0 EXECUTION

2.1 Location of Outlets

.1 The Consultant reserves the right to change the location of outlets to within 3 m (10 feet) from the point indicated on the drawings without extra charge, providing the Contractor is advised before installation is made.

2.2 Mounting Heights: where not dimensioned on the architectural or interior designer's drawings, the centreline of the device or operating control as follows:

.1 Thermostats: 1200 mm (47 inch) AFF (Above Finished Floor).

.2 Light switches: 1100 mm (43 inch) AFF.

.3 Duplex receptacles: min. 400 mm (16 inch) AFF.

.4 Duplex receptacles (over counter): 175 mm (7 inch) above counter or furniture height.

.5 Duplex receptacles (electrical and mechanical rooms): 1100 mm (43 inch) AFF.

.6 Receptacles for electric ranges: 130 mm AFF.

.7 Emergency lighting remote heads: 300 mm (12 inch) below finished ceiling, or 2400 mm (94 inch) AFF for exposed areas or areas with ceiling height above 2750 mm (108 inch).

.8 Communications outlets: to match adjacent power receptacles.

.9 Fire alarm pull stations: 1200 mm (47 inch) AFF.

.10 Fire alarm audible devices: 150 mm (6 inch) below finished ceiling for ceiling heights less than 2450 mm (96 inch), or 2300 mm (91 inch) AFF for exposed areas, all measured to the top of the device.

.11 Exact dimensions to be provided and approved by Consultant prior to any rough-in.

.12 Any mounting heights not specified are to be coordinated with the Consultant prior to installation.

3.0 CUTTING AND PATCHING

3.1 The Contractor will be responsible for all cutting and patching required for the installation.

3.2 Structural members are not to be cut without the consent of the Consultant.

3.3 Restore finishes to match existing surroundings.

4.0 CLEANING AND WASTE MANAGEMENT

4.1 The Contractor and associated sub trades, at all times during construction, is to keep the site free of all debris, boxes, packing, etc., resulting from performance of the Work.

4.2 At the completion of this Work, the installation is to be left in a clean and finished condition.

4.3 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

4.4 Remove and dispose off-site, all materials removed, abandoned, and not to remain, designated for salvage, or be re-used in an appropriate manner acceptable to local authorities having jurisdiction, specifically equipment and materials considered hazardous to the environment, unless otherwise noted to be turned over to the Owner or to the Landlord.

5.0 STARTING AND ADJUSTING

5.1 Conduct acceptance tests to demonstrate that the equipment and systems meet the specified requirements. Tests may be conducted as soon as conditions permit, and consequently the Contractor is to make all changes, adjustments, or replacements required as the preliminary tests may indicate prior to the final tests. Tests are as specified in various sections of the specifications.

5.2 Carry out tests in the presence of the Consultant. Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of Project. The Contractor shall be in charge of the plant during tests. The Contractor shall assume responsibility for damages in the event of injury to the personnel, building, equipment, and shall bear all costs for liability, repairs, and restoration in this connection. Submit test results.

5.3 Test new and interfaced systems for proper operation to ensure that the quality and reliability of the base building system is not altered or reduced.

01 77 00 - CLOSEOUT PROCEDURES

1.0 BUILDING PERMIT COMPLIANCE

1.1 Prior to requesting the Consultant's letter "Review of General Conformance" for submission to the municipal building department to allow occupancy, the following items must be complete and submitted to the Consultant, as applicable:

.1 General

.1 Submit all applicable inspection reports from Authorities Having Jurisdiction.

.2 Continuity of fire separations at service penetrations must be complete.

.3 All seismic restraint requirements must be complete.

.2 Fire Protection

.1 Contractor must confirm that all fire extinguishers have been installed.

.2 Provide Fire Inspector's clearance for fire pump and main sprinkler room.

.3 Provide NFPA 14 certificate for standpipe system.

.4 Provide NFPA 13 certificate for sprinkler system.

.3 Plumbing

.1 Confirmation that municipal plumbing inspector has reviewed the work and notes no deficiencies.

.4 HVAC

.1 Contractor must certify the availability of minimum ventilation from air supply system.

.2 Contractor must certify that HVAC control interlocks with life safety systems (e.g. fire alarm) are operational.

.5 Electrical

.1 Provide Certificate of Acceptance from Electrical Inspection Department.

.2 Any devices not installed must have the wiring made safe and terminated in an outlet box complete with cover.

.3 All outlets must have cover plates installed. All electrical equipment not located in service rooms must have covers and/or doors installed complete.

.4 Emergency Lighting

.1 Emergency lighting system must be operational and tested by Contractor. Where battery units and remote heads are indicated on the drawing, provide certification letter from equipment manufacturer indicating the system meets code requirements.

.2 If the building is provided with emergency power with CSA C282 equipment (emergency generator or similar), the contractor is to perform light meter measurements and submit a letter indicating the system meets code requirements.

.3 Simulate normal power failure within the premises in the presence of the consultant and the owner's representative. Test and verify exit lights and emergency lighting operations under emergency conditions. Submit letter of certification copy to Landlord stating that the systems have been tested, witnessed by the consultant and the Owner's representative, etc., and the methods of installation and performance are satisfactory to all parties.

.4 All exit lights must be installed and operational.

.6 Electronic Safety and Security

.1 Fire alarm system and devices must be operational. Submit fire alarm verification report per CAN/ULC-S537, and submit audibility test. Indicate tap settings of all signalling devices.

1.2 If any of the above items have not been completed at the time of Consultant's Inspection, and the letter of "assurance of professional field review and compliance" cannot be issued, any costs for subsequent Inspections will be charged to the Contractor.

2.0 SUBSTANTIAL PERFORMANCE

2.1 Prior to requesting Substantial Performance Inspection, the following items must be complete and submitted to the Consultant, as applicable:

.1 General

.1 Project record drawings must be submitted to Consultant for review.

.2 Maintenance manuals must be submitted to Consultant for review.

.2 HVAC

.1 Air Balancing report.

.2 Hydronic Balancing report.

.3 Electrical

.1 Provide final Certificate of Acceptance from Electrical Inspection Department.

.2 Receptacles, and all direct equipment connections labelled with source and circuit number.

.3 All panelboards provided with typewritten panel schedules.

.4 Load balancing report and voltage drop measurements.

.5 Lighting controls functional testing report.

2.2 If any of the above items have not been completed at the time of the Substantial Performance Inspection, and the Substantial Performance certificate cannot be issued, any costs for subsequent Inspections will be charged to the Contractor.

3.0 OPERATION AND MAINTENANCE (O&M) MANUALS

3.1 Submit three hard copies in 3-ring binder, and one soft copy in searchable PDF format of O&M Manual to the Consultant for review.

3.2 O&M Manuals to include:

.1 As-Built Drawings (AutoCAD and PDF format)

.2 Testing and Commissioning Reports

.3 Inspection Certificates

.4 Verification Reports and Certificates for all life safety systems.

.5 HVAC and Plumbing

.1 Valve charts

.2 HVAC balancing reports

.6 Electrical

.1 Panelboard schedules

.2 Lighting controls functional testing report.

.7 Communications

.1 Structured cabling testing reports.

.8 Warranties

.9 Training records

.10 Operation and Maintenance procedures.

.11 Reviewed shop drawings of all new equipment (arranged by Specification section number)

4.0 PROJECT RECORD DOCUMENTS

4.1 Record Drawings

.1 Maintain a drawing on Site, complete with red-line record of all revisions. Provide exact dimensions and routing of below-grade or below-slab services. Indicate the following:

.1 HVAC and Plumbing

.1 All pipe routing.

.2 Electrical

.1 All circuiting as installed and all power and systems junction box locations, as well as conduit routes.

.2 Coordinate access to Consultant's AutoCAD files.

.3 Complete record drawings accurately marked up in red ink must be submitted for review. Once reviewed, prepare as-built drawings in a neat manner, showing all deviations in work as per site red-line drawing.

4.2 AutoCAD as-built drawings

.1 On completion of Work, submit to the Consultant electronic drawings in AutoCAD and PDF format, and one full size hard copy of as-built AutoCAD files.

.2 Submit copies of 'As-Built' record drawings (in AutoCAD format) indicating actual circuits used and equipment installed on site and final unconditional certificate of approval from ESA and Building Inspection Department to Landlord.

5.0 WARRANTIES

5.1 Submit a written guarantee to the Owner for one year from the date of acceptance. This guarantee shall bind the Contractor to correct, replace or repair promptly any defective equipment workmanship without cost to the Owner.

5.2 Provide extended warranties as specified.

07 THERMAL AND MOISTURE PROTECTION

07 80 00 - FIRE AND SMOKE PROTECTION

1.0 FIRESTOPPING

1.1 Provide approved firestopping material to maintain integrity of fire separations.

1.2 Manufacturers: 3M, AD Fire Protection, Hilti, or approved equal.

1.3 Before starting any work on site, submit detailed shop drawings to the Consultant for review and comments. Include the following information:

.1 Manufacturer's technical product data and installation instructions for each specific type and location of penetration; certification that proposed firestopping materials and assemblies comply with CAN4-115-M.

.2 For each specific type and location of penetration, provide installation instructions from a recognized independent testing agency.

.3 Mark penetration types and locations on set of white prints. At completion of project, transfer this information to "as-built" drawings.

26 ELECTRICAL

26 01 00 - OPERATION AND MAINTENANCE OF ELECTRICAL SYSTEMS

1.0 TRACING EXISTING ELECTRICAL CIRCUITS

1.1 Trace all circuits in the area of work listed as existing, and verify existing conditions prior to any modifications as indicated.

1.2 Where drawings indicate "connect to existing circuit", use a spare breaker, where available. Otherwise, verify existing load with a meter and advise the Consultant if the additional load will cause a circuit to trip.

1.3 Where provided panelboard schedules indicate "Existing Circuit" or similar, provide the correct description for the circuit. Existing Circuit will not be acceptable in the final panelboard schedules submitted as part of closeout submittals.

2.0 EXISTING CABLING IN RETURN AIR PLENUMS

2.1 In ceilings being used as a return air-plenum, Contractor to review existing low-voltage cabling uncovered as part of the work.

2.2 Immediately notify the Consultant if any cables identified are not plenum rated (i.e. CMP, or FT-6 rated).

3.0 THERMOGRAPHIC INVESTIGATION

3.1 Check and inspect existing distribution equipment to be re-used (i.e., panels, panel breakers, disconnect switches, etc.) for any evidence of abnormal overheating conditions. Report to Consultant and rectify any issues encountered. Perform thermographic scan under actual tenant load in operations and submit scan results indicating problems have been corrected to Property Management for review and include same in Maintenance Manuals.

4.0 LUMINAIRE REPLACEMENT

4.1 Provide new fixture chain hangers to independently support new luminaires from the building structure, supported at opposite ends.

26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

1.0 REFERENCES

1.1 Canadian Standards Association (CSA)

.1 CSA C22.1:21, Canadian Electrical Code, Part 1 (25th Edition), Safety Standard for Electrical Installations.

.2 Ontario Electrical Safety Code (OESC) 28th Edition, 2021.

.3 CSA C235:19, Preferred voltage levels for AC Systems up to 50 000 V.

2.0 SELECTIVE DEMOLITION FOR ELECTRICAL

2.1 Remove all electrical equipment and devices on redundant structures. Make safe all circuits.

2.2 Maintain continuity of remaining devices and circuits.

2.3 To make safe: withdraw redundant wiring and remove unwanted conduit/wiring and accessories. Position breakers to off position and update panel schedules.

2.4 Make safe any redundant devices as shown on other drawings.

2.5 When relocating or removing equipment, should any circuits be abandoned, the conductors to these circuits must be removed or properly terminated as detailed in OESC Rule 2-130, Rule 12-114, Rule 12-3000, and OESC Bulletin 12-25-(latest version).

3.0 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

3.1 Conductors: minimum #12 AWG solid, and stranded for #8 AWG and larger. Copper conductors sized as indicated with RW90, 600 V insulation of chemically cross-linked thermosetting CSA C22.2 No. 38-14.

3.2 AC90 (commonly referred to as BX) cable maximum wire size to be #12 AWG unless otherwise noted. AC90 to be used only as drop to lighting fixtures and as drop to wiring devices in partitions from ceiling junction box/conduit combination. Maximum run of AC90 to be 3 m (10 ft) where exposed in lay-in suspended ceiling space only. Do not install exposed AC90. Do not daisy chain (leap frog) AC90 between luminaires.

3.3 All conductors used outdoor or in wet locations: RWU90 copper.

3.4 Wire and Box Connectors:

.1 Wire connectors: PVC insulation, steel shall be spring pressure type, current carrying parts copper or copper alloy sized to suit copper conductors as indicated to CSA C22.2 No. 65-13.

.2 Splicing connectors: fixture type current carrying parts copper or copper alloy sized to fit copper conductors #12 AWG with insulating materials of thermoplastic material to CSA C22.2 No.75-17.

.3 Clamps to connectors for flexible circuits to CSA C22.2 No.18.3-12 (R2017).

.4 Lugs, terminals, or screws used for termination of wiring to be suitable for copper conductors.

3.5 Voltage Drop:

.1 Feeder conductors: maximum voltage drop of 2%.

.2 Branch circuit conductors: maximum voltage drop of 3%.

4.0 CONDUIT FOR ELECTRICAL SYSTEMS

4.1 Rigid metal conduit: to CSA C22.2 No. 45.1-07 (R2017).

4.2 Electrical Metallic Tubing (EMT): with couplings to CSA C22.2 No. 83-M1985 (R2017).

4.3 Rigid PVC conduit: to CSA C22.2 No. 211.2-06 (R2011).

4.4 Flexible metal conduit and liquid-tight flexible metal conduit: to CSA C22.2 No. 56-17.

4.5 Conduit Fastenings:

.1 One hole steel strap to secure surface conduits 50 mm (2 in) and smaller. Use two hole steel straps for conduits larger than 50 mm (2 in).

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 1.5 m (5 feet) on centre.

4.6 Conduit Fittings:

.1 Fittings for raceways to CSA C22.2 No. 18.3-12 (R2017). Fittings manufactured for use with conduit specified. Factory elbows where 90% bends are required for 50 mm (2 in) and larger conduits.

.2 Cast fittings are not permitted to be used.

4.7 Branch circuits, control wiring, etc.

.1 Conceal conduit work in finished areas unless otherwise noted.

.2 Run conduit exposed in unfinished areas such as service rooms, rooms with no suspended ceilings, service tunnels, and penthouses. Install parallel to building lines.

.3 Use electrical metallic tubing (EMT) for branch circuits unless noted otherwise.

.4 Use rigid metal conduit in mechanical spaces.

.5 Use PVC conduit in service tunnels and for exterior work unless noted otherwise.

.6 Use liquid tight flexible conduit for connection to motors.

.7 Use flexible metal conduit for connection to recessed incandescent fixtures without a pre-wired outlet box, connection to surface fixtures, across expansion joints, work in movable metal partitions, or transformers.

.8 Flexible metal conduit for fixtures in finished areas only where chain hanging is specified. Tie wrap the flexible conduit to the chain.

.9 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete: schedule 40 steel pipe sized for free passage of conduit, and protruding 50.8 mm (2 in).

.10 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.11 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

5.0 BOXES FOR ELECTRICAL SYSTEMS

5.1 Junction and Pull Boxes:

.1 Junction and pull boxes: to CSA C22.2 No. 40-17 welded steel construction, with screw-on flat covers for surface mounting.

.2 Covers with 25.4 mm (1 in) minimum extension all around, for flush mounted pull and junction boxes. Only main junction and pull boxes are indicated. Provide all boxes so as not to exceed 30 m (100 ft) of conduit run between pull boxes.

5.2 Outlet boxes, conduit boxes to CSA C22.2 No. 18.1-13 (R2018).

5.3 Sheet Steel Outlet Boxes:

.1 Hot Dipped Galvanized steel single and multi-gang flush device boxes for flush installation, minimum size 75 mm x 50 mm x 32 mm (3 in x 2 in x 1-1/4 in). 100 mm (4 in) square outlet boxes when more than one conduit enters one side with extension.

.2 Hot Dipped Galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 100 mm x 50 mm x 50 mm (4 in x 2 in x 2 in).

.3 Cast boxes for surface work in finished areas.

5.4 Size boxes in accordance with CSA C22.1, rule 12-3036. Provide 100 mm (4 in) square or larger outlet boxes as required for special devices.

5.5 Gang boxes where wiring devices are grouped.

5.6 Blank cover plates for boxes without wiring devices.

5.7 Combination boxes with barriers where outlets for more than one system are grouped.

5.8 Location of Outlets

.1 Do not install outlets back-to-back in wall; allow minimum 150 mm (6 in) horizontal clearance between boxes.

.2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3 m (10 ft), and information is given before installation.

6.0 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

6.1 Provide all equipment grounding as required, regardless of whether it has been shown on drawings or called for in this specification.

6.2 Arrange grounds so that under normal operating conditions, no injurious amount of current will flow in any grounding conductor.

6.3 Provide a ground wire in every conduit.

7.0 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

7.1 Support Channels:

.1 Support channels: length as indicated, u-shape, size 44 mm x 44 mm x 3 mm (1-3/4 in x 1-1/3 in x 1/8 in) thick, surface mounted or suspended as required.

7.2 All supporting devices, strut channel, threaded rod, anchors, etc. of the "hot dipped" galvanized type. Electrogalvanized components will not be accepted.

7.3 Supports

.1 All conduits, panels, etc. to be securely and adequately supported.

.2 Where more than three conduits run together, conduit racks to be used.

.3 Single runs of conduit to be supported by galvanized conduit straps or ring bolt type hangers.

.4 Tie wire or perforated metal strap hangers will not be accepted.

.5 Support all luminaires independently of the ceiling structure.

7.4 Floor supports:

.1 Provide a 100 mm (4 in) high concrete housekeeping pad for floor mounted electrical distribution equipment, such as transformers, switchboards, distribution panelboards, engine generators, uninterruptible power supplies and batteries, and transfer switches.

.2 Extend pad a minimum of 100 mm (4 in) beyond footprint of equipment, unless noted otherwise.

8.0 VIBRATION CONTROLS FOR ELECTRICAL SYSTEMS

8.1 Ensure that all electrical equipment operates without objectionable noise or vibration. Provide isolation devices to prevent noise and vibration transmission (i.e., spring type and pad type isolators and loop flexible conduits).

8.2 Provide flexible conduits for final connections of conduits to any vibrating equipment.

9.0 IDENTIFICATION FOR ELECTRICAL SYSTEMS

9.1 Nameplates

.1 Ensure manufacturer's nameplates, approval label (CSA, cUL, etc.), and identification nameplates are visible and legible after equipment is installed.

.2 Provide warning signs, as specified, or to meet requirements of inspection department, health and safety, and the Consultant.

9.2 Wiring Identification

.1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

9.3 Identification of Equipment

.1 Identify all electrical equipment with engraved phenolic nameplates, engraved 10 mm (3/8 in) high white block letters, securely fastened with rivets.

.2 Identify all electrical splitters, junction boxes, conduits crossing walls and pull boxes of different systems with a different colour consistent throughout the project.

.3 Match existing identification system colours. Where an identification system does not exist, colours as follows:

.1 347/600 volt: blue.

.2 120/208 volt: black.

.3 Emergency: yellow.

.4 UPS power: orange.

.5 Communications: green.

.6 Fire Alarm: red.

.4 Label all receptacles and devices indicating panel and circuit numbers. Use electronic labeller with adhesive label. Install label on the faceplate of the device.

.5 Ensure that all panel directories are typewritten and indicate the latest renovations. Identify all circuits. Do not provide the words 'existing' for any circuits remaining as is. Should an existing panel not be labeled, the Contractor shall provide such, indicating the panel name, voltage, phase, current rating and 'fed from' information.

10.0 OVERCURRENT PROTECTIVE DEVICE COORDINATION

10.1 Ensure interrupting capacity of circuit protective devices meet the required fault level.

10.2 Provide high-interrupting capacity breakers for panels fed from dry-type transformers rated greater than 75 kVA.

11.0 EQUIPMENT WIRING

11.1 Provide the following services for equipment supplied by other trades:

.1 The trade supplying the equipment will be responsible for supply of motors, starters, variable frequency drives.

.2 In every instance, install starter, motor control centre, variable frequency drive (VFD), etc. and wire to line side of the starter, the Motor Control Centre, or VFD. Extend wiring from starter, motor control centre or VFD to motor.

.3 Provide minimum 600 mm (24 in) of flexible waterproof conduit for final connection to motors.

.4 Provide disconnect switches where required by code and as indicated on the drawings.

.5 Where individual starters and controls are grouped together provide a floor mounted strut channel support for mounting this equipment.

.6 Ascertain exact locations of starters, motor control centres, motors, motorized dampers, VAV boxes, touchless plumbing fixtures, and heating control valves from other drawings and coordinate exact locations with appropriate trade.

11.2 Plumbing equipment wiring

.1 Provide branch circuit wiring and an outlet for each touchless plumbing fixture. Control wiring performed by plumbing trade.

.2 For connections to domestic water heaters, provide 120 V connection for water supply solenoid valve interlocked with leak detection.

11.3 HVAC equipment wiring

.1 In the case of unit heaters, reheat coils, and cabinet unit heaters, terminate wiring on terminals provided. Control wiring, thermostat integration, and other controls are to be performed by the supplying trade.

.2 Provide branch circuit wiring and an outlet for each motorized damper, variable air volume box (VAV box), or heating control valve. Control wiring performed by HVAC trade.

11.4 Motor sizing

.1 Motors up to and including 1/3 HP, shall be 1 phase, 60 Hz, 120 volts.

.2 Motors above 1/3 HP as indicated on drawings.

26 08 00 - COMMISSIONING OF ELECTRICAL SYSTEMS

1.0 STARTUP

1.1 Startup equipment to NETA ATS standards.

2.0 CONDUCT FOLLOWING TESTS:

2.1 Insulation resistance testing:

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

.3 Check resistance to ground before energizing.

REVISIONS

No.	DATE	DESCRIPTION
1	2023-03-31	ISSUED FOR 95% CD
2	2023-06-06	ISSUED FOR 50% CD
3	2023-06-22	ISSUED FOR 90% CD
4	2023-07-28	ISSUED FOR 95% CD
5	2023-09-28	ISSUED FOR CLIENT REVIEW
6	2024-04-02	ISSUED FOR COORDINATION
7	2024-05-24	ISSUED FOR PERMIT
8	2024-06-07	ISSUED FOR TENDER
9	2024-07-03	ISSUED FOR TENDER

NOTES:

All dimensions and measurements must be checked and verified by the General Contractor

JULY 3 2024
T.W. SEDORE
LICENSED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

CLIENT:

CLIENT: UNIVERSITY OF TORONTO

PROJECT:

ED-22-703

CIRHR UNIVERSAL WASHROOM

CENTRE FOR INDUSTRIAL RELATIONS & HUMAN RESOURCES (CIRHR)
121 ST. GEORGE ST., TORONTO, ONTARIO

ORIGINAL PAGE SIZE: ARCH D - 24" x 36"

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SCALE:
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E0.2

ELECTRICAL SPECIFICATION I - WASHROOM

Plot Date: 2024-07-03 4:05:25 PM
Autodesk Docs://ED-22-703 - UofT Accessibility Improvement/ED-22-703 - QCG ME Model_R22 - Elec.rvt

DRAWN BY: Author
CHECKED BY: Checker

3.0 LOAD BALANCING:

3.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes. Balance the loading on feeders so that unbalanced load is less than 10 per cent.

3.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

3.3 Provide upon completion of work, load balance report: phase and neutral currents on panelboards, dry-type transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

26 09 23 - LIGHTING CONTROL DEVICES

1.0 OCCUPANCY SENSORS, TIME SWITCHES, ETC.

1.1 As described in applicable schedules.

1.2 Dimming Switches

.1 Provide dimmers with linear slide controls, and sized to suit loads controlled for fluorescent, incandescent, low voltage magnetic and low voltage electronic lighting as indicated.

.2 All dimmers shall incorporate an air gap which shall be accessible without removing the faceplate.

.3 Dimmer shall meet CSA C22.2 no. 111-10 and CSA C22.2 no. 184.1-15 limited short circuit test requirements for snap switches;

.4 Dimmer shall meet ANSI/IEEE C62.41.1-2002 and ANSI/IEEE C62.41.2-2002, tested to withstand voltage surges of up to 6000 V and current surges of up to 200 A without damage. Manufacturer shall provide file card upon request showing their compliance with the above standards.

.5 Gang dimmers shown side by side on plans under one seamless, multi-gang faceplate.

.6 Dimmers: rated 1000 W, unless otherwise noted.

.7 Finish colour by architect/designer.

.8 Manufacturers: Lutron Nova T series or approved equal.

2.0 SEQUENCES OF OPERATION

2.1 In accordance with ASHRAE 90.1-2013 as amended by OBC SB-10 2017.

2.2 Configure sensors to turn off lighting a maximum of 20 minutes of all occupants leaving the space. Confirm exact set point with the Consultant prior to installation.

3.0 SITE TESTS AND INSPECTIONS

3.1 The lighting controls manufacturer's representative and Contractor shall conduct functional testing and provide report as described in ASHRAE 90.1-2013:

.1 Lighting control devices and control systems shall be tested to ensure that control hardware and software are calibrated, adjusted, programmed, and in proper working condition in accordance with the construction documents and manufacturer's installation instructions.

.2 When occupant sensors, time switches, programmable schedule controls, or photosensors are installed, at a minimum, the following procedures shall be performed:

.1 Occupant Sensors

.1 Certify that the sensor has been located and aimed in accordance with manufacturer recommendations.

.2 For projects with up to seven (7) occupancy sensors, all occupancy sensors shall be tested.

.3 For projects with more than seven (7) occupancy sensors, testing shall be done for each unique combination of sensor type and space geometry.

.4 For each sensor to be tested, verify the following:

.1 Status indicator (as applicable) operates correctly.

.2 Controlled lights turn off or dim down to the specified level within the required time (20 minutes, or as noted), as applicable to the space type.

.3 For auto-on occupant sensors (occupancy mode), the lights turn on to the permitted level when someone enters the space.

.4 For manual-on sensors (vacancy mode), the lights turn on only when manually activated.

.5 The lights are not incorrectly turned on by movement in nearby areas or by HVAC operation.

.2 Automatic Time Switches

.1 Confirm that the automatic time switch control is programmed with appropriate weekday, weekend, and holiday (as applicable) schedules.

.2 Document for the owner automatic time switch programming, including weekday, weekend, and holiday schedules, as well as all setup and preference program settings.

.3 Verify that correct time and date are properly set in the time switch.

.4 Verify that any battery backup (as applicable) is installed and energized.

.5 Verify that the override time limit is set to no more than two (2) hours.

.6 Simulate occupied condition. Verify and document the following:

.1 All lights can be turned on and off by their respective area control switch.

.2 The switch only operates lighting in the enclosed space in which the switch is located.

.7 Simulate unoccupied condition. Verify and document the following:

.1 All non-exempt lighting turns off.

.2 Manual override switch allows only the lights in the enclosed space where the override switch is located to turn on or remain on until the next scheduled shut off occurs.

.3 Daylight Controls

.1 All control devices (photocontrols) have been properly located, field-calibrated, and set for appropriate set points and threshold light levels.

.2 Daylight controlled lighting loads adjust to appropriate light levels in response to available daylight.

.3 The location where calibration adjustments are made is readily accessible only to authorized personnel.

.3 The individual(s) responsible for the functional testing shall not be directly involved in either the design or construction of the project and shall provide documentation certifying that the installed lighting controls meet or exceed all documented performance criteria.

26 22 00 - LOW-VOLTAGE TRANSFORMERS

1.0 LOW-VOLTAGE TRANSFORMERS

1.1 Dry type transformers to CSA C22.2 No. 9-17, CSA C22.2 No. 47-13 (R2018), and CAN/CSA-C802.2-18 with the following features:

.1 CSA type 2 drip-proof enclosure.

.2 Comply with ANSI, NEMA, and IEEE Standards.

.3 Final coating to be ANSI 61 grey epoxy power.

.4 60 Hz operating frequency, 600-120/208 V, 3ø, delta-wye 3-phase with 3-coil, ANN type.

.5 Four (4) taps, 2xFCAN and 2xFCBN with 2.5% per tap.

.6 Copper windings.

.7 Epoxy impregnation, anti-vibration pads, electrostatic shield.

.8 220 insulation class and 115°C (239°F) winding temperature rise.

.9 To be wall mounted for 45 kVA or less unless otherwise noted.

.10 Heavy gauge steel with rust and corrosion protection.

.11 1-2 kV class with 10 kV BIL.

.12 Double neutral connector.

1.2 Meet or exceed the nominal efficiencies shown in Table 8.1 of ASHRAE 90.1-2013.

1.3 Average sound levels:

.1 45 dB max up to 45 kVA.

.2 50 db max up to 150 kVA.

.3 55 db max up to 300 kVA.

.4 57 db max up to 500 kVA.

1.4 Manufacturers:

.1 STI.

.2 Delta Transformer.

.3 Hammond.

.4 Powersmiths.

.5 Square D by Schneider Electric.

1.5 T-connected transformers are not acceptable.

26 24 16 - PANELBOARDS

1.0 DISTRIBUTION PANELBOARDS

1.1 Manufacturers:

.1 Square D by Schneider Electric, I-Line series.

.2 Eaton Cutler Hammer, PRL3 or PRL4 series.

.3 Equal by Siemens.

1.2 Description: CSA C22.2 no.29-15, circuit breaker type.

1.3 Panelboard bus: copper, ratings as indicated. Provide copper ground bus in each panelboard.

1.4 Minimum integrated short circuit rating: 10 000 amperes RMS symmetrical for 240 volt panelboards; 25 000 amperes RMS symmetrical for 600 volt panelboards, or as indicated.

1.5 Molded case circuit breakers: CSA C22.2 no. 5-16, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers CSA classified as type HACR for air conditioning equipment branch circuits.

1.6 Molded case circuit breakers with current limiters: CSA C22.2 no. 5-16, circuit breakers with replaceable current limiting elements, in addition to integral thermal and instantaneous magnetic trip in each pole.

1.7 Current limiting molded case circuit breakers: CSA C22.2 no. 5-16, circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole. Interrupting rating 100 000 symmetrical amperes, let through current and energy level less than permitted for same size class RK5 fuse.

1.8 Circuit breaker accessories: trip units and auxiliary switches as indicated.

1.9 Cabinet front: surface type, fastened hinge and latch, metal directory frame, finished in manufacturer's standard gray enamel.

1.10 Breaker positions labeled as "spare" or "space" constituting no less than 20% of available breaker positions, whether indicated or not in panelboard schedules.

1.11 Two keys for each panelboard and key panelboards alike.

1.12 Breakers feeding motors: motor rated.

1.13 Breakers for lighting circuits: switch rated.

1.14 Circuit breakers feeding transformers rated accordingly.

2.0 LIGHTING AND RECEPTACLE PANELBOARDS

2.1 To CSA 22.2 no 29-15 with the following features:

.1 600 V panelboards: bus and breakers rated for 25 000 asymmetrical interrupting capacity, or as indicated.

.2 250 V panelboards: bus and breakers rated for 10 000 asymmetrical interrupting capacity, or as indicated.

.3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number.

.4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

.5 Two keys for each panelboard and key panelboards alike.

.6 Copper bus with full size neutral.

.7 Mains suitable for bolt on breakers 25 mm (1 inch) or 19 mm (3/4 inch) wide.

.8 Finish trim and door baked grey enamel.

2.2 Molded case circuit breakers to CSA C22.2 no. 5-16.

2.3 Bolt-on molded case circuit breaker, quick-make, quick break type for manual and automatic operation with temperature compensation for 40°C (104°F) ambient.

2.4 Common-trip breakers with single handle for multi-pole applications.

2.5 All panels to be flush or surface mounted as indicated.

2.6 Lock-on devices on emergency lighting, night lights, security and exit light circuits.

2.7 Breakers feeding motors: motor rated.

2.8 Circuit breakers feeding transformers rated accordingly.

26 27 00 - LOW-VOLTAGE DISTRIBUTION EQUIPMENT

1.0 INDOOR SERVICE POLES

1.1 Two channel service pole, Wiremold NP800 series, or equal. Provide devices as indicated on plans.

1.2 Poles bolted to floor and secured at ceiling level.

2.0 WIRING DEVICES

2.1 Switches

.1 Manually operated AC switches to CSA C22.2 no. 111-10 (R2015).

.2 Snap switches to CSA C22.2 no. 55-15.

.3 15A and 20A-120V, single pole, double pole, three-way, and four-way switches with pilot lights and or key operator as indicated.

.4 Switches of one manufacturer throughout Project.

.5 Finish colour as selected by Architect. Confirm colour prior to ordering.

.6 Provide specification grade local 20A, 120 volt and 20A, 347 volt switches, AC type with matching cover plate:

.7 120 volt:

.1 P&S #262x series

.2 Hubbell #2121 series

.8 347 volt:

.1 P&S #2601-347 series

2.2 Receptacles

.1 Receptacles, plugs and similar wiring devices to CSA C22.2 no. 42-10, specification grade.

.2 Duplex or single receptacles, CSA type 5-15R, 125V, 15A, U-ground, with the following features:

.1 Suitable for no. 10 AWG for back and side wiring.

.3 Break-off links for use as split receptacles.

.4 Eight (8) back wired entrances, four (4) side wiring screws.

.5 Double wipe contacts, and riveted grounding contacts.

.6 Provide specification grade 15A. 120 volt, "U" ground receptacles, duplex type with matching cover plates, colour by Architect:

.1 P&S #26252 series

.2 Hubbell #2152 series

.3 Other receptacles with ampacity and voltage as indicated.

.7 Receptacles of one manufacturer throughout project.

.8 Controlled receptacles: Permanently marked to visually differentiate them from uncontrolled receptacles.

2.3 Cover Plates

.1 Cover plates for wiring devices to suit the wiring device.

.2 Cover plates from one manufacturer throughout project.

.3 Sheet steel utility box cover for wiring devices installed in surface mounted utility boxes in service areas.

.4 Stainless Steel cover plates for all flush mount boxes.

.5 Stainless steel cover plates for all surface mount cast boxes in finished areas.

.6 Where exposed to the weather, provide "while in use" cover plates.

26 28 00 - LOW-VOLTAGE CIRCUIT PROTECTIVE DEVICES

1.0 FUSES

1.1 Dimensions and Performance: CSA C22.2 No. 248 Series, Class as specified or indicated.

1.2 Manufacturers:

.1 Mersen.

.2 GEC.

.3 Littelfuse.

.4 Eaton-Cooper Bussman.

1.3 Voltage: Provide fuses with voltage rating suitable for circuit phase-to-phase voltage.

1.4 Power Load Feeder Switches: HRC-1 Class J time delay type (Gould type AJT).

1.5 Other Feeder Switches: HRC-1 Class J time delay type (Gould type AJT).

2.0 ENCLOSED SWITCHES

2.1 Fusible and non-fusible to CSA C22.2 no. 4, size as indicated.

2.2 Provision for padlocking in on-off switch position by one lock.

2.3 Mechanically interlocked door to prevent opening when handle in ON position.

2.4 Fuses: size as indicated.

2.5 Fuse holders: suitable without adaptors, for type and size of fuse indicated.

2.6 Quick-make, quick-break action.

2.7 On-off switch position indication on switch enclosure cover.

26 29 00 - LOW-VOLTAGE CONTROLLERS

1.0 ENCLOSED STARTERS

1.1 Hand-Off-Auto combination starters in minimum CSA type 2 enclosure, complete with HRC fusing and associated controls and overload relays.

1.2 To match motor FLA and Horsepower ratings.

1.3 Manufacturers:

.1 Allen-Bradley.

.2 Eaton.

.3 Square D by Schneider Electric.

.4 Siemens.

26 51 00 - INTERIOR LIGHTING

1.0 LUMINAIRE SUPPORTS

1.1 Provide chain hangers to independently support luminaires from the building structure, supported at opposite ends.

2.0 FLUORESCENT LAMPS AND BALLASTS

2.1 Manufacturers: GE, Signify (Philips), or Osram Sylvania.

2.2 Lamps: F32T8, or as indicated on schedule. 80 CRI, 3500 K CCT, low mercury lamps, minimum 94% lumen maintenance and 30 000 hour lamp life.

2.3 Programmed Rapid Start ballasts unless otherwise indicated on schedule. Less than 10% THD, power factor greater than 0.98.

3.0 LED INTERIOR LUMINAIRES

3.1 Performance tested in accordance with IES LM-79, LM-80, and L70 lumen maintenance at 50 000 hours or greater calculated per IES TM-21 extrapolation.

3.2 Drivers minimum 0.9 power factor, THD less than or equal to 20%, 0-10 volt dimming standard, or alternate protocol to suit controls.

3.3 5 year warranty.

3.4 80 CRI minimum.

3.5 Luminaire efficacy in accordance with DesignLights Consortium (DLC), or Energy Star, as applicable.

26 52 13.13 - EMERGENCY LIGHTING

1.0 BATTERY UNITS AND REMOTE HEADS PER SCHEDULE.

1.1 Use minimum 10 gauge or heavier if needed to provide a maximum voltage drop of 5%. Consult manufacturer's table for sizing the minimum gauge and length of wire runs permitted for connected loads to ensure a maximum voltage drop of 5% from the battery unit to the farthest emergency remote, in accordance with OBC and local inspection authorities.

1.2 Provide breaker lock on emergency lighting circuit at source panelboard.

1.3 Contractor to certify in writing to the Consultant that the system is complete, installed per CSA C22.2 No. 141, has been tested, and operates for the specified battery run time, and meets voltage drop requirements.

1.4 Manufacturers: Lumacell, Aimlite, Beghelli, Emergilite, Lithonia, Stanpro.

27 COMMUNICATIONS

27 05 00 - COMMON WORK RESULTS FOR COMMUNICATIONS

1.0 REFERENCES

1.1 TIA/EIA-568-B Commercial Building Telecommunications Cabling Standard

1.2 TIA/EIA-568-B.1 General Requirements

1.3 TIA/EIA-568-B.2 Balanced Twisted Pair Cabling Components Standard

1.4 TIA/EIA-568-B.2-1 Transmission performance for 4 pair 100-Ohm category 6

1.5 TIA/EIA-569-A Commercial Building Standard for Telecom Pathways and Spaces

1.6 TIA/EIA-606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings

2.0 WARRANTY

2.1 The contractor shall provide a written performance warranty for the complete installation for a period no less than 16 years from date of testing and acceptance. The system warranty shall be based on industry standards. The contractor shall also provide a one-year labour warranty on the installation.

3.0 GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

3.1 Bond all telecommunication cable trays, data cabinets, data racks, and all other metallic communication infrastructure components to the nearest TMGB or TGB using a minimum #6 AWG conductor and appropriate 2 hole compression lug grounding hardware.

4.0 PATHWAYS FOR COMMUNICATIONS

4.1 Communications conduits shall be minimum 27 mm (1 inch) diameter conduit from single gang box in partition to accessible ceiling space for maximum six communications drops per wall box. Conduit shall be complete with pull wire for addition of communications drops.

4.2 Conduit Pathways

.1 Conduit to CSA C22.2.

.2 Provide end bushings.

4.3 Junction and Pull Boxes:

.1 Junction and Pull Boxes, to CSA C22.2 No. 40-17, welded steel construction with screw-on flat covers for surface mounting.

.2 Covers with 25 mm (1 inch) minimum extension all around, for flush mounted pull and junction boxes. Only main junction and pull boxes are indicated. Provide all boxes so as not to exceed 30 m (100 foot) of conduit run between pull boxes.

4.4 Surface Raceway and Vertical Outlet Pole

.1 Surface raceway and vertical outlet poles refers to a surface raceway system used for branch circuit wiring and/or data network, voice, video and other low-voltage cabling shall be supplied by others, unless identified on the drawings.

5.0 HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

5.1 Cable Support System

.1 Open top cable supports shall be utilized as a pathway for communication cabling. The J Hook cable supports shall be manufactured from a non-conductive material suitable for use in air-handling spaces. The cable support must maintain complete horizontal and vertical 25 mm (1 inch) bend radius control and must manage up to 50 four-pair UTP cables. The system must allow for the ability to add future cable routing capacity. The cable support must provide the ability to retain the cable bundle with Hook and Loop Cable Ties. J-hooks fasteners shall be placed at maximum of 4'-0" intervals so the cables are properly supported and lower cables are not stressed and deformed due to the weight of the cable bundle.

6.0 BOXES FOR COMMUNICATIONS SYSTEMS

6.1 The outlets and surface mount boxes shall support the network system by providing high-density in-wall, surface mount or modular office furniture cabling applications. The outlets consist of faceplates for flush and recessed in-wall mounting as well as mounting to the modular office furniture systems. The surface mount boxes can be mounted where in-wall applications are not possible or to support applications where surface mount is the best option.

6.2 Provide blank off plates for all outlet boxes not populated with communications outlets.

7.0 CABLE TRAYS FOR COMMUNICATIONS SYSTEMS

7.1 Cablofil wire basket tray, dimensions as indicated on plans, or equal.

8.0 IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

8.1 Labeling shall be as per TIA/EIA-606.

8.2 Identify all pathway conduits and pull boxes with a unique colour from other trades, consistent throughout the project.

27 05 28 - PATHWAYS FOR COMMUNICATIONS

1.1 Conduits to communications outlet boxes: minimum 27 mm (1 inch) diameter conduit from single gang box in partition to accessible ceiling space for maximum six communications drops per wall box. Provide pull wire for addition of communications drops by Owner.

1.2 Conduits and boxes in accordance with Section 26 05 00.

1.3 Provide blank off plates for all outlet boxes not populated with communications outlets.

27 08 00 - COMMISSIONING OF COMMUNICATIONS

1.0 TESTING DATA

1.1 Contractor shall provide a complete testing report utilizing a testing device as specified in the applicable TIA/EIA standard with the correct adapter and test. All copper tests shall be compliant to current EIA/TIA standards: Perm Link or Channel. The summary report shall provide a "Pass/Fail" status of each port. The detailed report shall be provided to the end user in a universal format so that there is no need to purchase any software to read and print the report. Utilizing Adobe Acrobat is an acceptable manner.

1.2 Provide complete testing and certification of installation. Provide test results to engineer on CD or other common electronic media in both PDF format and raw test results from approved testing equipment.

1.3 Show all port identification on as-built drawings.

27 15 00 - COMMUNICATIONS HORIZONTAL CABLING

1.0 HORIZONTAL CABLING SYSTEM

1.1 The horizontal cabling system is the portion of the telecommunications cabling system that extends from the work area telecommunications outlet/connector to the horizontal cross-connect in the telecommunications rack.

1.2 Horizontal cabling is installed in a star topology (home run)

1.3 Bridged taps and splices are not permitted as part of the copper horizontal cabling

1.4 Provide drops as indicated on the drawings, using applicable rough-ins provided by the electrical contractor in wall and floor mount locations. Drops shall include 3048 mm (10 foot) service coil in ceiling space near drop location.

1.5 The horizontal structured cabling shall be Category 6 (1-gigabit @ 250 MHz) compliant.

1.6 Allow for an additional five drops to be installed as directed by Owner.

2.0 COMMUNICATIONS FACEPLATES AND CONNECTORS

2.1 Faceplates shall be white decorator style inserts in white faceplate. Outlets and surface mount boxes shall be White.

2.2 Faceplates

.1 Faceplates shall be one, two, three, four and six-port vertical single gang and two and four port horizontal, single gang faceplates with painted combination head screws. The faceplates shall mount to standard NEMA boxes and adapters with screw-to-screw dimensions of 83.3 mm (3.28 inch). Faceplates shall be available with or without labels. Dedicated sloped versions shall be available for improved bend radius control and decreased requirements in wall depth. Each faceplate shall accept modules that can be individually inserted and removed as required. Unused ports shall have blank inserts installed.

2.3 Modular Furniture Faceplates

.1 Modular Furniture Faceplates shall be four-port flat faceplates that snap directly into TIA/EIA standard furniture openings. If required, an extender shall be used with the four port flat faceplate to provide 12.7 mm (0.5 inch) additional depth. Each faceplate shall accept modules that can be individually inserted and removed as required. Unused ports shall have blank inserts installed.

2.4 Faceplate Frames and Inserts

.1 Faceplate frames shall be vertical, single and double gang frames with combination head screws, screw covers, labels, and a curved designer appearance. The faceplates shall mount onto standard NEMA boxes and adapters with screw-to-screw dimensions of 83.3 mm (3.28 inch). Each faceplate frame shall accept flat, sloped, sloped shuttered, sloped recessed and blank 1/2 and 1/3 size module inserts that can be individually inserted and removed as required from the front of the frame without removing the frame.

2.5 Jacks and Modules

.1 The cabling system shall be used for the Work Area subsystem, including all modular connectors. The network cabling system shall be comprised of modular connectors in support of high-speed networks and applications designed for implementation on copper cabling. All outlets shall utilize fully interchangeable and individual connector modules that mount side-by-side to facilitate quick and easy moves, adds and changes.

.2 Jacks and Modules shall be modules featuring IDC-termination technology. The eight position modules (six position for RJ11) shall be used in all work areas and shall meet the connector requirements of the applicable TIA/EIA standard. Termination shall be accomplished by use of an insulation displacement connection termination. The wiring scheme label shall be available with both T568A and T568B wiring schemes. All terminations for this project shall use the T568B (A) wiring scheme. The modules shall terminate four pair (3 pair for RJ11) 24 AWG and 22 AWG 100 ohm solid unshielded twisted pair cable. The modules shall be universal in design, including complying with the intermateability standard IEC 60603-7 for backward compatibility. Modules shall have UL and CSA approval. The modules shall have ETL verified performance to their specification and ISO Class E (Cat6), Class D (Cat5e), or Class C (Cat3) performance as defined in ISO/IEC 11801 in both the basic and channel links. They shall be universal in design, accepting six or eight pair modular plugs without damage to the outer module contacts. The modules shall be able to be re-terminated a minimum of 10 times. The module shall snap into all outlets and patch panels. The module shall have a colour coded base to signify performance.

27 15 01.23 - AUDIO-VIDEO COMMUNICATIONS HORIZONTAL CABLING

1.0 MANUFACTURERS

1.1 C2G, Extron, Crestron, Hubbell, approved equal.

27 16 00 - COMMUNICATIONS CONNECTING CORDS, DEVICES, AND ADAPTERS

1.0 PATCH CORDS

1.1 Factory terminated with modular plugs featuring a tangle-free latch design and clear strain-relief boots to support easy moves, adds and changes. Each patch cord shall be 100 per cent performance tested at the factory to the appropriate TIA/EIA category standard. The patch cords shall come in standard lengths of 1 m (3 ft), 1.5 m (5 ft), 2 m (7ft), 3 m (10 ft), 4 m (14 ft), and 6 m (20 ft). Patch cords shall be supplied to match the performance of the horizontal cabling installed.

1.2 Supply two patch cords per drop location as follows:

.1 1 x 2 m (7 ft) length.

.2 1 x 3 m (10 ft) length.

27 21 00 - DATA COMMUNICATIONS NETWORK EQUIPMENT

1.0 WIRELESS ACCESS POINTS

1.1 Fortinet FortiAP 221C, installed at locations noted "WAP" on drawings. Confirm exact location with Owner prior to rough-in. Provide one data outlet at each WAP location.

28 ELECTRONIC SAFETY AND SECURITY

28 46 00 - FIRE DETECTION AND ALARM

1.0 EXTRA MATERIALS:

1.1 Allow for five additional audible signalling devices to match existing system, and allow for five additional visual signalling devices, and allow for supplemental verification.

2.0 INSTALLATION

2.1 To CAN/ULC S524-14.

2.2 Manufacturer's Field Services

.1 The Manufacturer's representative shall inspect and verify the complete installation of the fire alarm equipment including those components necessary to the direct operation of the system such as: manual and automatic alarm initiating devices, alarm signalling devices and controls (whether or not manufactured by the manufacturer) to the satisfaction of the local Fire Marshal and verifying that the type of equipment installed is as specified herein.

.1 All wiring connections to all devices shall meet Underwriters' Laboratories of Canada and Canadian Standards Association requirements.

.2 Equipment shall be installed in accordance with the manufacturer's recommendations and all signalling devices shall be tested.

.3 Supervisory wiring of those items of equipment connected to a supervised circuit, shall operate and meet the governmental regulations to the satisfaction of inspecting officials.

.2 The manufacturer shall supply to the Contractor reasonable amounts of technical assistance with respect to any changes necessary to conform with work to all items above.

.1 During the period of inspection by the manufacturer, the electrical contractor shall make available qualified personal as required by the manufacturer.

3.0 VERIFICATION AND REPORT

3.1 On completion of the inspection and when all of the above conditions have been complied with, the manufacturer shall issue to the Consultant:

.1 A copy of the inspecting technician's report showing the location of each device and certifying the test results of each device.

.2 A certificate of verification to CAN/ULC-S537-13 (R2018) confirming that the inspection has been completed and showing the conditions upon which such inspection and certification have been rendered.

.3 The manufacturer shall submit shop drawings indicating the complete wiring arrangement of all devices, and interlocking. All directories and labeling shall be submitted for review. All equipment and devices shall have pertinent shop drawings submitted.

.4 Contractor shall be responsible for the verification of fire alarm audible signalling devices and adjust the location in order to provide audible levels as per Authorities Having Jurisdiction.

26 05 73.19 (16082) - ARC-FLASH HAZARD ANALYSIS

1.0 Submittals

1.1 The results of the arc flash hazard analysis studies shall be summarized in a final report. The complete report with input and output data shall be provided in digital PDF format and hard copy as part of the Operation and Maintenance manuals.

1.2 The report shall include the following sections:

.1 Executive Summary

.2 Descriptions, purpose, basis and scope of the study

.3 Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short circuit duties

.4 Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip unit settings, fuse selection

.5 Fault current calculations including a definition of terms and guide for interpretation of the computer printout

.6 Details of the incident energy and flash protection boundary calculations

.7 Recommendations for system improvements, where needed

.8 Single Line Diagram

2.0 Qualifications

2.1 Arc flash hazard analysis studies shall be conducted under the supervision and approval of a Registered Professional Electrical Engineer skilled in performing and interpreting the power system studies.

2.2 The Registered Professional Electrical Engineer shall be a full-time employee of the equipment manufacturer or an approved engineering firm.

2.3 The Registered Professional Electrical Engineer shall have a minimum of eight (8) years of experience in performing power system studies.

2.4 The equipment manufacturer or approved engineering firm shall demonstrate experience with Arc Flash Hazard Analysis by submitting names of at least ten actual arc flash hazard analysis it has performed in the past year

3.0 Arc Flash Hazard Analysis

3.1 The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in CSA Z462-08 Annex D.

3.2 The flash protection boundary and the incident energy shall be calculated at all significant locations in the electrical distribution system (switchboards, switchgear, panelboards and splitters) where work could be performed on energized parts.

3.3 The Arc-Flash Hazard Analysis shall include all significant locations in 240 volt and 208 volt systems fed from transformers equal to or greater than 112.5 kVA where work could be performed on energized parts.

3.4 Safe working distances shall be based upon the calculated arc flash boundary considering an incident energy of 1.2 calories per square centimetre.

3.5 When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short-circuit and coordination study model. Ground overcurrent relays should not be taken into consideration when determining the clearing time when performing incident energy calculations.

3.6 The short-circuit calculations and the corresponding incident energy calculations for multiple system scenarios must be compared and the greatest incident energy must be uniquely reported for each equipment location. Calculations must be performed to represent the maximum and minimum contributions of fault current magnitude for all normal and emergency operating conditions. The minimum calculation will assume that the utility contribution is at a minimum and will assume a minimum motor contribution (all motors off). Conversely, the maximum calculation will assume a maximum contribution from the utility and will assume the maximum amount of motors to be operating. Calculations shall take into consideration the parallel operation of synchronous generators with the electric utility, where applicable.

3.7 The incident energy calculations must consider the accumulation of energy over time when performing arc flash calculations on buses with multiple sources. Iterative calculations must take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors and generators should be decremented as follows:

.1 Fault contribution from induction motors should not be considered beyond 3-5 cycles.

3.8 Fault contribution from synchronous motors and generators should be decayed to match the actual decrement of each as closely as possible (e.g. contributions from permanent magnet generators will typically decay from 10 per unit to 3 per unit after 10 cycles).

REVISIONS

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1	2023-03-31	ISSUED FOR 95% CD
2	2023-06-06	ISSUED FOR 50% CD
3	2023-06-22	ISSUED FOR 90% CD
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NOTES:

All dimensions and measurements must be checked and verified by the General Contractor

JULY 3 2024
T.W. SEDORE
LICENSED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

CLIENT:
CLIENT: UNIVERSITY OF TORONTO

PROJECT:
ED-22-703

CIRHR UNIVERSAL WASHROOM

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ELECTRICAL SPECIFICATION II - WASHROOM

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3.9 For each equipment location with a separately enclosed main device (where there is adequate separation between the line side terminals of the main protective device and the work location), calculations for incident energy and flash protection boundary shall include both the line and load side of the main breaker.

3.10 When performing incident energy calculations on the line side of a main breaker (as required per above), the line side and load side contributions must be included in the fault calculation.

3.11 Mis-coordination should be checked amongst all devices within the branch containing the immediate protective device upstream of the calculation location and the calculation should utilize the fastest device to compute the incident energy for the corresponding location.

3.12 Arc Flash calculations shall be based on actual overcurrent protective device clearing time.

3.13 Maximum clearing time will be capped at 2 seconds based on IEEE 1584-2002 section B.1.2.

3.14 Where it is not physically possible to move outside of the flash protection boundary in less than 2 seconds during an arc flash event, a maximum clearing time based on the specific location shall be utilized.

4.0 Report Sections

4.1 Incident energy and flash protection boundary calculations

- .1 Arcing fault magnitude
- .2 Protective device clearing time
- .3 Duration of arc
- .4 Arc flash boundary
- .5 Working distance
- .6 Incident energy
- .7 Hazard Risk Category
- .8 Recommendations for arc flash energy reduction

5.0 Arc Flash Warning Labels

5.1 The contractor of the Arc Flash Hazard Analysis shall provide a 3.5 inch by x 5 inch thermal transfer type label of high adhesion polyester for each work location analyzed.

5.2 All labels will be based on recommended overcurrent device settings and will be provided after the results of the analysis have been presented to the owner and after any system changes, upgrades or modifications have been incorporated in the system.

5.3 The label shall include the following information, at a minimum:

- .1 Location designation
- .2 Nominal voltage
- .3 Flash protection boundary
- .4 Hazard risk category
- .5 Incident energy
- .6 Working distance
- .7 Engineering firm and issue date.
- .8 Labels shall be machine printed, with no field markings.

5.4 Arc flash labels shall be provided in the following manner and all labels shall be based on recommended overcurrent device settings.

- .1 For each 600 volt, and applicable 208 volt panelboard, one arc flash label shall be provided.
- .2 For each motor control center, one arc flash label shall be provided.
- .3 For each low voltage switchboard, one arc flash label shall be provided.
- .4 For each switchgear, one flash label shall be provided.
- .5 For medium voltage switches one arc flash label shall be provided

5.5 Arc Flash Warning Label General Instruction

- .1 Only qualified electricians who recognize and avoid the electrical and Arc Flash hazards are allowed to place the arc flash warning labels.
- .2 Electricians should wear suitable PPE, such as electrical safety boots, Safety Glasses, etc. while performing labeling.
- .3 Generally, arc flash label shall be put on a prominent pre-cleaned place on the front of the electrical equipment (such as switchgear, panel, disconnect switch, generator output breaker). Label should be visible and readable, displayed horizontally, attached flatly and securely, and not allowed to cover other signs or labels on the equipment.
- .4 Under the special request of the client, labels could be put on the back of the panel door when the panel is located in clean and finished spaces such as an office area.
- .5 When putting a label on small equipment with no space labeling on the wall just beside the equipment is allowed.
- .6 Special request may be attached to this General Instruction. For examples, more than one identical label is applied for large equipment; different labels could be applied for different sections of one equipment; for a splitter with several disconnect switches only one label is placed on the splitter for this group.
- .7 Take the pictures for each label to indicate both names of the label and equipment and labeling area of the equipment. Email these pictures to the Consultant for quality control and record.

FIRE ALARM CONTROL PANEL

Edwards United Technologies
Fire Shield Plus
Contractor to confirm exact make and model with University of Toronto.

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NOTES:

All dimensions and measurements must be checked and verified by the General Contractor

LICENSED PROFESSIONAL ENGINEER
JULY 3 2024
T.W. SEDORE
PROVINCE OF ONTARIO

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CLIENT: UNIVERSITY OF TORONTO

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ELECTRICAL SPECIFICATION III - WASHROOM

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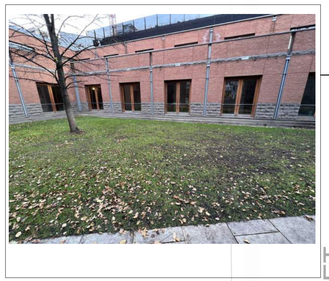

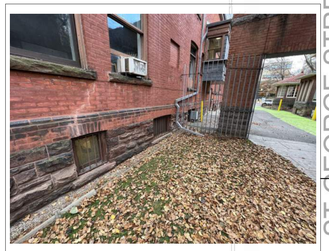

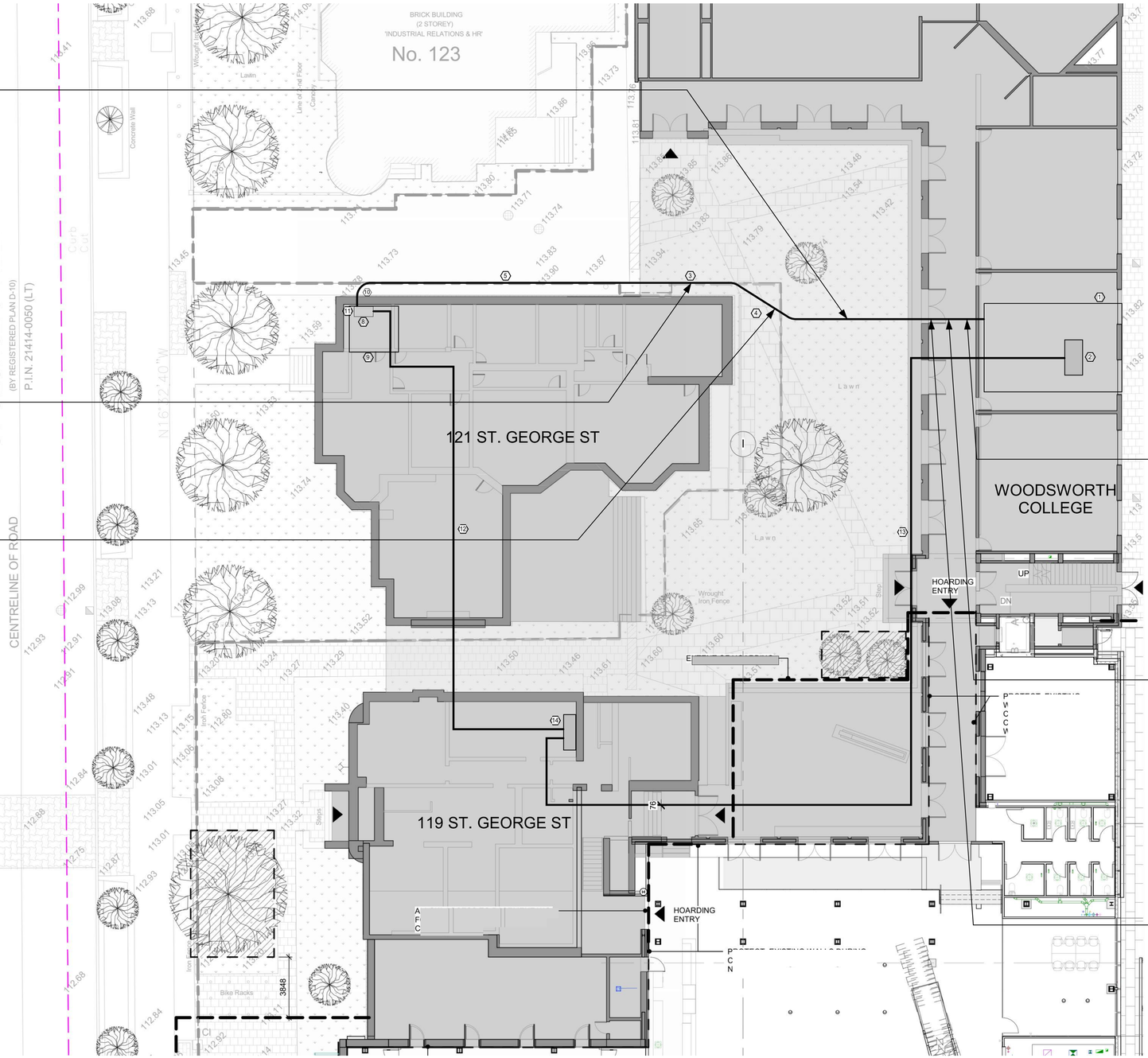

GENERAL NEW WORK NOTES:

1. THE ELECTRICAL SITE PLAN SHALL BE READ IN CONJUNCTION WITH THE PROJECT CONTRACT DOCUMENTS. FOR ADDITIONAL ELECTRICAL SCOPE TO BE CARRIED IN BID.
2. COORDINATE ELECTRICAL UNDERGROUND SERVICES WITH CIVIL DOCUMENTS AND TRADES.
3. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UNDERGROUND ELECTRICAL SERVICES AND CABLES. AS WELL AS OVERHEAD WIRES, TO BE REMOVED AND/OR PROTECTED DURING THE CONSTRUCTION PHASE.
4. THIS DRAWING IS DIAGRAMMATIC ONLY AND WAS CREATED WITH LIMITED AS-BUILT INFORMATION DURING THE TIME OF DESIGN. THE CONTRACTOR MUST CONDUCT A THOROUGH REVIEW OF THE SITE TO COORDINATE THE EXACT ROUTING OF THE CONDUIT.
5. PRIOR TO ANY WORK, THE ELECTRICAL CONTRACTOR SHALL LOCATE AND PROTECT EXISTING ELECTRICAL, INCLUDING COMMUNICATION SERVICES SCHEDULED TO REMAIN.

KEYNOTES:

1. APPROXIMATE LOCATION OF WOODSWORTH MAIN ELECTRICAL ROOM IN BASEMENT LEVEL.
2. APPROXIMATE LOCATION OF SWITCHBOARD AAA.
3. APPROXIMATE ROUTE AND LOCATION OF 6" CONDUIT ENCASED IN CONCRETE. AVOID TREE ROOT SYSTEM AS MUCH AS POSSIBLE.
4. EXISTING PAVERS ARE TO REMOVED AND REINSTATED AFTER INSTALLATION OF DUCTBANK.
5. RUN CONDUIT AS CLOSE TO THE BUILDING AS POSSIBLE. MAINTAIN MINIMUM BENDING RADIUS OF OF CONCRETE ENCASED DUCT BANK.
6. APPROXIMATE LOCATION OF CONDUIT PENETRATION INTO 121 ST GEORGE ST MAIN ELECTRICAL ROOM. COORDINATE EXACT LOCATION ON SITE. PROVIDE ALL REQUIRED WATERPROOFING AND INSULATION. REFER TO INSTALLATION DETAILS ON DETAIL SHEET.
7. NOT USED.
8. EXISTING SPLICE BOX TO BE REMOVED.
9. APPROXIMATE LOCATION OF 121 ST GEORGE ELECTRICAL ROOM.
10. APPROXIMATE LOCATION OF CONDUIT PENETRATION INTO 121 ST GEORGE ST MAIN ELECTRICAL ROOM. COORDINATE EXACT LOCATION ON SITE. PROVIDE ALL REQUIRED WATERPROOFING AND INSULATION. REFER TO INSTALLATION DETAILS ON DETAIL SHEET.
11. EXISTING FEEDER TO BE CUT BACK, CAPPED, MADE SAFE AND ABANDONED AT SPLICE BOX AND AT SOURCE PANEL (SWITCHBOARD CDP) IN WOODSWORTH COLLEGE.
12. APPROXIMATE ROUTING OF FEEDER TO 119 ST. GEORGE ST. TO BE CUT BACK, CAPPED, MADE SAFE AND ABANDONED. CONTRACTOR TO COORDINATE REMOVAL OF EXISTING FEEDER WITH THE INSTALLATION OF THE NEW FEEDER. NEW FEEDER IS TO BE IN PLACE PRIOR TO REMOVAL OF EXISTING.
13. APPROXIMATE ROUTING OF NEW FEEDER TO 119 ST. GEORGE ST. CONTRACTOR TO THOROUGHLY REVIEW ROUTING ON SITE TO FULLY UNDERSTAND SCOPE AND EXISTING CONDITIONS.
14. APPROXIMATE LOCATION OF PANEL BDP1 IN 119 ST. GEORGE ST ELECTRICAL

SERVICE TUNNEL IN BASEMENT LEVEL OF WOODSWORTH BUILDING FACING DRAWING SOUTH.

SERVICE TUNNEL IN BASEMENT LEVEL OF WOODSWORTH BUILDING FACING DRAWING WEST.

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JULY 3 2024
T.W. SEDORE
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ELECTRICAL SITE PLAN

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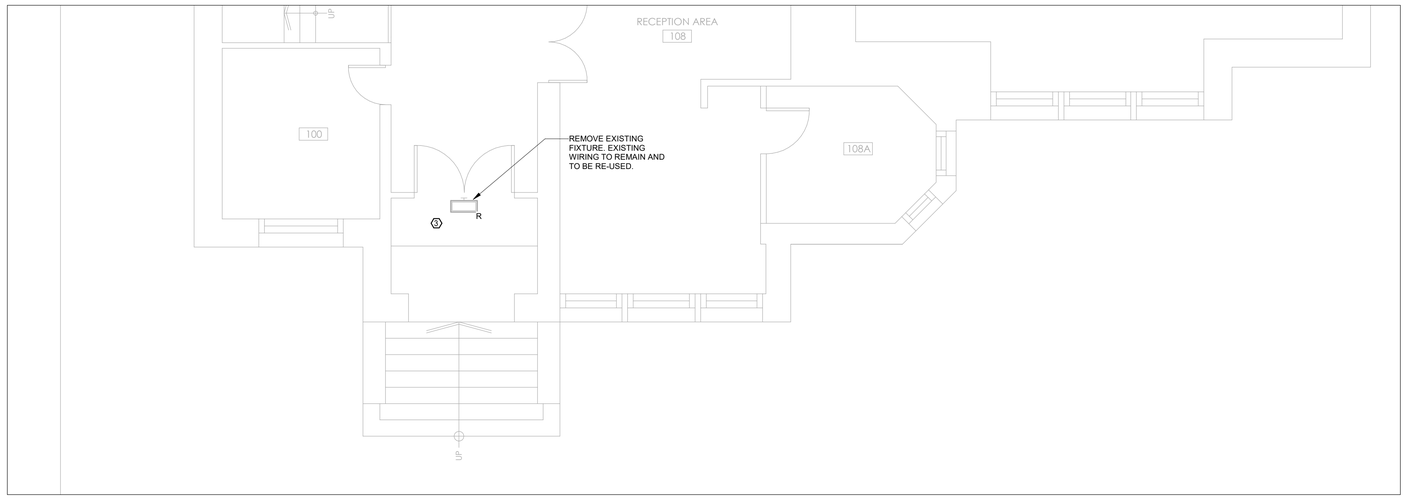

2 LIGHTING LEVEL 1 - DEMOLITION - RAMP

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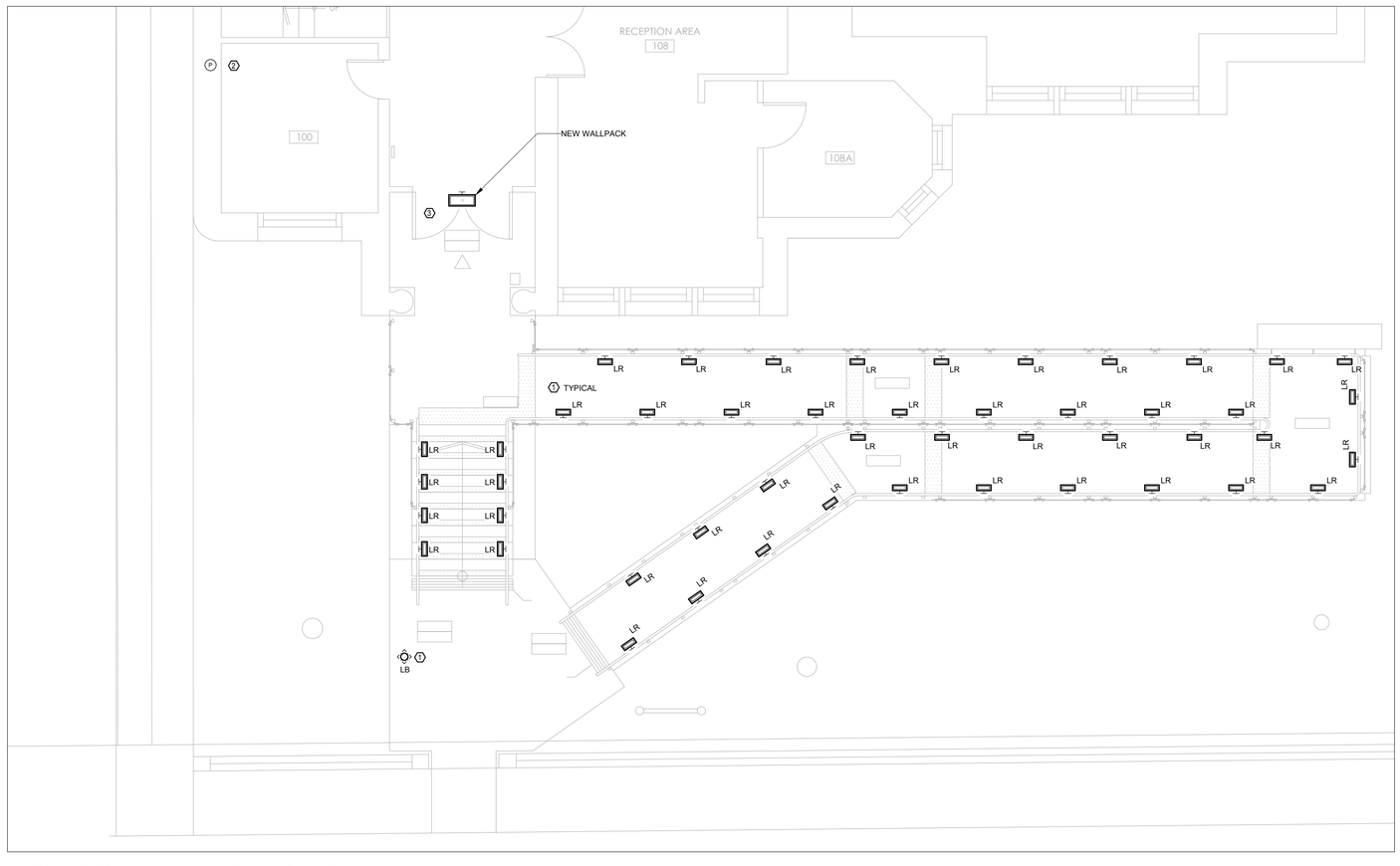

1 LIGHTING LEVEL 1 - NEW - RAMP

SCALE: 1 : 50

GENERAL DEMOLITION NOTES

1. THIS IS AN EXISTING BUILDING. ALL EXISTING DEVICES MAY NOT BE SHOWN. ELECTRICAL CONTRACTOR RESPONSIBLE FOR SITE WALKTHROUGH BEFORE COMMENCEMENT OF WORK .
2. ALL EXISTING CIRCUITS TO BE MADE SAFE AND REUSED IN NEW PORTION. ANY CIRCUITS THAT ARE NOT USED IN THE NEW PORTION ARE TO BE DISCONNECTED FROM PANEL, PULLED BACK TO SOURCE AND REMOVED.
3. CONTRACTOR TO COORDINATE NEW DEVICE HEIGHTS WITH ARCHITECTURAL AND U OF T STANDARDS.
4. ANY DISCREPANCIES BETWEEN WORKING DRAWINGS AND ON SITE CONDITIONS ARE TO BE COMMUNICATED TO THE CONSULTANT.
5. EXISTING LIGHTING IS FED FROM PANEL B CCT #1. WASHROOM 101 AND 101A LIGHTING TO BE REMOVED AND REPLACED WITH NEW LED FIXTURE FROM CCT #1

GENERAL NEW WORK NOTES:

1. THIS DRAWING IS ISSUED TO SHOW PROPOSED SCOPE OF WORK ONLY. THE CONTRACTOR MUST PERFORM A SITE INSPECTION (INCLUDING CEILING SPACES) DURING THE TENDER PERIOD AND ENSURE THAT ALL WORK THAT IS VISIBLE IS INCLUDED IN THE DEMOLITION SCOPE OF WORK. ALL EXISTING SERVICES THAT PASS THROUGH THE RENOVATION AREA (UNLESS OBSOLETE) ARE TO BE MAINTAINED AND/OR RELOCATED TO SUIT THE SCOPE OF WORK.
2. ALL EXISTING CIRCUITS TO BE MADE SAFE AND REUSED IN NEW PORTION. ANY CIRCUITS THAT ARE NOT USED IN THE NEW PORTION ARE TO BE DISCONNECTED FROM PANEL, PULLED BACK TO SOURCE AND REMOVED.
3. CONTRACTOR TO COORDINATE NEW DEVICE HEIGHTS WITH ARCHITECTURAL AND U OF T STANDARDS.
4. ANY DISCREPANCIES BETWEEN WORKING DRAWINGS AND ON SITE CONDITIONS ARE TO BE COMMUNICATED TO THE CONSULTANT.
5. THE EXISTING LIGHTING TO BE REMOVED AND REPLACED WITH THE NEW LED LIGHT FIXTURES AS SPECIFIED BY THE ARCHITECT. EXISTING LIGHTING IS FED FROM PANEL B CCT #1. EXISTING LIGHTING CIRCUIT TO BE RETAINED AND EXTENDED TO NEW LIGHTING LOCATIONS.

KEYNOTES:

1. ALL EXTERIOR RAMP AND STAIR LIGHTING TO BE FED FROM PANEL B CIRCUIT 13.
2. PHOTOCELL TO BE LOCATED ON ROOF. PHOTOCELL TO BE USED FOR NEW EXTERIOR LIGHTING ONLY. PHOTOCELL MUST BE FACING NORTH AVOIDING AS MUCH ARTIFICIAL LIGHT AS POSSIBLE.
3. THE EXISTING LIGHTING TO BE REMOVED AND REPLACED WITH THE NEW LED LIGHT FIXTURES AS SPECIFIED BY THE ARCHITECT. EXISTING LIGHTING IS FED FROM PANEL B CCT #1. EXISTING LIGHTING CIRCUIT TO BE RETAINED AND EXTENDED TO NEW LIGHTING LOCATIONS.

REVISIONS

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1	2023-06-06	ISSUED FOR 50% CD
2	2023-06-22	ISSUED FOR 90% CD
3	2023-07-28	ISSUED FOR 95% CD
4	2023-09-28	ISSUED FOR CLIENT REVIEW
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7	2024-06-07	ISSUED FOR TENDER
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NOTES:

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LIGHTING LEVEL 1 - DEMOLITION & NEW WORK

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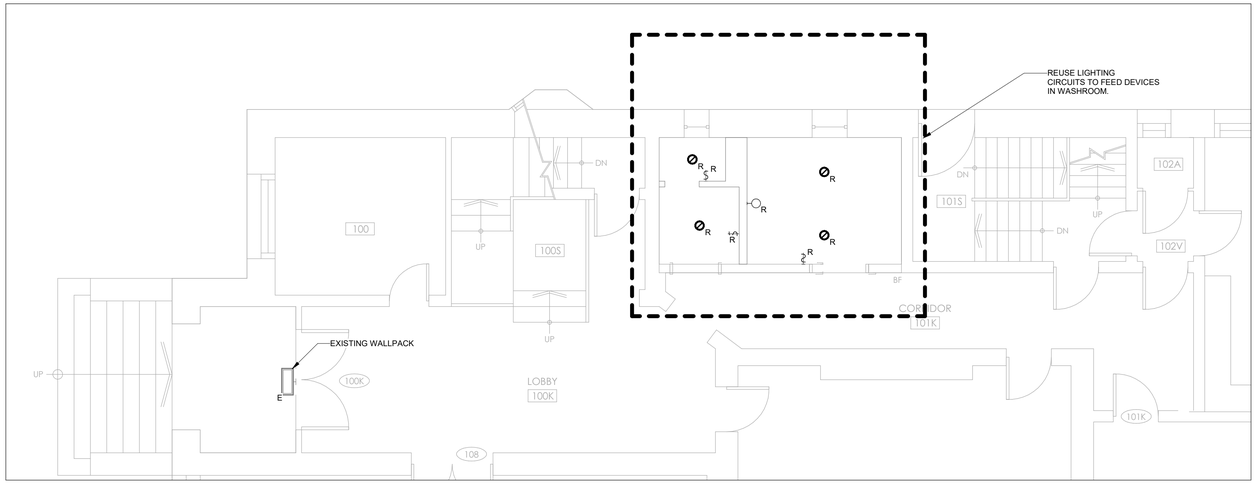
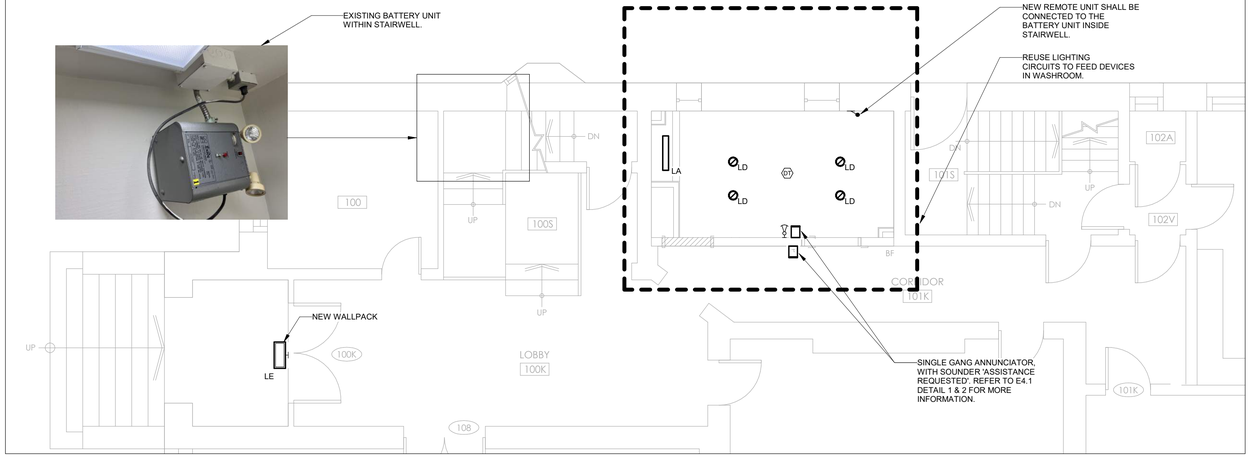


2 LIGHTING LEVEL 1 - DEMO - WASHROOM

SCALE: 1 : 50



1 LIGHTING LEVEL 1 - NEW - WASHROOM

SCALE: 1 : 50

GENERAL DEMOLITION NOTES

1. THIS IS AN EXISTING BUILDING. ALL EXISTING DEVICES MAY NOT BE SHOWN. ELECTRICAL CONTRACTOR RESPONSIBLE FOR SITE WALKTHROUGH BEFORE COMMENCEMENT OF WORK .
2. ALL EXISTING CIRCUITS TO BE MADE SAFE AND REUSED IN NEW PORTION. ANY CIRCUITS THAT ARE NOT USED IN THE NEW PORTION ARE TO BE DISCONNECTED FROM PANEL, PULLED BACK TO SOURCE AND REMOVED.
3. CONTRACTOR TO COORDINATE NEW DEVICE HEIGHTS WITH ARCHITECTURAL AND U OF T STANDARDS.
4. ANY DISCREPANCIES BETWEEN WORKING DRAWINGS AND ON SITE CONDITIONS ARE TO BE COMMUNICATED TO THE CONSULTANT.
5. EXISTING LIGHTING IS FED FROM PANEL B CCT #1. WASHROOM 101 AND 101A LIGHTING TO BE REMOVED AND REPLACED WITH NEW LED FIXTURE FROM CCT #1

GENERAL NEW WORK NOTES:

1. THIS DRAWING IS ISSUED TO SHOW PROPOSED SCOPE OF WORK ONLY. THE CONTRACTOR MUST PERFORM A SITE INSPECTION (INCLUDING CEILING SPACES) DURING THE TENDER PERIOD AND ENSURE THAT ALL WORK THAT IS VISIBLE IS INCLUDED IN THE DEMOLITION SCOPE OF WORK. ALL EXISTING SERVICES THAT PASS THROUGH THE RENOVATION AREA (UNLESS OBSOLETE) ARE TO BE MAINTAINED AND/OR RELOCATED TO SUIT THE SCOPE OF WORK.
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5. ALL ALTERATIONS TO THE FIRE ALARM ARE TO BE THIRD PARTY VERIFIED FOR THE EXTENT OF FIRE ALARM SCOPE OF WORK. CONTRACTOR TO SITE VERIFY THE EXISTING FIRE ALARM CONTROL LOCATION.

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CLIENT: UNIVERSITY OF TORONTO

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SCALE:
1 : 50

LIGHTING LEVEL 1 - DEMOLITION & NEW WORK

E2.1

DRAWN BY: Author CHECKED BY: Checker

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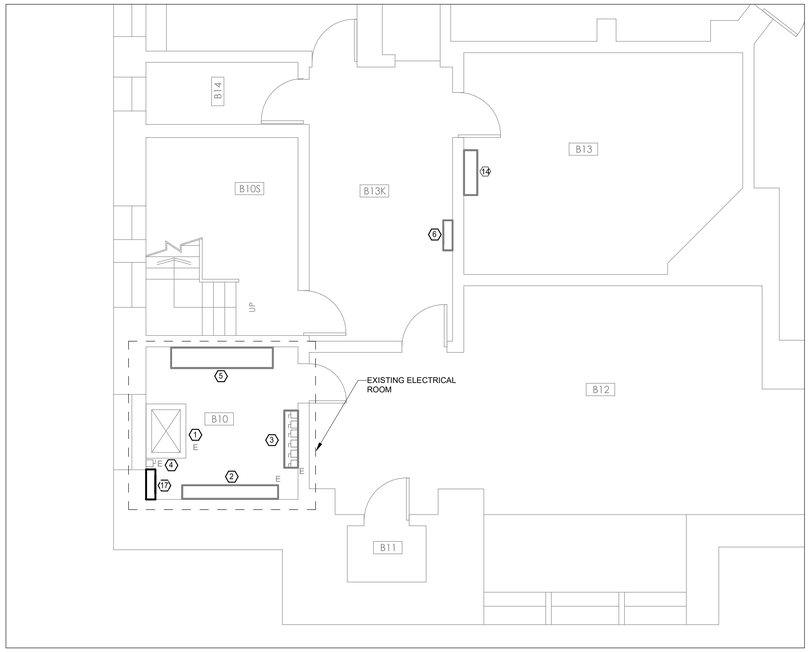
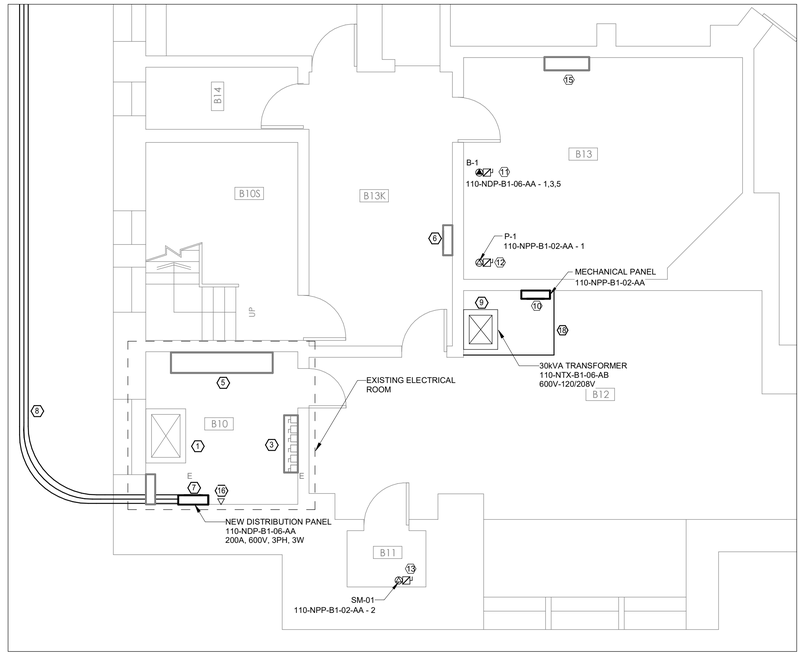


2 ELECTRICAL BASEMENT - DEMOLITION

SCALE: 1 : 50



1 ELECTRICAL BASEMENT - NEW WORK

SCALE: 1 : 50

GENERAL DEMOLITION NOTES

1. THIS IS AN EXISTING BUILDING. ALL EXISTING DEVICES MAY NOT BE SHOWN. ELECTRICAL CONTRACTOR RESPONSIBLE FOR SITE WALKTHROUGH BEFORE COMMENCEMENT OF WORK .
2. ALL EXISTING CIRCUITS TO BE MADE SAFE AND REUSED IN NEW PORTION. ANY CIRCUITS THAT ARE NOT USED IN THE NEW PORTION ARE TO BE DISCONNECTED FROM PANEL, PULLED BACK TO SOURCE AND REMOVED.
3. CONTRACTOR TO COORDINATE NEW DEVICE HEIGHTS WITH ARCHITECTURAL AND U OF T STANDARDS.
4. ANY DISCREPANCIES BETWEEN WORKING DRAWINGS AND ON SITE CONDITIONS ARE TO BE COMMUNICATED TO THE CONSULTANT.

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5. ALL ALTERATIONS TO THE FIRE ALARM ARE TO BE THIRD PARTY VERIFIED FOR THE EXTENT OF FIRE ALARM SCOPE OF WORK. CONTRACTOR TO SITE VERIFY THE EXISTING FIRE ALARM CONTROL LOCATION.
6. PROVIDE NEW FIRE ALARM STROBE DEVICE TO MATCH EXISTING IN THE BUILDING. EXTEND ALL CONDUIT AND FIRE ALARM CIRCUITING TO SUIT NEW LOCATION. TEST AND VERIFY UPON COMPLETION.

KEYNOTES:

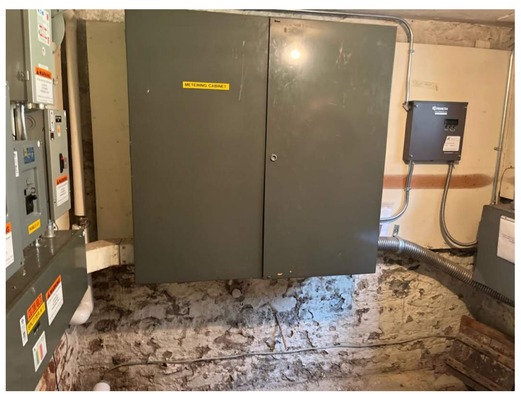
1. EXISTING 75kVA TRANSFORMER TO REMAIN. RUN NEW PRIMARY FEEDERS FROM NEW DISTRIBUTION PANEL.
2. EXISTING METERING CABINET TO BE REMOVED.
3. EXISTING SPLITTER AND ASSOCIATED DISTRIBUTION EQUIPMENT TO REMAIN. FEEDER TO SPLITTER TO BE REWORKED TO BE FED FROM NEW DISTRIBUTION PANEL.
4. EXISTING DISCONNECT SWITCH TO BE DEMOLISHED.
5. EXISTING TELECOM EQUIPMENT TO REMAIN.
6. EXISTING PANEL "A" TO REMAIN.
7. NEW 200A, 600V, 3PH, 3W DISTRIBUTION PANEL (110-NDP-B1-06-AA) C/W 200A NON-AUTO MAIN BREAKER AND METERING.
8. NEW FEEDER IN CONCRETE ENCASED DUCTBANK RUNNING FROM WOODSWORTH MAIN ELECTRICAL ROOM.
9. NEW 30kVA, 600V-120V/208V TRANSFORMER (110-NTX-B1-06-AB).
10. NEW 125A, 30 CCT MECHANICAL PANELBOARD TO BE INSTALLED.
11. PROVIDE A 60A, 600V, 3PH DIRECT CONNECTION FOR THE SNOWMELTING BOILER. COORDINATE EXACT LOCATION WITH MECHANICAL CONTRACTOR.
12. PROVIDE A 15A, 120V DIRECT CONNECTION FOR THE SNOWMELTING PUMP. COORDINATE EXACT LOCATION WITH MECHANICAL CONTRACTOR.
13. PROVIDE A 15A, 120V DIRECT CONNECTION FOR THE SNOWMELT CONTROLLER. COORDINATE EXACT LOCATION WITH MECHANICAL CONTRACTOR.
14. EXISTING WALL MOUNTED DISCONNECT SWITCHES TO BE RELOCATED TO NEW LOCATION.
15. EXISTING WALL MOUNTED DISCONNECT SWITCHES IN RELOCATED LOCATION.
16. PROVIDE DATA DROP FOR METERING. DATA DROP TO RUN BACK TO SWITCH SHOWN IN ITEM 5 ABOVE.
17. EXISTING SPLICE BOX TO BE DEMOLISHED. CUT BACK AND MAKE SAFE EXISTING WIRE AND CONDUIT.
18. SECURITY CAGE FOR ELECTRICAL EQUIPMENT. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT DIMENSIONS. PROVIDE NECESSARY BONDING AS REQUIRED BY CODE.

6 WALL MOUNTED DISCONNECT SWITHES

SCALE:N.T.S.

5 ELECTRICAL ROOM - NORTH WALL

SCALE:N.T.S.



4 ELECTRICAL ROOM - WEST WALL

SCALE:N.T.S.

3 ELECTRICAL ROOM - SOUTH WALL

SCALE:N.T.S.

REVISIONS

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NOTES:

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VG ARCHITECTS
THE VENTIN GROUP LTD

SCALE:
As indicated

E3.0

BASEMENT POWER LAYOUT - DEMOLITION & NEW WORK

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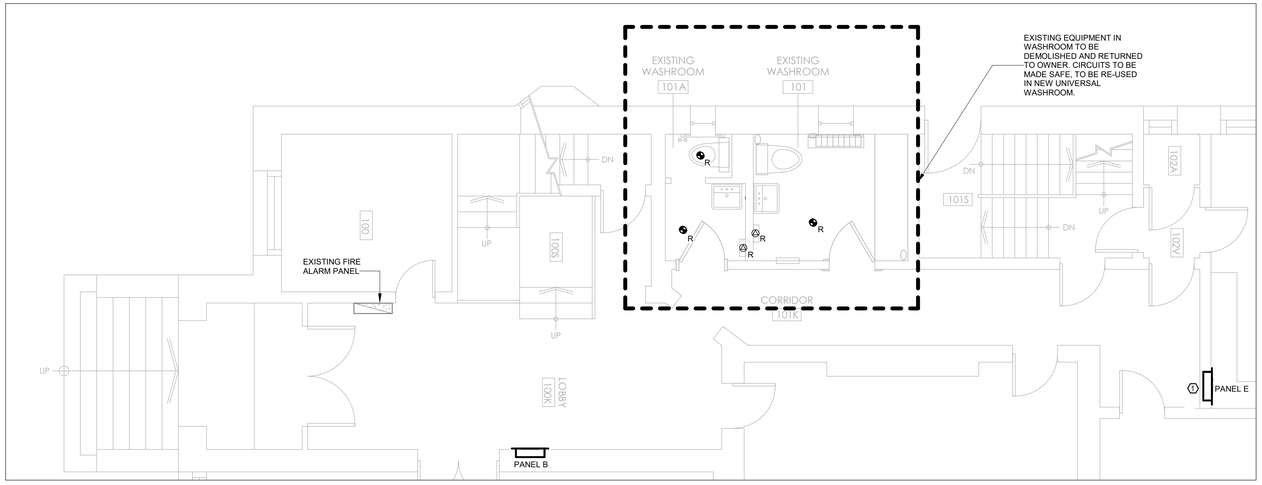
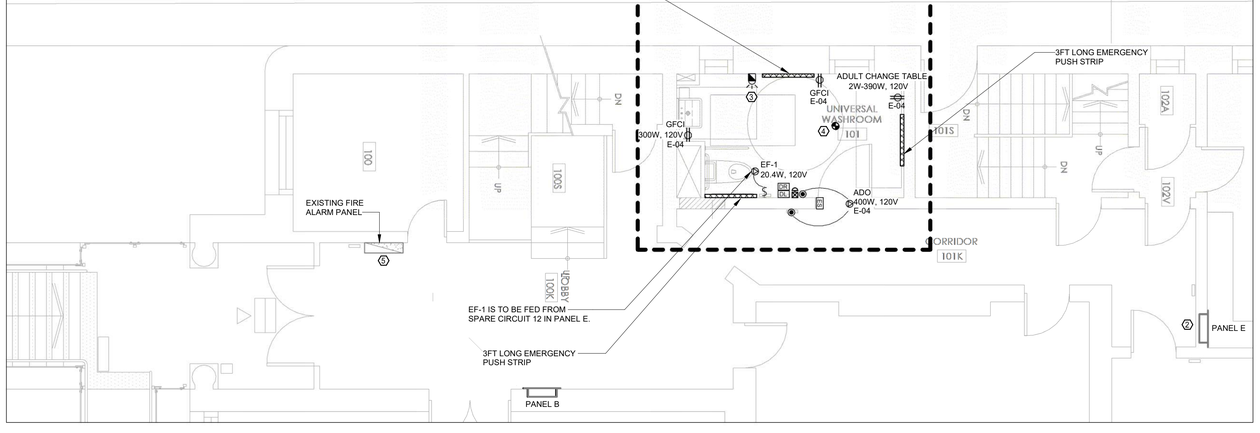


2 POWER LEVEL 1 - DEMOLITION - WASHROOM

SCALE: 1 : 50



1 POWER LEVEL 1 - NEW - WASHROOM

SCALE: 1 : 50

GENERAL DEMOLITION NOTES

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4. ANY DISCREPANCIES BETWEEN WORKING DRAWINGS AND ON SITE CONDITIONS ARE TO BE COMMUNICATED TO THE CONSULTANT.

KEYNOTES:

1. EXISTING PANEL E TO REMAIN. REWORK EXISTING CIRCUITS TO FEED NEW WASHROOM.

GENERAL NEW WORK NOTES:

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KEYNOTES:

1. REFER TO DETAIL 1 & 3 ON E6.0 FOR MORE INFORMATION
2. EXISTING PANEL E TO REMAIN. REWORK EXISTING CIRCUITS TO FEED NEW WASHROOM.
3. PROVIDE NEW FIRE ALARM STROBE TO EXISTING FIRE ALARM SYSTEM.
4. PROVIDE NEW SMOKE DETECTOR, CONNECT TO EXISTING FIRE ALARM WIRING SERVING THE SPACE
5. EXISTING FIRE ALARM PANEL (EDWARDS FIRESHIELD PLUS) TO REMAIN.

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NOTES:

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SCALE:
1 : 50

POWER LEVEL 1 - DEMOLITION & NEW WORK

E3.1

DRAWN BY: Author CHECKED BY: Checker

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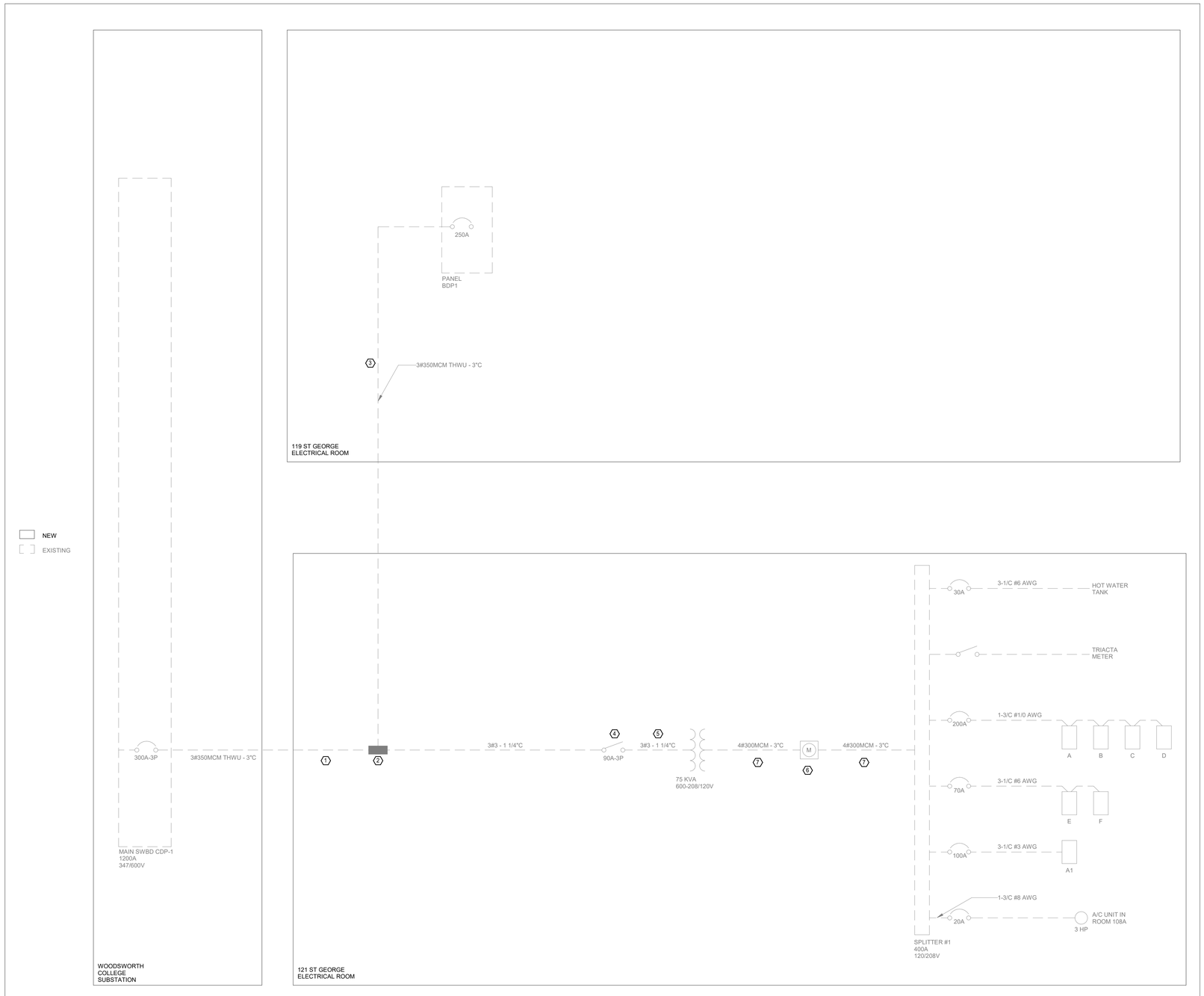

1 EXISTING SINGLE LINE DIAGRAM
SCALE: N.T.S.

KEYNOTES:	
1	EXISTING TECK FEEDER TO 119 ST. GEORGE ST. TO BE DEMOLISHED AND REPLACED WITH NEW WIRE IN CONDUIT DIRECTLY FEED TO PANEL BDP1.
2	EXISTING SPLICE BOX TO BE DEMOLISHED.
3	EXISTING FEEDER TO 121 ST. GEORGE ST. IS TO BE DISCONNECTED, CUT BACK AND ABANDONED
4	EXISTING 90A-3P DISCONNECT SWITCH TO BE DEMOLISHED.
5	EXISTING PRIMARY FEEDER TO 75kVA TRANSFORMER IS TO BE DEMOLISHED AND REPLACED WITH NEW TO SUIT NEW EQUIPMENT LAYOUT.
6	EXISTING METER TO BE DEMOLISHED.
7	EXISTING SECONDARY FEEDER FROM 75kVA TRANSFORMER IS TO BE DEMOLISHED AND REPLACED WITH NEW TO SUIT NEW EQUIPMENT LAYOUT.

REVISIONS

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2	2024-05-24	ISSUED FOR PERMIT
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SCALE:
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SINGLE LINE DIAGRAM - EXISTING

E4.0

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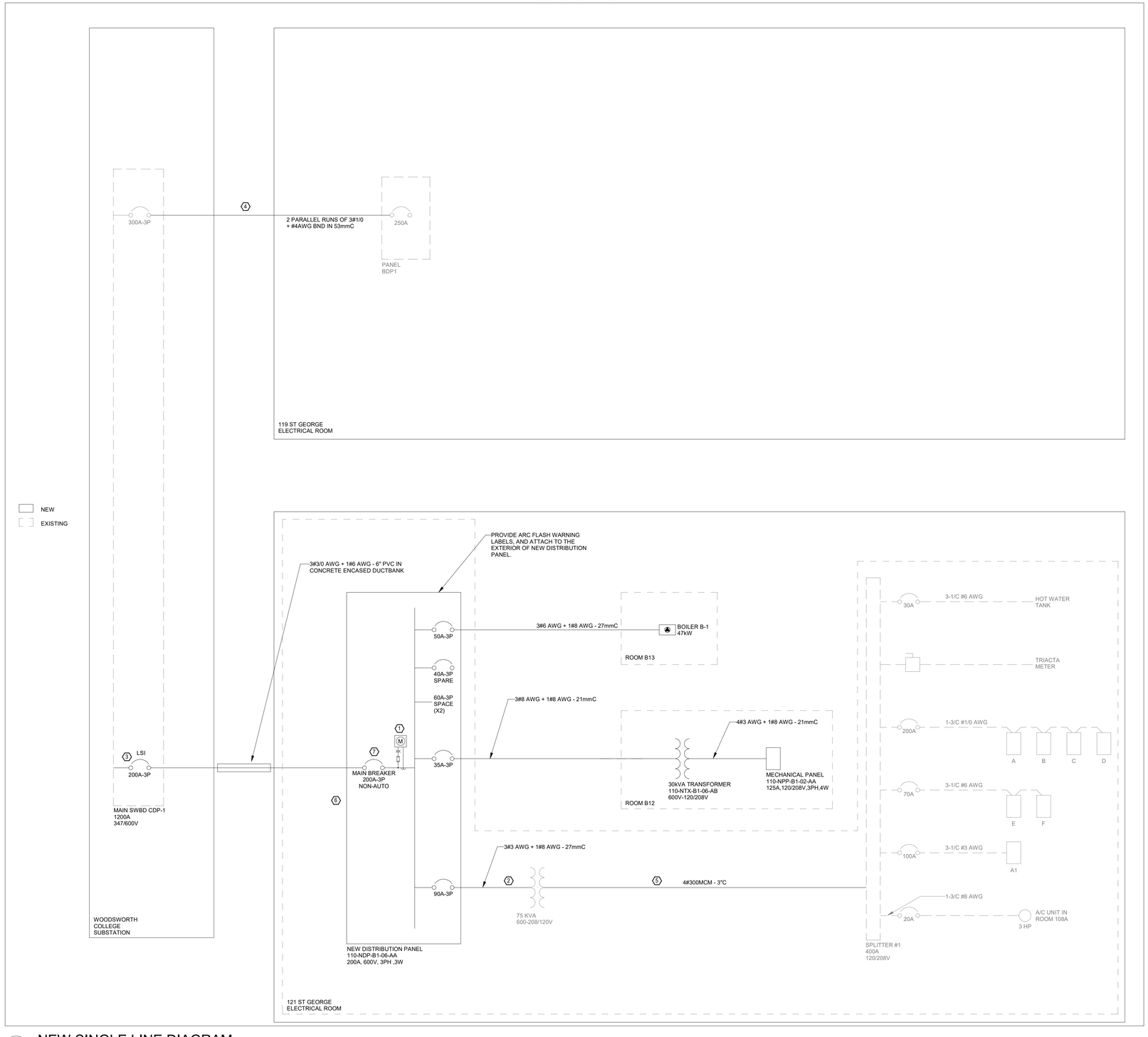
NEW SINGLE LINE DIAGRAM



1 NEW SINGLE LINE DIAGRAM
SCALE: N.T.S.

KEYNOTES:	
1	PROVIDE DIGITAL METER IN DISTRIBUTION PANELBOARD TO MEET THE UNIVERSITY OF TORONTO DESIGN STANDARDS (SCHNEIDER PM5560 OR EQUIVALENT)
2	PROVIDE NEW PRIMARY FEEDER TO EXISTING 75kVA TRANSFORMER. TRANSFORMER TO BE FED FROM NEW 90A-3P BREAKER IN DISTRIBUTION PANELBOARD.
3	PROVIDE NEW 200A-3P LSI BREAKER TO SUIT EXISTING FEDERAL PIONEER SWITCHBOARD.
4	CONTRACTOR PROVIDE NEW FEEDER TO PANEL BDP1 IN 119 ST. GEORGE ST. TO REPLACE EXISTING TECK FEEDER AND SPLICE BOX. CONTRACTOR TO CONFIRM EXACT ROUTING ON SITE.
5	PROVIDE NEW SECONDARY FEEDER FROM 75kVA TRANSFORMER TO SUIT NEW EQUIPMENT LAYOUT.
6	PROVIDE NEW 200A, 600V, 3PH, 3W DISTRIBUTION PANEL C/W 200A MAIN BREAKER AND METERING
7	PROVIDE INTEGRAL, NON-AUTO, SERVICE ENTRANCE TYPE, 200A-3P MAIN BREAKER C/W BARRIERS TO ISOLATE FROM THE DOWNSTREAM BRANCH CIRCUITS.

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SINGLE LINE DIAGRAM - NEW WORK

E4.1

DRAWN BY: Author CHECKED BY: Checker

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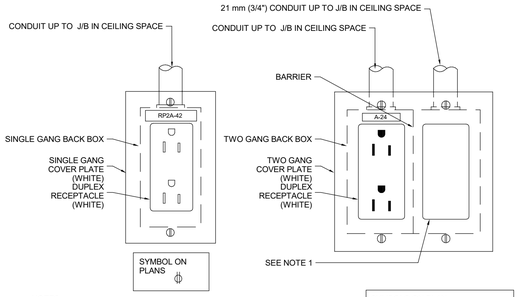


6 GANGED DECORATOR STYLE POWER OUTLETS AND COMM BOXES

SCALE: N.T.S.

LUMINAIRE SCHEDULE

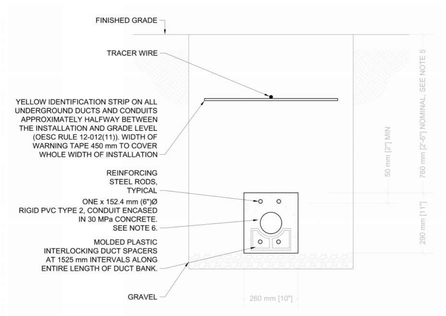
TYPE	DESCRIPTION	BASIS OF DESIGN MANUFACTURER AND CAT NO.	VOLTAGE/ INPUT WATTS	LUMEN PACKAGE AND OUTPUT	MOUNTING
LA	RECESSED PERIMETER LIGHT NARROW 3.5" APERTURE WITH ONE PIECE EXTRUDED ALUMINUM HOUSING	3G Lighting Recessed Perimeter Light 3G-4RPE-L500-H90-35K-UNV-DIM-WT-RG3-S2	120 V 3.9 W/FT	500 LM/FT 3500 K CCT MIN 93 CRI	RECESSED
LD	4.5" ROUND FIXED DOWNLIGHT	3G Lighting Round Fixed Light 3G-DL45RF-22-S80-35K-90D-UNV-DIM-WT-WI-NCF	120/277 V 22 W	2156 LUMEN 3500 K CCT MIN 80 CRI	RECESSED
LR	EXTERIOR STEPLIGHT	BEGA 22 131	120 V 14 W	93 LUMEN 3000 K CCT MIN 80 CRI	RECESSED
LE	EXTERIOR WALLPACK	GEOPAK Series 1 GEO1-24L-20-3K7-3-UNV	120-277 V 20 W	2495 LUMEN 3000 K CCT MIN 70 CRI	EXTERIOR WALLMOUNT
LB	EXTERIOR LIGHTED BOLLARD	BEGA 99 865 SYSTEM BOLLARD HEAD c/w 99 620 SYSTEM BOLLARD TUBE	120 V 29.4 W	1304 LUMEN 3000 K CCT MIN 80 CRI	BOLLARD

LIGHTING FIXTURE SCHEDULE NOTES:

CONTRACTOR TO ALLOW FOR ALL MOUNTING HARDWARE.
TRIMS, FINISHES, COLOURS, AND AESTHETICS OF LIGHTING FIXTURE TO BE CONFIRMED WITH ARCHITECT.

2 LUMINAIRE SCHEDULE

SCALE: N.T.S.



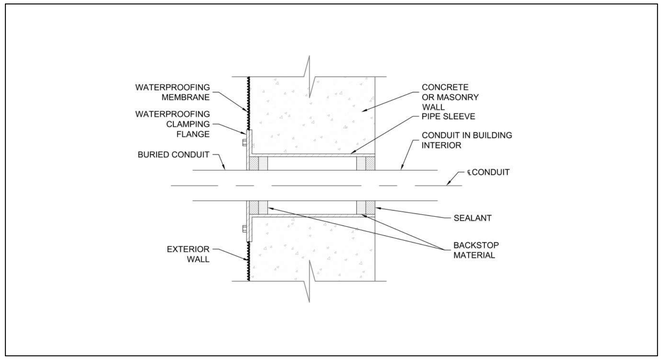
LOW VOLTAGE (BELOW 750 VOLT) DUCT BANK SECTION

NOTES:

1. DUCT BANK TO BE IN COMPLIANCE WITH 2021 ONTARIO ELECTRICAL SAFETY CODE (OESC), DIAGRAM D11, DETAIL 3, OR LATEST EDITION. WHERE ANY CONTRADICTION EXISTS BETWEEN THIS DETAIL AND THE OESC, THE OESC DIMENSIONS GOVERN.
2. DUCT BANK TO BE INSPECTED PRIOR TO POURING OF CONCRETE AND PRIOR TO BACKFILL. COORDINATE WITH AUTHORITY HAVING JURISDICTION AND RECEIVE ALL NECESSARY APPROVALS.
3. AMPACITY OF COPPER 3-PHASE + NEUTRAL + GROUND FEEDER BASED ON 2018 OESC TABLES LISTED BELOW, LOWER OF TWO VALUES (LESS APPLICABLE VOLTAGE DROP):
   3.1. TABLE D11A, "3/PHASE DETAIL 3", SIZE ___ MCM: 3 x ___ AMPS = ___ AMPS.
   3.2. TABLE 2, SIZE ___ MCM: 3 x ___ AMPS = ___ AMPS.
4. ALTERNATE DUCT BANK CONFIGURATION MAY ONLY BE CONSIDERED BY THE CONSULTANT IF THE SAME FEEDER METHODOLOGY ABOVE IS CONSIDERED, OR AN AMPACITY CALCULATION IS PROVIDED IN ACCORDANCE WITH IEEE 835.
5. GREATER DEPTH THAN THE NOTED DIMENSION WILL RESULT IN A DECREASE IN THE DUCT BANK AMPACITY. REDUCTION IN THE DEPTH REQUIRES COORDINATION WITH OESC TABLE 53.
6. CONDUIT FILL IN ACCORDANCE WITH 2021 OESC RULE 12-910.

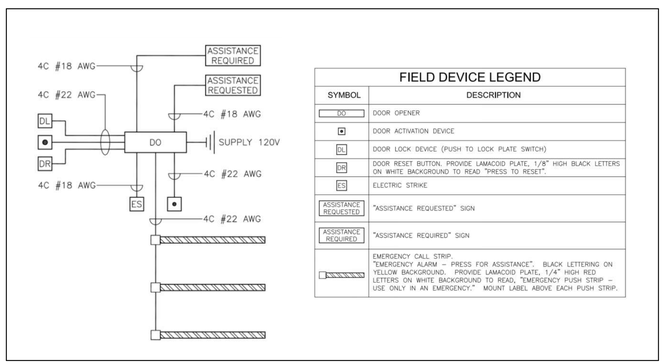
5 1W X 1H 6" CONCRETE ENCASED DUCT BANK

SCALE:N.T.S.



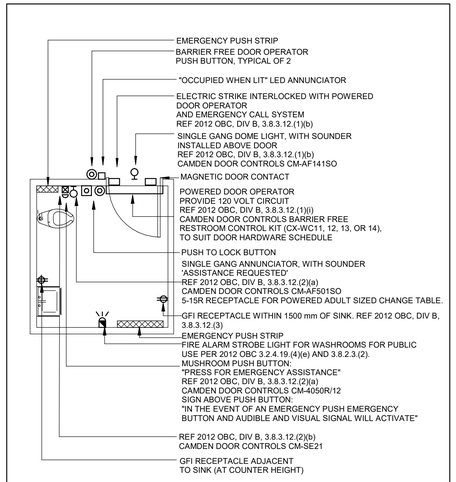
4 BURIED CONDUIT PENETRATION THROUGH EXTERIOR WALL

SCALE: N.T.S.



3 TYPICAL U OF T DOOR OPERATOR WASHROOM SCHEMATIC

SCALE: N.T.S.



UNIVERSAL RESTROOM "EMERGENCY ASSISTANCE" SIGNAL ACTIVATION, ANNUNCIATION AND SUPPORTING SIGNAGE SHALL BE CAMDEN DOOR CONTROLS MODEL CX/WEC10/CX-WEC-11 UNIVERSAL RESTROOM CONTROL KIT.

KIT SHALL INCLUDE:

1. CM-4050R/12 SINGLE GANG MUSHROOM PUSH BUTTON, 1/4" THICK BRUSHED ALUMINUM FACEPLATE AND RED BUTTON, MAINTAINED PUSH/PULL OPERATION WITH "PRESS FOR EMERGENCY ASSISTANCE" PERMANENTLY LASER ETCHED ON THE FACEPLATE.
2. CM-AF501SO SINGLE GANG LED ANNUNCIATOR WITH SOUNDER, RATED 85 dB AT 100 mm, WEATHER AND VANDAL RESISTANT CONSTRUCTION, BRUSHED STAINLESS STEEL FACEPLATE, WITH "ASSISTANCE REQUIRED" MESSAGE TEXT, THAT IS NOT LEGIBLE UNLESS THE ANNUNCIATOR IS ENERGIZED.
3. CM-AF141SO SINGLE GANG DOME LIGHT WITH PIEZO SOUNDER, RATED 93 dB AT 1 METRE, BRUSHED STAINLESS STEEL FACEPLATE AND 24 V INCANDESCENT BULB.
4. CM-SE21 SIGN, TO BE LOCATED ABOVE THE ACTIVATION SWITCH, 1.6 mm (1/16"), 381 mm BY 381 mm (15" BY 15"), FIRE RATED EXPANDED PVC WHITE, WITH 25 mm BLACK LETTERING. TEXT SHALL BE: "IN THE EVENT OF AN EMERGENCY PUSH EMERGENCY BUTTON AND AUDIBLE AND VISUAL SIGNAL WILL ACTIVATE"
5. INTERCONNECTED WITH DOOR HARDWARE, INCLUDING DOOR OPERATOR, PUSH TO LOCK BUTTON, ELECTRIC STRIKE, DOOR CONTACT.

NOTES:

1. CONFIRM EXACT HARDWARE AND ROUGH-IN REQUIREMENTS WITH EMERGENCY CALL SYSTEM VENDOR
2. CONFIRM EXACT EQUIPMENT LOCATIONS WITH ARCHITECTURAL DRAWINGS PRIOR TO ROUGH-IN.

1 TYPICAL UNIVERSAL WASHROOM DETAIL

SCALE: N.T.S.

REVISIONS

No.	DATE	DESCRIPTION
1	2023-03-31	ISSUED FOR 95% CD
2	2023-06-06	ISSUED FOR 50% CD
3	2023-06-22	ISSUED FOR 90% CD
4	2023-07-28	ISSUED FOR 95% CD
5	2023-09-28	ISSUED FOR CLIENT REVIEW
6	2024-04-02	ISSUED FOR COORDINATION
7	2024-05-24	ISSUED FOR PERMIT
8	2024-06-07	ISSUED FOR TENDER
9	2024-07-03	ISSUED FOR TENDER

NOTES:

All dimensions and measurements must be checked and verified by the General Contractor

LICENSED PROFESSIONAL ENGINEER
JULY 3 2024
T.W. SEDORE
PROVINCE OF ONTARIO

CLIENT:
CLIENT: UNIVERSITY OF TORONTO

PROJECT:
ED-22-703

CIRHR UNIVERSAL WASHROOM

CENTRE FOR INDUSTRIAL RELATIONS & HUMAN RESOURCES (CIRHR)
121 ST. GEORGE ST., TORONTO, ONTARIO

ORIGINAL PAGE SIZE: ARCH D - 24" x 36"

QUASAR CONSULTING GROUP
250 ROWNTREE DAIRY RD, WOODBRIDGE, ON
TEL: 905-507-0800
WEB: WWW.QUASARCG.COM

+VG ARCHITECTS
THE VENTIN GROUP LTD

SCALE:
As indicated

ELECTRICAL TYPICAL DETAILS AND LUMINAIRE SCHEDULE

E6.0

DRAWN BY: Author
CHECKED BY: Checker

Plot Date: 2024-07-03 4:05:45 PM
Autodesk Docs://ED-22-703 - Ud7f Accessibility Improvement/ED-22-703 - QCG ME Model_R22 - Elec.rvt

UNIVERSITY OF TORONTO

BLDG #: 110 **PANEL TAG:** 110-NDP-B1-06-AA **DATE MODIFIED:** 08-Jul-24

CONNECTED LOAD (W)	DEMAND FACTOR	TOTAL DEMAND (W)	DESCRIPTION (Item, Room Number[s]):	BKR (A)	CT		CT	BKR (A)	DESCRIPTION (Item, Room Number[s]):	CONNECTED LOAD (W)	DEMAND FACTOR	TOTAL DEMAND (W)
15667	0.30	4700.1	Boiler B-1	50	1	A	2	35	30kVA TXN (110-NTX-B1-06-AB)	10	0.30	3
15667	0.30	4700.1			3	B	4			10	0.30	3
15667	0.30	4700.1			5	C	6			10	0.30	3
		0	SPARE	40	7	A	8	90	Existing 75kVA TXN	25	0.60	15
		0			9	B	10			25	0.60	15
		0			11	C	12			25	0.60	15
		0	SPARE	40	13	A	14	60	PREPARD SPACE			0
		0			15	B	16					0
		0			17	C	18					0
		0			19	A	20	60	PREPARD SPACE			0
		0			21	B	22					0
		0			23	C	24					0
		0			25	A	26					0
		0			27	B	28					0
		0			29	C	30					0
		0			31	A	32					0
		0			33	B	34					0
		0			35	C	36					0
		0			37	A	38					0
		0			39	B	40					0
		0			41	C	42					0

BLDG: 110 **FLOOR:** BSMT **ROOM:** B10 **NEW TAG:**

RATINGS:	200A	600	3 PHASE	3 WIRE	**S.C.:**	

FED FROM:	**PANEL TAG:**	**BLDG #:**	**ROOM #:**	**BREAKER SIZE**	**FEEDER SIZE:**
	CDP-1	38		200A-3P	3#3/0AWG

UNIVERSITY OF TORONTO

Panel Tag:	110-NDP-B1-06-AA			
PHASE	**A**	**B**	**C**	**TOTAL**
CONNECTED LOAD (VA)	15702	15702	15702	47106
DEMAND LOAD (VA)	4718.1	4718.1	4718.1	14154.3

MAXIMUM MEASURED LOAD

DATE	TIME	AMPS	KVA	AMPS	KVA	AMPS	KVA	TOTAL KVA	POWER	TOTAL KW
								0		0
								0		0
								0		0
								0		0
								0		0
								0		0
								0		0
								0		0
								0		0
								0		0

MAINTENACE LOG

Date	Initials	Type

Date	Initials	Type

ET - Electrical Testing (NETA) | CL - Cleaning | CB - Cycling Breakers | BR (CCT#) - Breaker Replacement w/ CCT #

UNIVERSITY OF TORONTO

BLDG #: 110 **PANEL TAG:** 110-NPP-B1-02-AA **DATE MODIFIED:** JUNE 7,2024

CONNECTED LOAD (W)	DEMAND FACTOR	TOTAL DEMAND (W)	DESCRIPTION (Item, Room Number[s]):	BKR (A)	CT		CT	BKR (A)	DESCRIPTION (Item, Room Number[s]):	CONNECTED LOAD (W)	DEMAND FACTOR	TOTAL DEMAND (W)
420	0.30	126	Pump P-1 (Snow Melting)	15	1	A	2	15	Snow Melting Controller	500	0.30	150
		0	Spare	15	3	B	4	15	Spare			0
		0	Spare	15	5	C	6	15	Spare			0
		0	Space		7	A	8		Space			0
		0	Space		9	B	10		Space			0
		0			11	C	12					0
		0			13	A	14					0
		0			15	B	16					0
		0			17	C	18					0
		0			19	A	20					0
		0			21	B	22					0
		0			23	C	24					0
		0			25	A	26					0
		0			27	B	28					0
		0			29	C	30					0
		0			31	A	32					0
		0			33	B	34					0
		0			35	C	36					0
		0			37	A	38					0
		0			39	B	40					0
		0			41	C	42					0

BLDG: 110 **FLOOR:** BSMT **ROOM:** B12 **NEW TAG:**

RATINGS:	125A	120/208	3 PHASE	4 WIRE	**S.C.:**	

FED FROM:	**PANEL TAG:**	**BLDG #:**	**ROOM #:**	**BREAKER SIZE**	**FEEDER SIZE:**
	110-NTX-B1-06-AB	110	B12	35A	4#3AWG

Panel Tag: 110-NPP-B1-02-AA

PHASE	A	B	C	TOTAL
CONNECTED LOAD (VA)	920	0	0	920
DEMAND LOAD (VA)	276	0	0	276

MAXIMUM MEASURED LOAD

DATE	TIME	AMPS	KVA	AMPS	KVA	AMPS	KVA	TOTAL KVA	POWER	TOTAL KW
								0		0
								0		0
								0		0
								0		0
								0		0
								0		0
								0		0
								0		0
								0		0
								0		0

MAINTENACE LOG

Date	Initials	Type

Date	Initials	Type

ET - Electrical Testing (NETA) | CL - Cleaning | CB - Cycling Breakers | BR (CCT#) - Breaker Replacement w/ CCT #

UNIVERSITY OF TORONTO

BLDG #: 110 **PANEL TAG:** Panel B **DATE MODIFIED:** JUNE 7,2024

CONNECTED LOAD (W)	DEMAND FACTOR	TOTAL DEMAND (W)	DESCRIPTION (Item, Room Number[s]):	BKR (A)	CT		CT	BKR (A)	DESCRIPTION (Item, Room Number[s]):	CONNECTED LOAD (W)	DEMAND FACTOR	TOTAL DEMAND (W)
		0	LGT 100, 100K, 100S, 101, 101K, 102	15	1	A	2	15	LTG. RM. 108, 108A, 107			0
		0	LGT 103, 103S, 104, Exhaust Fan Rm 103	15	3	B	4	15	LTG. RM. 106, 105			0
		0	LGT RM 105	15	5	C	6	15	LTG. RM. 106A			0
		0	OUTLET RM. 100	20	7	A	8	15	PAPER DRYER			0
		0	OUTLET RM. 100	20	9	B	10		RM 103			0
		0	RECP. RM. 100, 100K	15	11	C	12	15	RECP RM 102			0
		0	SPACE		13	A	14	15	RECP. RM. 102, 103			0
		0	MOT SCREEN	15	15	B	16	15	RECP RM. 103, 104			0
		0	AIR CONDITIONER	15	17	C	18	15	RECP RM. 103, 104			0
		0	ROOM 106A,	15	19	A	20	15	RECP RM. 106, 107, 108			0
		0	ELECTRIC HEATER R. 107A	20	21	B	22	15	RECP RM. 106, 107, 108			0
		0	PROJECTOR RM. 107A		23	C	24	15	RECP RM. 106, 107, 108			0
		0	16MM T.P RM 107A	15	25	A	26	151	AIR CONDITION RM. 108			0
		0	LIGHTS & EXH FAN. RM. 07,	15	27	B	28	15	A/C UNIT RM. 105			0
		0	OUTDOOR LTG.	15	29	C	30	15	A/C UNIT RM. 105			0
		0			31	A	32					0
		0			33	B	34					0
		0			35	C	36					0
		0			37	A	38					0
		0			39	B	40					0
		0			41	C	42					0

BLDG:	110	FLOOR:	1	ROOM:	HALLWAY	NEW TAG:	

RATINGS:	225A	240V	3 PHASE	4 WIRE	S.C.:	

FED FROM:	PANEL TAG:	BLDG #:	ROOM #:	BREAKER SIZE	FEEDER SIZE:
	SPLITTER #1	110	B10	200A	1-3/C #1/0 AWG

Panel Tag:	Panel B			
PHASE	**A**	**B**	**C**	**TOTAL**
CONNECTED LOAD (VA)	0	0	0	0
DEMAND LOAD (VA)	0	0	0	0

	DATE	TIME	AMPS	KVA	AMPS	KVA	AMPS	KVA	TOTAL KVA	POWER	TOTAL KW
MAXIMUM MEASURED LOAD									0		0
									0		0
									0		0
									0		0
									0		0
									0		0
									0		0
									0		0
									0		0
									0		0

MAINTENACE LOG	Date	Initials	Type

Date	Initials	Type

ET - Electrical Testing (NETA) | CL - Cleaning | CB - Cycling Breakers | BR (CCT#) - Breaker Replacement w/ CCT #

UNIVERSITY OF TORONTO

BLDG #: 110 **PANEL TAG:** Panel E **DATE MODIFIED:** JUNE 7,2024

CONNECTED LOAD (W)	DEMAND FACTOR	TOTAL DEMAND (W)	DESCRIPTION (Item, Room Number[s]):	BKR (A)	CT		CT	BKR (A)	DESCRIPTION (Item, Room Number[s]):	CONNECTED LOAD (W)	DEMAND FACTOR	TOTAL DEMAND (W)
		0	AIR CONDITIONING A/C 107	15	1	A	2	15	UNIVERSAL WASHROOM DOOR OPERATOR	400	0.70	280
		0	AIR CONDITIONING A/C 108B	15	3	B	4	15	UNIVERSAL WASHROOM RECP	1000	0.30	300
		0	FAN F-108 RM. 108	15	5	C	6	15	SPARE			0
		0	RECEPTACLE RM. 107	20	7	A	8	15	SPARE			0
		0	PHOTOCOPIER RM. 106	20	9	B	10	15	RECEPTACLES RM 102			0
		0	PHOTOCOPIER RM. 103	15	11	C	12	15	UNIVERSAL WASHROOM EXHAUST FAN	20.4	0.30	6.12
		0			13	A	14					0
		0			15	B	16					0
		0			17	C	18					0
		0			19	A	20					0
		0			21	B	22					0
		0			23	C	24					0
		0			25	A	26					0
		0			27	B	28					0
		0			29	C	30					0
		0			31	A	32					0
		0			33	B	34					0
		0			35	C	36					0
		0			37	A	38					0
		0			39	B	40					0
		0			41	C	42					0

BLDG: 110 **FLOOR:** 1 **ROOM:** HALLWAY **NEW TAG:**

RATINGS:	225A	120/208V	3 PHASE	4 WIRE	**S.C.:**	

FED FROM:	**PANEL TAG:**	**BLDG #:**	**ROOM #:**	**BREAKER SIZE**	**FEEDER SIZE:**
	SPLITTER #1	110	B12	70A	3-1/C #6 AWG

Panel Tag:	Panel E			
PHASE	**A**	**B**	**C**	**TOTAL**
CONNECTED LOAD (VA)	400	1000	20.4	1420.4
DEMAND LOAD (VA)	280	300	6.12	586.12

MAXIMUM MEASURED LOAD

DATE	TIME	AMPS	KVA	AMPS	KVA	AMPS	KVA	TOTAL KVA	POWER	TOTAL KW
								0		0
								0		0
								0		0
								0		0
								0		0
								0		0
								0		0
								0		0
								0		0
								0		0

MAINTENACE LOG

Date	Initials	Type

Date	Initials	Type

ET - Electrical Testing (NETA) | CL - Cleaning | CB - Cycling Breakers | BR (CCT#) - Breaker Replacement w/ CCT #

S P E C I F I C A T I O N S

for

Centre for International Relations & Human Resources (CIRHR)
121 George Street
UNIVERSITY OF TORONTO

NEW ACCESSIBLE RAMP & UNIVERSAL WASHROOM

Project Number 22250/1

THE VENTIN GROUP (TORONTO) LTD., ARCHITECTS
72 Stafford Street, Suite 200
Toronto, ON, M6J 2R9
T: 416-588-6370
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Landscape Architecture
Snow Larc Landscape Architecture
577 Kingston Rd, Suite 302
Toronto On M4e 1r3

Structural Engineering
Tacoma Engineers Inc.
176 Speedvale Ave West
Guelph, ON, N1H 1C3

Mechanical and Electrical Engineering
Quasar Consulting Group
250 Rowntree Dairy Rd,
Woodbridge, ON L4L 9J7

Civil Engineering
MGM Consulting Inc.
MGM Consulting Inc.
555 Industrial Drive, Suite 201
Milton, Ontario, L9T 5E1

Date: June 2024
Issued for TENDER

DIVISION 2 - SITE WORK

DIVISION 3 – CONCRETE

DIVISION 4 – MASONRY

DIVISION 5 - METALS, STRUCTURAL & MISCELLANEOUS

DIVISION 6 – WOODWORK

DIVISION 7 - MOISTURE PROTECTION

DIVISION 8 - DOORS, GLASS, AND WINDOWS

DIVISION 9 – FINISHES

DIVISION 10 - SPECIALTIES

ARCHITECTURAL:

A0.1 COVER SHEET
A0.2 O.B.C. MATRIX & BUILDING KEY PLANS
A0.3 SURVEY
A1.1 SITE PLAN (EXISTING)
A1.2 SITE PLAN (PROPOSED)
A2.1 PARTIAL PLANS
A3.1 INTERIOR ELEVATIONS
A3.2 INTERIOR ELEVATIONS & DOOR DETAILS
A3.3 ELEVATIONS - RAMP
A3.4 ELEVATIONS - RAMP
A3.5 RESERVED
A3.6 RESERVED
A3.7 ELEVATIONS - STONE RESTORATION
A3.8 ELEVATIONS - STONE RESTORATION
A3.9 ELEVATIONS - STONE RESTORATION
A4.1 DETAILS - RAMP
A4.2 DETAILS - RAMP & STAIR
A4.3 DETAILS

STRUCTURAL:

S1.1 RAMP FOUNDATION PLAN
S2.1 RAMP DETAILS
S2.2 RAMP DETAILS

CIVIL:

CV-1 GRADING & SERVICING

LANDSCAPE:

L1 LANDSCAPE PLAN & DETAILS

MECHANICAL:

M0.1 MECHANICAL LEGEND & DRAWING LIST
M1.1 RAMP - DEMOLITION & NEW WORK - BASEMENT
M1.2 RAMP - NEW WORK - LEVEL 1 - MECHANICAL
M2.1 WASHROOM - DEMOLITION & NEW WORK - MECHANICAL
M3.1 MECHANICAL SPECIFICATIONS
M3.2 MECHANICAL SPECIFICATIONS
M3.3 MECHANICAL SPECIFICATIONS
M3.4 MECHANICAL SPECIFICATIONS
M4.1 RAMP - SCHEDULE & DETAILS
M4.2 WASHROOM - SCHEDULE & DETAILS

ELECTRICAL:

E0.1 ELECTRICAL LEGEND & DRAWING LIST
E0.2 ELECTRICAL SPECIFICATION I - WASHROOM
E0.3 ELECTRICAL SPECIFICATION II - WASHROOM
E0.4 ELECTRICAL SPECIFICATION III - WASHROOM
E1.0 ELECTRICAL SITE PLAN
E2.0 LIGHTING LEVEL 1 - DEMOLITION & NEW WORK
E2.1 LIGHTING LEVEL 1 - DEMOLITION & NEW WORK
E3.0 BASEMENT POWER LAYOUT - DEMOLITION & NEW WORK
E3.1 POWER LEVEL 1 - DEMOLITION & NEW WORK
E4.0 SINGLE LINE DIAGRAM - EXISTING
E4.1 SINGLE LINE DIAGRAM - NEW WORK
E6.0 ELECTRICAL TYP. DETAILS & LUMINAIRE SCHEDULE

End of Section 00015

LIST OF SCHEDULES

1.1 Schedules

1. ROOM FINISH SCHEDULE
2. DOOR SCHEDULE

End of Section 00020.

LEGEND

ACT	Acoustic Ceiling Tile
BK	Brick
CP	Concrete parging (25mm thick for walls)
CS	Concrete screed (50mm thick for floors)
EX	Existing
GL	Glass
GB	Gypsum Board
PL	Plaster
PT	Paint
PCT	Porcelain tile
RB	Rubber
SS	Stainless Steel
ST	Stain
STN	Stone
VSF	Vinyl Safety Flooring
WD	Wood
WP	Wallpaper
WW	Wood Panelling, Trim, Wainscot

1. Existing wood surfaces to remain such as windows, frames, sills, baseboard, wainscot etc. are to be refinished: stripped, patched, made good & painted. Retain EX WD base for reuse, repair, re-finish.
2. All walls to be painted to include entire surface. All surfaces of interior and exposed surfaces of ceilings, coves & bulkheads are to be painted.
3. Refer to ceiling plan for number, size and location of bulkheads, coves, access panels, ceiling mounted devices, etc.
4. Provide backing board (plywood or conc. Board) and blocking between studs at all wall locations where fixtures, electrical panels and equipment, counters and accessories are to be installed and/or anchored. See fixture and accessory manufacturer's installation instructions.

No.	NAME	FLOOR	BASE	WALLS				CEILING	COMMENTS
				NORTH	EAST	SOUTH	WEST		
				Material Finish	Material Finish	Material Finish	Material Finish	Material Finish	
101	UNIVERSAL WASHROOM	PCT	WD PT, PCT	GB PT	GB PT	GB PT	GB/PCT PT	GB PT	Patch/make good substrates. Refinish all surfaces including WD windows, sills, baseboards, casings, etc.

ROOM FINISH SCHEDULE

CIRHR – NEW ACCESSIBLE RAMP & UNIVERSAL WASHROOM
Issued for 95% Client Review

THE VENTIN GROUP (TORONTO) LTD., ARCHITECTS
Tel: (416) 588-6370
Fax: (416) 588-6327

Project No.: 22250/1
Date: July 2023

No.	NAME	FLOOR	BASE	WALLS				CEILING	COMMENTS
				NORTH	EAST	SOUTH	WEST		
				Material Finish	Material Finish	Material Finish	Material Finish	Material Finish	
101K	CORRIDOR	EX -	WD PT	PL, WP, WW WW, PT	EX PT	EX PT	EX PT	EX PT	Refinish north wall. Remove wallpaper. Patch/make good all wall substrates, WD wainscot, casings, baseboard, and paint/refinish.
B11	CELLAR	EX CS	- CP, PT	EX BK, STN CP, PT	- -	EX BK, STN CP, PT	EX BK, STN CP, PT	EX BK, STN CP, PT	Patch/make good substrates, repoint. Provide concrete parging on all interior walls and ceiling surfaces, paint finish. Insulate ceiling. Concrete screed on flooring, seal flooring.

THE VENTIN GROUP (TORONTO) LTD., ARCHITECTS
Tel: (416) 588-6370
Fax: (416) 588-6327

CIRHR – NEW ACCESSIBLE RAMP & UNIVERSAL WASHROOM **WOOD DOOR SCHEDULE**

THE VENTIN GROUP (TORONTO) LTD., ARCHITECTS
Tel: (416) 588-6370

Project No. 22250/1
Date: July 2023

LEGEND

BW	Spring Bronze Weatherstripping
CO	Concrete (existing opening)
DC	Door Closer
DL	Sliding Door Latch Lock (at top and bottom of inactive door leaf)
DH	Bronze Doorknob c/w Plate, Faceplate, Latch and Strike plate
EX	Existing (to remain)
GL	Glass Lites
H	Bronze Hinge
KP	Bronze Kickplate
ML	Mortise Lock
PT	Paint Finish
SJ	Stone Jamb (existing opening)
WD	Wood Solid Core
WC	Wired Door Contact

Door No.	Door						Frame			In Wall	Fire Rating	Glazing	Notes
	Width	Height	Thk	Mat'l	Fin.	Style	Mat'l	Fin.	Style				
101	965	2150	45	WD	PT	03/ A3.2	WD	PT	04/ A3.2	W1	-	GL In transom	Door scope includes frames, transom, casings, and trims.
100K	EX 2x780	EX 1900	EX 52	EX WD	ST	03/ A4.3	EX WD	ST	EX	EX/SJ	-	EX GL In side lites	Dimensions are approximate, confirm all dimensions on site. Door scope includes refinishing of frames, side lites, casings, and trims.

	GENERAL SCOPE OF WORK FOR HERITAGE WOOD DOOR 100K
1)	SAND SURFACES OF FRAME, JAMBS, CASINGS, ETC. DOWN TO SOUND & BARE SUBSTRATE, PATCH AND MAKE GOOD TO MATCH EXISTING AND REFINISH IN-SITU
2)	DOORS ARE TO BE REMOVED AND REFINISHED IN SHOP (AS PER NOTE 1)
3)	REMOVE ALL HARDWARE, CLEAN (INCLUDING REMOVAL OF PAINT), LUBRICATE AND RE-INSTALL WHERE HARDWARE IS TO BE RE-USED, OR INSTALL NEW WHERE PRESCRIBED BY SECTION 08710 (FINISH HARDWARE)
4)	DISCONNECT AND REMOVE WIRED DOOR CONTACTS, BUTTONS, SWITCHES, WIRING AND ASSOCIATED DEVICES TO ALLOW FOR RESTORATION WORK. RE-INSTALL AND TEST AT COMPLETION OF WORK
5)	REMOVE GLAZING VISION PANELS TO CARRY OUT RESTORATION AND REFINISHING OF WOOD SURFACES. RE-INSTALL AT THE COMPLETION OF THE WORK. REPLACE WOOD GLAZING STOPS WITH NEW TO MATCH EXISTING.
6)	PATCH AND MAKE GOOD ALL SURFACES BEFORE REFINISHING. FILL EXISTING SCREW HOLES (AT HINGES, PULLS, ETC.) AND TAP NEW TO ENSURE SCREWS ARE POSITIVELY FASTENED INTO SUBSTRATES
7)	REPLACE SPRING BRONZE WEATHERSTRIPPING INSTALLED AT FRAME JAMBS, HEAD AND AT U/S OF DOOR WITH NEW TO MATCH EXISTING (TYP.)
8)	REPLACE BRONZE KICKPLATE (TYP. 8" HIGH) W/NEW TO MATCH EXISTING
9)	FOLLOWING RE-FINISHING IN THE SHOP, RE-INSTALL DOORS AND ENSURE THESE ARE FREE TO OPERATE SMOOTHLY AND LATCH POSITIVELY. SHIM, PLANE OR OTHERWISE ADJUST SASHES, JAMBS, SILLS, AND HEAD SURFACES TO ENSURE FREE OPERATION
10)	REPLACE ALL SEALANTS AND CAULKING ENTIRELY
11)	REFER TO DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL LIST OF ACTIVITIES

DESIGNATED SUBSTANCE DATA

1.1 Refer to "Designated Substances in Building Materials Survey Report [DSSR] and Removal Procedures for the Designated Substances - CIRHR Accessible Ramp and Universal Washroom Project, 121 St George Street (Building #110)" and Woodsworth College (Building #38) report from, University of Toronto's Property Management, Dated March 26th, 2024 (32 pages).

1.2 It is understood that abatement of substances (as designed and identified in attached report) will be carried out by the University of Toronto under separate contract following contractor's mobilization for the ramp and universal washroom project. U of T's abatement contractor will need to coordinate all abatement activities with the GC as required.

1.3 This information given in this report was obtained for the use of the Owner in the execution of the design. It is presented in good faith to assist the Contractor and their subcontractors.

1.4 It is incumbent upon the Contractor to make whatever additional investigation and analysis they feel may be required for the proper execution of the Contract at no additional cost to the Owner.

End of Section 00310.

UNIVERSITY OF TORONTO

Property Management
255 McCaul Street, 4th Floor, Toronto, M5T 1W7
Telephone: (416) 978-2427 / Fax: (416) 978-3001

March 26, 2024

Attention: Mr. Mladen Pejic

Re: Designated Substances in Building Materials Survey Report [DSSR] and Removal Procedures for the Designated Substances
CIRHR Accessible Ramp and Universal Washroom Project
121 St. George Street (Building #110) and Woodsworth College (Building #038)

Dear Mr. Pejic:

Further to your request, F&S Hazardous Construction Materials Group (HCMG) is pleased to provide this final report summarizing observations made during a review of available reports, abatement records, bulk sampling records and current investigations/sampling for accessible designated substances in building materials for the above captioned project locations at 121 St. George Street Toronto M5S 2E8.

Ontario Regulation 490/09 - Designated Substances (O. Reg. 490/09), made under the Occupational Health and Safety Act outlines required steps to control exposure of workers to designated substances. Under O. Reg. 490/09 there are eleven (11) designated substances; acrylonitrile, arsenic, asbestos, benzene, coke oven emissions, ethylene oxide, isocyanates, lead, mercury, silica and vinyl chloride. This regulation applies to every employer and worker at a workplace where the designated substances are present, produced, processed, used, handled or stored and at which a worker is likely to be exposed to the designated substance. This assessment, issued for the above-mentioned project satisfies the Owner's requirements under Section 30 of the Ontario Occupational Health and Safety Act (OHSA), Revised Statues of Ontario 1990, as amended.

This report is an assessment of designated substances for the areas shown on the project drawings [current project locations] in specific and for remaining areas of the buildings in general.

In the event the General Contractor observes any suspect asbestos-containing material, which is not included in the sections below, the work shall be immediately stopped and the Project Manager be contacted for arranging further investigation and abatement.

Please Note: This report also details out:

1. **The scope for removal/disposal of designated substances for this project that will be done by the General Contractor.**
2. **The scope for removal/disposal of designated substances for this project that will be done by the University of Toronto Project Manager through their own forces.**

In the event the General Contractor observes any suspect asbestos-containing material, the work shall be immediately stopped and the Project Manager be contacted for arranging further assessment.

Quality control inspections for designated substances disturbance/removal will be performed by an external consultant and the University of Toronto staff throughout the project. Any contamination of surround areas indicated by visual inspection or air monitoring will require complete clean-up of the affected areas, by the General Contractor, without any extra cost to the University of Toronto.

The University of Toronto asbestos waste bin located on the south side of the central steam plant (17 Ursula Franklin Street, Toronto, ON M5S 2S2) can be used for disposing asbestos waste only.

OBSERVATIONS AND RECOMMENDATIONS

Based on a review of the available reports, bulk sampling records, abatement records and current investigations/sampling for accessible designated substances in building materials the following are our observations and recommendations:

ASBESTOS

For removal or disturbances of asbestos-containing materials, all procedures as defined in Ontario Regulation 278/05 and the University of Toronto Asbestos Management Program, available at https://ehs.utoronto.ca/resources/policies-and-procedures/ shall be followed. In case of conflict the more stringent procedures shall apply.

Removal of asbestos-containing materials must be conducted by a qualified abatement contractor and all appropriate procedures as detailed in this report and applicable regulations shall be followed.

Representative bulk samples of building materials suspected to contain asbestos were collected following the asbestos bulk sampling procedures prescribed in Code for the Determination of Asbestos by Bulk Samples, dated the 23rd of August 1985 and issued by the Ministry of Labour in O. Reg. 278/05. Any material that contains 0.5 per cent (%) or more asbestos by dry weight is considered to contain asbestos.

A total of Eighteen (18) bulk samples of suspect asbestos-containing building materials were collected during the current investigations. All bulk samples were submitted to EMC Scientific Inc. of Mississauga, Ontario, an independent analytical laboratory, for analysis of asbestos type and concentration by Polarized Light Microscopy (PLM) with dispersion staining.

The summary of sample results collected during current investigations is presented in Table 1 below. A copy of laboratory analytical report is attached at Appendix A.

Table 1 – Summary of Bulk Asbestos Samples Results

Sample #	Location	Material	Sample Results
110-090823-1A	Exterior Stair Wall	Sandstone Wall Mortar	None Detected
110-090823-1B	Exterior Stair Wall	Sandstone Wall Mortar	None Detected
110-090823-1C	Exterior Stair Wall	Sandstone Wall Mortar	None Detected
110-090823-2A	Main Entrance Door	Door Frame Caulking	Chrysotile 2%
110-090823-2B	Main Entrance Door	Door Frame Caulking	Not Analyzed
110-090823-2C	Main Entrance Door	Door Frame Caulking	Not Analyzed
110-090823-3A	Room 101	Door Frame Caulking	None Detected
110-090823-3B	Room 101A	Door Frame Caulking	None Detected
110-090823-3C	Room 101	Door Frame Caulking	None Detected
110-090823-4A	Room 101	Window Frame Caulking	Chrysotile 2%
110-090823-4B	Room 101A	Window Frame Caulking	Not Analyzed

Sample #	Location	Material	Sample Results
110-090823-4C	Room 101	Window Frame Caulking	Not Analyzed
110-090823-5A	Room 101	Drywall Joint Compound	None Detected
110-090823-5B	Room 101	Drywall Joint Compound	None Detected
110-090823-5C	Room 101A	Drywall Joint Compound	None Detected
110-160823-1A	Room B12	12"x12" White/pebbles Vinyl floor tile a) Tile b) Colorless mastic c) Grey cementitious	 None Detected None Detected None Detected
110-160823-1A	Room B12	12"x12" White/pebbles Vinyl floor tile a) Tile b) Colorless mastic	 None Detected None Detected
110-160823-1A	Room B12	12"x12" Black/pebbles Vinyl floor tile a) Tile b) Colorless mastic	 None Detected None Detected

Room 21, Woodsworth College (Building #038)

No asbestos-containing materials are present in Room 21 of the Woodsworth College. Please Note: The following building materials confirmed to contain asbestos are present in remaining areas of this building. These materials include vinyl flooring and lining material inside fire-rated doors.

Asbestos-containing materials that are currently hidden or are inaccessible may be present within the building. These materials include window/door caulking, window glazing putty, fire rated door liners, gaskets in piping systems, gaskets/internal liners in mechanical and electrical equipment, electrical wiring jacket, electrical panel backing, transite drainpipes, transite in HV cable trench and firestop materials.

121 St. George Street (Building #110)

The status of asbestos-containing materials within the current project locations at 121 St. George Street facility is provided below.

Window/Door Caulking

Non-friable asbestos-containing (Chrysotile) window caulking is present in Room 101 and 101A of the current project locations.

Non-friable asbestos-containing (Chrysotile) caulking is present on the main entrance doorframe.

Doorframe caulking in Room 101 and 101A does not contain asbestos.

Please refer to copy of laboratory analytical report attached at Appendix A.

All window and door caulking in other areas of the building shall be considered to contain asbestos, unless proven otherwise through abatement records and/ or sampling.

No removal or disturbance of asbestos-containing window/door caulking shall proceed without following appropriate asbestos procedures as listed below:

- Any window/Door restoration work shall proceed with caution considering the presence of asbestos in caulking material in addition to lead based paint.

- The University of Toronto Project Manager will schedule removal of asbestos-containing window/door caulking, required for the current project through own forces under a separate contract.

Drywall Joint Compound

Based on laboratory analytical results of this homogeneous material obtained during current investigations no asbestos-containing drywall joint compound is present within the current project locations. Please refer to copy of laboratory analytical results attached at Appendix A.

Gypsum board and drywall finishes in other areas of the building shall be considered to contain non-friable asbestos drywall joint compound applications, unless proven otherwise through confirmatory sampling or a review of available abatement/sampling records.

No removal or disturbance of asbestos-containing drywall joint compounds shall proceed without following appropriate asbestos procedures as listed below.

- The General Contractor and their sub-contractors shall follow the University of Toronto Standard Operating Procedure ID R2.05, attached at Appendix B for drilling holes in gypsum board or drywall finishes applied with asbestos-containing drywall joint compounds.
- In the event the current project scope of work requires making minor openings in gypsum board or drywall finishes applied with drywall joint compounds. The General Contractor and their subcontractors shall follow Type 1 asbestos abatement procedures [if one square meter or less area of gypsum board or drywall applied with drywall joint compound is to be removed]. The University of Toronto Standard Operating Procedure R1.00, attached at Appendix B, shall be followed including training and respirator fit test requirements. Removed drywall shall be disposed of as asbestos waste.
- In the event the current project scope of work requires removal of gypsum board or drywall finishes applied with asbestos-containing drywall joint compounds [if greater than one square meter of gypsum board or drywall area applied with drywall joint compound is to be removed]. The General Contractor shall identify/mark on site all such locations needed to be removed in order to achieve the requirements of the project. The University of Toronto Project Manager will schedule removal of identified materials through own forces under a separate contract.

Vinyl Floor Tiles/Flooring

Based on laboratory analytical results of homogeneous bulk samples obtained during current investigations and previous abatement records, no asbestos-containing flooring/mastic is present within the current project locations. Please refer to copy of laboratory analytical results attached at Appendix A.

Floor finishes in other areas of the building consist of both asbestos-containing and non-asbestos vinyl floor tiles. All vinyl floor tiles (non-friable) and adhesive mastic (non-friable) in areas of the building that are not part of current project shall be considered to contain asbestos, unless confirmed otherwise through abatement records and or sampling.

Asbestos-containing vinyl flooring tiles and mastic are suspected to be present under non-asbestos flooring (carpet, vinyl sheet flooring, wood and non-asbestos floor tiles, etc.).

No removal or disturbance of asbestos-containing vinyl flooring, adhesive mastic and backing paper shall proceed without following appropriate asbestos procedures.

- No asbestos-containing floor tiles and mastic are to be cut, drilled, ground or removed without following appropriate asbestos procedures.

- It is our understanding that the current project scope of work does not involve removal of any asbestos-containing flooring. However, if the scope changes, the General Contractor shall identify/mark on site all such materials needed to be removed in order to achieve the requirements of the project. The University of Toronto Project Manager will schedule removal of identified materials through own forces under a separate contract.
- Under the University of Toronto Asbestos Management Program, the design or work should not include installing rigid flooring over existing asbestos-containing vinyl floor tiles or sheeting.

Stair/Sandstone wall Mortar

No asbestos-containing sandstone wall mortar is present within the current project locations. Please refer to copy of laboratory analytical results attached at Appendix A.

Thermal Mechanical Insulation

Friable asbestos-containing (Chrysotile) thermal mechanical insulation is confirmed to be present on mechanical systems, including, but not limited to, heating and plumbing pipe, straights, valves, tees, elbows and fittings throughout the building.

Friable asbestos-containing thermal insulation may exist in presently inaccessible and hidden wall/ceiling/floor penetrations and cavities. Any insulating material discovered in such locations shall be assumed to contain asbestos unless proven otherwise through confirmatory sampling.

No removal or disturbance of asbestos-containing thermal mechanical insulation shall proceed without following appropriate asbestos procedures.

- It is our understanding that the current project scope of work does not involve removal of any asbestos-containing thermal mechanical insulation. However, if the scope changes, the General Contractor shall identify/mark on site all such materials needed to be removed in order to achieve the requirements of the project. The University of Toronto Project Manager will schedule removal of identified materials through own forces under a separate contract

Others

No other building materials suspected to contain asbestos were observed at accessible areas of the current project location.

Asbestos-containing materials for which either the sampling records are not available or that are currently hidden or are inaccessible may be present within the current project location and other areas of this building. These materials include:

• Gaskets in piping systems	• Firestop materials	• Electrical wiring jacket	• Gaskets/internal liners in mechanical and electrical equipment
• Electrical panel backing	• Transite in HV cable trench	• Fire rated door liners	

Investigation including sampling and analysis is recommended in the event of discovery of such materials for determination of presence/absence of asbestos. It is our understanding that the current project scope of work does not involve removal or disturbance of any the above materials from any area of this building. However, if the scope changes, the General Contractor shall identify/mark on site all such materials needed to be removed in order to achieve the requirements of the project. The University of Toronto Project Manager will schedule removal of identified asbestos-containing materials through own forces under a separate contract.

No removal or disturbance of asbestos-containing materials shall proceed without following appropriate asbestos procedures.

LEAD

Samples of paint finishes predominantly present within the current project locations at 121 St. George Street were collected during current investigation for determination of lead content. Paint samples were retrieved by scraping the paint down to the substrate to ensure collection of all layers of paint. All samples were submitted to an independent laboratory AGAT Laboratories of Mississauga, Ontario for determination of lead content.

A summary of sample results is presented in Table 2 below. Copies of laboratory analytical reports are attached at Appendix A.

Table 2 - Lead in Paint Sample Results Summary

Sample #	Location	Material	Test Results	Classification
110-080923-L1	Room 101	Cream Wall Paint	170000 µg/g	LCM
110-080923-L2	Room 101	Exterior Window Paint	38600 µg/g	LCM
110-080923-L3	Exterior Wall	Wall Mortar	42 µg/g	LLLP

LCM: Lead-Containing Material (≥0.1% or 1000 µg/g or 1000PPM Lead Content); LLLP: Low Level Lead Paint (<0.1% or 1000 µg/g or 1000PPM Lead Content).

Laboratory analytical results for lead content in paint finishes predominantly present on walls in Room 101, 101A and B12 identify the paint as Lead Containing Material (LCM ≥0.1% or 1000 µg/g or 1000PPM Lead Content).

Laboratory analytical results for lead content in paint finishes present on exterior windows in Room 101 and 101A identify the paint as Lead Containing Material (LCM ≥0.1% or 1000 µg/g or 1000PPM Lead Content).

Laboratory analytical results of exterior stair/sandstone wall mortar identify the mortar as low level lead-containing material [LLLM: (<0.1% or 1000 µg/g or 1000PPM Lead Content)].

All remaining paint finishes on structural components, windows, doors, floors, ceilings, piping systems, ductwork, mechanical equipment and all other surfaces within the current project locations at 121 St. George Street and the Woodsworth College including remaining areas of the buildings should be assumed to contain lead (≥0.1% or 1000 µg/g or 1000PPM Lead Content).

There is no regulatory limit currently in Ontario that determines what amount of lead in paint constitutes the paint to be considered "lead based paint". The Environmental Abatement Council of Canada (EACC) – Lead Guideline For Construction, Renovation, Maintenance or Repair (2014) recommends that a content of 0.1% (i.e. 1000 µg/g or 1000 mg/kg or 1000 ppm lead) is considered a "de minims" or "virtually safe" level of lead in paint or surface coatings, provided that aggressive disturbance or heating does not occur.

The above lead-based paint standards are the generally accepted threshold for defining a "lead-based paint". These levels are used as action levels where special precautions are typically implemented to contain debris created during construction or renovation activities and to protect workers from exposure during these activities.

The classification, general measures and procedures (or Type of operations) required for removal or disturbance of lead paint, lead painted materials and lead based materials shall depend on the type of

work to be conducted, the procedures adopted and the limit of lead in paint accepted by the General Contractor and their sub-contractors.

The General Contractor and their sub-contractors shall follow work procedures and training requirements as identified in Ontario Ministry of Labour, Immigration, Training and Skills Development Guidelines for Lead on Construction Projects, available at https://www.labour.gov.on.ca/english/hs/pubs/lead/ and the University of Toronto Standard Operating Procedures for the Control of Lead During Building Maintenance and Construction Activities, available at https://ehs.utoronto.ca/resources/policies-and-procedures/. In case of conflict the more stringent procedures shall apply.

Lead-containing wastes should be recycled if practicable or handled and disposed of according to Ontario Regulation 347.

Lead shall also prudently presumed to be present in the following materials:

- As a component of the solder on joints between copper pipe and fittings.
- As a component of the solder on the wire connections of electric components.
- As a component of wool present as caulking in bell fittings at cast iron drains.
- As a component of glazing on spectra glaze blocks and ceramic tiles.
- As a component of lead-acid batteries in emergency lights.
- As lead sheeting.
- As pigmented mortar.
- As lead piping.

MERCURY

Elemental mercury may be present in the electro-thermal switching devices and may be present in trace amount as vapours in metal halide bulbs, fluorescent light tubes and incandescent mercury bulbs in the interior of these buildings. It is recommended that at the time of their disposal, all mercury vapour bulbs may be recycled and possibly reused by qualified personnel or may be disposed of according to applicable regulations.

SILICA

Silica-containing materials are present within the current project locations and in other areas throughout the buildings. Crystalline silica is the primary component of many building materials such as concrete, concrete block, cement, mortar, drywall etc. Silica has also been found as a filler material in insulation. Exposure to airborne crystalline silica can occur when these building materials are disturbed or turned into powder (particularly grinding, drilling or cutting operations and during major demolition).

Work of disturbance/removal/drilling into silica-containing materials is included in the General Contractor's scope of work. For any work involving disturbance or removal of silica containing materials, the General Contractor and their subcontractors shall follow work procedures and training requirements in The Ontario Ministry of Labour Guideline "Silica on Construction Projects" available at https://www.labour.gov.on.ca/english/hs/pubs/silica/and The University of Toronto "Crystalline Silica Procedures" available at https://ehs.utoronto.ca/resources/policies-and-procedures/ . In case of conflict the more stringent procedures shall apply.

The classification, general measures and procedures (or Type of operations) required shall depend on the type of work to be conducted and the procedures adopted by the contractor. The following section outlines the classification of silica containing materials disturbance based on the guideline and procedures referred above.

Type 1 Operations

- Drilling of holes in concrete or rock that is not part of a tunneling operation or road construction.
- Any other operation at a project that requires the handling of silica-containing material in a way that may result in a worker being exposed to airborne silica.
- Entry into a dry mortar removal or abrasive blasting area while airborne dust is visible for less than 15 minutes for inspection and/or sampling.

Type 2 Operations

- Removal of silica containing refractory materials with a jackhammer.
- The drilling of holes in concrete or rock that is part of a tunneling or road construction.
- The use of a power tool to cut, grind, or polish concrete, masonry, terrazzo or refractory materials.
- The use of a power tool to remove silica containing materials.
- Tuckpoint and surface grinding.
- Dry mortar removal with an electric or pneumatic cutting device.
- Dry method dust cleanup from abrasive blasting operations.
- Entry into area where abrasive blasting is being carried out for more than 15 minutes.

Type 3 Operations

- Abrasive blasting with an abrasive that contains ≥1 per cent silica.
- Abrasive blasting of a material that contains ≥ 1 per cent silica.

BENZENE

Underground fuel storage tank was discovered in the exterior of the facility located at 121 St. George Street.

Benzene is a natural part of crude oil, and gasoline. Benzene, or Benzol, is a colorless liquid with a sweet or aromatic hydrocarbon odour. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities. Exposure to pure benzene within buildings other than where it is produced or used as part of a manufacturing process is unlikely. Breathing benzene can cause drowsiness, dizziness, and unconsciousness; long-term benzene exposure causes effects on the bone marrow and can cause anemia and leukemia.

Prior to removal, repair or decommissioning of the tank, the above ground storage tank and its contents (suspected to contain benzene as a fuel component) should be removed and disposed following all applicable Regulations and/or industry standards. The General Contractor and their sub-contractors shall review and follow all procedures specified in the report provided by EXP Services Inc. (provided with the tender).

OTHER DESIGNATED SUBSTANCES - Acrylonitrile, Arsenic, Coke Oven Emissions, Ethylene Oxide, Isocyanates and Vinyl Chloride

The buildings are not and were not used for any process or manufacturing, therefore none of the other Designated Substances listed above are suspected to be present.

NOTE: If additional materials not covered in this report are discovered during the project activities and suspected of containing designated substances, all work that may disturb the material shall be stopped

and an investigation (i.e., sampling and analysis) undertaken to determine the presence of any designated substances.

CONCLUSION

Based on the information contained in the available asbestos survey reports, abatement records, bulk sampling records and current investigation/sampling, designated substances (Asbestos, Lead, Mercury and Silica) are present in different building materials within the current project locations and other areas of the facility located at 121 St. George Street (Building #110).

No asbestos-containing materials are present in Room 21 of the Woodsworth College (Building #038). Other designated substances (Lead, mercury and Silica) are present in different building materials in Room 21 and other areas of the Woodsworth College (Building #038).

NOTE: If additional materials not covered in this report are discovered during the project activities and suspected of containing designated substances, all work that may disturb the material shall be stopped and the Project Manager be contacted for arranging further investigation (i.e., sampling and analysis) to determine the presence of any designated substances.

TRAINING

Any worker who may inadvertently come into contact with any asbestos-containing materials in the course of their work for the current project must have at a minimum Asbestos Awareness Training as outlined in the University of Toronto, Asbestos Management Program, available at https://ehs.utoronto.ca/resources/policies-and-procedures/.

Workers performing any asbestos work will require appropriate training, including respirator fit testing, as identified in Ontario Regulation 278/05 and the University of Toronto Asbestos Management Program, available at https://ehs.utoronto.ca/resources/policies-and-procedures/. In case of conflict the more stringent procedures shall apply.

Workers performing removal or disturbance of surfaces applied with lead based paint and lead-containing materials shall have appropriate training, including respirator fit testing, as identified in Ontario Ministry of Labour, Immigration, Training and Skills Development Guidelines for Lead on Construction Projects, available at https://www.labour.gov.on.ca/english/hs/pubs/lead/ and the University of Toronto Lead Management Program/Standard Operating Procedures for the Control of Lead During Building Maintenance and Construction Activities, available at https://ehs.utoronto.ca/resources/policies-and-procedures/ . In case of conflict the more stringent procedures shall apply.

Workers performing removal or disturbance of silica-containing materials shall have appropriate training, including respirator fit testing, as identified in Ontario Ministry of Labour Guideline "Silica on Construction Projects" available at https://www.labour.gov.on.ca/english/hs/pubs/silica/and The University of Toronto "Crystalline Silica Procedures" available at https://ehs.utoronto.ca/resources/policies-and-procedures/. In case of conflict the more stringent procedures shall apply.

Workers performing removal or disturbance of other hazardous materials shall require appropriate trainings as specified in the relevant regulations/guidelines.

Work will only be allowed once the training certificates of workers working inside asbestos enclosures are verified by the consultants and/or the University of Toronto designated staff.

Property Management
255 McCaul Street, 4th Floor, Toronto, M5T 1W7
Telephone: (416) 978-2427 / Fax: (416) 978-3001

CLOSURE

The conclusions presented in this report represent the best technical judgment based on the data obtained from the previous asbestos survey reports and survey of the planned renovation areas during this current investigation. The conclusions are based on the site conditions at the time the survey was performed at the specific testing and/or sampling locations and can only be extrapolated to an undefined limited area around these locations.

Information provided in this report is intended for the subject project in compliance to the requirements under Section 30 of the Ontario Occupational Health and Safety Act (OHSA), Revised Statues of Ontario 1990, as amended. Any use by a third party of this report or any reliance by a third party on or decisions made by a third party based on the findings described in this report, is the sole responsibility of such third parties. The University of Toronto F&S Hazardous Construction Materials Group accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted.

If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

Sincerely,

Prepared By:

Faiq Amir, C. Tech (Environmental)
Inspector
Hazardous Construction Materials Group
University of Toronto
F&S Property Management
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UNIVERSITY OF TORONTO

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APPENDIX A

Copy of Laboratory Analytical Results

emcscientific
INCORPORATED

Laboratory Analysis Report

To:

Faiq Amir
University of Toronto
Environmental Health & Safety
215 Huron Street, 7th Floor
Toronto, Ontario
M5S 1A1

EMC LAB REPORT NUMBER: A94718
Project Name:
Project No: 1134417
Analysis Method: Polarized Light Microscopy – EPA 600
Number of Samples: 15
Date Received: Aug 11/23 **Date Analyzed:** Aug 14/23 **Date Reported:** Aug 14/23
Analyst: Rahul Patel
Reviewed By: Malgorzata Sybydlo

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
110-090823-1A	A94718-1	Exterior stair wall/ sandstone wall mortar	Brown, cementitious material	**ND**			100
110-090823-1B	A94718-2	Exterior stair wall/ sandstone wall mortar	Brown, cementitious material	**ND**			100
110-090823-1C	A94718-3	Exterior stair wall/ sandstone wall mortar	Brown, cementitious material	**ND**			100
110-090823-2A	A94718-4	Main entrance door/ door frame caulking	Grey, caulking	**Chrysotile**	**2**	2	96
110-090823-2B	A94718-5	Main entrance door/ door frame caulking	NA	**NA**			
110-090823-2C	A94718-6	Main entrance door/ door frame caulking	NA	**NA**			
110-090823-3A	A94718-7	Room 101/ door frame caulking	Yellow, mastic	**ND**			100
110-090823-3B	A94718-8	Room 101/ door frame caulking	White, caulking	**ND**			100
110-090823-3C	A94718-9	Room 101A/ door frame caulking	White, joint compound	**ND**			100
110-090823-4A	A94718-10	Room 101/ window frame caulking	Grey and green, caulking	**Chrysotile**	**2**	2	96
110-090823-4B	A94718-11	Room 101/ window frame caulking	NA	**NA**			

emcscientific
INCORPORATED

Laboratory Analysis Report

EMC LAB REPORT NUMBER: A94718
Client's Job/Project No.: 1134417
Analyst: Rahul Patel

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
110-090823-4C	A94718-12	Room 101A/ window frame caulking	NA	**NA**			
110-090823-5A	A94718-13	Room 101/ drywall joint compound	White, joint compound	**ND**			100
110-090823-5B	A94718-14	Room 101/ drywall joint compound	White, joint compound	**ND**			100
110-090823-5C	A94718-15	Room 101A/ drywall joint compound	White, joint compound	**ND**			100

Note:
1. Bulk samples are analyzed using Polarized Light Microscopy (PLM) and dispersion staining techniques. The analytical procedures are in accordance with EPA 600/R-93/116 method.
2. The results are only related to the samples analyzed. **ND** = None Detected (no asbestos fibres were observed), **NA** = Not Analyzed (analysis stopped due to a previous positive result).
3. This report may not be reproduced, except in full without the written approval of EMC Scientific Inc. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
4. The Ontario Regulatory Threshold for asbestos is 0.5%. The limit of quantification (LOQ) is 0.5%.

A94718

UNIVERSITY OF TORONTO

REQUEST FOR ANALYSIS

Ship To: EMC Scientific Inc.
Sample Reception
5800 Ambler Drive, Suite 100, Mississauga, ON
L4W4J4 Ph: 905.629.9247 Fax: 905.629.2607

Shipped From:
Environmental Health & Safety, 7th Floor
215 Huron Street Toronto, Ontario M5S 1A1

Samples Collected By: Faiq Amir

Project, S.O. #: 1134417

Building Name: 121 St. George Street (110)

PLM Bulk xx
TEM Bulk
Bulk Mould
PCM Air
Other

Sample Number	Date Sampled	Sample Location	Sample Description	Analysis Turnaround Time	
				Regular	24 Hours
110-090823-1A	09-Aug-23	Exterior Stair Wall	Sandstone Wall Mortar		X
110-090823-1B	09-Aug-23	Exterior Stair Wall	Sandstone Wall Mortar		X
110-090823-1C	09-Aug-23	Exterior Stair Wall	Sandstone Wall Mortar		X
110-090823-2A	09-Aug-23	Main Entrance Door	Door Frame Caulking		X
110-090823-2B	09-Aug-23	Main Entrance Door	Door Frame Caulking		X
110-090823-2C	09-Aug-23	Main Entrance Door	Door Frame Caulking		X
110-090823-3A	09-Aug-23	Room 101	Door Frame Caulking		X
110-090823-3B	09-Aug-23	Room 101	Door Frame Caulking		X
110-090823-3C	09-Aug-23	Room 101A	Door Frame Caulking		X
110-090823-4A	09-Aug-23	Room 101	Window Frame Caulking		X
110-090823-4B	09-Aug-23	Room 101	Window Frame Caulking		X
110-090823-4C	09-Aug-23	Room 101A	Window Frame Caulking		X
110-090823-5A	09-Aug-23	Room 101	Drywall Joint Compound		X
110-090823-5B	09-Aug-23	Room 101	Drywall Joint Compound		X
110-090823-5C	09-Aug-23	Room 101A	Drywall Joint Compound		X

	Print Name	Signature	Date
Relinquished By:	Faiq Amir		August 09 2023
Received By:	Anny Bradford	Anny B	Aug 11 '23
Analyzed By:	RP	AN	Aug 11/23 1:55

Comments: Stop further analysis for each alpha numerical set once asbestos is identified by PLM method. e-mail results to:
yangting.shek@utoronto.ca
With CC to:
ehs.office@utoronto.ca
irfan.miraj@utoronto.ca
doug.colby@utoronto.ca
faiq.amir@utoronto.ca
on.khan@utoronto.ca

emcscientific
INCORPORATED

Laboratory Analysis Report

To:

Faiq Amir
University of Toronto
Environmental Health & Safety
215 Huron Street, 7th Floor
Toronto, Ontario
M5S 1A1

EMC LAB REPORT NUMBER: A94895
Project Name: 121 St George Street (110)
Project No: 1134417
Analysis Method: Polarized Light Microscopy – EPA 600
Number of Samples: 3
Date Received: Aug 17/23 **Date Analyzed:** Aug 18/23 **Date Reported:** Aug 18/23
Analyst: Rahul Patel
Reviewed By: Malgorzata Sybydlo

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
110-160823-1A	A94895-1	Room B12/ 12"x12" white/ pebbles vinyl floor tile with mastic	3 Phases: a) White, vinyl floor tile b) Colourless, mastic c) Grey, cementitious material	 **ND** **ND** **ND**		 1 	 100 99 100
110-160823-1B	A94895-2	Room B12/ 12"x12" white/ pebbles vinyl floor tile with mastic	2 Phases: a) White, vinyl floor tile b) Colourless, mastic	 **ND** **ND**		 1	 100 99
110-160823-1C	A94895-3	Room B12/ 12"x12" black/ pebbles vinyl floor tile with mastic	2 Phases: a) Black, vinyl floor tile b) Colourless, mastic	 **ND** **ND**		 1	 100 99

Note:
1. Bulk samples are analyzed using Polarized Light Microscopy (PLM) and dispersion staining techniques. The analytical procedures are in accordance with EPA 600/R-93/116 method.
2. The results are only related to the samples analyzed. **ND** = None Detected (no asbestos fibres were observed), **NA** = Not Analyzed (analysis stopped due to a previous positive result).
3. This report may not be reproduced, except in full without the written approval of EMC Scientific Inc. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
4. The Ontario Regulatory Threshold for asbestos is 0.5%. The limit of quantification (LOQ) is 0.5%.
5. Vinyl floor tiles may contain very fine asbestos fibres which the PLM method cannot detect. TEM analysis may be necessary to confirm the absence of asbestos.

A94895

UNIVERSITY OF TORONTO

REQUEST FOR ANALYSIS

Ship To: EMC Scientific Inc.
Sample Reception
5800 Ambler Drive, Suite 100, Mississauga, ON
L4W4J4 Ph: 905.629.9247 Fax: 905.629.2607

Shipped From:
Environmental Health & Safety, 7th Floor
215 Huron Street Toronto, Ontario M5S 1A1

Samples Collected By: Faiq Amir

Project, S.O. #: 1134417

Building Name: 121 St. George Street (110)

PLM Bulk	xx
TEM Bulk	
Bulk Mould	
PCM Air	
Other	

Sample Number	Date Sampled	Sample Location	Sample Description	Analysis Turnaround Time	
				Regular	24 Hours
110-160823-1A	16-Aug-23	Room B12	12"X12" White/pebbles Vinyl floor tile with mastic		X
110-160823-1B	16-Aug-23	Room B12	12"X12" White/pebbles Vinyl floor tile with mastic		X
110-160823-1C	16-Aug-23	Room B12	12"X12" Black/pebbles Vinyl floor tile with mastic		X

Relinquished By:	Faiq Amir (Print Name)	[signature] (Signature)	August 16 2023 (Date)
Received By:	Amy Bradford (Print Name)	Amy B (Signature)	Aug 17 '23 (Date)
Analyzed By:	RP (Print Name)	Rahul TBK Aug 23 (Signature) AH	Aug 17/23 225 (Date)

Comments: Stop further analysis for each alpha numerical set once asbestos is identified by PLM method. e-mail results to:
yangting.shek@utoronto.ca
With CC to:
ehs.office@utoronto.ca
irfan.miraj@utoronto.ca
doug.colby@utoronto.ca
faiq.amir@utoronto.ca
on.khan@utoronto.ca

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: UNIVERSITY OF TORONTO
255 MCCAUL ST 4TH FLOOR
TORONTO, ON M5T1W7
(416) 946-0101

ATTENTION TO: Irfan Miraj

PROJECT:

AGAT WORK ORDER: 23T056921

OCCUPATIONAL HYGIENE REVIEWED BY: Nivine Basily, Inorganics Report Writer

DATE REPORTED: Aug 18, 2023

PAGES (INCLUDING COVER): 6

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
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- *The test results reported herewith relate only to the samples as received by the laboratory.*
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- *All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.*
- *For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.*

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 23T056921

PROJECT:

CLIENT NAME: UNIVERSITY OF TORONTO

ATTENTION TO: Irfan Miraj

SAMPLING SITE:

SAMPLED BY:

Lead in Paint

DATE RECEIVED: 2023-08-11

DATE REPORTED: 2023-08-18

SAMPLE DESCRIPTION:				**110-090823-L1**	**110-090823-L2**
SAMPLE TYPE:				**Paint**	**Paint**
DATE SAMPLED:				**2023-08-09**	**2023-08-09**
Parameter	**Unit**	**G / S**	**RDL**	**5207053**	**5207058**
Lead	µg/g		10	170000	38600

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 23T056921

PROJECT:

CLIENT NAME: UNIVERSITY OF TORONTO

ATTENTION TO: Irfan Miraj

SAMPLING SITE:

SAMPLED BY:

Lead in solid

DATE RECEIVED: 2023-08-11

DATE REPORTED: 2023-08-18

		SAMPLE DESCRIPTION:		110-090823-L3
		SAMPLE TYPE:		Solid
		DATE SAMPLED:		2023-08-09
Parameter	Unit	G / S	RDL	5207059
Lead	µg/g		10	42

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5207059 As this analysis was performed on a sample matrix which is outside of the scope of our test method it is deemed non-routine and therefore, no information is available for Accuracy, Precision or Measurement Uncertainty.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

AGAT Laboratories
5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: UNIVERSITY OF TORONTO

AGAT WORK ORDER: 23T056921

PROJECT:

ATTENTION TO: Irfan Miraj

SAMPLING SITE:

SAMPLED BY:

Occupational Hygiene Analysis

RPT Date: Aug 18, 2023			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Lead in Paint															
Lead	5215927		171000	196000	13.6%	< 10	95%	80%	120%	106%	80%	120%	NA	70%	130%
Comments: Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated.															
Lead in solid															
Lead	5215927		171000	196000	13.8%	< 10	95%	80%	120%	106%	80%	120%	NA	70%	130%

Certified By:

AGAT Laboratories

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MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Method Summary

CLIENT NAME: UNIVERSITY OF TORONTO

AGAT WORK ORDER: 23T056921

PROJECT:

ATTENTION TO: Irfan Miraj

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Occupational Hygiene Analysis			
Lead	MET-93-6106	EPA SW 846 3050B & 6010C	ICP/OES

AGAT Laboratories

5835 Coopers Avenue
Mississauga, Ontario
L4Z 1Y2
www.agatlabs.com · webearth.agatlabs.com

Chain of Custody Record

Ph.: 905.712.5100 · Fax: 905.712.5122 · Toll Free: 800.856.6261

Laboratory Use Only

Arrival Temperature: N/A
AGAT WO #: 23T056921
Lab Temperature:
Notes: bag

Client Information:

Company: UNIVERSITY OF TORONTO 42535-07
Contact: Irfan Miraj
Address: 255 McCaul Street, Level 4
Toronto ON M5T1W7
Phone: 416-946-0101 Fax: 416-978-6650
Project: PO:
AGAT Quotation #: 775960

Please note, if quotation number is not provided, client will be billed full price for analysis.

Regulatory Requirements:

☐ Regulation 153/03 (reg. 511 Amend.)
Table ____ *Indicate one*
☐ Ind/Com
☐ Res/Park
☐ Agriculture
Soil Texture *(check one)*
☐ Coarse ☐ Fine

☐ Sewer Use
Region ____ *Indicate one*
☐ Sanitary
☐ Storm

☐ Regulation 558
☐ CCME
☐ Other *(specify)*
☐ Prov. Water Quality Objectives (PWQO)
☐ None

Turnaround Time Required (TAT) Required*

Regular TAT
☑ 5 to 7 Working Days

Rush TAT (please provide prior notification)
Rush Surcharges Apply
☐ 3 Working Days
☐ 2 Working Days
☐ 1 Working Day

OR
Date Required (Rush surcharges may apply):

*TAT is exclusive of weekends and statutory holidays

Invoice To:

Same: Yes ☑ No ☐
Company:
Contact:
Address:

Is this a drinking water sample? (potable water intended for human consumption) ☐ Yes ☐ No
If "Yes", please use the *Drinking Water Chain of Custody Form*

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Legend Matrix

GW Ground Water **O** Oil
SW Surface Water **P** Paint
SD Sediment **S** Soil

Report Information – reports to be sent to:

1. Name: SO#
Email: irfan.miraj@utoronto.ca, yangting.shek@utoronto.ca,
2. ~~Name:~~ doug.colby@utoronto.ca, faiq.amir@utoronto.ca, on.khan@utoronto.c
Email: ehs.office@utoronto.ca

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/Sample Information	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: ☐ B-HWS ☐ Cl- ☐ CN- ☐ EC ☐ FOC ☐ Cr+6- ☐ SAR ☐ NO_3/NO_2 ☐ N- Total ☐ Hg ☐ pH	Nutients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3/NO_3	VOC: ☐ VOC ☐ THM ☐ BTEX	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	TCLP:	Sewer Use	LEAD IN PAINT	LEAD IN MORTAR	LEAD IN CERAMIC TILE
110-090823-L1	09-Aug--23			Room 101	Cream Wall Paint																	X	
110-090823-L2	09-Aug--23			Room 101	Exterior Window Paint																	X	
110-090823-L3	09-Aug--23				Exterior wall Mortar																		X

Samples Relinquished by (print name & sign):	Date/Time	Samples Received by (Print name & sign):	Date/Time
Faiq Amir	August 09 2023	Amy Bradford	Aug 11 '23
Amy Bradford	Aug 11 '23	T K	2pm

Pink Copy – Client
Yellow + Golden Copy – AGAT
White Copy – AGAT

UNIVERSITY OF TORONTO

Property Management
255 McCaul Street, 4th Floor, Toronto, M5T 1W7
Telephone: (416) 978-2427 / Fax: (416) 978-3001

APPENDIX B

University of Toronto Standard Operating Procedure ID R1.00 and R2.05

Office of Environmental Health and Safety
UNIVERSITY OF TORONTO

Standard Operating Procedures
for the Control of Asbestos Fibres
During Type 1 Operations

ID R1.00

NON-FRIABLE ASBESTOS DISTURBANCE

The exposure of workers and the corresponding measures and procedures for the minor disturbance of asbestos in non-friable products are classified as Type 1.

When authorized workers conduct Type 1 activities involving the disturbance of asbestos in non-friable products, specific precautions are required in order to maintain a safe work environment for the workers and other building occupants.

The procedures follow the requirements outlined in the *Regulation Respecting Asbestos on Construction Projects and in Buildings and Repair Operations* (O.Reg. 278/05) under the Occupational Health and Safety Act of Ontario, and the transport and delivery of asbestos waste in accordance with Regulation 347 under the Environmental Protection Act.

1.0 APPLICATION

1.1 These procedures apply to all work involving activities which do not generate appreciable amounts of airborne asbestos, and generally present minimal hazard to workers or bystanders.

1.2 These operations include but are not limited to:

1.2.1 Installation or removal of intact non-friable asbestos containing products.

1.2.2 Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos materials if the material is wetted to control dust, and the work is done using non-powered hand-held tools.

1.2.3 Removing less than one square metre of drywall in which asbestos joint filling compounds were used.

1.2.4 Removal of asbestos cement products that can be removed intact or in sections (e.g. transite ceiling tiles and wall boards). This was formally SOP R1.40 and has been merged into this procedure since the same procedures apply.

1.3 This procedure does NOT apply to the installation or removal of asbestos-containing ceiling or floor tiles.

1.4 This procedure does NOT apply to the sanding of non-asbestos materials used for repair of drywall or other non-asbestos materials where there is no disturbance of underlying non-friable asbestos materials. As there is no asbestos disturbance, this is considered a non-asbestos activity.

2.0 DEFINITIONS

2.1 *Damp-Wiping:* A cleaning process for removing residual asbestos contamination using damp-cloths, sponges or mops.

2.2 *Work Areas:* Where actual work activity involving asbestos takes place.

3.0 MATERIALS AND EQUIPMENT

3.1 *HEPA Vacuum:* Vacuum cleaner equipped with a High Efficiency Particulate Arresting (HEPA) Filter, fitted with appropriate tools. The vacuum equipment shall have a filtering system capable of collecting and retaining fibres greater than 0.3 microns in diameter at 99.97% efficiency.

3.2 *Dropsheet:* Rip-proof polyethylene plastic or other suitable material that is impervious to asbestos.

3.3 *Amended Water:* A mixture of water and a non-ionic, non-sudsing surfactant added to reduce water tension to allow thorough wetting of asbestos fibres.

3.4 *Sprayer:* Sprayer with mist nozzle for application of amended water or sealant.

3.5 *Asbestos Waste Receptacles:* Containers for waste must be dust tight, suitable for the type of waste, impervious to asbestos and identified as asbestos waste. All waste must have two layers of containment (e.g. double bagging) and be sealed and cleaned with a damp cloth or HEPA vacuum immediately before being removed from the work area. Also, it must be labelled as per the Ontario Ministry of Environmental regulation, and shall be acceptable to the disposal site selected and the Ministry of the Environment.

3.6 *Small Tools:* Sponge(s), bucket(s), ladder, etc.

3.7 *Tape:* Reinforced duct tape or double-sided tape suitable for sealing polyethylene bags.

3.8 *Respirator:* Respirators are optional. See section 4.2

3.9 *Coveralls:* Full body disposable clothing of an appropriate size with attached hood. It should be elasticized at the cuffs and hood, and be made of material which does not readily retain or permit penetration of asbestos fibres.

3.10 *Shoe covers:* Elasticized disposable shoe covers with textured bottom for better grip. Shoe covers should be made of material which does not readily retain or permit penetration of asbestos fibres.

4.0 PERSONAL PROTECTION

4.1 While not mandatory, workers are strongly advised to wear respirators.

4.2 If a worker requests a respirator; the following shall apply:

4.2.1 All respiratory equipment shall be individually assigned and identified.

4.2.2 Each worker must attend respiratory protection training and be fit tested prior to beginning work.

4.2.3 Workers shall wear at least a half facepiece respirator fitted with purple HEPA (P100) filters.

4.2.4 Disposable single-use type respirators are not permitted.

4.2.5 All respirators shall be approved and labelled for protection against asbestos fibres, and shall meet the design and usage requirements of the National Institute for Occupational Safety & Health (NIOSH).

4.2.6 Replace filter cartridges as appropriate (36 hours of use or more frequently).

4.3 While not mandatory, workers are strongly advised to wear disposable coveralls:

4.4 A worker who is provided with protective clothing shall, before leaving the work area:

4.4.1 Decontaminate his or her protective clothing and footwear by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing,

4.4.2 If the protective clothing will not be reused, place it in an asbestos waste receptacle.

4.5 Facilities for washing hands and face must be provided and shall be used by every worker when leaving asbestos work areas.

4.6 Smoking, eating, drinking or chewing in asbestos work areas is prohibited.

5.0 PREPARATION - WORK AREAS

5.1 While posting signs for a Type 1 operation is not a legislative requirement, signage is useful for preventing others from approaching the work area.

5.2 When people are still in the area where work is to be done the Type I “Minor Asbestos Work Description” (last page of this SOP) should be filled out and distributed to anyone likely to be near the work being carried out.

5.3 Before beginning work, remove any visible dust from the work area or the surfaces of bound asbestos products by HEPA vacuuming or damp wiping.

5.4 Before beginning work, wherever practicable, cover floor and anything below the work with polyethylene drop-sheets to catch debris.

6.0 EXECUTION

6.1 Use only hand-held non-powered tools. Do not use compressed air.

6.2 Wet (with amended water) any asbestos-containing material that may be disturbed during this work. Maintain wet conditions throughout work. Do not use excess water which will drip off the material.

6.3 Start disturbing/removing/cut/drill, etc. with non-powered hand tools.

6.4 If using a hand drill and you encounter other, harder materials beneath the drywall and you are required to use a power drill, use the hand drill to drill the hole larger than the drill bit of the power drill so that the drill bit does not make contact with the drywall when drilling the material underneath. Before using power tool, damp wipe the surface to remove any drywall debris and per above, wet with area with amended water. Where possible, use non-powered hand tools for the entire task.

6.5 Immediately place non-friable asbestos waste into an asbestos waste receptacle. Double bag all waste as described in Section 7.0. HEPA vacuum and damp-wipe the second container/bag before removing waste receptacles from the work area.

6.6 Remove dust and waste from the workplace frequently during the work. Dust removal must be by HEPA vacuuming, damp mopping or wet sweeping. Waste removal should follow the procedures found in section 7.

6.7 On completion of work, clean all surfaces, tools, equipment, and work shoes by HEPA vacuuming or by damp wiping. Drop-sheets and used cleaning cloths must be wetted and disposed of as asbestos waste.

7.0 WASTE TRANSPORT AND DISPOSAL

7.1 Place asbestos waste into asbestos waste receptacles. Asbestos waste must be double-bagged, or double-contained, in receptacles that are clearly marked as containing asbestos. The bags or containers shall be selected to prevent any perforations or tears during filling, transport and disposal. The bags are usually rip-proof polyethylene bags sealed with duct tape. The outer bags must be HEPA vacuumed or damp wiped to remove any surface contamination immediately before being removed from the work area.

7.2 *For the St. George campus, transport the sealed containers to the locked, labelled dump-container that is maintained by Facilities and Services. The key for the locked dump-container can be obtained from the Materials Expeditor (Trade Services Tool Crib). Place the asbestos waste bags in the dump container and relock the dump-container. For the appropriate disposal procedures at the Mississauga and Scarborough campuses, consult with the Director of the University department that initiated the work.

7.3 Drywall containing asbestos drywall joint compound must be disposed of asbestos waste.

Appendix A: Minor Asbestos Work description (Type 1)

Date: _____ Start time: _____ Stop time (approx.):_____

Building: _____

Brief Work Description: _____

Supervisor of work party: _____

Name of Contractor or Trade: _____

Property or Project Manager: _____

Please note that workers that work on a daily basis with asbestos may be wearing respiratory protection and protective coveralls when working in an area where U of T employees, students or Faculty are present in their normal work clothes. This personal protective equipment (PPE) is optional for this kind of work under the asbestos regulations, but may be requested by the asbestos worker if desired. Asbestos workers wear this PPE because they are closer to the work being carried out, and are thus exposed at a much higher level than bystanders. In addition they are exposed to asbestos on a daily basis, and may wish to ensure that their total exposure is as low as possible. U of T employees in the area are not exposed on a daily basis, and thus are not subjected to the same level of risk. Please see the section on non-occupational exposure for more details.

ASBESTOS WORK

University employees as well as contractors are sometimes required to conduct work that involves the disturbance of asbestos-containing materials. Such work activities are strictly regulated. They are first categorized into three types of work operations - **Type 1 (low risk – the type covered by this form)**, Type 2 (moderate risk) or Type 3 (high risk). For each of these, the Asbestos Management Program designates corresponding standard operating procedures to prevent the exposure to airborne asbestos. These procedures include strict requirements for preparation of the work area, use of personal protective equipment, use of proper work practices to reduce the spread of asbestos fibres, personal hygiene practices, and asbestos waste handling.

NON-OCCUPATIONAL EXPOSURE

Asbestos-specific diseases are almost always a result of occupational exposure to asbestos. Non-occupational exposures resulting in disease have only been seen in spouses or other family members living with an asbestos worker, or those who have lived in the neighbourhood of asbestos plants.

Asbestos fibres are naturally occurring and result in a natural background present in our environment. This combined with the widespread use of asbestos in products such as truck brake linings, means that we are all exposed to very small amounts of asbestos in our daily lives. It is not this very low level of exposure that results in asbestos disease but the higher levels of occupational exposure that are of concern to most authorities. Studies have not shown any evidence of asbestos-specific diseases in individuals who breathe asbestos in the outdoor air or who inhale asbestos as occupants of asbestos-containing buildings. Regardless, proper measures for preventing or minimizing exposure to asbestos must always be in place.

If you have any questions about the work being conducted, then please contact the Property Manager or Project Manager listed above.

Office of Environmental Health and Safety
UNIVERSITY OF TORONTO

Standard Operating Procedures
for the Control of Asbestos Fibres
During Type 2 Operations

ID R2.05

DRILLING OF HOLES IN WALL WITH ASBESTOS JOINT DRYWALL COMPOUND WITH A HEPA FILTERED POWER TOOL

The exposure of workers and the corresponding measures and procedures for the minor disturbance of friable asbestos are classified as Type 2.

When authorized workers conduct Type 2 activities involving the minor disturbance of friable asbestos, specific precautions are required in order to maintain a safe work environment for the workers and other building occupants.

The procedures follow the requirements outlined in the *Regulation Respecting Asbestos on Construction Projects and in Buildings and Repair Operations* (O.Reg. 278/05) under the Occupational Health and Safety Act of Ontario, and the transport and delivery of asbestos waste in accordance with Regulation 347 under the Environmental Protection Act.

1.0 APPLICATION

1.1 These procedures apply to the drilling of holes in walls that contain asbestos drywall joint compound. Asbestos drywall joint compound is a non-friable asbestos-containing material.

1.2 Where possible, the use of hand tools to drill in drywall with asbestos drywall joint compound should be encouraged. The use of hand tools (instead of power tools) combined with the wetting down of materials will result in less airborne fibres and Type 1 procedures can be followed. See procedure R1.00 Non-Friable Asbestos Disturbance.

1.3 The procedures follow the methods in Ontario Ministry of Labour, Regulations Respecting Asbestos on Construction Projects and in Buildings and Repair Operations (Ontario Reg. 278/05) and the transport and delivery of asbestos waste in accordance with Regulation 347 under the Environmental Protection Act.

2.0 DEFINITIONS

2.1 *Work Areas:* Where actual work activity involving non-friable asbestos takes place.

2.2 *Damp Wiping:* A cleaning process for removing residual asbestos contamination using damp-cloths, sponges or mops.

3.0 MATERIALS AND EQUIPMENT

3.1 *HEPA Vacuum*: Vacuum cleaner equipped with High Efficiency Particulate Arresting (HEPA) Filter, fitted with appropriate tools. The vacuum equipment shall have a filtering system capable of collecting and retaining fibres greater than 0.3 microns in diameter at 99.97% efficiency.

3.2 *HEPA Filtered Tool*: A tool that has been manufactured specifically for the intended purpose and equipped with a filtering system that meets the same definition for filter efficiency above.

3.3 *Drop-sheet:* Rip-proof polyethylene plastic or other suitable material that is impervious to asbestos.

3.4 *Amended Water:* A mixture of water and a non-ionic, non-sudsing surfactant added to reduce water tension to allow thorough wetting of asbestos fibres.

3.5 *Sprayer:* Sprayer with mist nozzle for application of amended water or sealant.

3.6 *Asbestos Waste Receptacles:* Containers for waste must be dust tight, suitable for the type of waste, impervious to asbestos and identified as asbestos waste. All waste must have two layers of containment (e.g. double bagging) and be sealed and cleaned with a damp cloth or HEPA vacuum immediately before being removed from the work area. Also, it must be labelled as per the Ontario Ministry of Environmental regulation, and shall be acceptable to the disposal site selected and the Ministry of the Environment.

3.7 *Small Tools:* Sponge(s), metal bristle brush(es), bucket(s), ladder(s), heavy duty scraper(s), etc.

3.8 *Tape:* Reinforced duct tape or double-sided tape suitable for sealing polyethylene to all surfaces to be covered.

3.9 *Respirator:* See section 5 Personal Protective Equipment.

3.10 *Coveralls:* Full body disposable clothing of an appropriate size with attached hood and elasticized at cuffs and hood, made of material which does not readily retain or permit penetration of asbestos fibres.

3.11 Shoe covers: Elasticized disposable shoe covers with textured bottom for better grip. Shoe covers should be made of material which does not readily retain or permit penetration of asbestos fibres.

3.12 *Signage:* Warning of asbestos hazard in the work area:

DANGER

ASBESTOS

CANCER AND LUNG DISEASE HAZARD

AUTHORIZED PERSONNEL ONLY

RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA

4.0 NOTICE OF ASBESTOS WORK

Appropriate parties, including local-area occupants and when necessary other building users, must be notified of planned Type 2 activities. Where this work is part of a larger construction project, follow communications protocols for projects which are more broad and may include notifications to a large group of building occupants and relevant directors in Facilities Management (UTM and UTSc), Facilities Services (St. George) and EHS.

4.1 The notification is to include a description of the planned Type 2 activity, its proposed duration, and in general terms the precautionary measures required to maintain a safe work environment. This information is to be provided to the following:

4.1.1 Local area occupants (see Appendix I – The notification template in Appendix I can be handed to the occupants during emergency repairs, etc. or as part of an email communication when scheduling the work with the occupants. An email template version is available from EHS.).

4.1.2 Where appropriate, Manager, Hazardous Construction Materials Group (St. George only)

4.2 Signage at Work Location

4.2.1 This sign informs building users of the asbestos-related work being conducted at that work location and that entry into the area is restricted to authorized personnel only. Signs are to be posted in the work area in sufficient numbers to warn of the hazard.

5.0 PERSONAL PROTECTION

5.1 *Respirators:* Workers are required to don respirators when performing Type 2 work. The following shall apply:

5.1.1 All respiratory equipment shall be individually assigned and identified.

5.1.2 Each worker must be instructed and fit tested with his/her respirator.

5.1.3 Workers shall wear at least a half-face piece air-purifying respirator fitted with HEPA (P100) filters (material wetted). If the material cannot be wetted, a full face air-purifying respirator is required.

5.1.4 Disposable single-use type respirators are not permitted.

5.1.5 All respirators shall be approved and labelled for protection against asbestos fibres, and shall meet the design and usage requirements of the National Institute for Occupational Safety & Health (NIOSH).

5.1.6 Replace filter cartridges as appropriate (36 hours of use or more frequently). Dispose of used cartridges as asbestos waste.

5.1.7 No supervisor or worker shall have facial hair which affects respirator-to-face seal.

5.2 *Protective Clothing:* All workers must be provided with full body disposable protective clothing (coveralls), extra large size with attached hood and elasticized at the cuffs and hood, made of material which does not readily retain nor permit penetration of asbestos fibres.

5.3 *Facilities:* Provide facilities for washing hands and face which shall be used by every worker when leaving asbestos work areas.

5.4 *Practice:* Workers shall not eat, drink, smoke or chew while in contaminated work areas.

5.5 *Work Area Entry:* All persons shall don respirators with HEPA (P100) filters and clean coveralls before entering work area.

5.6 *Work Area Exit:* Before leaving the Work Area and still wearing a respirator, a worker shall:-

5.6.1 Thoroughly HEPA vacuum protective clothing, respirator and footwear.

5.6.2 Remove decontaminated coveralls and wash hands and face with water (in Work Area).

5.6.3 Leave the Work Area in street clothes and proceed to the nearest washroom to wash hands and face.

5.6.4 Coveralls may be reused throughout a day provided they are disposed of after each shift, or left inside the Work Area after each use.

6.0 PREPARATION - WORK AREAS

6.1 Do not use compressed air.

6.2 Clear immediate work areas of all moveable furnishings or equipment.

6.3 Erect tape barriers to keep all non-protected personnel at least 20 feet away. Post signs warning of asbestos hazard at tape barrier (see Signage in Section 3).

6.4 An enclosure is not necessary for this activity. As appropriate, a drop-sheet below the work is required; extend the drop-sheet at least 3 feet beyond line of work. Use rip-proof polyethylene if work is above rough concrete or other surface that could tear polyethylene.

6.5 Seal and tape all ventilation openings close to the work area with polyethylene plastic sheeting. No ventilation shutdown is required.

6.6 Post signs warning of asbestos hazard at the entrances to the work area

6.7 Don respiratory equipment and coveralls as described above.

7.0 EXECUTION

7.1 Do not use compressed air.

7.2 Wet (with amended water) any asbestos-containing material in the vicinity.

7.3 Remove any visible dust from the work area or the surfaces of asbestos products by HEPA vacuuming or damp wiping.

7.4 Drill using a power tool physically attached to HEPA dust collection following manufacturer's instructions. Alternatively, use the power drill with the Bitbuddie Dust Shroud attachment and connect to a HEPA vacuum to collect dust. The alternative Bitbuddie method should only be used on asbestos drywall joint compound is within 0.5-5% dry weight per sampling results.

7.5 With the HEPA filtration operating, begin the drilling process by positioning the operating drill bit at the proposed drilling location and carefully applying gentle force on the drill while the drill bit **slowly** produces a **"clear- cut"** hole in the wall; remove the tool about 5 seconds after the hole is drilled.

7.6 Repeat steps above for each additional proposed drilling location.

7.7 At completion of work, HEPA vacuum or wet wipe the drop-sheet, any other surfaces below the work area, tools and equipment.

7.8 Any polyethylene, tape and cleaning cloths are to be wetted and shall be carefully rolled together and bagged as asbestos waste. Coveralls shall be disposed of as contaminated waste.

8.0 WASTE TRANSPORT AND DISPOSAL

8.1 Place asbestos waste into asbestos waste receptacles. Asbestos waste must be double-bagged, or double-contained, in receptacles that are clearly marked as containing asbestos. The bags or containers shall be selected to prevent any perforations or tears during filling, transport and disposal. The bags are usually rip-proof polyethylene bags sealed with duct tape. The outer bags must be HEPA vacuumed or damp wiped to remove any surface contamination immediately before being removed from the work area.

8.2 *For the St. George campus, transport the sealed containers to the locked, labelled dump-container that is maintained by Facilities and Services. The key for the locked dump-container can be obtained from the Materials Expeditor (Trade Services Tool Crib). Place the asbestos waste bags in the dump container and relock the dump-container. For the appropriate disposal procedures at the Mississauga and Scarborough campuses, consult with the Director of the University department that initiated the work.

8.3 Drywall containing asbestos drywall joint compound must be disposed of asbestos waste.

Appendix I

Notification of Type 2 Asbestos Work for SOP 2.05 Drilling of Holes in Wall with Asbestos Drywall Joint Compound with a HEPA Filtered Power Tool (no ventilation shutdown required).

*****Please forward to all applicable occupants in or near the affected room(s).*****

Date: _____ Start time: _____ Stop time (approx.):_____

Building: _____ Room: _____

Brief Work Description: _____

Name of Contractor or Trade: _____ Phone number: _____

Property or Project Manager: _____ Phone number: _____

Please note that workers that work on a daily basis with asbestos may be wearing respiratory protection and protective coveralls when working in an area where U of T employees, students or Faculty are present in their normal work clothes. Asbestos workers wear this PPE because they are closer to the work being carried out, and are thus exposed at a much higher level than bystanders. In addition, they perform asbestos work on a routine, and may wish to ensure that their total exposure is as low as possible. U of T employees in the area are not exposed on a daily basis, and thus are not subjected to the same level of risk. Please see the section on non-occupational exposure for more details.

ASBESTOS WORK

University employees as well as contractors are sometimes required to conduct work that involves the disturbance of asbestos-containing materials. Such work activities are strictly regulated. They are first categorized into three types of work operations - Type 1 (low risk), Type 2 (moderate risk) or Type 3 (high risk). For each of these, the Asbestos Management Program designates corresponding standard operating procedures to prevent the exposure to airborne asbestos. These procedures include strict requirements for preparation of the work area, use of personal protective equipment, use of proper work practices to reduce the spread of asbestos fibres, personal hygiene practices, and asbestos waste handling.

NON-OCCUPATIONAL EXPOSURE*:*

Asbestos-specific diseases are almost always a result of occupational exposure to asbestos. Non-occupational exposures resulting in disease have only been seen in spouses or other family members living with an asbestos worker, or those who have lived in the neighbourhood of asbestos plants. Asbestos fibres are naturally occurring and result in a natural background present in our environment. This combined with the widespread use of asbestos in products such as truck brake linings, means that we are all exposed to very small amounts of asbestos in our daily lives. It is not this very low level of exposure that results in asbestos disease but the higher levels of occupational exposure that are of concern to most authorities. Studies have not shown any evidence of asbestos-specific diseases in individuals who breathe asbestos in the outdoor air or who inhale asbestos as occupants of asbestos-containing buildings. Regardless, proper measures for preventing or minimizing exposure to asbestos must always be in place.

If you have any questions about the work being conducted, then please contact the Property Manager or Project Manager listed above.

1.1 Refer to attached Geotechnical Investigation report from EXP Services Inc. dated July 6, 2023 (28 pages).

1.2 This information given in this report was obtained for the use of the Owner, by the Owner, in the execution of the design. It is presented in good faith to assist the Contractor and their subcontractors.

1.3 Any information pertaining to soils, and borehole logs are furnished as a matter of general information only and borehole descriptions of logs are not to be interpreted as descriptive of conditions at locations other than those described by the boreholes themselves.

1.4 It is incumbent upon the Contractor to make whatever additional soils investigation they feel may be required for the proper execution of the Contract at no additional cost to the Owner.

1.5 Examine the conditions on the site, present site conditions.

End of Section 00320.

EXP Services Inc.

1595 Clark Boulevard
Brampton, Ontario
L6T 4V1

Telephone: (905) 793-9800
Facsimile: (905) 793-0641

Reference: BRM-23006811-A0 **July 6, 2023**

University of Toronto
University Planning, Design & Construction
255 McCaul Street, 4th Floor
Toronto, Ontario
M5T 1W7

Attn: Mr. Mladen Pejic **Email: mladen.pejic@utoronto.ca**

Re: Geotechnical Investigation For Proposed Accessible Ramp
121 St George Street, Toronto, Ontario

Dear Mr. Pejic,

Introduction

This letter report presents the results of a geotechnical investigation completed by EXP Services Inc. (EXP) for a proposed accessibility ramp on the west side of the on-site building located at 121 St. George Street in Toronto, Ontario.

The finish floor level of the on-site building is ~ 115.04 m and the exterior grade at the west side is ~113.5m. The proposed ramp will rise from the west side of the on-site building and connect to the building finish floor level. The grade difference is about 1.5 m.

The existing onsite building is 2.5 storey brick building with a partial basement level.

Procedure

The fieldwork for this investigation was carried out on June 13 and June 14, 2023. Two (2) boreholes (BH1 and BH2) and one test pit (TP1) were advanced at the approximate locations shown on the attached Borehole Location Plan (Drawing No. 1).

Boreholes were advanced to depths about 6.7 to 9.8 m below the existing ground surface, using a portable drill rig (Geoprobe) adapted for soil sampling purposes owned and operated by a specialist drilling contractor. The soil samples were recovered with conventional split spoon equipment using the standard penetration test (SPT) method. One monitoring well was installed in BH2 for establishing groundwater elevation at the site.

The fieldwork was supervised throughout by EXP personnel who directed the drilling and sampling operations, logged the borings, made groundwater observations during and upon completion of drilling, processed the recovered samples and prepared the borehole logs. All recovered split spoon samples were transported to our laboratory for detailed examination. Laboratory testing included selective moisture content and unit weight determinations on recovered soil samples.

Ground surface elevations at the borehole locations were taken from a topographical plan - Part of Park Lot 14, Concession 1, from the Bay- York and Lots 20 to 24, both inclusive, Parts of Lots 25, 26 and 27, Registered Plan 101-E, prepared by Speight, Van Nostrand & Gibson Limited, dated October 6, 2009.

Subsurface Conditions

The detailed soil profiles encountered in the two boreholes BH1 and BH2 are indicated on the attached borehole logs along with the results of moisture content and unit weight determinations. It should be noted that the soil boundaries indicated on the borehole logs are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect approximate transition zones for the purpose of geotechnical design and should not be interpreted as exact planes of geological change.

The "Notes on Sample Description" preceding the borehole logs form an integral part of and should be read in conjunction with this report.

The following is a brief description of the soil conditions encountered during the investigation:

Topsoil

Approximate 100 mm thick layer of topsoil was encountered at both borehole locations.

Fill

Fill was encountered below the topsoil layer in both boreholes. The upper portion of the fill generally comprised of a mixture of topsoil with sandy silt which is black to dark brown in colour. The lower portion of the fill comprised of silty fine sand which is brown to orange-brown in colour. The fill extends to depths of about 1.8 m below existing ground surface (El. ~111.74 m).

Silty Sand

A native deposit of silty sand was encountered below the fill in both boreholes. This deposit is brown to grey in colour and contains some wet seams. Moisture contents of the clayey silt till ranged from about 18 to 20 percent of their dry mass. With recorded SPT ‘N’-values of 12 and 13, the silty sand can be described as being in a compact state. The silty sand extends to depths of about 2.3 m below existing ground surface (El. ~111.2 m).

Silty Clay to Clayey Silt

A grey silty clay to clayey silt deposit was encountered below the silty sand in both boreholes. Moisture contents of the silty clay to clayey silt ranged from about 21 to 30 percent of their dry mass. With recorded SPT 'N'-values of 8 to 23, the silty clay to clayey silt has a stiff to very stiff consistency. Both boreholes were terminated in the silty clay to clayey silt deposit at a depth of 6.7 to 9.8 m below grade.

Groundwater Conditions

Groundwater conditions were assessed by taking readings in open holes during the course of the fieldwork and in monitoring well installed in BH2. Short-term observations are recorded on the attached borehole logs. Groundwater was encountered at a depth of about 3.0 m below existing grade at the time of borehole drilling in Borehole BH1. After an elapsed time of 9 days, groundwater level was measured in the monitoring well installed in Borehole BH2 at a depth of 3.5 m below existing grade (El. ~110 m).

Foundation Considerations:

The proposed ramp area will be located adjacent to the west exterior building wall. Based on subsurface information two foundation options are presented below to provide support to the proposed accessible ramp:

Conventional Spread Footings: The proposed ramp structure can be founded on the native compact silty sand or underlying cohesive stiff silty clay to clayey silt deposit below ~1.8 m depth (El. ~111.7 m). The recommended bearing value at this level is 100 kPa at SLS (150 kPa at ULS).

OR

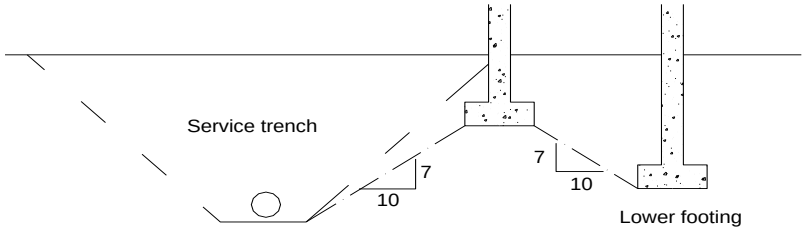
Helical Pile Foundation: The proposed ramp structure can be supported on helical piers founded in the native very stiff silty clay to clayey silt deposit. The helical pier is a proprietary foundation system installed by applying torque to a steel shaft with helix anchors and rotate it into the soil to the requires depth. Installation of the helical piles generally require no removal of soil and can be installed using portable hydraulic equipment resulting in less disturbance to the ground.

The helical pile foundation should be designed and installed by a specialist contractor. In the absence of any data having helical piers founded in similar soils, a static load test is recommended to verify the design capacity. The test should be carried out prior to the production pier installation.

The helical pier installation and load tests should be monitored by EXP on full time basis.

Footings/ Helical piles at different elevations should be located such that higher footing is set below a line drawn up at 10 Horizontal to 7 Vertical from the near edge of the lower footing/caisson.

This concept should also be applied to excavations for new foundations in relation to existing footings or underground services.



FOOTINGS NEAR SERVICE TRENCHES OR AT DIFFERENT ELEVATIONS

The total and differential settlements of the well designed and constructed footings/ helical piles places in accordance with the above recommendation are expected to be less than 25 mm and 20 mm, respectively.

Testpit findings:

In accordance with the scope of work, one (1) exterior test pit, designated as TP1, was advanced to obtain information for the existing footing of the on-site building in the area close to the proposed ramp. TP1 was completed on June 14, 2023 utilizing a rubber track mini-excavator operated by a contractor retained by EXP.

The test pit was positioned along the west exterior wall, on the south side of the main entrance. East wall of the test pit revealed that the exterior brick wall continues to the top of the stone footing at ~ 1.0m below the existing grade (~Elevation 112.7 m). The stone footing appeared to have a single layer of stone ~115 mm thick with projection of 175 mm from the face of brick wall. The founding material was noted to be a compact brown silty fine sand to sandy silt.

Along the north wall of the testpit (under the entrance steps), the same stone footing was revealed at same level as along east wall of the test pit at ~ 1.0m below existing grade (~Elevation 112.7 m). However, the projection of the stone footing along the north wall found in the testpit was wider and measured to be ~360 mm from the face of wall along the entrance steps.

At this location, we also encountered one metal pipe (~50 mm dia.) buried at a depth of about 1.2 m below existing grade. This buried metal pipe runs in an east-west direction, about 0.7 m away from the face of wall along the entrance steps.

Environmental Considerations

As part of the scope of work, selected soil samples were submitted for analytical testing to get indication about the soil quality to determine disposal options for excess soil (if any generated during construction of the proposed ramp).

Two (2) soil samples were submitted to an analytical laboratory, accredited by the Canadian Association for Laboratory Accreditation (CALA) and analyzed for selected Metals and Inorganic Parameters as well as petroleum marker parameters Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) and Petroleum Hydrocarbon Compounds (PHC).

Sample location data is shown below and Certificates of Analyses for the tested samples are attached in Appendix A for your reference.

Borehole / Sample No.	Depth (m)	Material / Soil Type	Test Performed
BH1 SS3	1.5 – 2.1	Silty sand	Metals and inorganic parameters, BTEX and PHCs
BH2 SS6	3.8 – 4.4	Silty clay to clayey silt	Metals and inorganic parameters BTEX and PHCs

For disposal purposes, analytical test results were compared with following Standards:

Table 1 Full Depth Background Site Condition Standards for residential / parkland / institutional / industrial / commercial / community (RPIICC) property use from Ontario Regulation 153/04 supporting document “Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act”, dated April 15, 2011 and Ontario Regulation 406/19 supporting document “Rules for Soil Management and Excess Soil Quality Standards”, dated 2020, hereinafter referred to as the “Excess Soil Quality Standards (ESQS)” ***(Table 1)***

With exception of elevated level of SAR in sample BH1 SS3, analytical test results of both soil samples were found to have met the selected Table 1 Standards. Elevated level of SAR in sample BH1 SS3 is likely associated with application of de-icing salt on the adjacent walkway during winter times and in insolation would not pose significant concern.

Closure

We trust the content of this letter is satisfactory for your purposes. If you have further questions, please do not hesitate to contact our office.

Yours truly
EXP Services Inc.

Stephen S. M. Cheng
Digitally signed by Stephen S. M. Cheng
Date: 2023.07.06 12:16:34 -04'00'

Aamna Arora, P. Eng.
Project Manager, Earth & Environmental

Stephen S. M. Cheng, P. Eng.
Discipline Manager, Geotechnical Division

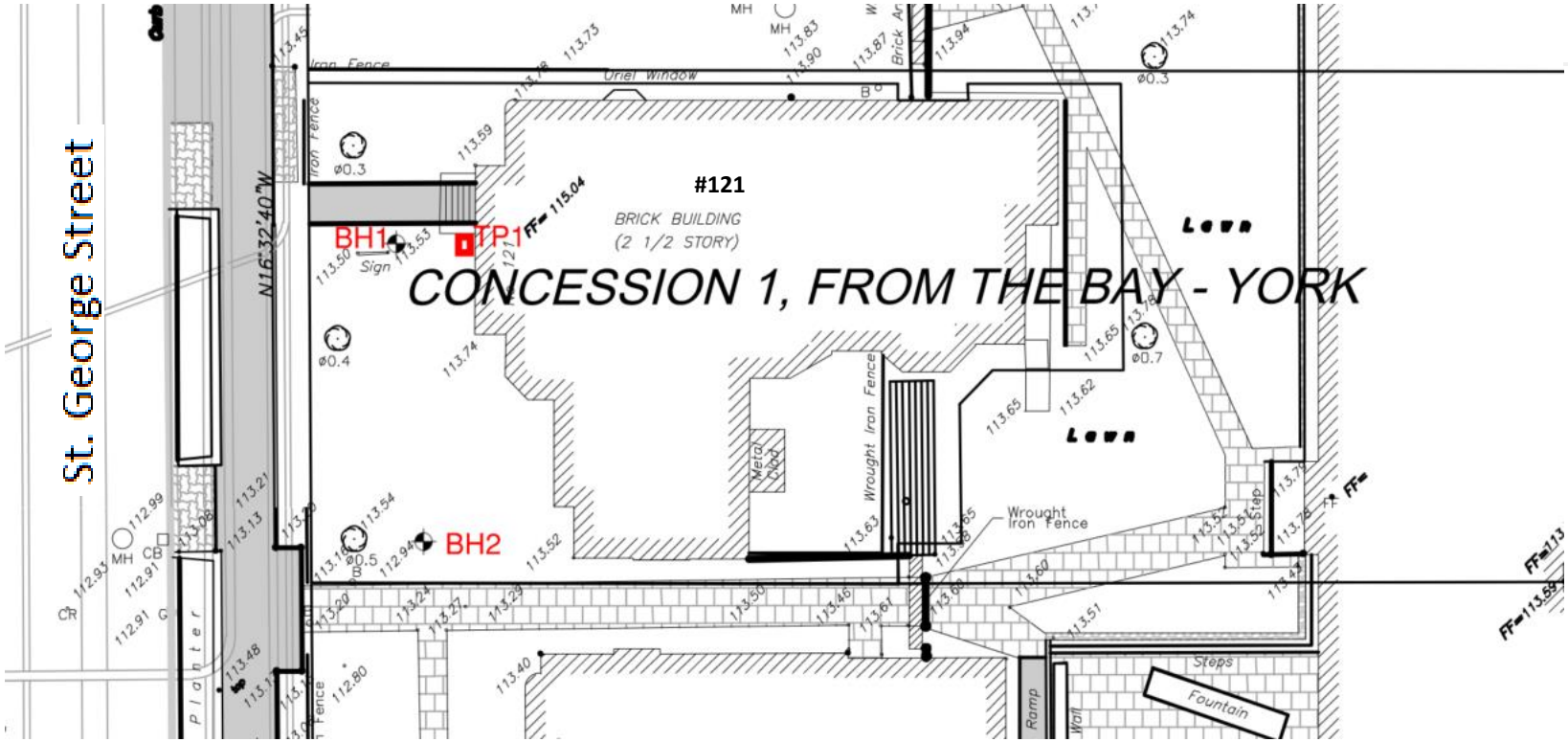
Drawing No. 1: Borehole /Testpit Location Plan

Drawing No. 2 and 3: Borehole Logs

Appendix A: Certificate of Analysis

Appendix B: Photographs taken during Test Pit Excavation

AA/aa/E:\BRM\BRM-23006811-A0\50 Input\1- Report\Letter Report- Testpit Investigation- Innis College.docx



LEGEND:

Approx. Borehole Location

Scale (m)

0 20

EXP Services Inc.
1595 Clark Boulevard
Brampton, Ontario
L6T 4V1
Telephone: (905) 793-9800
Fax: (905) 793-0641

SCALE: As shown		**Borehole/Test Pit Location Plan** Geotechnical Investigation Proposed Accessible Ramp 121 St George Street, Toronto, Ontario	
DATE: June 2023			
DWN.:AA	**CHKD.:**	**PROJECT NO.:** BRM-23006811-A0	**DRAWING NO.: 1**

Log of Borehole BH1

Project No. BRM-23006811-A0 Drawing No. 2

Project: Geotechnical Investigation- Proposed Accessible Ramp Sheet No. 1 of 1

Location: 121 St. George Street, Toronto, Ontario

Date Drilled: June 13, 2023

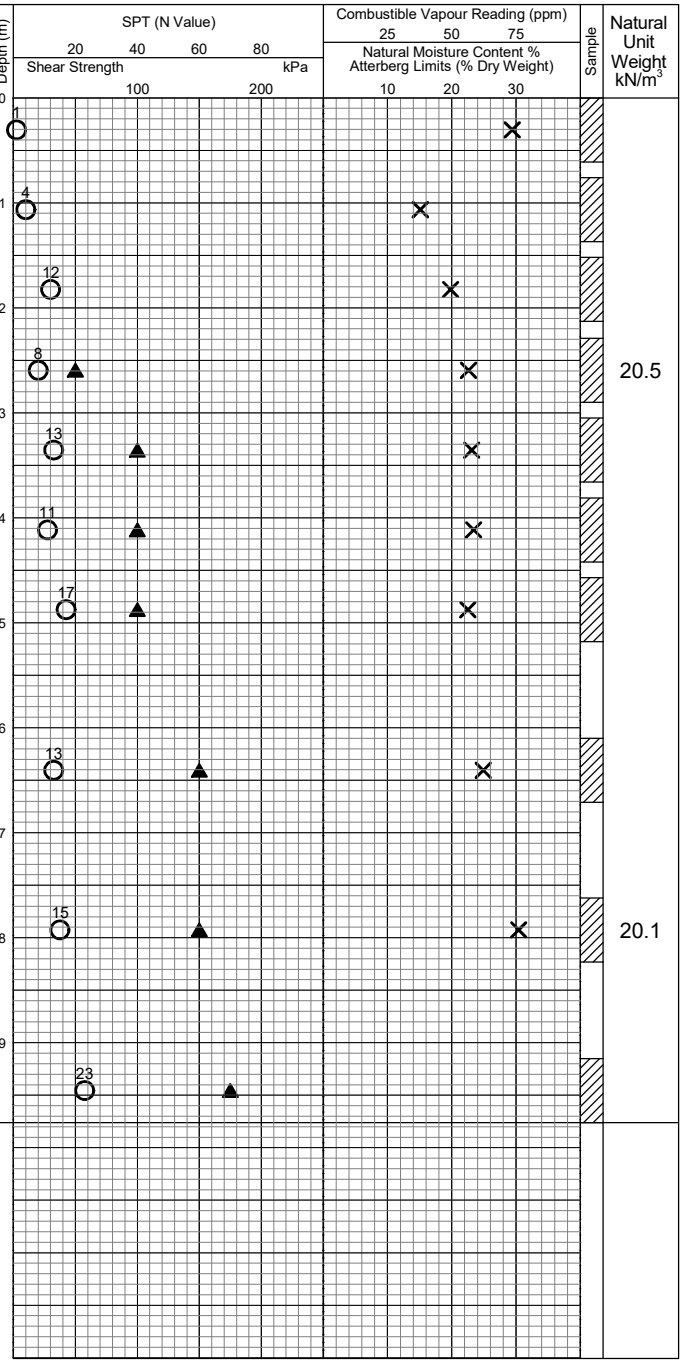
Drill Type: GeoProbe- Augers and split spoon

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

Soil Description	ELEV. m
~100 mm Topsoil over **FILL:** topsoil mixed with sandy silt, black to dark brown, organics, moist	113.53
Sand- silty fine, light brown to orange in colour	
SILTY SAND: fine, brown to grey, wet seams, very moist	~111.7
SILTY CLAY TO CLAYEY SILT : grey, moist, wet seams, stiff to very stiff	~111.2
END OF BOREHOLE	~103.8



Notes:
1. Borehole advanced to completion at ~9.8 m depth by conventional soil sampling methods using a specialist drilling subcontractor. For borehole definitions, see notes prior to logs.
2. This drawing forms part of and must be read in conjunction with the subject report (Ref. No.: BRM-23006811-A0); borehole data requires interpretation assistance by exp professional staff before use by others.

exp.
Brampton

Elapsed Time	Water Level (m)	Hole Open to (m)
On completion	3.0	

LAGWGL02EXP BOREHOLE LOGS.GPJ NEW.GDT 6/29/23

Log of Borehole BH2

Project No. BRM-23006811-A0 | Drawing No. 3

Project: Geotechnical Investigation- Proposed Accessible Ramp | Sheet No. 1 of 1

Location: 121 St. George Street, Toronto, Ontario

Date Drilled: June 13, 2023

Drill Type: GeoProbe- Augers and split spoon

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

Soil Description	ELEV. m	Depth (m)	Natural Unit Weight kN/m³
~100 mm Topsoil over **FILL:** topsoil mixed with sandy silt, black to dark brown, organics, moist	113.53	0	
Sand- silty fine, light brown to orange in colour		1	
SILTY SAND: fine, brown to grey, wet seams, very moist	~111.7	2	
SILTY CLAY TO CLAYEY SILT : grey, moist, wet seams, stiff to very stiff	~111.2	3	20.9
	110.02	4	
-becoming very stiff below ~4.5 m depth	~109.0	5	20.1
		6	
END OF BOREHOLE	~106.8		

SPT (N Value): 20 40 60 80 — Shear Strength: 100 200 kPa

Combustible Vapour Reading (ppm): 25 50 75 — Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SPT values: 2, 10, 13, 15, 15, 15, 19, 21

Notes:
1. Borehole advanced to completion at ~6.7 m depth by conventional soil sampling methods using a specialist drilling subcontractor. For borehole definitions, see notes prior to logs.
2. This drawing forms part of and must be read in conjunction with the subject report (Ref. No.: BRM-23006811-A0); borehole data requires interpretation assistance by exp professional staff before use by others.

exp. Brampton

Elapsed Time	Water Level (m)	Hole Open to (m)
On completion	Dry	
June 22, 2023	3.51	

LAGWGL02EXP BOREHOLE LOGS.GPJ NEW.GDT 6/29/23

Appendix A: Certificate of Analysis

Your P.O. #: BRM-GEO
Your Project #: BRM-23006811-A0
Site Location: 121 ST GEORGE ST., TORONTO
Your C.O.C. #: n/a

Attention: Aamna Arora

exp Services Inc
Brampton Branch
1595 Clark Blvd
Brampton, ON
CANADA L6T 4V1

Report Date: 2023/06/28
Report #: R7692676
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3I3640
Received: 2023/06/22, 14:52

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Hot Water Extractable Boron	2	2023/06/24	2023/06/27	CAM SOP-00408	R153 Ana. Prot. 2011
Free (WAD) Cyanide	2	2023/06/25	2023/06/26	CAM SOP-00457	OMOE E3015 m
Conductivity	2	2023/06/26	2023/06/26	CAM SOP-00414	OMOE E3530 v1 m
Hexavalent Chromium in Soil by IC (1)	2	2023/06/24	2023/06/27	CAM SOP-00436	EPA 3060A/7199 m
Petroleum Hydro. CCME F1 & BTEX in Soil (2)	2	N/A	2023/06/26	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Soil (3)	2	2023/06/23	2023/06/24	CAM SOP-00316	CCME CWS m
Acid Extractable Metals by ICPMS	2	2023/06/24	2023/06/26	CAM SOP-00447	EPA 6020B m
Moisture	2	N/A	2023/06/23	CAM SOP-00445	Carter 2nd ed 51.2 m
pH CaCl2 EXTRACT	1	2023/06/24	2023/06/24	CAM SOP-00413	EPA 9045 D m
pH CaCl2 EXTRACT	1	2023/06/26	2023/06/26	CAM SOP-00413	EPA 9045 D m
Sodium Adsorption Ratio (SAR)	2	N/A	2023/06/28	CAM SOP-00102	EPA 6010C

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Your P.O. #: BRM-GEO
Your Project #: BRM-23006811-A0
Site Location: 121 ST GEORGE ST., TORONTO
Your C.O.C. #: n/a

Attention: Aamna Arora

exp Services Inc
Brampton Branch
1595 Clark Blvd
Brampton, ON
CANADA L6T 4V1

Report Date: 2023/06/28
Report #: R7692676
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3I3640

Received: 2023/06/22, 14:52

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Soils are reported on a dry weight basis unless otherwise specified.

(2) No lab extraction date is given for F1BTEX & VOC samples that are field preserved with methanol. Extraction date is the date sampled unless otherwise stated.

(3) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following “Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003”. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Patricia Legette, Project Manager
Email: Patricia.Legette@bureauveritas.com
Phone# (905)817-5799

==========

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Bureau Veritas Job #: C3I3640
Report Date: 2023/06/28

exp Services Inc
Client Project #: BRM-23006811-A0
Site Location: 121 ST GEORGE ST., TORONTO
Your P.O. #: BRM-GEO
Sampler Initials: VS

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID		WEN177		WEN178		
Sampling Date		2023/06/13		2023/06/13		
COC Number		n/a		n/a		
	UNITS	**BH1 SS3**	**QC Batch**	**BH2 SS6**	**RDL**	**QC Batch**
Calculated Parameters						
Sodium Adsorption Ratio	N/A	5.4	8746674	0.45		8746674
Inorganics						
Conductivity	mS/cm	0.35	8751621	0.28	0.002	8751621
Available (CaCl2) pH	pH	7.84	8752010	7.83		8750395
WAD Cyanide (Free)	ug/g	<0.01	8751462	<0.01	0.01	8751462
Chromium (VI)	ug/g	<0.18	8750594	<0.18	0.18	8750594
Metals						
Hot Water Ext. Boron (B)	ug/g	<0.050	8750963	0.15	0.050	8750963
Acid Extractable Antimony (Sb)	ug/g	<0.20	8750607	<0.20	0.20	8750607
Acid Extractable Arsenic (As)	ug/g	1.7	8750607	2.3	1.0	8750607
Acid Extractable Barium (Ba)	ug/g	6.1	8750607	110	0.50	8750607
Acid Extractable Beryllium (Be)	ug/g	<0.20	8750607	0.57	0.20	8750607
Acid Extractable Boron (B)	ug/g	<5.0	8750607	8.3	5.0	8750607
Acid Extractable Cadmium (Cd)	ug/g	<0.10	8750607	<0.10	0.10	8750607
Acid Extractable Chromium (Cr)	ug/g	4.0	8750607	26	1.0	8750607
Acid Extractable Cobalt (Co)	ug/g	1.4	8750607	9.8	0.10	8750607
Acid Extractable Copper (Cu)	ug/g	7.8	8750607	23	0.50	8750607
Acid Extractable Lead (Pb)	ug/g	1.5	8750607	8.7	1.0	8750607
Acid Extractable Molybdenum (Mo)	ug/g	<0.50	8750607	<0.50	0.50	8750607
Acid Extractable Nickel (Ni)	ug/g	3.2	8750607	22	0.50	8750607
Acid Extractable Selenium (Se)	ug/g	<0.50	8750607	<0.50	0.50	8750607
Acid Extractable Silver (Ag)	ug/g	<0.20	8750607	<0.20	0.20	8750607
Acid Extractable Thallium (Tl)	ug/g	<0.050	8750607	0.15	0.050	8750607
Acid Extractable Uranium (U)	ug/g	0.22	8750607	0.69	0.050	8750607
Acid Extractable Vanadium (V)	ug/g	8.3	8750607	34	5.0	8750607
Acid Extractable Zinc (Zn)	ug/g	6.9	8750607	53	5.0	8750607
Acid Extractable Mercury (Hg)	ug/g	<0.050	8750607	<0.050	0.050	8750607

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Bureau Veritas Job #: C3I3640
Report Date: 2023/06/28

exp Services Inc
Client Project #: BRM-23006811-A0
Site Location: 121 ST GEORGE ST., TORONTO
Your P.O. #: BRM-GEO
Sampler Initials: VS

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

Bureau Veritas ID		WEN177	WEN178		
Sampling Date		2023/06/13	2023/06/13		
COC Number		n/a	n/a		
	UNITS	**BH1 SS3**	**BH2 SS6**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons					
Benzene	ug/g	<0.020	<0.020	0.020	8751690
Toluene	ug/g	<0.020	<0.020	0.020	8751690
Ethylbenzene	ug/g	<0.020	<0.020	0.020	8751690
o-Xylene	ug/g	<0.020	<0.020	0.020	8751690
p+m-Xylene	ug/g	<0.040	<0.040	0.040	8751690
Total Xylenes	ug/g	<0.040	<0.040	0.040	8751690
F1 (C6-C10)	ug/g	<10	<10	10	8751690
F1 (C6-C10) - BTEX	ug/g	<10	<10	10	8751690
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	10	8749043
F3 (C16-C34 Hydrocarbons)	ug/g	<50	<50	50	8749043
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	50	8749043
Reached Baseline at C50	ug/g	Yes	Yes		8749043
Surrogate Recovery (%)					
1,4-Difluorobenzene	%	100	101		8751690
4-Bromofluorobenzene	%	100	99		8751690
D10-o-Xylene	%	94	105		8751690
D4-1,2-Dichloroethane	%	96	96		8751690
o-Terphenyl	%	93	94		8749043

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Bureau Veritas Job #: C3I3640
Report Date: 2023/06/28

exp Services Inc
Client Project #: BRM-23006811-A0
Site Location: 121 ST GEORGE ST., TORONTO
Your P.O. #: BRM-GEO
Sampler Initials: VS

RESULTS OF ANALYSES OF SOIL

Bureau Veritas ID		WEN177		WEN178		
Sampling Date		2023/06/13		2023/06/13		
COC Number		n/a		n/a		
	UNITS	**BH1 SS3**	**QC Batch**	**BH2 SS6**	**RDL**	**QC Batch**
Inorganics						
Moisture	%	17	8749383	19	1.0	8749554

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Bureau Veritas Job #: C3I3640
Report Date: 2023/06/28

exp Services Inc
Client Project #: BRM-23006811-A0
Site Location: 121 ST GEORGE ST., TORONTO
Your P.O. #: BRM-GEO
Sampler Initials: VS

TEST SUMMARY

Bureau Veritas ID: WEN177
Sample ID: BH1 SS3
Matrix: Soil

Collected: 2023/06/13
Shipped:
Received: 2023/06/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	8750963	2023/06/24	2023/06/27	Gagandeep Rai
Free (WAD) Cyanide	TECH	8751462	2023/06/25	2023/06/26	Prgya Panchal
Conductivity	AT	8751621	2023/06/26	2023/06/26	Gurparteek KAUR
Hexavalent Chromium in Soil by IC	IC/SPEC	8750594	2023/06/24	2023/06/27	Surleen Kaur Romana
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	8751690	N/A	2023/06/26	Ravinder Gaidhu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	8749043	2023/06/23	2023/06/24	Dennis Ngondu
Acid Extractable Metals by ICPMS	ICP/MS	8750607	2023/06/24	2023/06/26	Daniel Teclu
Moisture	BAL	8749383	N/A	2023/06/23	Muhammad Chhaidan
pH CaCl2 EXTRACT	AT	8752010	2023/06/26	2023/06/26	Surinder Rai
Sodium Adsorption Ratio (SAR)	CALC/MET	8746674	N/A	2023/06/28	Automated Statchk

Bureau Veritas ID: WEN178
Sample ID: BH2 SS6
Matrix: Soil

Collected: 2023/06/13
Shipped:
Received: 2023/06/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	8750963	2023/06/24	2023/06/27	Gagandeep Rai
Free (WAD) Cyanide	TECH	8751462	2023/06/25	2023/06/26	Prgya Panchal
Conductivity	AT	8751621	2023/06/26	2023/06/26	Gurparteek KAUR
Hexavalent Chromium in Soil by IC	IC/SPEC	8750594	2023/06/24	2023/06/27	Surleen Kaur Romana
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	8751690	N/A	2023/06/26	Ravinder Gaidhu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	8749043	2023/06/23	2023/06/24	Dennis Ngondu
Acid Extractable Metals by ICPMS	ICP/MS	8750607	2023/06/24	2023/06/26	Daniel Teclu
Moisture	BAL	8749554	N/A	2023/06/23	Muhammad Chhaidan
pH CaCl2 EXTRACT	AT	8750395	2023/06/24	2023/06/24	Surinder Rai
Sodium Adsorption Ratio (SAR)	CALC/MET	8746674	N/A	2023/06/28	Automated Statchk

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GENERAL COMMENTS

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

Package 1	1.7°C
Package 2	1.0°C
Package 3	0.0°C
Package 4	1.0°C
Package 5	-4.0°C
Package 6	-3.7°C
Package 7	-2.0°C

Sample WEN177 [BH1 SS3] : F1 BTEX analysis : Soil weight exceeds the protocol specification of approximately 5g in the field preserved vial. Additional methanol was added to the vial to ensure extraction efficiency

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8749043	o-Terphenyl	2023/06/24	93	60 - 130	93	60 - 130	96	%		
8751690	1,4-Difluorobenzene	2023/06/26	95	60 - 140	97	60 - 140	102	%		
8751690	4-Bromofluorobenzene	2023/06/26	101	60 - 140	99	60 - 140	100	%		
8751690	D10-o-Xylene	2023/06/26	107	60 - 140	105	60 - 140	104	%		
8751690	D4-1,2-Dichloroethane	2023/06/26	100	60 - 140	92	60 - 140	93	%		
8749043	F2 (C10-C16 Hydrocarbons)	2023/06/24	103	60 - 130	104	80 - 120	<10	ug/g	NC	30
8749043	F3 (C16-C34 Hydrocarbons)	2023/06/24	103	60 - 130	104	80 - 120	<50	ug/g	NC	30
8749043	F4 (C34-C50 Hydrocarbons)	2023/06/24	106	60 - 130	107	80 - 120	<50	ug/g	NC	30
8749383	Moisture	2023/06/23							4.5	20
8749554	Moisture	2023/06/23							1.5	20
8750395	Available (CaCl2) pH	2023/06/24			100	97 - 103			0.28	N/A
8750594	Chromium (VI)	2023/06/27	84	70 - 130	94	80 - 120	<0.18	ug/g	NC	35
8750607	Acid Extractable Antimony (Sb)	2023/06/26	98	75 - 125	95	80 - 120	<0.20	ug/g	0.51	30
8750607	Acid Extractable Arsenic (As)	2023/06/26	107	75 - 125	102	80 - 120	<1.0	ug/g	1.7	30
8750607	Acid Extractable Barium (Ba)	2023/06/26	NC	75 - 125	99	80 - 120	<0.50	ug/g	4.5	30
8750607	Acid Extractable Beryllium (Be)	2023/06/26	106	75 - 125	98	80 - 120	<0.20	ug/g	6.0	30
8750607	Acid Extractable Boron (B)	2023/06/26	100	75 - 125	100	80 - 120	<5.0	ug/g	NC	30
8750607	Acid Extractable Cadmium (Cd)	2023/06/26	101	75 - 125	93	80 - 120	<0.10	ug/g	2.3	30
8750607	Acid Extractable Chromium (Cr)	2023/06/26	NC	75 - 125	99	80 - 120	<1.0	ug/g	0.34	30
8750607	Acid Extractable Cobalt (Co)	2023/06/26	102	75 - 125	99	80 - 120	<0.10	ug/g	0.76	30
8750607	Acid Extractable Copper (Cu)	2023/06/26	NC	75 - 125	100	80 - 120	<0.50	ug/g	2.2	30
8750607	Acid Extractable Lead (Pb)	2023/06/26	NC	75 - 125	99	80 - 120	<1.0	ug/g	2.5	30
8750607	Acid Extractable Mercury (Hg)	2023/06/26	NC	75 - 125	108	80 - 120	<0.050	ug/g	7.0	30
8750607	Acid Extractable Molybdenum (Mo)	2023/06/26	NC	75 - 125	98	80 - 120	<0.50	ug/g	0.81	30
8750607	Acid Extractable Nickel (Ni)	2023/06/26	NC	75 - 125	101	80 - 120	<0.50	ug/g	1.7	30
8750607	Acid Extractable Selenium (Se)	2023/06/26	108	75 - 125	103	80 - 120	<0.50	ug/g	NC	30
8750607	Acid Extractable Silver (Ag)	2023/06/26	105	75 - 125	99	80 - 120	<0.20	ug/g	3.0	30
8750607	Acid Extractable Thallium (Tl)	2023/06/26	105	75 - 125	101	80 - 120	<0.050	ug/g	6.5	30
8750607	Acid Extractable Uranium (U)	2023/06/26	109	75 - 125	104	80 - 120	<0.050	ug/g	2.4	30
8750607	Acid Extractable Vanadium (V)	2023/06/26	97	75 - 125	98	80 - 120	<5.0	ug/g	0.75	30

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8750607	Acid Extractable Zinc (Zn)	2023/06/26	NC	75 - 125	103	80 - 120	<5.0	ug/g	1.3	30
8750963	Hot Water Ext. Boron (B)	2023/06/27	110	75 - 125	103	75 - 125	<0.050	ug/g	5.1	40
8751462	WAD Cyanide (Free)	2023/06/26	100	75 - 125	104	80 - 120	<0.01	ug/g	NC	35
8751621	Conductivity	2023/06/26			103	90 - 110	<0.002	mS/cm	4.4	10
8751690	Benzene	2023/06/26	95	50 - 140	94	50 - 140	<0.020	ug/g	NC	50
8751690	Ethylbenzene	2023/06/26	108	50 - 140	111	50 - 140	<0.020	ug/g	NC	50
8751690	F1 (C6-C10) - BTEX	2023/06/26					<10	ug/g	NC	30
8751690	F1 (C6-C10)	2023/06/26	97	60 - 140	104	80 - 120	<10	ug/g	NC	30
8751690	o-Xylene	2023/06/26	107	50 - 140	103	50 - 140	<0.020	ug/g	NC	50
8751690	p+m-Xylene	2023/06/26	100	50 - 140	98	50 - 140	<0.040	ug/g	NC	50
8751690	Toluene	2023/06/26	94	50 - 140	92	50 - 140	<0.020	ug/g	NC	50
8751690	Total Xylenes	2023/06/26					<0.040	ug/g	NC	50
8752010	Available (CaCl2) pH	2023/06/26			100	97 - 103			0.49	N/A

N/A = Not Applicable

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.

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 spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 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 (absolute difference <= 2x RDL).

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Bureau Veritas Job #: C3I3640
Report Date: 2023/06/28

exp Services Inc
Client Project #: BRM-23006811-A0
Site Location: 121 ST GEORGE ST., TORONTO
Your P.O. #: BRM-GEO
Sampler Initials: VS

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

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CHAIN OF CUSTODY RECORD

ENV COC - 00014v3

Page 1 of 1

22-Jun-23 14:52
Patricia Legette
C313640

AK0 ENV-1747

Invoice Information	Invoice to (requires report) ☐	Report Information (if differs from invoice)		Project Information	
Company:	EXI SERVICES INC	Company:		Quotation #:	Stream 3.
Contact Name:	ACCOUNTS PAYABLE	Contact Name:	AAMNA ARORA	P.O. #/ AFE#:	BRM-GEO
Street Address:		Street Address:		Project #:	BRM-230068 11-A0.
City:	Prov: Postal Code:	City:	Prov: Postal Code:	Site #:	
Phone:		Phone:		Site Location:	121 ST George ST,
Email:	KAREN.BURKE@EXP.COM APP@EXP.COM	Email:	AAMNA.ARORA@EXP.COM	Site Location Province:	& TORONTO.
Copies:		Copies:		Sampled By:	

Regulatory Criteria

REG 153: ☐ Table 1 ☐ Table 2 ☐ Table 3 ☐ Table ____ ☐ Res/Park ☐ Ind/Comm ☐ Agri/other ☐ Med/Fine ☐ Course ☐ For RSC

OTHER: ☐ CME ☐ Reg 558* ☐ *min 3 day TAT ☐ MISA ☐ PWQO ☐ Reg 406, Table: ____ ☐ Sanitary Sewer Bylaw ☐ Storm Sewer Bylaw Municipality ____ ☐ Other: ____

Include Criteria on Certificate of Analysis (check if yes): ☐

SAMPLES MUST BE KEPT COOL (<10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

Regular Turnaround Time (TAT)
☒ 5 to 7 Day ☐ 10 Day

Rush Turnaround Time (TAT) Surcharges apply
☐ Same Day ☐ 1 Day ☐ 2 Day ☐ 3 Day ☐ 4 Day

Date Required: YY ____ MM ____ DD ____

Comments

	Sample Identification	Date Sampled YY	MM	DD	Time (24hr) HH	MM	Matrix	1 FIELD FILTERED	2 FIELD PRESERVED	3 LAB FILTRATION REQUIRED	4 BTEX/ F1	5 F2 - F4	6 VOCs	7 Reg 153 metals and inorganics	8 Reg 153 ICPMS metals	9 Reg 153 metals (Hg, Cr VI, ICPMS metals, HWS - B)	10 BTEX - PHCS	11	12	13	14	15	16	17	18	19	20	21 # OF CONTAINERS SUBMITTED	22 HOLD - DO NOT ANALYZE
1	BH1 SS3	23	06	13			SOIL							X			X										4	
2	BH2 SS6	23	06	13			↓							X			X										4	
3																												
4																												
5																												
6																												
7																												
8																												
9																												
10																												
11																												
12																												

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LAB USE ONLY	Yes	No	°C	1	2	3
Seal present						
Seal intact						
Cooling media present						

LAB USE ONLY	Yes	No	°C	1	2	3
Seal present						
Seal intact						
Cooling media present						

LAB USE ONLY	Yes	No	°C	1	2	3
Seal present						
Seal intact						
Cooling media present						

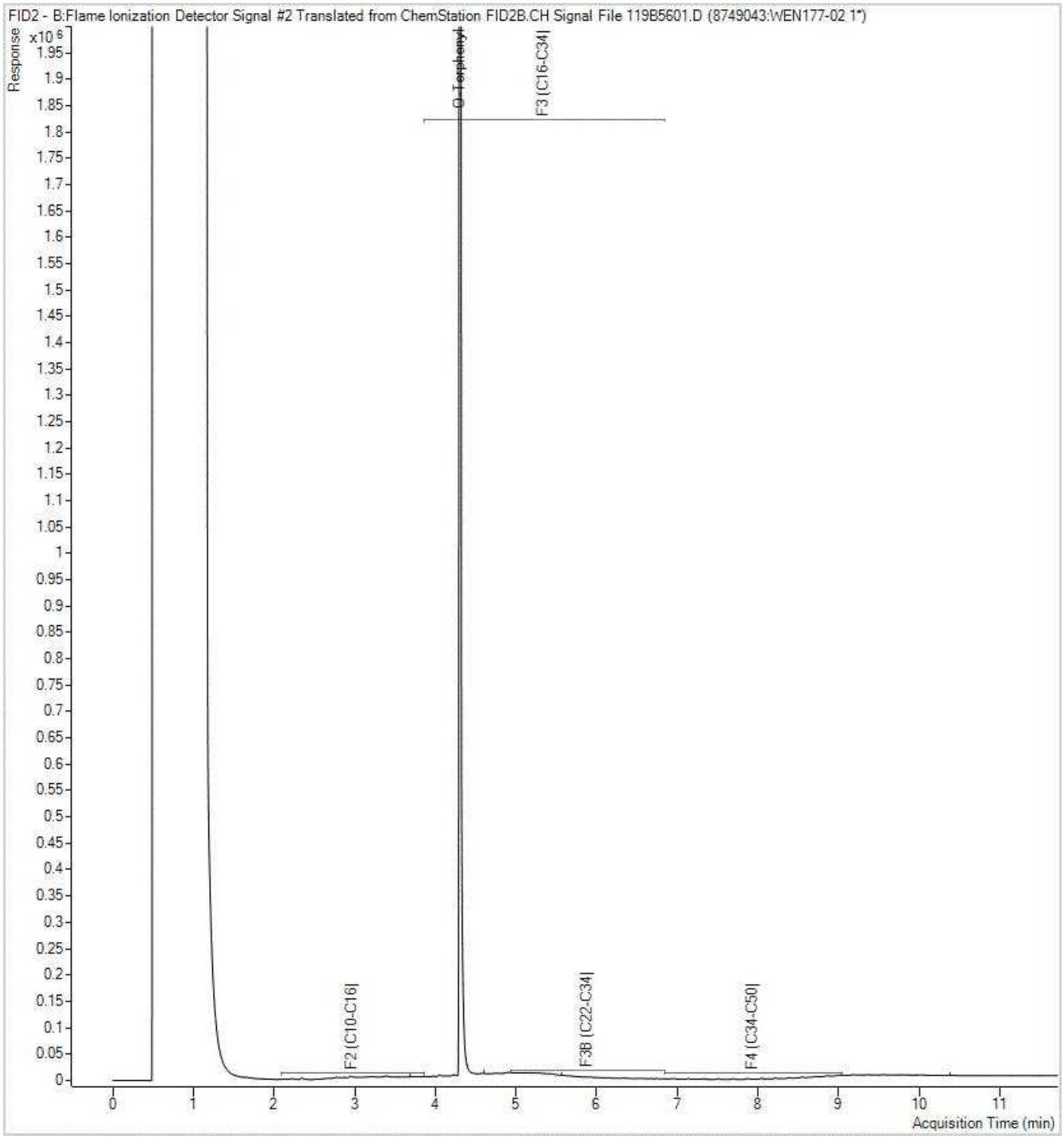
Temperature reading by: 1 2 3

Relinquished by: (Signature/ Print)	Date YY	MM	DD	Time HH	MM	Received by: (Signature/ Print)	Date YY	MM	DD	Time HH	MM	Special Instructions
1 VANESSA STICHLER	2023	06	22	14	36	1	2023	06	22	14	52	
2						2						

Bureau Veritas Job #: C3I3640
Report Date: 2023/06/28
Bureau Veritas Sample: WEN177

exp Services Inc
Client Project #: BRM-23006811-A0
Project name: 121 ST GEORGE ST., TORONTO
Client ID: BH1 SS3

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

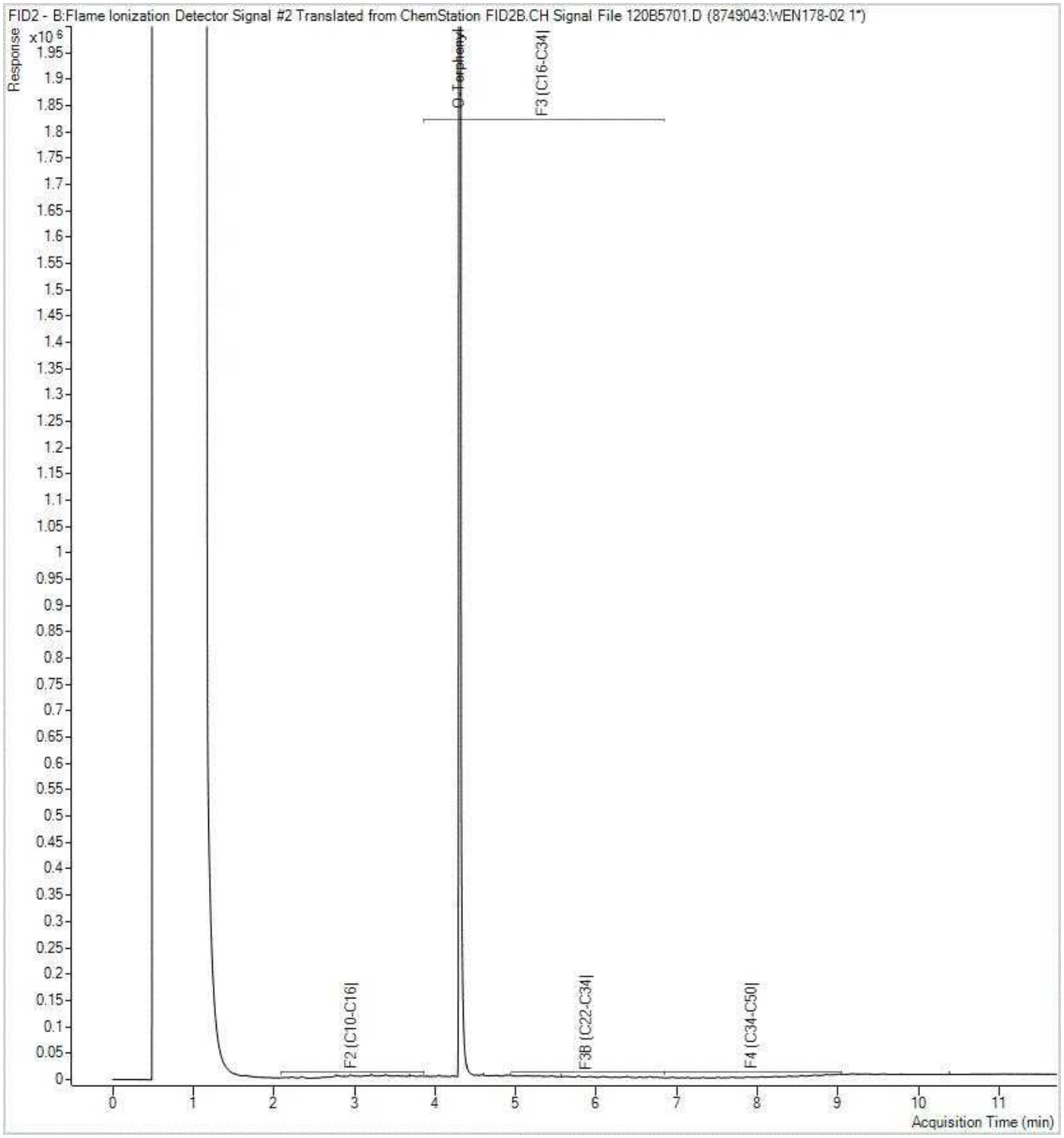


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C3I3640
Report Date: 2023/06/28
Bureau Veritas Sample: WEN178

exp Services Inc
Client Project #: BRM-23006811-A0
Project name: 121 ST GEORGE ST., TORONTO
Client ID: BH2 SS6

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



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

Appendix B: Photographs taken during Test Pit Excavation

Photo 1 – Test Pit Location

Photo 2: Below grade portion of the west exterior wall of the building / east wall of the test pit, showing top of the footing (looking East)

Photo 3: Thickness of the stone footing (115 mm)

Photo 4: Projection of the stone footing along east wall of the testpit (175 mm)

Photo 5: Top view below grade, looking down inside test pit, red arrow pointing to buried metal pipe

Photo 6: Projection of the stone footing along north wall of the test pit (360 mm)

1.1 Refer to attached Arborist Report and Tree Protection Plan by Cohen and Master Tree and Shrub Services Ltd. Revision Jan. 25, 2023 (17 pages).

1.2 This information given in this report was obtained for the use of the Owner in the execution of the design. It is presented in good faith to assist the Contractor and their subcontractors.

1.3 It is incumbent upon the Contractor to make whatever additional investigation they feel may be required for the proper execution of the Contract at no additional cost to the Owner.

1.4 Examine the conditions on the site, present site conditions.

End of Section 00340

COHEN & MASTER™

TREE AND SHRUB SERVICES

ARBORIST REPORT
&
TREE PROTECTION PLAN

121 ST GEORGE ST.
TORONTO, ON
M5S 2E8

Date: September 2, 2022
Revised: November 24, 2022
Revised: January 25, 2023

Cohen and Master Tree and Shrub Services Ltd.
42 Guardsman Road
Thornhill, Ontario, L3T 6L4
416-932-0622

Matthew Mitchell, B.Sc
ISA Certified Arborist – ON-1845A
ISA Tree Risk Assessment Qualification
matthew@cmtrees.com

METHODOLOGY

Tree Diameter Measurements: All relevant trees were sized by measuring their trunk diameter at 1.4 meters above existing grade, diameter at breast height (DBH) as per accepted arboricultural standards.

Tree Condition: A generalized assessment system was employed to describe the overall condition of tree health categories for each inventoried tree. A three (3) level scale from "Good", "Fair", and "Poor", was used to quantify the range of tree conditions. "Good" condition refers to the tree health category being greater than eighty (80) percent of a perfect specimen. "Fair" condition refers to a category condition that is less than eighty (80) percent but more than twenty (20) percent. "Poor" refers to a tree health category that is less than twenty (20) percent.

Tree #: Refers to the tree number on the tree assessment plan.

Common Name: The common name for each tree inventoried.

Botanical Name: The botanical name for each tree inventoried.

Diameter: Refers to diameter (in centimeters) measured at 1.4m (diameter at breast height (DBH)) above finished grade.

Root Zone (R.Z.): This is a tree health category to assess the growing conditions within the root zone of the tree. It is measured on a scale of Good, Fair, Poor.

Trunk Integrity (T.I.): This is a tree health category to assess the trunk condition of the tree for any defects or weaknesses or other notable issues. It is measured on a scale of Good, Fair, Poor.

Crown Structure (C.S.): This is a tree health category to assess the overall shape and condition of the tree crown, including scaffold and other branch conditions. This is also measured on a scale of Good, Fair, Poor.

Crown Vitality (C.V.): This is a tree health category to assess the crown health of the tree, including the amount of deadwood, dieback and live growth in the crown as compared to a 100% healthy tree. The size, colour and amount of foliage are also considered in this category. It is measured on a scale of Good, Fair, Poor.

Tree Protection Zone (TPZ): Tree Protection Zone (TPZ) as recommended by the City of Toronto. This distance is based on the diameter of the tree at breast height and the tree protection zone is measured from the trunk outwards.

Site Plan Recommendations

preserve: The TPZ of the tree will be fully protected (based on the TPZ requirements) during demolition and construction activities and will remain unaltered throughout the duration of demolition and construction. No permit is required.

INJURY (P): Any situation where the TPZ of the tree cannot be maintained and will be encroached upon, but the tree will not sustain injuries severe enough to compromise long-term health and structural stability. This includes situations where the movement of machinery or storage of materials would require disturbance within the TPZ. Measures to mitigate damage to the root zone and canopy (pruning, root exploration, soil de-compaction, mulching, fertilizing, etc.) may be recommended. A tree injury permit is required.

REMOVE (P): Any tree that is over 30cm in diameter but is not dead, that requires a permit from the city for removal. This includes trees significantly impacted by proposed construction which would sustain an unacceptable level of injury that would be unavoidable and likely cause long-term health and structural defects. A tree removal permit is required.

remove: Any tree that is dead, or that does not require a permit for removal. This also applies to trees less than 30cm in diameter that do not require a permit for removal.

Categories (as per City of Toronto guidelines)

0. Trees with diameters of less than 30cm, situated on private property on the subject site.
1. Trees with diameters of 30cm or more, situated on private property on the subject site.
2. Trees with diameters of 30cm or more, situated on private property, within 6m (non-ravine), or 12m (ravine) of the subject site.
3. Trees of all diameters situated on City owned parkland within 6m of the subject site.
4. Trees of all diameters situated within lands designated under City of Toronto Municipal Code, Chapter 658, Ravine Protection.
5. Trees of all diameters situated within the City road allowance adjacent to the subject site.

Specifications for Tree Protection Hoarding/Fencing

It is necessary to protect all trees designated for preservation during both demolition and construction activities. This tree protection can be accomplished by installing tree protection hoarding or tree protection fencing (TPH or TPF). The TPZ for non-ravine trees is based on the DBH of the tree and is 6cm TPZ diameter for every 1cm of tree diameter. The TPZ for ravine trees is based on the DBH of the tree and is 12cm TPZ diameter for every 1cm of tree diameter.

Tree Protection Hoarding should be comprised of plywood mounted on 2 x 4" wood frame (or t-bar if specified). Tree Protection Fencing should be comprised of orange plastic construction web fencing on 2 x 4" wood frame (or t-bar if specified). Horizontal Root Protection Hoarding should be comprised of plywood sheets (for soft surfaces), steel plate (for hard surfaces),

coarse wood chips, and 4 x 4" wood frame (or equivalent) to retain wood chips. In ravine designated or protected natural feature areas, sediment control fencing should be used in addition to tree protection hoarding/fencing. Tree protection should be installed in accordance with the City of Toronto "Tree Protection Policy and Specifications for Construction Near Trees".

Trunk Diameter (DBH) Measured @ 1.4m Above Grade	Minimum Protection Distances Required For:		
	Trees on City Property	Trees on Private Property	Ravine & Natural Feature Protection Trees
< 10cm	1.2m		drip line or 1.2m (whichever is greater)
10-30cm	1.8m		drip line or 3.6m (whichever is greater)
31-40cm	2.4m	2.4m	drip line or 4.8m (whichever is greater)
41-50cm	3.0m	3.0m	drip line or 6.0m (whichever is greater)
51-60cm	3.6m	3.6m	drip line or 7.2m (whichever is greater)
61-70cm	4.2m	4.2m	drip line or 8.4m (whichever is greater)
71-80cm	4.8m	4.8m	drip line or 9.6m (whichever is greater)
81-90cm	5.4m	5.4m	drip line or 10.8m (whichever is greater)
91-100cm	6.0m	6.0m	drip line or 12.0m (whichever is greater)
> 100cm	6cm protection for each 1cm of diameter	6cm protection for each 1cm of diameter	12cm protection for each 1cm diameter or the drip line (whichever is greater)

Replanting plan

Any private tree that is removed for the purpose of construction or land development will require a compensation replanting ratio of 3 to 1, three (3) replacement trees for every one (1) tree removed. City trees will require one (1) replacement tree to be planted on city property for every tree removed. Any private tree that is removed not related to construction will require at least one (1) replacement tree to be planted on private property for every tree removed. These trees must be 50 to 60mm in caliper and maintained in good condition.

Supplemental watering may be required during the drier periods of the year, especially during the first two (2) or three (3) years after planting. In situations where poor site conditions (light, soil, space, etc.) make planting a new tree on the development property impossible, a cash in lieu option may be proposed of $583 per every compensation tree not planted. Please refer to Toronto Municipal Code Article III tree planting instructions and per the City of Toronto Planting Detail PD-101 for transplanting burlap or balled trees.

City of Toronto Application to Injure or Remove Trees Fees

Non-construction related application fees
Applications to injure or remove trees not associated with construction or related activity:

- Private Tree: $123.55 per tree
- City Tree: $369.61 per tree
- Boundary/Neighbour Tree: $257.91 per tree

Construction related application fees
Applications to injure or remove trees associated with activity that includes but is not limited to building, demolition, excavation, boring, placement of fill or surface treatment, storage of construction materials or equipment, storage of soil, construction waste or debris, movement of vehicles and equipment. Applications for Official plan amendment, plan of subdivision and condominiums, site plan control, minor variance, consent and building permits:

- Private Tree: $369.61 per tree
- City Tree: $369.61 per tree
- Boundary/Neighbour Tree: $773.77 per tree

Applications and any additional forms required - must either be mailed, or hand delivered to the Tree Protection & Plan Review Office. Faxed or scanned documents are NOT accepted at this time.

Notes: Payment must be in the form of a certified cheque, bank draft and debit or credit card (MasterCard or VISA).

Permits are generally issued within approximately 6 weeks of the application. Completing and submitting a permit application for tree injury or removal does not guarantee that a permit will be granted.

Tree Protection Signs
A Tree Protection sign should be displayed on the tree protection fencing/hoarding to inform/remind the contractors and public of the tree protection measures in place.

Permit Posting
All approved tree removal/injury permits must be posted on the property during the time of tree work and must be visible from the street.

Fines for illegal tree removal
A person convicted of an offence under City of Toronto Municipal Code Chapter 813, Article III is subject to a minimum fine of $500.00 and a maximum fine of $100,000.00 per tree involved in an offense; a special supplementary fine of $100,000.00 is also possible.

SUMMARY

Cohen and Master Tree and Shrub Services have been retained to prepare this Arborist Report and Tree Protection Plan for construction at 121 St George St, Ward 11 – University-Rosedale. The tree assessment was completed on August 25, 2022, according to the requirements set forth by the City of Toronto Urban Forestry Department (TUF).

The purpose of this report is to assess trees that are 30cm in diameter or larger on private property and trees within 6m of proposed construction. None of the property falls within the jurisdiction of the City of Toronto's Ravine Protection By-law.

The proposed development is the construction of a new accessibility ramp at the front of the building. Due to the proposed development of the existing site, my client requires permission to injure three (3) privately owned trees: Tree #3 (Honeylocust, 53cm DBH), Tree #4 (Green Ash, 68cm DBH), and Tree #5 (Silver Maple, 63cm DBH). An application to injure these trees will have to be submitted to Toronto Urban Forestry (TUF).

Root exploration using Air Spade tools is recommended to assist in locating exact locations of required excavations.

Any required Tree Protection Hoarding/Fencing should be installed prior to any demolition or construction activities as outlined. All work within the TPZ of these bylaw protected trees must be supervised by an ISA certified arborist.

TREES PROPOSED FOR INJURY

Tree #3 – Honeylocust (*Gleditsia triacanthos*), 53 cm DBH – PERMIT REQUIRED

Tree #3 is a large, privately owned deciduous tree growing at the west side of the subject property, 121 St George St. The tree is growing in a lawn area at the front of the property. This tree is in good condition with a limited root zone and a small visible fungal fruiting body at its base. The proposed new accessibility ramp at the front entrance of the building will encroach on the TPZ of this tree. Some negative health impacts to this tree are anticipated and as such this tree should be monitored regularly post construction. A plant health care plan including soil work to encourage new root growth must be developed based on the results of the adjacent construction. An application to injure this tree will have to be submitted to Toronto Urban Forestry.

Tree #3 – PHOTOS

Tree #4 – Green Ash (*Fraxinus pennsylvanica*), 68 cm DBH – PERMIT REQUIRED

Tree #4 is a large, privately owned deciduous tree growing at the west side of the subject property, 121 St George St. The tree is growing in a lawn area at the front of the property. This tree is in good condition with a codominant main union. The proposed new accessibility ramp at the front entrance of the building will encroach on the TPZ of this tree. Construction methods that minimize the extent of excavation within this tree's TPZ should be utilized wherever possible. Some negative health impacts to this tree are anticipated and as such this tree should be monitored regularly post construction. A plant health care plan including soil work to encourage new root growth must be developed based on the results of the adjacent construction. An application to injure this tree will have to be submitted to Toronto Urban Forestry.

Tree #4 – PHOTOS

Tree #5 – Silver Maple (*Acer saccharinum*), 63 cm DBH – PERMIT REQUIRED

Tree #5 is a large, privately owned deciduous tree growing at the west side of the subject property, 121 St George St. The tree is growing in a lawn area at the front of the property. This tree is in good condition with a well contained crown and only minor deadwood throughout. The proposed new accessibility ramp at the front entrance of the building will encroach on the TPZ of this tree. Construction methods that minimize the extent of excavation within this tree's TPZ should be utilized wherever possible. Some negative health impacts to this tree are anticipated and as such this tree should be monitored regularly post construction. A plant health care plan including soil work to encourage new root growth must be developed based on the results of the adjacent construction. An application to injure this tree will have to be submitted to Toronto Urban Forestry.

Tree #5 – PHOTOS

ROOT ZONE/SOIL RESTORATION/PLANT HEALTH CARE

Root Zone/Soil Restoration includes soil aeration, decompaction, and the addition of mycorrhizae and other organics. This will increase the likelihood of compensatory roots growing to increase the health/stability of trees and landscape plants, as well as helping newly planted trees and landscape plants health and recovery. The following recommendations are for preparing and remediating soils to promote healthy rooting environments.

Air Spade

The Air Spade System is a specialized pneumatic air tool with a supersonic nozzle that is strong enough to blow away soil from roots, but is gentle enough not to harm the roots. This system can be used for both root exploration and for soil renovation. Typically for Air Spading around tree roots, a maximum air stream pressure of 100 pounds per square inch (PSI) is utilized to minimize damage to the root bark. The process of air spading soil helps with soil decompaction and aeration, while minimizing damage to existing root systems. This results in increased viable rooting areas for existing trees and new landscape plants.

Vertical Mulching

Vertical mulching is process of making a grid pattern of holes and back filling them with our custom compost mix. This will reduce soil compaction and improve soil structure and chemistry and improve water drainage. Tree roots respond very well to this process, having room to grow and nutrients to take advantage of. This is hugely beneficial for overall tree health. This process works well on lawns as it only makes a small hole on the surface and grass will grow in over the top onto the nutrient rich compost.

Soil Aeration Tubes

Soil Aeration Tubes are a specialized product that we insert into the soil. These tubes help with water infiltration into the ground, allow for an active convection based gas exchange between the atmosphere and the soil, and create space for feeder roots to grow. The holes to insert these tubes are created with an Air Spade. Soil aeration tubes are also an excellent port that we can inject liquids into later (fertilizer, ArborGain etc.).

Inoculating Trees and Landscape Plants

It is recommended that the new topsoil be drenched with ArborGain and mycorrhizal solution. This allows for spores to be transported in the water suspension that comes in contact with new emerging root grow. These spores will germinate and attach to developing root tips and finer roots. The goal of inoculating trees and new landscape plants is to bring the mycorrhizal spores in contact with the root system efficiently, and to promote new root growth.
It may take several applications to successfully inoculate a large/established root system. With large caliper trees, the root system will be at least 25% wider in diameter than the canopy of

the tree. This makes inoculating the entirety of an established root system a considerable challenge. However, existing trees and new landscape plants will always benefit from any new mycorrhizal symbiosis, therefore repeated inoculations will always be beneficial.

Construction Activities and Excavation Around Trees and Landscape Plants

Any soil disturbances around existing trees and landscape plants will result in damages to root systems. Damaged roots will begin recovery by producing a new phase of emerging root tips and root hairs where root systems have been stripped of fine roots. These areas of root damage and disturbance are the ideal location where new mycorrhizal symbiosis will be of greatest benefit. A thorough drenching of ArborGain will be of greatest benefit in such circumstances.

Compacted Soils for Established Trees and Landscape Plants

Remediation and decompaction of soils often requires air-spading and vertical mulching. These procedures are both necessary and recommended to help remediate rooting environments. However, both activities will damage/strip fine roots or break lateral roots. Inoculating with ArborGain will assist the roots in their recovery from these necessary but disruptive procedures. When the root systems of established trees and landscape plants do recover, the result is a larger available rooting area for roots to establish and grow.

ArborGain

ArborGain is a custom mix of humates, sea kelp and microbial food sources. Applied to the soil within the landscape, ArborGain stimulates root development, increases drought tolerance and improves soil health. Applied directly to the foliage, ArborGain improves cell structure of the leaf and boosts canopy health.

Kelp: These underwater forests of the ecosystem host a whopping 70 vitamins and minerals at their disposal. Kelp packs a powerhouse of macro & micronutrients, trace elements and natural growth hormones that allow plants to thrive, grow healthier and stronger with heightened growth rates, and boosts the plants immune system to ward off diseases and pests.

Humic Acid: Comprised of plant and animal matter found deep in the earth's crust, this pre-historic, fossilized by-product is known as Humic Acid. It naturally enhances biomass production (plant growth), increases water holding capacity and optimizes the nutrient supply of plants (especially Iron which is also readily available in ArborGain) just to name a few of its benefits.

Yucca: These hearty desert plants are used to dealing with drought and overall stress on an astronomical level. By feeding your crops, trees and turf the harvested yucca, those benefits of combatting weather stress are passed along to crops, trees and turf. Yucca also makes water more readily available for plants, reduces salt build-up and improves root growth.

TREE PRESERVATION AND PLANT HEALTH CARE FOR CONSTRUCTION AROUND TREES

Current ISA Best Management Practices for preserving trees in close proximity to construction activities indicate that trees should not be fertilized during construction or following the first year of construction activities. This is due to urban soils often being sterile and compacted, reducing water and nutrient uptake and causing a built up of fertilizer salts that may burn roots and reduce water uptake by the tree.

Therefore, we recommend saturating the soils around trees with ArborGain, and applying a layer of wood chips that are soaked with ArborGain to provide a slow release food source to help the tree during and after construction. This will stimulate microbial soil activity and root development, and provide a carbohydrate food source for trees to increase vigor and foliage growth. This will also help alleviate some tree stress due to construction activities, and increase drought tolerance. Individual tree needs should be assessed by a qualified arborist prior to construction and in addition to tree health and condition, soil analysis is also recommended to determine soil health and condition.

Pre-construction Phase

The following tree preservation measures should occur prior to construction:

- Tree Protection Hoarding/Fencing should be installed and be in place prior to demolition and construction activities.
- All contractors should be informed of the tree preservation measures and guidelines and any questions or inquiries should be addressed before demolition and construction begins.
- Trees that are proposed for removal (and after receiving the appropriate removal permits) should be removed prior to demolition and construction activities.
- Trees that are to be preserved should be properly pruned prior to construction.
- Watering within the Tree Protection Zones may be required during drought periods or as the season dictates.
- If injury should occur to retained trees during construction, the consulting arborist should re-evaluate the trees so that appropriate treatments can be recommended and performed.
- No excavation or demolition should occur until all tree preservation requirements have been met.
- These recommendations should be used as a minimum requirement for the survival of the retained trees and the consulting arborist should be included in all decisions regarding activities in and around Tree Protection Zones.

Construction Phase

The following tree preservation measures should occur during construction:

- Maintain and respect Tree Protection Zone (TPZ) fencing and Tree Protection Guidelines throughout each construction phase. Do not store or dump materials in the TPZ area.
- Branches that are required to be pruned during construction for clearance, should be done so by a qualified Arborist.
- Watering within the TPZ's may be required during dry periods.

- Preserved trees should be monitored by a qualified Arborist to evaluate construction injury/stress and make recommendations if necessary.

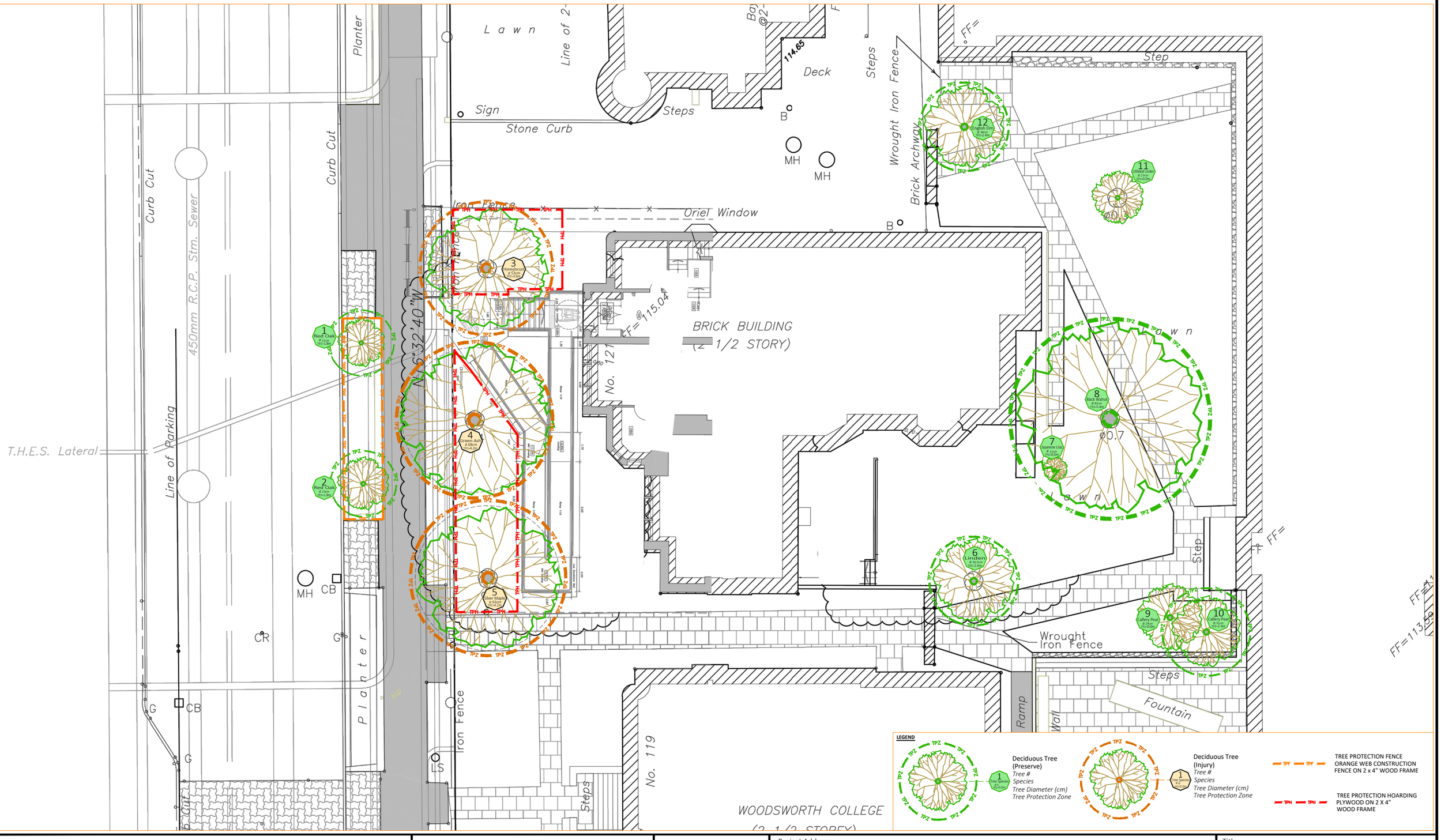
Post-Construction Phase

The following tree preservation measures should occur after construction:

- Remove Tree Protection Fencing/Hoarding only after receiving permission from the City of Toronto Urban Forestry.
- Continue watering trees if necessary.
- Supplemental soil care and fertilization if required.
- Post-construction monitoring of all trees by a qualified Arborist.

Post-Construction Monitoring

Construction injury to trees may not be immediately apparent and could take several years to become evident. All preserved trees should be inspected by a qualified Arborist on a semi-annual basis for a period of up to 2 years to monitor any tree health related issues as they occur and take appropriate measures.



LEGEND

- Deciduous Tree (Preserve): 1 Tree Species ø cm dia — *Tree #, Species, Tree Diameter (cm), Tree Protection Zone*
- Deciduous Tree (Injury): 1 Tree Species ø cm dia — *Tree #, Species, Tree Diameter (cm), Tree Protection Zone*
- TPF — TPF — TREE PROTECTION FENCE ORANGE WEB CONSTRUCTION FENCE ON 2 x 4" WOOD FRAME
- TPH — TPH — TREE PROTECTION HOARDING PLYWOOD ON 2 X 4" WOOD FRAME

COHEN & MASTER™
TREE AND SHRUB SERVICES

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CMTREES.COM BE GOOD TO YOUR TREES.

Project Address

121 ST GEORGE ST
TORONTO, ON
M5S 2E8

Title: Tree Protection Plan

Scale	1:200
Drawn	MM
Checked	AW
Date	JAN/2023
Project #	#59150

Sheet: TPP-1

TABLE DETAILS

Tree # - this number refers to the number on the tree assessment and plan - only the last three numbers on the tree tag are referenced
Tree Species - the common name for each inventoried tree.
Botanical Name - the botanical or Latin name for each inventoried tree.
DBH - refers to diameter at breast height (in centimeters) measured at 1.4 m above finished grade
Root Zone - this is an assessment of the growing conditions within the root zone of the tree. It is measured on a scale of Good, Fair, Poor
Trunk Integrity - this is an assessment of the trunk for any defects or weaknesses. It is measured on a scale of Good, Fair, Poor
Crown Structure - this is an assessment of the scaffold branches and the canopy of the tree. This is also measured on a Good, Fair, Poor
Crown Vitality - this is an assessment of the health of the tree and assesses the amount of deadwood and live growth in the crown as compared to a 100% healthy tree. The size, colour and
Overall Tree Condition - this is an assessment of the overall condition of the tree based on all parts of the tree. This is measured on a Good, Fair, Poor
Category - City of Toronto ownership categories. See below.
Tree Protection Zone (TPZ) - minimum Tree Protection Zone as recommended by the City of Toronto. This distance is based on the diameter of the tree and the protection zone is
Condition Comments - Observations that inform the condition rating.
Action - preserve - tree proposed to be preserved, not being injured or removed
INJURY (P) - tree proposed to be injured - permit required
remove - tree to be removed - no permit required
REMOVE (P) - tree proposed to be removed - permit required

Categories

0. Trees with diameters of less than 30 cm, situated on private property on the subject site.
1. Trees with diameters of 30 cm or more, situated on private property on the subject site.
2. Trees with diameters of 30 cm or more, situated on private property, within 6m (non-ravine), 12m (ravine) of the subject site.
3. Trees of all diameters situated on City owned parkland within 6m of the subject site.
4. Trees of all diameters situated within lands designated under City of Toronto Municipal Code, Chapter 658, Ravine Protection.
5. Trees of all diameters situated within the City road allowance adjacent to the subject site.

Tree #	Tree Species	Botanical Name	DBH (cm)	Root Zone	Trunk Integrity	Crown Structure	Crown Vitality	Overall Tree Condition	Category	Tree Protection Zone (m)	Condition Comments	Action
1	Red Oak	*Quercus rubra*	21	Poor	Good	Fair	Good	Fair	5	1.8	City road allowance.	preserve
2	Red Oak	*Quercus rubra*	23	Poor	Good	Fair	Fair	Fair	5	1.8	City road allowance.	preserve
3	Honeylocust	*Gleditsia triacanthos*	53	Poor	Good	Good	Good	Good	1	3.6	Limited root zone, visible fungal fruiting boddy at base.	**INJURY (P)**
4	Green Ash	*Fraxinus pennsylvanica*	68	Fair	Good	Fair	Good	Good	1	4.2	Codominant but otherwise in good condition	**INJURY (P)**
5	Silver Maple	*Acer saccharinum*	63	Fair	Good	Good	Good	Good	1	4.2		**INJURY (P)**
6	Littleleaf Linden	*Tilia cordata*	36.5	Fair	Good	Fair	Good	Good	1	2.4	Tight branch unions typical of the species.	preserve

7	Japanese Lilac	*Syringa reticulata*	11	Fair	Good	Fair	Good	Good	0	0	Heavily shaded by buildings and adjacent large trees.	preserve
8	Black Walnut	*Juglans nigra*	83	Fair	Good	Good	Good	Good	1	5.4	Minor deadwood throughout.	preserve
9	Callery Pear	*Pyrus calleryana*	29	Fair	Good	Fair	Poor	Fair	0	0	Tip dieback and yellowing foliage.	preserve
10	Callery Pear	*Pyrus calleryana*	31	Fair	Good	Fair	Poor	Fair	1	2.4	Tip dieback and yellowing foliage.	preserve
11	Littleleaf Linden	*Tilia cordata*	23	Fair	Good	Good	Good	Good	0	0		preserve
12	English Elm	*Ulmus procera*	36	Poor	Good	Fair	Good	Good	1	2.4	Root zone surrounded by hardscape.	preserve

LIMITATIONS OF ASSESSMENTS

It is the policy of Cohen and Master Tree and Shrub Services to attach the following clause in regards to limitations. This is to ensure that the client is fully aware of what is technically and professionally realistic in the preservation and assessment of trees in the urban environment.

The assessment of the trees in this report has been done in conjunction with and according to accepted arboriculture methods and techniques. These include an examination of the above ground parts of the tree for structural defects, scars, cracks, the overall condition of the root structures, the severity and direction of lean (if any), the general condition of the trees and the surrounding environment, external indications of decay such as fungal fruiting bodies, evidence of attack by insects, symptoms of infestation and pathogens, discoloured foliage, and the proximity of potential targets should a tree fail. Except where specifically noted, the trees were not cored, probed or climbed and there was no detailed inspection of the root crowns involving excavations, or samples taken to be scientifically tested.

Notwithstanding the recommendations and conclusions presented in this report, it must be acknowledged that trees are living organisms. They are not immune to changes in site conditions, dramatic weather events or seasonal variations in climate. Therefore it should always be recognized that trees are ever evolving and their health and vigour constantly vary over time. While all reasonable efforts have been made to ensure that the subject trees are healthy, no guarantees are offered or implied that these trees or part(s) of any trees will remain intact.

It is professionally and practically impossible to predict with absolute certainty the behaviour of any tree or its component parts under all circumstances and variables. Most trees have the potential for failure under adverse weather conditions and the risk can only be completely eliminated if the tree is removed. Inherently, a standing tree will always pose some level of risk. Although every effort has been made to ensure that this assessment is reasonably accurate, trees should be re-assessed periodically. The assessment presented in this report is valid at the time of inspection.

This report is property of Cohen and Master Tree and Shrub Services Ltd. and/or its agents and may not be used until payment is made in full unless written permission is granted. Cohen and Master Tree and Shrub Services reserves the right to withdraw this report and its recommendations, if any requirements are not met. All details and graphics are copyright of Cohen and Master Tree and Shrub Services Ltd.

On behalf of **Cohen and Master Tree and Shrub Services**,

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COHEN & MASTER™

TREE AND SHRUB SERVICES

SUPPLEMENTAL REPORT FOR OIL TANK

121 ST GEORGE ST.

TORONTO, ON

M5S 2E8

Date: February 26, 2024

Cohen and Master Tree and Shrub Services Ltd.
42 Guardsman Road
Thornhill, Ontario, L3T 6L4
416-932-0622

Adam Walicki, B.ENVD. E.E.T.
ISA Certified Arborist - ON 2490A
adam@cmtrees.com

METHODOLOGY

Tree Diameter Measurements: All relevant trees were sized by measuring their trunk diameter at 1.4 meters above existing grade, diameter at breast height (DBH) as per accepted arboricultural standards.

Tree Condition: A generalized assessment system was employed to describe the overall condition of tree health categories for each inventoried tree. A three (3) level scale from "Good", "Fair", and "Poor", was used to quantify the range of tree conditions. "Good" condition refers to the tree health category being greater than eighty (80) percent of a perfect specimen. "Fair" condition refers to a category condition that is less than eighty (80) percent but more than twenty (20) percent. "Poor" refers to a tree health category that is less than twenty (20) percent.

Tree #: Refers to the tree number on the tree assessment plan.

Common Name: The common name for each tree inventoried.

Botanical Name: The botanical name for each tree inventoried.

Diameter: Refers to diameter (in centimeters) measured at 1.4m (diameter at breast height (DBH)) above finished grade.

Root Zone (R.Z.): This is a tree health category to assess the growing conditions within the root zone of the tree. It is measured on a scale of Good, Fair, Poor.

Trunk Integrity (T.I.): This is a tree health category to assess the trunk condition of the tree for any defects or weaknesses or other notable issues. It is measured on a scale of Good, Fair, Poor.

Canopy Structure (C.S.): This is a tree health category to assess the overall shape and condition of the tree canopy, including scaffold and other branch conditions. This is also measured on a scale of Good, Fair, Poor.

Canopy Vigour (C.V.): This is a tree health category to assess the canopy health of the tree, including the amount of deadwood, dieback and live growth in the canopy as compared to a 100% healthy tree. The size, colour and amount of foliage are also considered in this category. It is measured on a scale of Good, Fair, Poor.

Tree Protection Zone (TPZ): Tree Protection Zone (TPZ) as recommended by the City of Toronto. This distance is based on the diameter of the tree at breast height and the tree protection zone is measured from the trunk outwards.

Site Plan Recommendations

preserve: The TPZ of the tree will be fully protected (based on the TPZ requirements) during demolition and construction activities and will remain unaltered throughout the duration of demolition and construction. No permit is required.

INJURY (P): Any situation where the TPZ of the tree cannot be maintained and will be encroached upon, but the tree will not sustain injuries severe enough to compromise long-term health and structural stability. This includes situations where the movement of machinery or storage of materials would require disturbance within the TPZ. Measures to mitigate damage to the root zone and canopy (pruning, root exploration, soil de-compaction, mulching, fertilizing, etc.) may be recommended. A tree injury permit is required.

REMOVE (P): Any tree that is over 30cm in diameter but is not dead, that requires a permit from the city for removal. This includes trees significantly impacted by proposed construction which would sustain an unacceptable level of injury that would be unavoidable and likely cause long-term health and structural defects. A tree removal permit is required.

remove: Any tree that is dead, or that does not required a permit for removal. This also applies to trees less than 30cm in diameter that do not require a permit for removal.

Categories (as per City of Toronto guidelines)

0. Trees with diameters of less than 30cm, situated on private property on the subject site.
1. Trees with diameters of 30cm or more, situated on private property on the subject site.
2. Trees with diameters of 30cm or more, situated on private property, within 6m (non-ravine), or 12m (ravine) of the subject site.
3. Trees of all diameters situated on City owned parkland within 6m of the subject site.
4. Trees of all diameters situated within lands designated under City of Toronto Municipal Code, Chapter 658, Ravine Protection.
5. Trees of all diameters situated within the City road allowance adjacent to the subject site.

Specifications for Tree Protection Hoarding/Fencing

It is necessary to protect all trees designated for preservation during both demolition and construction activities. This tree protection can be accomplished by installing tree protection hoarding or tree protection fencing (TPH or TPF). The TPZ for non-ravine trees is based on the DBH of the tree, and is 6cm TPZ diameter for every 1cm of tree diameter. The TPZ for ravine trees is based on the DBH of the tree, and is 12cm TPZ diameter for every 1cm of tree diameter.

Tree Protection Hoarding should be comprised of plywood mounted on 2 x 4" wood frame (or t-bar if specified). Tree Protection Fencing should be comprised of orange plastic construction web fencing on 2 x 4" wood frame (or t-bar if specified). Horizontal Root Protection Hoarding should be comprised of plywood sheets (for soft surfaces), steel plate (for hard surfaces),

coarse wood chips, and 4 x 4" wood frame (or equivalent) to retain wood chips. In ravine designated or protected natural feature areas, sediment control fencing should be used in addition to tree protection hoarding/fencing. Tree protection should be installed in accordance with the City of Toronto "Tree Protection Policy and Specifications for Construction Near Trees".

Trunk Diameter (DBH) Measured @ 1.4m Above Grade	Minimum Protection Distances Required For:		
	Trees on City Property	Trees on Private Property	Ravine & Natural Feature Protection Trees
< 10cm	1.2m		drip line or 1.2m (whichever is greater)
10-30cm	1.8m		drip line or 3.6m (whichever is greater)
31-40cm	2.4m	2.4m	drip line or 4.8m (whichever is greater)
41-50cm	3.0m	3.0m	drip line or 6.0m (whichever is greater)
51-60cm	3.6m	3.6m	drip line or 7.2m (whichever is greater)
61-70cm	4.2m	4.2m	drip line or 8.4m (whichever is greater)
71-80cm	4.8m	4.8m	drip line or 9.6m (whichever is greater)
81-90cm	5.4m	5.4m	drip line or 10.8m (whichever is greater)
91-100cm	6.0m	6.0m	drip line or 12.0m (whichever is greater)
> 100cm	6cm protection for each 1cm of diameter	6cm protection for each 1cm of diameter	12cm protection for each 1cm diameter or the drip line (whichever is greater)

Replanting plan

Any private tree that is removed for the purpose of construction or land development will require a compensation replanting ratio of 3 to 1, three (3) replacement trees for every one (1) tree removed. City trees will require one (1) replacement tree to be planted on city property for every tree removed. Any private tree that is removed not related to construction will require at least one (1) replacement tree to be planted on private property for every tree removed. These trees must be 50 to 60mm in caliper and maintained in good condition.

Supplemental watering may be required during the drier periods of the year, especially during the first two (2) or three (3) years after planting. In situations where poor site conditions (light, soil, space, etc.) make planting a new tree on the development property impossible, a cash in lieu option may be proposed of $583 per every compensation tree not planted. Please refer to Toronto Municipal Code Article III tree planting instructions and per the City of Toronto Planting Detail PD-101 for transplanting burlap or balled trees.

City of Toronto Application to Injure or Remove Trees Fees

Non-construction related application fees
Applications to injure or remove trees not associated with construction or related activity:

- Private Tree: $137.50 per tree
- City Tree: $411.35 per tree
- Boundary/Neighbour Tree: $287.03 per tree

Construction related application fees
Applications to injure or remove trees associated with activity that includes but is not limited to building, demolition, excavation, boring, placement of fill or surface treatment, storage of construction materials or equipment, storage of soil, construction waste or debris, movement of vehicles and equipment. Applications for Official plan amendment, plan of subdivision and condominiums, site plan control, minor variance, consent and building permits:

- Private Tree: $411.35 per tree
- City Tree: $411.35 per tree
- Boundary/Neighbour Tree: $861.16 per tree

Applications and any additional forms required - must either be mailed, or hand delivered to the Tree Protection & Plan Review Office. Faxed or scanned documents are NOT accepted at this time.

Notes: Payment must be in the form of a certified cheque, bank draft and debit or credit card (MasterCard or VISA).

Permits are generally issued within approximately 6 weeks of the application. Completing and submitting a permit application for tree injury or removal does not guarantee that a permit will be granted.

Tree Protection Signs
A Tree Protection sign should be displayed on the tree protection fencing/hoarding to inform/remind the contractors and public of the tree protection measures in place.

Permit Posting
All approved tree removal/injury permits must be posted on the property during the time of tree work and must be visible from the street.

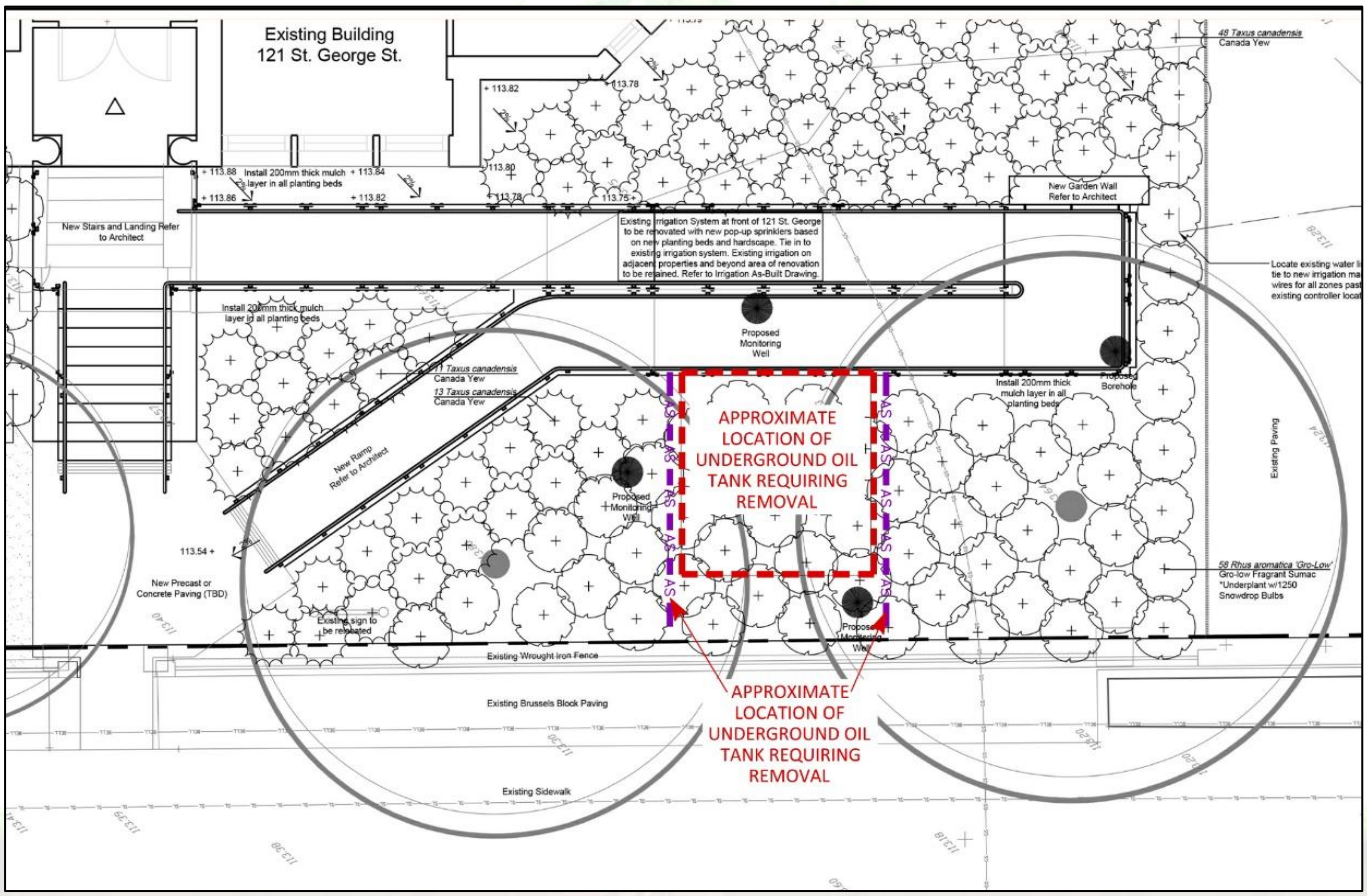
Fines for illegal tree removal
A person convicted of an offence under City of Toronto Municipal Code Chapter 813, Article III is subject to a minimum fine of $500.00 and a maximum fine of $100,000.00 per tree involved in an offense; a special supplementary fine of $100,000.00 is also possible.

SUMMARY

Cohen and Master Tree and Shrub Services have been retained to prepare this supplemental Arborist Report for construction at 121 St George St, Ward 11 – University-Rosedale. The tree assessment was completed on August 25, 2022, according to the requirements set forth by the City of Toronto Urban Forestry Department (TUF). This is a supplemental report to the previous reports submitted, as a result of a change in scope of work due to the discovery of a buried decommissioned oil tank during site investigation activities at the front of the property. The site visit took place on February 22, 2024.

Construction Context

The previously proposed development included the construction of a new accessibility ramp at the front of the building. A root zone exploration by air spade was performed on October 26, 2022, to determine the density and locations of significant roots at the nearest edge to the tree of the proposed ramp footprint. The results of this exploration can be found in a separate Root Exploration Report dated November 2, 2022. These results were used to revise the angle of the ramp and bridge a portion of the ramp over an area of Tree #4's root zone containing several significant roots. See drawing below for proposed revised ramp, and approximate location of oil tank requiring removal.



PROPOSED ADDITIONAL SCOPE OF WORK – ROOT EXPLORATION

The site investigation at the front of the property at 121 St. George Street verified the location of a decommissioned underground oil tank between Trees #4 and #5. This underground oil tank requires removal by means of excavation within the TPZ's of Tree #4 and Tree #5.

As a result of the removal of the decommissioned underground oil tank, my client requires permission to injure two (2) privately owned trees: Tree #4 (Green Ash, 68cm DBH), and Tree #5 (Silver Maple, 63cm DBH). Due to the proximity of the oil tank to Trees #4 and #5, an additional root exploration is recommended parallel to both the trees closest to the proposed extent of the oil tank excavation to verify the amount of structural roots that would be impacted and to provide additional recommendations.

Cohen and Master Tree and Shrub Services recommends the Best Management Practice of day-lighting the tree roots using the Air Spade soil excavation system in tandem with the Air Vac system for collecting debris. It is our preferred method to daylight roots without causing damage to the bark of the roots. Typically for an Air Spade excavation around tree roots, a maximum air stream pressure of 100 pounds per square inch (PSI) is utilized to minimize damage to the root bark. All work is to be done in the presence and under the supervision of an ISA Certified Arborist.

LIMITATIONS OF ASSESSMENTS

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On behalf of **Cohen and Master Tree and Shrub Services**,

Adam Walicki, B.ENVD. E.E.T.
ISA Certified Arborist - ON 2490A
adam@cmtrees.com

COHEN & MASTER™

TREE AND SHRUB SERVICES

SUPPLEMENTAL REPORT
REAR COURTYARD ELECTRICAL FEED

121 ST GEORGE ST.

TORONTO, ON

M5S 2E8

Date: February 26, 2024

Cohen and Master Tree and Shrub Services Ltd.
42 Guardsman Road
Thornhill, Ontario, L3T 6L4
416-932-0622

Adam Walicki, B.ENVD. E.E.T.
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METHODOLOGY

Tree Diameter Measurements: All relevant trees were sized by measuring their trunk diameter at 1.4 meters above existing grade, diameter at breast height (DBH) as per accepted arboricultural standards.

Tree Condition: A generalized assessment system was employed to describe the overall condition of tree health categories for each inventoried tree. A three (3) level scale from "Good", "Fair", and "Poor", was used to quantify the range of tree conditions. "Good" condition refers to the tree health category being greater than eighty (80) percent of a perfect specimen. "Fair" condition refers to a category condition that is less than eighty (80) percent but more than twenty (20) percent. "Poor" refers to a tree health category that is less than twenty (20) percent.

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Tree Protection Zone (TPZ): Tree Protection Zone (TPZ) as recommended by the City of Toronto. This distance is based on the diameter of the tree at breast height and the tree protection zone is measured from the trunk outwards.

Site Plan Recommendations

preserve: The TPZ of the tree will be fully protected (based on the TPZ requirements) during demolition and construction activities and will remain unaltered throughout the duration of demolition and construction. No permit is required.

INJURY (P): Any situation where the TPZ of the tree cannot be maintained and will be encroached upon, but the tree will not sustain injuries severe enough to compromise long-term health and structural stability. This includes situations where the movement of machinery or storage of materials would require disturbance within the TPZ. Measures to mitigate damage to the root zone and canopy (pruning, root exploration, soil de-compaction, mulching, fertilizing, etc.) may be recommended. A tree injury permit is required.

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remove: Any tree that is dead, or that does not required a permit for removal. This also applies to trees less than 30cm in diameter that do not require a permit for removal.

Categories (as per City of Toronto guidelines)

0. Trees with diameters of less than 30cm, situated on private property on the subject site.
1. Trees with diameters of 30cm or more, situated on private property on the subject site.
2. Trees with diameters of 30cm or more, situated on private property, within 6m (non-ravine), or 12m (ravine) of the subject site.
3. Trees of all diameters situated on City owned parkland within 6m of the subject site.
4. Trees of all diameters situated within lands designated under City of Toronto Municipal Code, Chapter 658, Ravine Protection.
5. Trees of all diameters situated within the City road allowance adjacent to the subject site.

Specifications for Tree Protection Hoarding/Fencing

It is necessary to protect all trees designated for preservation during both demolition and construction activities. This tree protection can be accomplished by installing tree protection hoarding or tree protection fencing (TPH or TPF). The TPZ for non-ravine trees is based on the DBH of the tree, and is 6cm TPZ diameter for every 1cm of tree diameter. The TPZ for ravine trees is based on the DBH of the tree, and is 12cm TPZ diameter for every 1cm of tree diameter.

Tree Protection Hoarding should be comprised of plywood mounted on 2 x 4" wood frame (or t-bar if specified). Tree Protection Fencing should be comprised of orange plastic construction web fencing on 2 x 4" wood frame (or t-bar if specified). Horizontal Root Protection Hoarding should be comprised of plywood sheets (for soft surfaces), steel plate (for hard surfaces),

coarse wood chips, and 4 x 4" wood frame (or equivalent) to retain wood chips. In ravine designated or protected natural feature areas, sediment control fencing should be used in addition to tree protection hoarding/fencing. Tree protection should be installed in accordance with the City of Toronto "Tree Protection Policy and Specifications for Construction Near Trees".

Trunk Diameter (DBH) Measured @ 1.4m Above Grade	Minimum Protection Distances Required For:		
	Trees on City Property	Trees on Private Property	Ravine & Natural Feature Protection Trees
< 10cm	1.2m		drip line or 1.2m (whichever is greater)
10-30cm	1.8m		drip line or 3.6m (whichever is greater)
31-40cm	2.4m	2.4m	drip line or 4.8m (whichever is greater)
41-50cm	3.0m	3.0m	drip line or 6.0m (whichever is greater)
51-60cm	3.6m	3.6m	drip line or 7.2m (whichever is greater)
61-70cm	4.2m	4.2m	drip line or 8.4m (whichever is greater)
71-80cm	4.8m	4.8m	drip line or 9.6m (whichever is greater)
81-90cm	5.4m	5.4m	drip line or 10.8m (whichever is greater)
91-100cm	6.0m	6.0m	drip line or 12.0m (whichever is greater)
> 100cm	6cm protection for each 1cm of diameter	6cm protection for each 1cm of diameter	12cm protection for each 1cm diameter or the drip line (whichever is greater)

Replanting plan

Any private tree that is removed for the purpose of construction or land development will require a compensation replanting ratio of 3 to 1, three (3) replacement trees for every one (1) tree removed. City trees will require one (1) replacement tree to be planted on city property for every tree removed. Any private tree that is removed not related to construction will require at least one (1) replacement tree to be planted on private property for every tree removed. These trees must be 50 to 60mm in caliper and maintained in good condition.

Supplemental watering may be required during the drier periods of the year, especially during the first two (2) or three (3) years after planting. In situations where poor site conditions (light, soil, space, etc.) make planting a new tree on the development property impossible, a cash in lieu option may be proposed of $583 per every compensation tree not planted. Please refer to Toronto Municipal Code Article III tree planting instructions and per the City of Toronto Planting Detail PD-101 for transplanting burlap or balled trees.

City of Toronto Application to Injure or Remove Trees Fees

Non-construction related application fees
Applications to injure or remove trees not associated with construction or related activity:

- Private Tree: $137.50 per tree
- City Tree: $411.35 per tree
- Boundary/Neighbour Tree: $287.03 per tree

Construction related application fees
Applications to injure or remove trees associated with activity that includes but is not limited to building, demolition, excavation, boring, placement of fill or surface treatment, storage of construction materials or equipment, storage of soil, construction waste or debris, movement of vehicles and equipment. Applications for Official plan amendment, plan of subdivision and condominiums, site plan control, minor variance, consent and building permits:

- Private Tree: $411.35 per tree
- City Tree: $411.35 per tree
- Boundary/Neighbour Tree: $861.16 per tree

Applications and any additional forms required - must either be mailed, or hand delivered to the Tree Protection & Plan Review Office. Faxed or scanned documents are NOT accepted at this time.

Notes: Payment must be in the form of a certified cheque, bank draft and debit or credit card (MasterCard or VISA).

Permits are generally issued within approximately 6 weeks of the application. Completing and submitting a permit application for tree injury or removal does not guarantee that a permit will be granted.

Tree Protection Signs
A Tree Protection sign should be displayed on the tree protection fencing/hoarding to inform/remind the contractors and public of the tree protection measures in place.

Permit Posting
All approved tree removal/injury permits must be posted on the property during the time of tree work and must be visible from the street.

Fines for illegal tree removal
A person convicted of an offence under City of Toronto Municipal Code Chapter 813, Article III is subject to a minimum fine of $500.00 and a maximum fine of $100,000.00 per tree involved in an offense; a special supplementary fine of $100,000.00 is also possible.

SUMMARY

Cohen and Master Tree and Shrub Services have been retained to prepare this supplemental Arborist Report for construction at the back of the property at 121 St George St, Ward 11 – University-Rosedale. The tree assessment was completed on August 25, 2022, according to the requirements set forth by the City of Toronto Urban Forestry Department (TUF). This is a supplemental report to the previous reports submitted, as an addition to the scope of work, including the back portion of the property. The additional scope of work includes excavation required for a new electrical feeder line running through the back courtyard, required to increase capacity for the new ramp snow melt system, as well as construction machinery access through the rear courtyard.

CONSTRUCTION CONTEXT

The proposed development includes the construction of a new accessibility ramp at the front of the building. This additional scope of work includes the required new electrical line to run through the back courtyard below grade, to increase the capacity of the new ramp snow melt system for the proposed ramp at the front of the property. There will be no encroachment within the TPZ's of the trees in the rear courtyard, however, the trees will require protection due to the movement of construction machinery through and adjacent to their TPZ's.

ROOT EXPLORATION

For the proposed electrical feed path (outlined in drawing TPP-2), Cohen and Master Tree and Shrub Services recommends the Best Management Practice of day-lighting the tree roots using the Air Spade soil excavation system in tandem with the Air Vac system for collecting debris. It is our preferred method to daylight roots without causing damage to the bark of the roots. Typically for an Air Spade excavation around tree roots, a maximum air stream pressure of 100 pounds per square inch (PSI) is utilized to minimize damage to the root bark. All work is to be done in the presence and under the supervision of an ISA Certified Arborist.

TREES REQUIRING PROTECTION

All trees in the rear courtyard will require tree protection. Tree Protection should consist of 1.2m high plywood tree protection hoarding on 2 x 4" wood frame, and where required, horizontal root protection consisting of Root Armour, designed for root zone protection through weight load distribution, more effectively than plywood and wood chips. Please see specifications at the end of the report.

Tree Protection Hoarding/Fencing should be installed prior to any demolition or construction activities as outlined.

Tree #	Tree Species	Botanical Name	DBH (cm)	Overall Tree Condition	Tree Protection Zone (m)	Tree Protection
6	Littleleaf Linden	*Tilia cordata*	36.5	Good	2.4m	1.2m high plywood tree protection hoarding and horizontal root protection
7	Japanese Lilac	*Syringa reticulata*	11	Good	1.8m	1.2m high plywood tree protection hoarding
8	Black Walnut	*Juglans nigra*	83	Good	5.4m	1.2m high plywood tree protection hoarding and horizontal root protection
9	Callery Pear	*Pyrus calleryana*	29	Fair	1.8m	1.2m high plywood tree protection hoarding
10	Callery Pear	*Pyrus calleryana*	31	Fair	2.4m	1.2m high plywood tree protection hoarding
11	Littleleaf Linden	*Tilia cordata*	23	Good	1.8m	1.2m high plywood tree protection hoarding
12	English Elm	*Ulmus procera*	36	Good	2.4m	1.2m high plywood tree protection hoarding and horizontal root protection

LIMITATIONS OF ASSESSMENTS

It is the policy of Cohen and Master Tree and Shrub Services to attach the following clause in regards to limitations. This is to ensure that the client is fully aware of what is technically and professionally realistic in the preservation and assessment of trees in the urban environment.

The assessment of the trees in this report has been done in conjunction with and according to accepted arboriculture methods and techniques. These include an examination of the above ground parts of the tree for structural defects, scars, cracks, the overall condition of the root structures, the severity and direction of lean (if any), the general condition of the trees and the surrounding environment, external indications of decay such as fungal fruiting bodies, evidence of attack by insects, symptoms of infestation and pathogens, discoloured foliage, and the proximity of potential targets should a tree fail. Except where specifically noted, the trees were not cored, probed or climbed and there was no detailed inspection of the root crowns involving excavations, or samples taken to be scientifically tested.

Notwithstanding the recommendations and conclusions presented in this report, it must be acknowledged that trees are living organisms. They are not immune to changes in site conditions, dramatic weather events or seasonal variations in climate. Therefore it should always be recognized that trees are ever evolving and their health and vigour constantly vary over time. While all reasonable efforts have been made to ensure that the subject trees are healthy, no guarantees are offered or implied that these trees or part(s) of any trees will remain intact.

It is professionally and practically impossible to predict with absolute certainty the behaviour of any tree or its component parts under all circumstances and variables. Most trees have the potential for failure under adverse weather conditions and the risk can only be completely eliminated if the tree is removed. Inherently, a standing tree will always pose some level of risk. Although every effort has been made to ensure that this assessment is reasonably accurate, trees should be re-assessed periodically. The assessment presented in this report is valid at the time of inspection.

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ISA Certified Arborist - ON 2490A
adam@cmtrees.com

BRICK BUILDING
(2 STOREY)
'INDUSTRIAL RELATIONS & HR'

No. 123

121 ST. GEORGE STREET

1.2m HIGH PLYWOOD TREE PROTECTION HOARDING ON 2x4" WOOD FRAME

HORIZONTAL ROOT PROTECTION HOARDING

AIR SPADE ROOT EXPLORATION LINE

1.2m HIGH PLYWOOD TREE PROTECTION HOARDING ON 2x4" WOOD FRAME

HORIZONTAL ROOT PROTECTION HOARDING

1.2m HIGH PLYWOOD TREE PROTECTION HOARDING ON 2x4" WOOD FRAME

EXTENT OF HOARDING

LEGEND

- Deciduous Tree (Preserve)
  - *Tree #*
  - *Species*
  - *Tree Diameter (cm)*
  - *Tree Protection Zone*
- TREE PROTECTION HOARDING PLYWOOD ON 2 X 4" WOOD FRAME
- AIR SPADE LINE
- HORIZONTAL ROOT PROTECTION HOARDING

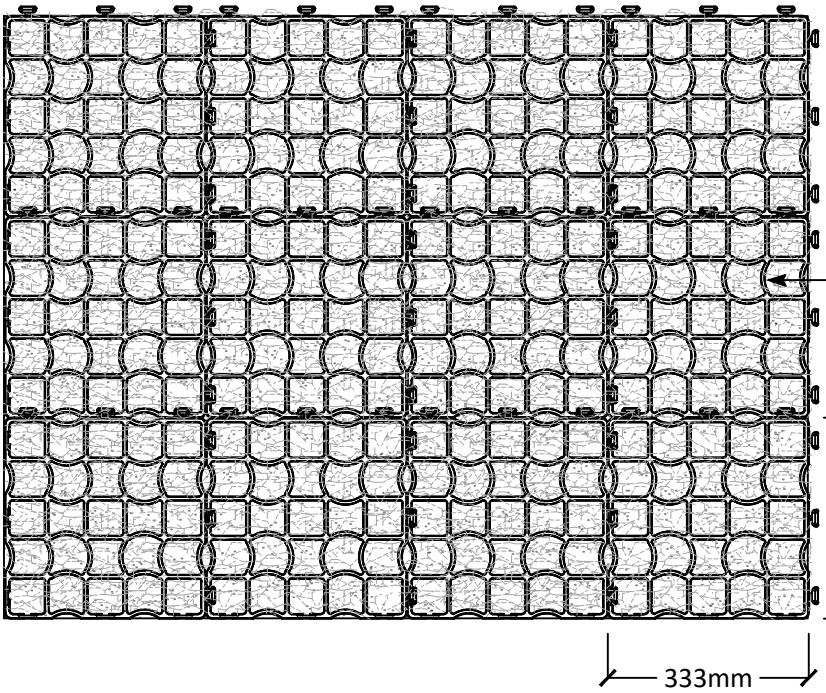
COHEN & MASTER™
TREE AND SHRUB SERVICES

Project Address

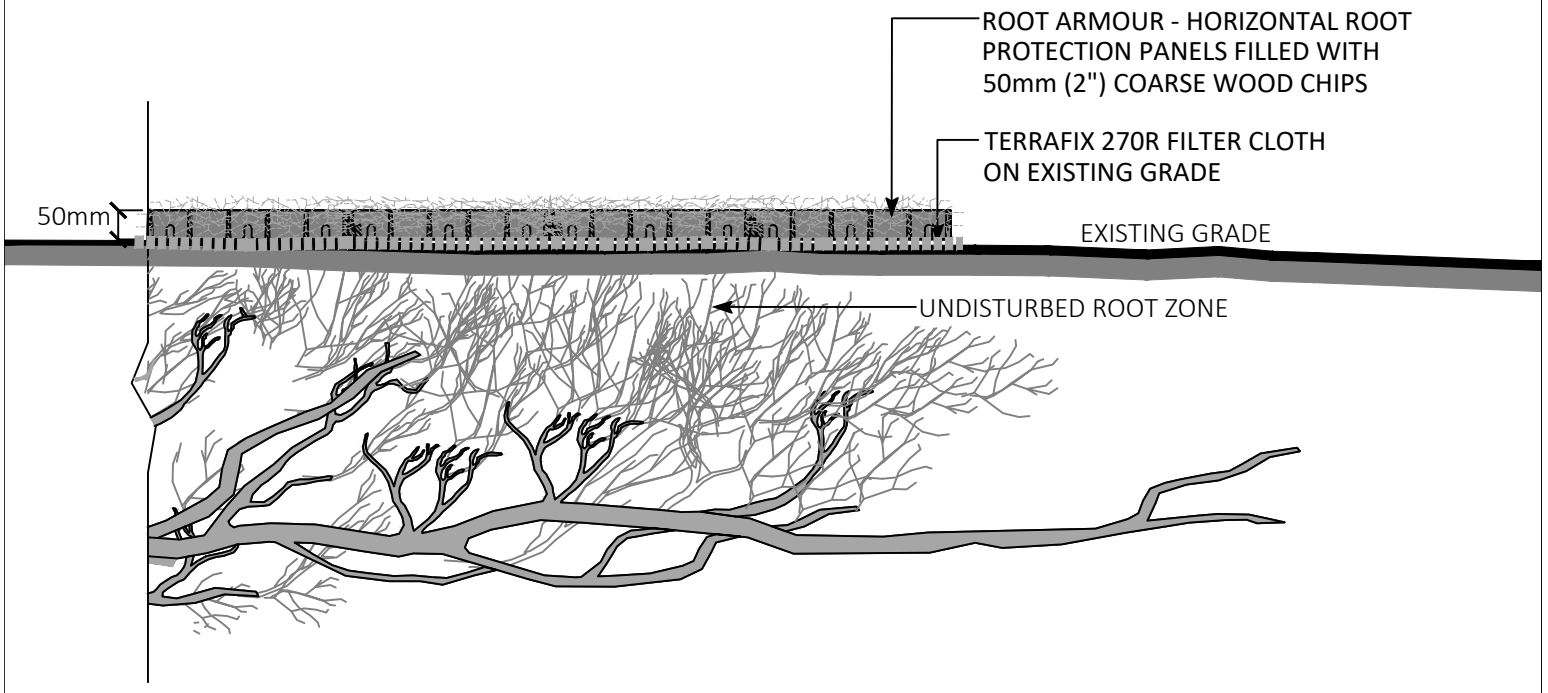
121 ST GEORGE ST
TORONTO, ON
M5S 2E8

Title	Tree Protection Plan (Rear Courtyard)
Scale	1:150
Drawn	AW
Checked	BF
Date	FEB/2024
Project #	#59150
Sheet	TPP-2

THIS DETAIL IS TO BE USED WHERE VERTICAL TREE PROTECTION HOARDING CAN NOT BE USED WITHIN TPZ



PLAN VIEW



CROSS SECTION VIEW

1.1 Refer to attached Existing Water Irrigation System As-Built Drawing by the University of Toronto, Aug. 31, 2021 (1 page).

1.2 This information given in this report was obtained for the use of the Owner in the execution of the design. It is presented in good faith to assist the Contractor and their subcontractors.

1.3 It is incumbent upon the Contractor to make whatever additional investigation they feel may be required for the proper execution of the Contract at no additional cost to the Owner.

1.4 Examine the conditions on the site, present site conditions.

End of Section 00350

123 ST. GEORGE ST.

121 ST. GEORGE ST.

WOODSWORTH COLLEGE
119 ST. GEORGE ST.

PROPERTY LINE

PROPERTY LINE

PROPERTY LINE

#1 #2 #3 #4 #5 #6 #7 #8 #9 #10 #11 #12 #13 #14 #15 #16

10.3m

5.6m

6m

13.5m

3.45m

15.6m

1.5m

RAIN BIRD
ESP-LXME CONTROLLER
MOUNTED ON SIDE OF
STAIRS. 16 ZONES

LEGEND

- RAIN BIRD LXME CONTROLLER
- RAIN BIRD 1804 PRS FIXED SPRAY HEAD
- RAIN BIRD 1806/1812 PRS HIPOP SPRAY HEAD
- RAIN BIRD 5004 PRS PLUS ROTOR SPRINKLER
- RAIN BIRD 5004 PRS PLUS ON RISER
- RAIN BIRD 3504 PRS ROTOR SPRINKLER
- RAIN BIRD 3504 PRS ROTOR SPRINKLER ON RISER
- MAIN LINE PIPE
- LATERAL PIPE
- WATER SOURCE:POINT OF CONNECTION
- VALVE BOX WITH ZONE VALVES
- FIRE HYDRANT

NO.	DATE	DESCRIPTION
01	08.31.2021	ISSUED FOR REVIEW

ROY NEVES Certified Irrigation Designer CID Irrigation Association 004171

95 ORMONT DRIVE
TORONTO, ONTARIO M9L 2S3
TEL: 416-746-8860
FAX: 416-740-6132

PROJECT

UNIVERSITY OF TORONTO

119 ST. GEORGE ST
TORONTO, ONTARIO

DRAWING TITLE

119 ST. GEORGE ST
WOODSWORTH COLLEGE
CONTROLLER
IRRIGATION SYSTEM
AS BUILT DRAWING

DATE: AUGUST 31, 2021

SCALE: AS INDICATED

SHEET: IR-1

1 GENERAL

1.1 Unless specified otherwise, the following instructions shall apply to all sections of the work. Where conflicts may exist in the tender documents the owner's (U of T) specifications shall govern.

1.2 Conform to The Ontario Building Code (latest edition), CEC CSA C22, (latest edition) CAN3-B44 and CSA W59.1 - latest editions, where applicable, to the Canadian Code for Construction Safety, as currently amended, and to the Construction Safety Act, Ont. as currently amended, and to all other applicable codes and Building By-Laws hereinafter referred to as Codes; and to the requirements of the authorities having jurisdiction, including public utilities, referred to in the Contract Documents as the authorities.

1.3 Conform to regulations of Municipality having jurisdiction regarding clean-up of tracking on streets and protection of sidewalks and curbs, and all other applicable laws, By-laws and Regulations.

1.4 Read General Work - Section 01015, for instructions and requirements regarding General Work and Services, Miscellaneous Work and Services and Temporary Work and Services. Trades requiring own offices, sheds, etc. shall provide, maintain, relocate, and remove same in a manner satisfactory to Contractor.

1.5 Establish rates of wages, hours, and conditions of work, in accordance with Provincial Codes and as generally recognized and accepted in locality. Wherever possible, give preference to use of local labour, building mechanics, suppliers, and subcontractors.

1.6 Install and arrange ducts, piping, tubing, conduit, equipment, and fixtures in such a way as to conserve head room and space as much as possible, to provide minimum interference and to be neat, orderly and tidy. Unless otherwise noted, run pipes, ducts, tubing, and conduit vertical, horizontal, and square with building grid. Conceal pipes, ducts, tubing, and conduit above ceilings, behind furring, in walls, except in mechanical rooms, equipment rooms and unfinished spaces, unless indicated or specified otherwise.

1.7 In all cases where a device or part of the equipment is herein referred to in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the installation.

1.8 Definitions

.1 Wherever the words 'approved', 'satisfactory', 'directed', 'permitted', 'inspected', 'instructed', 'required', 'submit', 'ordered', or similar words or phrases are used in the Contract Documents, it shall be understood, unless the context provides otherwise, that the words 'by (to) the Architect' follow.

.2 The words 'by others' when used in the Specifications or on the Drawings shall not mean by someone other than the Trade Contractor. The only means by which something shown or specified shall be indicated as not being in the Contract is by the use of the initials 'NIC' or the words 'not in (the) Contract', 'by owner', or by another Contractor.

.3 Exposed: means when visible by the occupants at completion of the work, unless scheduled or specified otherwise.

.4 The use of scope, related work, or similar articles in the specifications shall not relieve the contractor from their responsibility to assign the various parts of the work to the appropriate subcontractors and forces and shall not impose upon the Architect or Owner the duty to arbitrate disputes between the Contractor and the Subcontractor, nor shall it relieve the subcontractors from their responsibility for carefully examining all the Drawings and Specifications and coordinating their work with each other and the Contractor.

.5 Sepia: Chemically eradicable brown line reproduction on translucent paper.

2 CO-OPERATION – WORKING WITHIN AN OCCUPIED FACILITY

2.1 Co-operate and co-ordinate with other trades as required, for satisfactory and expeditious completion of work. Take field dimensions relative to work. Fabricate and erect work to suit field dimensions and field

conditions. Provide forms, templates, anchors, sleeves, inserts and accessories required to be fixed to, or inserted in work, and set in place or instruct related trades as to their location. Pay cost of extra work caused by and make up time lost, as a result of failure to provide an adequate time, the necessary co-operative information of items to be fixed to, or built in.

2.2 Co-operate with the building and their use of the existing facility. Co-ordinate work schedule and activities with the schedule of the building to avoid disruption to the on-going use of the site and adjacent buildings.

3 MATERIALS

3.1 Reserved

3.2 Reject material damaged in transit. Store packaged materials in original undamaged containers with manufacturer's labels and seals intact. Handle and store materials in accordance with manufacturers' and suppliers' recommendations. Prevent damage. Remove from site and replace damaged materials.

3.3 Conform to the Products, tables and standards in Section 01016 for the following:

.1 Metals
.2 Gauges & Equivalent Thickness
.3 Glass
.4 Concrete, Masonry, Paving
.5 Finish for Aluminium, Baked on Coatings
.6 Pencil Hardness Test
.7 Finish for Aluminium, Hard Anodizing

4 EXAMINATION

4.1 The Contractor affirms that before tendering, they did examine the site and ascertain the extent and nature of all conditions affecting the performance of the work including the existing building and including the location of all buried services which may have to be protected, removed or relocated. No extras will be allowed for anything which would have been revealed in the course of such an examination.

4.2 The Contractor affirms that before tendering they did examine the Specifications, Drawings, and other tender documents thoroughly. It shall be assumed that the Contractors thoroughly understands these documents, including those items about which questions have been asked and written instructions given.

4.3 Examine work upon which your work depends. Application of your work or any part of it shall be deemed acceptance of work upon which your work, or that part of it which has been applied, depends.

4.4 Drawings are in part, diagrammatic and incomplete, and are intended to convey scope of work and indicate general and approximate location, arrangement and size of fixtures, equipment, ducts, piping, conduit and outlets. Obtain more accurate information about locations, arrangement and sizes, from study and coordination of construction drawings, including architectural, structural, mechanical and electrical and become familiar with conditions and spaces affecting these matters before proceeding with work.

4.4 Where job conditions require reasonable changes in indicated location and arrangements, make changes at no extra cost to Owner. Install and arrange ducts, piping, conduit, equipment and fixtures in such a way as to conserve head room and space as much as possible.

5 SCAFFOLDING

5.1 Erect scaffolding independent of walls. Use scaffolding to interfere as little as possible with other trades. When not in use, move scaffolding as necessary to permit installation of other work. Construct and maintain scaffolding in rigid, secure and safe manner. Remove scaffolding promptly when no longer required. Scaffolding must comply to Occupational Health and Safety Act.

6 FLOOR SURFACES

6.1 Adequately protect existing and new floors and finishes from damage. Take special measures when moving heavy loads or equipment on them.

6.2 Keep floors free of oils, grease, or other material likely to damage them, discolour them, or affect bond of applied finishes.

6.3 Once building is enclosed, keep floors as dry as possible after curing.

7 PROTECTION AND MAKING GOOD

7.1 Protect existing property, adjacent public and private property, and work of other sections from damage while doing work.

7.2 Damaged work and property shall be made good wherever possible by those performing work originally, but at expense of those causing damage.

7.3 Attach and fasten fixtures and fittings in place in safe, sturdy, secure manner so that they cannot work loose or fall or shift out of position during occupancy of building as a result of vibration or other causes in normal use of building.

7.4 If, during work, any buildings, curbs, walks, roads, or landscaping are damaged, repair or replace them to the satisfaction of Architect and the local jurisdiction.

7.5 Protect glass and other finishes against heat, slag, and weld spatter, by erecting sturdy plywood or another heavy shield.

7.6 If tape or strippable coatings are used to protect finished metal surfaces, do not allow them to become baked on or to thermo-set.

8 IMPACT DRIVEN FASTENINGS

8.1 Do not use impact driven (explosive, hammer, etc., but not twist driven) fastening devices without written approval. Properly size holes in concrete and drill cleanly to avoid over-sizing for expansion anchors. When drilling upward, use jig to hold drill steady and plumb.

9 ALTERATIONS AND MAKING GOOD

9.1 Wherever it becomes necessary to cut or interfere in any manner with existing services and apparatus, do so at such times as approved by the Architect. Give minimum advance notice of one week and provide sufficient information of such requirements.

9.2 Consider existing installations to ensure best arrangement of pipes, conduit, ducts, and mechanical, electrical and other equipment in available space. For critical locations, prepare interference and installation drawings showing work of various sections as well as existing installations, for approval, before commencing work.

10 STANDARDS

10.1 Where initials of an organization are used, followed by number or combination of numerals and letters, this designates a standard produced by the organization. Conform to issue of standard so designated, as amended and revised to date of contract. When designation does not indicate a specific edition of standard edition current at date of Contract shall apply.

10.2 Wherever a standard confers upon a person, a body politic or a body corporate the right to approve, to select, to exercise authority or to interpret the standard, and refers to that person, body politic or body corporate as the Authority having jurisdiction, the Authority, the Engineer, the Department, the Purchaser, the Contracting Officer (e.g. U.S. Fed. Spec.) or by some other such designation, the Architect shall have the right to exercise the powers of any such person, body politic, or body corporate.

10.3 Where standards and manufacturer's instructions conflict with the Contract Documents, the Contract Documents shall govern.

11 FINISHED DIMENSIONS AND ELEVATIONS

11.1 See Article on Setting Out, in Section 01015. Give attention to finished dimensions and elevations of the work. Make finished work fit indicated spaces accurately. Make finished work flush, plumb, true to lines and levels and accurate in all respects.

12 NON-PAYMENT

12.1 All those doing work or supplying materials shall notify the Architect in writing if the Contractor fails to make payment when due. Failing such notice, the Architect will assume that payments have been duly made.

13 CLEANING AND CONTRACT CLOSE-OUT

13.1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

13.2 Store volatile wastes in covered metal containers and remove from premises daily.

13.3 Prevent accumulation of wastes which create hazardous conditions.

13.4 Provide adequate ventilation during use of volatile or noxious substances.

13.5 Use only cleaning materials recommended by manufacturer on surface to be cleaned, and as recommended by cleaning material manufacturer.

13.6 Reserved

13.7 Cleaning During Construction

.1 The successful Contractor will be responsible to maintain the work areas and designated storage areas in a neat, orderly, and clean condition and remove all excess materials and/or garbage from the site, daily.

.2 Provide on-site containers for collection of waste materials and rubbish. Location to be co-ordinated with Architect and Owner.

.3 Remove waste materials and rubbish from site on an ongoing basis.

.4 Clean interior building work areas daily or as needed, until work is complete.

.5 Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces or disrupt occupants.

.6 Promptly as the work proceeds and on completion, the Contractor shall clean up and remove from the premises all rubbish, surplus materials and equipment resulting from their work.

.7 Before final inspection, replace glass and mirrors that have been broken, damaged and/or etched during construction, or which are otherwise defective.

.8 Include in Work final cleaning by skilled cleaning specialists on completion of construction.

.9 Remove temporary protections and make good defects before commencement of final cleaning.

.10 Remove dust, stains, paint spots, soil, grease, fingerprints, and accumulations of construction materials, interior and exterior to the building. Perform cleaning in accordance with installer's instructions for each material. Final cleaning shall include:

.1 Cleaning and polishing of glass; porcelain, enamel, and finish metals; washroom accessories.
.2 Vacuum cleaning of ceilings, walls, and floors.
.3 Cleaning and waxing of floors.
.4 Cleaning of glazed wall surfaces.
.5 Cleaning of hardware, mechanical fixtures, lighting fixtures, cover plates, and equipment, including polishing of their finish metal, porcelain, vitreous, and glass components.
.6 Removing of visible labels left on materials, components, and equipment.
.7 Cleaning of masonry and concrete, if so directed by the Architect.
.8 Cleaning of millwork and doors.

13.8 Final Inspection and Closeout

.1 Submit proposed closeout procedures and schedule of inspection to Architect for approval before final inspections commence.

.2 Arrange for, conduct and document final inspections, closeout and take-over at completion of work of this specification in accordance with procedures described in OAA/OGCA TAKE-OVER PROCEDURES, OAA/OCGA Document No. 100, April 1997.

.3 Substantial completion cannot be applied for until the building is approved for occupancy by the local Building Authority, maintenance manuals have been submitted, operating instructions to the Owner have been completed and percentage of completion as per the Construction Lien Act has been obtained.

14 TRADEMARKS AND LABELS

14.1 Trademarks and labels shall not be visible in the finished work except for labels of ULC and other similar authorities and except where necessary to identify mechanical and electrical equipment, for maintenance and replacement and except where specified otherwise.

14.2 Except as provided in the foregoing paragraph, locate trademarks and labels on concealed or inconspicuous surfaces or remove by grinding if necessary or paint out where surface painted, if located conspicuously.

15 MAINTENANCE MANUALS

15.1 Under Section 01015-General Work, the Contractor is required to assemble maintenance manuals. All Trade contractors shall cooperate by submitting shop drawings and maintenance instructions in accordance with Section 01015. Submit instructions for cleaning, repairing, refinishing and freshening all finished surfaces. Submit operating, lubricating, repair, and other instructions to keep all equipment in good working order. All materials and equipment which suffers damage as a result of inadequate instructions or improper maintenance not covered by instruction or failure to warn of imperfect or harmful maintenance materials or procedures, shall be made good by the contractor at no extra cost to the Owner.

16 BURIED SERVICES

16.1 The Contractor shall be responsible for keeping records of all buried services. The Trade contractors concerned shall provide the Contractor with all necessary dimensions required to accurately locate those services.

17 EXISTING SERVICES

17.1 Where work involves breaking into or connecting existing services, carry out work at times directed by governing authorities, with minimum of disturbance to the operation of the facility, pedestrian, and vehicular traffic.

17.2 Before commencing work, establish location and extent of service lines in area of work and notify Architect of findings.

17.3 Where unknown services are encountered, immediately advise Architect, and confirm findings in writing.

17.4 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.

17.5 Remove abandoned service lines to distance of six feet from foundations. Cap or otherwise seal lines at cut-off points, in manner approved by authorities having jurisdiction over service.

17.6 Record locations of maintained re-routed and abandoned service lines. The Trade Contractors concerned shall provide the Contractor with all necessary dimensions required to accurately locate those services.

17.7 The appropriate Contractor shall assume full responsibility for the locations and protection of all under and above ground utilities, such as water, sewer and gas mains and building connections, hydro and telephone poles, wires, and conduits, etc. when excavating or digging below grade whether they are shown on the plans or not.

17.8 Where the location of any of these utilities has been shown on the plans, such information is not guaranteed. It is the appropriate Sub-contractor's responsibility to verify locations, invert elevations, etc., immediately after moving on the site. If for any reason the information obtained necessitates changes in procedures or design, advise the Architect at once. If this verification of existing conditions is not done at the outset and any problems arise, the responsibility for same will be entirely the Contractor's.

17.9 Contractor to provide temporary support of existing service lines, ductwork, and pipes where work requires excavation or demolition below or above existing lines or services or ductwork for construction of new footings, foundations, walls etc. Services shall be maintained at all times while building is occupied.

18 SAFETY

18.1 The Contractor will be responsible for submitting their safety program used in the ongoing operation of their company and any safety recommendations specifically relating to the tendered project.

18.2 Safety measures or procedures taken by the Contractor i.e. site safety meetings, site construction fences, etc., will not relieve the Contractor of their responsibilities for the safety of persons and property, and for compliance with the federal, provincial and local statutes, rules, regulations and orders applicable to the conduct of the work.

18.3 Submit copies of all Safety Meeting Minutes to Architect and Owner.

19 EMBEDDED CONDUIT, PIPE AND SLEEVES

19.1 Concrete Slabs

19.1.1 Conduits or pipes in concrete slabs. All pipes and conduits shall be depressed to pass under the slab.

19.1.2 Sleeves, conduits and pipes which pass through suspended slabs, beams, or walls, shall be in approved locations which do not impair the strength of the construction. Space them all not less than three diameters o.c.

20 SOUND ATTENUATING PARTITIONS

20.1 Avoid 'short circuiting' sound attenuating partitions by the careful location and treatment of ducts, grilles, diffusers, etc., and of electrical outlets and boxes, etc. Where electrical boxes are back-to-back, serving each side, locate them at least 10 inches (250 mm) apart laterally and if interconnected, use flexible connections.

End of Section 01010

1 EXAMINATION

1. Throughout the project, examine the work of all trades and promptly notify the Architect if any conditions do not or will not comply with the drawings and specifications.

2 SETTING OUT

1. Lay out work from control benchmarks and indicated verified reference points.

2. The General Contractor will provide layout lines and benchmarks for work on all other areas once they begin work on the site.

3. Protect and preserve benchmarks and reference points. Inform Consultant immediately if bench marks or reference points are disturbed or damaged by any work and pay for their repair and/or replacement.

4. Locate and fix grid lines and locations of walls, partitions, shafts, and all parts of the construction as work proceeds.

5. Verify grades, lines, levels, and dimensions indicated, particularly with road and sidewalk elevation, and report any errors or inconsistencies to the Architect before commencing work. Confirm job dimensions at once to allow prompt checking of shop and other drawings.

6. As work progresses, provide and maintain benchmarks at each floor, giving exact elevation of finished floor.

3 PROTECTION

1. Conform to Ontario Building Code 2012, and The Construction Health and Safety Act, all as currently amended.

2. Provide spare safety helmets for and enforce their use by Owner, Architect, their representatives and any authorized visitors to site.

3. Protect excavation, trenches, and buildings from damage by rain, water, ground water, backing up of drains or sewers and other water, frost and all other weather conditions. Do not allow footings or slabs to be placed on frozen ground. Do not permit excavations to reach full depth indicated when freezing temperature may be expected unless footings or slabs can be placed immediately after excavation has been completed. Protect excavations from frost by placing of suitable approved insulating material to adequate depth, if placing of concrete is delayed and after placing of concrete until backfilling occurs or freezing conditions terminate. Provide necessary pumps (including spare pumps) and temporary drainage for keeping project free of water throughout construction period. Pump water to public sewers or ditches by approved means. Refer to soils report for details. Control grading around excavations to prevent surface water from draining into excavation and from damaging adjoining property.

4. Protect building from movement and damage, especially during filling and compaction and until elements are securely anchored and cannot be damaged or moved by filling or compaction. Obtain approval of authorities having jurisdiction for such work and make changes as required by them.

5. Provide temporary 7'-6" (2.30 mm) high chain link fences complete with steel tubular top rail supports and steel posts, with chain link gates and locks, to enclose exterior construction and storage area, and pavement protection as required for protection of public, and of public and private property and as required by law and by authorities having jurisdiction. Erect sturdy railings around shafts, stair wells and the like to protect workers and public from injury. Equip foregoing protection with warning lights and signs. Alter, remove and relocate or replace hoardings, barriers, and entrances therein as required by authorities having jurisdiction and by the work. Hazards requiring such protection shall be eliminated as soon as possible and protection devices removed. Maintain fences, gates until construction is complete. Keep free from unauthorized signs.

6. Provide hoarding protection in conformance with municipal and UofT requirements along all streets where new exterior construction and/or demolition is along the property line and the street sidewalk.

7. Provide and maintain in working order, adequate, temporary Canadian Underwriters labelled, chemical solution (soda acid) Class A.1, fire extinguishers and locate in prominent positions to approval of authorities having jurisdiction.

8. Utilities and Services – Prior to starting the work contact the Public Utilities for location of underground services.

4 AS-BUILT DRAWINGS

1. Maintain as work progresses, accurate records of changes to the Drawings and concealed services. Accurate locations, depth, size, and type of underground utilities shall be included in these record drawings. The General Contractor will be supplied with clear prints of the floor plans for making these recordings. As-built drawings will be reviewed at each site meeting and must be properly maintained to receive Architect's approval before the monthly certificate draw will be approved.

2. Keep a daily record showing the progress of the work and all factors affecting the work, i.e., weather, strikes, accidents, shipping delay, etc.

3. The General Contractor shall also supply as-built drawings on computer disks in AutoCad latest edition by a professional drafting service. Approval shall be obtained by the Architect for approval of the professional drafting service.

4. Completed as-built drawings and instruction and warranty manuals shall be submitted prior to requesting substantial completion.

5 FIELD OFFICE & STORAGE AREA

1. Field Office: General Contractor to provide field office at site for Contractor's and Consultants' use. Provide janitor service for periodic dusting, cleaning, and removal of rubbish. Include construction and operating hardware, with security locks, as required. General location of office is shown on site plan.
2. Storage Area: General Contractor to provide storage area at site for products and

tools. Include construction and operating hardware, with security locks, as required. Separate storage for painter's materials and tools from other storage areas. General location of storage area is shown on site plan.

6 WASHROOM CONVENIENCES

1. Use of existing toilets in existing building is allowed on the condition that work force will not travel to areas not authorized or interfere with events or event preparation.

7 TEMPORARY DRAINS

1. Excavations, and building site and building shall be always kept free from water by means of trenches to sewers or pits from which it shall be pumped away and disposed from the site.

8 TEMPORARY WATER SERVICE

1. The Owner will make available the water supply from the building service for the use of the General Contractor. Supply is limited to one connection. Contractor will connect to service and provide all the required hose extensions, valves, etc.

9 TEMPORARY TELEPHONE AND FACSIMILE

1. The General Contractor shall provide and pay for a private telephone and facsimile until their work is complete.

10 TEMPORARY ELECTRICAL SERVICE

1. The Owner will make available hydro power for the use of the General Contractor from the building service (typically 15amp u-ground plugs). Contractor will be responsible to connect to service and shall supply all temporary feeds and lights necessary to the operations under this contract and including all power connections necessary to supply to the Trade Contractors on site. The Contractor shall provide and pay for the cost of any temporary power generators if required to carry out the work.

11 TEMPORARY HEATING

1. Provide temporary heat, heating equipment, and shelter, to keep that work which requires protection from cold, adequately warm and sheltered from elements and to allow it to be done safely and well, maintaining minimum temperature of 16 degrees Celsius (60 degrees F.) when finishing is being done and when building is closed in, until completion of work. Provide heating for materials affected by cold, both in storage and during construction. Construction requiring heat shall be suitably enclosed.

2. Do not use salamanders. Use temporary electric heaters of forced warm air type, operated in well-ventilated location and vented to exterior or radiant panel type. If used in areas of completed building, provide protection on floors and adjacent surfaces to prevent damage to floors and adjacent surfaces, particularly when re-fueling.

3. Provide temporary heat for interior spaces to maintain a minimum temperature of 16 degrees Celsius (60 degrees F.) throughout the building at all times.

12 TEMPORARY USE OF PERMANENT HEATING SYSTEM

1. Permanent heating and ventilation system may be used for temporary heating and ventilation only if the Architect gives their approval to do so in writing, and when piping is complete, all units are connected, all pumps and valves are installed and operating properly, all strainers are installed and permanent or temporary filters are installed, and entire system has been tested and is safe operating condition, and when no further shut-down of system will be necessary for future conditions.

2. Do not use air distribution system until permanent or temporary filters are in place. Filter air distribution system to prevent dirt and dust from entering units via return air. Keep unused ducts sealed to prevent entry of air. Replace or clean filters frequently during construction to minimize entry of dirt. Clean (if cleanable) or replace filters before turning over system to Owner.

3. Put system in charge of fully trained and experienced operator at all times. If required, operators shall be selected jointly by Owner and Contractor with a view to permanent employment by Owner upon completion. Operators shall qualify as set out in Operating Engineers Act, if applicable.

4. Clean, maintain and repair heating and ventilation system as require throughout its use during construction. Notify manufacturer and Architect immediately before turning over new heating equipment to Owner so that heating items may be checked for possible damage during temporary heating period. Make good damage to heating and air distribution equipment. Replace all worn parts and turn over system to Owner in clean, new condition, operating with circulating water properly treated chemically.

5. Permission might be given by the Architect in writing only upon 100% operation completeness of the systems. Neither the Owner nor the Architect are under any obligation to grant permission to use permanent heating system during construction period.

13 EXISTING ROADS

1. The Contractor shall protect existing roads, sidewalks, curbs and provide mud mats (if required) to the satisfaction of the Municipal Authorities and replace any that become damaged due to any operations under this contract.

14 STORAGE

1. Provide and erect where directed, weathertight storage facility of suitable size, with floor at least 12" off ground for storage of cement and lime. Contractors and subcontractors shall provide their own workshops and storage facilities for entire length of construction. At no time may the existing building be used for storage of materials.

15 DELIVERY AND STORAGE OF MATERIALS

1. Arrange for early deliveries necessary for execution of work without delay and have materials on job well in advance of the time it is needed.

2. Deliver, store and handle materials to exclude foreign material and prevent damage, soiling or breakage.

3. Materials to be stored on site, which need to be protected from weather, shall be so protected.

4. Packaged materials shall be delivered in packages with manufacturer's seals and all labels intact.

5. Delivery of materials, tools and supplies including the removal of disposable material from the site must be from/to exterior of the building only and NOT through the building.

6. Contractor is responsible to co-ordinate with City authorities for deliveries, if deliveries impact on pedestrian and vehicular traffic at street level.

16 BUILDING AND PREMISES

1. Owner reserves right to take over any completed portion prior to the specified completion date provided it does not affect completion of remaining work.

2. The facility and adjoining properties will remain functional and operational for the full duration of the project. The contractor is responsible to develop, implement, install, maintain and ensure areas outside and/or affected by the work are fully delineated, accessible and functional for the full duration of the project.

3. Provide and maintain temporary ladders, ramps, walks and hand rails as necessary during construction in compliance with requirements of The Occupational Health and Safety Act.

4. If Owner is forced to occupy construction areas or parts thereof prior to completion, but after date of Substantial Performance, Contractor shall not be entitled to indemnity for interference with the performance of the work.

5. During the Work, the contractor's force will have access through the existing building to the work area, and all locations where work must take place, however the contractor has full responsibility for the construction site. The building and premises will be occupied during construction typically Monday to Friday, from 8:30am to 4:30pm and depending on the schedule the building may be in operation 7 days a week, including evenings as per calendar of shows and performances.

6. Building occupant's activities take precedence. Contractor shall work around activities to complete work on time – accounting for afterhours/overnight and weekends at no extra cost.

7. Demolition and construction work that impacts facility's ongoing activities, shall be carried out after hours, outside the facility's regular working hours. Execute work in and outside existing building at times approved by Consultant and as mutually

agreeable to Owner so not to inconvenience the occupation, HEALTH AND SAFETY, or in any manner hinder the use of building. Provide a minimum of 48 hours' notice to owner prior to carry out any work that could disrupt ongoing activities.

8. All existing access doorways, stairways, and ramps into and within the building are required exits and shall be maintained operational and accessible at all times.

9. Ensure that construction personnel perform work in existing building only as required under the Contract; and that they use it as access to work areas only. Keep traffic through existing occupied areas to an absolute minimum in executing the Work. Secure construction areas as required to ensure safety of the occupants. Construction personnel shall use areas of the existing buildings only in a manner as determined by the Work. Do not take meal and coffee breaks within the building.

10. Minimize noise disruption (of any kind) to facility's occupants and neighboring residents. Vulgar language from workers will not be tolerated as well as noise from radios.

11. Take all measures to minimize and control offensive odours, chemicals, liquids, noise, dirt and dust during work. Dust created as a result of construction is to be cleaned by the contractor.

12. Before entering existing premises to carry out Work, or to obstruct, or take out of use any area of existing premises, or to cause any other interference, request meeting with Architect and Owner in order to reach agreement as to time and length of time you may cause interference, possess, obstruct or remove from use any such area or services.

13. All workforce members are required to sign in with security every day at start of their shift and sign out when they leave.

17 OWNERSHIP OF MATERIALS

1. All work or material delivered on the site or premises to form part of the works shall be considered the property of the Owner and shall not be removed without the consent of the Architect, but the Contractor shall have the right to and shall remove the surplus materials after he has completed the work. If so directed by the Architect, such surplus materials shall be removed at any time prior to the completion of the work.

2. All materials which are to be removed from the existing site and are not called for to be re-used or specifically called for in the specifications to be turned over to the Owner, shall become the property of the General Contractor and shall be removed from the site.

18 DETAILS AND MEASUREMENTS

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

2. Verify that work, as it proceeds, is executed in accordance with dimensions and

positions indicated which maintain levels and clearances to adjacent work, as set out by requirements of the drawings, and ensure that work installed in error is rectified before construction continues.

3. Check and verify dimensions referring to work and interfacing of services. Dimensions, when pertaining to work of other trades, shall be verified with trade concerned.

4. Do not scale directly from the drawings. If there is ambiguity or lack of information, immediately inform the Consultant and await his instructions before proceeding. Be fully responsible for rectifying, altering or redoing any work resulting from disregarding this clause.

5. All details and measurements of any work which is to fit or to conform with work installed shall be taken at the site.

6. Should revised drawings be issued after work has commenced, Contractor shall immediately return to Architect previous drawings which refer to said work. The Contractor will be held responsible for work being carried out in accordance with said revised drawings.

19 WORKMANSHIP

1. Work shall be done in accordance with best standard practices. Only skilled mechanics shall be used where such are required to produce a first-class job.

2. Use, install and handle manufactured materials, equipment and appliances in strict accordance with manufacturer's directions and instructions, unless specified otherwise.

3. Damaged material caused to mishandling or unprotected conditions during construction will be rejected.

20 FROST PROTECTION

1. Provide proper frost protection, including heating for materials to ensure scheduling of work without delay.

2. Similar protection shall be given to work done.

3. Work or materials damaged by frost shall be replaced by Contractor.

4. Snow and ice shall not be allowed to remain on any part of structure, except finished roofs, and shall be removed by Contractor.

21 PROJECT MEETINGS

1. Arrange regular meetings at two week intervals and notify the representatives of the Owner, Architect, Engineer and each subcontractor concerned with the current progress.

2. Contact all subcontractors concerned at least 24 hours in advance and request their presence at job meeting.

3. Review approved progress schedule for rapid and efficient completion of work according to Contract requirements, with suppliers of materials and sub-contractors.

4. Post and forward copies of progress schedule for advice of interested parties.

5. Record the minutes of each meeting and send copies to all attending and interested parties not later than two days after the meeting. In addition, send copies to the Architect, Consultants and Owner. Contractor to provide updated change order register and shop drawing register attached to each record of minutes to indicate exactly what has been issued and the status of approvals and/or distribution.

6. Keep Architect informed of progress, delays and of potential delays during all stages of work to avoid delays.

22 BROKEN GLASS

1. Replace all broken, damaged, or scratched glass and mirrors. Glass which has been broken, scratched, or damaged in installation shall be replaced by installer.

23 PROGRESS SCHEDULE

1. GC to prepare full progress schedules of the work in form to be mutually agreed upon by Contractor and Architect.

2. Prepare schedule immediately upon award of Contract and present three (3) copies to the Architect within a maximum of one week from Contract awarding date.

24 MAINTENANCE MANUALS

3. As soon as possible and in no event later than request for substantial completion check and assemble in three ring binders, all shop drawings, all warranties and guarantees submitted by manufacturers, suppliers and subcontractors and as called for throughout Specifications. Assemble three copies of recommended operation and maintenance procedures (such as flooring, equipment, and roofing). Present three matching binders to Architect for submission to Owner. Furnish a complete index in each binder listing its contents in detail and stamp and sign the cover page of each and every manual. Also ensure that the manuals are stamped and signed on the cover page by subcontractor submitting them. Note: A $10,000.00 holdback will only be released when all documents approved by the Consultants have been turned over to the Owner.

4. Recommended maintenance procedures shall contain warnings concerning the use of maintenance materials or practices which might injure the product covered by the recommended maintenance procedure. Should any product be injured or damaged by faulty maintenance or practices not warned against in the maintenance manual, then the Contractor shall rectify such damage or injury.

5. Complete maintenance manuals shall be submitted prior to requesting release of Holdback.

25 CHECK DRAINS

1. Just before acceptance of building by Owner, check drains and see that they are clean, clear and functioning properly.

26 FIRE PROTECTION AND ACCESS TO EQUIPMENT AND EXITS

1. Take necessary precautions to eliminate fire hazards and to prevent damage to work, equipment and other property both public and private having to do with the work. Inspect work of this contract at least once a week for this purpose.

2. Provide and maintain in working order suitable Underwriters' labelled fire extinguishers and locate in prominent positions, to approval of authorities.

3. Request and obtain HOT WORK PERMIT from facility operations and management prior to carry out any work involving welding, brazing and performing any operation with an open flame.

4. When welding, brazing and performing any operation with an open flame, a portable fire extinguisher shall be kept within 10 feet (3000 mm) of the operator at all times.

5. Store and locate materials and equipment packed in cardboard cartons, wood crates and other combustible containers in orderly and accessible manner. Place approved types of firefighting equipment in vicinity of materials or equipment packed in this type of crate or carton until permanent fire protection and equipment are available.

6. Store all rags and waste containing oil, grease or other flammable materials in an approved metal container and remove from the site at the end of each working day.

7. Only fire-resistant tarpaulins are permitted on site.

8. Locate temporary buildings and storage areas in relation to their hazards and probability of damage to existing buildings under construction. Unless constructed of noncombustible materials, wherever possible locate them at least 33 feet (10 m) away from buildings. If constructed of combustible materials separate these structures into small detached units.

9. Provide and maintain free access at all times from the street to fire hydrants and to outside connections for standpipes or other fire extinguishing equipment whether permanent or temporary. Do not place material or construction equipment within 10 feet (3 m) of hydrants or connection, nor between them and centre line of the street.

   Maintain free access at all times to control valves and hose on fire lines within building and to all portable extinguishers.

10. Install fire doors and put into operating condition at the earliest possible time.

11. Comply with requirements of 01545 Safety Requirements.

27 SAFETY

1. Take all precautions necessary to protect and safeguard workers from dangerous conditions including fumes; lead paints, etc.; asbestos; and silica hazardous to health.

2. Comply with requirements of 01545 Safety Requirements.

28 ADJACENT BUILDINGS AND STRUCTURES

1. Particular attention shall be paid to prevention of fire and elimination of fire hazards which would endanger new work or existing property.

2. No existing footings, foundations, pipe lines, electrical conduit and wiring shall be undermined or otherwise damaged or endangered by digging, butting of any other operation in the performance of the work of this Contract. Any existing work so affected shall be immediately repaired and made good to the Architect's satisfaction at the Contractor's expense.

3. Active services to the adjacent buildings shall be protected.

4. In case of damage to active services, notify Architect, Utilities and Authorities immediately and make all required repairs under direction of appropriate utility. Carry out repairs during off hours if required.

29 NOTES TO GENERAL CONTRACTOR

1. Ensure that the building is maintained weathertight and secure. The General Contractor shall furnish all temporary protection, enclosures, tarpaulins, etc., as may be required to weatherproof openings in the work.

2. Demolish and clean up all existing trees, scrub and debris and any other items found on the site not indicated to remain.

3. The General Contractor shall carry out all removal and disposal of all resultant debris.

4. In case of damage to active services, notify Architect, Utilities and authorities immediately and make all required repairs under direction of appropriate utility. Carry out repairs during off hours if required. In absence of specific requirements or direction, plug or cap unused or abandoned utility lines at least 3 feet (1000 mm) outside of new building walls, or as required by utilities, codes and authorities.

5. The location of construction storage facilities and trailers to be approved by the Architect and Owner.

6. Take all precautions necessary to protect and safeguard workers from dangerous conditions including fumes, lead and silica products that may be present during the construction that are hazardous to health.

7. Restore disturbed areas to original condition unless shown otherwise on drawings or stated in specifications.

30 CONSTRUCTION PARKING and DELIVERIES

1. Parking is NOT permitted on site, no exceptions. Deliveries shall be pre-approved and co-ordinated with facility operations.

31 PROTECTION FOR OFF-SITE & PUBLIC PROPERTY

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

2. Be responsible for damage incurred.

32 SIGN AND ADVERTISEMENTS

1. Construction sign to be supplied and installed by Contractor. Locate as directed by Architect. All costs for the installation of the sign to be included in Base Tender Sum. The Owner to approve sign layout prior to sign production.

2. Erect no other signs, except those signs which are necessary to give direction or for safety, or warning signs, without the Architect's permission. Where other signs are required or wanted, obtain Architect's approval.

33 PROTECTION OF BUILDING FINISHES & EQUIPMENT

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

2. Provide necessary screens, covers, hoardings as required.

3. Be responsible for damage incurred due to lack of or improper protection. Replace or repair finishes or equipment so damaged.

34 SECURITY

1. When work at site has progressed as to become attractive for vandalism or theft, engage a recognized security guard agency to provide security service at times when tradesmen are not present in substantial numbers. Continue service until after time of Substantial Performance and the Owner has occupied the building.

2. Extent of security services shall be at the discretion of the Contractor. Note that the fit, finish and new appearance of the finished building will not be comprised. Materials, products, finishes, etc. damaged due to vandalism are to be restored and/or replaced to an as-new condition.

End of Section 01015

1.1 Product Quality

1. Products supplied for work shall be new and as far as possible and unless otherwise specified, of Canadian manufacture.

1.2 Standards

1. Where a standard has been specified in the Outline Specifications or Detailed Specifications, incorporate minimum requirements of such standard into the work. Where specific requirements of Outline Specifications or Detailed Specifications are more stringent or different than those of the standard, follow the more stringent requirements.

2. Reference to standards, specifications, handbooks and manufacturer's catalogues refer to latest edition thereof and all amendments or revisions applicable at Tender Closing Date, unless date suffix is included with document number.

NOTE: Where a product is named in the Specifications by one of the following names or by any name followed by the number of one of the following articles, the product shall conform to the standard named in the corresponding article, except as specified or indicated otherwise.

1.3 Metals

1. Aluminum (A1)

.1 Bar, rod, wire, extruded shapes; architectural: CSA HA. Series (AA/ANS1 6063) (Alcan 50S) condition T5.
.2 Bar, rod, wire, extruded shapes; Structural: CSA HA Series (AA/ANS1 6061) (Alcan 65S) Condition T6.
.3 Plate, sheet, coil; utility: CSA HA Series Alloy MC10, (AA/ANS1 3003) (Alcan D3S); condition H14 (sheet, coil), F (plate).
.4 Plate, sheet, coil; anodizing: CSA HA Series Alloy 990C, (AA/ANS1 1100) (Alcan D2S); condition H14.
.5 Specially anodized aluminium (hard anodized): (AA-M21 or M12C22A42) conform to Finishes, Aluminium, Hard Anodized (FA-HA) attached to Section 01016.
.6 Painted aluminium: conform to Finishes, Aluminium, Baked on Coatings FABC attached to Section 01016.
.7 Anodized Aluminium: AA-M21 or M12C22A31.
.8 Aluminum for elevated floor plates (Bruce EDP) US Fed. Spec. QQ-A-591c, Ty A380 (mil-HDBK-H1C code 20087).
.9 Aluminum sand casting (signs, etc.) AA 443.0.

2. Sheet Gauges

.1 Gauges and equivalent thicknesses of sheet, plate, coil and strip shall conform to the table of gauges and equivalent thicknesses (GET) attached to Section 01016. See 1.3.4 and 1.3.6 special application of gauges to structural sheet.

3. Galvanized Sheet Steel

.1 ASTM A525 and 526, commercial quality sheets, plain commercial galvanized, stretcher levelled, or temper rolled to stretcher levelled standard of flatness if specified.
.2 Same as 1.3.3.1 except wipe coated instead of plain commercial galvanized.
.3 Same as 1.3.3.1 except mill phosphatized instead of plain commercial.
.4 ASTM A446 structural quality, Grades A or B, max. permissible working stress: Grade A, 20,000 psi; Grade B, 22,400 psi. plain commercial galvanized. Gauges shall apply to core sheet and shall be msg. Coating thickness shall be added to core thickness to determine thickness of coated sheet (see 1.2 a).
.5 Same as 1.3.3.4 except wiped coated instead of plain commercial, with a coating not less than .050 oz. per sq. ft. (see 1.1.d.).

.6 Same as 1.3.3.4 except wiped coated instead of plain commercial galvanized (see 1.2 a.).
.7 Preparation for painting, in ship, ASTM D2092-68.

4. Copper Metals

.1 Nickel Silver (white bronze): Anaconda American Brass Alloy 796 (leaded nickel silver) (has higher zinc content than any of the nickel silvers in ASTM B122-71a):

Copper	45%
Zinc	42%
Nickel	10%
Lead	1%
Manganese	2%

.2 Sheet copper and strip copper for roofing, flashing and building construction: ASTM B370, cold rolled temper, 20 oz. or as specified otherwise.
.3 Monel: (nickel 63-70%, approx. 5% other metals, remainder copper) plate, sheet, strip, hot rolled, annealed and pickled, AST B127; (Inco Monel 400).
.4 All applicable copper metals: ASTM B248.
.5 Architectural Bronze (Red Brass), ASTM B36, No. 3 (85% CU + 15% Nl).
.6 Where specified, Aluminum Bronze C95400, ASTM B36.

5. Stainless Steel

.1 Plate, sheet, and strip; CSA G110.6-1968, Type 302, 304, or 316 as specified, or as specified otherwise; finish: No. 4 unless specified otherwise.
.2 Structural shapes and bars, CSA G110, 4-1968, Type 302, 304 or 316 as specified; No. 4 finish unless specified otherwise.

6. Sheet Steel

.1 Sheets, cold-rolled carbon steel, commercial quality, ASTM A366 stretcher levelled, or temper rolled to stretcher levelled standard of flatness if specified.
.2 Porcelain enamelling steel, ASTM A424, Commercial Quality, Type 1 or 2.
.3 Same as 1.6 a. except special quality for electro deposited coatings.
.4 Same as 1.3 d. except ungalvanized.
.5 Hot-rolled, carbon steel sheets and strip, structural quality ASTM A570-70, 5 grades (stair treads, risers, etc.).
.6 Hot-rolled carbon steel sheet and strip, commercial quality ASTM A569-66T.
.7 Prepainted:

1. CSSB1 Technical Bulletin No. 5, as currently amended (modified silicone alkyd, 2000).
2. CSSB1 Technical Bulletin No. 5, as currently amended, except humidity resistance 5000 hours; salt spray resistance 400 hours; resistance to accelerated weathering 2500 hours (fluoropolymer, 10,000).
3. CSSB1 Technical Bulletin No. 5, as currently amended, except humidity resistance 3000 hours (silicone alkyd, 5000).

7. Sheet Steel (Cold Rolled)/Structural Steel (Hot Rolled)

.1 When steel thickness is indicated by gauge or by decimal fractions of inches, it is sheet steel (1.6) or galvanized sheet steel (1.3) or stainless steel (1.5). When steel thickness is indicated by common fractions of inches, it is structural steel (1.8). However, some sheet steels are structural quality, (i.e. having guaranteed strength).

8. Structural Steel

.1 CAN/CSA G40.21-M87, 38W or 44.

9. Soldering Materials
   .1 Solder: ASTM B32-70, Grade 45A (45:55 tin: lead); where service temperatures are higher than 140F use Grade 95TA (95:5 tin: antimony). **Note:** Solder for Div. 15 to conform to Div. 15 specifications.
   .2 Brazing: (as per 05500)
   .3 Flux: on stainless steel:
      1. Muriatic acid killed by the addition of zinc until all effervescence stops and no excess of zinc remains; improved by the addition of a small amount of ammonium chloride, plus 10% acetic acid; or
      2. muriatic acid: ferric chloride: nitric acid 90:50:3, by weight; or
      3. Approved commercial flux designed especially for use with stainless steel, such as EutecSol 682, or approved equal.
   .4 Flux: on copper and galvanized steel:
      1. killed muriatic acid as specified in 1.9 b.1; or
      2. suitable rosin type.

10. Galvanizing

   .1 All steel except (1.3), CSA G164 Hot Dip Galvanizing of irregular Shaped Articles. Must be done after all welding complete. No welding of galvanized products allowed.

11. Welding Materials

   .1 CSA W59, CSA W 55.2; for stainless steel, ASTM A371; for aluminum, ASTM B285.

12. Metal Filler

   .1 Epoxy: Hysol 6C epoxy adhesive kit (or 4297 in bulk) manufactured by Hysol (Canada) Limited, or approved equal.

13. Plating (Electrodeposited Coatings)

   .1 Cadmium (on steel): ASTM A165, Type NS (13 mu), OS (7.6 mu), TS (3.8 mu).

   .2 Chrome (on steel): ASTM B.456, Fe Ni20b Cr r unless specified otherwise, bright unless dull specified.

   .3 Chrome (on copper and copper-base alloys): ASTM B456, Type FC unless KC or QC specified; bright unless dull specified. (In this case FC is thick and QC is thin.)

   .4 Weight of zinc coating and thickness to be added to base metal to determine thickness of coated material.
   (Source: ASTM A-446, Tables 2 and 4)

Coating Class oz. per sq. ft.	Minimum Check Limited	Triple-Spot Test, Thickness in oz. per sq. ft.
2.75	2.35	0.0041
2.50	2.10	0.0037
2.25	1.85	0.0033
2.00	1.65	0.0030
1.75	1.40	0.0026
1.50	1.15	0.0022
1.25 commercial	0.90	0.0019
Wipe Coated (Colourbond or Satincoat in Canada only)	0.25	0.0005

NOTE: Light Commercial not available in Canada.

14. Paint

.1 Shop primer on steel: CGSB 1-GP-40d.
.2 Bituminous paint: CGSB 1-GP-108c.
.3 Baked enamel on steel: primer, CGSB 1-GP-81e, Type 2; finish CGSB 1-GP-88e, baking alkyd enamel.
.4 Baked enamel on aluminium: FA.BTAE, attached to Section 01016.

1.4 Substitutions

1. In making a request for a substitution, confirm in writing that:

.1 The Contractor has investigated the proposed product and method and determined it to be equal or superior in all respects to that specified.

.2 The same guarantee is given for the proposed substitution as for the product and method originally specified.

.3 The installation of the proposed substitution will be co-ordinated into the Work, and such changes in the Work will be made as required to accept the substitution and to ensure the Work is complete in all respects. The cost of changes to the Work necessary to incorporate a proposed substitution is to be included in any proposed increase or decrease to the Contract Price associated with the proposed substitution.

2. Do not substitute materials, equipment, or methods unless such substitutions have been specifically approved in writing prior to the close of tenders by the Consultant.

3. The Owner reserves the right to accept or reject, at its sole discretion, any proposed substitution.

1.5 Workmanship

1. All work shall be carried out in accordance with the best trade practice, by mechanics skilled in the type of work concerned.

2. Products, materials, systems, and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the applicable manufacturer's printed directions.

3. Where specified requirements conflict with manufacturer's written directions, follow manufacturer's directions, but inform the Consultant in writing prior to proceeding with affected work. Where specified requirements are more stringent than manufacturer's directions, comply with specified requirements.

End of Section 01016

1 PROCEDURE AND CONDITIONS

1.1 Refer to General Conditions of the Contract.

1. Description and amount of allowances are identified on the Tender Submission Package Pricing Form.

1.2 Contingency Allowance

1. The Contractor **shall not** include in his Contract Sum for overhead and profit, or Harmonized Sales Tax on the Contingency Allowance. Such fees shall be included by the Contractor at the time any work is authorized.

1.3 Cash Allowances

1. Cash Allowances are to be included in the Contractor's lump sum price.

2. The Contract Sum, and not the Cash Allowance(s), includes the Contractor's overhead, profit, and other associated costs not specifically stated to be covered in Cash Allowance(s), in connection with such Cash Allowance(s).

3. Adjust Cash Allowances individually with any unspent portions being credited to Owner. Adjust at time of final Change Order.

4. No refund of overhead and profit will be expected on any unspent portion of Cash Allowances. Likewise, no overhead and profit will be allowed on total amount by which all Cash Allowances are exceeded unless this excess is more than Ten Percent (10%) of total Cash Allowances, in which case, overhead and profit will be allowed on that portion exceeding Ten Percent (10%).

5. Extend to Owner all refunds, trade and quantity discounts which may be received in purchasing under Cash Allowances, except cash discounts for prompt payment.

6. In submitting final adjustments of Cash Allowances, include duplicate, summary statements and copies of receipted invoices substantiating purchases under Cash Allowances.

7. Include in the Contract the following cash allowances to cover the following items.

.1 Testing and Inspections: $20,000.00
.2 Signage and Wayfinding: $10,000.00
.3 Irrigation System: $15,000.00
(For the renovations to the existing irrigation system, including design, installation, and all associated appurtenances – Refer to L-1 and Irrigation As-built Drawing)

8. Unless otherwise indicated the cash, allowance includes supply and installation. No overhead or profit shall be charged on Cash Allowance expenditures. Harmonized Sales Tax not included in the allowances listed above.

9. Progress payments on accounts of work authorized under cash allowances shall be included in the Consultant's monthly certificate for payment. Copies of invoices are to be submitted to substantiate claims.

End of Section 01020

1 GENERAL

1.1 REQUIREMENTS INCLUDED

1. Requirements and limitations for cutting and patching the Work.

1.2 RELATED REQUIREMENTS

1. General Requirements - Section 01010
2. General Work - Section 01015
3. Individual Sections - Cutting and patching incidental work of the section. Advance notification to other sections required.

1.3 SUBMITTALS

1. Submit written request in advance of cutting or alteration which affects:

.1 Structural integrity of any element of Project.
.2 Integrity of weather-exposed or moisture-resistant elements.
.3 Efficiency, maintenance, or safety of any operational element.
.4 Visual qualities of sight-exposed elements.
.5 Work of the Owner or separate contractor.

2. Include in request:

.1 Identification of Project.
.2 Location and description of affected work.
.3 Statement on necessity for cutting or alteration.
.4 Description of proposed work, and products to be used.
.5 Alternatives to cutting and patching.
.6 Effect on work of the Owner or separate contractor.
.7 Written permission of affected separate contractor.
.8 Date and time work will be executed.

1.4 GENERAL

1. Execute cutting, fitting, and patching including excavation and fill, to complete the Work.
2. Fit the several parts together, to integrate with other work.
3. Uncover work to install ill-timed work.
4. Remove and replace defective and non-conforming work.
5. Remove samples of installed work for testing if requested by Consultant.
6. Provide openings in non-structural elements of Work for penetrations of mechanical and electrical work.

1.5 INSPECTION

1. Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

2. After uncovering, inspect conditions affecting performance of work
3. Beginning of cutting or patching means acceptance of existing conditions.

1.6 PREPARATION

1. Provide supports to assure structural integrity of surroundings; devices and methods to protect other portions of project from damage.
2. Provide protection from elements for areas which may be exposed by uncovering work; maintain excavations free of water.

1.7 PERFORMANCE

1. Execute work by methods to avoid damage to other work, and which will provide proper surfaces to receive patching and finishing.

.2 Use material to match existing.

.3 Reserved.

.4 Employ qualified trade contractor to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight exposed surfaces.

.5 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed without prior approval.

.6 Restore work with new products in accordance with requirements of Contract Documents.

.7 Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.8 Refinish surfaces to match adjacent finishes: For continuous surfaces refinish to nearest intersection.

1.8 DIVISION OF RESPONSIBILITY

1. Cuts or openings smaller than 8" X 8" or 8" diameter and required by any section for the installation of their work is the responsibility of that section. Openings larger than 8" X 8" or 8" diameter are the responsibility of this section.

End of Section 01045

1.1 Related Requirements

1. General Requirements - Section 01010
2. General work - Section 01015

1.2 Permits, Licenses and Fees

1. The Contractor shall obtain and pay for, in a timely manner in order to avoid delays to the construction, all permits, licenses and inspection fees required by authorities having jurisdiction for specific trade functions.

2. The Owner shall obtain and pay for, in a timely manner in order to avoid delays to the construction, the Building Permit and Occupancy Permit.

1.3 Building Code By-Laws and Regulations

1. Carry out all work in accordance with the regulations of the Ontario Building Code, latest issue, including all amendments and revisions.

2. Comply with all requirements, regulations and ordinances of all jurisdictional authorities.

3. Comply with and pay for requirements of local authorities regarding any necessary work outside the property lines such as curbs and sidewalks.

4. Inform the Consultant of any known variance of the Contract Documents from the requirements of the Building Code and authorities having jurisdiction and assume responsibility for work known to be contrary to such requirements and performed without notifying the Consultant.

1.4 Fire Protection

1. Materials and components required to construct fire rated assemblies and materials requiring fire hazard classification shall be listed and labelled.

2. Fire rated assemblies shall be constructed in accordance with applicable fire test report information issued by the fire rating authority. Deviation from fire test report will not be allowed.

3. Construct fire rated assemblies as continuous, uninterrupted elements except for permitted openings. Extend fire rated walls and partitions from top of floor assembly to underside of the fire rated assembly above.

1.5 Hazardous Materials

1. Comply with requirements of the Occupational Health and Safety Act, as amended to include WHMIS (Workplace Hazardous Materials Information System).

2. Ensure that a current Material Safety Data Sheets (MSDS) arrives before or with the first delivery of every controlled product.

3. Check the date to ensure that the MSDS is up-to-date (MSDS are valid for three years from date of production).

4. Ensure that worksite copies of the MSDS are available to workers wishing to consult them and to the health and safety representative and/or joint health and safety committee.

5. Ensure that workers are instructed in the purpose and content of MSDS.

End of Section 01060

1 SUMMARY

1.1 General

1. This Division governs Work of all other Sections. Sections of Division 1 are complementary and shall be read together with others.

1.2 Specification Format

1. Specifications are not intended as detailed description of installation methods but serve to indicate requirements in completed Work.

2. Where Contract Documents do not provide sufficient information for complete installation of item, then as supplement, comply with manufacturer's written instructions for quality of work.

3. Portions of Specifications are written in short form. Therefore, it shall be understood that where item of Work is stated in heading followed by material, equipment, component, or operation, words "shall be", "shall consist of" or similar words or phrases are implied which denote supply, fabricate, and supply, install, provide or commission of such materials, equipment or operations for component of Work designated by heading.

4. Where items in Contract Documents are referred to in singular provide as many as required to complete Work. Words used in one gender only shall mean females and as well as males and conversely.

5. Whenever used in Specifications following definitions shall apply:

6. Supply - Procurement and/or fabrication of materials, equipment, or components, or performance of services to extent indicated. Where used with respect to materials, equipment, or components, the term shall include delivery to Site but is not intended to include installation of item, either temporary or final.

7. Install - Placement of materials, equipment, or components, including receiving, unloading, transporting, storage, uncrating and installing, and performance of such testing and finish work as is compatible with degree of installation specified complete ready for use.

8. Provide - To Supply and Install, complete and in place, including accessories, finishes, tests, and services as required to render item so specified complete ready for use.

9. Commission - Startup and initial operation of equipment as required and/or as specified in respective Sections, to demonstrate satisfactory operation of components and entire system including calibration of any control instrumentation as required to maintain operations.

1.3 Drawings, Lists or Schedules of Items are intended to show scope and arrangement of work. For location of item described refer to such Drawings, Lists or Schedules unless location stipulated in Specifications.

1.4 Wherever words "acceptable", "approved", "reviewed", "satisfactory", "selected", "directed", "designated", "permitted", "inspected", "instructed", "clarification", "required", "report", "submit", "obtain", "consult", "advise", or similar words or phrases are used in Standards or in Contract Documents, it shall be understood that, unless context provides otherwise words "by/to/with/from the Owner's Consultant" shall follow them as applicable.

1.5 Discrepancies/Conflicts/Omissions

1. If discrepancies or conflicts in, or omissions from Drawings, Specifications or other Contract Documents are suspected, or if there is doubt as to meaning or intent thereof, notify the Owner's Consultant at once. Where there is conflict between Contract Documents, stringent requirements shall prevail.

2. Drawings, Specifications, and other Contract Documents are intended to be in compliance with

federal, provincial and municipal laws, by-laws, regulations and other requirements of authorities having jurisdiction. Perform work in conformity with such requirements. If discrepancies, conflicts, or omissions are suspected, notify Owner's Consultant at once.

3. Comply with the Owner's Consultant written instructions or explanations.

4. Contractor shall promptly, and not later than 10 working days of becoming aware of circumstances which may require a change in the Work or other directions, give written notice to the Owner's Consultant outlining such circumstances and requesting his written directions. Do no work in the affected area, or that would prevent the Consultant from properly assessing the situation or evaluating change, without his prior written approval. The Consultant will act promptly to give Contractor directions, so Work is not unreasonably delayed.

2 SUMMARY OF WORK

2.1 Work covered under this Contract.

1. Work of this Contract generally includes (but not limited to): New accessible pedestrian ramp and stair c/w associated components & systems (hydronic snow melting system, foundations, trench drains, glass and steel balustrades, garden walls, tactile strips, lighting, etc.). Restoration, conservation, repair and selective replacement of exterior masonry walls, surfaces, and components. Installation of a new foundation drainage system connected to municipal service, repair of below-grade foundations, re-pointing, parging, etc. Finish grading, landscaping, sodding, planting, irrigation system and signage. Exterior concrete slabs, curbs, and hard paving. Restoration and conservation of existing wood doors and windows including associated door thresholds and hardware. New Universal Washroom and associated components (fixtures, fittings, equipment, and finishes). Widening of existing door and transom openings in corridor. Fill-in, patch and make good walls, ceilings, and floor substrates in washroom(s), corridor, and basement cellar. Refinish all surfaces impacted by the work. Structural, civil, landscape, mechanical, electrical, and plumbing work associated with the above scope of work.

2. Work of this Contract includes furnishing labour, materials, equipment, services, and other related expenses to execute complete construction of facility specified under Contract Documents.

3. In accepting award of this Contract, Contractor hereby reaffirms that it is fully informed regarding all conditions affecting Work and further accepts to complete Work for purpose intended in accordance with Contract Documents. Contractor hereby reaffirms that it does not and will not have any conflict of interest in executing work of this Contract.

2.2 Existing Services

1. Before commencing Work, establish location and extent of existing services in area of Work and notify the Consultant of findings.

2. Whenever it is necessary to cut, interfere with, or connect to existing services or facility do so at hours and times recommended by governing authorities and approved by the Consultant; and with minimum disturbance to occupants, pedestrian and vehicular traffic and public and private property.

3. Submit schedule to and obtain approval from the Consultant for each proposed shut down of active service or facility. Adhere to approved schedule and provide notice to affected parties.

4. If unknown services are encountered, immediately notify the Consultant and confirm findings in writing and/or on Drawings. Obtain the Consultant's written direction if such services require cutting, capping or relocation to do Work.

3 PHASING

3.1 Description of Project Phasing

1. Project is to be carried out in one phase.

4 WORK RESTRICTIONS

4.1 Inclement Weather and Cold Weather Work

1. Take precautions during inclement weather and provide adequate protection.

2. Continue Work including winter months, if applicable, until Work is completed and accepted.

3. Inclement weather or extra work caused thereby shall not be considered a valid reason for additional payment or delay in satisfactory conclusion of Work.

4.2 Access To Site

1. Access to Site shall be as directed by Owner.

2. Work shall be confined to Work Site limits indicated on Drawings and/or within area defined by property lines. Work on Municipal property shall be carried out under regulations of respective Municipality and authorities having jurisdiction including without any limitations any associated fees, permits, insurance or bonding required.

3. Assume responsibility for care, custody and control of Site and perform work to extent covered in Contract Documents. Make good damage to existing Site and existing buildings (if any) due to Work of this Contract.

4.3 Access To Existing Building

1. Provide and maintain roads, walks, ramps, stairs, and such other means of access to and exits from existing building(s) as required to permit existing building(s) to remain operational. Maintain access to all entrances to building(s) including enclosed hoardings as required. Maintain access to existing service entrance at all times, including ready access for trucks and delivery vehicles.

4.4 Parking On Site

1. On-site parking is NOT available on the existing property.

4.5 Occupancy

1. Buildings will remain occupied during the performance of the Work. Execute Work to cause minimum interference with activities on premises and maintain maximum safety to occupants. Take reasonable measures to minimize and control noise, dirt and dust during Work. All existing entry doors are required exits and shall be always maintained accessible.

4.6 Security Clearance of Employees

1. Where Site is designated by authorities of Institution as a secure location, workers on Site may be subject to security checks and may be required to obtain security clearance before commencing to perform Work.

2. Security checks shall be arranged by authorities at Institution which has designated Site as secure location. Contractor shall provide to authorities at Institution, names, addresses, social insurance numbers and consents of all its workers, and that of any Sub-Contractor's workers performing work on Site.

3. Any worker who is unable to obtain security clearance, or who refuses to consent to such security checks, upon notice by Owner to Contractor, shall not be permitted to work on Site.

4. During course of Work, new workers not included in original submission may likewise be subject to security check. Such new workers shall not be allowed on Site until clearance is given by authorities of Institution.

5. Workers employed on Site shall sign "Daily Register" provided showing "IN" and "OUT" times and number of hours worked on each shift.

6. No Smoking Policy: Cooperate, respect, and comply with Smoke-Free Workplace policy requirements established by the Owner throughout its facilities. Smoking is not permitted on site.

7. Smoke-free workplace policy applies to enclosed areas in the buildings.

8. Smoke-free workplace policy applies to everyone who works on site and to visitors.

9. Ensure that Contractor's employees, sub-contractors, and suppliers, performing work on Site on Contractor's behalf, are instructed to comply with Smoke-Free Workplace policy requirements.

5 RELICS AND ANTIQUITIES

5.1 Relics and antiquities and items of historical, archeological, or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tablets, headstones, and similar objects found on Site or in building(s) to be demolished, shall remain property of UofT. Protect and store such articles and request direction from the Consultant.

5.2 Give immediate notice to the Consultant if evidence of archaeological finds is encountered during construction and await written instructions from the consultant before proceeding with work in this area.

End of Section 01100

1.1 Substitutions

1. The Contractor shall base his Tender Price upon the Tender Documents.

2. Prior to the Close of Tenders, the Owner and the Consultant may consider requests for substitutions from that specified in the Tender Documents, providing the requests are submitted in writing describing such substitutions in full detail, the type of material, equipment or method and reasons for deviating from the Tender Documents. In addition, submit any increase or decrease in price of any substitution.

3. In making a request for a substitution, confirm in writing that:

   .1 The contractor has investigated the proposed product and method and determined it to be equal or superior in all respects to that specified.

   .2 The same guarantee is given for the proposed substitution as for the product and method originally specified.

   .3 The installation of the proposed substitution will be co-ordinated into the Work, and such changes in the Work will be made as required to accept the substitution and to ensure the Work is complete in all respects. The cost of changes in the Work necessary to incorporate a proposed substitution is to be included in any proposed increase or decrease to the Contract Price associated with the proposed substitution.

   4 Where the contractor uses equivalent products other than that first named, on which design is based, the contractor shall be responsible for all details of installation including product size, arrangement, fit, colour, etc. and maintenance of all required clearances. Contractor shall prepare and submit revised layouts to indicate arrangement of all affected piping, ductwork, conduit, lighting, equipment, etc. Failure by Contractor to provide such drawings may be considered indication that additional costs associated with equivalent products such as revisions to surrounding architectural finishes, structural components, or the need for larger motor starters, larger power feeders, space revisions to associated product equipment, controls, etc. shall be included in Bid price.

4. Do not substitute materials, equipment or methods unless such substitutions have been specifically approved in writing prior to the close of tenders by the Consultant.

5. The Owner reserves the right to accept or reject, at its sole discretion, any proposed substitution.

1.2 Acceptable Products

1. First item named or specified by catalogue number meets specifications in all respects regarding performance, quality of material and workmanship, and is acceptable to the Architect.

2. Items, other than first named, meeting specifications regarding quality of materials and workmanship only, are acceptable to the Architect, if they also meet performance, match the first named product in colour and texture, etc. and/or capacities specified and can be accommodated within the space allotted.

3. General approval indicated by inclusion of other manufacturers named is subject to final review of submitted samples of shop drawings, performance data and test reports.

1.3 "Or Equal"

1. Where the phrase "or equal", "approved equal", or "equal as approved by the Architect" occurs in the Contract Documents, do not assume that materials, equipment, or methods will be approved by the Architect.

2. The decision of the Architect shall be final.

1.4 Availability of Specified Items

1. Verify prior to bidding that all specified items will be available in time for installation during orderly and timely progress of the work.

2. In the event specified items will not be so available, notify the Architect prior to receipt of bids.

3. Costs of delays because of non-availability of specified items, when such delays could have been avoided by the Contractor, will be back-charged as necessary and shall not be borne by the Owner.

End of Section 01105

1.1 Related Requirements

1. General Requirements - Section 01010

2. General Work - Section 01015

1.2 Pre-Construction Meeting

1. Immediately prior to construction, upon notification attend at location of Owner's choice, a pre-construction meeting, along with authoritative representatives of key subcontractors, project superintendent, inspection and testing company representatives, and the consultants.

2. Purpose of meeting is as follows:

.1 Review project communications procedures.

.2 Review Contract administration requirements including submittals, payment and change order procedures.

.3 Identify all critical points on Construction Schedule for positive action.

.4 Review Consultant's inspection requirements.

.5 Review any points which require clarification.

1.3 Site Meetings

1. Hold regular site meetings every week. Ensure that persons, whose presence is required, are present and that relative information is available to allow meetings to be conducted efficiently. The Consultant will attend these meetings. The Owner may also choose to attend these meetings, at his discretion.

2. Schedule additional meetings, if required.

3. Prepare an agenda for each meeting and distribute a copy to all required participants prior to the meeting.

4. Record minutes of each meeting and promptly distribute copies to be received by all participants not later than six days after meeting has been held.

1.4 Supervision

1. Employ an experienced and qualified superintendent for the project who shall devote his time exclusively to the work of this Contract and who shall be in complete charge of the work from commencement to completion. A working foreman will not be acceptable. The superintendent shall not be changed after commencement of work without the Consultant's approval. The Superintendent shall possess a C.C.S. and/or Gold Seal Certificate designation and be acceptable to the Owner.

2. Supervise, direct, manage and control the work of all forces carrying out the work, including subcontractors and suppliers. Carry out daily inspections to ensure compliance with the working drawings and detailed specifications and the maintenance of quality

standards. Ensure that the inspection staff includes personnel competent in supervising the mechanical and electrical trades.

1.5 Progress Record

1. The Contractor shall maintain on site, permanent written record of progress of work. Record shall be open to inspection by Owner at all times and copy shall be furnished to Consultants upon the Consultant's request.

2. This record shall show weather conditions, dates of commencement, progress and completion of various trades and items of work. Particulars pertaining to erection and removal of forms, pouring of concrete, installation of roofing and other critical or major components as well as number of employees of various trades and type and quantity of equipment employed daily, shall be noted.

3. Display a copy of the construction schedule in the site office from start of construction to completion. Superimpose actual progress of work on schedule at least once each week.

1.6 As-Built Drawings

1. Maintain an accurate set of As-Built Drawings showing progress of the work and all changes, revisions and additions to the work and deviations from the Contract Documents in red ink.

2. Include accurate location, depth, position, size and type of concealed and underground services, both inside and outside shall be as part of these As-Built Drawings.

3. As-Built Drawings shall be developed as the project progresses and be finalised for submittal to the Consultant at Project Closeout, as per section 01300.

1.7 Documents on Site

1. The Contractor's field office shall always contain a complete set of Contract Documents (Schematic Drawings and Performance Specifications) with all addenda, site instructions, change orders, reviewed shop drawings and samples, colour schedule, paint materials schedules, hardware list, progress reports and meeting minutes.

2. The Contractor's field office shall always contain a complete set of all construction documents, as issued for building permit and bearing the stamp of the appropriate municipal authority.

3. The Contractor is responsible for the timely distribution of all Site Instructions, Proposed Change Notices and Shop Drawings to all required subtrades and agents of the Owner including the Commissioning Consultant.

End of Section 01200

1 RELATED WORK

1.1 Individual submittals - under pertinent sections of this specification.

2 SUBMITTALS

2.1 Submit to Consultant, shop drawings, samples, and other items, in strict accordance with the provisions of this Section.

2.2 All submittals to the Consultant's office include prepaid carrying and all other charges.

3 SHOP DRAWINGS

3.1 The term shop drawings means drawings, diagrams, illustrations, schedules, performance charts, product data, brochures and other data which are to be provided by the Subcontractor to illustrate details of a portion of the work.

3.2 The Contractor shall arrange for the preparation by Subcontractors of clearly identified shop drawings as the Consultant may reasonably request.

3.3 Prior to submission to the Consultant, the Contractor shall review all shop drawings. By this review the Contractor represents that he has determined and verified all field measurements, field construction criteria, materials, catalogue numbers and similar data or will do so and that he has checked and co-ordinated each shop drawing with the requirements of the work and of the contract documents. The Contractor's review of each shop drawing shall be indicated by stamp, date and signature of an authorized person. Shop drawings received without Contractor's "reviewed" stamp will be rejected.

3.4 The Contractor shall submit shop drawings to the Consultant for his review with reasonable promptness and in orderly sequence to cause no delay in the Work.

3.5 The Contractor shall prepare a schedule fixing the dates for submission and return of shop drawings.

3.6 Submittal Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Consultant's receipt of submittal:

1. For scheduling purposes allow 10 Working Days for review of each submittal. Consultant will advise Contractor if additional time is required for technical or co-ordination review.
2. Concurrent Review: When concurrent review of submittals by Consultant's Subconsultants, Owner, or other parties is required, allow a minimum of fifteen (15) working days for initial review of each submittal. Direct transmittal to Consultant's Subconsultants will not be permitted.
3. No extension of Contract Time will be authorized because of failure to transmit submittals enough in advance of Work to permit correct and accurate processing by the Consultant.

3.7 Shop drawings shall be submitted in electronic format as a PDF or DWF file via e-mail. Scanned drawings will only be accepted if legible. Illegible drawings will be rejected.

3.8 The Subcontractor shall identify primary contact, including e-mail address for shop drawings submission and receipt of reviewed drawings and notifications.

3.9 With prior approval of the Consultant, catalogue cuts showing all aspects, design, sizes, components and rough-in information for equipment may be submitted as shop drawing.

3.10 The Subcontractor shall make changes in shop drawings which the Consultant may require resubmitting, the contractor shall notify the Consultant in writing of any revision other than those requested by the Consultant.

3.11 Shop drawings shall define the division of responsibility between different trades. Shop drawings shall show materials, methods of construction and attachment or anchorage, erection diagrams, connections and other details necessary to complete the work. Shop drawings shall show cross references to drawings and

specifications.

3.12 The review by the Consultant is for the sole purpose of ascertaining conformance with the general design concept. The review shall not mean that the Consultant approves the detail design inherent in the shop drawings, responsibility for which shall remain with the contractor, and such review shall not relieve the contractor of his responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the contract documents. The contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of the work of all sub-trades and work of other contractors.

3.13 Any adjustments made to the shop drawings by the Consultant are not intended to change the Contract Price. If the contractor deems that such adjustments affect the value of the work, he shall state so in writing before proceeding with the fabrication and installation of the work.

3.14 Make shop drawings accurately to a scale sufficiently large to show pertinent features of the item to be supplied and the method of connection to the work including attachments, reinforcing, anchorage and location of exposed fastenings.

4 REPRODUCTION OF DRAWING ELECTRONIC FILES

4.1 Reproduction of the Consultant's drawings to serve as background for shop drawings will be permitted. Remove all identification or reference to the Owner or Consultant from the drawings that are used for this purpose.

4.2 The release of these electronic files by the Consultant does not imply transfer of copyright and ownership to the Contractor. The Contractor shall be responsible for all liabilities and damages resulting from the use of these files.

4.3 Make payment to the Consultant for the cost of reproduction plus HST based on the number of drawing electronic files as indicated below.

1. 1 to 10 files: $550.00
2. 11 to 20 files: $650.00
3. 21 to 50 files: $850.00
4. 51 to 100 files: $1,350.00
5. More that 100 files: $7.50 per file, plus $350.00 administration fee.

5 SAMPLES

5.1 Samples, when requested by the Consultant, shall be submitted showing material, colour and finish. Materials used in the construction shall correspond to the reviewed samples.

5.2 Samples to be submitted in quantity which is required to be returned plus one which will be retained by the Consultant.

5.3 Refer to individual sections for more requirements for specified samples.

5.4 At each stage, assemble and submit all relevant samples in context, at one time, in the following groups:

1. Exterior Materials and Finishes
2. Interior Materials and Finishes
3. Ceiling Systems and Light Fixtures
4. Hardware
5. Cover plates, grilles, etc., of Mechanical and Electrical Sections.

5.5 Identify each sample with Project Number, Job Name, Date of Submittal, Type of Material, Names of Contractor, Subcontractor and Manufacturers.

6 COLOUR

6.1 Unless the precise colour and pattern is specifically described in the contract documents, whenever a choice of colour or pattern is available in a specified product, submit accurate colour charts from the manufacturer's standard range of colours and pattern charts to the Consultant for his review and selection.

6.2 Unless all available colours and patterns have identical costs and identical wearing capabilities and are identically suited for the installation, completely describe the relative costs and capabilities of each.

7 PROGRESS PHOTOGRAPHS

7.1 Upon commencement of the work and thereafter at monthly intervals supply to the Consultant 3 copies of coloured photographs with sufficient views from 4 locations of the progress of all parts of the work.

7.2 When directed by the Consultant, supply a final set of coloured photographs.

7.3 Each photograph shall be dated, and locations noted on back of same. Prints shall be 125 X 178 mm (5" x 7") in size. Insert each photograph in a heavy, clear, celluloid folder, 3 holes punched on the left-hand side for binding purposes. Each photograph shall have in the lower right-hand corner, a white patch with the name of the project and the date and location of exposure.

7.4 Cost of progress photographs is part of the contract sum and is not part of the allowances section.

7.5 Subcontractors are not required to take progress photographs, except if specifically required elsewhere in specifications.

8 SURVEY

8.1 Within 30 days of the commencement of the work, the Contractor shall submit a survey locating the existing above ground and buried services, the buildings on the property. The survey is to be compiled by a locating company and a registered Ontario Land Surveyor.

8.2 Prior to Substantial Completion, the Contractor shall submit an updated survey of the entire property showing all existing and new improvements. The survey is to be completed by a registered Ontario Land Survey in AutoCAD format (latest edition).

9 IDENTIFICATION OF SUBMITTALS

9.1 Completely identify each submittal and re-submittal by showing at least the following information:

1. Project Number,
2. Job Name,
3. Date of Submittal,
4. Name of Contractor,
5. Name and address of submitter, plus name and telephone number of the individual who may be contacted for further information,
6. Drawing Number and Specification Section number to which the submittal applies,
7. Whether this is an original submittal or resubmittal.

10 COORDINATION OF SUBMITTALS

10.1 Prior to submittals for Consultant's review, use all means necessary to fully coordinate material, including the following procedures:

1. Determine and verify field dimensions and conditions, materials, catalogue numbers and similar data,

2. Coordinate as required with the trades and with public authorities involved.

3. Secure necessary approvals from public authorities and others and signify by stamp, or other means, that they have been secured.

4. Clearly indicate deviations from the Contract Documents.

10.2 Unless otherwise specifically permitted by the Consultant, make submittals in groups containing associated items; the Consultant may reject partial submittals as not complying with the provisions of the contract documents.

10.3 Make submittals far enough in advance of scheduled dates of installation to provide required time for reviews, for securing necessary reviews, for possible revision and re-submittal, and for placing orders and securing delivery so as to cause no delay in the work or in the work of other contractors.

10.4 Costs of delays occasioned by tardiness of submittals shall not be borne by the owner.

11 SHOP DRAWINGS

11.1 Submit Shop Drawings as specifically required elsewhere in specifications.

12 SAMPLES AND MOCK-UPS

12.1 Submit samples and Mock-ups as specifically required elsewhere in specifications.

1. Where required by the Performance Specifications, construct mock-ups of the work in a location approved by the Consultant.

2. Construct mockups from the specified materials and assemblies for the review of the Consultant.

3. Make any revisions required by the Consultant.

4. Mockups reviewed and approved by the Consultant shall become the standard against which installed work will be evaluated.

5. Mockups, on the approval of the Consultant, may be incorporated into the finished work.

6. Do not proceed with the Work until the associated mockup has been approved.

13 EXTENDED WARRANTIES

13.1 In addition to the warranty requirements the Contractor shall note that the following extended warranty periods are required by the Contract Documents for the individual items under respective Sections.

Section	Title
03300	Concrete – 2 years
03300	Polymer Mortar – 2 years
Division 4	Stone conservation – 10 years
05732	Metals – 5 years
06200	Finish Carpentry - 2 years
06400	Architectural Woodwork - 5 years
07195	Air/Vapour Barrier- 5 years
07214	Spray Foam Insulation/Air Barrier- 10 years
07900	Caulking and Sealants- 3 years
08212, 08611, 08700 & 08710	Wood Doors, Windows, and Hardware - 3 years
08800	Glass & Glazing - 10 years
08810	Glass Balustrade – 10 years
09900	Paint – 2 years
Division 15	Refer to Division 15
Division 16	Refer to Division 16

14 MAINTENANCE AND OPERATING MANUALS

14.1 Submit in accordance with Section 01700 Contract Close-Out.

14.2 Submit Maintenance and Operating Manuals as specified in the following Sections:

Section	Title
04205	Mortar (colour formulae)
06200	Architectural Woodwork
08700	Finishing Hardware
08800	Glass and Glazing
09900	Painting
Div. 15	Mechanical
Div. 16	Electrical

15 Replacement Material

15.1 Supply replacement material at the completion of the project for the following products:

Section	Title
09655	Porcelain Tile(s) - 1% of total area of each colour & type
09900	Painting – 1 full 4 litre can of each type

15.2 Turn over all material to the Owner and obtain a signed receipt for same.

15.3 Submit extra material as specified in the following Sections:

Section	Title
04200	Masonry – 1% of total supply in weight, per each type.
Div. 15	All items indicated in Div. 15 sections

16 CASH FLOW CHART AND CONTRACT BREAKDOWN

16.1 The Subcontractor shall submit an estimated cash flow chart broken down monthly. Cash flow chart shall indicate anticipated Subcontractor's estimated monthly progress billings from commencement of work until completion.

16.2 The Subcontractor shall update the cash flow chart whenever changes occur to scheduling.

End of Section 01300

ARCHITECT'S SCHEDULED INSPECTIONS & APPROVALS

1 GENERAL

1.1 See Specifications for full listing of inspections and approvals.

2 SUMMARY LIST

2.1 Architect's approval before interfering with existing services and apparatus. One week notice to be given - 01010.

2.2 Architect's approval before Final Inspection - 01010.

2.3 Architect's approval of construction signs and locations - 01015.

2.4 Architect's approval of temporary fence and layout - 01015.

2.5 Architect's approval of substitutions - 01060.

2.6 Architect's approval of work schedule (Progress Schedule) - 01310.

2.7 Architect's approval of weeping tile and drainage system installation – 02620.

2.8 Architect's approval of sodded areas – 02822.

2.9 Architect's approval of mortar samples via test analysis - 04100.

2.10 Architect's approval of Masonry Restoration - 04502.

2.11 Architect's approval of wood cleaning – 06910

2.12 Architect's acceptance of mock-ups – 07620.

2.13 Architect's approval of caulking joint samples - 07900.

2.13 Notify Architect for Deficiency Inspection upon agreed Substantial Completion.

2.14 Notify Architect for One-Year Holdback Inspection.

2.15 Notify Architect for Two-Year Roofing Inspection for Extended Warranties

2.16 Notify Architect for Two Year Inspection of Extended Warranties

3 PROCEDURE

3.1 Submit samples for approval.

End of Section 01301

1.1 General

1. This section details the Construction Manager's responsibilities in preparation, submission and maintenance of construction schedules with form and requirements for periodic revisions. The Subcontractors shall provide the Construction Manager with their schedule of work and co-ordinate the work with and the Work Progress of other trades on site.

2. Unless specified otherwise, make all submissions to the Consultant at his office, with additional submissions made as directed by the Consultant to other parties involved in the construction.

3. Make all submissions required by the Contract Documents with reasonable promptness and in orderly sequence so as to cause no delay in the work.

1.2 Requirements Include

1. Schedule, form, content.
2. Stages/Phased Construction.
3. Schedule Revisions.
4. Bi-Weekly schedule updating.

1.3 Related Requirements

1. Section 01700 - Contract Closeout.

1.4 Schedules Required

1. Submit the following schedules:
   .1 Construction Progress Schedule
   .2 Weekly Schedule and Manpower Loading
   .3 Submittal Schedule for Shop Drawings and Product Data
   .4 Product Delivery Schedule if applicable

1.5 Submittals Schedule

1. Include schedule for submitting shop drawings, product data, and samples. Co-ordinate with section 01300 requirements. Incorporate into Preliminary Progress Schedule and Bi-Weekly Schedule updates.

2. Indicate dates for submitting, review time, resubmission time, float time, and last date for meeting fabrication schedule.

3. Include dates when SUBMITTALS and delivery will be required for the Owner-furnished products if applicable.

4. Include dates when reviewed submittals will be required from the Consultant.

1.6 Product Delivery Schedule

1. Include dates for delivery of products.

2. Include dates for products furnished by Owner, if applicable.

3. Submit a schedule of required equipment order dates and delivery dates for products

and/or assemblies which involve insignificant production time or fabrication time and/or will significantly affect the project schedule if not available when needed.

1.7 Construction Progress Schedule

1. Submit a detailed Progress Schedule in Gantt Format to the Owner a minimum of seven (7) days before first progress application for payment. The Contractor shall make all changes to the schedule requested by the Owner.
2. On schedule indicate a time bar for each major construction activity to be performed at the site, properly sequenced and co-ordinate with other activities of work. Itemize activities in sufficient detail that no one bar exceeds two months in duration (separate long running trades such as Masonry, Mechanical and Electrical into Logical Sub-Sections). Allow sufficient space below planned time bar for another time bar to record actual progress.

3. Show dates for commencement and completion of all activities. Estimate duration period and float (contingency) time for each activity.

4. Show projected percentage of completion for each activity as of the date of submission of monthly progress payment applications and/or to the date of submission of schedule when requested.

5. Indicate actual progress of each activity to date of submission of schedule. Indicate current status of all activities to date of submissions of schedule by showing where behind, on or ahead of planned schedule.

6. Show changes occurring since previous submission of schedules:

   .1 Major changes to scope
   .2 Activities modified since previous submission
   .3 Revised projections of progress and completion
   .4 Other identifiable changes.

7. Confirm commencement, duration and completion dates of all activities with subcontractors, subtrades and suppliers.

8. Deliver to Architect, at the end of each calendar month with progress application a project status report derived from evaluation of Schedule.

9. Include in this report updated schedule together with such supporting narrative and such graphical presentations necessary to clearly outline the progress of Work, areas of current and anticipated problems, effect of changes on schedules of major trade subcontractors and proposed corrective action.

1.8 Staged/Phase Construction

1. Prepare and submit sub schedules for each separate stage of Work when pertinent to the project.

2. Provide sub schedules to define critical portions of prime concern to master schedule.

3. Describe start and stop, float time and affected other work.

1.9 Weekly Schedule Update and Manpower Loading

1. Use the Construction Progress Schedule as a basis for reporting on a bi-weekly basis the complete status of construction progress, scheduled activities and manpower loading on the project.

2. There will be an Owner/Architect/Consultant/General Contractor/Trade Contractor meeting every second week to review the project status. Provide a detailed 2-week work schedule (based upon the Construction Progress Schedule) outlining work activities and manpower requirements planned for that period.

3. Identify current and anticipated problems and delays with respect to the past work period. the effects of said problems on the overall schedule and proposed corrective measures.

4. Submit to Architect two days prior to site meetings (every second week) the following:
   .1 Updated Construction Progress Schedule.
   .2 Outline of anticipated work activities for the forthcoming period.
   .3 Outline of required and/or anticipated manpower levels (by trade) for the forthcoming period.
   .4 Problems or delays experienced and/or anticipated.
   .5 Proposed corrective measures to react to problems or delays.

End of Section 01310

1 GENERAL

1.1 Related Sections

1. Section 01010 – General Requirements

2. Section 01300 – Submittals

3. Section 01433 – Mock-up Requirements

4. Section 01500 – Temporary Facilities

1.2 References

1. National Fire Protection Association (NFPA).

.1 NFPA 241 - Standard for safeguarding Construction, Alteration, and Demolition Operations, 2004 Edition.

2. Canadian Standards Association (CSA International).

.1 CAN/CSA-S350-M1980 (2003)- Code of Practice for Safety in Demolition of Structures.
.2 CSA O80.20-M89, Fire-Retardant Treatment of Lumbering Pressure Processes.
.3 CSA O80.27-M89, Fire-Retardant Treatment of Plywood by Pressure Processes.

3. Human Resources and Skills Development Canada.

.1 FC 301 Standard for Construction Operations
.2 FC 302 Standard for Welding and Cutting.

4. Parks Canada.

.1 Standards and Guidelines for the Conservation of Historic Places in Canada, published by Parks Canada (2003).

5. Deutsches Institut für Normung, Germany.

.1 DIN 4150-3:1999 Structural vibration - Effects of vibration on structures.

1.3 Performance Requirements

1. The Contractor is responsible for any damage to or loss of Heritage Materials occurring as a result of site, handling, transport and storage activities.

2. Ensure materials, equipment and procedures safely support existing structure and construction live loads.

3. Apply methods that minimize the risk of damage to Heritage Materials.

4. All methods and techniques utilized in the protection of Heritage Material, or materials that may have an impact on Heritage Materials, must conform to the Drawings and requirements of this Section.

1.4 Definitions

1. Heritage Character Defining Element: Areas containing or potentially containing Heritage Materials, as defined in the reasons for designation listed within City of Toronto, By-Laws or as indicated on the drawings, or as directed by the Architect.

2. Heritage Materials: Existing heritage materials identified as Heritage Character Defining Element are deemed essential to the heritage value of the building. These include but are not limited to:

   .1 Exterior stone masonry and other original structural and decorative elements of the building
   .2 Metal domes, associated components and supporting structures.
   .3 Heritage wood doors and windows
   .4 Other elements as indicated on the drawings and /or the Cultural Heritage Character Statement or reasons for designation of By-Law 100-09

1.5 Shop Drawings

1. Submit shop drawings in accordance with Section 01300.

2. Submit detailed plans, sections and details of protective barrier assemblies. Show both typical and atypical configurations.

3. Identify each assembly and locate all items in plan drawings.

4. Submit Product data specifications for fasteners, waterproofing and soft padding materials used in barrier assemblies.

1.6 Procedures

1. Submit detailed demolition procedures indicating tools used inside or near heritage areas. Describe additional measures to be implemented to ensure vibration control and protection of heritage fabric. Refer to Article 3.4 - Vibrations and Displacements.

2. Submit written plan describing procedures to be followed if undocumented or concealed heritage materials systems are discovered.

1.7 Mock-Ups

1. Erect mock-ups in-situ for protective and shoring measures for each condition containing heritage elements and materials to be protected.

1.8 Existing Conditions

1. Refer to Demolition (Temporary Works) Drawings showing existing conditions.

2. Before starting work, verify existing conditions and variations from original contract documents and notify Contractor of any discrepancy.

1.9 Heritage Character Defining Elements

1. All materials to be removed or protected are those as identified and defined in the reasons for designation listed within the City of Toronto, By-Law or as indicated on the drawings, or as directed by the Architect.

2. Apply heritage protection measures to all Heritage Character Defining Elements.

3. All known heritage items requiring additional protective measures are located and identified on the drawings.

4. Both sides of walls supporting heritage stone or other heritage materials are to be protected.

1.10 Scheduling

Submit schedule of activities, showing dates and estimated duration, to Contractor not later than 7 days before protection activities begin.

1. Work Plan Review:

.1 Submit protection and schedule work plan for all work in areas with Heritage Character Defining Elements to the Contractor for review in a timely manner in accordance with Section 01300 Submittals. Follow the approved Work Schedule. Heritage Protection may be required at different times for different areas.
.2 Inform the Contractor in a timely manner of upcoming milestone reviews as identified in the schedule and work plans.
.3 Once pre-demolition protective measures are completed, advise the Architect and schedule a visit for the heritage areas and associated facilities for review.

2. Submit schedule of activities, showing dates and estimated duration to Architect ot later than 7 days before dismantling/demolition of area immediately adjacent to areas with Heritage Character Defining Elements.

3. Unless otherwise indicated, all protective barriers shall remain in place for duration of the Contract.

4. During the course of the contract, allow for the temporary removal and reinstatement of Heritage Protection as required.

5. When work of the Contract is deemed sufficiently complete by Consultant, carefully remove protective barriers for final review. Ensure that all barriers are removed and that view of all previously concealed materials is unobstructed before advising Consultants to begin review.

1.11 Scheduling Sequence: General

1. Coordinate demolition activities specified in Section 02050 – Selective Demolition with the scheduling restrictions below.

2. Perform interior pre-demolition protective measures in accordance with the scheduling sequence below:

.1 Installation of heritage protection.
.2 Review of protective measures by Consultant and Contractor.
.3 Removal of shoring and protective measures.

3. Exploratory work may be performed concurrently with other Protective or Exploratory Work but must be coordinated with other work of the Contract.

1.12 Quality Assurance

1. Perform work in accordance with *The Standards and Guidelines for the Conservation of Historic Places in Canada* published by Parks Canada.

2. Accepted mock-ups must be maintained and remain accessible throughout and for the duration of the project. Accepted mock-ups may become part of the final work.

3. Workers Abilities

.1 All trades must be qualified to work on this Project.
.2 Unless specifically permitted by the Consultant, only accepted procedures and the personnel that performed them during the mock-ups may be utilized to do that procedure throughout the duration of the project.
.3 No approved specialized workers shall be changed during the progress of the work without written acceptance by the Contractor, following addition procedural mock-ups.

2 PRODUCTS

2.1 Materials

1. Ensure that materials used in exterior barriers conform to Section 01500 Temporary Facilities.

2. Material grades – general

.1 Conform to material grades prescribed in the following paragraphs for protective barriers.

.2 Lumber: spruce, pine or fir to CAN/CSA-O141, NLGA #2 grade, S4S, moisture content 19% (S-dry) or less. Where pressure treated lumber is required, treat lumber with Alkaline Copper Quaternary to CSA O80-Series.

.3 Plywood: exterior grade softwood plywood to CSA O151, thickness as indicated. Where pressure treated plywood is required, treat plywood with Alkaline Copper Quaternary to CSA O80-Series.

.4 Acceptable dust, dirt, liquid barriers, including:

.1 Vapour-permeable sheeting: made with flash spun high-density polyethylene fibers.
.2 6 mil clear construction grade polyethylene film.
.3 Polyethylene fastening tape compatible with sheeting.

.5 Acceptable soft padding:

.4 Compressible polychloroprene rubber, minimum 25 mm.
.5 Polychloroprene rubber foam sheeting, 13 mm thickness.
.6 Resilient medium-density closed-cell Polyethylene foam sheeting
.7 Low-density extruded polystyrene, minimum 25 mm.

.6 Accessories:

.1 Use only low impact and low vibration fasteners, including bolts with nuts and washers, wood screws, liquid adhesives, adhesive strips or tapes and removable, non-residue adhesive strips and tapes.
.2 No high impact attachment systems are permitted, including spikes, nails, staples, explosive actuated fastening devices and masonry anchoring fastener systems.

3 EXECUTION

3.1 Protective Measures – General

1. Provide protective measures for any and all heritage conditions identified as Heritage Character Defining Elements, or as indicated on the drawings, or as directed by the Architect.

2. Anchoring or attachment to historic materials:

.1 The use of any mechanical fasteners into or onto any heritage material is prohibited.
.2 In the event that dust, dirt, and liquid barriers require attachment to historic materials, only non-permanent removable, non-residue adhesive tapes may be used on the heritage material.
.3 No other attachments to historic materials are permitted.

3.2 Protective Measures – Exterior

1. Direct attachment of barriers, construction lifts, scaffolds, and debris chutes to the exterior masonry cladding or other heritage materials or construction is prohibited.

2. Passage of materials and construction debris through windows and other openings in the masonry facades is not allowed unless a proposal for protection measures is submitted in accordance with section 01300 Submittals and accepted by the Architect.

3. Provide barriers in all locations where exterior masonry may be damaged by normal site activities.

4. Protect perimeter of exterior openings with rigid barriers in locations where passage of materials is authorized. Barriers shall be continuous and extend at least 300 mm around the opening on the exterior façade. When barriers are removed, reinstall windows in original locations and caulk perimeter.

5. Paint visible side of barriers in accordance with Section 01500 Temporary Facilities.

6. Scaffold netting shall be tightly fastened to scaffolds

   .1 Resilient and sturdy enough to prevent tools and workers from accidentally damaging the protected stone façade.
   .2 Woven tightly enough to prevent passage of small tools and material fragments.

3.3 Protective Barriers

1. Provide protective barriers and coverings to protect heritage stairs, ceilings, walls and floors from abrasion, impact, dust, dirt and liquids.

2. Protective barriers shown on Temporary Works Drawings illustrate examples of acceptable construction assemblies. Final design of protective barriers is the responsibility of the Contractor and is subject to review by the Contractor.

3. Indicated barrier types are defined on Temporary Works Drawings.

3.4 Vibrations and Displacements

1. Protect sensitive heritage items from vibrations and sudden movements by combining bracing, rigid paneling and full-surface padding as required.

2. Use of high-impact mechanical demolition tools is prohibited within 10 m of Heritage Character Defining Elements.

3. If vibrations and displacements are deemed by the Architect to be excessive or any other demolition procedure is observed to be having a negative impact on heritage materials, stop any and all work until the situation is remedied and an effective mitigation is submitted and approved by the Contractor.

3.5 Prevention of Water/ Liquid/ Particulate Damage

1. Always maintain proper water-shedding conditions to ensure that rainwater does not infiltrate inside the building.

2. Provide waterproofing sheeting and wrapping to cover heritage materials so that if failed or damaged mechanical equipment, equipment being dismantled and removed, or any other demolition or abatement procedure does not cause liquids and/or allow particulates and/or airborne humidity or airborne particulates to come into contact with the heritage materials.

3. Water or any aqueous mixtures may produce significant damage to heritage items. Protect heritage items to remain in place from all contact with water or other aqueous mixture.

3.6 Unknown Heritage materials

.1 If undocumented or concealed materials or systems which are potentially heritage in nature are discovered anywhere within the building cease demolition activities in the immediate vicinity, tape off and protect the items, materials, and systems, and alert the Contractor immediately. Areas similar in nature under which similarly undocumented or concealed materials or systems could exist shall also be immediately identified by the Contractor so that advancing demolition is aware of the potential hidden items.

End of Section 01350

1 INSPECTION AND TESTING

1.1 General

1. General Requirements

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

1.2 Appointment and Payment Of Inspection Companies

1. Contractor will provide a minimum of three cost proposals from Inspection and Testing Companies for various trades for review and appointment by the Architect where specifically stated or required.

2. The cost of inspection and testing will be paid out of an allowance provided under the Contractor's budget, except where tests or inspections reveal work not in accordance with the Contract, the Contractor shall bear the cost of such tests and additional tests as the Architect requires to verify the acceptability of corrected work.

1.3 Responsibilities

1. The Architect will supply drawings and specifications as required for the use of the respective inspection and testing authorities and advise the Contractor of the Company appointed for the respective work.

2. The Contractor shall advise the Architect and the respective Inspection and Testing authority not less than 5 working days prior to the commencement of any work to be inspected or tested and ensure that proper facilities and co-operation is provided and that no work is carried out without the required inspection and testing.

3. Proper storage shall be provided for storing sample specimens at the job site at the required temperature and free from vibration or injury.

End of Section 01400

1.1 General Requirements

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

1.2 Appointment and Payment of Inspection Companies

1. Inspection and Testing Companies for various trades will be appointed by the Architect where specifically stated or required.

2. The cost of inspection and testing will be paid out of an allowance provided under Section 01020, except where tests or inspections reveal work not in accordance with the Contract, the Contractor shall bear the cost of such tests and additional tests as the Architect requires to verify the acceptability of corrected work.

3. The independent inspection companies shall inspect, and test site conditions, procedures and materials related but not limited to the following:

.1 Concrete
.2 Backfilling and compaction
.3 Mortar
.4 Waterproofing and drainage

1.3 Responsibilities

1. The Contractor shall prepare terms of reference for each testing agency based on the Scope of Work. These terms of reference shall be submitted to the Architect/Consultant for review and acceptance.

2. The Architect will supply drawings and specifications as required for the use of the respective inspection and testing authorities to the Contractor. The Contractor will solicit quotations from at least three separate testing agencies (per discipline). Architect/Consultant will review and provide recommendation to Owner on the selected Company to be appointed for the respective work. Owner shall approve selection in writing.

3. Testing agency is expected to do the following:

.1 Act on a professional and unprejudiced basis and carry out inspection and testing functions to establish compliance with requirements of Contract Documents, Working Drawings and Detailed Specifications.

.2 Check work as it progresses and prepare reports stating results of tests and conditions of work and state in each report whether specimens tested conform to requirements of Contract Documents, Working Drawings and Detailed Specifications, specifically noting deviations.

.3 Distribute reports as follows:
.1 Owner – 1 copy.
.2 Consultant – 2 copies
.3 Building Department – 1 copy
.4 Contractor – 1 copy
.5 Subconsultants (where applicable) – 1 copy

.4 Testing agency is not authorized to amend or release any requirements of Contract Documents, Working Drawings nor Detailed Specifications, nor to approve or accept a portion of work.

4. The Contractor shall do the following:

.1 The Contractor shall advise the Architect and the respective Inspection and Testing

authority not less than 48 hours prior to the commencement of any work to be inspected or tested and ensure that proper facilities and co-operation is provided and that no work is carried out without the required inspection and testing.

.2 Proper storage shall be provided for storing concrete specimens at the job site at the required temperature and free from vibration or injury.

.3 Provide testing agency with access to work at all times.

.4 Supply material samples for testing.

.5 Supply casual labour and other incidental services required by testing agency.

.6 Provide facilities for site storage of samples.

5. When initial inspection and testing indicates non-compliance with Contract Documents, Working Drawings or Detailed Specifications any subsequent re-inspection and re-testing occasioned by non-compliance shall be performed by same testing agency and cost thereof borne by the subcontractor.

End of Section 01410

1 DEFINITIONS

1.1 Mockups: Site constructed; full size physical assemblies used by Consultant to:

1. Review and verify selections made under sample and shop drawing submittals of specification Sections.
2. Demonstrate aesthetic effects and, where indicated, qualities of materials and execution.
3. Review construction, coordination, and operation.

2 QUALITY ASSURANCE

2.1 Notify Consultant seven working days in advance of dates and times when mockups will be constructed.

2.2 Allow seven working days for initial review and each subsequent review of each mockup.

2.3 Make adjustments as required by the Consultant until acceptance.

2.4 Accepted mockups establish the standard of remaining Work.

2.5 Obtain Consultant's acceptance of mockups prior to commencement of material fabrication and construction of assemblies.

3 MOCKUPS REQUIRED

3.1 Construct the mockups of type and sizes specified in individual sections. Mockups will form part of the completed Work, unless otherwise indicated.

4 MATERIALS AND FABRICATION

4.1 Fabricate materials and construct mockups using materials and methods specified and Reviewed under sample submittals of specification Sections.

5 INSTALLATION

5.1 Construct mockups in location and of size indicated or, if not indicated, as directed by Consultant, using installers who will perform the same tasks for Project.

5.2 Review with Consultant installation methods different from reviewed shop drawings and manufacturers' recommendations.

5.3 Demonstrate the proposed range of aesthetic effects and workmanship.

5.4 Maintain and protect mockups during construction in an undisturbed condition.

5.5 Modify and alter prototype as necessary to obtain the required test results at no cost to the owner. The cost of re-testing shall be paid by the contractor.

5.6 Allow sufficient time for testing evaluations, alterations, and re-testing to prevent delays to the project construction progress.

5.7 Demolish and remove mockups when directed.

End of Section 01433

1.1 Related Requirements

1. General Requirements - Section 01010
2. General Work - Section 01015

1.2 General

1. Provide all temporary facilities and controls required for the proper execution of the work.

2. Provide and maintain temporary systems in accordance with applicable regulations and requirements and shall arrange for, obtain, and pay for any permits required. Cost to be paid by the Owner.

1.3 Temporary Electricity and Lighting

1. Provide and pay for temporary electrical lighting and power systems required for the work of this Contract.

2. Install and maintain temporary electrical systems in accordance with the Construction Safety Association's "Temporary Wiring Standards on Construction Sites" the Ontario Electrical Code and other authorities having jurisdiction.

1.4 Temporary Heating

1. Furnish equipment, labour, and fuel to provide temporary heat as required for proper execution of the work of this Contract at no extra cost to the Owner.

2. If contractor makes use of meter when it is first turned on for temporary heat, then contractor is responsible to arrange for final inspections by Enbridge once all gas equipment is hooked up.

1.5 Temporary Ventilation

1. Provide minimum 1 air change per hour for enclosed areas receiving architectural finishes.

2. Do not allow excessive build-up of moisture inside building.

1.6 Temporary Telephone/Facsimile Machine

1. Provide site telephone and separate facsimile service for duration of Contract until completion.

1.7 Temporary Water

1. Provide temporary potable water supply, required for the work of this Contract.

1.8 Temporary Sanitary Facilities

1. Provide and maintain sanitary toilet facilities for the use of all personnel on site.

1.9 Temporary First-Aid Facilities

1. Provide site equipment and medical facilities necessary to supply first-aid service to injured personnel in accordance with regulations of the Worker's Compensation Act. Maintain facilities for duration of Contract.

1.10 Temporary Fire Protection

1. Provide and maintain on site, for the duration of the Contract, adequate fire protection in accordance with all regulatory and jurisdictional requirements.

1.11 Temporary Use of New Permanent Service and Equipment

1. Do not use any new permanent service or equipment without written approval of the Consultant.

2. Pay for any operating costs.

3. Perform any required repairs and maintenance and turn over equipment to Owner in new and perfect operating condition.

4. Use of permanent systems and equipment shall not affect the warranty conditions and warranty period for any such systems and equipment. Make allowances to ensure that the Owner receives the full equipment manufacturer's warranty from the date of project takeover.

1.12 Construction Aids

1. Provide and maintain temporary stairs, ladders, ramps, hoisting equipment, scaffolding and falsework.

1.13 Barriers

1. Provide and maintain required hoardings, barricades, guardrails, and light guards in accordance with applicable regulations, building codes and municipal By-Laws.

1.14 Temporary Controls

1. Provide protective coverings to protect work against damage caused by weather, including but not necessarily limited to rain, snow, ice, wind, frost, and excessive heat.

2. Provide wind breaks and sunshades to allow proper setting and curing of cementitious materials.

3. Protect building materials from freezing.

4. Prevent sprayed materials from contaminating air beyond application area, by providing temporary enclosures.

5. Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

1.15 Temporary Drainage and De-Watering

1. Provide and maintain temporary site drainage and de-watering necessary to carry out the work of this Contract.

2. Conform to erosion and sedimentation control requirements of the authorities having jurisdiction.

1.16 Disposal

1. Remove all surplus excavated material from the project site.

2. Remove all construction refuse off-site.

3. Provide all necessary haulage and related costs for disposal.

1.17 Temporary Field Office

1. The Contractor shall provide and maintain a temporary office to accommodate administrative activities and site meetings, complete with light, heating and cooling equipment, ventilation, phone, fax machine, table, and chairs.

End of Section 01500

1 GENERAL

1.1 REQUIREMENTS INCLUDED

1. Safety measures
2. Fire protection
3. Overloading precautions
4. Falsework
5. Scaffolding

1.2 RELATED REQUIREMENTS

1. General Requirements - Section 01010
2. General Work - Section 01015

1.3 CONSTRUCTION SAFETY MEASURES

1. Observe and enforce construction safety measures required by National Building Code (1997) Part 8, Provincial Government, Workplace Safety & Insurance Board and municipal statues and authorities.
2. In particular, the Ontario Construction Safety Act, the regulations of the Ontario Department of Labour and Ontario Hydro Safety Requirements shall be strictly enforced.
3. In the event of conflict between any provisions of above authorities the most stringent provisions will apply.

1.4 MATERIAL SAFETY DATA SHEETS

1. Submit Material Safety Data Sheets (MSDS) for any product to be used, installed or applied inside of the building if said product may emit toxic fumes and/or noxious odours.
2. Submit Material Safety Data Sheets for any product which is known to or suspected of creating a health hazard or discomfort when used in confined spaces, including but not limited to the following:
   .1 Adhesives
   .2 Solvents
   .3 Sealants (Caulking, etc.)
   .4 Paints and Coatings
   .5 Other products which may give off air borne particles after installation.
   .6 Any other product as direct by Architect/Consultants.
3. The required Material Safety Data Sheets to be submitted prior to ordering material or product for use as a part of the Work.
4. The Owner may withhold payment for work of a subtrade or section until MSD Sheets for products supplied by that subtrade or section have been submitted, reviewed by consultant and found to be acceptable.
5. Refer to Section 01700 - Project Close-Out for requirements regarding Certificates of

Compliance.

1.5 MATERIALS SPECIFICALLY EXCLUDED

1. Safety Data Sheets for any product suspected of containing asbestos if so requested by Consultant. Examples of some materials requiring scrutiny and/or confirmation include:

   .1 Transite drainage pipe - whether buried or above grade – not permitted.
   .2 Insulation and/or jacketting for pipes, ducts, motors, pumps, etc. - not permitted if any asbestos is present.

2. Solder for all piping is to be lead-free. "Lead Free" shall mean solder which contains less than 0.030% of lead when dissolved in fluoroboric and nitric acids and tested by inductively coupled argon plasma atomic emission spectroscopy. Steelbond 281 and Silverbrite are acceptable solder products.

   The mechanical contractor shall provide an affidavit signed by the principal of the company, on company letterhead, that all the solder used on the project was either one of the two acceptable products or that the solder used (identified by brand name) meets or exceeds the testing criteria.

   The Owner shall undertake random testing of the soldered joints. Should testing provide that the solder used was not as specified, the Owner shall take legal action against the contractor as appropriate.

3. All paint and finish coatings are to be lead and mercury-free. Submit Material Safety Data Sheets confirming that these products are free of all lead and/or mercury compounds.

1.6 FIRE SAFETY REQUIREMENTS

1. Comply with requirements of the local municipal fire department with respect to continuous fire safety on the job site.

2. Comply with fire safety requirements of other construction related authorities (Workplace Safety & Insurance Board, Ministry of Labour, construction trade unions, etc.). If more than one authority issues similar requirements, the more stringent shall govern.

3. The appropriate clauses of the Ontario Building Code relating to fire protection shall be strictly followed.

4. Provide and maintain free access to temporary or permanent fire hydrants and other fire protection equipment during performance of work required by insurance companies having jurisdiction and governing codes, regulations and by-laws.

5. Provide and maintain fire exits from occupied building areas. Obtain approval from local authorities for exiting modifications made throughout construction.

1.7 OVERLOADING

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

permanent deformation.

1.8 FALSEWORK

1. Design and construct falsework in accordance with latest issue of CSA S269.1-.

1.9 SCAFFOLDING

1. Design and construct scaffolding in accordance with latest issue of CSA S269.2-.

1.10 LIST OF MINIMUM SAFETY

1. Include all provisions for construction safety such as fences, storage provisions facilities, sanitation facilities, fire protection, electrical supply, temporary heat, ventilation, construction equipment with its supports and guards, stairs, platforms, ladders, scaffolds, guardrails, walkway lighting and morality lighting, work around asbestos lead, silica and fumes, all as required by the Construction Safety Act and Regulation, latest edition of the Province of Ontario, as well as all other applicable regulations of Jurisdictional Authorities.

1.11 SAFETY REQUIREMENTS

1. The Contractor will take all necessary steps to protect personnel (workers, visitors, general public, etc.) and property from any harm during the contract.
2. All work procedures will be in accordance with the legislated standards.
3. All equipment shall be in safe operating condition and appropriate to the task.
4. The Contractor shall ensure that only competent personnel are permitted work on site. The Owner will throughout the term of the contract also remove from the site any persons not observing or complying with safety requirements.
5. The Contractor shall provide competent personnel to implement their safety programs and ensure that the Owner's standards and those of the Ontario Health and Safety Act are being complied with.
6. The Owner’s representative or the Architect will monitor every week to ensure that safety requirements are met and that safety records are properly kept and maintained. Continued disregard for safety standards can cause the contract to be cancelled and the Contractor or subcontractors removed from site.
7. The Contractor will report to the Owner, architect and jurisdictional authorities any accident or incident involving Contractor, the Owner or public personnel and/or property arising from the contractor's execution of the work.

End of Section 01545

1.1 Fires

1. Open fires and burning of rubbish are not permitted on the site except by municipal permit.

1.2 Disposal of Wastes

1. Do not bury rubbish and waste materials on site.
2. Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm, or sanitary sewers.
3. All removal of waste products and debris resulting from the work must be audited and source-separated to comply with the most current version O.Reg 102 103 Industrial, Commercial and Institutional Source Separation Programs under the Environmental Protection Act and the 3 R's Regulation.

1.3 Drainage

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

1.4 Site Clearing and Plant Protection

1. Refer to Section 00340 – Arborist Investigation Data.

1.5 Pollution Control

1. Provide and maintain temporary erosion and pollution control features installed under this contract or previously installed.
2. Control emissions from equipment and plant to local authority's emission requirements.
3. Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.
4. Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

End of Section 01560

1 FIELD OFFICES AND SHEDS

1.1 Field Office: Upon request and subject to the approval of the Architect and UofT.

1.2 Storage Sheds: Contractor may provide, subject to the approval of the Architect and UofT, a lockable weather-tight sheds with floors raised above ground, for storage of materials, tools, equipment which may be damaged by weather or that may require containment.

1. Number and location of sheds are subject to the approval of the Architect and UofT.

2. Permanent storing of materials within hoarded areas or at bottom of scaffold is not allowed.

End of Section 01590.

1.1 Requirements Included

1. Systems demonstration
2. Document submission
3. Project commissioning
4. Inspection and takeover procedures

1.2 Related Requirements

1. General Requirements - Section 01010
2. General Work - Section 01015
3. General Conditions of the Contract: Fiscal provisions, legal submittals, and other administrative requirements.

1.3 Documents

1. Collect reviewed submittals in Section 01010 and 01300 and assemble documents executed by Subcontractors, suppliers, and manufacturers. Submit as per requirements in Section 01010 - General Requirements.

2. Provide bonds fully executed and notarized.

3. Submit a final statement of accounting giving total adjusted Contract Sum, previous payments, and monies remaining due.

4. Architect will issue a final change order reflecting approved adjustments to Contract Sum not previously made.

1.4 Operating and Maintenance Manuals

1. Provide two copies of operating and maintenance data, prepared on 8 ½" x 11" sheets in printed or typewritten form, contained in D-ring binders with soft vinyl covers.

2. Manual contents shall be assembled in systematic order, generally following the specification format. Provide labelled, celluloid covered tabs fastened to hard paper dividers to identify different Sections.

3. Binders all have clear plastic pocket at back of spine for identification. Insert label containing title "Operating and Maintenance Data", project name and volume number if applicable.

4. Include the following material in each manual:

.1 Title sheet labelled "Operating and Maintenance Data" and listing project name, date, volume number, if applicable and names and addresses of Design-Build Contractor, and consultants.

.2 List of contents. If more than one volume is required, provide a cross-reference contents page at front of each volume.

.3 Complete list of subcontractors and suppliers.

.4 Copy of finish hardware list, complete with all amendments and revisions.

.5 Schedule of paints and coatings. Include sufficient explanation to fully identify each surface with the applicable paint or coating used. Enclose copy of colour schedule.

.6 Maintenance instructions for all finished surfaces.

.7 Brochures, cuts of all equipment and fixtures.

.8 Operating and maintenance instructions for all equipment.

.9 Valve manual.

.10 Controls schematics.

.11 Extended warranties.

.12 Maintenance contracts.

.13 Other data required elsewhere in Contract Documents or deemed necessary by Consultant.

1.5 Record Drawings

1. Working and Record Drawings for this project shall be prepared using AutoCad (latest edition) CAD system.

2. Prior to Substantial Performance, prepare a CAD file set of Record Drawings based on the As-built Drawings and the Contract Drawings including all revisions, changes, deletions, and additions made during execution of the Work. Review record "as-built" drawings for completeness and then have "as-built" AutoCad (latest edition) drawings completed by a professional drafting service and provide "as-builts" on computer disks.

3. Submit one CAD file of the record drawings and one set of whiteprints of the record CAD file for all design disciplines (architectural, structural, mechanical, electrical, and civil) to the Consultant prior to application for Final Payment.

1.6 Maintenance Materials

1. Deliver to site, unload and store where directed, maintenance materials as required elsewhere in these Specifications. Obtain receipt from Owner for delivered materials and submit copy of receipt to the Consultant.

2. Package materials so that they are protected from damage and loss of essential properties.

3. Label packaged materials for proper identification of contents.

1.7 Operating Instructions

1. At Substantial Performance, at a time acceptable to Owner, but not before operating and maintenance manuals have been reviewed and accepted by the Consultant, instruct Owner's representatives in the operation of all systems and equipment.

2. Coordinate training sessions for each type of operating system and equipment with qualified instructors and attendance of relevant subcontractor.

3. Prior to final inspection, demonstrate operation of each system to the Owner and Consultant.

1.8 Project Commissioning

1. Expedite and complete deficiencies and defects identified by the Consultant.

2. Review Cash and Contingency Allowances in relation to Contract Price, change orders, hold-backs and other Contract Price adjustments.

3. Submit required documentation such as statutory declarations, Workplace Safety & Insurance Board Certificates, certificates of approval or acceptance from regulating bodies.

4. Attend "end-of-work" testing and break-in or start-up demonstrations.

5. Review inspection and testing reports to verify conformance to the intent of the documents and that changes, repairs or replacements have been completed.

6. Meet with structural consultant and inspection and testing consultant to co-ordinate completion, testing approvals.

1.9 Inspection/Takeover Procedures

1. The requirements of OAA/OGCA Document No. 100 "Take-Over Procedures" also govern applicable take-over procedures for this Contract.

2. Prior to application for certificate of Substantial Performance, carefully inspect the Work and ensure it is complete, that major and minor construction deficiencies are complete and/or corrected and the building is clean and in condition for occupancy. Notify the Architect, in writing, of satisfactory completion of the Work and request an inspection.

3. Prior to requesting a Substantial Performance submit the following:

   .1 Two copies of operating and maintenance manuals.

   .2 Two copies of inspection and acceptance certificates required from regulatory agencies.

4. Upon the agreement of the Consultant that Substantial Performance has been achieved, prepare a complete list of deficiencies, and submit list to the consultant.

5. Reissue an updated deficiency list incorporating additional deficiencies identified during the inspection.

6. The Owner will take over and occupy the building upon completion, inspection, and acceptance of the work.

7. During the Architect/Consultant inspections, lists of deficiencies and defects will be tabulated. Correct same.

8. When the Architect/Consultants consider deficiencies and defects have been corrected and it appears requirements of the Contract have been performed, make application for certificate of Substantial Performance.

9. All utility meters to be read and transferred into the Owner's name.

1.10 Final Submission

1. Prior to claiming final payment:

   .1 Submit record drawings.

   .2 Submit one complete set of reviewed shop drawings of mechanical and electrical items, folded to 8 ½" x 11" size, contained in heavy duty manila envelopes, numbered and labelled. Follow specification format with no more than one Section per envelope.

   .3 Submit two copies of the heating and ventilating systems balancing reports.

   .4 Submit replacement materials.

   .5 Submit five copies of the Consultant final deficiency lists.

   .6 Upon completion of all items noted on the deficiency list, clean all areas, surfaces, and components affected by corrections and completion of deficient items.

   .7 Ensure that all services, equipment, apparatus are properly tested and adjusted.

   .8 Deliver replacement materials to a location determined by the Consultant.

End of Section 01700

1.1 GENERAL REQUIREMENTS

1. Be responsible for cleanliness of the project to satisfaction of the Consultant. Maintain work in neat and orderly condition and free of debris at all times.

2. Remove from site and legally dispose of rubbish and waste materials.

3. Burning or burying of rubbish and waste materials on site is not permitted.

4. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

5. Use cleaning material only on surfaces recommended by cleaning material manufacturer.

1.2 CLEANING DURING CONSTRUCTION

1. Remove debris, packaging and waste materials daily.

2. Keep dust and dirt to an acceptable level.

3. Remove oily rags, waste and other hazardous substances from premises at close of each day, or more often if required.

1.3 FINAL CLEANING

1. Upon completion of the Work, clean all surfaces and components utilizing the services of a professional cleaning company. Provide professional cleaning of all areas and surfaces to allow Owner to occupy without further cleaning.

2. Remove stains, dirt and smudges from finished surfaces.

3. Clean wall, ceiling and floor surfaces in accord with respective material manufacturer's recommendations.

4. Clean glass remove stickers and paint; leave glass in spotless, polished condition; use cleaning liquids only.

5. Clean and polish hardware.

6. Clean mechanical and electrical fixtures and other fittings of labels, wrappings, paper and other foreign material.

7. Replace heating, ventilation and air conditioning filters.

8. Clean ducts, blowers and coils.

9. Upon completion of project, prior to Total performance. Remove from site all waste and surplus materials.

End of Section 01710

1.1 The Contractor shall organize a warranty inspection to take place two weeks prior to the expiration of the standard one-year warranty. The Consultant, sub-consultants and trade contractors, the Contractor, and the Owner's representatives shall attend.

1.2 As-built Drawings that were made as submittals at Project Close-out shall be made available by the Constructor for reference during the inspection.

1.3 Minutes will be taken by the Constructor and published within 10 working days of the inspection date.

1.4 A detailed list of any Warranty issues will be recorded by the Architect. This list will be given to the Constructor to rectify through his own forces or the sub-contractors.

1.5 Written notice of the results of the Constructor's efforts to rectify Warranty issues of materials, products or workmanship shall be provided 10 working days after the date of the inspection. Clarification of further study will be elaborated upon. A schedule of completion dates for any Warranty issues will be suggested for agreement with the Owner.

End of Section 01750

The printed forms outlined below shall form the basis of communication between the Architect and the General Contractor. Copies of forms unrelated to the issuance of monies, shall be kept on the site; neatly filed and readily accessible to the parties concerned.

1.1 Transmittal Record

1. A record of material issued by the Architect or General Contractor.

1.2 Site Visit Report

1. A progress report completed by the Architect or Consultant on a regular basis.

1.3 Change Notice

1. A description of contemplated changes to the Contract.

1.4 Cash Allowance Change Order

1. Assignment of money for work executed under the Cash Allowance Section.

1.5 Contingency Change Order

1. Assignment of money for work executed under the Contingency Allowance.

1.6 Change Order

1. Assignment of money for work executed beyond the financial limits of the Contract.

1.7 Change Directive

1. A description of a change in the work when the Owner requires the Contractor to proceed with a change in the work prior to the Owner and the Contractor agreeing upon the adjustment in Contract Price and Contract Time.

1.8 Certificate For Payment

1. For release of contract money based on monthly progress draws.

1.9 Supplementary Site Instructions

1. A description and/or clarification for the purpose of recording a clarification or interpretation of the contract documents or giving directions on problems resulting from field conditions.

End of Section 01800

1.1 The procedure for early release of construction lien holdback monies shall be initiated by the Contractor's written request for an inspection to determine the date of 100% completion of the subcontract. This request shall be complete with the following documentation:

1. Statutory declaration from the Contractor that all work under the subcontract is 100% performed.

2. Statutory declaration from the Subcontractor that all work under the subcontract is 100% performed.

3. Workplace Safety & Insurance Board interim release for the Contractor.

4. Contractor's written warranty to the Owner that they will make good any work of the Subcontractor as required by the contract documents.

5. Confirmation that the bonding company has been notified of the intent to claim early release of holdback monies.

1.2 Upon satisfactory receipt of all documentation required under item 1 above, the Architect and/or their Consultants shall review the work within ten (10) working days. If satisfied that all work under the particular subcontract has been properly performed, the Architect shall issue a certificate to the Owner, Contractor and Subcontractor within seven (7) working days of the date of the inspection of the work. The date of the inspection shall be noted by all parties.

1.3 The Contractor shall then issue, over the signature of one of their officers, a statutory declaration to the Owner, to the effect that:

1. No written notices of lien have been received by them.

2. The Subcontractors have been paid in full, except for construction lien holdback.

3. Final net amount of the subcontract, and the amount owing to it are as stated in the declaration.

1.4 The Subcontractor shall issue, simultaneously, and over the signature of one of their officers, a statutory declaration to the Contractor, to the effect that:

1. They have received no written notices of lien claims.

2. Their own Subcontractors and suppliers are listed completely in the declaration.

3. They have received payment in full from the Contractor except for Construction lien holdback.

4. Final net amount of their Subcontract and amount owing to it are as stated in the declaration.

5. They have received the certificate issued by the Architect pursuant to Part IV of the Construction Lien Act on day of 20.

1.5 The Subcontractor must provide releases from the Workplace Safety & Insurance Board on their own behalf and on behalf of their Subcontractors and Suppliers.

1.6 The Subcontractor shall provide a waiver of lien rights to the Owner, on their own behalf, and on behalf of their Subcontractors and Suppliers.

1.7 A Construction Lien Search shall be made 45 calendar days after the date that the Architect's Certificate has been advertised in the Daily Commercial News as per the current Construction Lien Act provided that:

1. No liens or certificates of action are registered.

2. All documents noted herein have been received; and

3. No written or oral notices of lien claims or of unpaid Subcontractors, Sub-subcontractors or Suppliers have been received by the Owner.

The Owner shall then make payment to the Contractor on the basis of the Architect's Certificate for Payment.

NOTE: The early release of holdback monies does not affect the commencement date and warranty requirements of the Contract, (i.e. the warranty period for the subcontract shall commence on the date of substantial performance of the prime contract).

End of Section 01900

1 GENERAL

1.1 Related Documents

1. Drawings and general provisions of the Contract, and Division 1 Specification Sections, apply to this Section.
2. The specification shall be read as a whole by all parties concerned. Sectioning of the specification is for convenience only. Each Section may contain more or less than the complete work of any trade. The Contractor is solely responsible to make clear to the Subcontractors the extent of their work.

1.2 Summary

1. This Section includes the following:

.1 Selective demolition, or removal and salvage, of masonry as outlined in the Contract Drawings.
.2 Selective removal, or removal and salvage, or removal and refurbishment, of heritage artifacts.
.3 Selective removal or removal and salvage of interior finishes.
.4 For selective removal of structural elements including bracing, joists, beams, columns, piers, footings and foundations, arches and walls, refer to structural drawings and specifications.
.5 For mechanical and electrical selective demolition, refer to mechanical and electrical drawings and specifications.
.6 Excavation work in the basement level is to only be performed in accordance with the sequence and scope of work defined in the structural drawings and specifications.
.7 Erection of temporary hoarding / dust screens.

2. Related Sections: The following Sections contain requirements that relate to this Section:

.1 Division 1 Section “General Instructions” for overall work.
.2 Division 1 Section "General Work" for site meetings, project supervision etc.
.3 Division 1 Section "Allowances" for cash allowances for as found conditions.
.4 Division 1 Section "Project Progress Documentation" for progress documentation and scheduling.
.5 Division 1 Section "Submittals"
.6 Division 1 Section "Temporary Facilities"
.7 Division 1 Section "Execution Requirements"
.8 Division 1 Section "Cleaning"
.9 Division 1 Section "Project Closeout" for record document requirements”
.10 Division 2 Section “Historic Structure Bracing” for shoring requirements”
.11 Division 2 Section “Excavation, Backfilling and Rough Grading”
.12 Demolition and removal of existing mechanical installations and equipment; Division 15, Mechanical.
.13 Demolition and removal of existing electrical installations and equipment: Division 16, Electrical.

1.3 Definitions

1. Remove: Remove and legally dispose of items, except those indicated to be reinstalled, salvaged, or to remain the property of the Owner.

2. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner's designated storage area.

3. Remove and Reinstall or Reuse or Refurbish or Reclaim or Restore: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.

4. Existing or Existing to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Architect, items may be removed to a suitable, protected secure storage location during selective demolition and then cleaned and reinstalled in their original locations.

5. Hand Demolition: systematic demolition of structures by workers using hand-held tools.

6. Mechanical Demolition: systematic demolition of structures using powered equipment.

7. Systematic Demolition: methodical dismantling of structure piece by piece, usually carried out in reverse order of construction.

8. Rapid Progressive Failure: method of demolition where key elements of structure are removed causing rapid and complete collapse of whole or part of structure.

1.4 Materials Ownership

1. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposal at the Contractor's option.

2. Historical items, relics, and similar objects that may be encountered during selective demolition, remain the Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to the Owner.

1.5 Submittals

1. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections, unless otherwise indicated.

2. Proposed dust-control measures.

3. Schedule of demolition activities indicating the following:

.1 Detailed sequence of demolition and removal work, with starting and ending dates for each activity.

.2 Interruption of utility services.
.3 Coordination for shutoff, capping, and continuation of utility services.
.4 Use of elevator and stairs if different than indicated in Drawings.
.5 Delete both sub-paragraphs below when selective demolition will not interfere with owner's operations.
.6 Locations of temporary partitions and means of egress if different than directed in Drawings.
.7 Exact methodology of removals.

4. Inventory of items to be removed and salvaged and compared with removed components shown on Drawings.

5. Inventory of items to be removed by Owner.

6. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by selective demolition operations.

7. Record drawings at Project closeout according to Division 1 Section "Contract Closeout."

.1 Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

8. Landfill records indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

9. Where required by authorities having jurisdiction, submit drawings, diagrams or details showing sequence of dismantling work and shoring of structures during demolition.
10. Drawings for structural elements shall bear signed professional seal of Structural Engineer licensed to practice in Ontario.

11. Mock-Ups: Sample demolition: when and where required, remove materials indicated to assess conditions and to confirm removal methodology and accuracy of cut locations findings.

1.6 Quality Assurance

1. Demolition Firm Qualifications: Experienced demolition company having 5 years Canadian experience and demonstrating successful completion heritage selective demolition work similar to the scope of work for this project. Submit proof of experience and list of projects.

2. Use skilled personnel having substantial experience in careful removal of masonry, finishes, etc identified to be salvaged for re-use.

3. Regulatory Requirements: Comply with governing current Provincial notification regulations before starting selective demolition. Comply with hauling and disposal regulations of Authorities Having Jurisdiction.

4. While the drawings indicate parts of the building to be demolished, they do not specifically cover or note all the items and parts of the building which are to be

removed or demolished. Extent of demolition to suit the design intent of the proposed final project.

1.7 Pre-Demolition Meeting

1. Prior to start of work, arrange for Site meeting of all parties associated with work of this Section. Presided by Consultant, meeting shall include Contractor, Demolition Subcontractor, Testing Company's Representative and Structural Design Engineer.

2. Prior to the meeting, examine the site and review the Specifications and Drawings for work included under this section and determine complete understanding of requirements and responsibilities relative to work including, storage and handling of materials, methods to be used, sequence and quality control, project staffing, restrictions due to environmental protection requirements, public access to occupied facility, adjacent buildings and structures to remain, driveways and other matters affecting demolition, to permit compliance with intent of this Section.

1.8 Project Conditions

1. Owner assumes no responsibility for actual condition of buildings or site elements to be demolished or selectively demolished. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

2. The building will remain open to the public for the duration of construction activities.

3. Existing Conditions: Building parts to be demolished are adjacent to occupied areas. Note that apart from enclosed work site area, occupants will have free use of building and areas around Project. Take care and provisions for protection of these individuals.

4. Maintaining Traffic: Do not close or obstruct streets, sidewalks, alleys, exit doors and exit passageways without permits. Do not place or store materials in streets, alleys or exit passageways.

5. Conduct operations with minimum interference with roads, streets, driveways alleys and exit passageways.

1.9 Scheduling

1. Arrange demolition schedule to conform to Owner's required date for completion of work.

1.10 Co-Ordination and Co-Operation

1. Co-ordinate the work of the Section with the work of all other sections affected to ensure proper sequencing, the safety and stability of the structure at all times.

1.11 Permits

1. Obtain and pay for all necessary Municipal and other permits required to carry out the work of this Section.

1.12 Insurance

1. This Sub-Contractor shall carry General Liability Insurance as well as protect the Contractor and the Owner from all claims of public liability and property damage. This insurance is in addition to the required liability insurance carried by the Contractor.

1.13 Warranty

1. Existing Special Warranty: Remove, replace, patch, and repair materials and surfaces cut or damaged during demolition, by methods and with materials so as not to void existing warranties.

2 PRODUCTS

2.1 Materials

1. Except as indicated on Drawings, materials forming permanent part of structure being demolished shall become property of this Section. Remove from Site.

2. Carefully remove, store, and protect material identified to be salvaged.

2.2 Repair Materials

1. Use repair materials as specified in other sections of this Specification and the Contract Drawings.

    1. Where identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.

    2. Use materials whose installed performance equals or surpasses that of existing materials.

3 EXECUTION

3.1 Examination

1. Verify that utilities have been disconnected and capped.

2. Survey existing conditions and correlate with requirements indicated to determine extent of demolition required.

3. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged. Submit to Consultant as per 1.5.5 and 1.5.6.

4. When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered, investigate, and measure the nature and extent of the conflict. Promptly submit a written report to the Architect, with accompanying photography.

5. Before commencing demolition operations, examine Site and when requested, provide engineering survey to determine type of construction, condition of structure

and Site conditions. Access strength and stability of damaged or deteriorated structures.

6. Assess the potential effect of removal of any part or parts on the remainder of structure before such part(s) are removed. Survey conditions to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during selective demolition. If needed, engage the services of a Professional Engineer Registered in Ontario.

5. Perform surveys as the Work progresses to detect hazards resulting from demolition activities.

7. Assess effects of demolition on adjacent properties and consider need for underpinning, shoring and/or bracing.

8. Investigate on site and be familiar with the following:

- load bearing walls and floors
- effects of soils, water, lateral pressures on retaining on foundations walls, and the recommendations of the Geotechnical Report.
- basement, vaults or similar underground construction extending beyond extent of structure to be demolished.
- presence of tanks, wells, other piping systems
- the extent and conditions of areas identified as containing hazardous materials, and the recommendations of the Designated Substances Reports

9. After determining demolition methods, determine area of possible vibration. Carefully inspect beyond those adjacent areas. List potential damage areas and photograph each for record purposes before starting work.

10. Obtain permission from adjacent properties (as required) regarding use of outriggers, swinging cranes and similar equipment.

11. Site measure to confirm dimensions shown on drawings. Elements of the new additions or alterations that are to align, co-ordinate, or repeat existing conditions are to be dimensionally verified to existing. All discrepancies to be reported to Consultant.

3.2 Utility Services

1. Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.

2. Contact municipal authorities or utility companies for assistance in locating and marking services passing under, through, or adjacent to building parts to be demolished. Such services include:

- electrical power lines
- gas mains
- oil pipelines
- communication cables
- water mains
- irrigation systems

- drainage piping (storm and sanitary)

3. Where utility services serving building are to be disconnected, and sealed or capped off:

    1. Arrange to shut off indicated utilities with utility companies.
    2. Where utility services are required to be removed, relocated, or abandoned, provide bypass connections to maintain continuity of service to other parts of the building, as needed, before proceeding with demolition.

3.3 Preparation

1. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

2. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

    1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

3. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.

    1. Provide, erect and maintain required hoarding and other protection around Site before commencing work.
    2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
    3. Protect existing site improvements, appurtenances, and landscaping to remain.
    4. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
    5. Provide temporary weather protection, as necessary.
    6. Cover and protect furniture, furnishings, and equipment that have not been removed.
    7. Maintain such areas free of snow, ice, mud, water and debris.
    8. Provide temporary lighting as needed to maintain lighting levels equal to that prior to erection.
    9. Provide flagmen where necessary or appropriate to provide effective and safe access to Site to vehicular traffic and protection to pedestrian traffic.
    10. Ensure scaffolds, ladders, equipment and other such equipments are not accessible to the public. Protect with adequate fencing or remove and dismantle at end of each day or when no longer required.
    11. Do not interfere with the use and activities of buildings. Maintain free and safe passage to and from buildings.
    12. If at any time safety of adjacent buildings appear to be endangered, cease operations and notify Consultant; take precautions to support buildings; do not resume operations until permission is granted by Consultant.

13. Protect existing adjacent work against damages which might occur due to work of this Section.
14. Erect and maintain dustproof partitions as required to prevent spread of dust, fumes, and smoke to other parts of building. Maintain fire exists from Site. On completion, remove partitions and make good surfaces to match adjacent surfaces of building.
15. Provide temporary protection around floor openings.
16. Materials and debris shall not be stacked in building to extent that overloading of any part of structure will occur.

4. Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of building to be selectively demolished.

    1. Strengthen or add new supports when required during progress of selective demolition.
    2. If Consultant considers additional bracing and shoring necessary to safeguard and prevent such movement or settlement, install bracing or shoring upon Consultants orders. Should Contractor fail to comply promptly with such request, such bracing or shoring may be placed by Consultant at Contractor's expense.
    3. Take precautions to guard against movement or settlement of structure or any component of the building to be retained and adjacent buildings, provide and place bracing or shoring; be responsible for safety and support of such buildings; be liable for any such movement or settlement, any damage or injury caused thereby or resulting there from. If at any time, safety of any adjacent structure or buildings appear to be endangered, cease operations, notify the Architect; take precautions to support such buildings; do not resume operations until permission has been granted. If such movement or settlement of adjacent building is caused by negligence or default of the contractor, he shall install sufficient bracing or shoring with no extra cost to the Owner.

3.4 Pollution Controls

1. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.

    1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, pollution or standing water.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

    1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.
    2. Coordinate with other outside forces so as not to obstruct current work undertaken by others.

3. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to existing condition before start of selective demolition.

3.5 Demolition

1. Ensure demolition work is supervised by competent foreman at all times.

2. Demolition shall proceed safely as specified herein, and as necessary to accommodate remedial work indicated. Walls and piers shall not be undermined.

3. At end of each day's work leave work in safe condition ensuring that no parts of structure are in danger of collapsing.

4. Until acceptance, maintain and preserve active utilities traversing premises.

5. Minimize noise. Avoid use of noise machinery during Owner's times of regularly scheduled use of premises and occasional special events.

6. Upon completion of selective demolition work, prevent access to excavations by means of fences or hoardings.

7. Maintain safety of Site by shoring against collapse below grade structures and excavations resulting from demolition. Where required, provide structural supports for adjacent structures.

8. Protect from weather parts of adjoining structures not previously exposed.

9. Demolish and remove existing construction only to the extent required by new construction and as indicated in the Drawings. Use methods required to complete Work within limitations of governing regulations and as follows:

    1. Proceed with stone/brick removal systematically, from higher to lower level if possible.
    2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain. Jack-hammers are not permitted to be used.
    3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
    4. Do not use cutting torches unless authorized by the Architect and until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
    5. Maintain adequate ventilation when using cutting torches.
    6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
    7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
    8. Locate selective demolition equipment throughout the structure and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

9. Dispose of demolished items and materials promptly. On-site storage or sale of removed items is prohibited.
10. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.
11. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain, using power-driven masonry saw or hand tools; do not use power-driven impact tools (jack-hammers, power chisels, etc.).
13. Remove and handle structural members and other heavy objects with safe and suitable equipment.

10. In event of unexpected discovery of buried fuel or other tanks, do no further work and immediately report discovery, orally and in writing to Consultant. Consultant will authorize remedial work, if any, in writing. Do such remedial work, as addition to Contract.

11. Demolish structures to extent shown in drawings. Remove materials from Site unless otherwise noted.

12. Separate attached structures by hand demolition prior to general demolition.

14. Remove existing trees and shrubs, (including roots) landscape elements, sod, fences, pathways etc. as required to carry out the work.

15. Acceptable Methods:

.1 Hand and mechanical demolition shall be acceptable methods for work of this Section. Verify with Consultant whether proposed methods of demolition are acceptable.

.2 Following methods of demolition will not be permitted in work of this Contract:

- use of rapid progress failure methods (explosives).
- Mechanical method of demolition whereby wrecking is accomplished by smashing walls or floors with heavy weight suspended by cable from boom or hoist or where walls are collapsed using power shovel, tractor or other mechanical contrivance.

16. Once initial demolition of walls has commenced, notify the Contractor for initial inspection to review any structural issues.

17. Once demolition of retaining walls or foundation walls has commenced, notify the Contractor for initial inspection to review any issues concerning structural, soils, water and lateral pressures on surrounding elements, prior to continuing with remaining demolition.

3.6 Patching and Repairs

1. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by demolition operations using like materials, methodology, and construction.

2. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

3. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction to remain in a manner that eliminates evidence of patching and refinishing.

3.7 Disposal of Demolished Materials

1. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

2. Do not burn demolished materials.

3. Transport demolished materials off Owner's property and legally dispose of them as per current Provincial environmental legislation.

4. Conform to requirements of municipality's Works Department regarding disposal of waste materials.

5. Materials prohibited from municipality waste management facilities shall be removed from site and disposed of at recycling companies specializing in recyclable materials.

6. Selling of materials on Site is not permitted.

3.8 Field Quality Control

1. Engage and pay structural engineer to prepare designs for and supervise demolition, removal, cutting and shoring, and re-installation necessary for work of this Section with special attention to:

   - foundations
   - structural members
   - shoring and bracing

2. Make good any damage to surfaces exposed in the final project caused by the work of this section.

End of Section 02100

1 GENERAL

1.1 General Requirements

1. Conform to Sections of Division 1 as applicable.

1.2 Related Work Specified Elsewhere

1. Soil Investigation Data – 00320
2. Earthwork - Below Paving, Sidewalks and Landscaping - Section 02215
3. Excavating, Trenching and Backfilling – Section 02300
4. Concrete Walks and Curbs - Section 02600
5. Sodding - Section 02822
6. Topsoil & Finish Grading – 02312

1.3 Reference Standards

1. All reference standards to be latest issue, including amendments
2. ASTM D698-91
3. CAN3-A23.1-M90
4. OPSS 1010-93 "Materials Specifications for Aggregates".

1.4 Requirements of Regulatory Agencies

1. All Standards to be latest issue with amendments.
2. Ontario Building Code.
3. The Construction Safety Act and all other regulations of the Ontario Ministry of Labour or local by-laws relating to the work of this Section.

1.5 Project Conditions

1. Protection

.1 Underground Services: Notify Public Utilities in advance of planned excavations adjacent to their services. Take care not to damage or displace encountered services. When such services are encountered notify Architect immediately and protect, brace and support them. Advise Architect which services require adjustment, relocation or abandonment. Where work on these services become necessary use following procedure:
- Essential Services: Make necessary repairs only to maintain essential services satisfactory to Architect and authorities having jurisdiction.
- Known Services: Repair promptly at no expense to Owner.
- Unknown Services: Repair promptly on Architect's instruction. Submit complete breakdown of cost of such work. Amount approved will be added to Contract Sum.

.2 Shoring and trench timbering, in addition to requirements of local authorities shall be carried out in accordance with requirements of The Occupational Health and Safety Act, latest edition and Regulations for Construction Projects, and all other applicable regulations of Ontario Ministry of Labour. In addition, follow the recommendations of Construction Safety Association brochure "Shoring and Timbering in Trenches', latest edition, wherever applicable.

.3 Shoring and Bracing

- Provide necessary shoring and bracing for excavations to existing premises including fences. Submit method of shoring and bracing for review before installing. Maintain shoring and bracing during work. Remove when no longer required and when notified.
- Shoring and bracing shall properly retain the banks of excavations and prevent caving-in or displacement or damage to surrounding or adjacent buildings or other property.
- Retain shoring and bracing until all other work affected thereby is carried out.
- Erect shoring and bracing free of footings, foundations, walls or other such work so it may

be removed entirely or in sections when it is no longer required and when directed, without causing damage or injury to the Work or adjacent property.

- Submit drawings showing the methods of shoring and bracing to be used. Drawings shall be engineered and stamped by a Certified Engineer from the Province of Ontario. Submit calculations if requested by the consultant.

2. Sub-Surface Conditions

.1 Refer to Section 00320. The information given in this report was obtained for the use of the Owner in the execution of the design. It is presented in good faith to assist the Contractor. No guarantee is made or implied as to its detailed accuracy for every site location. It is incumbent upon the Trade Contractor to make any additional tests to obtain any additional information deemed necessary for the proper execution of the work, at no additional cost to the Owner.

1.6 Scope

1. In general, the work of this section shall include the clearing, grubbing, topsoil removal, grading, preparation and performance of excavation to sub-grade for all pavements and sidewalks, and installation of topsoil and final grading at all landscape and grass areas.

2. Provide de-watering and or limestone backfill as outlined in the soil report to perform work at subgrade areas that are wet or where work is being performed at a wet time of the year.

1.7 Drawings

1. Site Plans

.1 Refer to drawings package:

.2 Final contours are to be maintained as closely as possible with due allowance for "blending" of grades for drainage away from the building. Generally, existing grades around building shall be maintained.

1.8 Environmental Requirements

1. Comply with the requirements of the following Federal and Provincial Legislation related to the transportation use and disposal of all existing contaminated fill materials being excavated from site.

.1 Federal Transportation of Dangerous Goods Act.

.2 Ontario Regulation number 309: Liquid industrial and hazardous waste regulation.

.3 All such waste shall be carried by an approved Ministry of the Environment Haulage carrier and disposed of at a Ministry of the Environment approved receiving facility.

1.9 Co-Ordination & Co-Operation

1. Co-ordinate the work of this Section with the work done by all other Sections in accordance with the General Instructions.

2. Particular care shall be taken in coordinating the work of this Section with the Trade Contractors performing related work.

1.10 Examination

1. Examine the site for the purpose of determining the conditions prevailing there, which may affect the work of this Section, including available access to the site, site contours, etc.

2. Determine the nature and location of all existing services below and above ground, which may affect the work of this Section.

2 PRODUCTS

2.1 Materials

1. Class "B" Granular: imported granular material in accordance with O.P.S.S. Specification Form 1010 for Granular 'B' specification form 1010

2. Class "A" Granular: imported in accordance with current O.P.S.S. Form 1010 for Granular 'A' Specification Form 1010.

3. Granular material shall be free draining and not susceptible to frost action as determined by current O.P.P.S. Methods.

4. Backfill and Fill at Landscaped Sodded Areas: Clean excavated materials free from waste materials, debris, rubbish, frozen portions, muskeg, organic or cohesive matter and rocks larger than 100 mm in diameter. If sufficient quantity of material is not available from excavation, use imported fill having same, or better characteristics.

5. Clear crushed aggregate: clear, clean, screened stone, in size between 10 mm and 25 mm.

6. Topsoil: see Section 02312

7. Submit representative samples of the proposed materials to the inspection company for testing and approval for use on this project two weeks prior to using.

8. Supply only those materials approved for use on this project by the inspection company.

2.2 Source Quality Control

1. All materials shall be subject to test and inspection by a testing and inspection company appointed by the Contractor.

2. Cost of testing will be paid for by Cash Allowance (Section 01020).

3. Provide access to pits in quarries for the personnel of the inspection company.

4. Provide representative samples of materials as may be required by the inspection company at no cost to the Owner.

3 EXECUTION

3.1 Examination

1. Examine the site for the purpose of determining the conditions prevailing there which may affect the work of this Section, including available access to the site, and existing ground water conditions.

2. Determine the nature and location of all existing services above and below ground which may require protection during the construction operation, or otherwise affect the work of this Section.

3.2 Preparation

1. Clearing

.1 Clear and remove obstructions to excavating. Remove trees and stumps not required to be retained.

.2 Clear site of all rubbish, rocks, boulders, tree stumps and other useless materials and debris, remove from site and recycle or dispose of unless instructed otherwise.

.3 Cut all dead trees and remove stumps and roots to a minimum depth of 600 mm below proposed finished grade.

.4 Burying of useless materials on the site is not permitted.

.5 Be responsible for obtaining the necessary permits and assume all costs.

.6 Backfill with approved fill and compact.

2. Topsoil and Stripping

.1 Strip area of Site to be excavated or graded free of any remaining topsoil and stockpile good re-usable topsoil approved by the Architect separately on Site where directed. Remove all unapproved topsoil and all other excavated materials from the site. Dispose of contaminated materials in conformance of Federal and Provincial Legislation requirements.

.2 All areas designed for landscape, sod and seeding or paving or the construction of structures, shall be stripped of all topsoil and organic matter to its full depth taking care not to contaminate with any sub-soil. Refer to Site Plan drawings.

.3 Topsoil will be re-used for landscape work, unless specified otherwise.

.4 Commence topsoil stripping only after designated areas have been cleared of scrub, weeds, brush stumps, rocks and other deleterious materials. Such materials shall be removed from the site and disposed of by the contractor.

3. Lines and Levels

.1 Establish accurate lines and levels as required and supply batter boards, line stakes and templates and establish permanent reference lines and bench marks required.

3.3 Performance

1. General

.1 After stripping of topsoil, do all necessary rough grading, excavating, and filling, where required, to establish the sub-grade under all areas to the extent, elevations and depth required for completion of work.

.2 Level of sub-grade shall be to the depths specified, after compaction of sub-grade and of materials placed thereon to allow for finished grades shown on drawings.

.3 Remove all soft and unstable areas in sub-grade to approved depth and backfill with clean, approved fill material.

.4 Provide for uniform slopes between points for which finished grades are shown on drawings. Meet and blend with existing grades in a smooth manner.

.5 Establish smoothly rounded grades at top and toe of slopes and banks.

.6 Do not grade when soil is wet or frozen.

.7 Compact sub-grade behind curbs, walls, and under paving and other hard surfaces to the specified density as noted in the Soil Report.

.8 Preparations of sub-grade:

.1 Scarify sub-grade on which topsoil is to be placed, to the minimum depths specified.

.2 Scarify sub-grades under areas which are to be raised by placing fill to minimum depth of 3" (75 mm) to provide a good bond and prevent slipping of fill.

.9 Fill material shall be clean, free of topsoil and organic matter and debris, and shall be approved by the Architect before placing. On site excavating material may be used for filling when approved by the Architect.

.10 Where required, supply and spread approved fill materials to raise existing grades to the specified sub-grade level, as shown on the drawings for new finish elevations.

.11 Place fill in loose layers, not exceeding 200 mm in depth and compact each layer to a minimum dry density of ninety-five percent (95%) of the maximum Standard Proctor Density, before placing subsequent layers.

.12 The surface shall be shaped at all times to ensure adequate surface run-off and prevent ponding and scouring.

.13 Keep excavation free of water by bailing, pumping or a system of drainage as required and provide pumps, suction and discharge lines or well points of sufficient capacity and maintain until such time as the permanent drainage system is installed or until Architect agrees to its removal. Take all necessary measures to prevent flow of water into excavation.

.14 Water discharged from de-watering systems shall be equal to or better in quality than the receiving stream or sewer storm water and shall be free of pollutants. Provide settling ponds and/or other treatment facilities as required to treat discharges at no cost to Owner.

.15 Supply and install additional erosion controls and temporary sedimentation ponds, plastic tubing and temporary catch basins, as required to prevent erosion and contamination of sediment onto other properties or into waterways.

.16 Maintain existing and any additional erosion controls until sod has been installed or seed areas have been growing for 6 months then remove all temporary erosion controls.

2. Below Building Excavation

.1 Refer to Specification Section 02300 for all areas below building area and extending 3000 mm beyond building area.

3. Roadways, Parking Lots, Concrete Walks and Curbs Excavation

.1 Excavate and rough grade at roadways, parking lots and hard surfaced areas to suit layouts shown on the drawings.

.2 At roadways and paved parking areas (heavy duty asphalt areas), excavate to remove all topsoil, organic matter or deleterious material to a depth not less than 530 mm below the final asphalt grade but not less than sufficient depth to remove all topsoil, asphalt, soft and compressible materials to expose competent subgrade soil level.

.3 At medium duty asphalt areas and walkways excavate to remove all topsoil, organic matter or deleterious material to a depth not less than 500 mm below final asphalt grade but not less than sufficient depth to remove all topsoil, asphalt, soft and compressible materials to expose competent subgrade soil level.

4. Slope and shape subgrade towards catch basins and subgrade subdrains with 2% fall at roads and a minimum 1% at parking areas. Maintain the following slopes for finished grades:

Driveway Grades - min. 2.0% max 4.0%

Parking Lot Grades	-	min. 2.0% max 3.0% perpendicular to parking bay min. 4.0% parallel to parking bay
Sidewalks	-	min. 2.0% crossfall max. 3.5% crossfall
Hard Play Area	-	min. 2.0% max. 2.5%
Soft Landscaped Areas	-	min. slope 2.5% max. slope 25%
Playing Fields	-	min. slope 1.5%
Drainage Swales	-	min. fall 0.5% (preferably 1.0%)

(See drawing for further details.)
Proof-roll existing sub-grade after excavation and shaping with a heavy vibratory roller.

5. Sub-excavate any soft or compressible materials and fill with modified Granular "B" compacted to 100% of SPMDD.

6. General Backfilling

.1 Prior to placing backfill, proof roll the exposed subgrade thoroughly with a smooth heavy roller to compact any loose zones. Sub-excavate any soft or compressible materials.

.2 Proceed promptly with backfilling as work progresses after obtaining Architect's review.

.3 Remove shoring material during backfilling.

.4 Inspect moisture content of fill prior to placing. Limit addition of water only to extent required to provide optimum moisture content for compaction. Puddling or flooding with water to compact fill is not permitted.

.5 Place all backfill and engineered fill in 200 mm (8") thick maximum layers. Compact each layer before placing next using approved mechanical equipment until compaction and level is reached.

.6 Areas adjoining vulnerable building components which cannot be thoroughly compacted by drawn equipment, shall receive equivalent compaction with mechanical tampers.

.7 Fill shall be free of frost, snow and ice and in no instance shall fill be placed on frozen snow, or ice-covered ground.

7. Backfilling Below Building

.1 Refer to Specification Section 02300 Excavating, Trenching & Backfilling

8. Roadways, Parking Lots and Hard Surfaced Areas, Fill

.1 Refer to specification sections; 02600 Concrete Walks and Curbs,

9. Rough Grading

.1 Rough grade all areas around the building in accordance with the drawings and required and existing grades, and as directed by the Architect. Co-ordinate this work with Division 2.

.2 Areas to receive sod or seeding shall be rough graded to an elevation 150 mm below finished grade.

.3 Slope ground so that water will drain at all times away from the building.

.4 Rough graded areas shall be cleanly raked free of coarse material and left ready for final grading.

3.4 Protection of Excavations

1. Protect adjacent construction and underground services from damage resulting from the excavation operations and from frost penetration.

3.5 Protective Measures

1. Furnish all necessary barriers and other protection around open excavations. For other barriers and hoardings, consult General Works Section.

2. Maintain barricades in good condition at all times until they are no longer required.

3.6 Field Quality Control

1. All materials and workmanship shall be subject to test and inspection by a testing and inspection company appointed by the Architect.

2. A representative (inspector) of the testing and inspection company will make random site inspections.

3. Sieve analysis, SPMDD tests for fill materials and field density tests of the compacted fill materials will be made by this inspector to ensure that the specified standard of work is achieved.

4. All excavation, placing and compaction procedures will be subject to the approval of the inspector.

5. Materials which fail to achieve the specified standard of compaction shall be re-compacted or replaced as directed by the Inspector.

6. The cost of testing will be paid for by Cash Allowance (Section 01020).

7. Provide access to the work for the personnel of the testing and inspection company.

8. The compaction tests are performed on behalf of the Owner to satisfy the Architect that the requirements of the Contract Documents have been met. They are not intended as a substitute for the contractor's quality control program.

3.7 Road Dust Control

1. Where directed and after the final layer has been placed and compacted, calcium chloride shall then be applied at the rate directed by the Architect by means of a mechanical spreader.

3.8 Clean-Up

1. At the completion of the work of this Section, remove any excess materials, debris and equipment from the site.

2. Remove from work site all contaminated excavated material and dispose at an approved dump site in conformance with all Federal and Provincial Legislation for disposal of contaminated materials.

End of Section 02215.

1 GENERAL

1.1 Description

1. Work included: Furnish all labour, materials, equipment, and services specified, indicated, or required to provide excavating, trenching, backfill and compaction as well as the removal on the existing underground storage tank (UST) located within the property's forecourt.

2. Refer to the March 22, 2024 letter from Exp (3 pages) included a the end of this Spec. Section for background information, scope of work, and requirements for the UST's removal. This work is to be executed by the same excavation sub-contractor (main scope) and completed under the review of Exp.

3. Related Work Described Elsewhere:

.1	00320	Soil Investigation Data
.2	01300	Submittals
.3	01350	Historic Protective Measures
.4	01410	Inspection and Testing Laboratory Services

1.2 Samples

1. Submit 20 kg (45 lbs.) samples of each type of fill specified including representative samples of excavated materials for analysis by testing laboratory.

2. Ship samples prepaid to testing laboratory in tightly closed containers to prevent contamination.

1.3 Submittals

1. Comply with pertinent provisions of Section 01300 regarding shoring, bracing and underpinning required in connection with excavation.

2. If drawings for structural elements are required, they shall bear the signature and stamp of a Professional Engineer Registered in Ontario.

1.4 Shoring and Bracing

1. Take precautions to guard against movement or settlement of adjacent structures, earth, bench marks, services, walks, paving, curbs and adjacent grades. Provide bracing and shoring if required.

2. Shore and brace excavations to prevent failure in accordance with *Construction Safety Act* and *Shoring and Timbering in Trenches* by the Construction Safety Association of Ontario.

3. Engage a registered structural engineer to design and assume responsibility for shoring and bracing.

4. Make good any damage and be liable for any injury resulting from inadequate shoring or bracing.

1.5 Dewatering

1. Take precautions necessary to sufficiently dewater excavation and fill areas to allow foundation construction and pipe installation.

1.6 Utility Lines

1. Where possible, known underground and surface utility lines are indicated. Locations of known existing services on plans are only approximate. Contractor shall be responsible for locating their exact position during the work. Notify Public Utility or Municipal Authorities well in advance of planned excavations and shoring adjacent to their services.

2. Record locations of maintained, re-routed and abandoned underground utility and sewer lines.

3. Make good any damage caused to existing utility and sewer lines resulting from work.

1.7 Protection

1. Protect excavated earth from freezing by approved method.
2. Grade around excavations to prevent surface water runoff into excavated area.

2 PRODUCTS

2.1 Materials

1. Reference to the abbreviation MTC indicates Ontario Ministry of Transport and Communications.
2. Grade Fill: Type 1 fill - Granular 'A' material conforming to OPSS Form #1020. Crushed rock composed of hard, uncoated cubical fragments produced from a naturally formed deposit and graded within the following limits:

Sieve Size (MTC)	Percent Passing
37.5 mm	100
16.0 mm	62-100
9.5 mm	48-73
4.75 mm	33-55
1.18 mm	15-45
300 um	5-22
75 um	0-8

3. Subgrade Fill: Type 2 fill - Granular 'B' material conforming to OPSS Form # 1020. Clean sand and gravel graded within the following limits:

Sieve Size (MTC)	Percent Passing
106.0 mm	100
22.4 mm	57-100
4.75 mm	26-100
1.18 mm	10-85
300 um	5-40
75 um	0-8

4. All fills shall be free of frost, ice or frozen particles, or stones greater than 106mm for granular ‘B’ or 37.5mm for granular ‘A’.

2.2 Stockpiling

1. Stockpile fill materials in areas designated by Consultant. Stockpile granular materials in a manner to prevent segregation. Protect from freezing.

3 EXECUTION

3.1 General

1. Conduct work in accordance with recommendations of independent inspection and testing agency included in allowance in Section 01410.

3.2 Excavating

1. Excavate to elevations and dimensions indicated or required for construction of work plus space required to erect forms, shoring, and to permit inspection.

2. Make excavation to clean lines to minimize quantity of fill material required.

3. Earth bottoms of excavations to be dry undisturbed or previously compacted soil, level, free from loose or organic matter.

4. Excavation must not interfere with normal 45° splay of bearing from bottom of any footing. Refer also to requirements of geotechnical investigations provided under 00320 Soil Investigation Data.

5. Remove from site tree root systems, boulders, cobbles and debris, where encountered in the work.

6. When complete, have Consultant inspect excavations before carry out work.

7. Correct unauthorized excavation at no extra cost as follows:

   .1 Fill under bearing surfaces and footings with concrete as specified for footings.
   .2 Fill under other areas with Type 2 fill compacted to 100% Standard Proctor Density.

3.3 Excess Water Control

1. Unfavourable weather: Do not place, spread, or roll and fill material during unfavorable weather conditions. Do not resume operations until moisture content and fill density are satisfactory to the Consultant.

2. Softened subgrade: Where soil has been softened or eroded by flooding or placement during unfavourable weather, remove all damaged areas and recompact as specified for fill and compaction below.

3. Dewatering:
   .1 Provide and maintain at all times during construction, ample means and devices with which to remove promptly and dispose of all water from every source entering the excavations or other parts of the work.

   .2 Dewater by means which will ensure dry excavations and the preservation of the final lines and grades of bottoms of excavations.

3.4 Backfilling

1. Do not commence backfilling until work of other sections to be backfilled has been inspected by the Consultant.

2. Areas to be backfilled to be free from debris, snow, ice, water or frozen ground.

3. Prior to placing fill under base courses and slabs on grade, compact existing sub-grade to obtain same compaction as specified for fill. Cut out "soft" areas and fill with suitable material until specified compaction can be obtained.

4. Where temporary unbalanced earth pressures are liable to develop on walls or other structures, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by the Consultant.

5. Backfill simultaneously each side of walls and other structures to equalize soil pressures, when possible.

6. Place and compact fill materials in continuous horizontal layers not exceeding 150mm (6") loose depth. Avoid disturbing or damaging buried services. Make good any damage. Increased fill depths are not to be attempted without demonstration of compaction to Consultant. Compact all areas to be back filled by mechanical tamping or rolling in accordance with the relevant soil report.

7. Maintain optimum moisture content to enable compaction to attain specified density.

8. Where sheeting and shoring materials are used to support sides of excavation and are to be later removed, leave them in place as long as possible, compatible with the placing and compacting of backfill, in order to eliminate voids or pockets in the backfill and to minimize possible movement or loss of adjacent ground and damage to facilities.

9. Bring all filled areas to rough grade level. Leave surfaces clean and free of coarse materials.
10. Bedding of Mechanical and Electrical Services to be carried out by this Section under the direction of the trade concerned using cohesionless material.

3.5 Fill Types and Compaction

1. Exterior sides of perimeter walls: use granular "B" to sub-grade levels. Compact to 95% Standard Proctor maximum dry density.

2. Within building area: Use granular "B" to underside of base course for concrete slabs. Compact to 100% Standard Proctor maximum dry density.

3. Under concrete slabs, including areas under thickened slabs: provide 150mm base course of granular "A" fill to underside of slab. Compact to 100% Standard Proctor maximum dry density.

3.6 Grading

1. Rough grading to levels, profile and contours required and made ready to receive surface treatment as indicated on site plan.

2. Protect parking areas, driveway and building subgrade. Rectify any deterioration of subgrade conditions due to weather conditions with replacement of the damaged subgrade material with engineered fill or granular material.

3. Maintain the following slopes for finished grades:

Driveway Grades	-	min. 2.0% max 4.0%
Parking Lot Grades	-	min. 2.0% max. 3.0% perpendicular to parking bay min. 4.0% parallel to parking bay
Sidewalks	-	min. 2.0% crossfall max. 3.5% crossfall
Hard Landscaped Areas	-	min. 2.0% max. 2.5%
Soft Landscaped Areas	-	min. slope 2.5% max. slope 25%
Playing Fields	-	min. slope 1.5%
Drainage Swales	-	min. fall 0.5% (preferably 1.0%)

4. Depth of compacted topsoil - sod 150 mm, seed 150 mm
   - shrub beds and planters 450 mm

3.7 Inspection and Testing

1. Testing of materials and compaction will be carried out by testing laboratory designated by the Consultant.

2. Owner will pay for inspection and testing costs.

3. Sieve analysis: proposed fill materials will be tested to confirm suitability for intended use and conformity with specifications.

4. Density tests: tests will be conducted in place on compacted fill to ASTM D2922-78 for Standard Proctor Density.

5. If, during progress of work, tests indicate fills installed under this contract do not meet specified requirements, remove defective fills, replace and retest at Contractor's expense. All re-testing is to be at the Contractor's expense.

3.8 Frequency of Tests

1. Consultant will determine frequency of testing as construction progresses. The following materials will be tested: excavated surfaces, fill under floor or other slabs on grade, backfill of structural walls.

3.9 Surplus

1. Remove surplus material not required for backfill, grading or landscaping, from the site.

End of Section 02300

March 22, 2024

Governing Council of the University of Toronto
c/o Project Management Office
University Planning, Design & Construction
255 McCaul St., 4th floor
Toronto, Ontario
M5T 1W7

Re: Request for Quote, Underground Storage Tank Removal
121 St. George Street, Toronto, Ontario

EXP Services Inc. (EXP), on behalf of the Governing Council of the University of Toronto (the 'Client'), requires subcontractor quotes to conduct an underground storage tank (UST) removal at 121 St. George Street, in Toronto, Ontario (herein referred to as the 'Site').

The UST was discovered during a geotechnical investigation for a proposed accessibility ramp at the Site, where fill and vent pipes were observed during construction activities. A Ground Penetrating Radar (GPR) survey was conducted on August 16, 2023 by All Clear Locates (ACL) to determine the size and exact location of the UST. The client requires that the UST, along with any associated infrastructure including vent piping, be removed from the Site and that the excavation be backfilled and re-turned to pre-existing conditions.

Information regarding requirements for the UST removal are listed in the Sections below.

1. Background

EXP completed a borehole drilling program in November of 2023 in the vicinity of the UST (EXP, 2023). The objective of the investigation was to determine whether there was any widespread contamination of the subsurface soil and groundwater associated with the operation of the UST. The results of the investigation are as follows.

- The UST Investigation comprised drilling four (4) sampled boreholes, designated Boreholes E 1 to E 3 and BH 2, to depths of approximately 4.2 to 5.6 m below grade. Boreholes E 1 to E 3 were positioned in close proximity to and surrounding the UST. Borehole BH 2 was positioned north of the UST to complete coverage of the front lawn area. Monitoring wells were installed in all boreholes for subsequent groundwater sampling and analytical testing.
- Based on potential contaminants of concern identified for the Site, the laboratory analytical program included soil analyses on Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Petroleum Hydrocarbons (PHCs), metal and Inorganic parameters as well as groundwater analyses on BTEX, and PHC (F1 – F4).

- Four (4) soil samples, one (1) from each of the boreholes were analyzed for BTEX and PHCs F1 to F4. The concentrations of BTEX and PHC in all samples met the industrial/community/commercial (ICC) property use criteria from Table 3 of the Ministry of Environment Conservation and Parks (MECP) Standards. Two (2) soil samples were analyzed for metal and inorganic parameters. The concentrations of all metal and inorganic parameters in all tested soil samples were below the ICC property use criteria from Table 3 of the MECP Standards.
- Four (4) groundwater samples were analyzed for BTEX and PHCs F1 to F4 Fractions. The analytical results for the analyzed parameters were all within the All types of Property Use criteria from Table 3 of the MECP Standards.

Based on the results of EXP's UST Investigation, it was concluded that soil and groundwater conditions in the vicinity of the UST meet the MECP Table 3 criteria applicable to the Site. No evidence of widespread contamination associated with the operation of the UST was identified.

Therefore, there is not anticipate to be large amounts of soil contamination, if any, surrounding the UST.

The scope of work is detailed below.

2. Scope of Work

The UST removal will consist of the following activities:

The amount of soil requiring disposal is anticipated to be less than 100m^3 (anticipated to be ~50-75 m^3) and are anticipated to be within the relevant site condition standards (Table 3 ICC soils) based on previous investigations around the tank area, as discussed above. As such, the soils should be able to mostly be reused as backfill once the tank pull and excavation is complete. We will require the contractor to excavate the soil on top of the UST (following the prior removal of overburden), ensure that the UST does not contain any liquid product or water, and remove the UST, including any associated piping and dispensing equipment (if such equipment is in place) from the Site. The subcontractor will also be responsible for either re-compaction of the excavated soils, if clean, or disposing of the soils from the excavation off-site at either a re-use site or MECP landfill, and will be responsible for the trucking and removal of these soils, if contaminated. A line item for removal of the soils if they are found to be contaminated or not suitable for reuse, is recommended.

The following scope of work is required:

- Mobilize equipment and personnel.
- Obtain public and private locates, develop Health and Safety Plan, and provide site specific Health and Safety supplies.
- Fence and secure the work areas.
- Daylight utilities around work area using a hydrovac.
- Excavate to remove and dispose offsite, 1 x 1000-gallon USTs and associated piping and tank. Hydrovac will be used to wash and clean the tanks of any remaining product and wash water, assumed 5,000L.
- Removal any contaminated or unsuitable soil at the direction of the on-site consultant via bin, if required.

- Aid the onsite consultant as required in collecting soil samples from the excavations.
- Slope and secure the excavations until samples results are obtained.
- Upon clean analytical and at the direction of the consultant, backfill and compact excavations with excavated soil and 150 MT of Granular A. Compaction testing will be completed by the University of Toronto geotechnical team.
- Restore lawn around work area by spreading topsoil and grass seed or defer to the University of Toronto landscaping team to reinstate the landscaping.

Please note that an environmental qualified person, arborist, and TSSA personnel, required to inspect and oversee the inspection have already been selected and should not be included in the proposal.

Please contact the writer should you have any questions, comments, or concerns.

Sincerely,

EXP Services Inc.

Amanda Catenaro, P.Geo.
Senior Project Manager
Environmental Services

Part 1 General

1.1 Waste Management and Disposal

1. Divert unused soil amendments from landfill to official hazardous material collections site approved by the Owner and/or Consultant.
2. Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

Part 2 Products

2.1 Source

1. Use existing on-site topsoil where possible.
2. Use imported topsoil only if on-site topsoil is deemed to be insufficient and only with the approval of the Owner. Advise the Consultant of topsoil source to be utilized and provide relevant documentation indicating the proposed topsoil is suitable for use and meets the requirements listed below.

2.2 Topsoil Quality

1. Mixture of particulates, microorganisms and organic matter that provides suitable medium for supporting intended plant growth.
2. Topsoil to be a fertile, friable, natural loam containing not less than 4% organic matter for clay loams and not less than 2% organic matter for sandy loams to a maximum of 15% and capable of sustaining vigorous plant growth, free of subsoil contamination, roots, weeds and stones over 25mm diameter; and having a pH ranging from 6.0 to 7.5.
3. Contain no toxic elements or growth inhibiting materials.
4. Topsoil Consistency: friable when moist.
5. Imported topsoil shall be screened through a 25mm size screen and ensure that it is free from:
    - Debris and stones over 25 mm diameter.
    - Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
6. Topsoil to be mechanically amended to meet requirements of Section 32 92 23 Sodding and Section 32 93 10 Trees, Shrubs and Ground Cover Planting.

2.3 Soil Amendments

Fertilizer: Conform to recommendations from soil testing agency with respect to improvement of tested topsoil and apply as specified for each condition.

Industry accepted standard medium containing nitrogen, phosphorous, potassium and any other micro-nutrients suitable to the specific plant species or application.

Sand: washed coarse silica sand, medium to course textured.

Compost: A mixture of soil and decomposing organic matter used as a fertilizer, mulch, or soil conditioner. Compost is processed organic matter containing 40% or more organic matter as determined by the Walkley-Black or LOI test. Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below 25) and contain no toxic or growth inhibiting contaminates. Composed bio-solids must meet the requirements of the Guidelines for Compost Quality, Category 'A' produced by the Canadian Council of the Ministers of the Environment (CCME), January 1996.

Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

Bonemeal: Finely ground with a minimum analysis of 3% nitrogen and 20% phosphoric acid.

2.4 Quality Control

1. The Contractor, at their expense, shall test any imported topsoil for Nitrogen, Phosphate, Potash and minor element values, soluble salt contents, organic matter, atrazine and pH value in order to determine the amount and type of fertilizer or additives to be applied.
2. Soil sampling, testing and analysis to be in accordance with Provincial standards.
3. The Contractor shall submit two (2) copies of the topsoil test reports to the Owner and Consultant for approval
4. Contractor is responsible for amending topsoil as per the topsoil test report.
5. Obtain approval of soil amendments from the Owner and/or Consultant prior to placement.

Part 3 Execution

3.1 Preparation of Existing Grade:

1. Allow for minor adjustment to rough grade, eliminating uneven areas and low spots to ensure positive drainage.
2. Remove debris, roots, branches, stones in excess of 25 mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials, and petroleum products if it was contaminated from the time of rough grading acceptance. Remove debris, which protrudes more than 75mm above surface. Dispose of removed material off site.
3. Cultivate entire area which is to receive topsoil to minimum depth of 150mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil. This does not apply to existing planting beds to be augmented with additional planting.

4. Place filter fabric over catch basins and manholes to prevent clogging with sediment during the spreading of topsoil and fine grading operations.

3.2 Finish Grading:

1. Obtain approval from Owner and/or Consultant before commencing finish grading.
2. Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.
3. Leave surfaces smooth, uniform and firm against deep foot printing
4. Spread topsoil in uniform lifts not exceeding 150mm settled depth.
5. Place required depth of amended topsoil for planting beds as indicated on details.
6. Place 100mm settled depth of topsoil for sodded areas.
7. For sodded areas, keep topsoil 15mm below finished grade.
8. Manually spread topsoil around trees, shrubs and other obstacles.

3.3 Soil Amendments: Apply and thoroughly mix soil amendments into the topsoil at recommended rates from the topsoil test results/report.

3.4 Acceptance: Obtain approval of finished grading from the Owner and/or Consultant.

3.5 Surplus Material: Dispose of excess topsoil off site. Obtain direction from Owner and/ or Consultant for reuse of any excess topsoil.

END OF SECTION

Part 1 General

1.1 Related Sections

- Section 32 91 21 - Topsoil Placement and Grading

1.2 Scheduling

- Schedule delivery and sod laying to follow shortly after finish grading.
- Schedule sod installation when frost is not present in ground.

Part 2 Products

2.1 Materials

1. Turfgrass Nursery Sod: Sod that has been especially sown and cultivated in nursery fields as turfgrass crop.
2. Turfgrass Nursery Sod Type: Commercial grade turf grass nursery sod as defined by the Nursery Sod Growers Association of Ontario.
3. Sod establishment support: Wooden pegs: 17 x 8 x 200 mm.
4. Water: Potable water.
5. Fertilizer: To Canada "Fertilizers Act" and "Fertilizers Regulations". Complete, synthetic, slow release with 65% of nitrogen content in water-insoluble form.

2.2 Source Quality Control: Obtain approval from Owner and/or Consultant of sod source. When proposed source of sod is approved, use no other source without written authorization.

Part 3 Execution

3.1 Preparation

1. Obtain approval of finished grade from the Owner and/or Consultant prior to sod installation.
2. Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.
3. Remove and dispose of weeds; debris; stones 25 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials off site.

3.2 Delivery and Storage

1. Deliver, unload and store sod on pallets.
2. Deliver sod to site within 24 hours of being lifted.
3. Do not deliver small, irregular or broken pieces of sod.
4. During wet weather allow sod to dry sufficiently to prevent tearing during lifting and handling.

5. During dry weather, protect sod from drying out and water sod as necessary to ensure its vitality and prevent dropping of soil in handling. Dry sod will be rejected.

3.3 Sod Placement

1. Lay sod within 36 hours of being lifted.
2. Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.
3. Roll sod to provide close contact between sod and soil.
4. The use of heavy roller to correct irregularities in grade is not permitted.

3.4 Sod Placement on Slopes & Swales and Pegging

1. Start laying sod at bottom of slopes.
2. Lay sod sections longitudinally along contours of slopes.
3. All swales to be sodded.
4. Peg sod on slopes steeper than 3 horizontal to 1 vertical, and drainage channels to following pattern:
    - 100 mm below top edge at 200 mm on centre for first sod sections along contours of slopes.
    - Not less than 4 pegs per square metre.
    - Not less than 6 pegs per square metre in drainage channels. Adjust pattern as directed by the Owner and/or Consultant.
    - Drive pegs to 50 mm above soil surface of sod sections.

3.5 Fertilizing Program: Fertilize during establishment period to following program, or as otherwise required by the Owner and/or Consultant.

Month	Day		Day	Rate	Ratio
Sept	15	to	30	350 kg/ha	6:6:12
April	15	to	30	350 kg/ha	12:8:8

3.6 Maintenance During Establishment Period: Perform following operations from time of installation:

- Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100mm until Substantial Performance.
- Cut grass, as many times as required, BUT NOT LESS THAN TWO (2) TIMES until Substantial Performance, to 50mm when or prior to it reaching height of 75mm. Remove clippings which will smother grassed areas.

- Maintain sodded areas 95% weed free.
- Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

3.7 Acceptance: Turfgrass Nursery Sod areas will be accepted by the Owner at Substantial Performance provided that:

- Sodded areas are properly installed.
- Sod is free of bare and dead spots and without weeds.
- No surface soil is visible when grass has been cut to height of 50mm.
- Sodded areas have been cut a MINIMUM OF TWO (2) TIMES after sod has knit, approximately 4 weeks after sod laying.
- **Areas sodded in fall will be accepted the following spring one month after start of growing season, provided acceptance conditions are fulfilled.**
- Remove wooden sod pegs from knitted grass areas.

END OF SECTION

Part 1 General

1.1 Related Sections

- Section 32 91 21 - Topsoil Placement and Grading

1.2 References

- Canadian Nursery Landscape Association (CNLA) – Canadian Standards for Nursery Stock – Latest Edition.
- International Society of Arboriculture (ISA) – Ontario Chapter.

1.3 Provide product data for:

- Fertilizer.
- Anti-desiccant.
- Mulch.
- Trunk protection

1.4 Provide samples for:

- Mulch.

1.5 Storage and Protection:

1. Protect plant material from frost, excessive heat, wind, and sun during delivery.
2. Immediately store and protect plant material which will not be installed within 1 hour after arrival in an approved site storage location.

1.6 Protect plant material from damage during transportation:

- When delivery distance is less than 30 km and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.
- When delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical.
- Protect foliage and root balls using anti-desiccants and tarpaulins, where use of enclosed vehicle is impractical due to size and weight of plant material.

1.7 Protect stored plant material from frost, wind and sun and as follows:

1. For bare root plant material, preserve moisture around roots by heeling-in or burying roots in sand or topsoil and watering to full depth of root zone.
2. For pots and containers, maintain moisture level in containers. Heel-in fibre pots.
3. For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.

1.8 Scheduling: Planting is to take place as soon as each area is complete but not in July or August. Schedule of planting program to include:

- Date for selection of specified plant material at source.
- Quantity and type of plant material.
- Shipping dates.
- Arrival dates on site.
- Planting dates.

Provide to and obtain approval of planting program schedule from the Consultant 14 days prior to shipment of plant material.

1.9 Warranty Period

The Contractor shall warrant all plants for TWO (2) FULL GROWING SEASONS from date of Substantial Performance.

The Owner reserves the right to inspect all plant material any time during the warranty period and require replacements at that time, at the sole discretion of the Owner and/or Consultant.

1.10 At the end of the first year of warranty, the Contractor shall:

- Remove all tree stakes and guys

1.11 Prior to the end of the Two (2) year warranty period, the Contractor shall:

1. Remove and replace all dead plant material, as required by the Owner and/or Consultant, when seasonal conditions are likely to ensure survival and make replacements in the same manner as specified for the original plants.
2. Remove trunk protection.
3. Plant material replacements that occur during the warranty period will require extended warranties equal to the original warranty period. Extended warranty period will commence when the Owner has accepted the plant material replacements.

Part 2 Products

2.1 Planting Soil Medium - Use native soil whenever possible, as follows:

- 2 parts native topsoil, 1 part compost
- Mechanically incorporated into existing topsoil.

2.2 Plant Material:

1. Plant material to conform to the applicable details and as listed in the “Plant List” on drawings.
2. Substitutions for specified plants require the Owner and/or Consultant’s written approval prior to delivery.

3. Type of root preparation, sizing, grading and quality to comply with the Canadian Standards for Nursery Stock, Latest Edition, published by the Canadian Nursery Landscape Association.
4. Source plant material grown in Zone 5 in accordance with Agriculture Canada Plant Hardiness Zone Map.
5. Plant material shall be free of disease, insects, defects, or injuries and structurally sound with strong fibrous root system.
6. Plant material to be root pruned regularly, but not later than one growing season prior to arrival on site.

2.4 Water: Potable water.

2.5 Accessories: T-bars, wire tightener, and clamps as per applicable detail.

T-Bar Protective Caps: Econ-o-guard by Deslauriers, Inc (1-800-743-4106) or approved equal.

2.6 Trunk Protection: Plastic Spiral Guards (45mm cal. tree or smaller): Ventilated, 600mm height, supplied by: Canadian Forestry Equipment Ltd., 1540 Trinity Drive, Unit #4 Mississauga, Ontario, L5T 1L6, Telephone: (800) 387-4940 or approved equal.

Bottom of guard to meet flush with rootball. Check and adjust guards at warranty inspection ensure they are free of gaps, trash and not interfering with root or trunk development.

Perforated flexible PVC pipe (larger than 45mm Cal). Height of guard shall be 800mm above mulch level.

Burlap wrap to 1200mm above mulch level.

2.7 Compost: A mixture of soil and decomposing organic matter used as a fertilizer, mulch, or soil conditioner. Compost is processed organic matter containing 40% or more organic matter as determined by the Walkley-Black or LOI test. Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below 25) and contain no toxic or growth inhibiting contaminates. Composed bio-solids must meet the requirements of the Guidelines for Compost Quality, Category ‘A’ produced by the Canadian Council of the Ministers of the Environment (CCME), January 1996.

2.8 Mulch: Natural Cedar varying in size from 25 to 75 mm in length.

2.9 Anti-Desiccant: Wax-like emulsion.

2.10 Source Quality Control: Obtain approval from Owner and/or Consultant of plant material prior to digging/upon delivery to the site prior to ordering plant material.

Imported plant material must be accompanied with necessary permits and import licenses. Conform to federal and provincial regulations.

Part 3 Execution

3.1 Pre - Planting Operations: Ensure plant material on site is acceptable to Owner and/or Consultant.

Deliver all materials in their original containers with all labels intact and legible. Containers with additives shall clearly indicate contents, weight, analysis, and manufacturer's name.

Prune damaged roots and branches from plant material.

3.2 Excavation and Preparation of Planting Beds:

Stake out location of tree pits and shrub beds and obtain approval from the Owner and/or Consultant prior to excavating.

Establish sub-grade by reviewing the root ball size and prepare planting beds as specified.

Excavate to depth and width as per applicable detail.

Remove rocks, roots, debris, and toxic material from material that will be used as planting soil for trees and individual shrubs. Dispose of excess material as directed by Owner and/or Consultant.

Scarify sides and bottom of shrub beds.

Remove water which enters planting pits and beds prior to planting. Notify Owner and/or Consultant if water source is ground water.

3.3 Planting

1. For container stock or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.
2. Plant vertically in locations as indicated. Orient plant material to give best appearance as directed by Owner and/or Consultant in relation to structure, roads, and walks.

For shrubs: Backfill soil evenly to finished grade and tamp to eliminate air pockets.

For ground covers and herbaceous plant material: Backfill soil evenly to finish grade and tamp to eliminate air pockets.

Water plant material thoroughly.

Dispose of burlap, wire, and container material off site.

3.4 Mulching

1. Ensure soil settlement has been corrected prior to mulching.
2. Spread mulch as per applicable detail.

3.5 Pruning

1. Prune all plants to remove dead and broken branches.

2. Preserve the natural character of the plant and do not remove leader.
3. Use clean, sharp tools, and make cuts clean and flush without leaving stubs.
4. Cut back to living tissue all cuts, scars and bruises and shape so as not to retain water.

3.6 Maintenance during Establishment Period

1. Perform following maintenance operations from time of planting to Substantial Performance:
2. Water to maintain soil moisture conditions for optimum establishment, growth, and health of plant material without causing erosion.
3. For evergreen plant material, water thoroughly in late fall prior to freeze-up to saturate soil around root system.
4. Remove weeds monthly.
5. Replace or spread damaged, missing, or disturbed mulch.
6. For non-mulched areas, cultivate as required to keep top layer of soil friable.
7. Remove dead or broken branches from plant material.
8. Keep trunk protection and guy wires in proper repair and adjustment.
9. Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plants.

3.7 Maintenance during Warranty Period – The Owner shall perform the following maintenance operations from time of Substantial Performance to the end of warranty period:

1. Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.
2. Prune dead, broken or hazardous branches from plant material.
3. Keep trunk protection and tree supports in proper repair and adjustment.

3.8 Acceptance

All plant material will be accepted by the Owner after the entire project has received Substantial Performance and the planting operation is completed, if in the sole discretion of the Owner, the plant material exhibits healthy vigorous growth and is free from disease, insects and fungal organisms.

All Plant material installed less than 90 days prior to frost will be accepted in following spring, 30 days after the start of the growing season if acceptance conditions are fulfilled.

END OF SECTION

1 GENERAL

1.1 General Requirements

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

1.2 Standards

1. All aggregates, equipment, methods and materials shall conform strictly to the Specifications of the Ministry of Transportation and Communications.

2. Conform to municipal requirements with respect to curbs, gutters and paving work on public property.

3. Refer to ASTM C309-91, ASTM D698-91, CAN/CSA-A23.1-M90, CAN/CSA-A23.2-M90, OPSS 1010-93, OPSS 1308-83.

1.3 Warranty

1. The work under this section shall be under warranty in accordance with the General Conditions and for a period of minimum two years after the date of issue of the Architect's Certificate of Substantial Completion.

1.4 Special Protection

1. Barricade paved surfaces from traffic until surfaces are ready for normal traffic. Any damage or marked surfaces are to be removed and replaced by contractor.

1.5 Related Work Specified Elsewhere

1. Cast-in-Place Concrete - Section 03300
2. Sodding - Section 02822
3. Topsoil and Finish Grading - Section 02312
4. Earthwork below Paving, Sidewalks and Landscaping - Section 02215
5. Soil Investigation Data - Section 00320

1.6 Unit Prices

1. Provide unit prices as requested in tender form.

2 PRODUCTS

2.1 Materials

1. Granular Base Course: Conform to the Ontario Provincial Standard Specifications form 1010, for material designated as Class "A" and "B".

2. Concrete: Materials shall conform to Section 03300.

3. Joint Filler: For concrete walks 13 mm thick premoulded bituminous impregnated fibre conforming to ASTM D.1751-71a.

4. Joint Sealant: Conform to CGSB 19-GP-24M Tremco THC900 self levelling urethane, or Sternson's Duoflex or Rubber Caulk 6000 by PRC Canada Inc.

5. Air Entrainment: Admixture as manufactured by the Master Builders Co. or Sternson Ltd.

6. Concrete Curing: Conform to Section 03300.

7. Concrete Sealer: Boiled Linseed oil conforming to ASTM D-260-58T cut back with kerosene to form a

50/50 mixture.

8. Reinforcing Materials shall conform to section 03300.

9. Concrete walkways to be minimum 125 mm thick reinforced with 6 x 6 6/6 WWM.

3 EXECUTION

3.1 Examination

1. Before work commences ensure that subgrading and filling as specified in Section 02215 and this section, has been correctly completed and that the subgrade is satisfactory in all aspects for placing of pavement. Report to Architect any deficiencies before proceeding with work.

2. Verify that sub-grade densities, as may be specified in Section 02215 have been attained.

3.2 Installation

1. Concrete Work:

.1 Concrete work of this Section shall be executed generally as specified on Section 03300.

.2 The compressive strength of concrete after 28 days shall be 32 Mpa unless indicated or specified otherwise.

2. Concrete Walks and Slabs:

.1 Lay concrete for walks min. 125 mm (5") thick of 32 Mpa concrete on granular "A" compacted to 100% SPMDD and Granular "B" to 98% SPMDD. Entrained air mix shall be 5% to 7%.

NOTE: Granular "A" to be a minimum 150 mm (6") thick. Provide Granular "B" to be a minimum 200 mm (8") thick as required to bring existing grade up to underside Granular "A" Layer.

.2 Finish wearing surface of walks with wood float or as directed by Architect. Round off edges of slab with an edging tool.

.3 Score surface of walks as indicated on drawings using proper tool or as directed by Architect.

.4 Turn down perimeter edges of sidewalks a min. 125 mm (5") in addition to sidewalk thickness, complete with 300 mm (12") thick compacted stone base.

.5 Slope walks away from building a minimum 1% toward storm sewer systems.

.6 Slope all concrete walks to one side at 3" (6 mm) per foot for drainage or as directed by the Architect.

.7 Widths of sidewalks as per site plan dimensions (not as per OPSD drawings).

3. Concrete Curbs (Barrier)

.1 Curb design shall be as indicated on drawings, using a minimum 200 mm (8") thick base of compacted to refusal.

.2 Entrained air in the concrete shall be 5% to 7%.

.3 Curb Type: as per 600.11, Concrete Barrier Curb.

4. Concrete Sidewalk Ramps/Drop Curbs

.1 Provide drop curbs and barrier-free ramped access where drop curbs shown on drawings.

.2 Refer to OPSD 310.030 and Drawings.

5. Expansion Joints

.1 Provide isolation joints filled with 1/2" (13 mm) joint filler at the following locations:

.1 Where shown and noted on drawings.

.2 At maximum 6000 mm (20'-0") intervals in both directions in sidewalks and concrete paved areas.

.3 Where two sidewalks intersect or meet.

.4 Where a sidewalk or concrete pavement meets building or curb.

.5 Refer also to OPSD 310.010 and OPSD 310.020.

.2 Install joint sealant at all expansion joints including locations where concrete abuts building (at entrances etc.).

6. Contraction Joints

.1 Provide contraction and dummy joints in sidewalks at locations shown on drawings or at approximately 1500 mm (5'-0") intervals in both directions. Refer to OPSD-310.010 and OPSD-310.020.

.2 Form joints be scoring concrete with "T" shaped tool providing a score 25 mm (1") deep.

7. Concrete Curing

.1 Concrete curing shall be done in accordance with Section 03300.

8. Sealing of Concrete

.1 Seal concrete surfaces using boiled linseed oil conforming to ASTM D-260-58T, cut back with kerosene to form a 50/50 mixture. Uniformly apply with spray, brush or roller in 2 coats not exceeding 9.2 sq.m./litre (50 sq. yds. per gallon) per coat. Surface shall be clean, dry and at least 2 weeks old. Air temperature above 7 degrees C. (45 degrees F.).

3.3 Making Good

1. Where new or existing concrete walks are disturbed or cracked, at the end of the project the Contractor shall remove concrete to the nearest joint in each direction and install new concrete to the satisfaction of the Architect.

End of Section 02600

1 GENERAL

1.1 General Requirements

1. Conform to Sections of Division 1 as applicable.

1.2 Related Work

1. Excavating, backfilling and rough grading, for foundation drains and building sub-drains: Section 02300, Excavating, Backfilling and Rough Grading.

2. Site services and/or plumbing connections.

3. Cast-in-Place Concrete: Section 03300.

1.3 References

CAN/CSA-B182.1-87:	Plastic Drain and Sewer Pipe and Pipe Fittings
CAN/CSA-B182.2-M90:	PVC Sewer Pipe and Fittings
CAN/CSA-B182.4-M90:	Profile (Ribbed) PVC Sewer Pipe and Fittings
OPSS 1860-91:	Material Specification for Geotextiles

2 PRODUCTS

2.1 Materials

1. Drainage aggregate: 19 m (3/4") clear crushed stone.

2. Geotextile filter cloth: "Terrafix 270R" as supplied by Terrafix Geosynthetics Inc., or "Mirafi P150" by Marafi Inc., or "Typar Style 3341" by DuPont Canada.

3. Drainage Tubing and fittings: Nominal 100 mm (4"), 150 mm (6"), 200 mm (8"), or 300 mm (12") diameter, flexible polyethylene, conforming to CGSB 41-GP-29Ma "Tubing, Plastic, Corrugated, Drainage", fully perforated complete with filter sock typically, non-perforated for sump collectors, where tubing pass through transfer ports and where shown. Include necessary fittings, caps, threaded pipe ends to accept cleanouts, and push-on joints as required.

4. Vertical drainage: dimpled high-impact resistant polystyrene or high-density polyethylene sheet or fused filament polyester core and attached filter fabric having width of 100 mm (4") wider than filter channel material, and of sufficient length to form 100 mm (4") end flap at top. Width of rolls: 1220 mm (48").

   Acceptable products:

   .1 'Sealtight Mel-Drain 5035-B' by W.R. Meadows.
   .2 'Hydrodrain 400' by Hydrotech.
   .3 'Miradrain 6000' by Mirafi Inc.
   .4 'Terradrain 600' by Terradrain Geosynthetics Inc.
   .5 'Hydroduct' by W.R. Grace.
   .6 'Delta-Drain 6000' by Cosella-Dorken Products Inc.

5. Horizontal Drainage Panels: prefabricated deck drainage system, having a 25 mm (1") flange running full length on one longitudinal edge, providing for overlapping capabilities as well as interlocking of the dimples. The woven geotextile shall be securely bonded to each dimple of the moulded polymeric core or fused filament polyester core with re-sealable adhesive, preventing intrusion of soil, concrete, grout in the flow channels. Woven geotextile shall extend beyond the edges of the polymeric core to provide overlap for the adjacent panels.

Acceptable products:

.1 'Miradrain 9000' by Mirafi Inc.
.2 'Terrafix 900' by Terrafix Geosynthetics Inc.
.3 'Hydroduct-HSF' by W.R. Grace.
.4 'Sealtight Mel-Drain 7055' by W.R. Meadows.
.5 'Delta-Drain 9000' by Cosella-Dorken Products Inc.

3 EXECUTION

3.1 Installation of Drainage Tubing

1. Place foundation drainage tubing as indicated on the Drawings. Bypass obstructions and footing irregularities.

2. Place drains to a minimum grade of 0.03%.

3. Provide adapters as required to connect perforated tubing to other tubing types and leave ready for connection to sump or outlet as indicated on Drawings.

4. Where weeping tile tubing joins enclosed headers and at directional changes, use specifically designed fittings.

5. Surround drains with 150 mm (6") of drainage aggregate. Cover drainage aggregate with geotextile filter cloth, joints lapped 200 mm (8").

6. Do not cover installation until inspected and accepted by Consultant.

3.2 Vertical Drainage

1. Attach vertical drainage with integral filter fabric facing excavation cut, as applicable. Cut only dimpled core polyethylene sheet and ensure filter fabric remains and is not damaged. Note this project requires two layers of vertical drainage board installed 'back-to-back'.

2. Installation shall be made in such manner that soils are not permitted to migrate into drainage channels. Provide end closures and/or filter fabric flaps for ends and sides. Wrap fabric flaps around to plastic backing. Ensure adjacent layers are overlapped in the direction of water flow as per manufacturer's specifications (typically 100 mm). Provide continuous closure strip at top of boards positively installed so to prevent migration of material/soil within the drainage layers.

3.3 Horizontal Drainage Panels

1. Prior to installation of deck drainage, arrange a job start-up meeting, with the Contractor, Landscape Subcontractor, Roofing Subcontractor, and Consultant in attendance.

2. Install deck drainage system in accordance with manufacturer's specifications, as indicated on the Drawings. Cover with geotextile filter fabric, with 300 mm laps, to prevent sand fines from entering drains. Repair damage fabric. Inspect for tears in the presence of Landscape Subcontractor.

3.4 Inspection

1. Install as per weeping tile manufacturer's recommendations.

2. Do not backfill with drainage aggregate until weeping tile is inspected and accepted by Consultant.

1 GENERAL

1.1 Section Includes

.1 Read and be governed by Conditions of the Contract and Sections of Division 1.

.2 Provide all labour, materials, products, plant equipment, tools services and incidentals to complete the plain and reinforced concrete work necessary and/or indicated on the Drawings and specified herein.

.1 Comply with mechanical and electrical Divisions for curb requirements at mechanical and electrical equipment items.

.2 Miscellaneous Concrete, including but not limited to:

1. Repairs to existing concrete window wells and exterior below & above grade concrete, walls, surfaces, etc.

2. Slab on grade

3. Other miscellaneous concrete which may be shown on drawings.

1.2 Standards

.1 The latest issue of the following standards, codes and by-laws shall govern the work except as specifically varied herein:

Canadian Standards Association (CSA):

CSA S269.1	Falsework for Construction Purposes.
CSA S269.2	Access Scaffolding for Construction Purposes
CSA S269.3	Concrete Formwork
CAN3-A23 Series	Standards for Concrete and Reinforced Concrete Structures.
CSA G-30 Series	Specifications for Concrete Reinforcing Materials.
CSA W186	Welding of Reinforcing Bars in Reinforced Concrete Construction.
CSA 0121	Douglas Fir Plywood.
CSA 086-01	Code for Engineering Design of Wood.
A3000	Cementitious Materials Compendium
Includes:	
A5	Portland Cement
A8	Masonry Cement
A23.5	Supplementary Cementing Materials
A362	Blended Hydraulic Cement
A363	Cementitious Hydraulic Slag
A456.1	Chemical Test Methods for Hydraulic Cement, Supplementary Cementing Materials, and Cementitious Hydraulic Slag
A456.	Physical Test Methods for Hydraulic Cement, Supplementary Cementing Materials, and Cementitious Hydraulic Slag
A456.3	Test Equipment and Materials for Hydraulic Cement, Supplementary Cementing Materials, and Cementitious Hydraulic Slag

American Society for Testing and Materials (ASTM):

ASTM A615M	Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
ASTM A775M	Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
ASTM C171	Specification for Sheet Materials for Curing Concrete.
ASTM C233	Standard Test Method for Air-Entraining Admixtures for Concrete
ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete

ASTM C309	Standard Specification for Liquid Membrane–Forming Compounds for Curing Concrete.
ASTM C311	Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete.
ASTM C1017	Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1315	Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

American Concrete Institute (ACI):

ACI 304	Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
ACI 305	Recommended Practice for Hot Weather Concreting.
ACI 306	Recommended Practice for Cold Weather Concreting.
ACI 309	Recommended Practice for Consolidation of Concrete.
ACI 315	Standard Practice for Detailing Reinforced Concrete Structures.
ACI 347	Recommended Practice for Concrete Formwork.

Concrete Reinforcing Steel Institute (CRSI):

CRSI-WCRSI	Placing Reinforcing Bars.

Ontario Ministry of Transportation and Communication Specifications for Organic Coatings for Steel Reinforcement (Concrete).

National Building Code NBC 2005 and its Structural Commentaries, The Building Code, Ontario Reg. 350/06 and other requirements of Authorities having jurisdiction.

1.1 Design

.1 Formwork and Falsework:

.1 Comply with all the requirements of The Occupational Health and Safety Act. Be responsible for safety provision, e.g. handrails, guardrails, etc., until the formwork has been stripped from that area.

.2 Design, erect, support, brace and maintain formwork to safely support vertical and lateral loads until they can be supported by the concrete structure. Construct forms so members will be of correct size, shape, alignment, elevation and position.

.3 Forms shall have sufficient rigidity to maintain specified tolerances.

.4 Well in advance of the work, submit to the Construction Manager, design of shores, bracing and re-shoring prepared by and having the seal of a Professional Engineer registered in the Province of Ontario.

.5 Design formwork in accordance with and for loads and lateral pressures recommended in CSA S269.1. Allowable stresses shall conform to the requirements of CSA 086 and CAN3-S157, except where there is a variance in requirements, in which case provincial or municipal requirements shall govern the design of formwork for loads and lateral pressures, in accordance with the design considerations of CSA S269.1.

.6 Construction loads shall not exceed the superimposed load, which the member is capable of carrying safely and without damage.

1.4 Submittals

.1 Shop Drawings for Forms and Falsework:
Provide details of design and construction of all forms and falsework, shoring and reshoring, predicted deflections under loads and calculations for establishing member sizes and deflections, including

provisions for adjustment in case of settlement. All drawings and design sheets shall be prepared and stamped by a Professional Engineer registered in the Province of Ontario and shall be submitted in sufficient time to permit an adequate review. Drawings shall show any special requirements for stripping of formwork, and the amount, method of distribution, and proposed supplemental support of loads during construction. Drawings shall also indicate contractors proposed location of construction joints, pour sequences, crane openings and support reactions for cranes and hoists.

.2 Loading and Support of Concrete:
Construction loads shall not exceed the superimposed load which the member is capable of carrying safely and without damage. The amount, method of distribution, and any proposed supplemental support of loads during construction shall be submitted for the Consultant's review.

.3 Shop Drawings and Bar Lists for Reinforcement:
Detail reinforcement in accordance with the requirements of the Drawings, CAN3-A23.3 and ACI-315. Prior to detailing the reinforcement, prepare preliminary placing drawings of the structure so that formed holes and sleeving required under other Sections are shown. Submit these drawings for circulation as shop drawings and for review by the Consultant.

After the Consultant has examined and returned the preliminary placing drawings, update these drawings, detail the reinforcement and prepare bar lists for every portion of the structure. Placing drawings shall be prepared to a minimum scale of 1:50 in a clear complete manner that will permit the placing of reinforcement without reference to the Structural Drawings.

.4 Concrete:
Prior to the start of concreting the supplier shall submit a quality control plan giving details of the control of concrete production. Certificates of recent origin shall be included showing that all materials incorporated in the concrete meet the appropriate CSA requirements. After the start of concrete deliveries, a quality control report shall be submitted monthly, to a distribution advised by the Consultant. This report shall include current certification that all materials used in the concrete met the appropriate CSA requirements.

.5 Certificates:
Prior to commencement of the work, and at no extra cost to the Owner, provide the following certificates prepared by an approved inspection company.

.1 Aggregates:
Certification that coarse and fine aggregates proposed for the work comply with Specification requirements.

.2 Cement:
Results of physical and chemical tests required by CAN3-A5.

.3 Concrete:
The mix proposed for each class of concrete giving proportions by dry weight of cement, coarse and fine aggregate, type and amount of admixtures or air entraining agents, and water-cement ratio. In lieu of submitting the mix designs, provide certification that compressive strength, slump, entrained air content and other specified properties will be met. Certification shall be sealed by a Professional Engineer licensed in the Province of Ontario.

.4 Reinforcing Steel:
Test data from a Canadian testing company that each size and grade of reinforcing steel meets Specification requirements. Where reinforcing steel is of Canadian manufacture, suitable mill test reports will be sufficient.

1.5 Quality Assurance

.1 General

.1 The Owner will appoint and the Consultant will direct an independent testing and inspection company to make inspections or perform tests as outlined below or as the Consultant directs. Testing as described herein shall be paid for by the Owner, except that the Contractor shall be required to pay for subsequent tests made necessary to verify acceptability of corrected work not meeting the requirements of the Contract Documents. Refer to Sections 01400 and 01410.

.2 Give the Consultant and independent inspection company adequate advance notice so as to afford them reasonable opportunity to inspect the work in compliance with contract requirements. Failure to meet this condition may result in the withholding of a final certificate of acceptance until the contractor has furnished positive proof of the adequacy of the work in question (e.g. load tests).

.3 Inspection of any work shall not relieve the Contractor of the responsibility of checking his own work and satisfying himself that everything is in accordance with the Drawings and Specifications.

.2 Inspection:

.1 Ensure that the soil at footing elevations has been inspected prior to placing of concrete.

.2 The conveying, placing, consolidation, curing and protection of poured concrete shall be visually inspected to ensure compliance with the Drawings and Specifications.

.3 Testing:

.1 Cement and Aggregates:
The Consultant may require tests on these materials as he deems necessary during the work.

.2 Concrete:

.1 General:
Unless specifically stated otherwise herein or on the Drawings, comply strictly with the requirements of Clause 4 of CAN3-A23.1.

.2 Evaluation of Tests:
Evaluation of concrete quality shall be the responsibility of the Consultant.

.3 Frequency of Testing:
One test shall be carried out for:

a) each individual pour.
b) each 50 m^3 of regular strength concrete (up to 40 MPa or part thereof).
c) each 25 m^3 of high strength concrete (45 MPa and up) or part thereof).
d) each class of concrete used each day.

.4 Strength Tests:

.1 For a strength test, three standard test specimens shall be made, one tested at 7 days and two tested at 28 days.

.5 Additional Strength Tests:
With reference to accelerated strength determination, cold weather concreting and removal of forms, additional tests may be required as directed by the Consultant or as requested by the Contractor. The cost of such tests requested by the Contractor is part of the work of this Section. The cost of concrete pull-out cylinders for form removal is part of the work of this Section. A test using pull-out specimens shall consist of no less than 2 cylinders.

.6 Failure of Tests to Meet Requirements:
If the results of test indicate that the concrete is not of the specified quality, the Consultant may request one or more of the remedies given in Clause 4.4.6.8.1 of CAN3-A23.1. Failing that, the Consultant may require strengthening or replacement of those portions of the structure which he deems to be unsatisfactory.

.3 Tests on Reinforcing Steel:

.1 All tests and inspection, unless specifically noted otherwise, shall be performed in strict accordance with CSA Standard G30 Series. No other procedures are to be instituted without written permission of the Consultant.

.2 The Consultant will notify the inspection company in advance when a series of reinforcing steel tests will be required.

.3 A series of reinforcing steel specimens for each grade and size of reinforcing steel contained in any 100 tons of steel shipped will be tested. A series of tests shall include 2 bars for each test, one tensile test and one bend test required for each size and grade of steel used.

.4 The inspector will witness the cutting of samples of reinforcing steel from areas designated by the Consultant. The inspector will identify and tag each sample and transport it to the laboratory for testing.

.5 Where reinforcing steel is of Canadian manufacture and satisfactory mill test certificates identifiable to the steel are available, no tests will normally be required.

.6 The inspector will inspect each mechanical tension splice visually for the presence of cracks, undercuts, inadequate size, misalignment and other visible defects. Welds having visible defects shall be cut out and the bars re-welded as outlined in the Specifications and in conformity with the manufacturer's requirements. Splices consisting of threaded bars and couplers shall be torque tested.

.7 Tension tests shall be performed on 5% of welded tension splices, or as the Consultant directs. The cost of re-testing materials to verify corrected work which did not meet the Specifications shall be borne by the Contractor.

.8 The inspector will inspect "butt splices" visually for alignment, end bearing, and proper installation of sleeves.

.9 Inspection of Epoxy Coated Reinforcement:

.1 Inspection will be conducted, in accordance with ASTM A775.

.2 Thickness and bend tests will be conducted as per ASTM A775.

2 PRODUCTS

2.1 Materials

.1 Normal Strength Concrete:
Ready-mix, controlled concrete to be used throughout. Conform to CAN3-A23.1 and ACI 304 for methods on measuring materials, batching, mixing and delivery.

.2 Grout:
"Embeco" non-shrink grout, manufactured by Master Builders Co. or other approved manufacturer having a minimum compressive strength of 35 MPa at 28 days. Where grout is exposed to view or to weather, use non-ferrous expansion agents.

.3 Cement:
General Use Hydraulic (GU), High Early Hydraulic (HE) or Low Heat of Hydration Hydraulic (LH) Cement conforming at the time of its incorporation in the mixture to CAN3-A5.

.1 For slab-on-grade construction only, cement shall also combine GU cement with slag to retard setting process.
.2 For foundation mat construction: Low Heat of Hydration Portland Cement, Type 40 is required. A blend of 50% Normal Portland Cement (CAN3-A5-M88) with 50% Cementitous Hydraulic Slag may be used in place of low heat cement to control heat generation, provided the strength, density and temperature requirements are met.

.4 Aggregates:

.1 Coarse aggregate:
Crushed rock or gravel or a combination thereof, conforming in all respects to CAN3-A23.1. The nominal size of the coarse aggregate for concrete shall be 19 mm to No. 4.

.1 For slab-on-grade construction only, the nominal size of the coarse aggregate shall be 20 mm to 40 mm with 50% larger than 30 mm. Pit run gravel for sections required to be pumped is permissible.

.2 Fine aggregate:
Natural sand, or other inert materials with similar characteristics, or a combination thereof, conforming to CAN3-A23.1.

.3 Maximum size of aggregate:

.1 The nominal maximum size of aggregate shall be not larger than 40 mm in footings and 19 mm in all other members.

.2 Maximum size of aggregate in congested locations shall be 10 mm when directed by the Consultant.

.4 Admixtures:

.1 Follow the recommendations of ASTM C1017 Standard Specifications for Chemical Admixtures for use in Producing Flowing Concrete, unless otherwise specified herein.

.2 All admixtures shall be used in accordance with the manufacturer's instructions, except as otherwise specified herein.

.3 All admixtures shall be introduced into the concrete mix in liquid form, by adding to the mix water.

.4 Add a water reducing admixture conforming to ASTM C494/ C260 / C233 to all concrete.

.5 No calcium chloride shall be used in any concrete. If calcium chloride is part of admixtures identify areas where the admixture is being used and the quantities of calcium chloride involved.

.6 No admixtures other than air entraining agents and water reducing admixtures will be permitted in the concrete without prior written approval by the Consultant.

.7 Air entraining agents or water reducing admixtures to conform to ASTM C1017 / C233 /C260.

.5 Mixing water for use in Portland Cement concrete:
Clean and free from any injurious amounts of oil, acid alkali, organic matter, sediment, or any other deleterious substances.

.6 Materials for curing concrete shall meet the requirements of one of the following Standards: ASTM C309, ASTM C171.

.7 All materials for concrete shall be stored in accordance with CAN3-A23 and ACI 304.

.8 Proportions:

.1 Design and mix in accordance with CAN3-A23.1, Clause 4.1.2 Table 5 Alternate Number 1.

.2 Design the mix such that the concrete will be homogeneous, uniformly workable, readily placeable into corners and angles of forms and around reinforcement, but without permitting materials to segregate or excessive free water to collect on the surface. Design the mix to prevent the loss of superplasticisers and/or the absorption of water by the aggregate if the concrete is pumped.

.3 Concrete for all parts of the work shall be of the specified quality, capable of being placed without excessive segregation and, when hardened, of developing all characteristics required by the Contract Documents.

.4 The constituent materials and mix proportions for concrete shall be selected specifically:

.1 To provide the specified strength as indicated on the drawings, with sufficient margin to comply with the requirements of CAN3-A23.1 Clause 4.3.5.

.2 To provide impermeable concrete with adequate durability to withstand satisfactorily the destructive environments to which it may be exposed and to comply with the requirements of CAN3 A23.1 Clause 4.1.1.

.3 To provide the most favourable volume stability characteristics practicable consistent with conditions of placement, workability requirements and materials available (refer to Clause 4.3.26 CAN3-A23.1).

.4 To have the required air-dry unit density. All concrete, unless specifically designated otherwise, shall be "normal density" concrete.

.5 Concrete slump for various members shall be as shown on the Drawings and/or specified in CAN3-A23.1.

.6 Provide air-entrainment consistent with the appropriate Exposure Class in accordance with Table 10 and Table 14 of CAN3-A23.1.

.7 For slabs-on-grade construction, the water cement ratio shall not exceed 0.45.

2.2 Reinforcing Steel

.1 Reinforcement shall be deformed billet steel and welded wire fabric conforming to CSA G30 series and to Material Specifications notes on the Drawings and/or noted herein.

.1 Welded wire fabric: 400 MPa yield.
Unless shown otherwise, provide 152 x 152 MW18.7 X MW18.7 or 305 X 305 MW37.4 X MW37.4.
All welded wire fabric to be supplied in sheets.

.2 Column ties: : 400 MPa yield.
(substitution of higher strength bars will not be permitted.)

.3 "Dywidag Threadbar Reinforcing System" or approved equivalent, Grade 75, conforming to ASTM A615 and CAN/CSA G30-18.

.4 All others: 400 MPa yield.

.2 All accessories for supporting and positioning reinforcement shall be in accordance with ACI Detailing Manual, ACI 315, unless otherwise indicated on the Drawings. Provide samples of bar supports for the Consultant's review.

.3 Mechanical Splices:

.1 End-bearing (compression only) splices:
"Speed-Sleeve" by Erico Products Inc.,
"Pre-Set" by Stricon Products Ltd. or approved equal.

.2 "Compression only" splices:
"Cadweld C-16 Series" by Erico Products Inc. or approved equal.

.3 "Tension" splices:
"Cadweld C-Series" or "Lenton" Rebar Splicing System by Erico Products Inc., "Fox-Howlett" No-Slip Coupling by Wapiti Industries Inc. or approved equal.

.4 "Tension" Splices Bar-to-Structural Steel:
"Cadweld B-Series" by Erico Products Inc. or approved equal.

.4 Epoxy Coated Reinforcing and Accessories

.1 All reinforcing contained or extending into zones defined as containing Epoxy Coated Reinforcing shall be coated in strict conformance with ASTM A775.

.2 Bar supports should be manufactured from a dielectric material.

.3 Nylon coated tie wire must be used.

2.3 Formwork & Miscellaneous Materials

.1 Sheathings:

.1 Unexposed surfaces:
Plywood or metal panels, sound, in good condition and free from defects which may impair strength.

.2 Exposed surfaces not defined as Architectural concrete:
New, Douglas Fir plywood, not less than 17 mm thick, concrete form grade, solid one side, conforming to CSA 0121.

.2 Wales and studs:
Eastern Spruce, construction or standard grade, selected for straightness, 50mm x 100mm nominal size, except that 75mm x 100mm nominal size shall be used at vertical joints in plywood sheathing.

.3 Grooves and reglets:
White Pine dressed to exact size.

.4 Shores:
Adjustable so that shore heights may be altered before or during a pour; and of such a type that they may be removed without producing undue strains or shock in concrete work.

.5 Internal form ties:
Commercially manufactured type, having a minimum working strength when fully assembled of at least 3 KN and adjustable in length so as to permit tightening of forms, and of a type sufficiently stiff to act as spreaders. (Wood spreaders will not be permitted).

.6 Water Stops:
Steel Industrial Products PVC Waterstop Type 41BS.
http://www.steels.com/contractorsproducts.htm

Greenstreak PVC Waterstop #939 http://waterstop.com/Div3/Waterstops/pvc_prods.asp

Or other approved manufacture.

.7 Expansion Joint Filler:
Where shown to be sealed - an approved non-extruding unicellular foamed plastic type equal to ITP Soft Type backer rod or other approved manufacture.

.8 Reinforced Concrete Block Lintels:
Supply and place concrete and reinforcing steel for reinforced block lintels as indicated on Drawings. Accurately place and secure reinforcement in the cavity prior to concreting. Trowel top of lintel as required to permit laying of succeeding block course. Cure concrete fully before removing temporary supports.

.9 Hardware and Miscellaneous Embedded Materials:
In areas defined as Exposure Class C, exposed to de-icing salts, all embedded items, supplied by this or other Sections shall conform to one of the following requirements:

.1 Manufactured from a non-metallic material.

.2 Protected by an effective and durable coating. Sacrificial metallic coatings such as zinc are not acceptable.

3 EXECUTION

3.1 Formwork and Falsework

.1 Comply with all the requirements of The Occupational Health and Safety Act. Be responsible for safety provision, e.g. handrails, guard-rails, etc., until the formwork has been stripped from that area.

.2 Design, erect, support, brace and maintain formwork to safely support vertical and lateral loads until they can be supported by the concrete structure. Construct forms so members will be of correct size, shape, alignment, elevation and position.

.3 Forms shall have sufficient rigidity to maintain specified tolerances.

.4 Camber forms in an approved manner to the details shown on the Drawings or 6 mm in 3 m for spans in excess of 6 m. Slope forms to roof and floor drains as required.

.5 Well in advance of the work, submit to the Consultant, design of shores, bracing and re-shoring prepared and having the seal of a Professional Engineer registered in the Province of Ontario.

.6 Design formwork for loads and lateral pressures recommended in CSA S269.1. Design considerations shall also be in accordance with CSA S269.1. Allowable stresses shall conform to the requirements of CSA 086, except where there is a variance in requirements, in which case provincial or municipal requirements shall govern the design of formwork for loads and lateral pressures, in accordance with the design considerations of CSA S269.1.

.7 Conform to recommendations of CSA S269.1 and the requirements of CAN3-A23 except as varied herein.

.8 Build forms to permit adjustment of height, easy dismantling and stripping, and such that removal will not damage the concrete.

.9 Place shores supporting successive storeys directly above those below, or design so loads will be transmitted directly to those below.

.10 Where adequate bearings for shores cannot be secured below (such as at locations of large openings) provide a system of supports (beams or trusses) to bridge the openings.

.11 Brace shores horizontally in two directions and diagonally in the same two vertical planes so forms can safely withstand dead and moving loads.

.12 Adequately brace shores more that one tier high and brace at tier junctions.

.13 Provide continuous mud sills, of suitable size, bedded in sand or stone, beneath shores where they would otherwise bear on soil. Adequately prepare the soil so that settlement will not occur during or after concreting. Do not set mud sills on frozen ground.

.14 Build top forms on sloping concrete where required to prevent flow of the concrete out of the forms. Provide vents to top forms to permit air or bleed water to escape from the forms.

.15 Provide temporary openings at the base of column, wall pier, deep beam and other forms to facilitate cleaning and inspection. Place openings so water for removing debris will run clear to outside of forms.

.16 Adequately tie side forms for walls, or deep beams, to prevent bulging.

.17 Make joints of forms sufficiently tight to prevent leakage of concrete fines, particularly at corners of exposed beams, walls and columns or at the corners of exposed edges of slabs.

.18 Where necessary, provide suitable markers to indicate the location and configuration of continuing concrete members so that dowels can be positioned accurately in relation to their position in continuing members.

.19 Accurately set anchor bolts, steel templates, steel connection units or other inserts supplied by other Sections into forms and secure them rigidly so that they do not become displaced during concreting. Set and secure these items to the tolerances required in the appropriate "Sections of the Specifications".

.20 Perform forming and finishing operations so that completed work will be within tolerance limits set out in ACI 347, except as noted otherwise below:

.1 Variation from the plumb:

.1. In the lines and surfaces of columns, piers, walls and in arises: 6 mm per 3 m but not more that 25 mm.

.2. For exposed corner columns, control-joint grooves and other conspicuous lines;
In any bay or 6 m maximum: 6 mm.
In 12.5 m or more: 12 mm.

.2 Variation from the level or from the grades indicated on the drawings.

.1 In slab soffits, ceilings, beam soffits, and in arises:
In any 3 m of length: 6 mm.
In any bay or 6 m maximum: 8 mm.
In 12.5 m or more: 18 mm.

.2 For exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines:
In any bay or 6 m maximum: 6 mm.
In 12.5 m or more: 12 mm.

.3 Variation of the linear building lines from established position in plan and related position of columns, walls and partitions:

.1 In any bay or 6 m maximum: 12 mm.

.2 In 12.5 m or more: 25 mm.

.3 No variation in building line, which results in extension of the building over lot lines or restriction lines, will be permitted.

.4 Variation in the sizes and locations of sleeves, floor openings, and wall openings, and in location of bolts, inserts and fastenings: 6 mm.

.5 Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls:
minus: 6 mm.
plus: 12 mm.

.6 Variation in footings:

.1 Variation in dimensions in plans:
minus: 12 mm.
plus: 50 mm.

.2 Misplacement or eccentricity - two percent of the footing width in the direction of misplacement, but not more than 50 mm.

.3 Reduction in thickness: minus 5% of specified thickness.

.7 Variation in steps:

.1 In a flight of stairs:
Rise: 3 mm.
Tread: 6 mm.

.2 In consecutive steps:
Rise: 3 mm.
Tread: 3 mm.

.8 The above tolerances notwithstanding, the interior faces of all elevator shaft walls, shall not deviate from their theoretical positions into the shaft space by more than 25 mm.

.9 Tolerances of concrete members are specified to comply with ACI Standards. However, establish those areas where use of these tolerances will disrupt the work of trades depending on concrete lines, and ensure that special care is taken with such concrete lines. Provide for cutting concrete or alterations to the details of other trades where tolerances are exceeded in critical areas.

.10 Variations from a reference system and general dimensions shall be in accordance with CAN3-A23.1, Clause 6.4. Accumulated tolerances of individual structural elements shall not exceed these limits.

.11 Structural tolerances specifically addressing floor and roof surfaces will be in accordance with CAN3-A23.1, Clause 7.5 and Table 22, Class A. Provide for levelling with grout or grinding as approved to achieve surface tolerances.

.21 Preparation of Form Surfaces:
Coat surface of forms to be in contact with concrete with an approved, non-staining material which provides complete bond-breaking action and will not deleteriously affect the repairing or later surface treatment of the concrete work. Apply surface treatment strictly in accordance with manufacturer's instructions. Lumber once used in forms shall have nails withdrawn and surfaces to be in contact with concrete thoroughly cleaned, repaired and re-coated with release compound, if necessary, before being used again. Exposed walls and columns to have high quality appearance.

.22 All openings, sleeves, recesses are not shown on the Structural Drawings. Refer to Architectural, Mechanical and Electrical Drawings for openings and sleeving requirements not shown, located or dimensioned on the Structural Drawings. No sleeves, chases and openings through structural members shall be formed without the Consultant's approval. Where pipes or services pass through walls or slabs, form the openings as necessary using lumber, except where such openings are specified to be sleeves by the appropriate trade. Form chases or recesses as shown or required.

.23 Alignment of Forms during Placing:
Prior to placing concrete, provide suitable means for checking the alignment and elevations of forms during placing of concrete. Check frequently during placing of concrete. Carry out corrective measures if required, both horizontally and vertically, until concrete is placed.

.24 Forms for Exposed Concrete:

.1 Make joints of forms sufficiently tight to prevent leakage of concrete fines at corners of exposed beams, walls and columns or at the corners of exposed edges of slabs, and other concrete exposed to view.

.2 Provide 25mm chamfer strips at all exposed edges of concrete and 18 mm v-joints at control joints.

.3 Form panels for exposed concrete may be reused 3 times, provided the tie holes are reused and panels are not damaged in a way that will cause visual defects.

.4 Refer to Architectural drawings and specifications for form tie locations and form tie pattern layout for all exposed concrete work.

.5 Prior to forming and pouring exposed interior stairwell walls and columns, and other similar exposed concrete areas, provide a layout pattern for Architect's review. Joint layout should be uniform and shall be subject to Architect's approval.

3.2 Fabrication of Reinforcement

.1 Fabricate, handle, and place all reinforcement in accordance with CAN3-A23 Series, ACI Detailing Manual ACI 315 and/or the requirements of this specification and the Drawings.

.2 Execute fabrication accurately to the dimensions indicated on the Drawings, so that reinforcement may be placed to tolerances specified in CAN3-A23.3.

.3 Fabricate reinforcement at the mill or at a fabricator's shop. Heating of reinforcement will be permitted only when approved by the Consultant.

.4 Tag each bar with the code mark corresponding to that appearing on the bar list.

.5 Do not straighten or rebend reinforcement in a manner that will injure the metal. Do not use bars with kinks or bends not shown on the Drawings.

.6 Bend all bars cold except if otherwise stated on Drawings. Bending diameters shall be in accordance with the recommendations of ACI Detailing Manual ACI 315, except where shown otherwise on the Drawings.

.7 Bars to be used shall be shipped to site only if they have been properly shaped as shown on the Drawings. The tolerances shall be:

.1 Length of bars: plus or minus 12 mm.

.2 Overall dimensions of stirrups, ties and spirals: plus or minus 8 mm.

3.3 Placement of Reinforcement

.1 Install and place all reinforcement in accordance with CAN3-A23, ACI 315 and/or the requirements of this Specification and the Drawings.

.2 Provide a rodman during placing of concrete to correct displaced reinforcing steel.

.3 Prior to placement remove from the reinforcing steel all loose scale, dirt or foreign matter which would reduce bond to concrete.

.4 Reinforcement found unacceptable by the Consultant shall be removed, cleaned and reset at no additional cost. Clean reinforcing steel as necessary prior to depositing concrete.

.5 Installation:

.1 Provide supports and accessories in accordance with the recommendations of ACI 315 and the CRSI Standards.

.2 Prior to concreting, place reinforcement, support and secure same against displacement, in accordance with the requirements contained in ACI 315 and CRSI Standards, to the tolerances specified in CAN3-A23.

.3 Place reinforcement accurately in position indicated on Drawings, and wire securely or support in position in such a manner that no movement will take place before concrete has set at intervals not to exceed 1500 mm. Use spacing blocks, metal chairs, or metal hangers of approved material, size and shape, or precast concrete chairs and tie securely in place with No. 16 gauge wire. Support top bars securely on continuous high chairs.

.4 Reinforcement shall not be straightened or re-bent in a manner that will injure the material. No splices in reinforcement, other than those indicated on the Drawings shall be permitted, unless approved by the Consultant.

.5 Conform to requirements of CAN3-A23 for concrete cover to reinforcement and spacing of bars, unless otherwise noted.

.6 Place reinforcement accurately and secure against displacement by using annealed iron wire ties or clips approved by the Consultant. Tack welding of reinforcement to secure in place will not be permitted.

.7 Secure reinforcement in walls using sufficient spacers to maintain the required distance between reinforcement and wall face and so that vertical bars are plumb.

.8 Support reinforcement in beams and suspended slabs using beam chairs, continuous chairs or slab bolsters.

.9 Set column and wall dowels prior to concreting, by approved means, so that each dowel is maintained in its correct position.

.10 Support reinforcement in footings, slabs on grade, walks, pavements on precast concrete blocks or other approved devices of a number and thickness to maintain reinforcement in correct position. Where toppings are placed on waterproof membranes, vapour barriers, and the like, prevent reinforcement or tie wire contacting these items.

.11 Do not drive or force reinforcement into fresh concrete.

.12 Pre-assemble column and beam cages as necessary. Do not "spring" or bend ties and stirrups in order to place longitudinal reinforcement.

.13 No field bending of reinforcement shall be done except as shown or as directed by the Consultant, and then only as specified.

.14 Firmly secure reinforcement in members exposed to weather in forms so no metal comes closer than 40 mm from the exposed concrete surface.

.15 Exercise care in the placing of reinforcing so as not to disturb sleeves, boxes, or other inserts, or damage adjacent fresh concrete.

.16 Do not replace or cut any reinforcing steel interfering with sleeves, boxes, or other inserts without the approval of the Consultant.

.17 Bars used for concrete reinforcement shall meet the following tolerances:

.1 Sheared length $\pm$ 20 mm.

.2 Depth of truss bars $\pm$ 10 mm.

.3 Stirrups and ties $\pm$ 10 mm.

.4 Other bends $\pm$ 5 mm.

Bars shall be placed to a tolerance of $\pm$ 5 mm.

.18 Welding:

.1 Where required by the Drawings, weld reinforcement as shown.

.2 Weld reinforcement in accordance with CSA W186.

.3 Welding operators shall be fully approved by the Canadian Welding Bureau in accordance with CSA W47.1, and shall be in possession of a current permit.

.4 Only low hydrogen electrodes shall be used for welding of reinforcing steel.

.5 Copies of C.W.B. approved welding standards shall be made available to the Consultant upon request.

.19 Welded Wire Fabric:
Supply welded wire fabric in flat sheets. Unless other reinforcing is shown, place and maintain welded wire fabric at mid-depth in slabs on grade, walks, toppings, and housekeeping pads, and 25 mm cover from top for composite slabs (concrete slabs on metal deck).

.20 Placement of Epoxy Coated Reinforcement shall meet the following requirements:

.1 Bar supports should be manufactured from a dielectric material or wire bar supports should be coated with dielectric material such as epoxy or vinyl compatible with concrete, for a minimum distance of 50 mm from the point of contact with epoxy-coated reinforcing bars.

.2 Nylon-coated tie wire must be used.

.3 Final inspection and repairs of coating damage in accordance with ASTM A775.

.6 Splicing of Reinforcement:

.1 No splices in reinforcement, other than those indicated on the Drawings shall be permitted, unless approved by the Consultant.

.2 Where other splices are required, obtain the approval of the Consultant prior to the preparation of shop drawings. Lapped splices of reinforcing bars shall meet the requirements of CAN3-A23 except where the Drawings show otherwise.

.3 Splice adjacent sheets of welded fabric by lapping not less than 300 mm on all sides, except where the Drawings show otherwise. Wire laps securely together.

.4 Do not splice reinforcement in slabs, beams, girders, or spandrels except where specifically shown on the Drawings.

.5 Lapped Splices:
Lapped splices of reinforcing bars shall meet the requirements of CAN3-A23 except where the Drawings show otherwise.

.6 End-bearing Splices (compression only):

.1 End bearing surfaces of all column and wall bars to be butt-spliced shall be accurately saw cut 90 degrees to the axis of the bar, with a tolerance of 1 ½ degrees. The ends shall be held in concentric contact by an approved sleeve.

.2 Incomplete bearing shall be cause for rejection of the joint. Dismantle a rejected joint and reassemble it after refacing the bars.

.3 Where bars cannot be properly aligned and/or fully butted, for any reason, use a mechanical splice as specified in following article.

.7 Welded or Threaded Splices:

.1 Provide approved mechanical splices at locations shown.

.2 In each concrete member splice not more than 50 percent of the bars at any one location. Distance between adjacent splice locations shall not be less than 600 mm.

.3 Mechanical "compression only" splices shall develop the ultimate strength of the bars.

.4 Mechanical "Tension" splices shall develop 125 percent of the specified yield strength of the bars.

.5 Mechanical "Tension" splices of bars to structural steel shall develop the ultimate strength of the bars. Pre-heat the base material prior to welding.

.6 Clean rust, scale, hardened concrete or other foreign matter from the splice areas of reinforcing steel by power wire brushing down to bare metal.

.7 Preparation of reinforcing steel to comply with mechanical splice manufacturer's requirements.

.8 Closely align the reinforcing bars to eliminate the possibility of other than axial stresses developing in the joint.

.7 Safety Provisions:
Provide at all times the necessary security measures whether or not specifically called for by the authorities having jurisdiction so as to prevent any bars from becoming loose, falling off, being knocked off, or otherwise endanger any person or materials present. Do not overload the structure or formwork due to improper storage of reinforcing steel.

3.4 Joints and Embedded Items

.1 Construction Joints:

.1 Provide construction joints at locations shown. The location and details of construction joints not shown shall be subject to the approval of the Consultant.

.2 The maximum length of a concrete pour shall be 24m. Procedures for pours of greater height than 3.6m shall be approved by the Consultant.

.3 Remove laitance and concrete fines where necessary from the surface of horizontal construction joints to partially expose the coarse aggregate.

.4 Continue reinforcement through the joint in its normal position. Add additional reinforcement across the joint as shown or directed.

.5 Use vertical construction joints in slabs, beams or continuous footings unless noted otherwise. Locate construction joints at mid-span between points of support in slabs, beams or similar members.

.6 Provide horizontal construction joints in walls or column only at the underside of beams or slabs unless noted otherwise.

.7 Provide a shear key in construction joints unless shown otherwise.

.8 Beam haunches or column capitals shall be considered as part of the floor systems and shall be monolithic therewith. Brackets shall be monolithic with columns.

.9 Install continuous waterstops in locations shown fixed rigidly in forms prior to concreting. Waterstop splices to be heat-welded in such a manner that the waterstopping action will not be impaired.

.10 Provide reglets in joints as required.

.11 Before depositing new concrete on set concrete, retighten forms, clean the surface of the set concrete, reinforcing steel and forms of foreign matter, adhering concrete of laitance. Saturate these items with water.

.12 The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed prior to placing adjoining concrete.

.2 Expansion and Control Joints:

.1 Reinforcement or other embedded metal items bonded to concrete (except dowels in floors bonded on only one side of joints) shall not be permitted to extend continuously through any expansion joint.

.2 Construct expansion and control joints at the exact locations and in accordance with the details shown.

.3 Where specific locations of control joints are not shown, locate as the Consultant directs.

.4 Mark the locations of control joints on the first form face erected to assist in accurately positioning the break in horizontal reinforcement.

.5 Construct clean expansion joints free of foreign material likely to impair the proper operation of the joint.

.6 Provide a non-extruding joint filler in expansion joints for the full area between adjacent concrete members. Anchor the filler material to one of the adjacent members or between concrete members and adjacent members of other materials.

.3 Waterstops:

.1 Provide specified waterstops in construction joints exposed to earth and weather and in water retaining structures.

.2 Make waterstops continuous for the full length of the joint. Joints shall be heat-welded.

.3 Install in accordance with the manufacturer's instructions so that the water-stopping action is not impaired.

.4 Rigidly fix waterstops in forms to maintain their position during concreting.

.4 Other Embedded Items:

.1 All sleeves, inserts, anchors and embedded items required and supplied by the trades for adjoining work or for its support shall be placed prior to concreting.

.2 All trades whose work is related to the concrete or must be supported by it, shall be given ample notice and opportunity to introduce and/or finish embedded items before concrete is placed.

.3 Embedded conduit within floor slabs shall conform to the following size restrictions:

Slab or wall thickness:	125 mm to 200 mm	20 mmϕ max
	200 mm or greater	32 mmϕ max

Location and congestion of all conduits shall be subject to the approval of the Structural Consultant. In general, no conduit will be permitted within structural columns.

.5 Placing Embedded Items:

.1 Expansion joint material, waterstops, and other embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

.2 The positioning of the embedded items shall not impair the structural capacity of the slab or beam. Adequate clearances to reinforcing steel shall be maintained. Neither conduits nor junction boxes will be permitted within columns.

.3 Acceptance of embedded items is to the discretion of the Structural Engineer.

3.5 Placing of Concrete

.1 All concrete under this Section shall be transported, placed and consolidated in accordance with CAN3-A23.1 and the recommendations of ACI 304 and 309, except as varied herein.

.2 Conveying:

.1 Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients and in a manner which will assure that the required quality of the concrete is maintained.

.2 Flush equipment for conveying concrete with clean water before and after each pour.

.3 Add no water to the concrete after mix has been batched, unless authorised by the signature of the supplier's inspector on the delivery sheet.

.4 Convey concrete using suitable equipment to ensure continuous placing of concrete.

.5 Placing of concrete by pumping or pneumatic conveying methods shall conform to the publication "Placing Concrete by Pumping Methods", prepared by ACI Committee 304. Special care shall be exercised with regard to the following:

.1 Select the pumping equipment such that the specified concrete can be handled.

.2 Control placing to minimise segregation.

.3 Loss of slump during conveying shall be within acceptable limits.

.4 Do not use aluminum or aluminum alloy in the discharge pipes.

.3 Depositing:

.1 Arrange the sequence of placing concrete such as to prevent damage to partially hardened concrete due to injurious vibration or shock.

.2 Immediately before placing concrete, clean forms and reinforcement of foreign matter.

.3 Deposit concrete in forms as rapidly as possible, as nearly as practicable to its final position, in approximately horizontal layers not exceeding 600 mm in depth. Avoid segregation due to re-handling or flowing. Do not use concrete mixed more than 1½ hours after introduction of mixing water (one hour during hot weather conditions), or concrete contaminated by foreign materials.

.4 Place concrete in a continuous operation until an entire section is completed. Do not permit cold joints to develop.

.5 The maximum free drop of concrete shall be 1.2 m. In columns, walls, piers or abutments use suitable plastic "elephant trunks" to achieve drops in excess of 1.2 m and to control the rate of pour.

.6 In formwork for columns or walls over 3.6 m in height, provide openings spaced not further apart than 2.4 m vertically (and horizontally in walls) to permit pouring of concrete and insertion of vibrators.

.7 Allow 24 hours minimum before depositing concrete in beams or slabs supported thereon.

.8 In upstand beams, and similar details where concrete has to be placed to two or more stages and where the monolithic nature must be maintained, cast the upper portion as soon as the stiffening of concrete in the lower portion will permit. Minimise the accumulation of free water or laitance at the level of the joint by using, in the lower portion, concrete having a stiffer consistency than normal. Remove free water before the next layers of concrete are placed.

.9 Remove concrete spilled on to forms around hoisting equipment before depositing concrete in these areas. Protect membranes during placing of concrete over waterproof deck areas.

.4 Consolidation:

.1 Thoroughly compact concrete, during and after depositing, by spading and vibration to work the concrete around reinforcement and inserts so that the finished concrete is dense, uniform and free of air holes or honeycombs. Prevent segregation of the paste and aggregate.

.2 Use internal mechanical vibrators operating at a minimum frequency of 8,000 impulses per minute, fully immersed, to compact concrete. External vibrators may be used where adequate compaction is not possible using internal vibrators alone. The type and method of use of vibrators shall be to the approval of the Consultant. Maintain vibrators in good operating order.

.3 Apply the vibrator systematically and at such intervals that zones of influence of the vibrator overlap. Apply the vibrator at any point until the concrete is properly compacted, but not for such time that segregation will occur. Do not impel the concrete horizontally into place by means of vibrations.

.5 Protection:

.1 Unless adequate protection is provided and approval is obtained, concrete shall not be placed during rain, sleet or snow.

.2 Rainwater shall not be allowed to increase the mixing water nor to damage the surface finish.

.3 Refer to Section 3.6 for further protection requirements.

3.6 Curing and Protection

.1 Freshly deposited concrete shall be protected from premature drying and extremes of temperature and shall be maintained with minimal moisture loss at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete. Finishing and curing of horizontal surfaces are specified under Section 03 34 50.

.2 Initial Curing:
The concrete surface shall be kept continuously moist until the concrete temperature produced by the heat of hydration of the cement has peaked and dropped several degrees. This period will vary with the initial temperature of the concrete, the massiveness of the section, the ambient temperature, the type and quantity of cement, and the type and quantity of admixture used.

.3 Final Curing:
Immediately following initial curing and before the concrete has dried, additional curing shall be maintained for a period of time to ensure that the specified strength and quality can be obtained. Effective means shall be provided for maintaining the temperature of the concrete and all surfaces at not less than 10°C for five (5) days after placing. The concrete shall be kept above freezing temperature for a period of seven (7) days. When high Early Strength Cement is used the protection period may be reduced to two thirds (β) of the above stated time.

.4 Methods, Materials and Applications:

.1 Methods:
Curing, as required in Article 3.6.1, 3.6.2 and 3.6.3, shall be achieved using one or more or the following:

.1 Continuous sprinkling.

.2 Curing compounds.

.3 Other moisture-retaining methods as approved by the Consultant.
.4 Do not use curing compounds which are not compatible with applied Architectural finishes.

.2 Application:
Curing compounds shall be applied in such a way as to form a complete and unbroken film on the surface of the concrete and the form shall be protected so that it remains intact for the entire curing period. The rate of application shall not be less than that recommended by the manufacturer.

.3 Cure all high strength concrete with the application of a curing compound.

.5 Protection of Freshly Placed Concrete:

.1 Protect freshly placed concrete from the harmful effects of sunshine, drying winds, rain, cold or running water by use of adequate tarpaulins or other suitable materials.

.2 Protect concrete from damaging mechanical disturbances particularly load stresses, heavy shock and excessive vibration.

.3 Protect freshly placed concrete from defacement due to building operations.

.6 Protection of Completed Work:

.1 At all times during the work, protect exposed members, as required with polyethylene sheets or the like, from staining or becoming coated with concrete leakage, due to continuing concreting operations. Members which become coated may be classed as defective work by the Consultant.

.2 Protect exposed concrete from staining due to rusting of reinforcement projecting beyond construction joints.

.3 Take suitable measures to prevent spalling and cracking damage occurring to the structure due to water freezing in expansion joints, small holes, slots, depressions and the like.

3.7 Cold Weather Concreting

.1 Conform to the requirements of CAN3-A23.1 and ACI 306, except as varied herein.

.2 Where necessary before concrete placement is begun, provide on hand and ready for use, all equipment necessary for adequate protection and curing.

.3 Temperature at which protection is required:

.1 After the first frost until the mean daily temperature at the job site falls below 4°C for more than one day, protect concrete from freezing for not less than the first 48 hours after it is placed.

.2 When the mean daily temperature falls below 4°C for more than one day, place concrete at a minimum temperature of 13°C when deposited in forms. Maintain all surfaces of concrete at a temperature of 13°C minimum for 5 days after placing. Maintain concrete temperature above freezing for a minimum of 7 days.

.4 Do not use salts, chemicals or other foreign materials in concrete.

.5 Keep a record of the date, hour, outside air temperature and weather. Record temperatures at several points within the enclosure and on the concrete surface, corners and edges in sufficient number to show highest and lowest temperatures of concrete. Record maximum and minimum temperature readings in each 24-hour period.

.6 Preparation before Concreting:

.1 Before placing concrete, remove ice, snow and frost and raise temperature of surfaces coming in contact with concrete above 4 degrees C.

.2 Do not place concrete on a frozen sub-grade or on one that contains frozen materials.

.7 Protection:

.1 Obtain protection by use of adequate supplementary insulation, enclosing concrete surfaces with raised tarpaulins, or building a complete housing around concrete with provision for heating the housing when required.

.2 When outside temperature falls below -12°C during placing or during protection period, ensure that a complete housing of concrete work and supplementary heat is provided.

.3 When outside temperature falls below -5°C but not below -12°C during placing or during protection period, ensure that adequate enclosures of concrete work with tarpaulins or insulation are provided. Supplementary heat shall be used if directed by the Consultant.

.4 When outside temperature falls to -5°C during placing or during curing ensure that adequate enclosure of concrete work with tarpaulins or insulation is provided. Ensure that supplementary heat is available.

.5 Ensure that enclosures or housing are constructed reasonably tight and safe for wind and snow loadings.

.6 A method of insulating forms without supplementary heat may be substituted for protecting walls, columns, and slabs above slab on grade, if approved by the Consultant.

.7 Leave housing and enclosures in place for entire period of protection, except that sections may be temporarily removed as required to permit placing of additional forms or concrete provided the uncovered concrete is not permitted to freeze. Make up time lost from the required period of protection at the required temperature before protection is discontinued and removed.

.8 Insulate or enclose tie rods, reinforcement or structural steel which projects from the concrete being protected within the protective housing.

.9 Construct and place combustion type heaters and vent same, so that combustion gases do not come in contact with surfaces of fresh concrete.

.10 Keep adequate fire fighting apparatus close to the enclosure and easily accessible.

.8 Heating Units:

.1 Disperse heating units to avoid heating concrete locally or drying it excessively. Avoid high temperature and dry heating within enclosures.

.2 Maintain constant attendance to ensure safe, continuous operation of heating units during the protection period.

.3 Take particular care to maintain edges and corners of concrete at the required temperature owing to their greater vulnerability to freezing.

.4 At the end of the specified protection period, remove protection so that the drop in temperature of any portion of the concrete will be gradual and will not exceed 15 degrees C in 24 hours.

.9 Snow and Ice Removal:

.1 Do not use calcium chloride or other salts for the removal of snow, ice and frost from concrete surfaces, form, or reinforcing steel.

.2 Remove snow and ice with steam jets or other means approved by the Consultant.

.10 Slabs on Grade:

See Article 3.12 of this section for additional cold weather protection requirements for placing and finishing slabs on grade.

3.8 Hot Weather Concreting

.1 Conform to requirements of CAN3-A23.1 and ACI 305 except as varied herein.

.2 Use a set retarding admixture when the Consultant directs.

.3 Use means to maintain ingredients of concrete at as low temperature as practical. Keep stockpiles of aggregates moist and shaded from the sun. Do not use cement having a temperature above 25°C.

.4 Keep surfaces of conveying equipment and chutes cool and shaded from the sun before concreting. Spray with cool water immediately before concreting.

.5 Sprinkle forms and reinforcement with cold water immediately before concreting.

.6 Dispatch ready-mix trucks and organise the work to keep mixing time at the minimum. Minimise exposure of mixing trucks to the hot sun while waiting.

.7 Provide adequate personnel and organise the work to keep placing time to a minimum.

.8 Place concrete in thin layers and small areas so compaction of the concrete will ensure adequate union of adjacent portions.

.9 If surfaces set too rapidly or if plastic shrinkage cracks occur, keep concrete moist by a fog spray, wet burlap or other means. Suitable vibration, as long as the concrete will still become plastic under vibration, may be used to eliminate plastic shrinkage cracks.

.10 Provide continuous moist curing during the first few hours after placement and prevent alternate wetting and drying during the remainder of the curing period.

3.9 Removal of Forms

.1 Notify the Consultant of intention to strip forms, in advance of removal.

.2 The minimum strength of concrete in place for safe removal of soffit forms is 70% of the specified 28-day strength. The stripped member shall be of sufficient strength to carry safely its own weight together with superimposed construction loads.

.3 Do not disturb shores or forms supporting horizontal or inclined flexural members until approval to strip has been given. The Consultant's approval to strip forms will be based upon the results of the tests on concrete pull-out cylinders and on-site curing conditions. As a rough guide, 70% of the specified 28-day strength should be attained in 5 days in normal weather and 10 days in "cold weather".

.4 Strip column and wall forms before removal of shores beneath slabs or beams and strip slabs prior to removal of shores beneath beams.

.5 Side forms for vertical members may be stripped as soon as the concrete is sufficiently strong to stand unsupported, but not before 24 hours after concreting, unless otherwise approved by the Consultant.

.6 For High Strength concrete only, remove forms for column and vertical elements after 1 day to minimise rate of heat build-up. Provide protection to concrete when necessary to prevent thermal shock.

.7 Do not strip within one bay of a construction joint until new concrete beyond the construction joint has reached 70% of its specified 28-day strength and has been approved by the Consultant.

.8 Reshoring:

.1 Where reshoring is permitted or required, the operations shall be planned in advance and shall be subject to approval as per 3.1. While reshoring is under way, no live load shall be permitted on the new construction.

.2 Where forms are stripped from horizontal members before concrete has reached its specified 28-day strength, reshore the members so that they can safely support their own load plus construction loads. The reshores below a completed portion of structure, which are to support a portion of structure to be poured, shall be capable of safely supporting the dead load of the completed structure to be poured plus construction loads. Design and install reshores so that they are supported on members which can safely support the reshore load.

.3 Stripping and reshoring shall proceed simultaneously so as not to leave an area greater than 10 square metres unsupported by either formwork or reshoring at any instant. Install reshores tight to construction above and below so that they will not significantly shorten under load but take care not to preload the construction below or raise the construction above by over tightening.

.4 Reshore slabs immediately at intervals not over 3 m in each direction over their entire areas. In the case of one way slabs with spans less than 3 m, provide at least one line of reshores along the midspan.

.5 Maintain reshoring in place for 28 days or for such longer time as may be required to ensure that the concrete has reached its designated 28-day strength.

3.10 Footings

.1 A copy of the subsurface investigation data is available for review. See Section 01 01 00.

.2 Found footings on natural, undisturbed soil or sound rock, where applicable, capable of safely sustaining, within accepted limits of settlement, the design bearing pressure specified on the Drawings.

.3 The bearing strata at founding elevations shall be inspected and bearing values verified by the soil Inspector before any footings are placed.

.4 Keep a record of footing founding elevations.

.5 Construct footings in a particular are commencing from the lowest footing elevation and thence proceeding to the higher elevation.

.6 Form footing sides unless footings are shown to be poured against undisturbed soil or unless the Consultant permits otherwise.

.7 Ensure that water, disturbed soil or foreign matter is removed from footing excavations before placing reinforcing or concrete. Do not permit the soil at founding elevations to deteriorate due to the presence of water in the excavations, or construction activity.

.8 During cold weather, do not pour footings on frozen soil or soil which has been allowed to freeze and thaw. Ensure that frozen soil or soil that was frozen and thawed is removed.

3.11 Slabs on Grade

.1 Do not place concrete slabs on grade until underfloor drainage and the specified sub-floor material has been placed, inspected and approved. Do not place concrete on a frozen sub-grade, on one that has been frozen and thawed, or on one that contains frozen materials. If the sub-grade becomes frozen, remove affected material and replace with compacted granular fill.

.2 Maintain the sub-grade for a depth of 200 mm minimum below the sub-floor material at a temperature of 10°C minimum, when concrete is poured thereon. Ensure that the sub-grade below slabs on grade already constructed does not become frozen.

.3 Upon approval of the placement of the sub-floor material, place reinforcing as shown. Place and consolidate concrete and finish and cure as specified.

.4 Provide a layer of building paper between slabs and abutting adjacent construction.

.5 Saw-cut where indicated on Structural Drawings or at maximum 6000 mm c/c where not indicated. The width of the saw-cut shall be 6mm and shall have depth of one-quarter the slab thickness. Saw-cut as soon as it is practicable to work on the slab without tearing out the coarse aggregate.

.6 Construction joints may be provided in slabs on grade so that pours on any one day may be kept to reasonable sizes. Locate construction joints to the Consultant's approval. Use techniques to finish abutting pours at joints to eliminate "humping". If humping occurs grind the joint down level to the surrounding surface. Provide a reglet at joints of the approximate width of a saw-cut and fill the reglet as specified for saw-cuts.

3.12 Openings through Completed Members

.1 Do not cut openings or sleeves through completed members without the Consultant's approval. Where the location of openings or sleeves is approved, mark their position on each side of members to be perforated. In the case of slabs over 75 mm thick, cut 2/3 of the thickness by drilling from the top and remaining 1/3 by cutting from the bottom. Drill walls similarly from each side. Maintain the axis of the hole at right angles to the surface of the member unless directed otherwise by the Consultant.

3.13 Treatment of Formed Surfaces

.1 Immediately after stripping of forms, the bared surfaces of concrete shall be inspected by the Consultant. Do not proceed with repairs or surface treatment to concrete prior to the Consultant's inspection.

.2 Exposed surfaces including core walls and stairs shall have a smooth dense surface free from voids, fins, ridges and bulges. All form residue shall be completely removed and all form tie holes filled with non-shrink grout.

.3 Unexposed Surfaces:

.1 After the Consultant's inspection, remove or cut back to within 25 mm of the concrete surface bolts, ties, nails, or other metal not specifically required for construction purposes.

.2 Where no serious defects are revealed by the Consultant's inspection, cut out areas of moderate honeycombing to sound concrete. Saturate with water and fill with cement mortar of the same general composition as that used in the concrete.

.3 Where serious defects are found, such as large voids or extensive honeycombing, repair the defect as directed by the Consultant.

.4 Where the surfaces are to be plastered or similarly finished, remove fins, ridges and bulges, which would interfere with the application of the finish.

.5 Where vertical concrete surfaces are to receive capillary damp-proofing and water-proofing, remove all form ties with inserts, and chip back concrete 25 mm where form ties are without inserts.

.6 Make good openings left in concrete construction around rakers, and the like using a concrete of the same proportions as the surrounding work and reinforce same with mesh, as detailed on the Drawings. Openings left or cut for other trades shall be made good by this Section at the cost of the Section requiring the opening.

.4 Exposed Concrete Surfaces:

.1 Exposed concrete surfaces including but not limited to internal stairwell walls and interior circular columns shall have a smooth dense surface free from voids, fins, ridges and bulges. All form residue shall be completely removed. All offsets shall be levelled, and all voids and damaged areas shall be saturated with water immediately after stripping of forms, and

filled with bonded cement mortar mixture which should be brought to an even surface by means of a wood spatula or float.

.2 Bring surfaces to a smooth mortar finish by use of only sand, water and carborundum block. Produce a surface, which is perfectly straight, smooth, and free from marks, roughness, projecting lines and other defects.

3.14 Defective Materials and Workmanship

.1 Materials, or workmanship, which fail to meet specified requirements may be rejected by the Consultant whenever found at any time prior to final acceptance of the work, regardless of previous inspection. If rejected, defective materials, or work incorporating defective materials or workmanship, shall be removed and replaced or repaired to the satisfaction of the Consultant without unnecessary delay, at no expense to the Owner.

.2 Where the Consultant's inspection indicates that materials or workmanship may be below specified quality, he shall have the right to have tests performed or surveys made such as: tests on reinforcement, concrete core strength tests, analytical calculation of structural strength or load testing of the structural elements in question, in order to help determine whether the work need be replaced. All such testing or survey work will be made at the Contractor's expense regardless of their results.

.3 No corrections are to be made to surfaces of members which do not meet tolerance requirements, such as elevator walls or floor surfaces, without the Consultant’s approval.

.4 All testing shall be conducted in accordance with the requirements of the Ontario Building Code except where this would, in the Consultant's opinion cause undue delay or give results not representative of the rejected material in place.

End of Section 03300.

1 GENERAL

1.1 Section Includes

1. Preparation of concrete and application of repair materials.
2. Rehabilitation of concrete surfaces.
3. Repair of concrete internal reinforcement.
4. Replacement of existing damaged concrete topping (sloped to drains) over existing concrete roof decks and under flat-seamed copper roofing at the Administration Building.

1.2 Related sections

1. Division 01 of this Specification.

1.3 Price and Payment Procedures

1. The Payment quantity for concrete patch repairs will be based on an area measurement of the deteriorated concrete surfaces and linear measurement of cracks.

2. The Payment quantity for rebar replacement if required is for sections of reinforcing steel that are replaced due to extent of corrosion and concrete deterioration. Replacement to be authorized by Consultant in advance of work proceeding.

3. For pricing purposes, the following quantities are to be included in the base bid price.

   1) Concrete Patch repairs: 30 square feet

   2) Concrete Crack repairs: 30 linear feet

   3) Replacement of concrete topping sloped to drain (or gutters): 60 square feet

1.4 References

1. CSA-A23.1-04/A23.2-04 - Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

2. CAN/CSA-A3000-03 (2004) - Cementitious Materials Compendium.

3. ASTM C881/C881M-02 - Epoxy-Resin-Base Bonding Systems for Concrete.

4. ASTM C882/C882M-05e1 - Test Method for Bond Strength of Epoxy-Resin Systems used with Concrete by Slant Shear.

5. ASTM C884/C884M-98(2005) - Test Method for Thermal Compatibility Between Concrete and an Epoxy-Resin Overlay.

1.5 Submittals for Review

1. Section 01300: Submittals

2. Product Data: Indicate product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, and general recommendations regarding each material.

3. Areas to receive concrete repair are to be documented and mapped onto appropriate drawing format (plan, elevation, or reflected ceiling plan), clearly labelled for the type of repair required and submitted for consultant's review and verification.

1.6 Sealant:

.1 Colour samples

.2 1-foot mock-up in selected colour

1.7 Closeout Submittals

1. Section 01700: Contract Close-out
2. Accurately record actual locations and types of concrete repair and structural reinforcement (if required).

1.8 Quality Assurance

1. Perform welding work in accordance with CSA W59.
2. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years' experience.
3. Applicator Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented experience and approved by the manufacturer.
4. Design reinforcement splices under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at the place where the Project is located.

1.9 Delivery, Storage, and Protection

1. Section 01015: General Work
2. Comply with instructions for storage, shelf life limitations, and handling.

2 PRODUCTS

2.1 Concrete Repair Material

1. Patch Repairs - Mortar:
   - .1 SikaCrete-08 SCC self-compacting concrete for all form and pour applications. Upon written approval from Consultant, ready-mix concrete (35 MPa, 0.42 w/c, 5-8% air, 3/8 pea stone) may be substituted for this specified repair mortar.
   - .2 Where finished surface is exposed to view: King MS-S6 or King MS-S6 SCC, or an approved equivalent, colour matched to original concrete.
   - .3 For repairs less than 1 ½" thick, the Concrete Repair Mortar shall be SikaTop 123 Plus polymer modified fast-setting repair mortar.
   - .4 For repairs greater than 1 ½" thick, the Concrete Repair Mortar shall be SikaCrete-08 SCC self-compacting concrete.
2. Crack Repairs – Epoxy Resin:
   - .1 Injection adhesive: Two component epoxy resin bonding system conforming to the requirements of ASTM C881M, containing 100 percent solids, meeting the following requirements:
     - .1 Bond Strength: ASTM C882/C882M, 18.6 MPa
     - .2 Tensile Strength: ASTM D638, 45 MPa
     - .3 Elongation: ASTM D638, 2 percent at 7 days at 21 degrees C.
     - .4 Flextural Strength: ASTM D790, 45 MPa
     - .5 Compressive Strength: ASTM D695, 55 MPa

.6 Thermal Compatibility: ASTM C884/C884M

.2 Surface Seal:

Use materials to seal the crack faces that have the strength and adhesion to contain the injection adhesive in the crack during the injection process and while the injection adhesive cures and shall not leave a residue or damage the surfaces to which it is applied.

.3 Do not inject cracks that are less than0.13 mm or greater than 6 mm in width.

.4 Cracks wider than 6 mm are to be widened to 50 mm and treated as concrete patch repairs.

3. Replacement of existing Concrete Toppings sloped to drains or gutters - Mortar:

.1 Sika Level Patch, quick set patching mortar for all applications, ready-mix concrete.
.2 Sika Level Screed cementitious screeding and patching mortar.

2.2 Anti-Corrosion Coating and Bonding Agent

1. SikaTop Armatec 110 EpoChem, or approved equivalent, shall be used as both an anti-corrosion coating for exposed reinforcing steel and as a bonding agent between existing and new concrete materials.

2. Anti corrosion coating to be used with King products: BASF MasterProtect P8100AP.

2.3 Sealant

1. Polyurethane sealant, such as Dymeric 240FC by Tremco Inc. or approved alternate.

3 EXECUTION

3.1 Examination

.1 Verify existing conditions before starting work.
.2 Verify that surfaces are ready to receive work.
.3 Beginning of installation means acceptance of existing surfaces.

3.2 General

.1 Protect all existing property, equipment and fixtures from damage resulting from these operations.
.2 Inspect all surfaces prior to commencement of work and report to the Consultant any deficiencies in the surface that render it unsuitable for proper execution of this Work.
.3 Identify all unsound concrete using hammer-sounding and mark the areas with chalk for review by Consultant.
.4 Design & install shoring as required to provide a safe work environment and preserve the structural integrity of the stair and adjacent structures during repair and curing.

3.3 Concrete Repair Mortar – Patch Repairs

1. Preparation

.1 Existing concrete surface coatings at all areas included in contract shall be removed using dry abrasive blasting.
.2 Abrasive blast cleaning shall only be permitted when concrete and reinforcing steel are surface dry.
.3 Areas and components not designated for abrasive blast cleaning shall be protected from adjacent blast cleaning operations.

.4 Immediately after abrasive blast cleaning is completed, the surface shall be checked to identify the presence of fractured or loose aggregate beyond those areas previously identified on drawings.

.5 Abrasive blasting shall be of an extent to fully remove all existing coatings, dirt, and laitance, and provide surface profile in accordance with manufacturer's requirements.

.6 Saw cut the perimeter of approved areas to a depth of ¾". Do not saw-cut outside the areas identified for removal.

.7 Do not cut any existing steel reinforcing that may be discovered during the concrete removal process. Inform consultant for further review.

.8 Remove concrete within the identified areas to a uniform depth.

.9 Minimum removal depth shall provide 1" clear space around all exposed reinforcing steel.

.10 Remove additional fractured or unsound concrete, following review of repair areas by Consultant.

.11 Remove additional concrete, as directed by Consultant, to expose reinforcing steel free of corrosion. A minimum of 4" 'clean' reinforcing steel must be visible at the perimeter of all repair areas.

.12 Remove and dispose of all concrete removed.

.13 Feather edging shall not be permitted.

2. Application

.1 Dampen all prepared surfaces to ensure that the surface is saturated surface dry.

.2 Apply anti-corrosion bonding agent at minimum 0.5mm thick, using a paintbrush, roller or suitable spay gun. Work bonding agent well into the substrate to ensure complete coverage over surface irregularities.

.3 Place the Concrete Repair Mortar prior to the bonding agent drying. If agent dries, re-apply bonding agent as per manufacturer's instructions – re-tempering is not acceptable.

.4 Concrete placement shall be by hand trowel application where possible and where required by formwork and pour or pump. Work concrete against the edge of all repairs. Level surface using a wood or sponge float and finish flush with original slab profile. Finish concrete surface once the surface stiffens.

.5 Cure concrete as per manufacturer's written instructions including continuously moist curing for a minimum of 2 days.

3.4 Epoxy Resin – Crack Repairs

1. Preparation

.1 Clean existing concrete surfaces by means of abrasive blast. Identify cracks to be injected and notify Consultant for review.

.2 Drill 9.5 mm injection holes at an angle of 60 degrees to intersect the crack section at approximately the mid-point. Drill hole spacing shall not exceed the thickness of the concrete panel or bulkhead being injected and shall not exceed 300 mm under any condition.

.3 Remove dust and drilling debris from drilled holes using compressed air nozzle.

.4 Install 9.5 mm plastic injection packers complete with metal fittings in accordance with supplier's instructions.

.5 The crack shall be flushed with an air-water mixture or an alternating water and air flush to remove all deleterious material prior to the injection of grout. The flushing material shall be injected throughout the injection port and continued until it exudes from the adjacent injection port and the crack is thoroughly cleaned. This flushing shall proceed from one

end of the crack to the other. A final flush shall be made with air only to remove all the free water.

.6 Seal the surface opening of the cracks prior to injection, in accordance with the recommendations of the manufacturer of the epoxy resin. The surface sealing material shall withstand the maximum injection pressure without developing leakage along the crack section. Surface sealing shall not commence until at least one hour after the final air flush.

2. Application

.1 Inject epoxy into cracks using automated injection equipment suitable for the product in question. Injection hoses shall have a rated working pressure equal to or greater than the maximum pump operating pressure and shall be equipped with a calibrated gauge at the injection port end. Ensure that pressure gauges are properly calibrated before commencing each major section of the work.

.2 Injection shall proceed from the lowest elevation of the crack and continue from port to port without interruption to the other end of the crack. The injection nozzle shall not be moved to the adjacent injection port until there is a showing of grout at the adjacent injection port, or the current port refuses further epoxy injection.

.3 While under pressure, each injection port shall be sealed off immediately after completion of injection at that injection port.

.4 If a maximum operating pressure greater than 3 MPa is required, the injection operation shall cease until the Contractor determines why this operating pressure is required.

.5 After epoxy has cured, grind off the excess sealing material on walls and remove all injection ports. Patch wall surface, Concrete Repair to create a smooth seamless surface.

3.5 Replacement of existing damaged, cracked or deteriorated sloped concrete toppings

1. Preparation

.1 Remove as found fractured, deteriorated, spalled or otherwise unsound concrete. Dispose of all concrete removed.

.2 Clean existing concrete substrates to remain thoroughly.

2. Application

.1 Dampen all prepared surfaces to ensure that the surface is saturated surface dry.

.2 Place the Concrete Repair Mortar prior to the bonding agent drying. If agent dries, re-apply bonding agent as per manufacturer's instructions – re-tempering is not acceptable.

.3 Concrete placement shall be by hand trowel application where possible. Work concrete against the edge of all repairs. Slope surfaces o drains or gutters using a wood or sponge float and finish flush with original slab profile. Finish concrete surface once the surface stiffens.

.4 Once application of Sika Level Patch is complete apply Sika Level Screed cementitious screeding and patching mortar. Ensure top surfaces are smooth and even.

.5 Cure concrete as per manufacturer's written instructions including continuously moist curing for a minimum of 2 days.

3.5 Reinforcing Steel Preparation – if required

.2 Remove all corrosion products from exposed reinforcing steel by use of appropriate mechanical tools or pressure blasting.

.3 Apply two coats of anti-corrosion coating product to the exposed reinforcing steel as an anti-corrosion coating. Application to follow manufacturer's written instructions including coating thickness and re-coating time.

.4 Where concrete removal results in 'freeing' a complete section of reinforcing steel or corrosion has resulted in a 'loss of section', replace the reinforcing steel with new reinforcing steel to match.

3.6 Sealant Installation

.1 Grout all cracks on the parapet walls and other vertical surfaces at roof level (both sides) in a "V" configuration, minimum of ½" wide by ½" deep, or at a ratio of 1:1.

.2 Remove existing sealants in joint cavities and clean surfaces to remove residue. Rout any new joint cavities scheduled for new sealant. Sandblast or shot blast all joint cavities scheduled for new sealant and blow clean with oil-free and water-free compressed air within 24 hours of sealant installation. If approved by the Engineer in advance joint cavities may be prepared by abrasive wheel (zec wheel) cleaning in lieu of sandblasting or shot blasting.

.3 Prepare all surfaces intended for new sealant.

.4 Install sealant with a concave joint pattern, flush with adjoining surface beneath.

.5 Modify the depth of existing joints by additional routing or positioning of backer rod to maintain a width to depth ratio of 2 to 1 unless otherwise noted on the drawings.

.6 At no location is the sealant width allowed to exceed 1".

.7 Remove existing failed and deteriorated sealant. Reinstall new sealant where existing sealant is removed.

.8 Where necessary, square up joint edges and execute repairs with epoxy repair mortar in accordance with manufacturer's recommendations

End of Section 03900

1 GENERAL

1.1 Summary

1. This section to conform to Division 1, General Requirements.

2. Section Includes
General: This section describes the general standards and requirements applicable to all related sections of work.

1.2 Related Work Specified Elsewhere

1. Mortar and Grout: Section 04100
2. Specialty Restoration Mortar: Section 04101
3. Masonry Accessories: Section 04150
4. Stone Supply: Section 04420
5. Masonry Restoration: Section 04500
6. Stone Conservation: Section 04501
7. Masonry Cleaning: Section 04510
8. Limestone Paving: Section 04540

1.3 References

1. The following general standards apply to all work carried out in this and related sections.

.1 CSA A179M-1994: Mortar and grout for unit masonry.

.2 CAN3-A371-1994: Masonry Construction for buildings.

.3 CAN3-A370-1994: Connectors for masonry.

2. Additional material standards as relevant are referenced in related sections.

3. Definitions as relevant are referenced in related sections.

4. CAN/CSA – A82.1 – M87: Burned Clay Brick

1.4 Scope and Intent of Work

1. Work in this section involves the conservation, restoration, and repair of existing historic masonry.

2. The intent is to carry out the work described herein in accordance with established procedures for historic masonry conservation, to the highest levels of workmanship and standards. See Section 01015 References for guidelines.

3. The intent of conservation is to preserve wherever possible the character and materials of the buildings and not to restore the building facades to their original pristine condition.

4. Provide all labour, material and equipment and perform all operations required to carry out all masonry work as described herein, as described on the drawings, or as required for the proper completion of the work.

5. Fully co-ordinate work with that of other trades and other masonry contractors.

1.5 Sequence of Work

1. The work shall be carried out in the following sequence:

.0 Mobilization and Temporary Works
.1 Masonry Cleaning.
.2 Cutting out all mortar joints.
.3 Consolidation.
.4 Cutting of reglets.
.5 Dressing back of masonry.
.6 Grouting.
.7 Backpointing.
.8 Repairs and replacement in stone.
.9 Final pointing.
.10 Remaining repairs to exterior.
.11 Final building clean down.

1.6 Submissions

1. Samples

Submit samples of all materials to be used in the work, including:

.1 One of each type of masonry accessory specified.

.2 One of all mortar constituents in 500 ml plastic container with screw top lid and with contents clearly marked.

.3 Sieve analyses from approved testing company of custom blended aggregate containing mortar sand, stone and brick dust.

.4 Two samples of each type of stone, 200 mm x 100 mm x 50 mm with direction of bedding marked.

.5 One of each type of cleaning material specified in 250 ml containers with safety screw caps where appropriate and with contents clearly marked, with WHMIS information on the container.

2. Mock-Ups

.1 Prepare mock ups of the following items of work:

i Raking out of mortar, 4 lineal metres to existing brick masonry to include horizontal and vertical joints.
Ii Raking out, 4 lineal metres to existing cut sandstone, to include horizontal and vertical joints.
iii Repointing, 2 lineal metres to existing brick masonry.
iv Repointing, 2 lineal metres to existing cut sandstone.
v Cleaning, 1m^2 panel for each type of cleaning technique specified, on different substrates and representative of full range of soiling or stain.

.2 Samples shall be repeated until satisfactory results are obtained to the satisfaction of the Architect.

.3 Approved mock-ups shall form the standard for the method and quality of work to be performed throughout the project.

.4 All mock-ups shall be prepared in the presence of the Architect.

3. Other Submissions

.1 Submit manufacturers literature for all products.

.2 Submit details of all tools, machinery and equipment required to complete the work. Remove rejected items from site.

.3 Submit shop drawings and mock-ups in accordance with the requirements of Section 04420 Cut and Carved Stone Supply.

.4 Submit sequence and installation procedure for all cut stone replacement

.5 Laboratory Testing: Submit laboratory tests for proposal clay brink masonry supply, to also include for initial absorption rate in data submittal. Follow Section 01410 for other procedures.

.6 Record Drawings: at the completion of the project provide accurately and professionally drawn record drawings describing aspect of the work identified in the relevant technical sections. Blank elevations will be provided at an appropriate scale. Final drawings will be in an approved electronic format. Follow Section 01700 for other procedures.

4. Approvals

.1 Approval of samples, mock-ups and submissions shall be made in writing by the Architect.

1.7 Qualifications

1. Provide competent trade foreperson, well skilled and experienced in the specialized type of work required, for continuous supervision.

2. Provide demonstrated, specialised, skilled and competent trades persons who shall have considerable experience in this type of work.

.1 The skills of individuals will be subject to review and acceptance by the Architect.
.2 Review will include production of basic mock-up.
.3 Proposal masonry tracks will fill out a Canadian Standard Form at Contractor's Qualification Statement (Building Construction Document No.11):

1. Name, location and description of firm and plant facilities.
2. Indicate annual sales volume and year of incorporation of the firm.
3. Three references with contract information and phone number.
4. Names, qualifications and experience of all senior tradesmen allocated to this project who will be carrying out the work specified.
5. Name, location, photographs, description and contract value of three related projects undertaken within the last three years.

3. Provide a list of the proposed workers a minimum one week prior to commencement of the work and include for each person their training experience and list of related projects.

4. No workers shall be changed during the progress of the work without written acceptance by the Architect.

5. All workers shall be required to demonstrate competence levels to the satisfaction of the Architect, before being permitted to work on the building.

6. Competency levels shall be required for the following:

.1 Cutting out of mortar joints
.2 Backpointing and final pointing
.3 Cutting out of stone
.4 Dutchman repairs
.5 Replacement of stone
.6 Mortar repairs
.7 Conservation procedures

7. Only individuals meeting competency levels shall be permitted to work on this project.

8. The contractor shall replace all workers not meeting satisfactory standards.
9. The standard of competency to be met or exceed shall be, where appropriate, previous work carried out on the building, or the highest levels of competency available within the restoration industry.

1.8 Product Delivery, Storage and Handling

1. Deliver materials to job site in dry condition.

2. Store all materials on pallets held off the ground by means of planks or timber skids and protect with waterproof non-staining covers.

3. Maintain all materials in dry condition until use, except where specified otherwise.

4. Remove contaminated or 'out of date' materials and replace at no cost to Owner.

1.9 Environmental Requirements

1. Cold Weather Requirements

.1 No masonry work shall be carried out when air temperatures fall below 10°C, unless the following provisions are made.

.2 When air temperatures fall below 10°C, provide a weathertight, heated enclosure in which to carry out work, store all materials and mix mortars, and, in which the air temperature is maintained above 10°C. at all times.

.3 Maintain these conditions for a minimum 4 weeks following completion of any masonry work, which ever is greater.

.4 Do not remove heat or enclosure where masonry is not thoroughly dried out. Request and obtain permission of architect before removing heat or enclosure.

.5 Maintain minimum/maximum thermometers and relative humidity gauges on site and in all enclosures and maintain a daily record of temperature and humidity. Follow the guidelines below for work at various temperatures.

2. Hot Weather Requirements

.1 When wall surfaces or ambient temperatures reach 25°C protect new work from rapid drying by providing damp burlap protection kept misted as necessary to control drying and shrinkage and covered with polyethylene tarpaulins to control rapid evaporation.

3. Transportation, Use and Disposal of Chemical Materials

.1 Comply with the requirements of the following Federal and Provincial Legislation related to the transportation use and disposal of all chemical type of materials and all revisions and any other relevant legislation as applicable to this work.

i Federal Transportation of Dangerous Goods Act.
ii Ontario Regulation number 309 Liquid Industrial and Hazardous Waste Regulation.
iii All such waste shall be carried by an approved Ministry of the Environment Haulage carrier and disposed of at a Ministry of the Environment approved receiving facility.

4. Removal of Existing Pointing Mortar

.1 Attention is drawn to the fact that significantly substantial quantities of silica exist in the existing pointing mortar, classifying it as a hazardous material.

.2 The contractor shall be responsible for all testing of the existing mortar and to determine the requirements for its containment, collection, safe removal and the health and safety of the building occupants, site operatives, and other trades.

.3 The contractor shall comply with current and proposed legislation to provide protective clothing, breathing apparatus, and all other necessary measures. The Contractor shall ensure all operatives are fully informed of the hazards, and trained in required procedures, prior to commencing work.

.4 The contractor shall ensure that their operatives wear and maintain this equipment and follow all necessary procedures at all times when involved with such hazards.

.5 The contractor shall be responsible for the containment of all existing mortar waste on the scaffold lift where removed and shall be responsible for its removal from each scaffold lift and the ground level on a minimum daily basis.

.6 Maintain and be responsible for continuity of adequate protection at ground level around the building, to prevent leaking of toxic materials into the soil.

.7 Provide secure and clearly marked containers for hazardous waste.

.8 Fine dust from various masonry procedures may drift into the building through cracks in the masonry or at window openings causing potential health risks to occupants. Take all necessary steps to prevent this occurrence and cease activity until corrective action has been taken, e.g. install 6 mil polyethylene with non-staining tape.

.9 The Contractor will provide one unfurnished trailer at the site for workers to change in and out of clothing. Reference Section 01590.

1.10 Protection

1. Keep masonry dry using waterproof, non-staining coverings that fully protect new work from wind driven rain, until masonry work is complete and protected by flashings or other permanent construction.

2. All completed or existing work shall always be protected from damage, marking and mortar droppings. Maintain non-staining coverings until completion of work.

3. Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

4. Refer to additional protection requirements in relevant sections.

1.11 Access

1. Access to all surfaces to be provided by scaffolding contractor to enable proper work supervision and inspection to be carried out.

2 PRODUCTS

2.1 Materials

1. Materials are specified in related sections.

3 EXECUTION

3.1 Protection

1. Protect surrounding property, monuments and site fixtures from any overhead work occurring on the exterior masonry walls.

2. Remove disparate or non-functioning wall accessories judged to be in impedance of performing the work.
3. Provide temporary wood framing and plywood protection at all windows within the area of masonry work to occur, and within all walls scaffolded.

4. Work that has been completed shall be covered, tarped and protected from the actions of adjacent masonry walling work.

3.2 Cutting Out

.1 Set cut-outs for plastic repairs square and perpendicular to building planes.

.2 Under no circumstances are the existing joints to be widened.

.3 Take great care so as not to damage or dislodge adjacent masonry units. Any units damaged or dislodged during cutting out or rebuilding operations must be repaired, rebuilt, or replaced at the Contractor's sole expense in a manner acceptable to the Consultant**.**

1. Damage includes nicks, scoring, deep scratches, chipped edges or the like that are, in the opinion of the Consultant**,** caused by neglect or lack of proper care by the workers in carrying out the specified requirements of this contract.
2. Stone chips and shards caused by cutting out work must be immediately epoxy repaired at no extra cost to the Owner.
3. Procedure for epoxy repair of stone shards and chips is described in Section 04500 - Masonry Restoration.

4. Cutting-out operations are to be carried out using only the following specified methods:

5. Hand Chiselling:

.1 Perform cutting-out by hand chiselling with proper tools appropriately sized for the joint.

6. Hand Sawing:

.1 Joints under 3 mm are to be sawn-out by hand using hacksaw blades.

7. Electric Drills:

.1 Hole fillings are to be removed using sharp masonry drill bits.

8. Rotary-grinders:

.1 Joints may be partially cut-out by sawing with hand held mini-grinders utilising 115 x 1.6 mm (4-1/2" x 1/16") carborundum or diamond-tipped blades.
.2 Saws may be used only to score one cut down the centre-line of each horizontal joint. Do not saw out vertical joints in brickwork or small masonry units that are less than 150 mm in height.
.3 For deep cutting-out of wide Portland cement mortar joints (over 10 mm in width) a 9" x 1/8" rotary grinder wheel may be used to widen and deepen the initial mini-grinder cut . Only one cut down the centre of the joint is permitted. Vertical joints may not be cut using this method.
.4 Final cutting-out of the mortar in the joint is to be done by snapping the mortar edges from the masonry with sharp bolsters and raking out the remaining mortar using hand or pneumatic chiselling tools.
.5 Individual workers are to be restricted to one-half hour of cutting-out using rotary grinders per four (4) hour work segment to reduce fatigue and resultant error.

9. Pneumatic Chisels:

.1 Provide small hand-held pneumatic carving tools such as the "Barre" type manufactured by Trow & Holden.
.2 Provide a range of points and claws suitable for the project. All tools are to be hard and sharp.
.3 Provide sharpening, and rehardening and tempering of tool points, on a daily basis to ensure sharp, hard tools are used at all times.
.4 Equipment is to be fitted with remote stopcock air controls on the air supply line within 600 mm of the tool. Integral trigger type equipment is not to be used.
.5 Compressed air is to be clean and free from oil or any other contaminants.

3.3 Masonry Installation

.1 Laying Masonry Units

1. Tie back full headers into backup on each course. Build masonry columns solid in the bond patterns shown.
2. Fully tie back the units into adjacent masonry every 600 mm horizontally.
3. Lay units in a full bed of mortar, plum, level and true to line. Spread mortar in a thick uniform layer with shallow centre furrow; butter ends of the units at back, front and top and shove into place. Provide ample mortar on ends of units to completely fill vertical joint without slushing. Tap units into line until plumb and level.
4. Completely fill joints with mortar. This is a mandatory requirement. If inspection reveals that this requirement has not been met, the complete masonry panel, partition or wall wherein the omission occurs shall (if so instructed by the Consultant) be pulled down and rebuilt in accordance with this specification at no additional cost to the Owner.
5. Strike off excess mortar flush with faces on all sides unless shown otherwise on the drawings.
6. Accurately execute all cutting, fitting, internal and external corners and built-in work. Close ends of brickwork with full units. Use king-closers to achieve accurate horizontal dimensions. Do not use queen-closers.
7. Infill existing openings in masonry work, tooth-in at edges. Build solid with masonry.
8. All existing walls are load-bearing masonry.

3.4 Repointing

.1 Initial Jointing:

1. Fill joints with mortar and compact with suitable jointer to provide a flat, dense and uniform joint. Pay particular attention to the interior and exterior corners of the masonry.
2. Fill joints in lifts to a maximum of 20 mm.
3. After initial set of mortar (thumb-nail hard) rake back the mortar to the specified depth.
4. Strike flush all joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint, waterproofing or similar thin finish coating.

.2 Tamping:

.1 After initial hardening of the raked-back mortar vigorously tamp the joints with a suitable short-handled, dense brush or wooden tool to compact the joint and eliminate initial shrinkage cracks.
.2 All joints must be tamped to ensure no voids are left behind the mortar and a full bond to the backup material is achieved.

.3 Curing: Provide damp curing of completed joints for three (3) days after installation.

.4 Protect masonry joints from washdown water and precipitation until fully cured.

3.4 Cleaning

.1 Ensure mortar droppings, stone shards, and general masonry dust is cleaned from the completed masonry wall after work of this section is completed.

.2 Coordinate with section 04510 Masonry Cleaning.

.3 Remove residual staining and efflorescence which becomes visible adjacent to rebuilt masonry by initial dry brushing and vacuuming

End of Section 04050.

1 GENERAL

1.1 Summary

1. This section to conform to Division 1, General Requirements.

2. Work Included in this Section:

The preparation and supply of mortar for all masonry work.

1.2 Related Work Specified Elsewhere

1. Masonry Procedures: Section 04050
2. Specialty Restoration Mortar: Section 04101
3. Masonry Accessories: Section 04150
4. Cut Sandstone Supply: Section 04420
5. Cut Limestone Supply: Section 04430
6. Masonry Restoration: Section 04500
7. Masonry Cleaning: Section 04510

1.3 References

1. Do masonry work to CSA A179M-1976 except where specified otherwise.

1.4 Submissions

1. Submit samples, and obtain approvals as specified in Section 04050, Masonry Procedures. Submit the following:

.1 Dried 100 mm diameter mortar patties, 20 mm high, for colour match and testing.
.2 Dried 50 mm cubes for testing.
.3 Submit three samples of each type of mortar prepared, dated and labelled as to batch and mortar type.
.4 Submit 50 mm cubes for testing as requested throughout the job. Approximately 20 samples may be requested. Where testing determines samples do not meet those approved, additional cubes will be required to be submitted at no cost to Owner.

2 PRODUCTS

2.1 Materials

1. Water: potable, clean and free from contaminants.

2. Aggregates:

.1 Sand: to CSA A82.56M, [Aggregates for Masonry Mortar] sharp, screened and washed pit sand, free of any organic material, grading and colour to approval of architect as follows:

1. Provide custom blended sand conforming to the following sieve analysis for joints in excess of 8 mm wide:

Sieve Size retained on each sieve	Percentage by Weight	Percentage by weight passing each sieve
No. 4 (4.75 mm)	00	100
No. 8 (2.36 mm)	10	90
No. 16 (1.18 mm)	20	70
No. 30 (600 microns)	20	50

No. 50 (300 um)	20	30
No. 100 (150 um)	15	15
No. 200 (75 um)	15	0

2. Provide custom blended sand conforming to the following sieve analysis for joint less than 8 mm wide:

Sieve Size retained on each sieve	Percentage by Weight	Percentage by weight passing each sieve
No. 4 (4.75 mm)	00	100
No. 8 (2.36 mm)	00	100
No. 16 (1.18 mm)	10	90
No. 30 (600 microns)	20	70
No. 50 (300 um)	30	40
No. 100 (150 um)	25	15
No. 200 (75 um)	15	0

.2 Stone Dust: Black granite dust, grey sandstone dust ground to pass 600 micron sieve.

.3 Hydraulic Lime: Fresh hydraulic lime, finely ground, moderately hydraulic. Acceptable product: Riverton air entrained hydraulic lime, available from Liner Rolpanit.

.4 Lime: Hydrated, high calcium non-hydraulic lime.

.5 Pozzolan: Fresh Metakaolinite reative pozzolanic powder. Acceptable product: Metastar, available from Liner Rolpanit.

.6 Admixture for Colour: inorganic pigment, dry powder, mineral oxide type, as manufactured by Harcross Pigments Canada, Toronto, Ontario. Provide custom blended pigment as required, to match mortar to both grey and buff sandstones.

2.2 Sources

1. Use same manufacturer brands and suppliers for sources of mortar materials for entire project.

2.3 Equipment

1. All lime putty based mortars are to be prepared in a mortar mill comprising a mortar pan with adjustable cast iron sprung rollers on a cranked roller shaft and will steel scrapers and blades. Acceptable equipment: Rolpanit roller pan mixer by Liner Rolpanit [North American] Inc., or approved equal.

2. All mortars prepared from dry ingredients may be mixed in paddle mixers.

2.4 Grout Mix

1. Grout: One tenth part Metastar, one part hydrated lime, three parts fine sand, and from 5 to 7 parts water depending on viscosity required; all by volume.

2.5 Back-Pointing, Bedding, Pointing and Repair Mortars

1. Mortars are based on the proportion specifications of CSA A179M-1976, .

2. Mortar for bedding and backpointing stone: one part Metastar, three parts hydrated lime and nine parts aggregate.

3. Mortar for pointing stone generally: one part Riverton air entrained hydraulic lime; one tenth part hydrated lime and three parts aggregate. Where a light buff colour mortar is required, prepare using a buff coloured sand. Where a colour mortar is required, prepare using an aggregate blend comprising

of buff sand blended with the coloured stone dust, black granite dust and not more pigment than 10% of the hydraulic lime content.

4. Total aggregate portion of mortar mixes shall conform to the grading above. Where aggregate portion is a blend of sand, stone dust, and pigment this blend shall also conform to the grading above.

5. Repair mortars for carrying out mortar fills to existing stone: refer to Section 04900, Stone Conservation.

3 EXECUTION

3.1 Preparation of Grout

1. Prepare grout in quantities that can be used in 30 minutes only.
2. Prepare grout by thorough mixing to fully blend constituents to form a pouring consistency grout.
3. Keep stirring at regular intervals throughout use until grout is placed to prevent settling of solids.
4. Strain mix through sieve (maximum No. 50/300 microns) to remove solids that would impede pouring and filling of voids.
5. Use grout within 30 minutes of initial mixing.
6. Discard all grout mixed beyond 30 minutes.

3.2 Preparation of Mortars

1. Preparation of Hydraulic Lime/Aggregate Mortars:

.1 Prepare masonry boxes and equipment as for all mixes.
.2 Prepare blend of aggregates and pigments as determined previously.
.3 Thoroughly blend the materials dry in a paddle mixer, gradually adding the hydraulic lime and non hydraulic lime to ensure its complete and even distribution throughout the mix.
.4 Add small measured quantities of water, mixing for approximately 3 minutes after each addition of water. Mix lime putty and sand thoroughly in mortar mill for a total of 5 more minutes once the correct water content is reached.
.5 Add just sufficient water to produce a plastic mortar that will hang on the trowel.
.6 Allow mix to sit for 15 minutes then re-mix for a further 5 minutes
.7 Use within one hour. Do not re-temper.

2. Bulking of Sand and Aggregates:

.1 Bulking is the increase in volume of dry sand when it becomes damp.

.2 Damp sand can occupy as much as one-third more volume than either dry or saturated sand.

.3 Damp sand can be used, however, if its volume is adjusted for bulking.

3. Test and Adjustment of Sand Quantities for Bulking:

.1 Test sand to be used in mortar for bulking at the start of the work, after each new delivery of sand and any severe change in weather.
.2 Obtain a sample of sand which accurately reflects the average condition of the pile of damp sand, by the following methods:

1. Take 4 shovelfuls of sand, each from a different level of the pile, and mix thoroughly.
2. Place this sand in a conical pile and divide into 4 quarters with a board. Remove 2 opposite quarters from the pile, and combine the 2 remaining quarters and mix thoroughly.
3. Repeat this quartering and mixing procedure until a sample of the size required for testing remains.

.3 Fill a 1-litre capacity jar, about two thirds full with the damp sand to be tested. Drop the sand in loosely. Do not pack it in. Level off the surface, then measure the depth of the damp sand (D).

.4 Empty the sand into another container, being careful not to lose any, and half fill the first container with water.

.5 Pour back about half of the test sample of sand slowly into the water so that it is entirely saturated. Rod it thoroughly to remove any air.

.6 Add the rest of the sand, rodding again to remove, and level off the surface. Measure the depth of the saturated sand (S), which will be less than the depth of the damp sand.

.7 Calculate the percentage bulking, using formula: (D-S) x 100%/S = percentage bulking; where D = depth of damp sand, and S = depth of saturated sand.

.8 When batching the sand for use in mortar, increase the volume of the sand used by the percentage bulking shown in the test. For example, if the mortar mix is a standard 1:1:6 mix requiring 6 parts of sand and the percentage bulking is found to be 20%, the volume of sand used in the mortar should be: (6 x 12)/100 = 7.2 parts. To adjust for bulking, the actual mortar mix will therefore be 1:1:7.2 when this same damp sand is being used.

4. Preparation of Coarse Stuff:

.1 Prepare measuring boxes to ensure accurate proportioning of lime putty and aggregates.

.2 Take lime putty from bins, siphon off water by screening lime through muslin to remove excess water.

.3 Adjust aggregate for bulking as described above.

.4 Mix lime and sand thoroughly in paddle type mechanical mortar mixer for minimum 10 minutes. Do not add water.

.5 Lime sand coarse stuff may be stored indefinitely if protected from air by storing in plastic air-tight bins.

5. Gauging of Coarse Stuff with Setting Aids [Hydraulic Lime, Pozzolan, Cement] and Pigments:

.1 Rework coarse stuff to regain workability prior to gauging with setting aids as follows:

1. Remix in the mixer for 10 minutes and continue further beating, ramming, and chopping by hand, ensuring thorough mixing to produce stiff workable mix. DO NOT ADD WATER.
2. Add mortar colouring additive and ensure thorough mixing with coarse stuff.
3. Slurry setting aid where required to prevent “balling” and add the coarse stuff. Mix thoroughly for minimum five minutes to produce workable, plastic mix, just wet enough to allow the mortar to hang on a trowel.
4. When gauging a setting aid with the coarse stuff the volume of coarse stuff is always equal to the total aggregate content, not the sum of the lime and aggregate. Thus a mix of 1 part setting aid to 3 parts lime and 9 parts sand will be gauged used 1 part setting aid to 9 parts of coarse stuff.

.2 Measuring boxes are to be maintained for all mortar constituents.

.3 Measuring container is to be maintained for the correct quantity of water for use in all batches.

.4 Thoroughly clean all mortar boards, measuring boxes and mixer between batches.

.5 Use mortar within two hours and without tempering. Tempering mortar will result in colour change where pigments are used.

3.3 Mortar Colour

1. Prepare samples as described in Section 04050 for approval.

2. Mortars are to be prepared to match the colour of the grey and buff stones i.e., two distinct mortar colours.

End of Section 04100

1 GENERAL

1.1 Summary

1. This section to conform to Division 1, General Requirements.
2. Work Included in this Section:

    1. The intent of this section is the repair and reconstruction of stone details which have been damaged. It is important that the final work match as closely as possible the colour and texture of the existing stone.

    .2 The scope of work is as follows:

        .1 The cutting out and repair of stone with proprietary mortar patching material.
        .2 Existing stone to be repaired by this method shall be Queenston Limestone.
        .3 Application of a sacrificial render to existing limestone to draw out efflorescence over a period of several months.

1.2 Related Work Specified Elsewhere

1. Masonry Procedures: Section 04050
2. Mortar and Grout: Section 04100
3. Masonry Accessories: Section 04150
4. Masonry Restoration: Section 04500

1.3 Submissions

1. Comply with the requirements of Section 04050, Masonry Procedures.

2. In addition, comply with the following additional requirements and submittals to prevent delay of work and to allow for review and approvals:

    .1 Samples of all specified materials together with relevant materials safety data sheet (M.S.D.S.).

    .2 Colour matched samples are to be prepared for each type of repair condition.

    .3 Colour matched samples may be submitted on off-cuts or matching stone but final acceptance will be given against samples prepared on the building.

    .4 Prepare samples where they will be exposed to the same conditions as on the building. Fully cure for a minimum of 3 days.

    .5 Accepted samples shall form the standard and quality of work, including colour for the entire project.

    .6 Record Drawings: Provide record drawings of completed masonry work accurately showing the location and extent of the following:

        1. Parging removals
        2. Mortar fills
        3. Plastic repairs and reinforcement.
        4. Shard repair of fractured units
        5. Crack repairs
        6. Sacrificial Renders coats
        7. Retooling

    .7 Photo Record: Provide a photo record which illustrates the masonry repairs.

.1 Provide Consultant with two sets of photographs.
.2 Provide detailed and overall photographs of the following:

.1 Surface preparation
.2 Cutting out cavity
.3 Pin/mesh installation
.4 Scratch coat and base coat
.5 Finish coat

1.4 Qualifications

1. Comply with the requirements of Section 04050, Masonry Procedures.

2. In addition the following requirements will be strictly enforced:

.1 All patch repairs shall be carried out by persons who have successfully completed the manufacturer's training course and received written certification from the repair mortar manufacturer.

.2 Maintain proof of certification on site at all times. Persons without certification shall not carry out patch repair work specified in this section.

1.5 Delivery, Storage and Handling

1. Deliver, store and handle materials to protect them from moisture, extreme temperatures in accordance with the manufacturer's instructions.

2. Material for this project shall be delivered in the manufacturer's original, unopened containers with the project name, reference, grade, batch and production date show on the containers.

1.6 Environmental Requirements

1. Comply with environmental requirements relating to temperature extremes and humidity as specified in Masonry Procedures, Section 04050.

2. In addition, in hot weather conditions, protect, repair mortars from direct sunlight and wind when ambient air temperatures exceed 20^{O} and do not prepare or use repair mortars when ambient air temperatures exceed 30^{O}.

1.7 Protection

1. Protect masonry immediately adjacent and below areas of work from repair mortar droppings. Immediately clean off any repair mortar from unprotected materials.

1.8 Schedule

1. Provide schedule of repair mortar patching prior to commencing work for approval of Architect.

2. Adjust work schedule to accommodate restricted or limited access to various rooms or areas of the building as required.

3. Estimated Quantities of Masonry Renders and Plastic Repair Section Work:

.1 The stipulated price for the work is to be based upon the graphic representations shown on the Drawings for quantities for the Work of this Section. Payment for final measured quantities more than 10% above or 10% below these estimates will be added or deducted from the stipulated price at the agreed unit rates.

1.9 Mock-ups

1. Mock-ups
   .1 Provide mock-ups in accordance with the requirements of Section 01300 - Shop Drawings, Product Data, Samples and Mock-ups. Section 1300 – Submittals and Section 01400 - Quality Control.

   .2 Provide procedure demonstrations in the presence of the [Consultant] Engineer for the preparation of the following mock-ups:

      .1 Surface preparation
      .2 Cavity preparation
      .3 Mortar fill
      .4 Plastic repair
      .5 Shard repair
      .6 Shelter coat
      .7 Hand dressing of old fillings
      .8 Drilling out old hole fillings
      .9 Packing and finishing of new fillings

   .3 Provide mock-ups for review of the following masonry procedures:

      .1 Surface preparation
      .2 Cavity preparation
      .3 Mortar fill
      .4 Plastic repair
      .5 Shard repair
      .6 Shelter coat
      .7 Hand dressing of old fillings
      .8 Drilling out old hole fillings
      .9 Packing and finishing of new fillings

2 PRODUCTS

2.1 Materials

1. Water: potable, clean and free from contaminants.
2. Where water has high iron or other metal content, pre-treat with complexing agents before use to reduce risk of staining.
3. Repair mortars for patching stonework: proprietary formulated, pre-mixed and pre-pigmented cementitious powders, without any acrylic, latex or any synthetic polymer additives. Refer to Section 04100 for mortar mix specifications.

4. Sacrificial Renders:

   .1 Scratch coat: Mix X:

      .1 Formulation:

         .1 Mix Formula: 1 Lime – 2.55 Aggregate

      .2 Materials:

         .1 Lime: Lime Putty
         .2 Aggregate: Mortar Sand

.2 Base coat: Mix Y:

.1 Formulation:

.1 Mix Formula: 1 Lime - 4 Aggregate

.2 Materials:

.1 Lime: Lime Putty
.2 Aggregate: Mortar Sand

.3 Finish coat: Mix Z:

.1 Formulation:

.1 Mix Formula: 2 Lime - 5 Aggregate

.2 Materials:

.1 Lime: Lime Putty
.2 Aggregate: Mortar Sand
.3 Stone Dust: Buff stone ground to sieve specification, or
.4 Brick Dust: ground to sieve specification

5. Mechanical anchors, dowels and mesh:

.1 Stainless steel threaded rod to ASTM AS80, Type 316, 2mm - 12mm diameter, as required.

.2 Stainless steel mesh, Type 316, 4x4 mesh, by Ferrier Wire Goods Company, Continental Wire Cloth or McNichols.

6. Core Bits:

.1 Tiger Thin Wall Core Bits, as distributed by Universal Grinding, Diamond Products Division, 192 Pearl Street East, Bag Service #1090 Brockville, Ontario K6V 1R4 (Attn: Mr. Henry O'Hare tel. (613) 342-6636 fax. (613) 342-1806)

2.2 Tools and Equipment

1. Tools for application and finishing: a selection of trowels, plasterers' and modellers' tools, stone carving chisels and plasterer's stainless-steel jointing rules of various lengths.
2. Sponges: plasterer's sponges.
3. Brushes: Tampico fibre or nylon bristle type.
4. Spray Bottles: hand held >spritzer type plastic spray bottles capable of delivering from a fine mist to a coarse spray.
5. Measuring cups: maintain suitable, graduated measuring containers for the accurate gauging of repair compound and water.

3 EXECUTION

3.1 Preparation

1. The location and size of all patches shall be agreed with the Architect prior to cutting back any stone.
2. Cut back deteriorated or spalled stone or previous repair to a sound substrate.
3. Cut back not less than 12 mm and leave edges square. Do not feather edges in the patch area.
4. All cutting out is to be done using hand stone cutting chisels. No grinders or pneumatic tools are permitted in this work.
5. Leave cut back surface on the claw to give textured surface to assist bond on the patching mortar.

6. Where depth of patch or location warrants install dowels to assist in reinforcing patch in accordance with manufacturer's instructions.

3.2 Mixing Patching Mortar

1. Do not mix more material than can be used within 30 minutes. Discard any material that has been mixed for 30 minutes or more.
2. Thoroughly mix powders with water in ratios recommended by manufacturer.
3. Adjust water content to suit weather conditions.

3.3 Application of Patching Mortar

1. Pre-wet substrate with spray bottles. Depending on porosity of stone, vary amount of pre-wetting. Pre-wetting is designed to prevent substrate from draining moisture from the patching mortar.
2. Immediately prior to commencing patching re-wet surface. Surface should glisten but there should be no standing water.
3. Apply the patching mortar in a series of lifts up to 75 mm thick with no waiting period or requirement to scratch between lifts.
4. Mortar should be applied lightly but firmly enough to ensure a homogenous patch with no voids. Build up profile of surrounding surfaces.
5. Allow material to achieve an initial set (15-20 minutes, depending on weather conditions) before scrapping off excess material back to profile of surrounding stonework.
6. Where patches exceed 75 mm in thickness build up in two or more layers or approximately 75 mm each. Work material around any reinforcing.
7. Allow first layers to set a little prior to applying second layer.
8. Hollows or colour lightening (cement skin or laitance) may be scraped back and fresh material applied to fill out to profile.

3.4 Finishing

1. Do not float-patch, leave as tooled by scraping tools.
2. Where coarse aggregate has been incorporated into the patching material, finish using brush to lightly stipple and remove excess material.
3. Clean any mortar residue from around the edges of the repair using sponges with clean water. Repeat as necessary using clean water each time. Do not allow sponge or water to touch repair mortar as this will produce a 'halo' effect at the edges of the patch.

3.5 Curing

1. Lightly mist patches with clean water to control drying and shrinkage.
2. Depending on weather conditions, mist from 30 minutes to 2 hours following completion of patch.
3. Continue misting from 2 to 4 times a day for 4 days.
4. Where continuous misting cannot be provided for a minimum of 2 days following completion of patch, cover patch with polyethylene sheet, taped in place to retard drying. Commence misting as soon as possible.
5. Masking up with plastic should not be carried out immediately following completion of patch but following initial setting.

End of Section 04101.

1 GENERAL

1.1 Summary

1. This section to conform to Division 1, General Requirements.
2. Work Included in this Section

.1 Supply of masonry anchors, dowels and cramps.

.2 Supply of accessories for repairs specified in Section 04500, Masonry Restoration. Accessories to include:

.1 Wall Ties
.2 Tieback anchors
.3 Tieback anchors at corner cornice blocks
.4 Anchor pins
.5 Anchor rods and couplings
.6 Epoxy repair dowels
.7 Bent plate anchorage
.8 Rod and plate tieback anchorage

.3 Miscellaneous masonry accessories

1. Stainless steel tenons at corner cornice blocks, pinnacles, coping stones and other decorative stones.
2. Two per block, approx. 450 mm long each

1.2 Related Work Specified Elsewhere

1.	Masonry Procedures:	Section 04050
2.	Mortar and Grout:	Section 04100
3.	Speciality Restoration Mortar:	Section 04101
4.	Brick Masonry Supply:	Section 04210
5.	Limestone Supply	Section 04430
6.	Masonry Restoration:	Section 04500
7.	Surface Treatments:	Section 04515

1.3 References

1. Masonry anchors shall conform to CAN3-A370-M84, Connectors for Masonry.
2. Be governed by the requirements of the following ASTM Standards referenced in the specification:

.1 ASTM A555 - Specifications for General Requirements for Stainless and Heat Resisting Steel Wire and Wire Rods
.2 ASTM A666-84 - Specification for Austenitic Stainless Steel, Sheet, Strip, Plate and Flat Bar for Structural Applications
.3 ASTM F593-85 - Stainless Steel Bolts, Hex Cap Screws, and Studs
.4 ASTM F594-85 - Stainless Steel Nuts

3. Be governed by the requirements of the following technical handbooks:

.1 Atlas Stainless Steels Technical Data Handbook, 1984

1.4 Submissions

1. Comply with requirements specified in Section 04050.

2 PRODUCTS

2.1 Materials

1. Dowels: stainless steel to ASTM A580, type 304, or brass, nominal 2-6 mm. diameter, threaded for pinning across cracks. Size of dowels to be approved by Assembly Designee.
2. Dowels: stainless steel to ASTM A580, Type 304 or brass, from 6-10 mm diameter, threaded for setting of stone. Size of dowels to be approved by Assembly Designee.
3. Cramps: stainless steel to ASTM A666, type 304, standard hooked bar or strap anchor nominal 4 mm. thick, 25 mm. wide to suit installation.
4. Fasteners:

.1 Screws: brass and stainless-steel round-head self-tapping screws and washers minimum No.12 gauge.
.2 Bolts: brass and stainless-steel round-head type with nuts and washers as required, minimum 6 mm diameter unless otherwise noted.
.3 Veneer Anchor Fasteners:

.1 Type 410 stainless steel self-drilling fasteners
.2 Size #10 - 16 x 19 mm (3/4")
.3 Acceptable material: #508-810 self-drilling 410 stainless steel fasteners, as supplied by Spae-naur.

.4 Light Duty Anchors: conform to GSA FF-S-325, Group V, Type 2:

.1 Class 2, nylon sleeve with brass or stainless-steel screw fastener and washer (use with round head or flat head as detailed). Acceptable materials: Bantam Plug, as manufactured by Rawlplug or Mungo Plug as manufactured by Ucan.
.2 Class 3, zamac Alloy, steel nail drive anchor. Acceptable material: Zamac Nailin, as manufactured by Rawlplug.
.3 Class 4, nylon body, stainless steel nail drive anchor. Acceptable materials: Nylon Nailin, as manufactured by Rawlplug or Tapit as manufactured by Ucan.

.5 Medium Duty Anchors: conform to GSA FF-S-325, Group II:

.1 Type 1: lead shields with 6 mm diameter brass bolt and washer. Acceptable material: Lag Shield, as manufactured by Rawlplug or Ucan.
.2 Type 2: non-caulking zinc alloy bolt anchor. Acceptable material: Single, as manufactured by Rawlplug or Ucan.
.3 Type 3: stainless steel expansion anchor. Acceptable material: stainless steel drop in, as manufactured by Rawlplug or Ucan.

.6 Heavy Duty Anchors: conform to GSA FF-S-325, Group VIII:

.1 Type 1: Stainless Steel Anchor. Acceptable materials: Rawl stainless steel Rawl-stud or Hilti stainless steel Kwik-bolt.

.7 Chemical Anchor:

.1 Quartz aggregate, hardener and resin in a glass capsule.
.2 Use with a stainless-steel all-thread rod with a flat end.
.3 Acceptable materials: Hammer Capsule by Rawlplug or Hammer Cap by Ucan

.8 Stitching Anchors and Tension-Ring Anchors:

.1 Anchor systems as designed and supplied by Cintec Harke.

.9 Long Masonry Anchor:

.1 Heavy duty pure nylon frame plug with hex bolt fabricated from stainless steel Grade A4-80, with the addition of titanium for extended corrosion

protection.

.2 Acceptable material: 200 mm long Mungo Nylon Frame Plug with 8 mm diameter bolt shank hex head stainless steel screw as distributed by Ucan.

.3 Provide 3mm rubber washer underside of cramp over rigid metal through-flashings.

.4 Acceptable Material: Spae-Naur catalogue No. 4163 Buna S rubber (5/16" inside diameter).

5. Backer Rod: Polyethylene rope, extruded closed cell foam, non-absorbent, 30% larger than joint.

6. Sealant: two component, polysulphide base, chemical curing, custom colour to match Credit Valley and Sackville sandstones and to approval. Approved Sealant: Tremco Dymeric.

7. Primer: as recommended by sealant manufacturer.

8. Solvent: MEK or as recommended by manufacturer.

9. Isolation Tape: pressure sensitive, non-bonding to sealant.

10. Asphalt Emulsion: brush or spray applied: eg: "Bakor 700-01".

11. Resin: two-part epoxy resin system, low viscosity, high modulus, moisture insensitive, U.V. stable (non-yellowing).

12. Burlap: clean, non-staining (with no printed matter) to approval of Assembly Designee.

13. Plumber's Hemp: asbestos free, non-oily jute rope.

14. Manufacturers:

.1 Harris and Edgar Limited, 222 Purley Way, Croyden, England.
.2 Fischer Italia, Padova, Italy.
.3 Rawlplug: Rawlplug Canada Limited 7407 Bren Road, Mississauga, Ontario [tel. (416) 673-7295].
.4 Hilti: Hilti (Canada) Limited, 6325 Dixie Road, Mississauga, Ontario [tel. (800) 363-HILTI].
.5 Ucan: Ucan Fastening Products, 100 Brisbane Road, Toronto, Ontario [tel. (416) 661-3268].
.6 Spae-naur: Spae-naur Limited, 815 Victoria Street North, Kitchener, Ontario N2G 4B1 [tel. (416) 868-1629].

3 EXECUTION

3.1 Installation

1. The installation of masonry accessories is described in Section 04500, Masonry Restoration.

End of Section 04150.

1 GENERAL

1.1 Summary

1. This section to conform to Division 1, General Requirements.
2. Work Included in this Section.

.1 Supply of cut stone worked to finished dimensions and profiles.

1.2 Related Work Specified Elsewhere

1. Masonry Procedures: Section 04050
2. Masonry Accessories: Section 04150
3. Masonry Mortar: Section 04100
4. Masonry Restoration: Section 04500
5. Masonry Cleaning: Section 04510
6. Limestone Paving: Section 04540

1.3 References

1. Stone (paving, stair treads and risers, stair landings) shall conform to ASTM C-568, Standard Specification for Limestone Building Stone.
2. Stone (walling) shall conform to ASTM C616-80, Standard Specification for Sandstone Building Stone.

1.4 Definition

1. Classification

.1 Limestone, Type II; medium density.
.2 Sandstone, Type I; siliceous sandstone.

1.5 Submissions

1. Submit six samples of each type of stone, 200 mm x 100 mm x 50 mm for approval prior to ordering.
2. Samples should be representative of the full range of colour, visible markings, and finish to be supplied for the entire project. Indicate quarry bed or direction of bedding on samples. Where applicable, indicate standard colour and grade of sample.
3. Submit shop drawings for all new stone required. Refer to drawings for location.
4. Drawings shall show all details of size, section, bedding, jointing, anchor or tying system and finish of stone.
5. All moulded and profiled work details to be submitted full size.

1.6 Qualifications

1. Stone Supply and Cutting

2. The subcontractor carrying out this work must be approved by Consultant prior to commencing work.

3. The following information is required:

.1 Name, location, and full description of facilities.
.2 Examples of related work cutting limestone undertaken with present staff and facilities within last 12 months.
.3 Detailed time schedule indicating all critical stages in stone supply, from receipt of order, through supply from quarry, shop fabrication and delivery to site.

4. Submit information with bid.

1.7 Product Delivery, Storage and Handling

1. Finished stone shall be delivered to site in substantial, purpose made containers, packed to avoid chipping damage or soiling from any means.
2. Label each container to clearly indicate contents and location on building.
3. Indicate on each stone quarry bed or direction of bedding and location of stone on building referenced to shop drawings. Mark stones where not exposed with permanent markings.
4. Store stone on site in containers or on non-staining pallets, clear of the ground.
5. Avoid excessive handling and protect against chipping damage, soiling, or staining.

2 PRODUCTS

2.1 Materials

1. Limestone – Adair by Arriscraft, min. 50mm thick, various sizes, square cut.
   For stair, landings and pedestrian walkways paving material.

   .1 High density, fine grained, free from seams, cracks or other imperfections that would impair its structural integrity.

   .2 Stone shall be from approved samples and be free from mottling or piebald markings, excessive bedding markings, iron banding, shelly formations, pit holes, open textured bands or any foreign substance which may impair its appearance.

   .3 Stone shall match the existing in colour, texture, physical and chemical characteristics.

   .4 Alternate sources will be considered if they are demonstrated to meet the characteristics specified above.

2. Sandstone – Red Sandstone, St Bees Sandstone, various sizes and thicknesses to match existing in colour and texture variations.

   .1 High density, fine grained, free from seams, cracks or other imperfections that would impair its structural integrity.

   .2 Stone shall be from approved samples and be free from mottling or piebald markings, excessive bedding markings, iron banding, shelly formations, pit holes, open textured bands or any foreign substance which may impair its appearance.

   .3 Stone shall be extracted from the areas of the quarry which meet or exceed the published test data for the stone. This data must include the following:

   Compressive Strength (dry and at right angles to bedding)

   Porosity

   Saturation coefficient

   Water absorption

   Bulk specific gravity

   .4 Submit test data from the areas where stone shall be extracted for the work of this project confirming conformance with published test data for the stone and the requirements specified herein.

   .5 Stone shall match the existing in colour, texture, physical and chemical characteristics.

   .6 Alternate sources will be considered if they are demonstrated to meet the characteristics specified above.

2.2 Stone Cutting

1. Cut stone to shape and dimensions obtained from accurate measurements and profiles taken from existing stone.
2. Ensure survey information is typical by taking profiles adjacent to location where new stone is to be set.
3. Dress exposed faces true, make beds and joints same thickness as existing and at right angles to face.

4. Execute moulded work from full size details. Make exposed arises in true alignment and ease slightly to prevent snipping.

5. Cut stones for anchors, cramps, dowels, and support systems. Provide lewis pin and clamp holes in pieces that cannot be manually handled. Do not cut holes in exposed surfaces.

6. Damage of any kind to new cut stone will not be accepted. The use of "dutchmen" to repair damage will not be accepted.

2.3 Tolerances

1. Fabrication tolerances shall not exceed:

.1 mm± on any dimension.
.2 1.5 mm± deviation from square.
.3 1.0 mm± deviation from flat surface on any exposed face.

2.4 Bedding of Stone

1. All stone shall be supplied to be laid on its natural quarry bed with the following exceptions:

.1 Arches: lay stones with bed at right angles to thrust.
.2 Projecting undercut members: to be edge-bedded.
.3 As indicated on the drawings.

2.5 Finishes

1. Dress exposed surfaces of moulded work to match existing as follows:

.1 All finishes to match existing to approval of Consultant.
.2 Drafted margins with bush-hammered fields to individual steps and landings.
.3 All other finishes to be smooth, with no discernible cutting marks.

3 EXECUTION

3.1 Installation

1. Installation of stonework is described in Section 04500, Masonry Restoration.

End of Section 04430

1 GENERAL

1.1 Summary

1. This Section to conform to Division 1, General Requirements.
2. Work Included in this Section

.1 Raking out and pointing of joints in existing stone masonry.

.2 Hand grouting voids.

.3 Backpointing of joints.

.4 Pointing of joints in new and repaired stone masonry.

.5 Cutting Out and Replacement of Stone.

.6 Repair of stone.

.7 Preparation of reglets.

.8 Removal of surplus equipment, metal fixings, including pointing of scaffold tie holds.

.9 Miscellaneous repairs.

1.2 Related Work Specified Elsewhere

1. Masonry Procedures: Section 04050
2. Masonry Mortar: Section 04100
3. Specialty Restoration Mortar: Section 04101
4. Masonry Accessories: Section 04150
5. Stone Supply: Section 04430
6. Masonry Restoration: Section 04500
7. Masonry Cleaning: Section 04510

1.3 Submissions

1. Submit samples, literature and details of tools, machinery and equipment as specified in Section 04050, Masonry Procedures.
2. Execute mock-ups as specified in Section 04050, Masonry Procedures.
3. Prepare materials for testing, in accordance with requirements of Section 01400, Quality Control.

1.4 Qualifications

1. Comply with requirements specified in Section 04050, Masonry Procedures for all aspects of work specified in this section.
2. All consolidation, pinning, filling, and cleaning shall be carried out by a conservator or under the continuous supervision of a conservator.
3. Provide full career details of training and experience of individuals proposed for the work of this section. Only individuals with relevant training and experience shall carry out this work. Individuals without relevant qualifications shall be rejected.

1.5 Sequence of Work

1. Refer to sequence of work specified in Section 04050, Masonry Procedures.
2. The Contractor shall develop a sequence of work which shall be agreed with the Architect.

1.6 Mock-up

1. Execute mark-up for each type of conservation procedure including pinning, grouting, crack injection, repair mortars and shelter coating.
2. Where colour of stone dictates, execute as may repair mortar mock-ups necessary to match the variations in stone colour.

2 PRODUCTS

2.1 General

1. The use of any materials or custom equipment not listed below is not permitted without prior review of Architect and Masonry Consultant.
2. Substitutions for any materials or custom equipment is not permitted without prior review of Architect and Masonry Consultant.

2.2 Product Delivery, Storage and Handling

1. Materials have limited shelf life.
2. Ensure materials are delivered to site in original, unopened containers.
3. Do not allow materials to freeze.

2.3 Materials

1. Dispersed Hydrated Lime-based Materials:
   - .1 Dispersed Hydrant Lime Injection Mortar: Proprietary injection compound composed of dispersed hydrant lime, marble powders, mixing water and dispersing aids of not more that 0.4% by weight.
   - .2 Dispersed Hydrated Lime Putty: Proprietary lime mortar compound composed of dispersed hydrated lime, mixing water and dispersing aids of not more than 2% by weight.
   - .3 Dispersed Hydrated Lime Putty: Proprietary lime mortar compound composed of dispersed hydrated lime, mixing water and dispersing aids of not more than 2% by weight.
   - .4 Dispersed Hydrated Lime Shelter Coats:

     Proprietary lime mortar compound composed of dispersed hydrated lime, marble powders, mixing water and dispersing aids of not more than 0.45 by weight; custom coloured to match stone, to approval Architect Masonry Consultant.
   - .5 The dispersed hydrated lime products may be obtained from Liner Rolpaint, Toronto, ON.
2. Syringes; plastic 10cc - 50cc.
3. Injection needles; length and gauge to suit application.
4. Pins; threaded nylon or stainless steel; length and diameter to suit application.
5. Resin for pin setting: Type to be agreed with Architect and Masonry Consultant.
6. Aggregate as supplied in Section 04065 -Historic Mortars, to pass 2.36 mm size.
7. Crushed black granite dust; to pass 2.36 mm sieve.
8. Ethyl Alcohol.
9. Clean water.
10. Sponges, cotton rags, absorbent towels.
11. <u>Materials Specified Elsewhere</u>
    - .1 Masonry Mortar: Section 04100

.2 Specialty Restoration Mortar: Section 04101
.3 Masonry Accessories: Section 04150
.4 Brick Masonry Supply: Section 04210
.6 Cut Sandstone Supply: Section 04420
.7 Masonry Cleaning: Section 04510

3 EXECUTION

3.1 Preparation

1. Seal and protect all openings, doors, windows and adjacent areas to prevent damage and the spread of construction dust, water or other materials into the building or onto adjacent sidewalks.
2. All sills and projecting courses are to be covered with rigid protection, secured into joints, for the duration of the work.
3. Any part of scaffolding, shoring or any construction plant shall not directly bear against the masonry. Provide isolating material of lumber or plywood with additional padding as necessary to prevent damage to the existing masonry.

3.2 Treatments

1. The sequence of treatments for any block of stone will depend on the nature of the substrate. Confirm to Architect and Masonry Consultant concurrence with the treatments shown on the drawings. Report any variation prior to commencing work.

3.3 Mortar Removal for Repointing

1. Generally

.1 This project involves 100% repointing of all mortar joints in the contract area.

.2 Mortar is defective when:

i It is cracked.
ii It is spalled, chalked, dusted or otherwise crumbling and excessively weathered back.
iii The Architect states so in writing.

.3 Where mortar is found to be defective beyond specified raking depths, continue raking until sound mortar is encountered.

.4 Be aware that additional raking out beyond specified depths will be necessary and that voiding can be expected, requiring alternately backpointing or grouting prior to finish re-pointing.

.5 If masonry unseats or bond is broken, remove unit and reset.

2. Tools and Techniques

.1 Tools for cutting out shall be narrower than the joint.

.2 Cutting out of mortar shall be carried out by one of the following techniques.
i. Cutting out with hammer and chisels with dust channels, cutting away from the arrises to prevent spalling of the masonry.
ii. Flat-bladed quirks and light hammers, hacksaw blades or similar tools are to be used where fine joints are encountered.
iii. Small hand-held low-impact pneumatic carving tools, fitted with appropriate points and chisels to the approval of the architect for cutting out rock-faced work only.
iv. Hand held rotary saws or any type of grinder or wheel are not permitted on this project.

.3 Clean joints back for the full specified depth, removing all mortar on the masonry surfaces to a square surface of existing mortar at back of joint.

.4 Clear the joints of all loose particles of old mortar and leave ready for inspection.

3. Damage

.1 Take care to prevent damage to masonry units resulting from cutting out operation.

.2 Damage includes the widening of existing joints, nicks, gouges and chipped or scratched surfaces from cutting out tools, resulting from improper workmanship.

.3 Any damage to existing masonry as a result of the cutting out process is unacceptable. Damage shall result in the Contractor changing the approach, technique or individuals carrying out work, so that no damage occurs. Continuing damage shall result in the Consultant stopping the work and requiring all operatives involved in the work to undertake a three-day training workshop before recommencing cutting out operations on the building. All damaged masonry units shall be replaced at no change in the contract cost or schedule.

4. Inspection

.1 Provide access, permit inspection, correct any defects and obtain approval of all raked joints prior to commencing pointing.

5. Depth of Raking

.1 Raking shall be carried out to at least twice the width of the joint to a minimum depth, measured from the arris of the masonry unit, of not less than 20 mm.

.2 Generally:

i Stone masonry, mortar joints: 30 mm.

3.4 Cutting Out and Replacement of Stone

1. Cutting Out of Stone

.1 Cut out all damaged stone where indicated on the drawings for replacement or repair.
Obtain approval of Architect prior to proceeding.

.2 Where large blocks are scheduled for replacement, existing stone shall be cut out so that entire blocks may be reclaimed.

.3 All existing stone removed shall become property of the Owner unless specified otherwise.

.4 Contractors shall be responsible for shipping remaining stone to client's storage yard.

.5 Advise the architect of any damaged stone not identified for replacement or repair prior to commencing repair work.

.6 Where indenting stone pieces into block slightly undercut vertical beds and allow a few millimetres space at the rear.

.7 Generally indented stone shall have a minimum bearing of 150 mm on bed.

2. Setting Stone

.1 Drench dry stones with clean water just prior to setting.

.2 Install anchors, dowels and cramps.

.3 Set stones true and in alignment, maintain joint thicknesses with soaked softwood, or plastic wedges until bedding mortar has set.

.4 Pack exterior horizontal and vertical joints with plastic foam joint filler and leave ready for repointing.

.5 Remove wedges when dry without breaking them off.

.6 Grout vertical joints of projecting course.

.7 Pack exterior profile of these joints with plastic foam joint filler set to leave 30 mm from face of joint.

.8 Fill joints behind packing with liquid bedding mix.

.9 Sponge off any mortar droppings as work progresses.

.10 Remove plastic foam joint filler and leave joints ready for pointing.

3.5 Repair of Stone

1. Indenting Stone Pieces into Block [Dutchman Repairs]

.1 Select stone to match surrounding colour, free from defects and with bedding to match adjacent work.

.2 Cut piece of sufficient surface area to cover the area of damage to be cut away to rectangular or square frame, min. 50 mm deep and rub and finish all bed faces to ensure fine, true, uniform arrises, with 1 mm joint between host stone and Dutchman.

.3 Transfer outline onto damaged area by scribing.

.4 Cut out to scribe lines using tempered chisels by hand ensuring that the edges are not plucked or spalled. Undercut bed joints as described in 3.3.3. above. Obtain approval from Architect before commencing any cutting on site.

.5 Drill the back of the piece and set minimum two stainless steel threaded pins with resin mortar minimum 10 mm, maximum 20 mm, allowing 15 mm projection and allow to cure.

.6 Transfer pin location and drill out host stone to receive pins.

.7 Grout holes with thixotropic resin mortar.

.8 Prepare repair mortar: stone dust mortar and butter cavity to receive piece.

.9 Ease piece into cavity, ensuring pins locate into holes and clean off mortar from face.

.10 Leave face of piece slightly proud and finish to original profile and finish by rubbing back or tooling as required. Rubbing back marks on existing stone are not permitted.

2. Repairs to Deteriorated Stone

.1 Repairs In-situ: Filling voids in stone

i Remove all existing mortar and filling materials from cracks and voids using hand tools. Do not damage surface of stone during removal.

ii Build up mortar in void by packing repair mortar in layers not exceeding 15 mm in depth.

iii Allow mortar to achieve thumb print hardness before applying next layer.

iv Finish mortar filling by stippling back mortar to compact the joint and finish it just behind the arrises of the stone.

.2 Repair of Cracked (Split) Stone

i Remove stone to be repaired by cutting out mortar around perimeter. Maintain support to surrounding masonry as necessary.

ii Clean surfaces of stone to be repaired.

iii Prepare thixotropic resin and resin: stone dust mortar.

iv Drill holes for stainless steel threaded pins to re-anchor stone together.

v Set pins with thixotropic resin mortar.

vi Apply repair mortar to entire surface of stone to be bonded.

vii Clamp using softwood shims and allow to set.

viii Remove any mortar squeezed out of crack promptly to prevent staining.

ix Re-set repaired stone.

.3 Pinning Back Surface and Filling

i. The number of pins and their location shall be agreed with the Architect and Masonry Consultant prior to commencing work.
ii. Mask off surrounding areas to prevent the spread of dust
iii. Drill hole 50% larger than stainless steel pins. Stainless steel threaded pins will range from 2mm to 5mm in diameter.
iv. Clean dust from holes using acetone and cotton swabs
v. Determine dowel length, ensuring sufficient room for mortar plug at surface.
vi. Run resin stone dust mix into hole in order to set ends only of dowel.
vii. Place with fine tools or hypodermic syringes.
viii. Spread resin on dowel and place in hole, plug ends with cotton swabbing as necessary to retain resin in hole.
ix. Remove swab and when resin set plug deep holes with repair mortar, shallow holes with the lime shelter coat.

.4 Filing of Cracks

i. Flush crack with clean water until all dirt and loose material are flushed from crack.
ii. Carrying out final flushing with l0% ethyl alcohol solution.
iii. Prepare dispersed hydrated lime injection mortar by diluting with de-mineralized water up to 30%.
iv. Inject lime grout into cracks, ensuring complete tilling. Depending on the crack, filling may require from a single application to multiple applications and where very deep, damming of the surface will be necessary to ensure complete filling.
v. Keep surface of stone clean of grout spills, as the work progresses. Do not allow grout to be absorbed into surface.
vi. Where appropriate, use undiluted injection grout to fill outer parts of crack or where width of crack warrants.
vii. Allow grout to harden.
viii. Prepare dispersed hydrated lime shelter coat for use.
ix. Inject shelter coat over the lime grout to mask the white colour. Pill out crack flush with adjacent surface. Re-apply as necessary to achieve flush surface.
x. Clean up any spills or runs immediately.

.5 Grouting of Thin Plates of Stone

i. Where grouting is required, drill pattern of grouting and pouring holes. Hole diameters should be as small as possible.
ii. Ensure lowest point of hollow area is drilled to avoid trapping flushing water.
iii. Flush out with clean water followed by l0% ethyl alcohol solution.
iv. Grouting procedure may vary according to the situation, with filling of void either from the top holes or by filling up in lifts from the bottom. Ensure hollow areas are completely filled.
v. Grout using dispersed hydrated lime injection mortar, diluted not more than 30%, but at the appropriate viscosity to provide ideal flow for the particular condition.
vi. Empty gentle vibration to assist flow.
vii. Clean up all spills as the work proceeds.
viii. Fill all holes with lime shelter coat.

.6 Repair Mortar Fillings

i. Prepare samples of repair mortars to meet the variation of colour in the stone.
ii. The characteristics of the repair mortar when wet and dry should be similar to the stone in colour, texture and permeability.
iii. Prepare aggregates and stone dusts in order to avoid the use of pigments.

iv. Prepare mock-ups using repair mortar prepared in proportions varying from 1:6 to 1:9, dispersed hydrated lime putty to aggregates.

v. Pre-wet surface prior to application. Place repair mortars in up to l5mm layers and allow to harden before applying second layer.

vi. At surface slightly overfill, leaving repair mortar proud. Cover with damp absorbent towel.

vii. At appropriate time, work back repair mortar to finish flush with adjacent stone.

viii. Texture surface of repair mortar to match adjacent surface.

ix. Keep repair mortar damp for a minimum of three days.

.7 Application of Shelter Coat

i. The dispersed hydrated lime shelter coat may be applied as a surface treatment to weak and friable stone to consolidate the outer face of the stone and provide a sacrificial surface. Treat entire stone.

ii. Prepare surface by scraping back loose material with modern spatulas.

iii. Pre-wet surface.

iv. Apply lime shelter coat by brush, working it into the surface. Wipe off excess with burlap cloths and clean cotton rags.

v. Protect treated surface with damp absorbent towels or cotton rags. Keep damp for three days.

3. Resetting Misaligned Stone

.1 Remove stone units as necessary to reset all stone in true alignment.

.2 Drill stones for new dowels across joints and for cramps to tie back stone into core where possible.

.3 Re-set stone and install dowels and cramps.

4. Strike Centring.

.1 Dressing of Stone at Flashing Upstands

.2 Where flashings are required to vertical stone surfaces to reglets, prepare stone as follows:

i Determine the location of all such situations and agree requirement for dressing of stone with architect prior to proceeding.

ii Dress irregular stone surfaces to smooth face to accommodate flashing upstand dressed back against stone.

iii Use hand-held low impact pneumatic stone-carving chisels only.

iv Dress surfaces to smooth and true face.

5. Rubbing Back Stone

.1 Where indicated on drawings rub back friable stone to remove loose detail only.

.2 Agree all locations with Architect. Prepare sample etc. as below.

.3 Rub back with sandstone blocks to prevent marking of stone.

6. Dressing Back Stone

.1 Where indicated on drawings dress back stone.

.2 Agree all locations with Architect. Prepare sample for approval by Architect prior to commencing work.

.3 Dress back loose and friable stone using hand tools only.

.4 Leave stone without ledges which will trap moisture.

7. Cutting Drips in Stone

.1 At locations indicated on the drawings cut drip in soffit of stone.

.2 Mount guide to ensure accurate cuts.

.3 Cut drip using grinder, stopping short of ends.

.4 Finish ends by hand.

8. Removing Cement and Resin from Stone

.1 Remove all cement and resin surface coatings, patches and previous filling of cracks and repairs on surface of stone.

.2 Tools and technique for removal shall be agreed with Architect. Prepare sample for approval by Architect prior to commencing work.

.3 Removal shall be carried out using a combination of hand and power tools to minimise damage to surface.

.4 Where voids or cracks remain in stone as a result of removal of cements and resins, repair stone as described previously above.

3.6 Hand Grouting

1. Hand grout voids that cannot be successfully filled by backpointing procedures. Obtain Architect's acceptance of voids and damming procedures prior to commencing grout operations.

2. Prior to grouting, ensure that grout will not penetrate into intentional cavities in walls by examining site conditions at back faces of voids and joints. Report findings to the Architect. Grouting may occur only where intentional cavities cannot be filled by grouting operations. Take all measures required to contain grout in voids and joints to be grouted using temporary damming materials, and as specified below.

3. Carefully flush out joints and voids to be grouted to remove all loose materials and prewet backup materials. Do not oversoak wall, and ensure water does not penetrate to the interior, damage interior finishes, or flood intentional cavities.

4. Pack solid faces of joints to be grouted with non-staining, non-oily, plumber's hemp or other acceptable damming material to a minimum depth of 20 mm, so that grout will be contained in the joint or void, and the void can be filled solid. Where required to keep grout from intentional cavities in the walls, install temporary dams to back face of joint.

5. Form grout cup on wall at top of void or joint to be grouted using non-staining, non-oily, potters clay or other acceptable material to direct grout into voids without staining walls. Keep clay cups damp to prevent drying and cracking. Other methods of directing grout into voids and joints will be acceptable to Architect's approval.

6. Pour grout into joint or void via clay cup, until voids filled. Do not exceed one metre lifts or one vertical joint at any one time.

7. Continually observe interior and exterior faces of wall at grouting during grouting operations. Cease grouting if leaks occur at interior. Seal all leaks and make good all damage caused to the satisfaction of the Architect.

8. Remove any grout spills immediately, using clean water and non-metallic bristle brushes to wash surfaces.

9. Allow grout to set for 24 hours, then remove hemp packing, temporary dams, grout cups, and other grouting aids.

10. Allow grout and wall to fully dry [minimum 3 weeks] before commencing finish pointing.

3.7 Backpointing

1. Obtain acceptance of raked out work prior to commencing pointing operations.

2. Where cut out joints are deeper than raking out depths specified above, backpoint joints to bring mortar face to specified depth for raked out joints, in preparation for finish pointing. Where voids exist that conventional backpointing cannot fill, grout voids in accordance with 3.4 Hand Grouting above.

3. Immediately prior to pointing, thoroughly wet joints in order to control absorption.

4. Allow water to soak into masonry and mortar, leaving no standing water but remaining wet.

5. For backpointing, fill all joints full with pointing mortar, compacting mortar firmly into joints to ensure positive adhesion to all inner surfaces. Place mortar in layers, maximum 30 mm thick, minimum 12 mm thick, allowing each layer to set to thumbprint hard before placing next layer. Bring face of mortar in backpointed joint to specified depth for raked out joints, measured from the arris of the masonry unit, leave ready for final pointing.

6. Prevent mortar from being placed or smeared onto face of stone to prevent mortar staining of masonry faces during backpointing.

7. Keep work clean, remove all droppings as work proceeds, and again at the end of each day.

3.8 Pointing of Joints

1. General

.1 Obtain Architect's acceptance of raked out, backpointed, and grouted work prior to commencing pointing operations.

.2 Prevent mortar from being placed or smeared onto face of stone to prevent mortar staining of masonry faces during pointing.

.3 Allow water to soak into masonry and mortar, leaving no standing water but remaining wet.

.4 Fill all bed and head joints full with pointing mortar, compact joints firmly to ensure positive adhesion to all inner surfaces.

.5 Thoroughly compact mortar into joint.

.6 At initial set, finish joints with stripping action using a short stout bristle brush to compact the joint further and produce a textured finish, exposing the aggregate. Do not project the mortar past the arrises or feather the mortar.

.7 On the rock faced work keep joints back approximately 3 mm behind arrises. On the cut stone and decorative work keep joints back approximately 1 mm behind arrises.

.8 Keep work clean, remove all droppings and clean faces of masonry units as work proceeds and again at the end of each day.

2. Protection on Completion

.1 Protect newly laid mortar from frost, rainfall or rapid drying conditions for three weeks.

.2 Protect newly laid mortar from frost until mortar is fully cured; minimum 3 weeks.

.3 Provide burlap enclosure and misting for minimum 48 hours to prevent initial shrinkage of mortar.

3.9 Preparation of Reglets

1. Cut and prepare reglets for all flashings where required.

2. Cut reglets 12 mm high and 25 mm deep for copper flashings and cut reglets 20 mm high and 30 mm deep for lead flashings. Obtain approval of Architect before cutting any stonework. Remove all loose mortar or stone to clean, square face at the back of the reglet.

3. Use straight edges to maintain accurate cuts.

3.10 Removal of Surplus Equipment and Metal Fixings, including Pointing of Scaffolding Tie Holds

1. Remove all metal fixings, brackets, wires, bolts, nails, screws and shields from masonry.

2. Remove any anchors or plugs by coring to ensure their complete removal.
3. Repoint where removed from mortar joints and at fixings on striking the scaffold.
4. Where removed from masonry unit and masonry unit will not be replaced patch hole with repair mortar.
5. Finish flush with face of masonry unit.
6. Do not permit this matrix to spread onto face of masonry.

3.11 Cutting Out and Replacement of Deteriorated Brick

1. Cut out all damaged back up brick and prepare for replacement with new brick.
2. Brick is damaged when:
   .1 It is cracked, chipped or spalled.
   .2 The outer face of the brick is hollow, detached or missing.
   .3 The Architect states so in writing.
3. Maintain stability of structure at all times.

3.12 Localized Replacement of Bricks

1. Bond, coursing and jointing to match existing.
2. Dampen back up masonry thoroughly and evenly; allow surface to dry.
3. Set bricks in full bed of mortar true to line and level with adjacent units.
4. Ensure cavity to rear of brick is filled solidly with mortar.
5. Fill and compact bed and vertical joints until filled solidly with mortar.
6. Tool joints flush to match existing.

3.13 Rebuilding Areas of Brickwork

1. Carry out work all as described in drawings.
2. In addition the following requirements apply:
   .1 Where replacing in excess of four bricks in one area, install masonry ties to bond facing with back up wythes of masonry.
   .2 Ties should be randomly installed except where areas are sufficiently large for ties to be set every 600 mm. horizontally and every 400 mm. vertically with staggered centres.
   .3 Ensure ties are solidly set in back up wythe.

End of Section 04500.

1 GENERAL

1.1 Summary

1. This section to conform to Division 1, General Requirements.
2. Work Included in this Section

.1 The cleaning of all stone surfaces of the building in the contract area.
.2 Cleaning shall include but not be limited to:

i. Removal of atmospheric soiling from masonry.
ii. Removal of soluble salts from masonry.
iii. Removal of organic staining, from the masonry.
iv. Removal of metallic stains:
a) Copper
b) iron
v. Removal of paints, bitumen and tars.
vi. Complete surface finishes, building clean down on completion of the work to remove any mortar staining, dust, and animal matter.

3. Scope and Intent of Cleaning

.1 Cleaning shall be carried out to all stone surfaces to remove soiling and staining without causing damage to the substrate.

1.2 Related Work Specified Elsewhere

1. Masonry Procedures: Section 04050
2. Masonry Restoration: Section 04500

1.3 Submissions and Mock-Ups

1. Submit samples, literature and details of tools, machinery and equipment as specified in Section 04050 Masonry Procedures.
2. Execute mock-ups as specified in Section 04050 Masonry Procedures.

1.4 Qualifications

1. Comply with requirements of Section 04050: Masonry Procedures.

1.5 Environmental Requirements

1. In addition to the requirements of Section 04050 - Masonry Procedures, the following also applies.
2. No masonry cleaning involving the use of water shall be undertaken within one month of average temperatures falling below freezing.
3. No chemical cleaning shall be performed when ambient or wall surface temperatures fall below 10°C. Maintain temperature for a minimum three weeks following cleaning.
4. No masonry cleaning shall be performed when winds are sufficiently strong to spread cleaning materials or rinsed cleaning materials to adjacent unprotected areas.
5. Comply with the requirements of the following Federal and Provincial Legislation related to the transportation use and disposal of all cleaning materials.

.1 Federal Transportation of Dangerous Goods Act.
.2 Ontario Regulation number 309: Liquid industrial and hazardous waste regulation.
.3 All such waste shall be carried by an approved Ministry of the Environment Haulage carrier and disposed of at a Ministry of the Environment approved receiving facility.
.4 Provide copies of certificates related to transportation use and disposal of all cleaning materials to Architect.

1.6 Protection

1. Submit complete details of all protection measures prior to commencing cleaning for approval by Architect.
2. Protect the public and adjacent property from contact with cleaning materials by erecting properly constructed protection, positioned to confine and prevent any overspray of water or chemicals. Provide complete details of such protection for approval by the Architect.
3. Any materials that may be damaged by the effects of any of the cleaning operations shall be protected as described herein.
4. All windows, including glass, frames and exterior metal shall be protected by painted 6 mm exterior grade plywood sealed at the edges with split closed cell pipe insulation and secured with non-ferrous anchors to prevent penetration of liquids.
5. In addition, employ polyethylene sheet with adhesive tape, strippable latex caulking and closed cell backer rod to protect all other situations as necessary.
6. Protect all other surrounding areas as recommended by the product manufacturer or as directed by the Architect. Such areas include, adjacent shrubs and lawns, all non-masonry surfaces and particularly metal surfaces.
7. Operatives shall be aware of hazardous nature of cleaning operations and shall always wear appropriate safety clothing during cleaning operations.

1.7 Schedule

1. Provide schedule of cleaning operation prior to commencing work for approval by Architect.
2. Provide Architect with minimum 48 hours notice of intent to commence cleaning operations.

2 PRODUCTS

2.1 Materials

1. Water: potable, clean and free from contaminants.
2. Where water has high iron or other metal content, pre-treat with complexing agents before use to reduce risk of staining.
3. Surfactant: non-ionic detergent suitable for use on masonry.
4. Petroleum based solvents: xylene, toluene, benzene and proprietary asphalt and tar removers.
5. Organic Solvents: methylene chloride.
6. Chemicals: Acids

   .1 EDTA (Ethylene Diamine Tetra-acetic Acid).
   .2 Orthophosphoric Acid, or proprietary "ferrous stain remover".
   .3 Proprietary ammonia-based "copper stain remover".

7. Poultice medium: absorbent clay medium; attapulgite clay.
8. Poultice reinforcement and accessories:

   .1 Fibre reinforcing: fibrillated fibre concrete reinforcement.
   .2 Plastic mesh reinforcing; alkali resisting.
   .3 6 mil clear polyethylene film.

9. Abrasives:

   .1 Abrasives shall be 70 and 90 mesh non-siliceous slag aggregate to approval of Architect.
   .2 Aluminum oxide powder, 100mesh.
   .3 Olivine, 120 to 150 mesh.
   .3 Abrasives for use with proprietary cleaning systems shall be approved by the Architect.

10. Biocide: Proprietary biocide, quaternary ammonia based.

2.2 Cleaning Equipment

1. Water Rinsing Equipment:

   .1 Piping and fittings to be plastic or non-ferrous.

.2 Water pumps to be fitted with accurate pressure regulators and gauges that are capable of being pre-set and locked at maximum specified levels.

.3 Equipment shall be designed to provide a flow rate of between 18 and 30 litres per minute [4 - 6 g.p.m.] at pressures ranging from 35kPa to 400kPa [50 p.s.i. - 600 p.s.i.].

.4 When rinsing on masonry or adjacent to masonry, employ pressures below 140kPa and working distances to ensure there is no loss of surface or damage to substrate.

.5 Equipment shall be equipped to provide heated rinse water at 80°C.

.6 Spray heads to be equipped with nozzles of the fan type with spray tips of between 15° and 25°.

2. Tools:

.1 Brushes: soft fibered nylon, natural soft and stiff bristle, phosphor bronze or stainless steel.

.2 Scrapers: wood, plastic or stainless steel.

.3 Trowels: corrosion resistant.

2.3 Abrasive Equipment

1. Portable light abrasive cleaning machine designed to operate in the 0-35 kpa range controlled at the nozzle by a trigger, and for use with a variety of nozzles from 2-6 mm in diameter. Acceptable products: Clemco 10289 CLR Classic Portable Abrasive Blast Cleaning Machine, complete with remote control valve, air filter, dial pressure regulator, and abrasive metering valve, to permit surge-free cleaning with 70 mesh and finer abrasives and equipped with 2 mm and 3 mm nozzles. Available from Hodge-Clemco Ltd., Orgreave Drive, Sheffield S139NR, UK.

2. Micro-abrasive equipment:
.1 Laboratory sized
.2 Electrically operated.
.3 Specifically designed for use with abrasives of fine flour consistency operating in the 0-35kpa range.
.4 Able to be fitted with a variety of nozzles from .006" up to .006" by .150".

3. Proprietary cleaning systems based on micro-abrasives and low-pressure water delivered by means of various nozzles (including standard, micro and piccolo) producing a rotating vortex process. Equipment should incorporate new Rotec/Quintek nozzles.
.1 Acceptable material: Jos Cleaning System.

3 EXECUTION

3.1 Preparation

1. All Methods: Provide protection as required and described herein and obtain approval of Architect.

3.2 Testing

1. Carry out test panels for each technique to determine detailed optimum procedures for each substrate and level of soiling.
2. Locations of test panels shall be selected by the Architect.
3. If initial methods prove unsatisfactory, combinations of methods shall be tried from acceptable alternatives.
4. Submit written results of tests, outlining methods, materials, concentrations of chemicals, dwell times etc. Obtain approval of Architect before proceeding.

3.3 Cleaning of Pigeon Droppings and Staining

1. The removal of all pigeon soiling is to be carried out wherever present on the building.
2. Using scrapers, remove as much of the soiling as possible.

3. Low pressure, maximum 140 kPa [200 p.s.i.] surfactant cleaning shall be employed to remove all stains. Supplement water washing with bristle brushing where sound substrate exists.
4. Use additional techniques in conjunction with poultices as necessary or as directed.
5. Allow poultice to dry.
6. Carefully scrape residue into plastic bags, seal and remove from site. Dispose of waste in accordance with hazardous waste legislation.
7. Pick up any droppings and dispose of as above.
8. Reapply poultice and repeat process as necessary.
9. Micro-abrasive clean where pigeon repellant has been applied over soiled stone.

3.5 Removal of Soluble Salts from Exterior Masonry

1. Dry brush areas containing salts to remove surface residues. Collect salts in bags and remove from site.
2. Thoroughly irrigate stone to put salts into solution.
3. Empty nebulised spray heads arranged to achieve maximum saturation with minimum water run-off.
4. Construct eaves trough to collect run-off and run to barrels. Remove from site.
5. Prepare poultice medium from attapulgite clay and clean water to consistency of stiff cream. Reinforce with fibres as necessary.
6. Trowel apply poultice to contaminated wall areas approximately 12 mm thick and leave finished neatly.
7. Where appropriate to provide support for the poultice over large areas apply mesh over poultice and secure into mortar joints with stainless steel fasteners.
8. Apply cover of polyethylene film or sheet and tape edges to control rate of drying.
9. Remove plastic after 24 hours.
10. Allow poultice to dry.
11. Carefully scrape residue into plastic bags, seal and remove from site. Dispose of waste in accordance with hazardous waste legislation.
12. Pick up any droppings and dispose of as above.
13. Reapply poultice up to four times as directed by the Architect.
14. Permit samples to be taken for analysis between applications.

3.6 Air Abrasive Cleaning

1. Air abrasive cleaning is to be employed for the localised removal of soiling including black atmospheric soiling which does not respond to other techniques or where it is more appropriate.
2. The location of all air abrasive cleaning will be agreed to with the Architect.
3. Perform cleaning as determined by testing.
4. Testing will have determined the equipment type, the abrasive, and mesh size, nozzle and venturi combinations, and size where relevant pressure at the nozzle, working distance and level of clean.
5. Clean without damaging stone.
6. Allow for one half day of training of operatives under the direction of the Site Conservator for all abrasive techniques.
7. Perform all cleaning in the presence of the Architect and to the level clean directed on site.
8. Permit Architect to carry out testing of cleaned stone to ensure compliance with performance standards.
9. Collect and dispose of cleaning materials from the work area twice daily, at the mid-day break and at the end of the working day.

3.7 Removal of Organic Growth

1. Remove organic growth where present.
2. Apply proprietary solution of quaternary ammonium - based biocide in accordance with manufacturer's directions, by hand held spray unit.
3. Apply as flood coat, allowing solution to penetrate masonry. Mask off and protect all other masonry from treatment.
4. Contain solution in area of clean. Collect any run off and dispose of in accordance with hazardous waste legislation.
5. Reapply as necessary.
6. Where organic growth turns brown where protection has killed it, dry brush or air abrasive clean stone to remove surface residues.

3.8 Removal of Metallic Stains, Bitumens, Tars or Paint

1. Carry out cleaning employing poultices to remove stains.
2. Prepare poultice medium mixed with clean water or solvents and chemicals as appropriate to the nature of soiling.
3. Mix to consistency of stiff cream.
4. Pre-wet soiled area with liquid portion of poultice.
5. Trowel apply poultice approximately 12 mm thick over soiled area and leave finished neatly.
6. Apply cover of polyethylene film or sheet and tape edges to control rate of drying.
7. Remove plastic after 24 hours.
8. Allow poultice to dry.
9. Carefully scrape residue into plastic bags, seal and remove from site. Dispose of waste in accordance with hazardous waste legislation.
10. Pick up any droppings and dispose of as above.
11. Reapply poultice and repeat process as necessary.

3.9 Clean Down of Building

1. Immediately prior to application of cleaning materials pre-wet section of wall to be cleaned using clean water.
2. Apply sufficient water to surfaces to point where no further water is absorbed.
3. Apply 5% solution by weight of surfactant.
4. Agitate on surface to create lather and to remove soiling.
5. Do not allow to dry out.
6. Thoroughly rinse all traces of cleaning solution from the masonry.
7. Reapply as necessary.

End of Section 04510.

1 GENERAL

1.1 Summary

.1 This Section to conform to Division 1, General Requirements.

.2 Work Included in this Section:

.1 Placement of Paving Stone Units.

.2 Backpointing of joints.

.3 Pointing of joints in stone masonry.

.4 Hand grouting voids.

1.2 Related Work Specified Elsewhere

.1 Masonry Mortar: Section 04100
.2 Stone Supply: Section 04430
.3 Stair and Ramp Accessories: Section 10900

1.3 Submissions

.1 Submit samples, literature and details of tools, machinery and equipment as specified.

.2 Execute mock-ups as specified in this section.

.3 Prepare materials for testing, in accordance with requirements of Section 01400, Quality Control.

1.4 Qualifications

.1 Provide demonstrated, specialized, skilled, and competent trades persons who shall have extensive experience in this type of work. The skills of individuals will be subject to review and acceptance by the Architect. Review will include production of basic mock-up.

1.5 Sequence of Work

.1 The Contractor shall develop a sequence of work which shall be agreed with the Architect.

1.6 Mock-up

.1 Execute mock-up for a strip of minimum 3'-0" long of laid paving stone.

2 PRODUCTS

2.1 General

.1 The use of any materials or custom equipment not listed below is not permitted without prior review of the Architect.

.2 Substitutions for any materials or custom equipment is not permitted without prior review of Architect.

2.2 Product Delivery, Storage and Handling

.1 Materials have limited shelf life.

.2 Ensure materials are delivered to site in original, unopened containers.

.3 Do not allow materials to freeze.

2.3 Materials

.1 Crushed black limestone dust; to pass 2.36 mm sieve.

.2 Clean water.

.3 Sponges, cotton rags, absorbent towels.

.4 Materials Specified Elsewhere

.1 Masonry Mortar: Section 04100

.2 Limestone Stone Supply: Section 04430

3 EXECUTION

3.1 Preparation

1. Seal and protect all openings, doors, windows, and adjacent areas to prevent damage and the spread of construction dust, water, or other materials into the building or onto adjacent sidewalks.

2. All sills and projecting courses are to be covered with rigid protection, secured into joints, for the duration of the work.

3. Any part of scaffolding, shoring or any construction plant shall not directly bear against the masonry. Provide isolating material of lumber or plywood with additional padding as necessary to prevent damage to the existing masonry.

4. Stone treads at stair will require continuous routing (at stair nosing) for the installation of colour contrast strips. Follow manufacturer installation instruction and product specifications. Pre-route stone prior to deliver units to site.

5. Stone paving at top stair landing will require drilling for the installation of individual stainless steel tactile attention indicators (tactile domes). Follow manufacturer installation instruction and product specifications. If required, pre-drill stone prior to deliver material to site or alternatively carry out drilling on-site.

3.2 Setting Stone

1. Drench dry stones with clean water just prior to setting.
2. Set stones true and in alignment, maintain joint thicknesses with soaked softwood, or plastic wedges until bedding mortar has set.
3. Pack exterior horizontal and vertical joints with plastic foam joint filler and leave ready for repointing.
4. Remove wedges when dry without breaking them off.
5. Pack exterior profile of these joints with plastic foam joint filler set to leave 30 mm from face of joint.
6. Fill joints behind packing with liquid bedding mix.

7. Sponge off any mortar droppings as work progresses.
8. Remove plastic foam joint filler and leave joints ready for pointing.
9. Mortar Fillings
   - .1 Prepare samples of repair mortars to meet the variation of colour in the stone.
   - .2 The characteristics of the repair mortar when wet and dry should be similar to the stone in colour, texture and permeability.
   - .3 Prepare aggregates and stone dusts in order to avoid the use of pigments.
   - .4 Prepare mock-ups using mortar prepared in proportions varying from 1:6 to 1:9, dispersed hydrated lime putty to aggregates.
   - .5 Pre-wet surface prior to application. Place mortars in up to l5mm layers and allow to harden before applying second layer.
   - .6 At surface slightly overfill, leaving repair mortar proud. Cover with damp absorbent towel.
   - .7 At appropriate time, work back mortar to finish flush with adjacent stone.
   - .8 Texture surface of mortar to match adjacent surface.
   - .9 Keep repair mortar damp for a minimum of three days.

3.3 Hand Grouting

.1 Hand grout voids that cannot be successfully filled by backpointing procedures. Obtain Architect's acceptance of voids and damming procedures prior to commencing grout operations.

.2 Prior to grouting, ensure that grout will not penetrate intentional cavities in walls by examining site conditions at back faces of voids and joints. Report findings to the Architect. Grouting may occur only where intentional cavities cannot be filled by grouting operations. Take all measures required to contain grout in voids and joints to be grouted using temporary damming materials, and as specified below.

.3 Carefully flush out joints and voids to be grouted to remove all loose materials and prewet backup materials. Do not oversoak wall, and ensure water does not penetrate to the interior, damage interior finishes, or flood intentional cavities.

.4 Pack solid faces of joints to be grouted with non-staining, non-oily, plumber's hemp or other acceptable damming material to a minimum depth of 20 mm, so that grout will be contained in the joint or void, and the void can be filled solid. Where required to keep grout from intentional cavities in the walls, install temporary dams to back face of joint.

.5 Form grout cup on wall at top of void or joint to be grouted using non-staining, non-oily, potters clay or other acceptable material to direct grout into voids without staining walls. Keep clay cups damp to prevent drying and cracking. Other methods of directing grout into voids and joints will be acceptable to Architect's approval.

.6 Pour grout into joint or void via clay cup, until voids filled. Do not exceed one metre lifts or one vertical joint at any one time.

.7 Continually observe interior and exterior faces of wall at grouting during grouting operations. Cease grouting if leaks occur at interior. Seal all leaks and make good all damage caused to the satisfaction of the Architect.

.8 Remove any grout spills immediately, using clean water and non-metallic bristle brushes to wash surfaces.

.9 Allow grout to set for 24 hours, then remove hemp packing, temporary dams, grout cups, and other grouting aids.

.10 Allow grout and wall to fully dry [minimum 3 weeks] before commencing finish pointing.

3.4 Backpointing

.1 Obtain acceptance of raked out work prior to commencing pointing operations.

.2 Where cut out joints are deeper than raking out depths specified above, backpoint joints to bring mortar face to specified depth for raked out joints, in preparation for finish pointing. Where voids exist that conventional backpointing cannot fill, grout voids in accordance with 3.4 Hand Grouting above.

.3 Immediately prior to pointing, thoroughly wet joints in order to control absorption.

.4 Allow water to soak into masonry and mortar, leaving no standing water but remaining wet.

.5 For backpointing, fill all joints full with pointing mortar, compacting mortar firmly into joints to ensure positive adhesion to all inner surfaces. Place mortar in layers, maximum 30 mm thick, minimum 12 mm thick, allowing each layer to set to thumbprint hard before placing next layer. Bring face of mortar in backpointed joint to specified depth for raked out joints, measured from the arris of the masonry unit, leave ready for final pointing.

.6 Prevent mortar from being placed or smeared onto face of stone to prevent mortar staining of masonry faces during backpointing.

.7 Keep work clean, remove all droppings as work proceeds, and again at the end of each day.

3.5 Pointing of Joints

.1 General

1. Obtain Architect's acceptance of raked out, backpointed, and grouted work prior to commencing pointing operations.

2. Prevent mortar from being placed or smeared onto face of stone to prevent mortar staining of masonry faces during pointing.

3. Allow water to soak into masonry and mortar, leaving no standing water but remaining wet.

4. Fill all bed and head joints full with pointing mortar, compact joints firmly to ensure positive adhesion to all inner surfaces.

5. Thoroughly compact mortar into joint.

6. At initial set, finish joints with stripping action using a short stout bristle brush to compact the joint further and produce a textured finish, exposing the aggregate. Do not project the mortar past the arrises or feather the mortar.

7. Keep work clean, remove all droppings and clean faces of masonry units as work proceeds and again at the end of each day.

8. Protection on Completion

   .1 Protect newly laid mortar from frost, rainfall or rapid drying conditions for three weeks.

   .2 Protect newly laid mortar from frost until mortar is fully cured; minimum 3 weeks.

   .3 Provide burlap enclosure and misting for minimum 48 hours to prevent initial shrinkage of mortar.

End of Section 04540

1 GENERAL

1.1 General Requirements

1. The General Conditions, the Supplementary General Conditions, the Instructions to Bidders, and Division 1 - General Requirements, shall be read in accordance with this Section.

2. The specification shall be read as a whole by all parties concerned. Sectioning of the specification is for convenience only. Each section may contain more or less than the complete work of any trade. The Construction Manager is solely responsible to make clear to the Subcontractors the extent of their work.

1.2 Shop Drawings:

1. Submit shop drawings for review by the Architect prior to fabrication. Submit hardcopies of shop drawings, five (5) copies in total.

2. Be governed by the following Design Criteria-Applicable Standards:

.1 All standards in accordance with latest issue.

.2 CSA Standard CAN3-S16.1-M, "Steel Structures for Buildings" Limit States Design.

.3 CSA Standard W59, "Welded Steel Construction" (Metal Arc Welding).

.4 CSA Standard W.55.2, "Resistance Welding Practice."

.5 CSA Standard W55.3, "Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings."

.6 CSA Standard W.47, "Certification of Companies for Fusion Welding of Steel Structures."

.7 CSA Standard S.136, "Cold Formed Steel Structural Members".

.8 Ontario Building Code 2012, as amended.

3. Certificates:

.1 Provide a certificate signed and sealed by the licensed/registered professional engineer responsible for the fabricated designs and the detailed connections stating that the materials and connections have been designed, detailed and fabricated in accordance with the applicable standards.

.2 Certification must bear the original seal and signature of the engineer and be dated. Photocopies are not acceptable.

4. Clearly indicate construction details, sizes of steel sections, thickness or gauge of steel sheet, connections, joints, method of anchorage, number of anchors, supports, reinforcement and accessories. Confirm all dimensions on site.

1.3 Related Work Specified Elsewhere:

1. Concrete Walks and Curbs - Section 02600
2. Cast in Place Concrete – Section 03300
3. Masonry Restoration - Section 04500
4. Limestone Paving - Section 04540
5. Metals Conservation - 05732
6. Sheet Metal Flashing and Trim - Section 07620
7. Rough Carpentry - Section 06100
8. Glass Balustrades – Section 08810

1.4 Standards:

1. Materials and workmanship shall conform to the requirements of the Ontario Building Code - 2006, as currently amended.

2. Do welding work to CSA W59, unless specified otherwise. Welders to qualify under CSA W47, CSA W55.2 and CSA W55.3.
3. ASTM B36-86 - Brass Plate, Sheet Strip and Rolled Bar.
4. ASTM B249 / B249M-09 – General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, Shapes and Forgings.
5. ASTM B455-05 – Standard Specification for Copper-Zinc Leaded Alloy (Leaded Brass) Extruded Shapes
6. ASTM B135-85 - Low-lead Brass Tube.
7. ASTM F593-85 - Stainless Steel Bolts, Hex Cap Screws, and Studs.
8. ASTM F594-85 - Stainless Steel Nuts.
9. ASTM A296 - Stainless Steel.

1.5 Quality Assurance:

1. Welding Applicable Standards:
   .1 CSA Standard W59, "Welded Steel Construction" (Metal Arc Welding).
   .2 CSA Standard W.55.2, "Resistance Welding Practice."
   .3 CSA Standard W55.3, "Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings."
   .4 CSA Standard W.47, "Certification of Companies for Fusion Welding of Steel Structures."
2. Quality Assurance: Fabrication and erection of **ALL** components to be by companies holding current C.W.B. Certification as Division 1 or Division 2.1. All welding by welders will hold current certification for the required welding position.
3. Qualifications of Subcontractor:
   .1 Work of this Section shall be executed by a subcontractor who has adequate plant, equipment and skilled tradesmen to perform the work expeditiously and is known to have been responsible for satisfactory installation similar to that specified during a period of at least the immediate past five years.
4. Welder Qualifications:
   .1 Weld structural components: in steel, to conform to requirements of CSA Standard W59, and by a fabricator fully certified by the Canadian Welding Bureau to conditions of CSA Standard W47.1 and W55.3 as applicable.
5. Regulatory Requirements
   .1 Work of this Section which functions to resist forces imposed by dead and live loads shall conform to requirements of the Authorities having Jurisdiction.
   .2 Submit shop drawings required by Authorities to them.
6. Quality Control Submittals:
   .1 Inspect Architectural Bronze material sheets.
   .2 Check qualifications of welders and fabricators. Check correctness or procedures, materials and equipment.
7. Welding:
   .1 Begin by subjecting approximately 25% of welds to inspection. If problems are indicated, increase inspection to as much as 100% of all welds at the discretion of the Consultant and Inspector.
   .2 Inspection shall be visual, or in the event of problems, ultrasonic.

8. Erection:

.1 Check erection for tolerances and any cutting required.

.2 Check one or more in every five bolted connections for torque in all bolts and soundness of connection.

1.6 Scope:

1. Fabricate, supply, and install the following components:

.1 Supporting frames, base plates, posts, lintels, brackets, etc.

.2 Landscaping edging as per 03/A4.3

.3 Fabricate and assemble by welding and/or mechanical fastening ready to install on site.

.4 Metal components (whole or a portion of) as identified for replacement on drawings, schedules, and other sections of these specifications.

.5 Metal components (whole or a portion of) as identified for repair in-situ and/or in-shop on drawings, schedules, and other sections of these specifications.

.6 Metal components in whole as identified on drawings, schedules, and other sections of these specifications as new.

2 PRODUCTS

2.1 Materials:

1. Unless detailed or specified otherwise, standard products will be acceptable if construction details and installation meet intent of drawings and specifications.

2. Include all materials, products, accessories, and supplementary parts necessary to complete assembly and installation of Work of this Section.

3. Incorporate only metals that are free from defects which impair strength or durability, or which are visible. Install only new metals of best quality, and free from rust or waves and buckles, and that are clean, straight, and with sharply defined profiles.

4. Non-Ferrous Metals:

.1 Sections and plate: C95400 Aluminum Bronze.

.2 Miscellaneous plate: C95400 Aluminum Bronze.

.3 Sections and Plate of Bronze: C95400 Aluminum Bronze

.4 Solder material: Harris Safety Silv 0XHP Brazing Filler Metal, with black brazing flux as required by manufacturer, by the Harris Products Group.

5. Ferrous Metals:

.1 Stainless Steel Structural Shapes, Bar, Rod and Plate: ASTM 666-84 and ASTM A296, Type 304: full hard temper, Brinell hardness: 140, Tensile strength 35,000 - 50,000 psi.Type 316: full hard temper.

.2 Stainless Steel Fasteners: Type 304 stainless steel with machine threads for connection of braces and components. ASTM F593-85 (bolts) and ASTM F594-85 (nuts).

.3 Include with Work of this Section anchor bolts, bolts, washers and nuts, lag screws, rods, expansion shields, toggles, straps, sleeves, brackets, clips and other items necessary for secure installation as required by loading and jurisdictional authorities.

.4 Mild steel welded wire mesh with electroplated brass coating as supplied by Dupont Wire, 130 Lepage Court #14, Toronto, ON M3J 1Z9, Canada (416) 638-8891.

6. Prime Paint: Zinc Chromate, rust inhibitive primer conforming to CGSB-1-GP-18M or oil alkyd type (shop coat) conforming to CGSB-1-GP-40M.

7. Expansion Joints: as specified.
8. Welding Materials: CSA W59
9. Non-shrink Grout: Por-Rok by Hallemite Products Ltd., or SET 15 Minute Anchoring Cement by SET Products Ltd.
10. Galvanized Touch-Up Paint: Zinc rich, Galvafroid by W.R. Meadows of Canada Ltd. or approved equal.
11. Bronze Lacquer Finish: Acrylic lacquer such as "Incralac" (Stanley Chemical Co.), (Conservation Materials), (Maas & Waldstein Co.), (Custom Aerosal Packaging), or approved equal. Available in spray cans or 5-gallon drums.

2.2 Fabrication - General

1. Fabricate components in the shop in largest size practicable to minimize field jointing.
2. Fabricate components square, straight, true, free from warpage and other defects. Accurately cut, machine file and fit joints, corners, copes and mitres.
3. Reinforce fabricated components to safely withstand expected loads.
4. Make joints in built-up sections with hairline joints in least conspicuous locations and manner.
5. Make allowance for thermal expansion and contraction when fabricating exterior work.
6. Joints shall be welded unless otherwise indicated and unless details of construction do not permit welding. Exposed welds shall be continuous and shall be ground smooth.
7. Close exposed open ends of tubular members with welded on steel plugs.
8. Where work of other Sections is to be attached to work of this section, prepare work by drilling and tapping holes, as required to facilitate installation of such other work.
9. Work of this Section, supplied for installation under other Sections, shall be prepared as required ready for installation by drilling, countersinking and tapping holes, forming shapes and cutting to required sizes.
10. Grind off mill stampings and fill recessed markings on steel components left exposed to view.
11. Make workmanship of best grade of modern shop and field practice known to recognized manufacturers specializing in this work. Fit joints and intersecting members accurately. Make work in true plumb, true, square, straight, level and accurate to sizes and shapes detailed, free from distortion or defects detrimental to appearance or performance.
12. Insulate metals where necessary to prevent corrosion due to contact between dissimilar metals and between metals and masonry, concrete or plaster. Use bituminous paint, butyl tape, building paper or other approved means.
13. Supply all fastenings, anchors and accessories required for fabrication and erection of the work. Make exposed metal fastenings and accessories of same material, texture, colour and finish as base metal on which they occur unless otherwise shown or specified. Keep exposed fastenings to an absolute minimum and inconspicuous, spacing them evenly and setting them out neatly. Make fastenings of permanent type.
14. Draw mechanical joints to hairline tightness and seal countersunk screws and access holes for locking screws with metal filler where these occur on exposed surface.

2.3 Finishes

1. Thoroughly clean steel of lose scale, rust, oil, dirt and other foreign matter. Suitable prepare steel surfaces by power tool cleaning to receive specified finishes. Bronze stock material to be clean and free from corrosion, weld drippings and any extraneous stains.
2. Grind smooth sharp projections.

3. Remove oil and grease from steel components by solvent cleaning. Bronze stock to be wiped down with a soft cloth and kept dry before coating.

4. Apply coatings in the shop and before assembly. Where size permits, galvanize components after assembly.

5. Shop apply coat of primer to interior components after fabrication except where galvanized finish and stainless steel is required.

6. Hot dip galvanize exterior components and other components, where so indicated, after fabrication in accord with requirements of CSA Standard G164-M1981.

7. Apply coat of bituminous enamel to contact surfaces of metal components in contact with cementitious materials and dissimilar metals.

8. Bronze stock to be lacquered after fabrication of frame assembly and after field drilling and tapping for mechanical fasteners. Lacquer to be spray-applied in shop to a minimum 25 micron dry film thickness.

9. After erection and installation, thoroughly clean the work and apply field touch up of same formula as shop coat to all damaged or unpainted surfaces. Work all paint well into all joints, crevices and open spaces.

2.4 Miscellaneous Steel Sections

1. Supply all miscellaneous steel angles, plates, etc., indicated on the architectural drawings or noted on the structural drawings by others. Size according to loads, set plumb and true and securely fix. Continuously weld and grind smooth exposed connections. Others may be welded or bolted.

3 EXECUTION

3.1 Verification and Preparation

1. Take site measurements to ensure that Work is fabricated to fit surrounding construction, around obstructions and projections in place, or as shown on Drawings, and to suit service locations.

2. Prior to commencing fabrication and erection, inspect adjacent construction and notify the Consultant in writing of any conditions which might prejudice a proper installation. Commencement of erection shall constitute acceptance of adjacent construction and conditions.

3. Protect existing work and the work of other trades from damage.

4. Be responsible and pay full costs of repair for any damage caused by this trade.

5. Maintain protection of the Work of this Section from time of installation until final finishes are applied or to final cleanup.

3.2 Installation

1. Install components plumb, square, straight and true to line. Drill, cut and fit as necessary to attach this work to adjoining work.

2. Provide temporary supports and bracing required to position components until they are permanently anchored in place.

3. Securely anchor components in place; unless otherwise indicated, anchor components as follows:

.1 To concrete and solid masonry with expansion shields and bolts.

.2 To hollow construction with toggle bolts.

.3 To thin metal with screws or bolts.

.4 To thick metal with bolts or by welding.

.5 Fill space between railing members and sleeves with non-shrink grout.

.6 To wood with bolts or lag screws.

4. Provide all components required for anchoring. Make anchoring in concealed manner wherever possible. Make exposed fastenings, where approved by Architect neatly and of same material, colour, texture and finish as base metal on which they occur. Keep exposed fastenings evenly spaced.

4. Dissimilar metals and metals in contact with cementitious elements shall have contact surfaces coated with bituminous paint or be isolated by other means as approved by Architect.

5. After installation, clean and refinish injured finishes, welds, bolt heads and nuts. Refinish with zinc rich paint or primer or finish coating to match original finish.

3.3 Miscellaneous Items, Steel Brackets Supports and Angles

1. Supply for installation by respective trades, steel brackets, supports and angles as indicated on drawing. Drill for countersunk screws and anchor bolts. Prime paint for interior, hot-dipped galvanize for exterior.

2. Provide steel miscellaneous angles and hanger rods as required by the work.

3. Provide other metal fabrications which are not a part of a manufactured item or covered under another section in Division 5. Refer to drawings.

3.4 Welding and Brazing

1. Ensure metal surfaces are clean and free of oil, grease or oxide contamination. Brush surfaces with a stainless-steel brush or a rigorous rubbing with emery cloth. If using emery cloth, wipe surface free of dust particles with a clean, dry cloth.

2. Assemble framing members using appropriate jig material to ensure a flat face fit of all bronze tee members, and that the temporary jig keeps all members from excessive movement during the welding process. It is suggested the members are scarfed together for maximum area of weld and strength.

3. Apply flux material by brush to the weld surfaces to be heated. Be neat with the application and do not allow extraneous flux to drip or adhere to non-welded surfaces of the bronze.

4. Pre-heat the bronze areas to be welded using appropriate oxy-acetylene torch methodology. Heat to brazing temperature. Do not directly heat the fluxed surfaces to be welded.

5. Allow the braze solder to leach into the joint, keeping the temperature of the bronze members hot enough to allow full capillary action of the brazing material into the joint.

6. Quench the joint in clean, distilled water to clean the joint of miscellaneous flux material. Any remaining flux must be wire brushed off or cleaned in a weak acid solution, taking care not to acid-etch the joint. All extra flux material must be cleaned off; no black discolouration is to be left around the jointing areas.

3.5 Lacquer Finishes

1. Shop spray bronze frame assembly with Incralac Lacquer, ensuring to provide uniform coverage over entire surface area.
2. Minimum number of coats – 6 coats. Wait 15-20 minutes per coat, final coat must be left to cure for a minimum of one (1) hour.
3. Minimum dry film thickness to be 25 microns (0.025 mm).
4. Clean drips and uneven surfaces with a methanol mineral spirit and re-apply lacquer to an even coat.

End of Section 05500

1 GENERAL

1.1 GENERAL REQUIREMENTS

1. Conform to Sections of Division 1 as applicable.

1.2 RELATED WORK

1. Firestopping and smoke seals: Section 07840, Penetration Firestopping.
2. Finish painting: Section 09900, Painting and Finishing.

1.3 REFERENCES

ASTM A53-90b	-	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM A123-89a	-	Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153-82 (1987)	-	Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307-92a	-	Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength
ASTM A325M-92a	-	Specification for High-Strength Bolts for Structural Steel Joints [Metric]
ASTM A366M-91	-	Specification for Steel Sheet, Carbon, Cold-Rolled, Commercial Quality
ASTM A570M-92	-	Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
ASTM A 653/A653M-96	-	Specification for Steel Sheet, Zinc-Coated Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
CAN/CGSB-1.40-M89	-	Primer, Structural Steel, Oil Alkyd Type
CAN/CGSB-1.81-M90	-	Air Drying and Baking Alkyd Primer for Vehicles and Equipment
CAN/CGSB-1.181-92	-	Ready Mixed Organic Zinc Rich Coating
CAN/CSA-G40.20-M92	-	General Requirements for Rolled or Welded Structural Quality Steel
CAN/CSA-G40.21-M92	-	Structural Quality Steels
CAN/CSA-G164-M92	-	Hot Dip Galvanizing of Irregularly Shaped Articles
CAN/CSA-S16.1-M89	-	Limit States Design of Steel Structures
CSA W47.1-92	-	Certification of Companies for Fusion Welding of Steel Structures
CSA W48 Series	-	Electrodes
CSA W48.1-M91	-	Carbon Steel Covered Electrodes for Shielded Metal Arc Welding
CSA W59-M89	-	Welded Steel Construction (Metal Arc Welding)
CAN/CSA-W117.2-M87	-	Safety in Welding, Cutting and Allied Processes
SSPC	-	Steel Structures Painting Council, "Steel Structures Painting Manual Vol. 2"

1.4 SYSTEM DESCRIPTION

1. Design Requirements

.1 Generally, Drawings give information on specific shape and dimensions required and in certain cases, load imposed. For items where load information is only indicated, provide steel supports and anchorage for general design indicated, sized to suit specified loads. Provide bracing as may be required to counter lateral loads and dynamic stresses where vibration of support equipment may occur.

.2 Comply with OBC, for design of all stressed members.

1.5 SUBMITTALS

1. Shop Drawings:

.1 Submit shop drawings. Show and describe in detail work of this Section including large scale detail of members and materials, of connection and jointing details, and of anchorage devices, dimensions, gauges, thicknesses, description of materials, metal finishing, as well as other pertinent data and information.

.2 Shop drawings indicating structural components shall bear professional stamp and signature of professional engineer licensed to design structures and registered in Province of Ontario.

2. Certification:

.1 Submit certification from registered professional structural Engineer registered in province of Ontario, who shall affix his/her seal and signature to certificate, stating structure is capable of supporting its own weight and specified live loads.

1.6 QUALITY ASSURANCE

1. Welder Qualifications:

.1 Execute welding by firm certified in accordance with CSA W47.1 Division 1 or 2.1.

.2 Operators employed on Work shall be qualified per CSA W47.1 for work as specified herein.

2 PRODUCTS

2.1 MATERIALS

1. Steel, Structural Quality, WWF, W-Shapes, HSS Sections and Structural Tees: CAN/CSA-G40.20-M and CAN/CSA-G40.21-M, Grade 350W.
2. Steel, Structural Quality, Plates, Bars, Angles and C-channels: CAN/CSA-G40.20-M and CAN/CSA-G40.21-M, Grade 300W.
3. Sheet Steel: Commercial Quality ASTM A366M stretcher levelled or temper rolled.
4. Steel Pipe: ASTM A53 standard weight, Schedule 40 seamless black.
5. Aluminum extrusions: AA 6063-T5 alloy
6. Welding Materials: Conform to CSA W48.1-M and CSA W59-M.

7. Fasteners (Concrete Anchors, Toggle Bolts, and Hammer Driver Bolts): Star Expansion, Hilti (Canada) Ltd. or Ucan Fastening Products.
8. Metal Filler: Polyester based, White 'Lightnin' by Marson Canada Inc. or Combo or First choice by Dura Chemicals Ltd.
9. Primer: Conform to following requirements:
   .1 CAN/CGSB-1.40-M.

2.2 PREFABRICATED ITEMS

.1 Reserved

2.3 FABRICATION

.1 Fit and assemble work in shop where possible. Execute work according to details and reviewed shop drawings. Where full shop assembly is not possible, make trial assembly in shop.

.2 Do welding to CSA W59-M. File or grind welds smooth and flush where exposed to view and where specifically indicated on Drawings.

.3 Fit joints and intersecting members accurately. Make work in true planes with adequate fastening.

.4 Supply fastenings, anchors, accessories required for fabrication of work of this Section. Such items occurring on or in exterior wall or slab shall be hot dip galvanized.

.5 Fastenings include (without being limited to) anchor bolts, machine bolts, toggle bolts, self-drilling anchor, lag screws, expansion shields, sleeves, brackets, washers, and nuts. Supply bolts with all washers and nuts required for complete installation. Provide lock washers where vibrations may occur.

.6 Make exposed metal fastenings and accessories of same material, texture, colour and finish as base metal on which they occur unless otherwise indicated or specified. Keep exposed fastenings to an absolute minimum evenly spaced and neatly laid out. Make fastenings of permanent type unless otherwise indicated.

.7 Shop Welding:

1. Execute welding to avoid damage or distortion to Work. Should there be, in the opinion of The Architect or Inspection and Testing Company, doubt as to adequacy of welds, they shall be tested for efficiency and any work not meeting Standards shall be removed and replaced with new work satisfactory to The Architect. Carry out welding in accordance with following Standards:
   CSA W48-M: for electrodes (If rods are used, only coated rods are allowed)
   CSA W59-M: for design of connections and workmanship
   CAN/CSA-W117.2-M: for safety

2. Clean welded joints and steel exposed for sufficient space to properly perform welding operation. Neatly finish welds. Welds which will be exposed to view and finish painted shall be continuous and ground smooth.

.8 Shop Painting:

1. Do not prime non-ferrous metals.

2. After fabrication, blast clean ferrous metals exposed in finished work, SSPC SP6. Clean, brush, scrape and remove oil, grease, and extraneous matter from other surfaces, solvent clean to SSPC SP1.

3. After cleaning mask edges with duct tape to be field welded.

4. Prime Finish: After cleaning, except where specified otherwise, apply full, smooth priming coat in shop. Work paint into corners and open spaces and deliver to Site with primer undamaged and to satisfaction of The Architect. (Commercial blast cleaned surfaces are to be primed immediately).

.9 Hot Dip Galvanizing:

1. After fabrication, hot dip galvanize specific miscellaneous steel items indicated on Drawings and/or called for herein. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with brush or spray-applied anti-corrosion coating containing 92-95% zinc, in accordance with manufacturer's printed directions.

2. Galvanize following: 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 indicated on Drawings.

3. Hot-dip galvanize steel members specified to be galvanized except galvanized sheet steel, in accordance with CAN/CSA-G164-M and requirements of following ASTM Standards, with minimum coating weights or thicknesses as specified.:

- Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips: ASTM A123; average weight of zinc coating per m^2 (sq ft) of actual surface, less than 6 mm (1/4") thickness members, 605 g (2 oz); 6 mm (1/4") or heavier thickness members, 710 g (2.3 oz).
- Iron and Steel Hardware: ASTM A153; minimum weight of zinc coating, in (ounces per sq ft) of surface shall be in accordance with Table 1 of ASTM A153, for various classes of materials used on Work.

4. Galvanized steel sheet to ASTM A 653/A653M -Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, coating designation Z275 (G90), minimized spangle and chemically treated. Weight of zinc coating, 275 g/m^2 (1-1/4 oz per sq ft) on both sides of sheet.

.10 Aluminum Finish: all aluminum to be clear anodized to AAM12 C22A31.

3 EXECUTION

3.1 INSTALLATION

1. Build and erect work plumb, true, square, straight, level and accurate to sizes detailed, to reviewed shop drawings, free from distortion or defects detrimental to appearance and performance.

2. Insulate metals where necessary to prevent corrosion due to contact between dissimilar metals and between metals and masonry, concrete or plaster. Use bituminous paint, butyl tape, building paper or other approved means.

3. Supply instructions, templates, and, if necessary, supervise installation of fastenings or accessories requiring to be built-in by other Sections of Work.

4. After erection and installation, clean work and apply field touch of same formula as shop coat primer to damaged or unpainted surface of shop primed material. Work primer into joints, crevices, interstices, and open spaces.

5. Weld as specified herein.

3.2 CONNECTIONS

1. Main member connections shall be welded or bolted with high tensile strength bolts and double angle connections as listed in CISC Code of Standard Practice for Structural Steel.

2. Bolted Connections

    1. High strength bolted connections shall be bearing type using M20 (3/4") bolts conforming to ASTM A325M. Secondary members may be bolted with machine bolts.

    2. Perform high tensile bolted connections in accordance with CAN/CSA-S16.1-M and be field tested. Accurately space holes of size 1.6 mm (1/16") larger than nominal diameter of bolt. High tensile bolt connections shall be bearing (friction) type unless noted otherwise. Provide compressor or electrical equipment capable of supplying and maintaining required pressure at wrench. Make connections without use of erection bolts, some high tensile bolts will serve that purpose. Nuts or bolts, except high tensile bolts, shall be prevented from becoming loose by burring bolt thread, by welding or by lock washers or lock nuts.

3. Fasteners

    1. Supply fasteners, anchors and accessories required for erection of work of this, and other Sections. Ensure items occurring on or in exterior wall or slab are stainless steel or hot dipped galvanized (as per drawings).

    2. In concrete and masonry, use epoxy injection anchor for vibration and heavy loads, and where anchors may be close to edge or close to adjacent anchors.

3. Use sleeve anchors in hollow block and brick for light static loads.

4. Use ULC approved drop-in anchors for pipe and sprinkler systems suspended from concrete ceiling.

5. Use wedge anchors for light to medium static loads in concrete.

6. Use concrete screws for light static loads in concrete, block, and masonry.

7. Use heavy load expansion anchors for heavy static, vibratory or impact loading in concrete.

4. Welding

1. Welds on exterior work shall be continuous to provide proper weathering.

2. Take necessary safety precautions in accordance with CSA Standards when welding is carried out in cold weather.

3. No welding of galvanized products is allowed.

3.3 SCHEDULES

1. General: Provide miscellaneous metal work indicated on Drawings and not included in work of other Sections in addition to items listed below. Where items are required to be built into masonry, concrete or other work supply such items to respective Sections with all anchors and accessories for building in.

2. Itemized List: Provide the following metal work unless specifically designated to be supplied only. The list supplied herein is not necessarily complete and shall be augmented by thorough inspection of Drawings and all other requirements to complete Work. Each item shall be as indicated on Drawings and as detailed on reviewed shop drawings:

1. Support Framing Systems: Provide fabricated steel support for washroom vanities, shelving, counter, and other framing systems indicated, complete with anchors, brackets, sleeves, screws, and incidentals required to complete installations. Secure to wall and/or floor in semi concealed manner to support vanities greater than 6'-0" in length or where end of vanity is not supported by abutting wall.

2. Aluminum Framing for cabinetry: Supply aluminum extrusions to sizes and shapes as required by 06400, Architectural Millwork for fabrication of cabinetry and millwork.

3. Sheet Steel Covers: Supply sheet steel covers fabricated of minimum 0.9 mm (1/32") thick galvanized steel sheet to Division 15, Mechanical and 16, Electrical requiring covers over temporarily unused sleeves in vertical plane. Openings in slabs and openings in other horizontal planes shall be structurally sound to suit application and size of opening and shall be in conformance with OBC requirements.

4.

5. Provide steel sections which are:

   - Not indicated and identified on Structural Drawings, unless noted to be supplied by another Section of Specifications.

   OR

   - Not noted on Drawings to be supplied by another Section of Specifications.

   OR

   - Not specified under another Section of Specifications.

6. Provide such items complete with anchors, brackets, bearing plates and other accessories required for installation.

7. Where steel sections are required to be built into masonry or concrete, supply such members to respective trades for building in.

8. Work shall include, without being limited to:

   - Steel lintels (loose), including those required over masonry openings and recesses for mechanical or electrical services.

   - Where lintels cannot be supported on masonry, provide plates anchored flush into column or wall and weld lintel thereto to satisfaction of The Architect.

   - Steel framing for louvre openings.

9. Miscellaneous Items: Provide items complete with anchors, brackets, sleeves, screws, and other incidentals required and as detailed. Where steel items or supports are required to be built into masonry or concrete, supply such members to respective trades.

End of Section 05999

1 GENERAL

1.1 GENERAL REQUIREMENTS

1. Conform to Sections of Division 1 as applicable.

1.2 RELATED WORK

1. Supply of wood doors: Section 08210, Wood Doors.

2. Finish Carpentry and Millwork, under Section 06200, 06255 and 06400.

3. Filling over surface nail holes: Section 09900, Painting and Finishing.

1.3 REFERENCES

ASTM E84-91a	- Test Method for Surface Burning Characteristics of Building Materials
CAN/CGSB-37.4-M89	- Fibrated, Cutback Asphalt, Lap Cement for Asphalt Roofing
CAN/CSA-G164-M92	- Hot Dip Galvanizing of Irregularly Shaped Article
CAN/CSA-O80 Series-M89	- Wood Preservation
CAN/CSA-O86.1-M89	- Engineering Design in Wood (Limit States Design)
CSA O86.1.1-M91	- Commentary on CSA Standard CAN/CSA- O86.1- M89, Engineering Design in Wood (Limit States Design)
CSA O121-M78	- Douglas Fir Plywood
CAN/ULC-S102-M88	- Surface Burning Characteristics of Building Materials and Assemblies
NLGA	- National Lumber Grades Authority, Standard Grading Rules for Canadian Lumber, 1987
ULC	- Underwriters' Laboratories of Canada

1.4 SUBMITTALS

1. Shop Drawings

    1. Submit shop drawings.

    2. Shop drawings shall clearly indicate material being supplied and shall show all connections, attachments, reinforcing, anchorage, and location of exposed fastenings.

2 PRODUCTS

2.1 MATERIALS

1. Framing Lumber: Lumber for each type of structural component shall be of same species and grade, equally seasoned and shall be processed and stamped at same mill. Lumber identification shall conform to requirements of Standard Grading Rules for Canadian Lumber of National Lumber Grades Authority (NLGA).

2. Grading: 120, National Grading Rule for Dimension Lumber.

3. Moisture Content: Moisture content of all lumber for rough carpentry at the time of building-in, shall not exceed 17%.

4. Studs: Spruce, 122b "Construction" light framing.

5. Joists and Other Framing Members: Spruce 124b. "No. 1" Structural Joists and Planks, except as otherwise specified.

6. Members Other Than Studs and Less Than 89 mm (4") Wide: Spruce, 122c. "Standard" light framing, except as otherwise specified.

7. Nailing Strips, Blocking, Furring and Strapping: Spruce, 122c. "Standard" light framing.

8. Fire Retardant Lumber

    1. Fire Retardant Treatment: Dricon by John A. Biewer (Canada) Ltd.
    2. All lumber shall be kiln dried to 19% and have visible grade stamps according to National Lumber Grading Association rules for dimensional lumber.
    3. Pressure treat lumber with fire retardant chemical, according to CSA 080.20, and colour for on-site recognition. Follow-up inspection and labelling shall be provided by ULC and material shall be certified to have following:

        Flame spread rating: 25 or less
        Fuel contribution: 25 or less
        Smoke development: 25 or less.

    4. All pieces of lumber shall be kiln dried to 19% after pressure impregnation. Treated lumber shall remain dry (below fibre saturation) in relative humidity exposures up to 95%.
    5. Fire retardant chemical used for treatment, shall be free of halogens, sulphates, ammonium phosphates, and formaldehyde.

9. Softwood Plywood, Douglas Fir, CSA O121-M of Following Grades:

    1. Good One Side (G1S).

10. Wood Preservative

    1. All exterior wood and all interior wood attached to masonry shall be pressure treated.
    2. For painted surfaces use Pentox (clear) by Osmose-Pentox Inc. or Super Solignum-10-10 Paintable Penta by Solignum Inc.
    3. For concealed surfaces use Pentox (green) by Osmose-Pentox Inc. or Preserv-Green 1-42 by Solignum Inc.

11. Rough Hardware: Nails, screws, bolts, lag screws, anchors, special fastening devices and supports required for erection of carpentry components. Use galvanized components if exposed to exterior atmosphere. Galvanize in accordance with requirements of CAN/CSA-G164-M.

3 EXECUTION

3.1 INSTALLATION

1. Construct and install work as indicated on Drawings.

2. Machine dressed work shall be slow fed using sharp cutters and finished members shall be free from drag, feathers, slivers or roughness of any kind.

3. Frame materials with tight joints rigidly held in place.

4. Design construction methods for expansion and contraction of materials.

5. Erect work plumb, level, square and to required lines.

6. Be responsible for methods of construction and for ensuring that materials are rigidly and securely attached and will not be loosened by work of other trades.

7. Fasten wood nailers, blocking, framing, and strapping solidly to adjacent materials in true planes. Bore holes for bolted work true to line and same size as bolts, drive into place for snug fit, use plate or washer to prevent nut from bearing directly on wood, and turn up nuts, bolts, and lag screws tight at time of installation and again immediately before being concealed with other work are at completion of work.

8. Furring, Bearing Plates and Rough Framing: Provide and install where indicated on Drawings or required.

9. Strips and Blocking

    1. Provide and install wood strips, infill panels and sheathing required for attaching work of other Sections.
    2. Provide and install all wood blocking required.

10. Wood Preservative Treatment

    1. Treat fresh cut ends of pressure treated wood with two coats of wood preservative.

    2. Apply 1 coat of wood preservative to all concealed wood members in contact with exterior walls or roof including deck of roof platform and walk, before fixing in place. Apply 1 coat wood preservative to wood platform and walks before fixing in place. Treat all cut ends of preserved lumber.

    3. Treat all surfaces of exterior blocking, curbs, cants and other concealed exterior woodwork, with wood preservative; apply in accordance with manufacturer's directions.

    4. Ensure compatibility with membranes to be applied to wood treated with preservative. Conform to membrane manufacturer’s directions.

11. Rough Hardware

    1. Supply and install all rough hardware.

2. Fasten to hollow units with toggle bolts and to solid masonry or concrete with lead expansion shields and lag screws. No organic fibre or wood plugs shall be used.

12. Miscellaneous Carpentry Work: Supply and install all other carpentry indicated on Drawings or as required for completion of work. Co-operate with other trades in installing items supplied by other Sections, cut openings in woodwork when so required and make good disturbed surfaces.

13. Roof Curbs, Bases and Supports: Construct pressure treated wood roof curbs for ventilation ducts, fan bases, etc., as detailed or required by other trades. Construct suitable approved pads to receive duct supports. Note tops of all curbs for roof top units shall be a minimum 14" (350 mm) above finished roof surface.

14. Rough Bucks, Grounds, Blocking, Strapping, Furring

1. Furring, blocking or strapping indicated is not be regarded as exact or complete. Location and methods of securing these pieces to option of Contractor. Provide adequate nailing.

2. Cut grounds and screeds in long lengths as practical with square ends. Erect to create true, plumb planes and fasten rigidly in place.

3. Provide minimum 2" x 4" (38 mm x 89 mm) blocking as necessary for attachment of base, trim, cabinets, fixtures, hardware, miscellaneous specialties, equipment and the like unless indicated otherwise. Cut ends square and fasten rigidly to build structure.

4. Rough bucks shall be minimum 2" (38 mm) thick wood of width indicated, set straight, true and plumb, braced and fastened securely in place.

5. For general strapping, set treated wood strips vertically spaced 16" (400 mm) on centre, unless otherwise indicated. Shim so faces form a true plane. Provide intermediate horizontal strapping at all joints to wall finishes applied over grounds.

15. Framing

1. Frame walls, partitions, roofs, etc., as indicated. Note: metal studs supplied and installed under Section 09110.

2. Set wood studs 16" (400 mm) o.c. unless otherwise noted, using a single bottom plate and double top plates. Double studs at openings and triple at corners and partition intersections. Provide one row of horizontal bridging of same material as studs.

16. Blocking: Provide minimum 2 x 4 (38 mm x 89 mm) blocking or size as required for secure attachment of base, trims, cabinets, fixtures, miscellaneous specialties, equipment etc. and the like unless specified otherwise. Cut ends square and fasten rigidly to building structure.

17. Fire Retardant Wood: Electric and Telephone Backboards and Panel Boards: Supply and install 19 mm thick backboards and panel boards, fire pressure treated, fir plywood. Consult electrical drawings for locations and requirements. Provide wood strapping as required. Fasten to wall using fasteners and spacing suitable to wall type to provide secure, sturdy installation which will carry equipment load without damaging.

End of Section 06100

1 GENERAL

1.1 General Requirements

1. Conform to Sections of Division 1 as applicable.

1.2 Related Work (NOT LIMITED TO)

1. Supply of doors and frames: Section 08212, Heritage Style Wood Doors.
2. Filling nail holes: Section 09900, Painting and Finishing.

1.3 References

CAN/CGSB-11.3-M87	-	Hardboard
CAN3-A172-M79	-	High Pressure Paper Base, Decorative Laminates
CAN/CSA-G164-M	-	Hot Dip Galvanizing of Irregularly Shaped Articles
CSA O112 Series-M77	-	CSA Standards for Wood Adhesives
CSA O115-M82	-	Hardwood and Decorative Plywood
CSA O121-M1978	-	Douglas Fir Plywood
CSA 0151-M1978	-	Canadian Softwood Plywood
CAN3-O188.1-M78	-	Interior Mat-Formed Wood Particleboard
NEMA	-	LQI, Decorative Board
NFPA 80	-	Fire Doors and Windows 1990 Edition
NHLA	-	National Hardwood Lumber Association 1982
NLGA	-	National Lumber Grades Authority, Standard Grading Rules for Canadian Lumber, 1987
ULC	-	Underwriters' Laboratories of Canada

1.4 Submittals

1. Shop Drawings:
   - .1 Submit shop drawings.
   - .2 Shop drawings shall clearly indicate material being supplied and shall show all connections, attachments, reinforcing, anchorage and location of exposed fastenings.

2. Samples:
   - .1 Submit 3 representative samples, minimum 600 mm long, of each type of hardwood required.

1.5 Delivery, Storage and Handling

1. Protection:
   - .1 If required, store finish carpentry components items in temperature and humidity-controlled area until delivery.
   - .2 Do not permit delivery of finish carpentry components to Site until area is sufficiently dry so that woodwork will not be damaged by excessive changes in moisture.

1.6 Warranty

1. Warrant work of this Section against defects and deficiencies in accordance with General Conditions of the Contract. Promptly make good defects and deficiencies which become apparent within warranty period to satisfaction of Consultant and at no expense to Owner. Defects and deficiencies include but are not limited to warpage of finish carpentry components.

2 PRODUCTS

2.1 Materials

1. Framing Lumber: Lumber for each type of structural component shall be of same species and grade, equally seasoned and shall be processed and stamped at same mill. Lumber identification shall conform to requirements of Standard Grading Rules for Canadian Lumber of National Lumber Grades Authority (NLGA).

2. Grading: 120, National Grading Rule for Dimension Lumber.

3. Fitment Framing: Pine, 117c. "C Select".
4. Nailing Strips and Strapping: Spruce, 122c. "Standard" light framing.
5. Rough Hardware: Nails, screws, bolts, lag screws, anchors, special fastening devices and supports required for erection of carpentry components.

2.2 Fabrication

1. General Workmanship

.1 Fabricate and install work in accordance with best practice by skilled workers of companies specializing in work specified and to requirements of other trades. Each item shall be as indicated on Drawings and as detailed on reviewed shop drawings.
.2 Use running members in greatest lengths obtainable.
.3 Machine dressed work shall be slow fed using sharp cutter and finished work shall be free from drag, feathers, slivers, or roughness of any kind. Remove machine marks by sanding.
.4 In finished work machine sand exposed surfaces in shop and hand sand on job to even smooth surfaces, free from scratches, ready for finishing.
.5 Frame materials with tight joints rigidly held in place. Use glue blocks where necessary.
.6 Assemble work in shop and deliver to Work ready for installation, as far as practicable. Leave ample allowance for fitting and scribing on job.
.7 Take care to prevent opening up of glue lines in finished work.
.8 Design construction methods for expansion and contraction of material.
.9 Conceal joints and connections wherever possible. Locate prominent joints where directed by MBS Designee. Intermediate joints between supports not permitted.
.10 Accurately scribe, cope and mitre members where required.
.11 Finished woodwork shall be free from bruises, blemishes, mineral marks, knots, shakes and other defects and shall be selected for colour, grain and texture.
.12 Take field dimensions and fabricate work to suit field dimensions.
.13 Fasten wood nailers, blocking, framing and strapping solidly to adjacent materials in true planes.
.14 Moisture content of interior woodwork shall be not less than 4% nor more than 8%.

3 EXECUTION

3.1 Installation

1. Construct and install work as indicated.
2. Install work in accordance with best practice by skilled workers specializing in work specified and to requirements of other trades. Each item shall be as indicated and as detailed on shop drawings.
3. Erect work plumb, level, square and to required lines.
4. Be responsible for methods of construction and for ensuring that materials and rigidly and securely attached and will not be loosened by work of other trades.
5. Joints made on Site shall be equal in quality and workmanship to joints made in shop.
6. Install finish hardware.

3.2 Doors and Frames

1. Doors Frames, Screens and Transoms:

.1 Set door frames and screens plumb, square, level, maintaining widths and heights. Coordinate with other sections.
.2 Brace frames rigidly in position while building in. Remove temporary steel shipping jamb spreaders. Install wood spreaders at third points of frame, rebate height to maintain frame width. Provide vertical support at centre of head for openings exceeding 1200 mm in width. Remove wood spreaders after frames have been built-in.
.3 Make allowance for deflection to ensure structural loads are not transmitted to frame.
.4 Pack voids in door jamb and head which occur at exterior walls with specified insulation.
.5 Prior to installation apply urethane foam coating to inside face of door frame where sound

resistant doors are indicated on Drawings and Schedule.

2. Door Installation:

.1 Hang doors to swing shut with 1.6 mm clearance at heads, 2 mm at jambs and 6 mm clearance over finished floor surfaces. Install doors so face on opening side is kept 1.6 mm shy (recessed) from rebate even after bumpers are installed. Undercut wood doors where required by Division 15.
.2 Install fire rated doors in accordance with NFPA 80 requirements.
.3 Adjust operable parts for correct clearance and function.
.4 Install door silencers and metal louvres.
.5 Secure transom and side panels by means of concealed fasteners or countersunk screws concealed by means of wood plugs matching panel.
.6 Trim non-rated door width by cutting equally on both jamb edges. Trim door height by cutting bottom edges to maximum of 19 mm. Trim fire-rated door height at bottom edge in accordance to ULC requirements. After trimming door, have painter seal top and bottom edges of door under Section 09900, Painting and Finishing.

3. Finish Door Hardware:

.1 Take delivery of finish hardware and install, except hardware specified as part of work of another Section. Check each item as received.
.2 Install finish hardware for fire rated doors in accordance with NFPA 80 requirements.
.3 Set, fit and adjust hardware according to manufacturer's templates and instructions. Hardware shall operate freely. Protect installed hardware from damage and paint spotting.
.4 Install all hardware for doors.
.5 Consult with manufacturer of hardware items such as door monitoring equipment, card reader access equipment, electric strikes, and electric hinges operated by card access equipment and combination magnetic door holder releases/door closers and install in accordance with manufacturer's recommendations under supervision of Section 16720, Fire Detection and Alarm System. Provide adequate notice to Section 16720, Fire Detection and Alarm System in advance of installation. Use templates as supplied by manufacturer for pre-drilling doors and frames.
.6 Pre-drill kickplates and doors before attachment of plates. Apply with water resistant adhesive and countersunk stainless-steel screws.
.7 Barrier Free Access: Mount door hardware in full conformity with Section 3.7 of the Ontario Building Code – Barrier Free Access and in accordance with dimensions indicated in the Contract Documents. Confirm mounting heights with MBS Designee prior to commencement of frame and door preparation.
.8 All mineral core fire doors shall have pilot hole of 3 mm diameter pre-drilled for installation of hinges and screws shall be turned into pilot holes by use of manual or "Yankee" screwdriver.

4. Weatherstripping of Doors:

.1 Obtain weatherstripping from Section 08710, Finish Hardware or as specified in door schedules.
.2 Weather-strip exterior doors. Install effectively to tightly seal entire perimeter of door. Secure in place with non-ferrous screws, in accurate alignment.
.3 Maintain integrity of weather seal at head of doors fitted with closers. Adapt weatherstripping as required to achieve specified performance and provide any necessary accessories.

5. General: Supply and install all other carpentry indicated on Drawings or as required for completion of work. Co-operate with other trades in installing items supplied by other Sections, cut openings in woodwork when so required and make good, disturbed surfaces.

3.3 Wainscotting and Panelling

1. This Section is to include for the supply and installation, rebuilt, patching, and making good of the existing wood wainscot, baseboards, casings, trims and panelling in Corridor 101K - to match existing.
2. Construct work square, level, and true to match existing in size, assembly and maintaining same widths

and heights.

3.4 Field Quality Control

1. In accordance with Section 01400, Quality Requirements, Minister may engage services of independent recognized Architectural Hardware Consultant (AHC) to review hardware supplied upon delivery to Site and to review installation to assess proper application of finish hardware in accordance with reviewed hardware and keying schedules.

2. Notify MBS designee 2 weeks in advance of delivery of finish hardware to Site and 2 weeks in advance of Substantial Performance of the Contract and allow AHC with free access. Obtain and co-ordinate service of competent mechanic from Section 08710, Finish Hardware to assist with verification of hardware received and operation and adjustment of operating hardware items.

3.5 Cleaning

1. On completion, clean all surfaces from dust.

End of Section 06200

1 GENERAL

1.1 Summary

1. This section to conform to Division 1 General Requirements.
2. Work Included in this Section:

.1 The cleaning of doors and windows' wood surfaces including frames, sills, jambs, trims, casings, stops, paneling, etc.

.2 Cleaning shall include but not be limited to complete removal of paints, stains, adhesives and all existing finishes.

3. Scope and Intent of Cleaning:

.1 Apply the cleaning material to remove existing paint and stain coatings from:

.1 All doors and wood window sashes – to be carried out in the shop
.2 All door/window surfaces including frames, sills, jambs, stops, casing, apron, and any other non-removeable exterior wood trim and components associated with doors and windows – to be carried out in-situ.

.2 Apply material to remove all existing paint and stain finishes without causing damage to the substrate. Removal of adhesives, where present, is required to prepare wood for refinishing.

1.2 Related Work Specified Elsewhere

1. Surface Preparation: Section 09993
2. Painting: Section 09994

1.3 Submissions and Mock-Ups

.1 Submit samples, literature and details of methods, tools, machinery and equipment proposed.

1.4 Qualifications

.1 Work of this section shall be completed by individuals with a minimum of five (5) years' experience at this type of work.

1.5 Environmental Requirements

.1 Comply with the requirements of the following Federal and Provincial Legislation related to the transportation, use and disposal of all cleaning materials.

.1 Federal Transportation of Dangerous Goods Act.
.2 Ontario Regulation Number 309: Liquid industrial and hazardous waste regulation.
.3 All such waste shall be carried by an approved Ministry of the Environment Haulage carrier and disposed of at a Ministry of the Environment approved receiving facility.
.4 Provide copies of certificates related to transportation use and disposal of all cleaning materials to Architect.

.2 Ensure removal and disposal of any hazardous materials is in accordance with the governmental regulations and policies.

1.6 Protection

1. Submit complete details of all protection measures prior to commencing cleaning for approval by Consultant.
2. Protect the general public and adjacent spaces from contact with cleaning materials by erecting properly constructed protection, positioned to confine and prevent spread of the cleaning materials. Provide complete details of such protection for approval by the Consultant.

3. Any materials that may be damaged by the effects of any of the cleaning operations shall be protected as described herein.
4. In addition, employ polyethylene sheet with adhesive tape, strippable latex caulking and closed cell backer rod to protect all other situations as necessary.
5. Protect all other surrounding areas and adjacent surfaces as recommended by the product manufacturer or as directed by the Consultant.
6. Operatives shall be aware of hazardous nature of cleaning operations and shall always wear appropriate safety equipment and clothing during cleaning operations.

1.7 Schedule

1. Provide schedule of cleaning operation prior to commencing work for approval by Consultant.
2. Provide Consultant with minimum 48 hours notice of intent to commence cleaning operations.

2 PRODUCTS

2.1 Materials

1. Water: potable, clean and free from contaminants.
2. Where water has high iron or other metal content, pre-treat with complexing agents before use to reduce risk of staining.
3. Abrasives:

.1 The use of power tools is NOT permitted on historical wood
.2 Abrasives for use with proprietary cleaning systems shall be approved by the Consultant.

4. Paint Strippers

.1 Do not use sodium hydroxide (lye) based strippers.

.2 Methylene chloride base, gel type. The following materials are acceptable:
1. Fast Acting Stripper by ProSoCo

.3 Organic ester based; the following materials are acceptable:

.1 3M Safest Stripper, Minnesota Mining and Manufacturing Company, St Paul, Minnesota 55144-1000, Telephone (612) 733-1100.
.2 Peel-Away 6, as manufactured by Dumond Chemical Inc., 1501 Broadway, New York, NY, Telephone (212) 869-6350.
.3 Savogran Strypeeze Safer, as manufactured by Savogran Company, P.O. Box 130, Norwood, Massachusetts 02062, Telephone (617) 762-5400.

.4 Shellac, Lacquer, and Varnish Remover: Minwax Antique Furniture Refinisher.
.5 Smart Strip Pro (SCI-66) by Dumond Chemicals Inc., 83 General Warren Boulevard, Suite 190, Malvern, Pennsylvania USA 19355 – Telephone: 1-609-655-7700.

.5 Fasteners
.1 Brass nails and screws.

.6 Consolidant Materials
.1 Refer to section Wood Epoxy Consolidation – 08612.

.7 Semi-rigid Patching Compound Materials
.1 Refer to section Wood Epoxy Patching – 08613.

2.2 Cleaning Equipment

.1 Tools:

.1 Brushes: soft fibered nylon, natural soft and stiff bristle or phosphor bronze.

.2 Scrapers: wood, plastic or stainless steel.
.3 Trowels: corrosion resistant.
.4 Sand Paper (Grade/Grit as required)

3 EXECUTION

3.1 Preparation

.1 All Methods: Provide protection as required and described herein and obtain approval of the Architect.

3.2 Testing

.1 Carry out test panels for each technique to determine detailed optimum procedures for paint and stain removal.
.2 Test locations shall be selected by the Architect.
.3 If initial methods prove unsatisfactory, combinations of methods shall be tried from acceptable alternatives.
.4 Submit written results of tests, outlining methods, materials, concentrations of chemicals, dwell times etc. Obtain approval of Architect before proceeding.

3.3 Cleaning

.1 Air abrasive cleaning must not be employed on historical wood.
.2 The user of heat guns is NOT permitted for the stripping of wood.
.3 The use of power tools is NOT permitted on historical wood. The use of chemicals as listed above, along with manual scraping and sanding is the mode of operation for cleaning any historical wood.
.4 Perform cleaning as determined by testing and by paint stripper manufacturer recommendation.
.5 Clean without damaging wood. Remove all sealants.
.6 Allow for one half day of training of operatives under the direction of the Wood Cleaning Contractor.
.7 Collect and dispose of cleaning materials from the work area twice daily, at the mid-day break and at the end of the working day.

End of Section 06910.

1 GENERAL

1.1 General Requirements

.1 Conform to Sections of Division 1 as applicable.

1.2 Related Work

.1 Gypsum Board: Section 09250
.2 Division 3: Concrete
.2 Insulation for mechanical work: Division 16

1.3 REFERENCES

ASTM E84-91a	-	Test Method for Surface Burning Characteristics of Building Materials
CAN/CGSB-51.10-92	-	Mineral Fibre Board Thermal Insulation
CAN/CGSB-51.34-M86	-	Vapor Barrier, Polyethylene Sheet for Use in Building Construction
CGSB 71-GP-24M	-	Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation
CSA B111-74	-	Wire Nails, Spikes and Staples
CAN/ULC-S102-M88	-	Surface Burning Characteristics of Building Materials and Assemblies
CAN/ULC-S701-97	-	Thermal Insulation, Polystyrene, Boards and Pipe Covering
CAN/ULC-S702-97	-	Mineral Fibre Thermal Insulation for Buildings

1.4 Delivery, Storage And Handling

.1 Deliver materials to Site in original wrappings with labels intact and store in areas directed by Architect.
.2 Store insulation on raised platforms and protect with waterproof covers. Prevent exposure of insulation to sun.
.3 Store materials inside buildings for 24 hours prior to installation.

2 PRODUCTS

2.1 Materials

.1 Loose Insulation: Loose mineral fibre insulation, CAN/ULC-S701-97, Type 5, thickness and/or 'R' value as indicated on Drawings. Mineral wool semi-rigid batt insulation with flexible edge by Roxul or Paratec.
.2 Rigid Insulation: ROCKWOOL Comfortboard® 80 for underside of slab in basement Cellar B11 50mm thick, Styrofoam™ Brand XPS Insulation by Dupont 50mm thick or Sopra XPS by Soprema 50mm thick for all other uses (ramp, stair, slabs, walls).
.3 Vapour Barrier: Polyethylene film, CAN/CGSB-51.34-M, 0.10 mm or 0.15 mm (4 or 6 mils) thick.
.4 Adhesive Tape for Sealing Vapour Barrier Joints: Polyethylene Adhesive Tape:

Scotch brand No. 483 manufactured by 3M Canada Inc.

.5 Foil Vapour Barrier Tape: Pressure sensitive aluminum foil tape, 0.127 mm (2 mils) thick, 75 mm (3") wide, Scotch brand No. 425 manufactured by 3M Canada Inc. or dead soft aluminum foil tape manufactured by Canadian Hanson Ltd.

3 EXECUTION

3.1 Installation

1 General

.1 Install materials in accordance with manufacturer's instructions.

.2 Do not cover insulation until it has been reviewed by Architect.

.2 Loose Insulation

.1 Install insulation to maintain continuity of thermal protection to building elements and spaces. Insulation to be friction fit between studs, joists, or furring members.

.2 Fit insulation closely around electrical boxes, pipes, ducts, frames, and other objects in or passing through insulation.

.3 Do not compress insulation to fit into spaces.

.4 Do not install insulation in any part of the building where protection against inclement weather has not yet been provided and where the insulation could thereby be wet or damaged.

.5 Provide and install supports as required to keep insulation in place at soffits with floor above and around ducts in attic space.

.6 Keep insulation a min. 3" (75 mm) from heat emitting devices such as recessed light fixtures.

.3 Rigid Insulation

.1 Work shall include rigid insulation in roof parapets, roof curbs and below concrete entrance slabs.

.2 Surfaces to receive rigid insulation shall be clean, free of grease and oil, and reasonably smooth with no mortar or concrete pin projections.

.3 Install all materials in accordance with manufacturer's printed instructions unless otherwise specified herein.

.4 Ensure a uniform, continuous thermal barrier effect. Where insulation is to be provided under other Sections, co-ordinate the work such that the thermal barrier continuity is achieved.

.5 Install insulation after building substrata materials are dry.

.6 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.7 Fit insulation closely around electrical boxes, plumbing and heating pipes and ducts, and other protrusions.

.8 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from damaged or broken edges. Use the longest possible lengths to reduce the number of joints. Keep insulation minimum 3" (75 mm) from heat emitting devices such as recessed light fixtures, and a minimum 2" (50 mm) from sidewalls of CAN4-S604 Type "A" chimneys and CAN1-B149.1 and CAN1-B149.2 Type "B" and "L" vents.

.9 In multiple layer applications offset both vertical and horizontal joints.

.10 Do not enclose insulation until it has been inspected.

.11 Prime surfaces before using asphaltic type adhesives and install insulation using adhesive or fasteners in strict accordance with manufacturer's instructions.

End of Section 07 21 16

1 GENERAL

1.1 GENERAL REQUIREMENTS

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

1.2 WORK INCLUDED

1. Firestopping and smoke seals at wall to above grade floors and roof assemblies at all vertical fire separations and at fire rated walls (including 0 hr. rated walls) as noted on the Fire Separation Diagrams at both drywall and masonry walls. Firestopping and smoke seals for all openings and penetrations through floor assemblies. Division 15 and 16 of firestopping and smoke seals shall be by Mechanical and Electrical Contractors where their equipment and materials penetrated rated walls.

1.3 RELATED SECTIONS

1. Gypsum Wallboard - Section 09250
2. Mechanical - Division 15
3. Electrical - Division 16

1.4 SAMPLES

1. Submit samples in accordance with Section 01300 - Shop Drawings, Product Data, Samples and Mock-ups.

2. Submit 1'-0" (300 mm) x 1'-0" (300 mm) sample of each actual firestop material proposed for project.

1.5 QUALITY ASSURANCE

1. Applicator shall be licensed by the manufacturer of fireproofing materials with minimum three years documented experience for installing firestopping and smoke seal systems.

2. Submit manufacturer's certification that materials meet or exceed specified requirements.

3. Product manufactured under ULC Follow-up Program. Each container or package shall bear ULC label or listing mark.

1.6 SHOP DRAWINGS

1. Submit shop drawings and product data in accordance with Section 01300 - Shop Drawings, Product Data, Samples and Mock-ups.

2. Submit shop drawings to show proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.

3. Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation.

1.7 SEQUENCING AND SCHEDULING

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

1.8 MUNICIPAL AUTHORITY APPROVAL

1. Discuss firestopping and smoke seal requirements with municipal building inspector to obtain their approval prior to installation. Determine which products and/or procedures will be required to obtain final approval.

2. Submit in writing, prior to commencing installation, full detailed descriptions of materials and methods to be employed for firestopping work to achieve full final approval of authorities having jurisdiction.

2 PRODUCTS

2.1 MATERIALS

1. Firestopping and smoke seal systems: A/D FIREBARRIER Firestop Systems by A/D Fire Protection Systems Inc., capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN4-S115-M85, and not to exceed opening sizes for which they are intended. Other manufacturers shall not be used unless approved in writing (5) days prior to tender closing. Approved Alternate Manufacturer: Tremco Ltd., Fire Stopping Systems.

2. Mineral Wool Backing Insulation: ULC Labelled, preformed non-combustible material A/D FIREBARRIER Mineral Wool by A/D Fire Protection Systems Inc.

3. Firestopping Sealant: ULC labelled, single component silicone based, A/D Silicone FIREBARRIER Sealant by A/D Fire Protection Systems Inc.

4. Firestopping Seal: ULC labelled, single component water-based seal, A/D FIREBARRIER Seal by A/D Fire Protection Systems Inc.

5. Spray-On Firestopping Sealant: ULC labelled, high performance single component, water-based, elastomeric acrylic firestop sealant, "TREMstop Acrylic SP" (sprayable grade) by Tremco Ltd.

6. Fire resistance rating of installed firestopping assembly not less than the fire resistance rating of surrounding floor and wall assembly as indicated on the drawings.

7. Firestopping system at openings around penetrations for pipes, ductwork, conduit and other mechanical and electrical items requiring sound and vibration control; elastomeric sealant type with mineral wool; do not use a cementitious or rigid seal at such location.

8. Primers: to manufacturer's recommendation for specific material, substrate, and end use.
9. Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

10. Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

11. Sealants for vertical joints: non-sagging.

12. Firestopping mortar is not acceptable for this project.

3 EXECUTION

3.1 EXAMINATION

1. Examine existing conditions to receive this work prior to submitting shop drawings.

2. Examine surfaces to receive work of this Section and report any defects which may affect the Work of this Section.

3. Verify that openings are ready to receive the Work of this Section.

4. Confirm compatibility of surfaces to receive firestopping and smoke seal materials.

5. Beginning of installation means acceptance of existing surfaces and substrate.

3.2 PREPARATION

1. Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are dry and frost free.

2. Prepare surfaces in contact with firestopping materials and smoke seals to manufacturer's instructions.

3. Maintain insulation around pipes and ducts penetrating fire separation.

4. Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

1. Install firestopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.

2. Seal holes or voids made through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained. For vertical sections, sealant is required only on the top side of the mineral wool. It is required on both sides for horizontal sections except only one side on 0 hr. rated walls.

3. Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
4. Tool or trowel exposed surfaces to a neat finish.

5. Remove excess compound promptly as work progresses and upon completion.

6. Install firestopping with smoke seal sealant on both sides of all fire rated walls except for 0 hr. rated walls where sealant is required continuously only one side of mineral wool backing insulation.

3.4 INSPECTION

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

2. Arrange for final inspection of the work of this Section by firestopping manufacturer and municipal building inspector prior to concealing or enclosing work. Make corrections required.

3.5 SCHEDULE

1. Fire and smoke seal at all areas where work is indicated on drawings and at locations as follows:

.1 Generally all locations required by code.

.2 Penetrations through fire resistance rated (including 0 hour rated fire separations) masonry and concrete walls (except mechanical and electrical penetrations which will be firestopped by the mechanical and electrical contractors).

.3 Top of fire resistance rated masonry and gypsum rated partitions and walls NOTE: Refer to Architectural drawings for locations of vertical fire separations.

.4 Intersection of fire resistance rated masonry.

.5 Control and sway joints in fire resistant rated masonry.

.6 Penetrations through all floor slabs and fire rated ceilings (except mechanical and electrical penetrations which will be firestopped by the mechanical and electrical contractors).

.7 Openings and sleeves installed for future use through fire resistant rated separations.

3.6 CLEAN-UP

1. Remove excess materials and debris and clean adjacent surfaces immediately after application.

2. Remove temporary dams after initial set of firestopping and smoke seal materials.

3.7 CERTIFICATION

1. The manufacturer of the firestopping and smoke seal products shall inspect each application on site and certify in writing its fire rating.

2. Costs for manufacturer's site inspection of firestopping and smoke seals application and certification shall be included in this Contractor's Section 07270 base bid.

End of Section 07270

1 GENERAL

1.1 General Requirements

1. Conform to Sections of Division 1 as applicable.

1.2 Related Work

1. Read other Sections of Specifications for extent of sealing specified in those Sections. Do all other sealing indicated, specified or required.

1.3 References

CAN/CGSB-19.13-M87	-Sealing Compound, One-Component, Elastomeric, Chemical Curing
CAN/CGSB-19.17-M90	-Sealing Compound, One-Component Acrylic Emulsion Base
CAN/CGSB-19.22-M89	-Mildew-Resistant Sealing Compound for Tubs and Tiles
CAN/CGSB-19.24-M90	-Multicomponent, Chemical-Curing Sealing Compound

1.4 Description

1. Provide joint sealant work required to seal building tightly from exterior and interior, to withstand action of elements and to complete building envelope and all other joint sealant work, unless specified to be included under other Sections.

1.5 Submittals

1. Samples: Provide cured, colour samples of manufacturer's standard range of colours in each type of sealing and caulking compound for colour selection by Architect. Submit samples of primer, bond breaker tape and joint backing material, if requested.

2. Submittals: Submit product information from sealant manufacturers 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, brick, stone, concrete, masonry, metals and metal finishes, paints.
   8. suitability of sealants for temperature and humidity conditions at time of application.

1.6 Quality Assurance

1. Qualifications: Perform work of this Section by recognized and established sealant applicator having experience using skilled mechanics trained in use of sealing equipment and specified materials. Submit proof of experience upon Architect's request.

2. Review Specification for work included under this Section 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. Consider also following items:

   - Weather conditions under which work will be done;
   - Anticipated frequency and extent of joint movement;
   - Joint design;
   - Suitability of durometer hardness and other properties of material to be used;

- Recommendations of manufacturer for mixing of multi-component sealants;
- Number of beads to be used in sealing operation and priming operation if required.

1.7 Mock-Up:

1. At Site, in area(s) designated by Architect, provide a 1 m (39") long mock-up for each type 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. Construct additional samples if required to obtain approval. Do no sealing work until samples have been approved. Approved samples shall become standard of comparison for sealing and caulking work on Site and shall become part of Work.

1.8 Delivery, Storage And Handling

1. Deliver caulking and sealing materials to Site in original, unopened containers with manufacturers labels and seals intact. Labels shall 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 sealing materials that has been stored for period of time exceeding maximum recommended shelf life of materials.

1.9 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 and obtain Architect's approval.

1.10 Warranty

1. Warrant work of this Section against defects and deficiencies in accordance with General Conditions of the Contract. Promptly correct to satisfaction of Architect and at no expense to Owner, any defects or deficiencies which become apparent within warranty period. Defects include, but are not limited to cracking, crumbling, melting, shrinkage, sag, failure in adhesion, cohesion or 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.

2 PRODUCTS

2.1 Materials

1. Colours: to be selected by Architect from manufacturer's standard range to match colour of predominant materials to which sealant is applied.

2. Formulation: non-bleeding, non-migrating, capable of supporting their own weight. Use self levelling type for horizontal surfaces and non-sag type at vertical and soffit applications. Use manufacturer's product for each Type specified.

3. Sealant Types:

1. Single component modified urethane base chemical curing conforming to CAN/CGSB-19.13-M, Class MCG-2-25-B-N, Sikaflex 1A by Sika Canada Inc. or Dymonic and or Vulkem 116 by Tremco Limited or RC-1 by Sternson Limited.

2. Multi component, polyurethane base, chemical curing, CAN/CHSB-19.24-M80 Type 2, Class B, by Tremco Limited or approved equivalent. Colour to be mixed to colours as selected by

Architect.

4. Joint Backing: preformed, compressible, resilient, non-waxing, non-extruding, non-staining strips of closed cell polyethylene or urethane foam. Sizes and shapes to suit various conditions, diameter 25% greater than joint width. Backing shall be compatible with sealant, primer and substrate.

5. Bond Breaker Tape: as recommended by sealant manufacturer.

6. Joint Primer: non-staining, suitable for substrate surfaces, compatible with joint forming materials and as recommended by sealant manufacturer.

7. Cleaning material: non-corrosive, non-staining, solvent type, xylol, methyl-ethyl-ketone (MEK), toluol, isopropyl alcohol (IPA) or as recommended by sealant manufacturer and acceptable to material or finish manufacturers for surfaces adjacent to sealed areas.

3 EXECUTION

3.1 Examination

1. Ensure joints are suitable to accept and receive sealants. Commencement of work implies acceptance of surfaces and conditions.

2. Do not apply sealant to masonry until mortar has cured.

3. Before any sealing work is commenced, test materials for indications of staining or poor adhesion.

3.2 Preparation

1. Remove existing caulking and/or sealant from all joints (and as noted on Drawings). Ensure that all joint interfaces are clean.

2. 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.

3. Clean porous surfaces such as concrete, masonry or stone by wire brushing as required to obtain clean and sound surfaces.

4. Clean ferrous metals of rust, mill scale and foreign materials by wire brushing or sanding.

5. Remove loose particles by thorough brushing.

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, ketone solvent, xylol or toluol and wipe dry with clean cloth. 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 following width/depth ratio:

   .1 maintain 2:1 width/depth ratio: minimum joint size shall be 6 mm (1/4") x 6 mm (1/4"), maximum depth of sealant to be 13 mm (1/2").

8. Install joint backing material to achieve correct and uniform joint profile.

9. Where joint design or depth of joint prevents use of joint backing material, apply bond breaker tape to prevent three-sided adhesion.

10. 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.

11. Reserved.

12. Where surfaces adjacent to joints are likely to become coated with sealant during application, mask them prior to priming and sealing.

13. Do not exceed shelf life and pot life of materials, and installation times, as stated by manufacturers.

14. Be familiar with work life of sealant to be used. Do not mix multiple component materials until required for use.

15. Use materials as received from manufacturer, without additions, deletions and adulterations of materials.

16. Mix multiple component sealants and bulks sealants using mechanical mixer capable of mixing without mixing air into material, strictly in accordance with manufacturers' 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.

17. 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 Architect and change primer and sealant to compatible types approved by Architect.

18. Where irregular surface or sensitive joint border exists, apply masking tape at edge of joint to ensure joint neatness and protection.

19. 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 sealant using hand operated guns or pressure equipment fitted with suitable nozzle size and equipment approved by sealant manufacturer. Apply in accordance with manufacturer's directions and recommendations.

2. 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 shall not be acceptable.

3. 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.

4. Compound may be tooled, provided that such tooling does not damage seal or tear compound. Avoid pulling of sealant from sides.

5. Tool surfaces as soon as possible after sealant application or before any skin formation has occurred, particularly when using silicone sealants.

6. Joint surfaces shall be 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.

7. Drawings do not show all locations to be sealed. This Section to seal all locations except those indicated in other Sections of Work, required to create and ensure continuous enclosure.

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 Architect. Tests may include sampling of installed product where adhesion, cohesion or reversion failure is suspected.

2. 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. Confirm in writing by Manufacturers Representative to be on site throughout construction period work to inspect application of sealant and surface preparation.

3.5 Repair

1. Remove any compounds not complying with requirements specified herein. Exercise care in removal operations not to mar or damage finishes adjacent to joints. Repeat preparation, priming and installation of new material as specified to provide finished work complying with specified requirements, and acceptable to Architect. Do such repair work at no extra cost to Owner.

3.6 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.

3.7 Protection of Completed Work

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 Architect.

End of Section 07900

1 GENERAL

1.1 General Requirements

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

1.2 Work of related Sections

1. Painting and Finishing – Section 09900
2. Installation of wood doors and frames: Section 06200, Finish Carpentry.
3. Supply and Installation of new Glazing: Section 08800, Glass and Glazing
4. Installation of door hardware: Section 08710, Door Hardware.

1.3 Submittals

1. Shop Drawings: Indicate each type of door, cut-outs and materials being supplied. Manufacturer's numbering system shall correspond to consultant's numbering system.

2. Samples:

.1 Submit samples measuring 6" x 6" (150 mm x 150 mm) of each species.
.2 Submit samples showing full range of grain and colour variation.
.3 Submit samples of door panels in specified finish.
.4 Contractor shall provide preparations in the manufacture's shop to allow consultants and owner to review laid-up panelized doors prior to finishing.
.5 Provide cut-away corner samples minimum 1'-0" (300 mm) square to clearly indicate construction, joinery and finish characteristics of each type of door.

1.4 Product Handling

1. Protect materials on site to eliminate damage, warping, shrinkage, twisting, making and exposure to moisture. Store all fabricated items under conditions which will ensure that moisture content will be limited to not less than 5% and not more than 15%.

2. Store doors in vertical position. Separate face surfaces by blocking to permit air circulation.

1.5 Warranty

1. Contractor hereby warrants in accordance with the General Conditions, for a period of 2 years, that all Work and materials except as otherwise indicated shall remain free of any defects, and that any defects attributable to any faulty or inadequate materials, or faulty or poor quality of work shall be promptly corrected without cost to Owner.

2. Warranty shall include complete re-hanging and redecorating costs.

3. Warping, shrinking, twisting, showing of ghost lines, splitting, delaminating, or sagging under normal use will be considered as defects. Warpage and shrinkage shall not exceed ¼" (6 mm) clearance over height or width.

1.6 Reference Standards

1. Standard of finished carpentry and door work in accordance with the "Millwork Standards" (latest issue) of the Architectural Woodwork Manufacturers Association of Canada (AWMAC) (lattes issue).

2. Manufacture doors in accordance with CAN/CSA 0132.2-M90 for solid doors.

3. Details, connections and all installation procedures shall be in conformance with the best practise as set forth in the previously cited industry standard and historical method that may differ from today's modern practice.

4. Provide dressed finish lumber surface six (6) sides.

5. All structural lumber and plywood shall bear the grade and mark of the association under whose rules it is produced.

1.7 Work Included

1. This Section includes the manufacturing, supply and installation of new wood doors, frames, transoms, casings, and thresholds in existing or new openings. Refer to drawings and schedules for additional details re design, construction and miscellaneous requirements. Finish to match existing heritage wood doors.

2 Products

2.1 Materials

1. Lumber:

.1 Solid Wood Cores, Panels, Rails and Stiles: White Oak, Quarter Sawn (no knots) Kiln dried to minimum of 5% and maximum 7% moisture content.

.2 Finish: 1) Stain and varnish doors to match existing wood type grading and colour, or
2) Paint (solid colour) to match existing paint colour.
Refer to door schedule for the allocation of the above two finishes.

2. Putty: Oil based.
3. Linseed Oil: Premium double boiled.
4. Turpentine: Premium grade.
5. Stainless Steel Fasteners: By Hilti or approved equal.
6. Painting:

.1 Primer by this Section: Alkyd (permalize Exterior or Interior Primer by Pratt & Lambert).
.2 Finish by this Section: Alkyd (Effecto Enamel by Pratt & Lambert). Custom tinted to Architect's selection.
.3 Finish by this Section: Solid colours and sheen to match existing or as selected by Architect. Finish doors in accordance with Section 09900

7. Gaskets (at Perimeter of Panels): Rubber neoprene or heritage bronze, submit sample for Architect's approval.
8. Adhesive: Resorcinal ™ resin adhesive (CSA 0112.7-M1977) Class II Type 1- or 2-Part Epoxy G @ by Industrial Formulators of Canada Ltd.
9. Glass: Tempered, CAN/CGSB-12.1-M90, thickness shall be 6mm, colour: clear.

2.2 Fabrication – General

1. Provide doors of size to suit frame opening ensuring 1/16" (1.5 mm) clearance of jambs and head and maximum ¼" (6 mm) clearance at floor unless indicated to be undercut. Adjust undercut at shaped thresholds.

2. Bevel strike edges of single leaf doors 1/16" (1.5 mm) maximum in 2" (50 mm) unless indicated otherwise. Slightly crown meeting edges of pairs of doors from centre to each face edge.

3. Prepare doors and frames required to be sound and light tight for gaskets. Install integral core blocking for scheduled hardware attachments and mounting. Grommet and through bolt attachments are not permitted.

4. Sanding of door faces shall exceed the requirements of CSA 0115, and shall be suitable for direct application of finishes.

5. Shop seal all exposed edges of natural finish doors using approved clear non-staining sealer. Provide

factory applied white paint primer to all surfaces of paint grade doors.

6. Incorporate cut-outs and stops for glass, louvers and weatherstripping.

7. Radius vertical edges of double acting doors to 60 mm radius.

8. Affix ULC or WH labels to doors required to be 20 min. or 45 min. fire rated (20MFR, 45 MFR).

9. Seal top and bottom edges with two coats urethane finish or lacquer applied in door manufacturer's plant.

2.3 Fabrication – Solid Wood Panelized Doors

1. In addition to Architectural Woodwork Manufacturers Association of Canada and CSA 0132.2, Clause 4, doors shall be constructed only of solid construction without finger jointing of stiles.

2. Use hardwood dowelled jointing techniques as per Clause 4.1.8.3 of CSA 0132.2., or mortise and tenon joints as per Architectural Woodwork Institute, Section 1000-2, Premium Grade, except only blind shoulder dadoes are acceptable. Mortise and Tenon Construction: The blind mortise and tenon shall be sized for a drive fit. The tenon shall be set adhesive or all joints shall be pinned. The pins, stainless steel, shall be barbed and countersunk and shall be no more than 3/8" shorter than the thickness of the door.

3. All doors shall match existing doors of same type in details, construction, profiles and thickness.

4. Stiles and rails shall be constructed of two pieces of wood and laminated together. Panels shall be made of wood laminated together with edge grain exposed.

5. Once stiles and rails have been fabricated together treat all wood surfaces with two coats of boiled linseed oil and turpentine mixed 1:1, applied 12 hours apart. Wipe excess after 1 hour. Apply one coat of alkyd primer after the linseed oil has oxidized (approximately after 48 hours). Apply one coat of finish.

6. Treat all panels with 2 coats of linseed oil and turpentine mixture then prime and install one coat of finish as noted above.

7. Install panels into stile rail frames allowing panels to float. Install rubber gasket at edges of panels to allow them to float but maintain weather seal.

8. All finish carpentry shall produce joints true, tight and well nailed. No hammer mars or ragged saw kerfs will be allowed. All work must be of a first-class nature. Make all joints to conceal shrinkage. Mitre all exterior corners, cope all interior corners and mitre or scarf ends to end joinery. Fasten all finish carpentry securely, straight, level, true and plumb.

9. At exposed interior finish work, set nails and cover their heads with plastic wood filler.

10. At exterior finish work use stainless steel finishing nails, making all joints watertight, using waterproof glue or caulking. Any butt joints on exterior work that are exposed during this work are to be primed before covered up.

2.4 Preparation for Hardware

1. Factory prepare and reinforce doors for site mounting of hardware including butt hinges, locksets, latch sets, and other hardware as required.

2.5 Shop Finishing of Doors (Stain and Laquer finish)

1. Include shop finishing of paint and stain finish doors supplied under this section.

2. All faces and edges of paint and stain grade doors and transom panels shall receive factory finish equivalent to Architectural Woodwork Institute, Architectural Woodwork Quality Standards, Section

1500, Polyester Clear Lacquer (Non-Catalyzed), Premium Grade, "furniture finish", for open grain woods, unfilled finish, consisting of the following:

- Hand sand and seal wood
- 1 coat Pratt & Lambert or Benjamin Moore Stain
- Impervo Enamel thinned with varsol, wiped on and off to give uniform coat
- 1 coat sanding sealer Pratt and Lambert
- Sanding (200 grit serrated paper)
- 1 Intermediate coat non-catalyzed lacquer
- 1 topcoat non-catalysed lacquer, spray applied.

3. Apply coatings evenly, free of runs, sags, or similar defects. Shop apply final coats at connection of fabrication, hardware machining, and unless otherwise accepted, at completion of site fitting.
4. Work of this section includes the non-site touch-up of finished surfaces after woodwork has been installed by finishing specialists having applied finishes of this work.
5. All faces and edges of paint grade and transom pommels shall be factory finished consisting of the following: Install alkyd primer after doors have been treated with linseed and turpentine mixture. Install 1 coat of finish.

2.6 Shop Finishing of Doors (Solid Paint Colour finish)

1. Include shop finishing of paint finish doors supplied under this section.

2. All faces and edges of paint grade doors and transom panels shall receive factory finish equivalent to Architectural Woodwork Institute, Architectural Woodwork Quality Standards, relevant section(s).

3. Paint (solid colour) to match existing paint colour, or as selected by the Architect, as per Section 09900.

3 EXECUTION

3.1 Installation

1. Special Protection:
   .1 Deliver doors to site in protective scuff-resistant wrapping. Do not remove wrapping until doors are installed.
   .2 Print door identification on wrapping.
   .3 Doors to be stored in a dry, secure area until installed.

2. Door Installation:
   .1 Hang doors to swing shut with 1.6 mm (1/16") clearance at heads, 2 mm (3/32") at jambs and 6 mm (1/4") clearance over finished floor surfaces. Install doors so face on opening side is kept 1.6 mm (1/16") shy (recessed) from rebate even after bumpers are installed. (Check and comply with Door Schedule for conditions requiring greater clearance from floor for air movement and in areas to be carpeted.)
   .2 Adjust operable parts for correct clearance and function.
   .3 Secure transom and side panels by means of concealed fasteners or countersunk screws concealed by means of wood plugs matching panel.
   .4 Trim non-rated door width by cutting equally on both jamb edges. Trim door height by cutting bottom edges to maximum of 19 mm (3/4"). Trim fire-rated door height at bottom edge in accordance to ULC requirements. After trimming door, have painter seal top and bottom edges of door under Section 09900, Painting and Finishing.

3. Finish Hardware:

   .1 Supply and install, except hardware specified as part of work of another Section. Check each item as received.
   .2 Set, fit and adjust hardware according to manufacturer's templates and instructions. Hardware shall operate freely. Protect installed hardware from damage and paint spotting.
   .3 Install all hardware for doors, including hinges, closers, weather-strip, exiting devices, latches, pulls, kickplates and locks.

.4 Pre-drill kickplates and doors before attachment of plates. Apply with water resistant adhesive and countersunk stainless-steel screws.

.5 Maintain integrity of weather seal at head of doors fitted with closers. Adapt weatherstripping as required to achieve specified performance and provide any necessary accessories.

.6 Where door stop contacts door pulls, mount stop to strike bottom of pull.

.7 Barrier Free Access: Mount all locksets, panics, latches, etc., in full conformity with most stringent code. Confirm mounting heights with Architect prior to commencement of frame and door preparation.

3.2 Field Quality Control

1. Owner may engage services of independent recognized Architectural Hardware Consultant (AHC) to review hardware supplied upon delivery to Site and to review installation to assess proper application of finish hardware in accordance with reviewed hardware and keying schedules.
2. Notify Architect 2 weeks in advance of delivery of finish hardware to Site and 2 weeks in advance of Substantial Performance of the Contract and allow AHC with free access. Obtain and coordinate services of competent mechanic from Section 08700, Finish Hardware to assist with verification of hardware received and operation and adjustment of operating hardware items.

3.3 Cleaning

1. On completion, remove manufacturer's identification markings and clean all surfaces.

End of Section 08212.

1.1 GENERAL REQUIREMENTS

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

1.2 RELATED WORK SPECIFIED ELSEWHERE

1. Supply and Installation of Rough Hardware - Section 06100
2. Installation of Finishing Hardware - Sections 06200
3. Wood Doors – Section 08210

1.3 INSPECTION

1. Hardware supplier shall check all hardware when it has been installed and shall notify the Architect of any cases where it has not been properly installed, is defective, or is not as specified. Replace defective hardware. Hardware supplier or closer manufacturer on his behalf shall check all door closers after they have been installed to make sure that all adjustments such as back checking degree have been properly made. Notify the Architect of any closers which have not been properly adjusted.

1.4 SCHEDULING AND PACKAGING

1. Supply finishing hardware to those who are to install it complete with templates and other complete installation instructions, in sufficient time to avoid delaying the progress of the work.
2. Package hardware separately for each door or unit and state clearly on each package the number and description of the door or unit for which the hardware therein is intended.
3. Supply all required expansion shields, anchors, and other related accessories for satisfactory attaching or installing all finishing hardware.
4. Supply a key box to hold a minimum of 2 keys for each door.

1.5 WARRANTIES

- Locksets 2 years
- Exit devices 2 years
- Door closers 10 years
- Door operators 5 years
- Door pulls 5 years
- Electric Strikes 5 years
- Electric locksets 5 years
- Electric panic devices 5 years
- Hinges full mortise 10 years
- Hinges, continuous 10 years
- Door seals 5 years

1.6 HARDWARE - UNIVERSITY OF TORONTO STANDARDS

1. Refer to attached Standards.

Notes to schedule:

1. All existing conditions and dimensions are to be site verified.

2. Contractor is responsible for confirming all quantities.

3. Lock cores are supplied and installed by the owner.

4. All wiring and boxes to push buttons/auto operators to be recessed & concealed.

5. Auto door operators must be coordinated with all security systems (card readers, lock system set c.) as applicable and required.

6. Contractor is to coordinate/confirm with security contractor to ensure that the correct operation of complete system is provided at all locations where applicable and required.

7. Concealed blocking for ADO as required is by GC.

End of Section 08710

July 12, 2023

Revision: 4

Hardware List for:

121 St George Street Project

Architect:

+ VG Architects

1 Pair of Existing Exterior Doors 100K

Wood frame

Wood door

Existing

1	Electronic lockset Z7750-NE-RR Electronic latch retraction, electronic controlled outside lever H	SDC
1	Automatic surface door operator Pair S4100LE x 4.5" x 6" cover Include for a Horton wire harness sinc to allow for sequence of operation Dark Bronze	Horton
2	Actuators CM-222/A42 x CM-23D	Camden
1	Bollard CM-48-BSU-BRZ Dark Bronze	
1	Set of flushbolts FB41P x DP2 613	Ives
1	Coordinator COR42/72 x Filler bar 315AN	Ives
2	Kick plate 8400 300mm x DW x WS Confirm height requirement to match existing doors 613	Ives
1	Threshold 625A - V3-MSLA-10 x DW Bronze *Confirm the requiered width of the threshold to suit site conditions*	Zero International
1	Weatherseal/soundseal 19WB Apply to the hinge side verticle jambs and the top and bottom of door Bronze	Zero International
2	Door sweep 8192D x DW Dark Bronze	Zero International
2	Key switch CM-1210-7224 630	Camden
2	Mortise Cylinder MEDECO by Owner 626 *For the keyswitch*	Medeco
1	Power supply PS904-4RL	Von Duprin

Note: Reuse existing hinges, astragal, stops, power transfer, card reader and door contacts. Exterior card reader is to be removed from wall and installed on new bollard. See drawing 01/A3.1 Bollard is to be custom-modified to allow installation of both Card Reader and Automatic Door Actuator.

1 Single door to B/F Washroom - Door 101

Wood frame

Wood door

965 x 2150 x 45

3	Hinges 3CB1 127 x 114 630	Ives
1	Storeroom function lockset 8204 LNB x less cylinder 630	Sargent
1	Mortise Cylinder MEDECO by Owner 626	Medeco
1	Automatic surface door operator S7100 x pull side mounting 689	Horton
1	Washroom package CX-WC13AXFM-PS	Camden
2	Emergency Call Kit CX-WEC10	Camden
2	Panic Strip Dado Tapeswitch *Required length to be determined*	
1	Kick plate 8400 250 mm x DW x B-NHA 630	Ives
1	Overhead concealed door stop GJ100S ADJ x DW 630	Glynn Johnson

General Notes:
Complete supply, testing and commissioning of auto operators, electric strikes, washroom package, audible/light and actuators is done by this section (08710).

All 115VDC, wiring and back boxes is complete by electrical.

University of Toronto

REAL ESTATE OPERATIONS
DESIGN & ENGINEERING
215 Huron Street, Toronto, Ontario M5S 1A2

Door Hardware Standards

1. General

All barrier free access doors incorporating the use of a door operator will follow the design standards set by the University of Toronto on the attached drawings.

Any new products introduced to the University of Toronto must be beta tested on the Campus for a minimum period of 6 months before being listed as an approved alternate.

All Hardware must come with written warranties as listed:

- Locksets 2 years
- Exit devices 2 years
- Door closers 10 years
- Door operators 5 years
- Door pulls 5 years
- Electric Strikes 5 years
- Electric locksets 5 years
- Electric panic devices 5 years
- Hinges full mortise 10 years
- Hinges, continuous 10 years
- Door seals 5 years

2. Keying

The requirements for all keying systems are to be carried out by the University of Toronto Lock shop. All Cylinders for locksets to be supplied and installed by the University of Toronto Lock Shop.

3. Hardware Specifications

Closers

Floor mounted door closers are unacceptable. Surface mounted overhead type is preferred. All closers should be field serviceable.

Closers at exterior doors and all stairwell doors shall be equivalent to an L.C.N 4040 or better.

Closers at all other doors shall be equivalent to an L.C.N 1460 or better.

Door operators

Operators shall be Horton 4000 series for all doors with the exception of a single stall barrier free washroom which shall be a Horton 7000 series or better shall be used.

Locksets

All locksets to be American Standard Mortise lockset. The function will be determined by Facilities & Services depending on location.

Exit devices

All exit devices shall be a flat bar regular stile device.

If required all exterior doors shall use cylinder dogging on the exit device.

Hinges

All hinges on oversized doors shall be a continuous hinge.

All hinges for interior doors shall be a full mortise hinge.

All electric transfers through any door shall be concealed wire contact transfer hinge.

Note: Pivot hinges are not acceptable.

Electric Locking Devices

All doors using a card access system and/or barrier free access, shall use electric latch retraction panic device or an electric mortise lockset with request to exit feature.

No electric strikes shall be used with the exception of:

- Barrier free washrooms.
- Where there is no other possible way of using electric locks.

All electric locking device shall be 24 volts dc with the exception of standalone battery operated locksets.

Door Pulls and Kick Plates

Door pulls with through bolt fixing should be at or near the same height as push plates so that the pull bolts will be hidden. Hardware which will require regular polishing or maintenance should be avoided. All edges should be rounded. Kick plates on doors should be stainless steel for full width of actual door.

Standard measurements
The following standard hardware heights shall be observed:

- Door Pulls 700mm to 1200mm
- Push Plate 1150mm to centre line
- Door Bar 1000mm to centre line
- Door Lever l000mm to centre line
- Dead lock (bolt) 1300mm to centre line
- Exit Device Bolt 950mm to centre line

List of Approved Manufacturers

Mortise Locksets
Schlage
Sargent
Corbin

Exit Devices
Von Duprin
Sargent
Corbin

Hinges, full mortise
McKinney
Hager

Hinges, continuous
Markar
McKinney
Gallery

Door closers
L.C.N.
Sargent
Norton

Flush bolts
Ives
Rixson

Surface bolts
Glynn Johnson

Control arms
Glynn Johnson
Rixson

Pemko
National Guard Products

Electric Strikes
Hess
Von Duprin
Folger Adams

Motise locksets
Electric
Schlage
Sargent

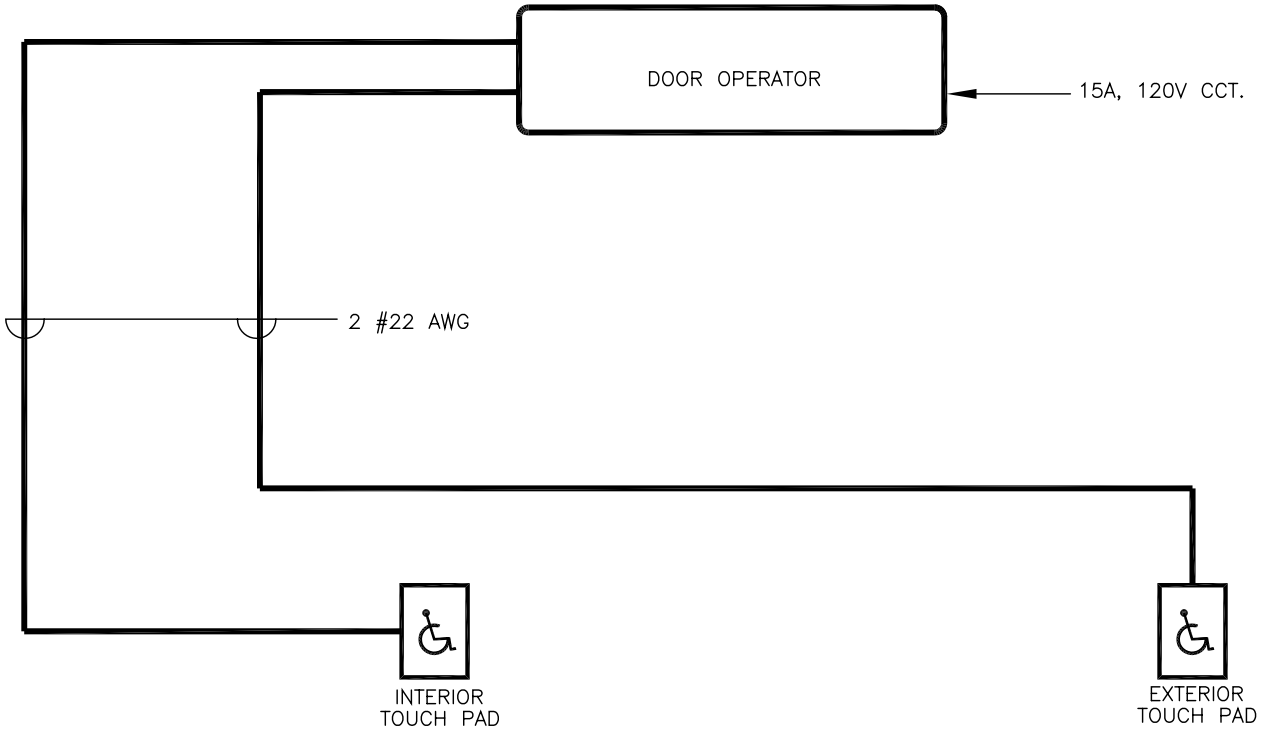
Panic devices, Electric Latch Retraction
Sargent

Door Operators
Horton

Cylingers and Keying
Supplied and installed by University of Toronto

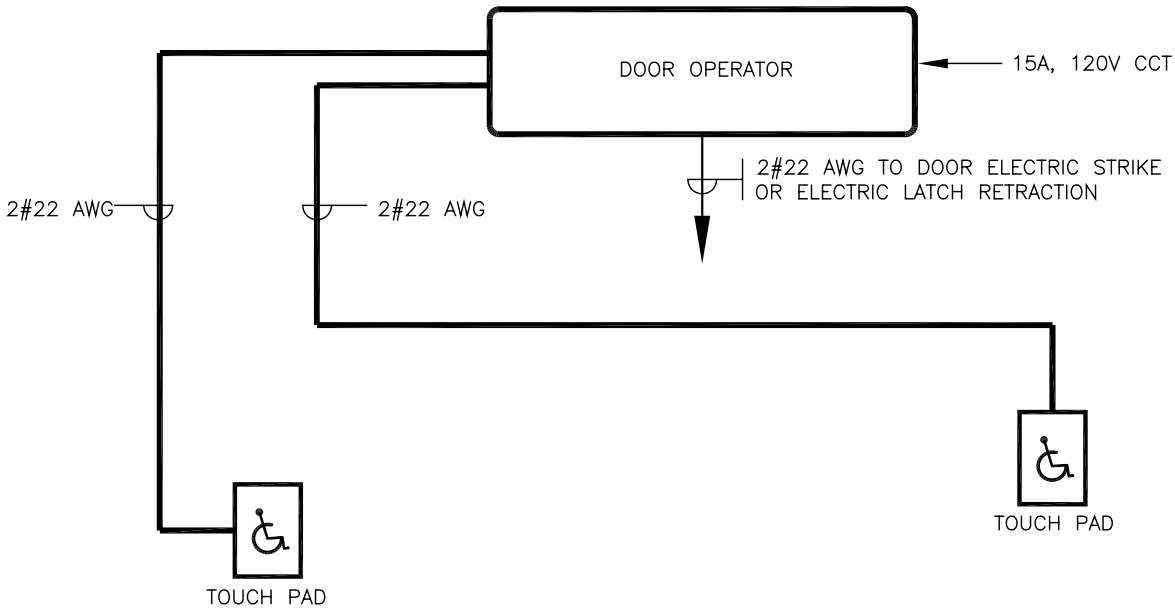
Key Switches
Rutherford Controls
Camden
IEI

Door seals
K.N. Crowder
Rixson



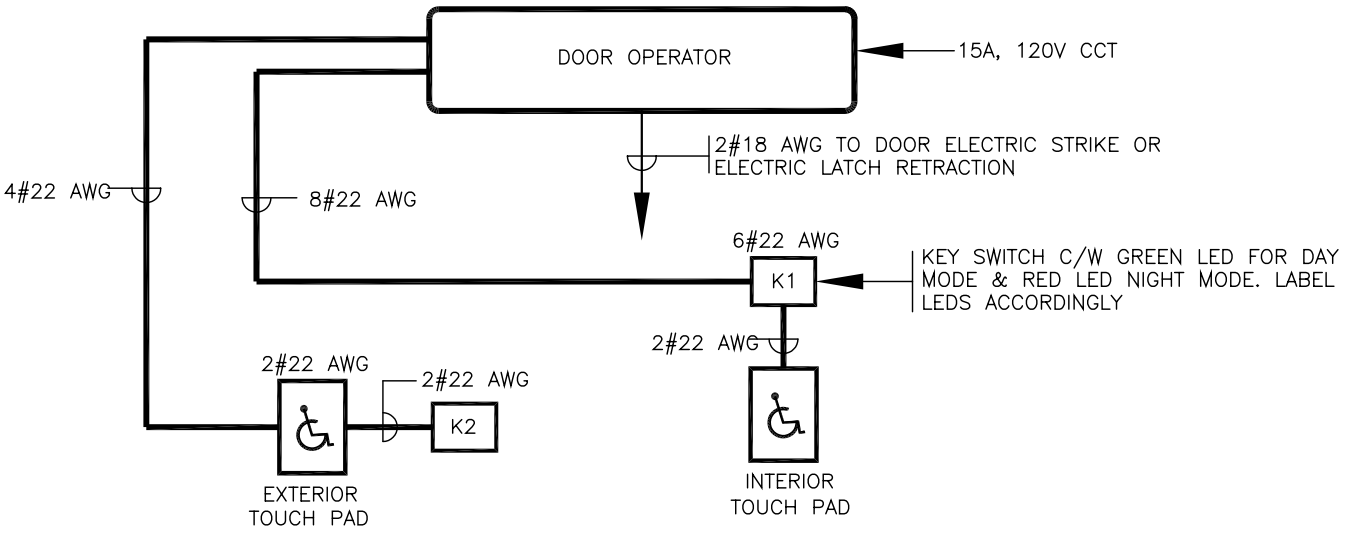
1. TOUCH PADS SHALL BE SUPPLIED BY GENERAL TRADE, & INSTALLED & WIRED BY ELECTRICAL CONTRACTOR.
2. DOOR OPERATOR SHALL BE SUPPLIED & INSTALLED BY GENERAL TRADE, & WIRED BY ELECTRICAL CONTRACTOR.
3. THIS WIRING SCHEMATIC IS APPLICABLE TO HORTON DOOR OPERATORS ONLY. COORDINATE WITH HORTON AUTOMATICS FOR WIRING DETAILS.
4. ALL LOW VOLTAGE WIRING SHALL BE STRANDED & SHIELDED COPPER CONDUCTORS INSTALLED IN CONDUIT OR PLENUM RATED IN HOLLOW METAL DOOR FRAME WHERE ACCESSIBLE.
5. LOW VOLTAGE WIRING FINAL CONNECTIONS & COMMISSIONING OF THE DOOR OPERATOR SYSTEM BY HORTON AUTOMATICS, TEL. 905-331-7491, 1-800-866-9523
6. USE BX (AC90) FOR POWER WIRING TO THE DOOR OPERATOR ONLY THROUGH HOLLOW METAL DOOR FRAME WHERE ACCESSIBLE.

University Of Toronto REAL ESTATE OPERATIONS DESIGN & ENGINEERING	Title: AUTOMATIC DOOR OPERATOR Project: NON-LATCHABLE DOOR	Drawn by: GDP Scale: Date: MAY 2008	Drawing No.: SK-1



1. TOUCH PADS SHALL BE SUPPLIED BY GENERAL TRADE & INSTALLED & WIRED BY ELECTRICAL CONTRACTOR.
2. DOOR OPERATOR SHALL BE SUPPLIED & INSTALLED BY GENERAL TRADE & WIRED BY ELECTRICAL CONTRACTOR. ELECTRIC STRIKE SHALL BE SUPPLIED BY GENERAL TRADE & INSTALLED & WIRED BY ELECTRICAL CONTRACTOR.
3. THIS WIRING SCHEMATIC IS APPLICABLE TO HORTON DOOR OPERATORS ONLY. COORDINATE WITH HORTON AUTOMATICS FOR WIRING DETAILS.
4. ALL LOW VOLTAGE WIRING SHALL BE STRANDED & SHIELDED COPPER CONDUCTORS INSTALLED IN CONDUIT OR PLENUM RATED IN HOLLOW METAL DOOR FRAME WHERE ACCESSIBLE.
5. LOW VOLTAGE WIRING FINAL CONNECTIONS & COMMISSIONING OF THE DOOR OPERATOR SYSTEM BY HORTON AUTOMATICS, TEL. 905–331–7491, 1–800–866–9523.
6. USE BX (AC90) FOR POWER WIRING TO THE DOOR OPERATOR ONLY THROUGH HOLLOW METAL DOOR FRAME WHERE ACCESSIBLE.

University Of Toronto REAL ESTATE OPERATIONS DESIGN & ENGINEERING	Title: AUTOMATIC DOOR OPERATOR Project: LATCHABLE DOOR	Drawn by: GDP Scale: Date: MAY 2008	Drawing No.: SK-2



OPERATION

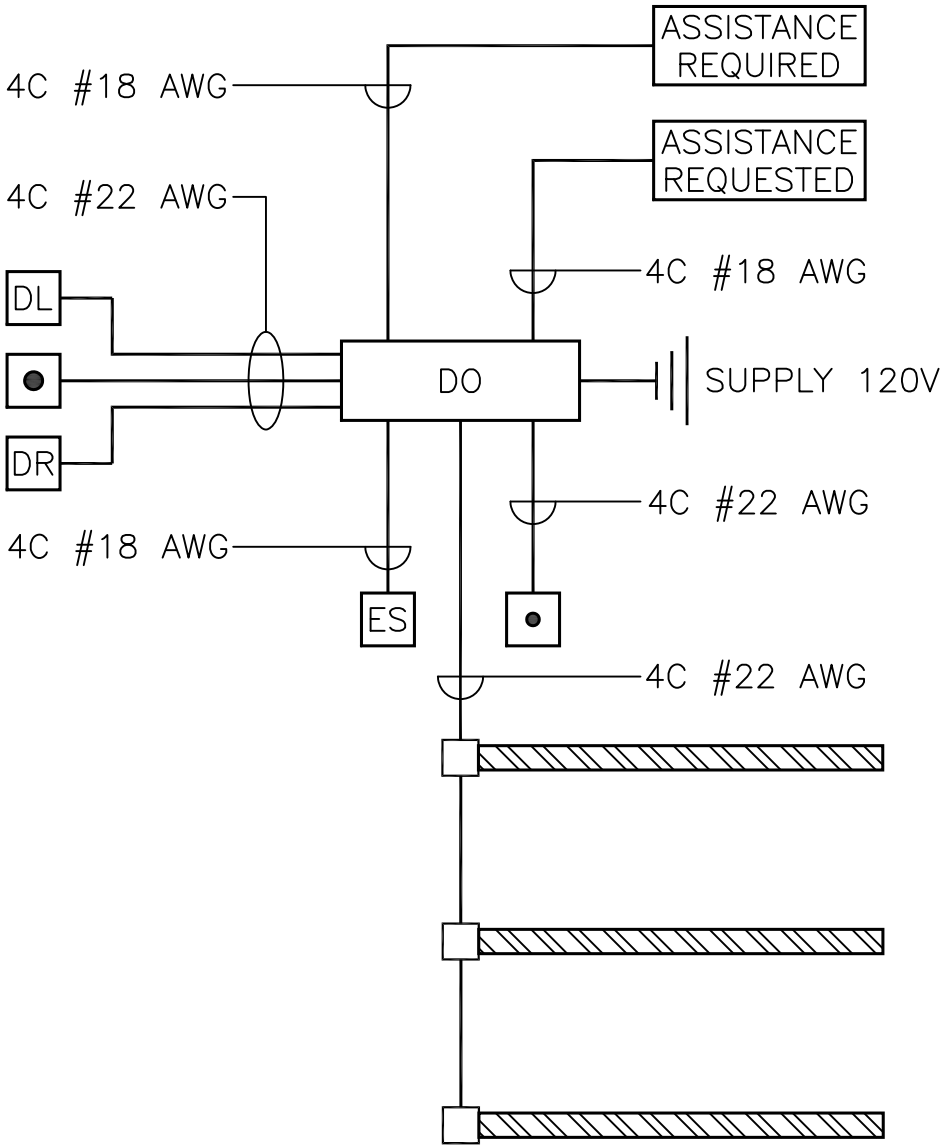
K1 INSIDE KEY SWITCH RESTRICTS DOOR OPERATOR FROM EXTERIOR AFTER HOURS. INTERIOR TOUCH PAD OPENS DOOR IN DAY OR NIGHT MODE. KEY SWITCH SHALL BE COMPLETE WITH MAINTAINED CONTACTS LED. OUTLET BOX TO ALLOW THE KEY FACE PLATE TO BE MATCHED TO THE BOX MOUNTING HOLES AND TAMPER PROOF SCREWS FOR MOUNTING THE KEY FACE PLATE. KEY SWITCH TO MATCH MASTER BUILDING KEY.

K2 EXTERIOR KEY SWITCH OPENS THE DOOR AFTER HOURS. EXTERIOR TOUCH PAD OPENS DOOR IN DAY MODE ONLY. KEY SWITCH SHALL BE COMPLETE WITH MOMENTARY CONTACT. OUTLET BOX TO ALLOW THE KEY FACE PLATE TO BE MATCHED TO THE BOX MOUNTING HOLES AND TAMPER PROOF SCREWS FOR MOUNTING THE KEY FACE PLATE. KEY SWITCH TO MATCH BUILDING MASTER KEY.

1. TOUCH PADS AND KEY SWITCHES SHALL BE SUPPLIED BY GENERAL TRADE & INSTALLED & WIRED BY ELECTRICAL CONTRACTOR.
2. DOOR OPERATOR SHALL BE SUPPLIED & INSTALLED BY GENERAL TRADE & WIRED BY ELECTRICAL CONTRACTOR. KEY CYLINDERS BY U. of T. LOCKSHOP & ELECTRIC STRIKE BY GENERAL TRADE. ELECTRIC STRIKE INSTALLED & WIRED BY ELECTRICAL CONTRACTOR.
3. THIS WIRING SCHEMATIC IS APPLICABLE TO HORTON DOOR OPERATORS ONLY. COORDINATE WITH HORTON AUTOMATICS FOR WIRING DETAILS.
4. ALL LOW VOLTAGE WIRING SHALL BE STRANDED & SHIELDED CONDUCTORS INSTALLED IN CONDUIT OR PLENUM RATED IN HOLLOW METAL DOOR FRAME WHERE ACCESSIBLE.
5. LOW VOLTAGE WIRING FINAL CONNECTIONS & COMMISSIONING OF THE DOOR OPERATOR SYSTEM BY HORTON AUTOMATICS, TEL. 905-331-7491, 1-800-866-9523.
6. USE BX (AC90) FOR POWER WIRING TO THE DOOR OPERATOR ONLY THROUGH HOLLOW METAL DOOR FRAME WHERE ACCESSIBLE.

University Of Toronto
REAL ESTATE OPERATIONS
DESIGN & ENGINEERING

Title: AUTOMATIC DOOR OPERATOR	Drawn by: GDP	Drawing No.
Project: LOCKABLE DOOR	Scale:	SK-3
	Date: MAY 2008	



University of Toronto UPDC DESIGN & ENGINEERING	Project: DOOR OPERATOR DETAILS Title: LOCKABLE & ALARMED WASHROOM DOOR SCHEMATIC	Drawn by: GDP Scale: N/A Date: 06 DEC 2019	Project No. Drawing No. WR-01

FIELD DEVICE LEGEND

SYMBOL	DESCRIPTION
DO	DOOR OPENER
	DOOR ACTIVATION DEVICE
DL	DOOR LOCK DEVICE (PUSH TO LOCK PLATE SWITCH)
DR	DOOR RESET BUTTON. PROVIDE LAMACOID PLATE, 1/8" HIGH BLACK LETTERS ON WHITE BACKGROUND TO READ "PRESS TO RESET".
ES	ELECTRIC STRIKE
ASSISTANCE REQUESTED	"ASSISTANCE REQUESTED" SIGN
ASSISTANCE REQUIRED	"ASSISTANCE REQUIRED" SIGN
	EMERGENCY CALL STRIP. "EMERGENCY ALARM – PRESS FOR ASSISTANCE". BLACK LETTERING ON YELLOW BACKGROUND. PROVIDE LAMACOID PLATE, 1/4" HIGH RED LETTERS ON WHITE BACKGROUND TO READ, "EMERGENCY PUSH STRIP – USE ONLY IN AN EMERGENCY." MOUNT LABEL ABOVE EACH PUSH STRIP.

University of Toronto
UPDC
DESIGN & ENGINEERING

Project: DOOR OPERATOR DETAILS		Drawn by: GDP	Project No.
Title: LOCKABLE & ALARMED WASHROOM DOOR SCHEMATIC FIELD DEVICE LEGEND		Scale: N/A	
		Date: 06 DEC 2019	Drawing No. WR-02

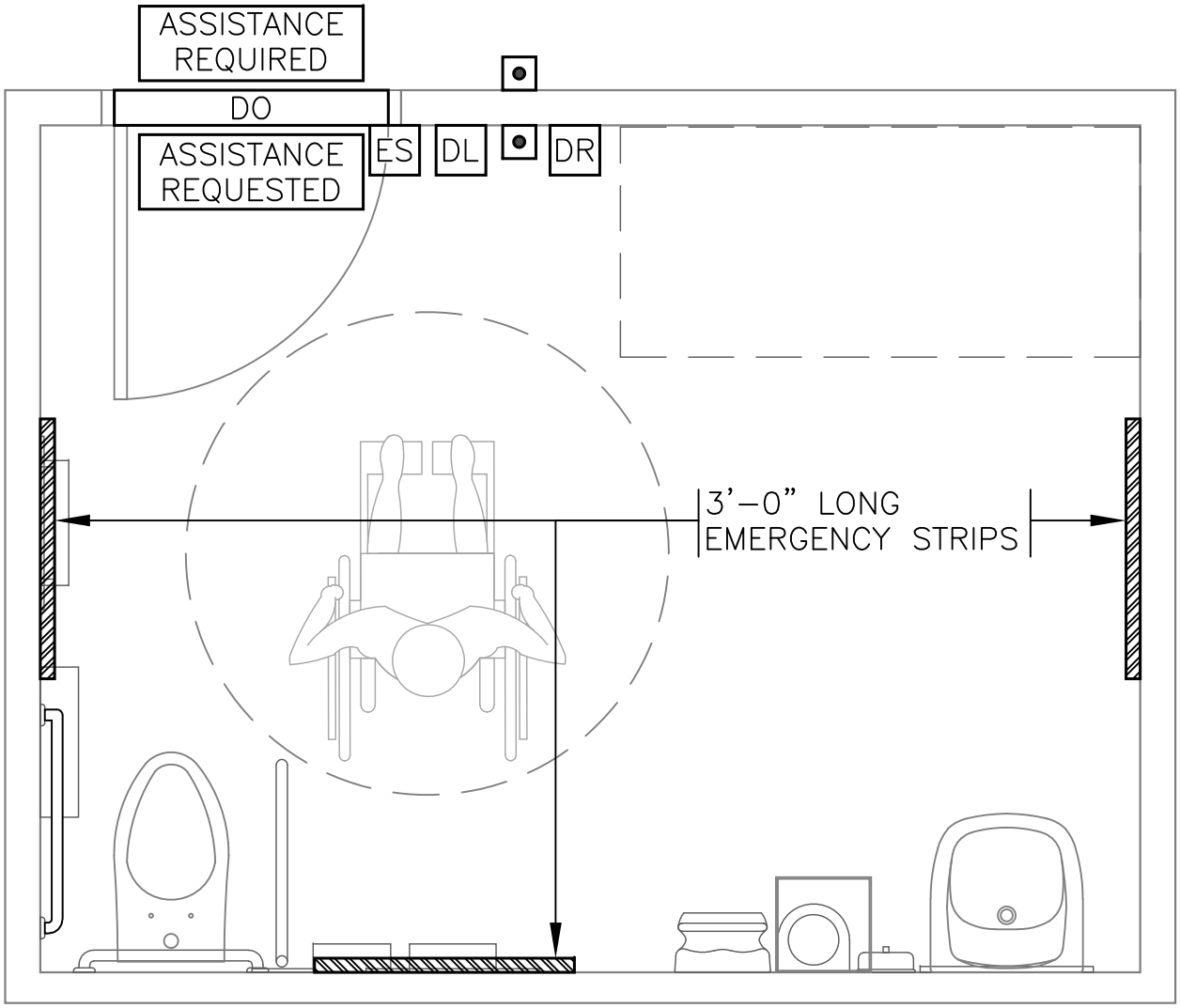
SEQUENCE OF OPERATION: ACCESSIBLE WASHROOM

- DOOR ACTIVATION DEVICE OPENS DOOR.
- DOOR LOCK DEVICE DEACTIVATES EXTERIOR DOOR ACTIVATION DEVICE, LOCKS THE DOOR & ACTIVATES THE IN USE SIGN.
- INTERIOR DOOR ACTIVATION DEVICE UNLOCKS AND OPENS THE DOOR & DEACTIVATES THE IN USE SIGN.
- EMERGENCY CALL STRIPS ACTIVATE THE ASSISTANCE REQUIRED SIGN, THE AUDIBLE BUZZER & UNLOCKS THE DOOR.
- DOOR RESET BUTTON RETURNS THE SYSTEM TO NORMAL MODE.

NOTES: (ACCESSIBLE WASHROOM)

1. FOR EXACT HEIGHTS, REFER TO ARCHITECTURAL DRAWINGS.
2. LOW VOLTAGE WIRING SHALL BE COPPER CONDUCTORS.
3. ALL LOW VOLTAGE WIRING SHALL BE STRANDED & SHIELDED INSTALLED IN CONDUIT OR PLENUM RATED IN HOLLOW METAL DOOR FRAME WHERE ACCESSIBLE.
4. RUN WIRES IN TO HEADER OF AUTOMATIC DOOR OPERATOR OPPOSITE HINGE SIDE ABOVE DOOR JAMB TO ALLOW FOR ORGANIZED LOW VOLTAGE WIRING DUE TO LOCATION OF RELAY.
5. MINIMUM CONDUIT SIZE TO BE 3/4".

University of Toronto UPDC DESIGN & ENGINEERING	Project: DOOR OPERATOR DETAILS	Drawn by: GDP	Project No.
	Title: LOCKABLE & ALARMED WASHROOM DOOR SCHEMATIC SEQUENCE OF OPERATION & NOTES	Scale: N/A	
		Date: 06 DEC 2019	Drawing No. WR-03



University of Toronto
UPDC
DESIGN & ENGINEERING

Project: DOOR OPERATOR DETAILS

Title: LOCKABLE & ALARMED WASHROOM DOOR SCHEMATIC TYPICAL WASHROOM ELECTRICAL LAYOUT

Drawn by: GDP

Scale: 1:25

Date: 06 DEC 2019

Project No.

Drawing No. WR-04

1 GENERAL

1.1 **GENERAL REQUIREMENTS**

.1 Conform to Sections of Division 1 as applicable.

1.2 RELATED WORK

.1 Finish Carpentry: Section 06200

.2 Wood Doors: Section 08212

.3 Glass Balustrades: Section 08810

1.3 **REFERENCES**

ASTM C509-91	-	Specification for Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C542-90	-	Specification for Lock-Strip Gaskets
ASTM D1044-90	-	Test Method for Resistance of Transparent Plastics to Surface Abrasion
ASTM D1925-70	-	Test Method for Yellowness Index of Plastics
ASTM E90-90	-	Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
CAN/CGSB-12.1-M90	-	Tempered or Laminated Safety Glass
CAN2-12.3-M76	-	Glass, Polished Plate or Float, Flat, Clear
CAN2-12.4-M76	-	Glass, Heat Absorbing
CAN/CGSB-12.5-M86	-	Mirrors, Silvered
CAN2-12.6-M76	-	Mirrors Transparent (One-Way)
CAN/CGSB-12.8-M90	-	Insulating Glass Units
CAN2-12.9-M76	-	Glass, Spandrel
CAN2-12.10-M76	-	Glass, Light and Heat Reflecting
CAN/CGSB-12.11-M90	-	Wired Safety Glass
CAN/CGSB-12.12-M90	-	Plastic Safety Glazing
CAN2-12.13-M79	-	Glass, Patterned
CAN/CGSB-19.2-M87	-	Glazing Compound Non-hardening Modified Oil Type
CAN/CGSB-19.13-M87	-	Sealing Compound, One-Component, Elastomeric, Chemical Curing
CAN/CGSB-19.18-M87	-	Sealing Compound, One-Component, Silicone Base, Solvent Curing
CAN/CGSB-19.21-M87	-	Sealing and Bedding Compound Acoustical
CAN/CGSB-19.24-M90	-	Multicomponent, Chemical-Curing Sealing Compound
Glazing Manual 90	-	Flat Glass Marketing Association

1.4 **SUBMITTALS**

.1 **Samples:** Submit samples of materials if required by The Architect before commencing work. Ensure samples are clearly labeled with manufacturer's name and type.

1.5 **WARRANTY**

.1 Warrant mirror's silvering from deteriorating for period of 10 years in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period to satisfaction of The Architect and at no expense to The Owner.

2 PRODUCTS

2.1 **GLASS MATERIALS**

.1 **Tempered Glass:** To CAN/CGSB-12.1 transparent, 13mm thick, tong free, roller marks free, with visible after installation factory applied permanent impression in one corner identifying each pane as tempered.

2.2 **GLAZING AND SEALING COMPOUND MATERIALS AND ACCESSORIES**

.1 **Sealing and Bedding Compound, Acoustical:** CAN/CGSB-19.21-M
.2 **Glazing Tape:** 440 polyisobutylene-butyl tape manufactured by Tremco Manufacturing Co. (Canada) Ltd., or 3M ribbon sealer butyl tape manufactured by Minnesota Mining and Manufacturing Co. Ltd.
.3 **Gaskets:** ASTM C509 cellular, elastomeric, preformed, black.

.4 **Spacer Shims and Setting Blocks:** Neoprene, Shore "A" Durometer hardness 70-90, 100 mm (4") long, wide enough to extend from fixed stop to opposite face of glass and of height suitable to provide adequate glazing "bite" for setting blocks. Neoprene, Shore "A" 40 to 50 Durometer hardness, of adequate thickness to provide correct glass to face clearance of at least 3 mm (1/8") for spacer shims.
.5 **Primer Sealers and Cleaners:** To glass and plastic glazing manufacturer's standards.

2.3 **FABRICATION**

.1 Label each light of glass and/or plastic glazing with registered name of product and weight and quality of glass and/or plastic glazing.
.2 Check dimensions on Job Site before cutting materials.
.3 Grind and chamfer edges of unframed glass and mirrors.
.4 Ensure minimum bite or lap of glass and/or plastic glazing on stops and rabbets as recommended by glass and/or plastic glazing manufacturer.

3 EXECUTION

3.1 **INSTALLATION**

.1 **Glazing – General**

.1 Conform to recommendation of Glazing Manual 1990, Flat Glass Marketing Association, except as specified herein.
.2 Glaze hollow metal doors, screens, borrowed lights, windows and other work, scheduled to be glazed.
.3 Check frames are plumb, within tolerance for size and joints, connectors, screws or bolt heads are effectively sealed.
.4 Check compatibility of glazing materials and framing sealants with each other.

.5 Do not field cut or abrade tempered glass.
.6 Install glazing within temperature limits recommended by glazing manufacturer. Check to ensure openings and stops to be painted have been primed before commencing installation.

3.2 **WORKMANSHIP**

.1 Ensure openings are free from moisture, frost, rust, dirt and foreign matter.
.2 Remove protective coatings. Clean glass surface to receive sealant with clean cloth dampened with Xylol or 50-50 mixture of Acetone and Xylol. Wipe dry with clean, dry cloth.
.3 Clean plastic glazing with cleaning agents and follow procedures recommended by glazing manufacturer.
.4 Apply primer-sealer to contact surfaces.
.5 Place setting block in accordance with manufacturer's instructions.
.6 Install glass by resting on setting blocks. Ensure full contact and adhesion at perimeter. Do not impact glass against framing during installation.
.7 Install removable stops without displacing tape, sealant or gasket.
.8 Provide edge clearance of 3 mm (1/8") minimum.
.9 Apply tape to clean dry surface not more than 24 hrs prior to glazing. Do not remove release paper until glass is ready to be installed. Joints shall be squared and tightly and neatly butted. Do not overlap. Do not stretch tape to make it fit. Lightly daubed joints with compatible gunnable sealant to assure positive seal. Only joints in tape shall be at corners.
.10 Lateral shims if not continuous shall be spaced uniformly at 450 mm (18") to 600 mm (24") centres.

.11 **Interior Glazing**

.1 Dry Method-Tape/Tape:

- Cut glazing tape to proper length and install against permanent stop projecting 1.5 mm (1/16") above sightline.
- Place glazing tape on free perimeter of glass projecting 1.5 mm (1/16") above sightline.
- Trim off excess tape to sightline.

.2 Combination Method-Tape/Sealant:

- Cut glazing tape to proper length and install against permanent stop projecting 1.5 mm (1/16") above sightline.
- Fill gap between glass and applied stop with sealant to depth equal to bite of frame on glass to uniform and level line.
- Trim off excess tape to sightline.

.3 Dry Method: Gaskets

- Place gasket against permanent stop and position glass sheet.
- Apply removable stops. Install gaskets in frame channels.

.4 Combination Method-Tape/Gasket:

- Cut glazing tape to proper length and install against permanent stop.
- Position glass.
- Apply removable stops and install gaskets in frame channel.

.12 Mirrors

.1 Install mirrors where indicated on Drawings.

.2 Mount plumb and level and accurately in position and secure rigidly in position.

.3 Ensure back-up wall surface is thoroughly dry, smooth and firm and is primed or painted.

.13 Sand Blasted Glass Sealer

.1 Clean and prepare surface to manufacturer's instructions.

.2 Shop apply sealer coat in a clean dust free environment.

3.3 FINISHING

.1 Remove sealant and compound droppings from finished surface.
.2 Periodically clean installed glass during construction to avoid permanent etching and staining.
.3 Mark glass lights with temporary, easily removable large safety markings after glass installation.
.4 Maintain safety markings until final cleanup. Remove markings at time of final clean-up
.5 Avoid storing materials adjacent to glass.
.6 Protect glass from other trades.
.7 At completion of Work, replace any damaged or broken glass provided under this Section with similar glass.

End of Section 08800

1. GENERAL

1. GENERAL REQUIREMENTS

.1 The General Conditions of the Contract, Supplementary Conditions, and the General Requirements of Division 1, form part of this section, and must be read in conjunction with the requirements of this section, and all related sections.

.2 The work of this section, and related work specified in other sections shall comply with all requirements of Division 1 – General Requirements.

2. SECTION INCLUDES

.1 Provision of all labour, materials, equipment and incidental services necessary to provide extensions to tempered glass balustrades, including;

.1 Engineered glass guards

.2 Stainless steel handrails, handrail mounts, guard pin connectors, guard shoes, covers, end caps, all fittings, and all accessories.

3. REFERENCE STANDARDS

.1 ASTM-A269-01; Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
.2 ASTM-A276-00a; Specification for Stainless Steel Bars and Shapes.
.3 ASTM C864-99; Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
.4 ASTM D2240-91; Test Method for Rubber Property - Durometer Hardness.
.5 CAN/CGSB-12.1-M90; Tempered or Laminated Safety Glass.
.6 CAN/CGSB-12.20-M89; Structural Design of Glass for Buildings.

4. DESIGN CRITERIA

.1 Design stair and ramp balustrade and connections to OBC vertical and horizontal live load requirements. Design shall be performed by a professional engineer licensed to practice in the Province of Ontario.

5. QUALITY ASSURANCE

.1 Manufacture & Fabrication

.1 Companies to be certified under Division 1 or 2.1 of CSA-W47.1 for fusion welding, and CSA-W55.3 for resistance welding. Provide certification that all welded joints are certified by Canadian Welding Bureau.

.2 Installation

.1 Work shall be performed in strict accordance with reviewed shop drawings.

.3 Pre-installation Meeting

.1 Convene a pre-installation meeting for the Products specified in this section. Attendees must include, as a minimum, representatives of the following:

.1 Contractor (Site Superintendent & Project Manager),

.2 Installation Subcontractor (Site Foreman & Project Manager),

.3 Related Subcontractors, and Consultant

6. SUBMITTALS

.1 Shop Drawings and Samples

.1 Submit shop drawings in accordance with Section 01300 Submittals. Submit sample of blackened steel material and glass for approval.

.2 Each shop drawing submitted shall bear the stamp and signature of a qualified Professional Engineer registered in the Place of the Work who has coverage of minimum $1,000,000 liability insurance.

.3 Submit all necessary shop drawings, bearing the professional seal and signature of the Subcontractor' Engineer, including design calculations for review by the Consultant. Shop drawings to include all necessary shop details and erection diagrams with;

.1 member sizes, locations, thickness (exclusive of coatings), metallic coatings and mechanical properties,

.2 connection details for attaching framing to itself and to the structure,

.3 dimensions, requirements of related work, and critical installation procedures,

.4 temporary bracing required for erection purposes,

.5 design loads, and

.6 welds indicated by welding symbols as defined in CSA-W59.

.4 Submit copies of engineering calculations and/or certified data verifying the capacity of members, connectors, connections, and the ability of assemblies to meet the design requirements, signed and sealed by the Subcontractor's Engineer.

.5 Do not fabricate until submittals are reviewed and approved by Consultant.

2 PRODUCTS

1. MATERIALS

.1 Blackened Stainless Steel Sections and Accessories: commercial grade, Cold Roll Steel Sheets and Bars, Plates, Fasteners. Abel Black™ from Diversified Ulbrich or approved equivalent.

.2 Welding materials: to CSA W59.

.3 High strength bolts: to ASTM A325.

2. SYSTEM COMPONENTS

.1 Handrails:

.1 Custom made, circular in cross section, blackened stainless steel, (custom made bracket and saddle required).

.2 Handrail Brackets:

.1 Custom made, blackened stainless steel plate c/w integral post and saddle for handrail. Brackets are typically welded to Rail Posts or wall mounted.

.3 Rail Post:

.1 Custom made, assembled from blackened stainless steel plates of various shapes and size, c/w integral, welded custom made 'L' shaped brackets for glass guard support, and c/w a 125mm long, 19mm dia. S.S. threaded rod welded at base of post, for anchoring into concrete curbs and slabs.

.4 Glass Mounts:

.1 Point Supported Standoff Base and Flat Cap welded to post's custom 'L' brackets. Custom blackened stainless steel finish to match railing.

.5 Glass: See Section 08800. Glass to be transparent and tempered, minimum 13mm thick to be engineered, stamped, signed by engineer. Flexural strength of glass must satisfy latest OBC, as currently amended to withstand the loading on guards.

.6 Shims & Spacers: Neoprene, 80 – 90 (Shore A) durometer hardness to ASTM D2240, purpose-made to suit glazing method, glass weight, and area.

3. FINISHES

.1 Blackened Stainless Steel:

.1 Variations in the color and shade of final finish is to be minimized.
.2 Cold Roll Steel Sheets and Bars. Mill scale must be removed.

.3 Prior to oxidation (Patina), all exposed steel shall receive a fine linear grain finish. Directional finish shall be "brushed" stainless #6.
.4 Care must be given to prevent scratching from handling.
.5 Dents, Scratches, or gouges are not acceptable.
.6 Clean surface finish thoroughly prior to black oxide finish (patina).
.7 Black oxide finish shall be relieved by 50% using soft scotch-brite or steel wool, followed by application of a clear suitable compatible lacquer coating.
.8 Lacquer shall be applied to coating mfrs. recommended dry film thickness.
.9 Fabricator must supply a full sized sample of each shape with specified finish for architects' approval.

4. ACCESSORIES

.1 Screws and fasteners: 13mm blackened stainless steel socket head cap screws.

5. FABRICATION

.1 Fabricate railing and guards to configurations and details as indicated on the drawings.

.2 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings. Make exposed connections of same material, colour and finish as base material on which they occur.

.3 Accurately form connections with exposed faces flush; tops of glazed guards to be aligned with maximum 1/16" tolerance, mitres and joints to fit tight.

.4 All joints in handrails shall be concealed type, or shall be counter-bored and plugged flush.

.5 Grind or file exposed welds and sections smooth.

.6 Shop-fabricate in sections as large and complete as practicable.

.7 All exposed edges to be chamfered 45 degrees, 1/8"

.8 Confirmation on design and shop drawing approval. Glass guard and handrail engineer to coordinate and verify. Hole locations are to be fabricated through the glass guard panes for installation.

3 EXECUTION

1. INSTALLATION

.1 Install plumb and true in exact locations. Provide all accessories (bolts, screws, plates, etc.) as required to positively connect to structure.
.2 Hand items over for templating post locations into concrete to appropriate trades together with setting templates.

END OF SECTION

1 GENERAL

1.1 General Requirements

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

1.2 Description

.1 Repair and replacement of existing lath and plaster.

.2 Related Work Specified Elsewhere:

.1 Gypsum Wallboard - Section 09250

.2 Carpentry - Section 06100 and 06200

.4 Demolition - Section 02100

.5 Painting - Section 09900

.6 Mechanical - Division 15

.7 Electrical - Division 16

1.3 Product Handling

.1 Deliver materials with their original packaging intact and store according to manufacturer's instructions.

.2 Keep lath and plaster materials under cover and free from dampness.

1.4 Environmental Conditions

.1 Surface and ambient temperatures must be minimum 55 degrees F. (13 degrees C.). In cold weather, temporary heat must be provided at least one week prior to plastering and maintained until plaster is dry.

.2 Before plastering ensure windows and openings are suitably covered and electrical wires are pulled through to outlets.

1.5 Protection

.1 Protect the work of other trades from work of this trade. Make good at own expense, to satisfaction of the Architect.

.2 Provide adequate controlled ventilation during application and drying of plaster. Take precaution to prevent too rapid or uneven drying. Close all openings in dry or windy weather. After plaster has set, provide air circulation and dehumidifiers, if necessary, to remove excess moisture from plaster. Do not permit plaster to dry or freeze before it sets.

1.6 Quality Assurance

.1 Employ fully trained mechanics who are regularly employed in this field.

.2 Execute work to the following standards:

.1 Manual of Lathing and Plastering, GYP. A102 published by Gypsum Association, Evanston, Illinois.

.2 Interior Furring, Lathing and Gypsum Plastering - C.S.A. Standard A82.30, 1980.

.3 Prior to installation of plaster work, erect sample wall panels using materials, joints, bond, and finishes shown for final work; and provide special features as directed.

.1 Build sample panels on the site, directed by Architect, of full panel thickness and approximately 6'-0" wide by 6'-0" high, indicating proposed range of colour, texture, and workmanship to be expected in completed work. Provide quantity of sample panels necessary to obtain acceptance by Architect.

.4 Obtain Architect acceptance of visual qualities before start of work. Retain approved sample panels until the end of job for comparative reference. Do not alter, move, or destroy mock-ups until work is complete. Remove panels when directed by Architect.

1.7 Rejections

.1 Defective materials or workmanship whenever found at any time prior to acceptance of the work shall be rejected regardless of previous inspection. Inspection will not relieve responsibility but is a precaution against oversight and error.

.2 Remove and replace defective materials and the work of other trades affected by this replacement, at no additional cost to the Owner.

1.8 Examination

.1 Report to the Consultant, in writing, all defects of surfaces or work prepared by other trades and on unsatisfactory site conditions.

.2 Thoroughly examine all surfaces scheduled to receive work of this Section to see that they are secure, rigid, true, and not liable to impair performance or appearance.

.3 Commencement of work shall imply totally acceptance of surface and site conditions.

1.9 Job Conditions

.1 Co-operate in coordinating work of other Sections with work of this Section, in order that the work may proceed in an orderly and effective manner.

2 PRODUCTS

2.1 Materials

.1 Water: Potable.

.2 Sand: CSA A82.57-M1977.

.3 Lime: Hydrated lime conforming to CSA A82.44-1950 (R197l).

.4 Cement: CAN/CSA-A5-M88.

.5 Metal Accessories: such as corner beads, screeds and control joints shall be formed as indicated on drawings or as per Manual of Lathing and Plastering where detail is not indicated from 24 gauge (.61 mm) zinc coated steel.

.6 Metal Lath: expanded and ribbed, fabricated from copper bearing or hot dipped zinc coated steel, coated with rust inhibitive coating after fabrication. Where furring at 12" (300 mm) o.c. use 3/8" (9.5 mm) ribbed lath weighing 2.5 lbs. per sq. yd. (13.3 N/sq. m.) at 16" (400 mm) o.c. use 3/8" (9.5 mm) ribbed lath weight 3.00 lbs. per sq. yd. (1.6 kg/sq. m.). Lath for reinforcing across junctures shall be diamond mesh weight 3.0 per sq. yd. (1.6 kg/sq. m.).

.7 Reveal Moulding: Fry Reglet “W” reveal extruded aluminum reveal moulding model “W RM-75-75" as distributed by I.K. MacCullum & Associates, Ballinafad, Ontario (416-460-2295)

.8 Base Coat Plaster: General purpose neat gypsum hardwall base plaster Paristone as manufactured by Domtar Building Materials Ltd., or equal product of Canadian Gypsum Co. Ltd.

.9 Gauging Plaster: Gold Dust Gauging Plaster by Domtar Construction Materials or equal product of Canadian Gypsum Co. Ltd. conforming to CSA A82.22-M1977.

.10 Trowel Finishing Lime: Whitecoat Finishing Lime.

2.2 Mixes

.1 Mix and apply all plasters in accordance with manufacturer's instructions.

.2 Mixing shall be done in a motorized mechanical mixer of type approved by material manufacturer. Mix each batch separately. Clean out mixer between batches. Mix no more material than can be used in one hour. Accurately measure all ingredients.

.3 Mixes and premixed plaster shall conform to CSA A.82.57-M1977.

3 EXECUTION

3.1 General

.1 Work of this Section shall be performed in accordance with the best practice recommended in Manual of Lathing and Plastering, published by the Lathing and Plastering Industry Committee, and with C.S.A. A82.30-M1980.

.2 Minimum thickness of plaster shall be 3/4" (19 mm) over lath.

.3 Thoroughly brush and clean all surfaces to be plastered and fill or smooth out any major irregularities.

.4 Wet base coats before applying succeeding coat.

.5 Discard partly set, frozen, caked, or lumpy material.

.6 Plaster work shall be straight, true, out of wind, flush with grounds or screeds and shall provide a surface free from defects detrimental to appearance or performance.

.7 Do not apply plaster to surface containing frost.

.8 Where plaster butts against any metal item which is set in the plaster and is flush with the finished plaster surface, provide 1/8" wide x 1/8" deep (3.18 mm x 3.18 mm) raked "vee" joint at juncture.

.9 Mix plaster according to manufacturer's instructions.

3.2 Metal Lath

.1 Apply metal lath with long dimensions across supports and stretch taut.

.2 Locate end joints over framing members and stagger end joints in alternate courses.

.3 On vertical surfaces lap lower sheet over upper sheet.

.4 Place ribs of lath against framing members; lap end joints at least 2" (50 mm) over support or securely tied. Nest edge ribs with ribs of adjacent sheets.

.5 At internal angles reinforce juncture with a continuous strip of 3" (76.2 mm) lath reinforcement.

.6 At external angles erect corner bead wire tied at 9" (225 mm) o.c. on both sides.

.7 Use hot dipped galvanized metal lath for all plaster work.

3.3 Accessories

.1 Provide metal screeds where plaster butts against surface having no trim concealing the junction, around perimeter of every opening in a plastered surface, at junction of plaster walls and ceilings to prevent bonding of ceilings to walls and at junction of plaster and other materials, and at junctions where plaster is on dissimilar construction.

3.4 Plaster Repair/Renovation

.1 Minor Repairs and Patching

.1 At localized areas where plaster is missing, damaged, cracked, or deteriorated remove deficient plaster and provide a new plaster repair keyed to the existing wall surface.

.2 Plaster repair all cracks and gouges.

.3 Reinforce with metal lath as required, to ensure plaster repairs are securely mechanically attached to substrate.

.4 Sand all existing projections and deficient previous repairs.

.5 Finish all repairs to a smooth, hard, polished surface, free from blemishes, irregularities, lap streaks, brush marks, or other defects.

.2 Replace Areas of Deteriorated Plaster

.1 Execute minor repairs and patching as described in item 3.4.1 above, i.e., Repair Type 1.

.2 Inspect deteriorated plaster. Notify Architect of additional areas of deteriorated plaster not identified in the scope of work, within 7 days of award of contact.

.3 Following approval to proceed with demolition, remove only the areas of deteriorated plaster. Deteriorated plaster is defined as plaster which is not securely keyed to the lath; plaster which is cracked, chalky, powdering, or not cemented. Remove sufficient plaster at repair areas to allow for proper repair allowing repairs to form straight lines and flush finished work.

.4 Repair/replace existing lath where lath is missing, loose, or deteriorated. Lath is to be well secured mechanically to the substrate to ensure a sound base for plaster repair.

.5 Make allowance for expansion due to moisture absorption and subsequent shrinkage.

.6 Remove sealer, coatings, oil, grease, wax, etc. from existing surfaces to be plastered; or cover surface with self-furring metal lath or furring and lath. Flame should not be used to remove coatings; the carbon deposit will destroy the bond and bleed through the plaster.

.7 It is essential that lath and plaster patching and repair material be the same type as the existing construction in order that thermal expansion coefficients of new and existing materials be consistent. New masonry and concrete work should be permitted to thoroughly cure prior to applying plaster.

.8 Repairs and replacements are to blend in and match existing plaster exactly to original design.

.3 Re-Plaster Entire Wall and Ceiling

.1 Remove all existing plaster.

.2 Repair/replace existing lath where lath is missing, loose, or deteriorated. Lath is to be well secured mechanically to the substrate to ensure a sound base for plaster repair.

.3 It is essential that lath and plaster patching and repair material be the same type as the existing construction in order that thermal expansion coefficients of new and existing materials be consistent. New masonry and concrete work should be permitted to thoroughly cure prior to applying plaster.

.4 Plaster wall as per sections 3.5, 3.6, and 3.7.

.4 Entomb Existing Wall and Ceiling

.1 Laminate gypsum wallboard over existing plaster wall, as per section 09250.

.5 Restore Corner Bead Detail

.1 Restore historic corner bead detail at outside corners of walls, piers, and arches where the detail has been damaged, or altered.

.2 Remove existing plaster and damaged wood corner bead. Reinstate wood corner bead and plaster reveal detail to match the original historic profile.

.6 Replace Plaster Within 6" (150 Mm) of Ceiling

.1 Proceed as per section 3.4.3

3.5 Base Coat Application

.1 Use three coat work for plaster work.

.2 Dampen base coat plasters as required for proper suction. Apply water uniformly over the entire surface by light fog spray and permit to draw. Avoid excess wetting.

.3 Apply scratch coat with sufficient material min. 3/8" (10 mm) thick to cover well and pressure to form a good bond.

.4 Scratch surface heavily and permit to set hard and firm before applying brown coat.

.5 Apply brown coats min. 3/8" (10 mm) thick - bring out to grounds.

.6 Straighten with rod-darby to a true surface and scratch surface with a plaster scratcher, serrated edged darby, or a wood float having a projected nail, to leave the surface rough and ready for the final coat.

.7 Provide shrinkage clearance of 1/8" (3 mm) for gypsum plaster, where objects project through or into plaster (columns, lights, outlet boxes, etc.).

3.6 Interior Finish Coat Application

.1 Trowel finish plaster to a smooth, hard, polished surface, free from blemishes, irregularities, lap streaks, brush marks or other defects.

.2 Form slight "V" groove quirks where plaster finishes flush with frames, trim, floors, light fixtures, or other surfaces.

3.7 Interior Gypsum Lime Putty Finish

.1 Scratch on a thin coat, double back to obtain a true, even surface, allow to dry, then fill in any imperfections. Trowel to a smooth finish using the water brush sparingly.

3.8 Control Joints

.1 Provide shrinkage control joints in plaster ceilings at changes of area and direction according to the best standard practice and where directed. Space joints not more than 12'-0" (3650 mm) apart. Separate fixed objects.

3.9 Fire Rating

.1 Conform with following for fire rated partitions, ceilings, and bulkheads:

.1 Fire resistant ratings called for on drawings and schedules.

.2 Appropriate codes and regulations.

.2 Repair all existing fire rated plaster ceilings to maintain fire separation indicated on drawings.

3.10 Cleaning

.1 At completion of plaster work, clean plaster from beads, screens, door frames, and contiguous work, leaving work ready for decoration by others. Remove plaster rubbish, excess material, scaffolding tools, and other equipment, leaving floors broom clean.

3.1 Remedial Work

.1 Upon completion of the plastering, the Contractor shall repair any damaged or defective (including unsatisfactory appearance) work prior to applying subsequent finishes.

.2 Any plaster that cracks, becomes loose, or develops any other defects due to faulty materials or workmanship during the Warranty Period shall be repaired or replaced, including applied finishes, as required by the Architect.

End of Section 09230

1 GENERAL

1.1 GENERAL REQUIREMENTS

.1 Conform to Sections of Division 1 as applicable.

.2 Definitions: Drywall - Gypsum Board.

1.2 RELATED WORK

.1 Wood framing: Section 06100, Rough Carpentry.

.2 Installation of door frames and frame anchor in gypsum board partitions: Section 06200, Finish Carpentry or Section 06400, Carpentry and Millwork.

.3 Firestopping and smoke seals: Section 07270.

.4 Ceramic tile finish: Section 09300, Porcelain & Ceramic Tile.

.5 Resilient tile: Reserved

.6 Finish painting: Section 09900, Painting and Finishing.

.7 Mechanical installations: Division 15, Mechanical.

.8 Electrical installations: Division 16, Electrical.

1.3 REFERENCES

ASTM A525M-91a - Specifications for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
ASTM C514-90 - Specification for Nails for the Application of Gypsum Wallboard
ASTM C645-88 - Specification for Non-load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board
ASTM E84-91a - Test Method for Surface Burning Characteristics of Building Materials
CAN/CGSB-19.21-M87 - Sealing and Bedding Compound Acoustical
CAN/CGSB-51.33-M89 - Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction
CAN/CSA-A82.27-M91 - Gypsum Board
CAN/CSA-A82.31-M91 - Gypsum Board Application
CAN/ULC-S101-M89 - Standard Methods of Fire Endurance Tests of Building Construction and Materials
CAN/ULC-S102-M88 - Surface Burning Characteristics of Building Materials and Assemblies
ULC - Underwriters' Laboratories of Canada

1.4 SUBMITTALS

.1 Shop Drawings: Submit shop drawings. Show design, construction and relevant details of furring, enclosures and partitions which require fire rating.

.2 Provide written confirmations to Divisions 15, Mechanical and 16 Electrical, when requested that suspended ceiling is capable of supporting additional weight of

mechanical and electrical fixtures specified in Divisions 15, Mechanical and 16, Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to Site with manufacturers original labels intact. Do not remove wrappings until ready for use.

.2 No outside storage permitted. Store in clean, dry area, off ground.

.3 Stack gypsum board flat on level and dry surface without overhanging boards. Prevent sagging and damage to edges, ends and surfaces. Protect bagged products from excessive moisture or wetting.

1.6 PROJECT CONDITIONS

.1 After installation, do not leave fibre-reinforced gypsum sheathing board exposed to weather conditions longer than 60 days.

2 PRODUCTS

2.1 MATERIALS

.1 Gypsum Wallboard:

1. Gypsum Wallboard: CSA A82.27-M. Use Type X (special fire retardant) board such as CGC Firecode `C' when fire rating is required.

2. Use board with round or tapered edges unless otherwise called for.

3. Backing Board and Gypsum Coreboard: CSA A82.27-M1977.

4. Thickness: 5/8" (16 mm) or as noted on drawings or as required.

5. Exterior Sheathing: 5/8" (16mm) thick Dens-Glass Gold Fiberglass - Faced Sheathing by Georgia Pacific Corporation.

6. Impact Resistant Wallboard: 5/8" (16mm) thick DensArmor Plus (paperless interior panels) by Georgia Pacific. Taping procedures as recommended by Manufacturer to suit this application.

.7 Water Resistant Gypsum Board: Sheetrock W/R Gypsum Panels by CGC Gypsum 12.7 mm (1/2") thick unless indicated otherwise on Drawings.

.2 Metal Studs

1. For Gypsum Board: ASTM C645, Galvanized sheet steel, minimum 0.59 mm thickness, zinc coating Z275 (25 gsg) (0.0247"), screwable with crimped web and returned flange, of depth shown.

2. Provide knockout openings in web at 460 mm (18") oc to accommodate (if required) horizontal mechanical and electrical service lines and bracing.

.3 Floor and Ceiling Partition Track for Gypsum Board: Galvanized sheet steel, minimum 0.59 mm overall thickness zinc coating Z275 (25 gsg) (0.0247"), pre-punched with square holes along centre line and with minimum 30 mm (1-3/16") legs, top track having longer legs where required to compensate for deflection of structure above. Width to suit metal studs.

.4 Furring Channels: Galvanized sheet steel, minimum 0.59 mm overall thickness zinc coating Z275 (25 gsg) (0.0247") screw channels, 66.7 mm wide x 22.2 mm deep, (2-5/8" x 7/8").

.5 Runner Channels: Galvanized sheet steel, minimum 1.64 mm overall thickness zinc coating Z275 (16 gsg) (0.0635"), 38.1 mm (1-1/2") high with 19 mm (3/4") flanges, for primary furring member in suspended ceilings and as horizontal stiffeners or bracing in metal stud systems.

.6 Hangers: 4.8 mm (3/16") nominal diameter mild steel rod.

.7 Tie Wire: 1.60 mm nominal diameter (16 IW ga.) galvanized, soft annealed steel.

.8 Corner Bead: Galvanized steel sheet, minimum 0.59 mm overall thickness zinc coating Z275 (25 gsg) (0.0247"), ASTM A525M, minimum width of flanges 28.6 mm (1-1/8") for 12.7 mm (1/2") thick board and 31.8 mm (1-1/2") for 15.9 mm (5/8") thick board.

.9 Casing Bead: CGC 200A or Bailey 4411 fillable edge trim (Do not use J-moulds), 0.022" base thickness commercial grade sheet steel with zinc wiped coating to ASTM A 525-93; perforated flanges; one-piece length per location.

.10 Control Joint: Galvanized sheet steel with perforated flanges, manufacturer's standard.

.11 Reveal Mouldings: Bailey D300, 0.022" base thickness commercial grade sheet metal with zinc wiped coating to ASTM A 525-93; one-piece length per location or approved alternative.

.12 Gypsum Board Screws: Self-drilling, self-tapping gypsum board screws, 25.4 mm (1") long #6 for single layer application, 41.3 mm (1-5/8") long #7 for double layer application.

.13 Laminating Compound: CAN/CSA-A82.31-M, asbestos-free, as recommended by manufacturer

.14 Joint Cement, Tape, Topping Compound and Accessories: As recommended by gypsum board manufacturer.

.15 Dust Barrier: Minimum 0.152 mm (6 mil) polyethylene, CAN/CGSB-51.33-M, Type 2.

.16 Sponge Tape: Self-sticking adhesive on 1 side, closed cell neoprene sponge tape, Perma-Stik 1220X by Jacobs and Thompson Inc.

.17 Adhesive: Manufacturer's standard, multi-purpose construction adhesive.

.18 Sound Attenuation Blankets: Noise Control by Ottawa Fibre Inc. or Quiet Zone by Owens Corning Canada of sufficient thickness to meet required STC rating for sound-proofed partitions.

.19 Acoustic Sealant: Non-hardening, CAN/CGSB-19.21-M, Tremco Acoustical Sealant by Tremco Ltd.

.20 Elastomeric Sealant: as recommended by manufacturer of fibre-reinforced gypsum sheathing board.

.21 Diffuser Trim: Bailey D800, Drywall Reveal Trim, 0.022" base thickness commercial grade sheet metal with zinc wiped coating to ASTM A 525-93; one-piece length per location or approved alternative.

3 Execution

3.1 EXAMINATION

.1 Temporary heat is provided under Section 01500, Temporary Facilities and Controls. Carry out work of this Section only when temperature is maintained and controlled in range of 13 deg C to 21 deg C (55 deg F to 70 deg F), for at least 24 hrs before installing gypsum board and is so maintained until joint cement and adhesives are cured.

.2 Provide adequate ventilation to eliminate excessive moisture before commencing and during work to ensure proper drying of joint filler and adhesive. Do not force dry adhesive and joint treatment.

.3 Examine substrate for compliance with applicable requirements, installation tolerances and other conditions affecting installation of fibre-reinforced gypsum board or sheathing. Do not proceed until unsatisfactory conditions have been corrected. Beginning of installation shall indicate acceptance of substrate conditions.

3.2 INSTALLATION

.1 General

1. Conform to CAN/CSA-A82.31-M, except as otherwise specified herein.

2. Cooperate with mechanical, electrical and other trades to accommodate fixtures, fittings and other items in gypsum board areas.
3. Install casing bead and sponge tape where gypsum board abuts materials other than itself and acoustic tile ceilings including at exterior door and window frames, where juncture is not concealed with trim; or elsewhere where indicated on Drawings. Unless indicated otherwise, use tape 3 mm (1/8") narrower than casing bead to provide recess at exposed side. Compress tape by 25%.

4. If gypsum board abuts another gypsum board surface and joint is shown not to be taped and filled or otherwise covered, make juncture same as above.

5. Install sponge tape between gypsum board partition or furring framing, where such framing abuts exterior door or window frame.

6. Install sponge tape between floor and gypsum board partition track. Tape shall be either full width or 1 strip 9.5 mm (3/8") wide on each side of framing member.

7. Erect casing beads plumb or level with minimum number of joints. Do not use scrap pieces.

8. Where additional supports are not installed on electrical fixtures located in ceiling, provide written confirmation to Division 16 Electrical that suspended ceiling is capable of supporting weight of lighting fixtures, and other electrical fixtures required by Division 16, Electrical.

9. Allow for deflection at top of partitions to avoid transmission of structural loads to framing system.

10. Provide partitions of thickness indicated on Drawings.

11. Provide adequate reinforcing for framing to receive wall mounted fixtures and vanities.

12. Firmly fasten panel to framing members without cutting surface paper or fracturing core. Ensure panel joints are aligned. Lay out panels with maximum spacing between panels not to exceed 6 mm (1/4").

.2 Gypsum Board Laminated to Concrete and/or Concrete Block Masonry

.1 Base shall be straight, dry uncoated, clean and free from efflorescence.

.2 Mix laminating adhesive in accordance with manufacturer's directions. Allow to stand 30 minutes before using.

.3 Apply adhesive with notched trowel to leave 10 mm x 12 mm ribbons, 32 mm apart over entire back side of face layer.

.4 Erect gypsum board immediately after spreading adhesive. Use moderate pressure to develop full adhesive contact with substrate.

.5 Temporarily secure gypsum board in place with concrete nails or bracing. Ensure that joints are accurately aligned. Avoid impact or movement of boards until adhesive sets firmly. Remove temporary support when adhesive has set.

.6 Do not treat joints of laminated gypsum board for at least 24 hrs after lamination.

.3 Wall Furring

1. Apply metal furring members vertically to exterior masonry and concrete

walls at 600 mm (24") o.c. or less as required to suit insulation sizes. Fasten members 600 mm (24") o.c. through flanges.

2. Shim furring members as required to present true, plumb line for application of gypsum board.

3. Locate furring members not more than 50 mm (2") away from openings, interior corners, intersections, frames, control joints and similar items.

4. Where resilient wall furring is indicated at sound rated partitions, apply metal furring members horizontally to wood studs at 600 mm (24") oc. Screw-fasten members at each stud through flanges.

.4 Stud Partitions

1. Provide accurately aligned partition tracks at top and bottom of partitions. Secure at 600 mm (24") oc.

2. Erect studs vertically in partition tracks at 400 mm (16") oc and not more than 50 mm (2") abutting walls, openings and each side of corners.

3. Place attachment clip over main/cross tee from top. Line up pre-drilled hole on clip with hole on main/cross tee and screw clip to main/cross tee with 12 mm (1/2") wafer screw.

4. Screw through pre-drilled holes in attachment clip into top track of stud partition or glazed partition. Do not screw through ceiling grid.

5. Coordinate installation of attachment clip with Section 09510, Acoustic Ceilings. Do not damage ceiling grid system during installation of these clips.

6. Extend studs on each side of openings from floor to ceiling or structure above, whichever is indicated.

7. Locate 2 framing members on each side of framed openings. Frame over and below openings and runner sections at least 150 mm longer than rough openings. Cut ends to fit bend wed up and screw anchor to adjacent studs. Install cut to length intermediate vertical studs in same manner and spacing as wall studs over such framed openings. Securely anchor studs to head and jamb anchor clips of door frames by blot or screw attachment. Insert intermediate studs above and below channels to support gypsum board.

8. Install horizontal runner at top and bottom of rough opening in glazed partitions.

9. Install cut to length intermediate vertical studs, in same manner and spacing as wall studs, over door frames and above and below other openings.

10. Where studs extend over 3600 mm (12'-0") in height provide horizontal bracing spaced approximately 2400 mm (8'-0") oc vertically and provide double studs at each side of door frames.

11. Size, brace and reinforce studs as necessary to provide sturdy, rigid partitions to heights and lengths required.

12. Securely anchor partition track to building structure and make 12 mm (1/2") allowance in partition studs for deflection of structure above to avoid transmission of structural loads on partitions. Do not secure studs or gypsum board to top track.

13. Where horizontal runs of service lines are to be installed, arrange with applicable trades to have lines installed prior to gypsum board application.

.5 Ceiling Furring

1. Hangers:

- Hangers for suspended gypsum board ceilings, bulkheads and duct furring shall support grillage independent of walls, columns, pipes, ducts, conduit and similar components. Erect hangers plumb and securely anchor to structure.

- Where hangers are suspended from concrete slab or composite concrete slab and steel deck, use lead expansion shields or self-drilling expandable steel anchors and threaded inserts designed to accept hangers.

- Space hangers at maximum 1200 mm (4'-0") o.c. along runner channels and not more than 150 mm (6") from ends to support weight of ceiling and superimposed loads such as lighting fixtures, diffusers and grilles.

- Where ducts are large or where combination of ducts, or combination of ducts and other items interfere so that hanger spacing exceeds 1200 mm (4'-0"), increase size of main runner channels and hangers accordingly to sustain increased loading and span.

2. Runner Channels:

- Space runner channels at maximum 1200 mm (4'-0") oc and not more than 150 mm (6") from boundary walls, interruptions of continuity and changes in direction.

- Run channels at right angles to structural framing members.

- Where splices are necessary, lap members at least 200 mm (8") and wire each end with minimum double strand of tie wire. Avoid clustering or lining up splices. Provide hanger within 150 mm (6") of splice.

- Attach channels to rod hangers by bending hanger sharply under bottom flange of runner and securely wire in place with saddle tie.

3. Cross Furring:

- Erect furring channels at right angles to runner channels.

- Space furring channels at 600 mm (24") o.c. and not more than 150 mm (6") from boundary walls, interruptions in ceiling continuity and change in direction.

- Secure furring channels to each support with double strand of tie wire or with clip approved by manufacturer of furring components. Splice joints by nesting and tying channels together.
- Furring channels shall be level to maximum tolerance of 3 mm (1/8") over 3600 mm (12').

.6 Ceiling Bulkhead

1. Fur for gypsum board faced vertical bulkheads within and at termination of ceilings.

2. Fur above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as shown.

.7 Gypsum Board - Single Layer

1. Ceilings:

- Apply gypsum board to metal furring with screws.
- Erect board with long dimension parallel to supports. Locate end joints over supporting members.
- Space screws at 200 mm (8") oc.

2. Partitions:

- Apply gypsum board to metal studs with screws.
- Erect board with long dimension parallel to supports. Locate end joints over supporting members.
- Locate vertical joints at least 300 mm (12") from jamb lines of openings.
- Space screws at 200 mm (8") oc at board edges and 300 mm (12') oc on board field.

3. Ceiling and Partition Fasteners:

- Perimeter screws shall be not less than 10 mm (3/8") nor more than 13 mm (1/2") from edges and ends and shall be opposite screws on adjacent boards.
- Drive screws with power screw gun and set with countersunk head slightly below surface of board.

4. Joints:

- Finish all joints.

.8 Gypsum Board - Double Layer

1. Lay out work to minimize end joints on face layer; to offset parallel joints between face and base layers by at least 250 mm (10"), and to apply face

layer at right angles to base layer.

2. Base Layer:

- Base layer shall be same as face layer, or backing board, and applied at right angles to framing members.
- Secure base layer with screws spaced 300 mm (12") oc to each member.
- Perimeter screws shall not be more than 13 mm (1/2") from edges and ends shall be opposite screws on adjacent boards.
- Surface of erected base layer shall be straight, plumb or level, and without protrusions before face layer is applied.

3. Face Layer:

- Apply face layer at right angles to base layer with adhesive.
- Apply adhesive with notched spreader to leave 10 mm x 13 mm (3/8" x 1/2") ribbons, 38 mm (1-1/2") apart over entire back side of face layer.
- Erect board immediately after spreading adhesive.
- Supplement adhesive with screw fasteners. Provide temporary support for board until adhesive bond has fully developed.
- As alternative to adhesive specified, joint cement mixed with water in accordance with manufacturer's directions may be used. Allow joint cement and water mixture to stand 30 minutes before using.

4. Joints:

- Finish joints in face layers only, unless otherwise required to achieve fire resistant ratings indicated, as hereinafter specified.

.9 Fire Rated Construction

1. Provide fire rated enclosures, separations, and assemblies as shown conforming to requirements of authorities having jurisdiction.

.10 Water Resistant Gypsum Board

1. Install water resistant gypsum board on walls of all washrooms and shower areas.

2. Seal all cut edges, ends, utility holes and fastener holes and heads with board manufacturer's sealant as directed by manufacturer.

.11 Sound-Proofed Partitions

1. Where indicated on Drawings, provide soundproofed partitions with minimum Sound Transmission Class of 50 STC.

2. Install sound-proofed partitions in locations indicated on Drawings to meet required minimum STC rating. Gypsum board shall be applied on both sides of sound-proofed partitions. Follow manufacturer's details and recommendations.

3. Apply minimum 12 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. Add additional, seal full perimeter of cut-outs around electrical boxes, ducts or similar penetration in partitions where perimeter sealed with acoustic sealant.

.12 Access Doors: Build-in access doors supplied by Mechanical and Electrical Divisions where required in gypsum board installations, in accordance with manufacturer's recommendations, to match and blend with surrounding surfaces.

.13 Control Joints

1. Construct control joints of (preformed units) (2 back-to-back casing beads) set in gypsum board facing and supported independently on both sides of joint. Provide continuous polyethylene dust barrier behind and across control joints.

2. Install control joints straight and true. Locate control joints at changes in substrate construction, at approximate 10 m (33') spacing on long corridor runs and 15 m (50') spacing on ceilings, at 1 jamb over door frames, and where indicated on Drawings.

.14 Firestopping and smoke seal

.1 Firestopping and smoke seals around penetrations, at control joints and deflection spaces in fire separations shall be part of work of Section 07840, Penetration Firestopping. Provide assistance as required to trade performing firestopping.

.15 Pressed Steel Frames

1. Install pressed steel frames where they occur in gypsum board partitions.

2. Anchor frames securely to studs using minimum of 3 anchors per jamb for jambs up to 2100 mm (7') high and minimum of 4 anchors per jamb for jambs over 2100 mm (7') high.

.16 Finishing

.1 Do filling either manually, using tools of trade, or by mechanical taping and filling machine of proven efficiency.

.2 Apply joint filler, tape and topping cement according to manufacturer's directions.

.3 Finished work shall be smooth, seamless, plumb, true and flush, having square, neat corners.

.4 Drive home fasteners protruding above panel surface. Fill fastener depressions.

.5 Apply continuous coat of joint compound to fill channel formed by tapered edges of panels. Centre tape and lightly press to embed in compound. Apply thin coat over tape.

.6 Apply joint compound over butt joints and embed tape in manner similar to tapered joint. Provide sufficient quantity of compound under the tape to ensure adequate bond.

.7 Apply coat of joint compound to corner and casing beads.

.8 Fold tape to form 90□ angle. Apply joint compound to both sides of corner. Embed in taping compound.

.9 After joint compound has dried completely. Apply additional coats of finishing compound to obtain required level of finish. Provide recommended sanding between coats as recommended by manufacturer.

.17 Cutting and Patching

.1 Do all cutting, patching and making good as required by installation of work of other Sections and cooperate closely with these Sections to assure satisfactory finish.

End of Section 09250

1 GENERAL

1.1 GENERAL REQUIREMENTS

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

1.2 REFERENCE STANDARDS

1. Do tile work to Installation Manual 2000 "Porcelain Tile and Ceramic Tile", produced by Terrazzo Tile and Marble Association of Canada (TTMAC), except where specified otherwise.

1.3 MAINTENANCE DATA

1. Provide maintenance data for tile work.

1.4 MAINTENANCE MATERIALS

1. Provide minimum 2% of each type and colour of ceramic and quarry tile required for project maintenance use. Store where directed.

2. Maintenance material to be of same production run as installed material.

1.5 ENVIRONMENTAL REQUIREMENTS

1. Air temperature and structural base temperature at quarry tile and ceramic installation area must be above 54 degrees F. (12 deg. C.) for 48 hours before, during and 48 hours after installation.

1.6 SAMPLES

1. Submit full size but minimum 1'-0" x 1'-0" (300 mm x 300 mm) samples of each type, colour, texture, size, and pattern of tile to be used for the approval of the Architect before installation.

1.7 RELATED WORK SPECIFIED ELSEWHERE

1. Rough Carpentry - Section 06100
2. Caulking - Section 07900
3. Finish Carpentry - Section 06200
4. Washroom Accessories - Section 10800
5. Mechanical - Division 15
6. Electrical – Division 16

1.8 SHOP DRAWINGS

1. Porcelain Tile: submit shop drawings showing expansion joint, control joint locations and pattern layouts for Architect's approval prior to pouring of the concrete floor (see item 3.3)

2 PRODUCTS

2.1 TILES:

1. Tile: Conforming to CGSB 75-GP-1A.

2. Ceramic Tile: Walls – BLANCO BRILLO "Bright" by Olympia Tile, Size: 250mm x 750mm

3. Porcelain Tile: Floor – KONE "Pearl" by Olympia Tile, Size: 300mm x 600mm

Architect to finalize selection of floor tile following submission of samples for review.

2.2 MORTAR BEDS:

1. For Walls: 1-part Portland Cement: 1/5 to 1/2 parts hydrated lime; 4 parts sand; gauged with Laticrete 4237 latex as per manufacturer's directions.

2. For Floors: 1-part Portland Cement: 4 parts sand: gauged with Laticrete 4237 latex as per manufacturer's directions.

2.3 THIN SET MORTAR:

1. Portland cement/sand gauged with Laticrete 4237 latex as per manufacturer's directions. Approved equal manufacturer is TEC.

2.4 EPOXY FLOOR GROUT:

1. Stain resistant Latapoxy SP-100. Colour to be selected by consultant from full range.

2.5 WALL GROUT:

1. Unsanded dry set Laticrete 600 Series/1776

2.6 CAULKING:

1. Flexible caulking conforming to CGSB 19-GP.22M: Dow Corning 786 and CGE 1702 Sanitary Sealant. Colours as selected by Architect.

2.7 METAL DIVIDER STRIPS: 14-gauge zinc divider strip.

2.8 FLOOR SEALER AND PROTECTIVE COATING: Aqua Mix Penetrating Sealer by Aqua Mix Inc. type as approved by tile and grout manufacturers.

2.9 CLEANER: Aqua Mix Miracle Cleaner by Aqua Mix Inc. or as recommended by tile and grout manufacturers.

2.10 PORCELAIN TILE TRANSITION STRIPS: From Porcelain Tile to Carpet: Schluter Reno TK AETK100.

2.11 CONTROL JOINTS: Porcelain Tile: Schluter Dilex BWB 100. Colour as selected by Architect.

2.12 WALL EDGE TRIM: Porcelain Tile: Schluter Schiene, brushed stainless steel to suit porcelain tile thickness.

3 EXECUTION

3.1 EXAMINATION

1. Examine substrates before commencing work to ensure they are satisfactory. Defective work resulting from installation on unsatisfactory surfaces will be considered the responsibility of those performing the work of this section.

3.2 WORKMANSHIP

1. Regard recommendations, installation methods specified and illustrated in Terrazzo, Tile and Marble Association Manual No. 2000, and applicable manufacturer's instructions as minimum acceptable standard accept as varied by this Specification.

2. Fit tile units around corners, fitments, fixtures, drains and other built-in objects to maintain uniform joint appearance. Make cut edges smooth, even and free from chipping. Edges resulting from splitting not acceptable.

3. Maximum surface tolerance 1:800.

4. Make joints between tiles uniform. Tile joints shall be 1/4" (6 mm) wide for quarry tile, plumb, straight, true, even and with adjacent units flush. Align patterns.

5. Drill holes for fixing accessories of other trades.

6. Finish surfaces flat and level or sloped and graded to drain where floor drains occur.

7. Sound tiles after setting and replace hollow sounding units to obtain full bond.

8. Make internal angles square, external angles bull nosed.

9. Install divider strips at junction of tile flooring and dissimilar material.

10. Clean installed tile surfaces progressively as work proceeds. Do not allow mortar to stain absorbent tile. Do not use acids for cleaning. Seal in accordance with manufacturer's approved products and in accordance with TTMAC certified products only.

11. Install tiles in patterns as shown on drawings. Layout borders, defined lines, accent patterns and bands wherever they occur prior to setting tile. Keep inner edges of borders against fields or wall panels straight.

12. Install base trim, control joints, and beveled reducing strips as per manufacturer's instructions.

3.3 EXPANSION AND CONTROL JOINTS

1. Control joints to be located directly on block control joints.

2. Control joints are also to be placed where tile abuts other hard materials.

3. Install control joints in tile floors at 10'-0" (3050 mm) max. o.c. and at 20'-0" (6100 mm) max o.c. at wall locations.
4. Allow for control joints at the perimeter junction to all walls, around all columns.

5. Submit shop drawings to indicate layout of control joints. Quarry tile control joints shall occur directly above a concrete floor control joint therefore minimizing the cutting of quarry tile.

6. The approved control joint shop drawing layout shall be marked onto the concrete floor slabs by the quarry tile contractor and the actual cutting of the control joints in the concrete floor slab shall be done by the concrete floor finisher.

7. It is the responsibility of the quarry tile contractor and the concrete floor finisher to co-ordinate through the project manager the exact location of floor control joints.

8. At expansion joint locations install back to back metal divider strips at each side of joint then caulk between.

3.4 INSTALLATION OF PORCELAIN TILE

1. Refer to TTMAC Specifications and Detail No. 311F-2000 Detail A, thin set method of quarry tile.

2. Install tile using thin set mortar, in accordance with manufacturer's instructions.

3. Provide levelling coat to level floor prior to installation.

3.5 GROUTING OF PORCELAIN TILE

1. Pack joints solid with grout at quarry tile using a plastic or non-staining trowel.

2. Allow joints to stiffen before finishing.

3. Remove excess grout with clean cloths.

4. Grout shall be mixed according to manufacturer's instructions. Colour as selected by Architect from full range of colours.

5. Clean all surfaces with clean solution specified as per manufacturer's instructions.

3.6 CAULKING

1. Install caulking neatly and tool concave around base of all door frames.

3.7 CLEANING AND REMEDIAL WORK

1. Clean tile surfaces upon completion of grouting as per tile manufacturer printed instructions using cleaning agents and procedures recommended by the manufacturers of tile and grout.

2. Remove all grout haze, observing tile manufacturer's recommendations as to use of acid and chemical cleaners. (Do not use muriatic acid on tile work or pavers.)

3. Rinse tile work thoroughly with clean water before and after using chemical cleaners.

4. After setting, all tile surfaces shall be sounded and visually inspected and wherever any hollow backed, or damaged tiles are found they shall be removed and replaced with matching tiles.

3.8 PROTECTION FROM CONSTRUCTION DIRT

1. Seal cementitious grout joints and unglazed tile with "Aqua Mix Penetrating Sealer" by Aqua Mix Inc. or as recommended by manufacturer.

2. Cover all tile floors with heavy duty non-staining construction paper, masked in place.

3. Prior to final acceptance of tile work, remove paper and clean with "Aqua-Mix Miracle Cleaner" by Aqua Mix Inc. or as recommended by manufacturer.

3.9 PROTECTION FROM TRAFFIC

1. Prohibit all foot and wheel traffic from using newly tiled floors for at least three days, preferably seven days after grouting is completed.

2. Place large, flat boards in walkways and wheel ways for seven days, where use of newly tiled floor is unavoidable.

3. Leave finished installation clean and free of cracked, chipped, brock, unbonded or otherwise defective tile work. Replace damaged or defective work.

End of Section 09300

1 GENERAL

1.1 General Requirements

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

1.2 References

Paints conforming to Standards in **BOLD** also conform to ECP-07/ECP-12.

ASTM D523-89	-	Test Method for Specular Gloss
CAN/CGSB-1.2-M89	-	Boiled Linseed Oil
CAN/CGSB-1.4-92	-	Petroleum Spirits Thinner
CAN/CGSB-1.5-M91	-	Low Flash Petroleum Spirits Thinner
CAN/CGSB-1.57-M90	-	Alkyd, Interior, Semigloss Enamel
CAN/CGSB-1.59-M89	-	Alkyd, Exterior Gloss Enamel
CAN/CGSB-1.68-M91	-	Solvent Type Primer-Sealer for Interior Wall
CGSB 1-GP-74M	-	Paint, Traffic, Alkyd
CAN/CGSB-1.76-M91	-	Interior and Exterior Heat Resistant Enamel
CAN/CGSB-1.81-M90	-	Air Drying and Baking Alkyd Primer for Vehicles and Equipment
CAN/CGSB-1.100-M89	**-**	**Interior Latex Type, Flat Paint**
CAN/CGSB-1.119-M89	**-**	**Primer-Sealer, Wall, Interior Latex Type**
CAN/CGSB-1.135-M91	-	Flat Alkyd Enamel for Equipment
CAN/CGSB-1.138-93	**-**	**Exterior Latex Type Flat Paint**
CAN/CGSB-1.143-M90	-	Heat Resistant Aluminum Enamel, Silicone Alkyd
CAN/CGSB-1.154-M89	**-**	**Latex Type Paint for Concrete Floors**
CAN/CGSB-1.162-M90	-	Stucco and Masonry Coating, Emulsion Type
CAN/CGSB-1.175-M89	-	Polyurethane Interior Coating, Oil Modified, Clear, Gloss and Satin
CGSB 1-GP-180Ma	-	Coating, Polyurethane, Two-Package, Resistant to Chalking and Yellowing
CAN/CGSB-1.181-92	-	Ready Mixed Organic Zinc-Rich Coating
CAN/CGSB-1.186-M89	-	High Performance Glazed Coating System, Interior
CAN/CGSB-1.188-M90	**-**	**Emulsion Type Filler Masonry Block**
CGSB 1-GP-189M	-	Primer, Alkyd, Wood, Exterior
CAN/CGSB-1.195-M90	**-**	**Interior Semi-gloss Latex Paint**
CAN/CGSB-1.198-92	-	Cementitious Primer (for Galvanized Surfaces)
CAN/CGSB-1.202-92	-	Interior Low Gloss Alkyd Enamel
CAN/CGSB-1.203-M91	**-**	**Exterior Latex Wood Primer**
CAN/CGSB-1.204-92	**-**	**Exterior Latex Type Pigmented Stain**
CAN/CGSB-1.209-93	**-**	**Low Sheen Latex Interior Paint**
CGSB 85-GP-16M	-	Painting Galvanized Steel
CAN/CGSB-85.100-93	-	Painting
ECP -	Environmental Choice Program	
ECP-07-89	-	Water-borne Surface Coatings
ECP-12-89	-	Solvent-borne Paints
OPCA	-	Ontario Painting Contractors Association
SSPC-	Steel Structures Painting Council, "Steel Structures Painting Manual, Vol. 2"	
ULC -	Underwriters' Laboratories of Canada	
CAN/ULC-S102-M88	-	Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

1.3 Submittals

1. Material List

.1 Submit in writing list of proposed materials prepared by paint manufacturer, for approval at least 60 days before materials are required. List shall bear manufacturer's official certification that materials listed meet or exceed requirements specified herein.

1. Samples

.1 Prepare samples of various finishes for Architect's approval either on site or by submitting samples as directed. Submit samples at least thirty (30) days before materials are required.

.2 Submit opaque paint samples in triplicate on 8" x 12" (200 mm x 300 mm) draw-down cards. Identify each sample as to job, finish, formula, colour name, number, sheen name and gloss units, date and name of Subcontractor.

.3 Submit samples of stains and clear finishes in triplicate on 50 mm x 100 mm (2" x 4") piece of wood of same species and grade as scheduled to receive stain or clear finish.

1.4 Pre-Construction Meeting

1. Prior to any painting being started, request a meeting on Site to be attended by all parties associated with work of this Section including Architect, Contractor, Subcontractor, Material Manufacturer's Representative and any sub-trades whose work will be painted, or whose work is adjacent to or may be affected by work of this Section. The meeting is to review conditions, surfaces, anticipated problems and to clarify quality of workmanship acceptable to Architect.

2. Prior to the Pre-Construction Meeting, review Specification for work included under this Section 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, schedule, restrictions on areas requiring painting and other matters affecting construction, to permit compliance with intent of this Section.

1.5 Product Handling

1. Delivery and Storage

.1 Deliver materials to site in their original containers with label intact and store in spaces directed by Architect. Keep stored materials with lids securely covered at all times and take all necessary precaution against fire and spontaneous combustion. Storage area to be maintained in accordance with manufacturer's MSDS requirements.

.2 Ventilate, heat and maintain storage area at minimum temperature of 10 deg C (50 deg F) and protected from direct rays of sun.

.3 Provide warning signs where toxic materials and explosive solvents are used.

.4 Provide C02 fire extinguisher of minimum 20 lbs. (9 kg.) capacity in storage area while materials are stored within.

.5 Leave storage areas clean and free from evidence of occupancy on completion.

1.6 Environmental Conditions

1. Paint and finish in clean, dust-free, properly ventilated and adequately lit areas (minimum 100 lx (9.3 ft. candles). Maintain adequate ventilation at all times to control excessive humidity. Do not paint or finish in unclean or improperly ventilated areas. Do not paint in temperatures lower than 50 degrees F. (10 degrees C.) or varnish in temperatures lower than 65 degrees F. (18 degrees C.). Maintain minimum interior temperature of 18 deg C (65 deg F) during application and drying of paint and varnish and maintain until building occupancy occurs.

2. Do not undertake exterior painting if air and surface temperature are expected to fall below 10 deg C (50 deg F) before coating has dried. Avoid painting during winds, weather conditions which may affect paint application or following rain. Wait until frost, dew or condensation has fully evaporated. Avoid painting surfaces exposed directly to hot summer sun. Safe levels for temperature and humidity shall be determined by use of an electronic meter.

3. Test for moisture content in each location immediately before commencing application of paint. Do

not apply paint on surfaces where moisture content exceeds 14%. Promptly notify Consultant if such conditions are encountered.

4. Provide approved equipment for testing moisture content of surfaces to receive paint finishes and have available on Site at all times during Work of this Section.

5. Do not apply paint finish in areas where dust is being generated.

1.7 Protection

1. Provide metal pans or adequate tarpaulin to protect floors in areas assigned for the storage and mixing of paints.

2. Use sufficient drop cloths and protective coverings for the full protection of floors, furnishings and work not being painted.

2. Leave above areas clean and free from evidence of occupancy upon completion of painting.

4. Protect paint materials from fire and freezing. Maintain product in accordance with manufacturer's MSDS requirements.

5. Keep waste rags in metal drums containing water and remove from building at end of each working shift.

1.8 Related Work Specified Elsewhere

1. Read carefully all other Sections of the specifications to determine the extent of prime and finish coats applied by others.

2. Reserved

3. See Section 09910 – Painting Metal Surfaces, for extent of shop coating for metal work and pre-painted finishes.

4. Wood finish, wood preservative or fire-retardant treatment for rough and finish carpentry: Section 06100, Rough Carpentry or Section 06200, Finish Carpentry.

5. Some prime and finish coats applied by other Sections. Read carefully other Sections of Specifications to determine extent thereof.

6. Gypsum board; section 09250

7. Heritage Doors and Frames; section 08212

8. Sealants; section 07900

9. Conservation of Wood Window and Door Frames; section 08611

10. Surface Preparation for Wood; section 09993

1.9 Finish Carpentry & Architectural Millwork

1. All cabinet millwork must be finished in the shop by Section 06400. All other finish carpentry materials to be finished by Section 09900.

1.10 Scope of Work

1. With exceptions noted in 1.6 and 1.7 above or specifically called for in other Sections of the Specification, all paintwork is included in the scope of this Section

2. In locations where Drawings do not call for paint or similar finish on interior and exterior wood and

metal surfaces, the intent of this Specification is that all wood and metal surfaces shall be painted.

3. Paint exposed drywall and the like in locations where finish is not otherwise specified or noted. Do not paint such surfaces in mechanical shafts, unless specifically noted.

4. Make good paint finish on shop coated work where damaged.

5. Paint visible portions of steel shelf angles, lintels and structural steel.

6. Paint edges and all faces of doors where primed for paint supplied.

7. Paint all roof top equipment, pipes, conduit, vents, ducts, pipe insulation, etc. exposed on roofs (including primed and prefinished items).

1.11 Quality Assurance

1. Paint work shall meet or exceed standards set out in C.G.S.B. Specification No.'s 85-GP-1M to 85-GP-33A.

2. Perform work of this Section by applicator with minimum 5 years of proven, satisfactory and successful painting experience on projects of similar size and nature. Submit proof of such experience with list of projects in Canada upon Architect's request. Provide qualified crew of painters and full-time review of work by qualified supervisor for duration of work.

3. Provide and coordinate Site inspection service by manufacturer's representative in advance of work commencing and during progress of work to ensure correct use and application of each specified material. Obtain in writing from manufacturer's representative approval of surface preparation methods outlined in Specifications or obtain specific recommendations for alternative methods. Report such conditions to Architect.

4. As work progresses and upon completion of work, submit written reports and manufacturer's confirmation that materials and application methods conform to manufacturer's requirements.

1.12 Extended Warranty

.1 Provide warranty certificate stating that the paint coatings specified under this section for galvanized surfaces are guaranteed against failure of the paint systems, including peeling, blistering, colour fading, shrinking, cracking, etc. for a period of two (2) years from the Date of Substantial Performance. Promptly correct any defects or deficiencies which become apparent within warranty period to satisfaction of Architect and at no expense to Owner.

1.13 Retouching

1. Do all retouching, etc. to ensure that the building may be handed over to the Owner in perfect condition, free of spatter, fingerprints, rust, watermarks, scratches, blemishes or other disfiguration.

1.14 Test Area

1. A room or area in the building will be designated by the Architect as a test area to establish standard of workmanship, texture, gloss and coverage.

2. Apply 900 mm x 900 mm (36" x 136") samples of each finish onto each type of surface to be coated, with correct material, coats, colour, texture and degree of gloss in sample area and have same approved prior to providing Work of this Section. **Or** Apply full size test samples in areas designated by Architect of each finish on each type of surface to be coated with correct material, number of coats, colour, texture and degree of gloss required.

3. Provide additional samples if required to obtain approval. Do no painting until samples have been

approved. Approved panels shall become standard of comparison for painting work on Site. Correct and refinish work which does not compare with approved finishes. Approved full size sample panels may become integral part of finished Work if permitted by Architect.

4. Retain test area until after completion of Work. Test area to be minimum standard for the Work.

5. Failure to comply with the above will be cause for Architect to request all Work previously painted to be repainted.

1.15 Definitions:

1. "Exposed" means visible in completed Work. In case of closets, cabinets and drawers, it includes their interiors.

2 PRODUCTS

2.1 Materials

.1 Paint and finishing materials for each procedure listed in Finish Schedule shall be products of single manufacturer.

.2 Paint products shall meet or exceed requirements of ECP-07 Guidelines for water-based paints and ECP-12 Guidelines for solvent based paints. In addition, paint products shall meet or exceed applicable performance standards issued by CGSB or other such standards approved by accredited standards writing organizations.

.3 Paint shall have excellent flowing and brushing properties. Paint shall cure free of sags, runs, wrinkles to yield desired finish specified.

.4 Several competitive sources of supply are currently offering environmentally friendly paint products that conform to Environmental Choice Program guidelines and carry EcoLogo on paint containers. Several paint products currently supplied by following companies have been approved by ECP/CSA to carry EcoLogo. Not all products available from listed companies conform to stated guidelines. Other manufacturer's products bearing EcoLogo shall be deemed acceptable provided they meet standards of products specified or other requirements specified herein.

.5 SOLVENT BASED PAINTS

1. Benjamin Moore and Co., Ltd.
2. Pittsburgh Paints
3. Dulux Paints (Canada) Inc.
4. PPG Canada Inc. (Coatings and Resins Division)
5. Sherwin-Williams
6. Para Paints
7. Pratt and Lambert

.6 SILICATE BASED PAINTS

.1 KEIM Mineral Coatings of America, Inc.
.1 Keim Innotop Sol-silicate interior paint.

.7 POWDER COATING

.1 Automatic Coating Limited; 416-335-7500.
.1 Thermoset powder coating.

.8 ZINC-RICH COATING

.1 Manufactured by Fosroc.
.1 Galvafroid zinc rich cold galvanizing coating.

9. Reserved

10. Thinners, cleaners: Type and brand recommended by the paint manufacturer.

11. Materials to be new and first line of manufacturer.

12. Deliver materials to site in original unbroken containers bearing brand and manufacturer's name.

3 EXECUTION

3.1 Condition of Surfaces

1. Do work only when surfaces and conditions are satisfactory for production of quality work. Report to Architect in writing any surfaces which are found to be unsatisfactory. Commencement of work shall imply acceptance of substrate surfaces.

2. Ensure temperature of surfaces to be finished is between 10 and 20 deg.C (50 and 68 deg.F) and surfaces are dry and free of dirt, grease or other contaminants that may affect applied finish.

.2 Verify moisture content of surfaces with electronic moisture metre. Do not proceed without written directions if moisture reading is higher than 12-15%.

.3 If substrate is steel, do not apply coatings over moisture or when surface temperature is within 3 deg C (5 deg F) of dew point.

.4 If substrate is wood, do not stain or paint if moisture reading is higher than 12%. Inspect work to assure surfaces are smooth, free from machine marks and that nail heads have been countersunk.

.5 If substrate is cast-in-place concrete, allow it to cure for 60 to 90 days before proceeding with priming.

.6 If substrate is precast prestressed concrete, inspect and accept or reject filled-in surface blow holes.

.7 If substrate is new plaster or masonry, allow to cure for 30 to 90 days. Ensure that moisture content is below 12% and test for alkalinity and neutralize (pH 6.5-7.5) before proceeding with priming.

.8 If substrate is gypsum board, inspect to ensure joints are completely filled and sanded smooth. Inspect surfaces for "nail popping", screw heads not recessed and taped, breaks in surface or other imperfections and have repaired as required.

3.2 Preparation

1. Concrete and Masonry

.1 Test surfaces for alkalinity with pink litmus paper or other recognized method.

.2 Where extreme alkalinity occurs, wash surface with 4% solution tetrapotassium pyrophosphate (5 oz. per gallon (31 ml./l.) of water) where latex base paint is to be used and with zinc sulphate solution (3 lbs. per gallon (300 g./l.) of water where other paint bases are to be used.)

.3 Etch normal concrete surfaces to receive alkyd paint with muriatic acid solution (1 part commercial) 31.45% to 3 parts water. Neutralize and allow to dry before painting.

.4 Prepare masonry concrete surfaces to CGSB 85-GP-31M.

2. Metal

.1 Touch-up shop primed metal after first removing loose primer, rust, oil, grease and other contaminants.

.2 Feather edges to make touch-up inconspicuous when applying new primer.
.3 Prime with zinc chromate primer.

.4 Conform to CGSB 1-GP40d.M to CGSB 85-GP-14M.

3. Galvanized Surfaces

.1 For Primer Application Type C Corrosive ensure that all surfaces to be painted are clean, dry, and free of all contaminants.

.2 Cleaning of existing surfaces to be conducted according to SSPC-SP-4 Flame Cleaning procedure. Pass high temperature, high velocity, oxyacetylene flames over entire surface and then wire brushing. Primer is to be applied before surface is cool.

.3 Phosphatize galvanized metal surfaces using CGSB 31-GP-105M pretreatment or prime with galvanized metal primer.

4. Woodwork

.1 Inspect millwork to assure surfaces are smooth, free from machine marks and that nail heads have been countersunk. Seal all knots and sapwood in surfaces to receive paint, with a vinyl sealer compatible with finish specified conforming to CGSB 1-GP-125b.

.2 Sand smooth all woodwork which is to be finished and clean surfaces free of dust before applying first coat. Fill nail holes, splits and scratches with non-shrinking filler conforming to CGSB 1-GP-103b after first coat is dry. When these occur on a transparent surface, filler shall be stained to match the finish as approved by Architect. Between coats, sand lightly with No. 00 sandpaper and remove dust.

.3 Prime all wood noted for paint finish immediately on delivery to site.

.4 Back paint all wood noted for stain, varnish or natural finish.

.5 Prepare all wood surfaces to CGSB-85-GP-1M.

5. Hardware

.1 Remove finishing hardware, electric cover plates and accessories, mask any that are not removable. Replace these when paint is dry and clean them. Do not clean hardware with solvent that will remove permanent lacquer finish.

6. Plaster and Gypsum Wallboard

1. For small holes, scratches or other surface marks fill with patching compound and sand smooth.

.2 For larger holes or damaged areas do not proceed until trade for original work has filled or repaired surfaces to acceptable levels.

.3 Clean surfaces dry, free of dust, dirt, powdery residue, grease, oil, wax or any other contaminants. Sand and dust as necessary prior to painting.

.4 Prepare wallboard surfaces to CGSB-85-GP-33M.

7. Copper

.1 Prepare copper piping and accessories to CGSB 85-GP-20M.

8. General

.1 Mask specification plates occurring on equipment, switch boxes, and similar items requiring painting.

.2 Protect, remove and replace hardware, accessories, lighting fixtures and similar items as required.

.3 Conform with Architect's colour schedules and exactly match approved samples.

.4 Provide sandblasting for surface preparation if deemed necessary.

.5 Remove dust, grease, rust and extraneous matter from surfaces (except rust occurring on items specified to be primed under other Sections shall be removed and work re-primed under those Sections). Vacuum fibre acoustic tile and insulation covering surfaces.

.6 Remove mildew by scrubbing affected area with solution of tri-sodium-phosphate (TSP) (150 g) and bleach (125 g) in 3.5 L water. Rinse well with clean water and allow to dry. If condition is serious, source out finishes with extra mildew resistance.

.7 Metal Stacks, Breeching, Piping: Blast clean to 37-50 mm (1.5-2 mil) profile using grit abrasive to SSPC-SP6.

3.3 Application

1. Finishes and number of coats specified in the schedule are intended to cover surfaces perfectly. If they do not, apply further coats until perfect coverage is achieved as required.

2. Any areas exhibiting incomplete or unsatisfactory coverage shall have the entire plane painted. Patching will not be acceptable.

3. Walls needing repainting, entire wall (plane) shall be painted to the satisfaction of the Architect. See drawings for extent of work.

4. Spray painting will not be permitted unless specifically approved in writing by the Architect in each instance. Architect may withdraw approval at any time and prohibit spray painting for reasons such as carelessness, poor masking or protection measures drifting paint fog, disturbance to other Trades or failure to obtain a dense, even, opaque finish. Spray painting shall be full double coat, i.e. at least two passes for each coat. Do not use spray or roller on wood or metal surfaces, brush only unless approved in writing by Architect.

5. Arrange to have traffic barred from completed areas wherever possible.

6. Apply materials in strict accordance with manufacturer's directions and specifications and be familiar with these directions and specifications.

7. Prime woodwork as soon as possible after woodwork is delivered to site. Prime all surfaces, whether exposed or not, before installation. In case of woodwork, which is to be stained, apply one coat of penetrating sealer to all finish surfaces of wood having uneven absorption, such as birch or pine. Woods of uniform density such as oak shall be left unsealed. Back prime stained and varnished woodwork with one coat of gloss varnish reduced 25%. Fill open grain woods with filler tinted to match wood when transparent finish is required and work well into grain. Before filler sets, wipe excess from surface.

8. Apply primer-sealer coats by brush or roller method.

9. Permit paint to dry before applying succeeding coats, touch up suction spots and sand between coats with 180-grit sandpaper.

10. Where two coats of the same paint are to be applied, the first coat shall be the same colour as the finish coat and be inspected by the Architect before application of final coat, to allow the Architect to make reasonable modification of colour if necessary. Furnish Architect with a schedule showing expected completion of the respective coats of paint for the various areas and surfaces. Keep this schedule current as the job progresses.

11. Exterior paints shall be factory tinted to required colours.

12. Flat and semi-gloss finishes on plaster and other surfaces of large areas shall be applied by roller and to

all other surfaces applied by brush.

13. Paint shall be uniform in sheen, colour and texture, free from brush or roller marks, sags, runs or other defects.

14. Finish edges of doors (top, bottom, sides and cutouts) with paint or stain treatment as required to match face of door. Seal hidden edges of doors with one coat of shellac and one coat gloss varnish or two coats paint. Repaint tops and edges of wood doors after fitting.

15. Even up stained woodwork in colour as required by nature of wood and as directed by Architect. Apply same finish on trim, fitments, cupboards and other protecting ledges as on surrounding work, disregard sight lines.

16. Carefully hand smooth and sandpaper wood between coats (including priming). Apply one coat sealer before applying first coat paint filler to knots or sap blemishes on wood surfaces to receive paint or stain finish.

17. Remove rust, oil, grease and loose shop paint from metal work by brushing or with wire brushes and make good shop coat before proceeding with final finish. Feather out edges to make touch up patches inconspicuous.

18. After fist coat, fill nail holes, splits, and scratches, using putty coloured to match finish.

19. Clean castings with wire brush before application of first paint coat.

20. Do not etch galvanized metal. Prepare prime and paint as described elsewhere in this section. This includes metal door frames and the like with wiped zinc coating.

21. Remove form oil or parting compounds from concrete surfaces. Use Xylol or approved compound.

22. Paint interior of pipe spaces, ducts, etc. visible through grilles or through metal ceilings in black matt finish.

23. Conform with Architect's colour schedule and exactly match approved samples.

24. Mechanical and Electrical Materials

    .1 Refer to instructions regarding painting and finishing of materials and equipment supplied and installed by those trades.

    .2 Remove grilles, covers, access panels for mechanical and electrical systems from location and paint separately, if these items are not factory finished.

    .3 Paint work to match adjacent walls and ceilings unless directed otherwise. Note: This includes trim on fixtures exposed, speakers, emergency lights, concealed sprinkler covers, grilles, diffusers, louvres, vents, fire extinguisher cabinets, electrical panels, etc.

    .4 Paint interior surfaces that are visible through grilles and louvres with one coat of flat black metal paint to limit of sight line.

25. Apply materials in accordance with manufacturer' directions and specifications. Do not use adulterants. Any reduction of coating's viscosity shall be done in accordance with manufacturer's directions.

26. Gloss terms shall have following values based on OPCA gloss reflectance guidelines.

Gloss Term	**Gloss Value**
Flat or Matt	0 to 5 Units at 60 deg and max 10 units at 85 deg
Eggshell, Velvet or Low Lustre	5 to 25 Units at 60 deg and min 10 units at 85 deg
Satin	20 to 35 Units at 60 deg
Semi-Gloss	35 to 65 Units at 60 deg

High-Gloss	65 and greater

29. Do not paint baked enamel, chrome plated, stainless steel, aluminium or other surfaces finished with final finish in factory. Finish paint all primed surfaces.

3.4 Adjust and Clean

1. Imperfections occurring on surfaces requiring patching during "warranty period" shall be repainted in such a way that the patch is not visible at a distance of 5'-0" (1500 mm).

2. If patch painting not acceptable repaint entire surface.

3. Upon completion, remove masking and clean adjacent surfaces free of overspray spatters, drips, smears and overspray.

4. At completion clean entire area of surplus materials and equipment.

3.5 Field Quality Control

1. Locate testing area in building to establish standard of workmanship, texture, gloss and coverage where designated.

2. Apply samples of all finishes on each type of surface to be coated with correct material, number of coats, colour, texture and degree of gloss required.

3. Retain test area until completion of work. Use approved work in test areas as standard for corresponding work throughout building. Correct and refinish work which does not compare with approved finishes.

3.6 Finish Schedule

1. General

.1 Finish the listed exposed surfaces, wherever they occur unless such surfaces are specifically noted to be left unfinished.

.2 Exposed means visible in the completed work and includes the interior of closets, cabinets and drawers.

.3 The Architect shall have the option of having wood painted or with transparent finish and of which finish shall be used.

.4 In instances where materials specified are not suitable for a particular job application, or are contrary to manufacturer's recommendations for use on a particular surface, such condition shall immediately be brought to the attention of the Architect for clarification and instructions.

.5 Finishes shall match approved samples, but Architect reserves the right to make reasonable changes to finish specifications to obtain desired results without additional cost or obligation of Owner.

.6 A colour chart giving colour schemes for various areas will be prepared after tendering, by the Architect. The final selection of colours and surface textures of all finishes throughout and whether finishes are transparent (natural) or opaque (paint) shall rest solely with the Architect.

.7 Where existing surfaces have been disturbed, the entire plane shall be painted. Finish shall match existing unless noted otherwise on drawings.

2. Exterior Schedule

.1 Metal (Ferrous, Copper, Cast Iron, etc.)

Refer to Section 05732: Metals Conservation, and Section 09910: Painting Metal Surfaces.

Note: All exterior areas and roof top equipment, pipes, conduit, vents, ducts, grilles, pipe insulation, masonry lintels, accessories, ladders, etc. to be painted.

.2 Galvanized Steel

One coat galvanized primer. Use a Polyamide converted epoxy primer by Devoe Coatings, "4170-1000 with 4170-999-catalyst".
Two coats of galvanized Finish Coat. Use a single package tough, durable alkyd modified urethane coating with water, chemical and solvent resistance by Devoe Coatings "Devoe" Glid Shield Urethane Gloss Enamel No. 4328-0100 Series (installation within 72 hours of installing primer).

Note: All exterior areas are to be painted including railings, masonry lintels, accessories, roof top piping, fence framing, ladders, etc.

.3 Painted Wood Surfaces

Refer to Section 09994: Painting of Wood Surfaces

.4 Stained Pressure Treated Wood

Two coats solid hide stain conforming to 1-GP-145D.

3. Interior Schedule

.1 Metal (Ferrous, Copper, Cast Iron, etc.)

Refer to Section 05732: Metals Conservation, and Section 09910: Painting Metal Surfaces.

.2 Hot Ferrous Metal - (Valve bodies, strainers, etc., on high temperature lines.) - One coat primer, heat resistant, aluminum alkyd - Two coats heat resistant enamel.

.3 Galvanized Steel

One coat galvanized primer. Use a Polyamide converted epoxy by Devoe Coatings "4170-1000 with 4170-9999-catalyst".
Two coats of galvanized Finish Coat. Use a single package tough, durable alkyd modified urethane coating with water, chemical and solvent resistance by Devoe Coatings ADevoe Glid Shield Urethane Gloss Enamel No. 4328-0100 Series (install within 72 hours of installing primer).

.4 Woodwork Painted

One coat wood primer.
Two coats interior alkyd trim enamel.

.5 Natural or Stained Close Grain Wood

One coat non-bleeding alkyd stain.
One coat sanding sealer.
Two coats alkyd interior flat, satin or gloss varnish as directed by Architect.

.6 Natural or Stained Open Grain Wood

One coat stain filler.
One coat sanding sealer.

Two coats interior gloss varnish.
One coat alkyd interior flat, satin or gloss varnish as directed by Architect.

.7 Interior of Wood Drawers

Three coats gloss varnish.

.8 Concrete

One coat filler applied at the minimum rate of 80 sq. ft per gallon (1.63 m2 per litre), or as required by block texture to completely fill pores. Pinholes will not be accepted.

One coat primer-sealer CGSB1-GP-119M.
Two coats interior alkyd enamel.

.9 Exposed Insulated Pipes and Ductwork

One coat size.
One coat alkyd undercoat.
Two coats alkyd flat.

.10 Plaster and Gypsum Wallboard (Drywall)

One coat of Latex sealer.
Two coats interior flat or velvet alkyd or eggshell paint.

At textured ceilings install tinted Latex sealer only.

.11 Surfaces Behind Grilles and Duct Work (where visible within 12' (300 mm) of grille):

.1 Two coats vinyl latex matt black.

.13 Painted Light Trims, Emergency Lights, Louvres, Diffusers, Vents, Concealed Sprinkler Covers, Fire Extinguisher Cabinets, and Electrical Panels, Etc.

.1 Two coats interior alkyd enamel to match surrounding wall and ceiling colours.

3.7 Wood Furniture Finishes (By Section 06400)

1. Natural or Stained Transparent Wood Furniture Finish

One coat non-bleeding alkyd stain.
One coat sanding sealer.
Two coats polymerizing two component catalytic conversion varnish system. “Duravar Plus” manufactured by M.L. Campbell and distributed by W.E. Saunders & Sons Painters Ltd. (519-582-2621). Flat, stain or gloss finish as directed by Architect.

2. Interior of Wood Drawers

Three coats tinted sealer to inside sides, back and bottom.

3. Unexposed Millwork Surfaces

Two coats of tinted sealer including backs of all base and wall cabinets, enclosures, etc.

0.8 Disposal of Paint Waste

0. Be responsible for removal and disposal of material and waste generated by this Section.

1. Remove empty and partly used containers from Site and recycle or disposed of as Hazardous Waste in acc

ordance with local municipal, provincial and federal environmental regulations. Provide proof of such action in form of receipts of tipping fees, disposal fees or bills of lading, as applicable.

3. Remove from Site peripheral items, such as clean up solvents, paint brushes, rags, and similar items and dispose of where necessary in accordance with local municipal, provincial and federal environmental regulations.

4. Do not rinse off latex paints from brushes and rags under running water tap. While work is ongoing, whether using latex or alkyd products, rinse off all brushes and rags in container with appropriate solvent (water or paint thinner). Leave such container in well-lit and well-ventilated area, away from any flammable conditions. Dispose of emulsion created in accordance with local municipal, provincial and federal environmental regulations.

3.9 Maintenance Material

1. Provided four sealed cans, one-liter capacity, of each product in each colour used in the Work for Owner's use in maintenance work.

2. Container to be new fully labelled with manufacturer's name, type of paint, and colour.

3. Provide Owner 3 copies of paint formula for each colour and type of paint for Owner's maintenance manual.

End of Section 09900

1 GENERAL

1.1 Related Sections

1. General Conditions as applicable
2. Section 06910: Wood Cleaning
3. Section 09900: Painting

1.2 Description

1. The section describes the work necessary to prepare the wood surfaces of doors, windows, and existing wood components to remain and to be refinished such as frames, sills, wainscot, paneling, casing, trims, baseboards, etc. - for primer and paint.

1.3 Workmanship

1. Work of this section shall be completed by individuals with a minimum of five (5) years experience at this type of work.

1.4 Mock Ups

1. Contractor shall complete the work described in this section on one sample window and one door identified beforehand by the Consultant. This work shall be executed under direct review by the Consultant. Acceptance of the completed sample by the Consultant shall be necessary before additional surface preparation work proceeds.

2. Provide Consultant five (5) days notice prior to undertaking work on this sample (mock-up).

1.5 Product Storage and Handling

1. Observe good housekeeping practices when executing work in this section.

2. If existing paint is identified to contain lead, follow safety precautions for contact, removal, containment and removal of old paint contaminated with lead as defined by local, provincial and Federal regulations.

3. Provide fire extinguisher (carbon dioxide type) minimum 9 kg capacity at immediate work area.

1.6 Project Conditions

1. Surface preparation work shall be performed in favorable weather conditions as defined herein. The temperature range within the work area shall be between 50 to 90 degrees F.

2. Wood being prepared must be dry and have moisture content below 12% by weight. Protect area from moisture until painting is complete and cured.

3. Use of a heated enclosure around the work area is acceptable.

4. Mask or otherwise protect surrounding or adjacent historic fabric and occupants from all activities associated with this work. No fastenings associated with hoarding or other protects shall be installed in historic material without prior approval of Consultant.

5. Prevent dust associated with these activities from spreading beyond the immediate work area and into the building interior.

6. All exterior surfaces shall be protected by the use of polyethylene tents to protect from moisture from the time that surface preparation begins and until painting is about to commence. Once painting begins use breathable tarps through to final painting.

1.7 Daily Clean Up

1. Remove from building any oil-soaked rags and/or brushes at the end of each workday or earlier in the day if use of oil is finished, whichever occurs first. This is to avoid any danger of linseed oil-soaked rags spontaneously combusting.

2. Clean up work area at the end of each workday. Remove from building and discard unused materials, containers, tools, towels and paint dust in accordance with any local, Provincial and Federal regulations.

2 PRODUCTS

2.1 Materials

1. Refer to Wood Cleaning – section 06910.
2. Non-ionic detergent.

3 EXECUTION

3.1 Scope of Paint Removal

1. Prepare surfaces to receive new finishes as required.

2. All surfaces of doors and windows including frames, jambs, sills, casings, aprons, trims, thresholds etc. will require re-painting (unless specifically stated otherwise), surfaces shall be scraped and sanded to sound substrate which may or may not be bare wood.

3. Remove existing paint to expose the condition of existing wood.

4. Where epoxy repairs are required, remove all paint to bare wood from the affected area.

5. Where exiting wood surface is characterized by rough grain finish, remove paint in such a manner to retain existing grain.

3.2 Surface Preparation for Woodwork

1. The use of power tools on historical wood is not permitted. Chemical stripping and careful hand scraping and sanding are the means for removing painting.

2. Open flame devices including heat guns for paint removal are not permitted.

3. Scraping and sanding shall be done carefully so as not to gouge or otherwise alter the profiles of mouldings and existing exposed wood grain. Orbital sanders are not permitted because of the tendency to tear across the grain.

4. Customize blades for scrapers to match the shape of the original profiles.

5. Carefully sand to achieve smooth surface without altering profiles, feather edges or obliterate exposed wood grain where existing. Lightly sand all surfaces that are to be painted.

3.3 Interior and Exterior Cleaning

1. Interior, exterior and hidden surfaces of all woodwork associated with windows and doors are soiled.

2. Carefully vacuum all surfaces including wood and glazing inside and out using a soft nozzle tip that will not scratch surfaces.

3. Agitate stubborn areas with a nylon brush.

4. Wash all surfaces with a small amount of non-ionic detergent in potable water using nylon brushes and/or lint free cloths.

5. Rinse all surfaces with potable water and dry with lint free cloths.

End of Section 09993

1 GENERAL

1.1 Related Sections

1. General Conditions as applicable
2. Section 09900: Painting and Finishing
3. Section 09993: Surface Preparation

1.2 Description

.1 The work in this section describes priming and painting for wood surfaces including but not limited to: windows, frames, casings, sills, jambs, heads, sashes, doors, trims, strips, thresholds, baseboards, quarter rounds, paneling, etc.

1.3 Delivery and Storage

1. Deliver packaged materials in original, unopened, labeled and sealed containers.
2. Keep stored materials at a temperature between 50-90 degrees F. and protect from direct sun or inclement weather.

1.4 Job Conditions

1. No painting shall be undertaken if the temperature is expected to fall below 50 degrees F. within the next 48 hours unless a heated enclosure is provided.
2. Finishes shall not be applied in direct sunlight.
3. Finishes shall be protected from moisture for 48 hours after application.
4. Surfaces must be dry, clean, free from dust, grease, oil or other contaminants that will affect the work of this Section.

1.5 Protection

1. Use adequate amount of drop cloths and protective coverings to protect furnishings, work of others and adjacent historic fabric not being painted.
2. Remove waste rags from site at the end of each working shift.
3. All exterior surfaces shall be protected using polyethylene tents to protect from moisture from the time that surface preparation begins and until painting is about to commence. Once painting begins, use breathable tarps through to final painting.
4. General contractor to ensure that odours associated with new paint are ventilated completely.

1.6 Colour

1. Contractor shall provide as many as three sample panels (8" x 10" card stock) of the different paint colour(s) and finish(es) for review by Consultant and Owner. Colours other than white shall be custom tints different than those available in standard colour wheels, typically colour shall match existing unless otherwise noted.

1.7 Scheduling of Work

1. Submit work schedule starting and final completion dates for consultant's approval.
2. Take measures necessary to complete work within approved scheduled time.
3. Any change in approved schedule must be submitted for approval by the consultant.
4. Co-ordinate execution of the work with other work at the site.

2 PRODUCTS

2.1 Base Coat Primer

1. Ensure primer is compatible with existing paint system, for surfaces where new paint system will be applied on top of existing paint.
2. Top of the line Alkyd primer such as "Suprime 8" by Pratt & Lambert

2.2 Top Coat

.1 Finish is to match existing colour.
.2 Top of the line Acrylic Latex top-coat such as "Accolade" by Pratt & Lambert

2.3 Varnish

.1 Linseed oil varnish, Le Tonkinois Linseed Varnish No.1 (Marine) by Allback Organic Linseed Paint or equivalent alternative product.
.2 Le Tonkinois GELOMAT Linseed varnish or an equivalent alternative product.

2.4 Other

1. Thinners, cleaners, primers, and sealers for knots recommended by the coating manufacturer.
2. All materials to be new and top line of manufacturer.
3. Non-ionic detergent.
4. Potable water.

3 EXECUTION

3.1 General

1. Preparation: see "Section 09993: Surface Preparation".
2. Ensure all epoxy work is complete, cured and tooled. See "Section 08613: Wood Epoxy Patching".
3. Follow all manufacturers' printed instructions.
4. Seal knots, cracks and imperfections.
5. Back prime all new material on all six sides before installation.
6. In addition, all new glazing stops, parting strips, trims, casings, etc. to receive one "top-coat" on all six sides before installation.
7. Conform to approved samples.
8. Thoroughly clean all interior, exterior and hidden surfaces by thoroughly vacuuming and then by washing with detergent in potable water. Rinse with potable water and allow surfaces to dry.
9. Protect, remove, index/log hardware and re-install at completion of paint work
10. At interior surfaces, including but not limited to: aprons, paneling, sills, jambs, casings, trims, the intent is to paint and/or stain – varnish existing finishes and new material to match existing in type and colour.

3.2 Application

1. Base coat primer is to be applied on clean and dry wood. Ensure moisture levels are below 14%. Follow manufacturer's requirements to establish acceptable levels.
2. Due to the paint odour, allow 8 hour drying time before start of business day (8 am).
3. Typically (1) coat primer, two (2) finish coats. Finish and number of coats specified are intended to cover surfaces completely. If they do not, apply further coats until complete coverage is achieved to Consultant's approval.
4. Apply materials in strict accordance with manufacturer's directions and specifications.
5. All base coat primer and finish paint shall be applied by brush.
6. After application of first coat, Consultant must give approval of colour before second coat application. Contractor shall allow for changes in tint at this stage.
7. Finishes shall be uniform in sheen, colour and texture, and free from sags, runs or other defects.
8. Once back putty has cured apply linseed oil varnish or paint to putty and neatly lap onto glass by 1/16" (1.5mm).
9. On exterior of sash neatly lap paint onto glass by 1/16" (1.5mm).
10. Apply varnish on interior faces of interior surfaces to match existing. Mix varnish with GELOMAT as required to attain acceptable gloss levels. Provide a mock-up for review.
11. Protect, remove and replace hardware and weather stripping as required.

3.3 Clean Up

1. On completion of work, remove surplus material, tools, equipment, and debris from work area to satisfaction of owner.

2. Remove excess paint from glass and other adjacent surfaces.
3. Clean wood and glass surfaces thoroughly.
4. Ensure free operation of sashes and door is not impacted by the paint work.

End of Section 09994.

1 GENERAL

1.1 GENERAL REQUIREMENTS

1. Conform to Sections of Division 1 and General Conditions as applicable.

1.2 RELATED WORK

1. Rough Carpentry – Section 06100
2. Gypsum Board – Section 09250
3. Porcelain Tile - Section 09300
4. Resilient Sheet Flooring - Section 09657
5. Division 15 – Access Panels required for Mechanical Work not specified herein.
6. Division 16 – Access Panels required for Electrical Work

1.3 SUBMITTALS

1. Shop Drawings: indicate mounting location, direction of swing, locking mechanism, edge condition adjacent to mounting surface, finish, material thickness.
2. Submit for approval, manufacturer's catalogue literature related to installation and fabrication.

2 PRODUCTS

2.1 GENERAL

1. Supply access panels as shown on the drawings.
2. Access door sizes shall be as shown on drawings.
3. All doors shall open 180˚ have rounded safety corners.
4. For fire rated ceilings or wall provide a fire rated access door that will match the fire rating of the wall that the access door is installed in. The Contractor shall be responsible for reviewing the drawings and providing fire rated access doors where they are required.
5. Where body access is possible, the access doors shall be provided with a releasing mechanism on both sides of the door.

2.2 ACCESS PANELS

1. Floor Doors

.1 Door: ¼" smooth aluminum plate, recessed for 1/8" or 3/16" floor covering.

.2 Frame: 5/16" (nominal) – 6061 - T6 extruded aluminum, recessed for 1/8" or 3/16" floor covering.

.3 Hinges: Zinc plated steel hinges with stainless steel pivot points.

.4 Latch: Zinc plated steel slam latch with a removable cover plug operable from the inside by a spoon handle and the outside by a removable tool.

.5 Lift Assist: Door panel is counterbalanced for ease of operation.

.6 Hold Open Arm: Automatically locks the door panel in an open position of

90°.

.7 Standard Live Load: 150lbs sq/ft.

.8 Finish: Aluminum, mill finish.

.9 Warranty: Maxam Metal Products Ltd. guarantees all floor door products to be free from defects in workmanship and materials for a time period of five years from date of shipping.

.10 Standard of Acceptance: Maxam Metal Products Ltd. Model MT, Recessed Aluminum

2. Recessed Access Door for Drywall Applications

.1 Doors shall be 16-gauge steel. Mounting frame shall be 14-gauge steel.

.2 Doors shall be provided with a 25mm (1") recess or 15mm (5/8") to suit the thickness of the drywall ceiling.

.3 The frame shall be provided with a galvanized steel drywall taping bead on all sides.

.4 The hinge shall be a concealed pivoting rod.

.5 The latch shall be a flush to the surface, screwdriver operated cam latch unless otherwise specified.

.6 The steel finish shall be 5 stage iron phosphate preparation with prime coat of grey baked enamel.

.7 2.2.2.7 Standard of Acceptance: Acudor DW-5015, Mifab, Zurn, Watrous

3. Fire Rated Access Door

.1 Doors shall be constructed of 20-gauge steel with a 16 gauge mounting frame.

.2 Doors shall be filled with 50 mm (2") thick fire rated insulation.

.3 The door frame shall be provided with a 25mm (1") wide flange and mounting frame to have anchor straps.

.4 The hinge shall be concealed and shall be provided with a spring closer.

.5 Doors shall be UL/ULC rated for 45 min. "B" label with 250°F temp rise in 30 minutes.

.6 The latch shall be a universal self-latching bolt, operated by a knurled knob.

.7 The steel finish shall be 5 stage iron phosphate prepared with a prime coat of grey baked enamel.

.8 For drywall applications, provide a galvanized steel drywall taping bead flange.

.9 Standard of Acceptance: Acudor FB-5050, Mifab, Zum, Watrous.

4. Fire Rated Access Door with Inside Latch Release

.1 Doors shall be constructed of 16-gauge mounting frame.

.2 Doors shall be flush to frame with reinforced edges.

.3 The door frame shall be provided with a 25mm (1") wide flange and shall be provided with anchor straps.

.4 The hinge shall be concealed and shall be provided with a spring closer.

.5 The door shall be UL/ULC rated for 45 min. hour "B" label or 2 hour "B" label as required where temperature rise is not a factor.

.6 The latch shall be a universal self-latching bolt, operated by a knurled knob.

.7 The steel finish shall be 5 stage iron phosphate prepared with a prime coat of grey baked enamel.

.8 Doors shall be provided with an interior latch release.
.9 For drywall applications, provide a galvanized steel drywall taping bead flange.
.10 Standard of Acceptance: Acudor FB-5070, Mifab, Zurn, Watrous.

3 EXECUTION

3.1 INSTALLATION

1. Access door locations have been indicated on drawings where required for man access. Access doors required for hand access to access electrical or mechanical system components are the responsibility of Division 15 and Division 16 respectively.
2. The Division 15/16 sub-contractors must provide a set of drawings showing locations and types of all access doors to the Consultant for approval, prior to commencing the installation of any piping, ductwork or conduit within these areas.
3. Access doors shall be turned over to the building trade that is responsible for finishing the floor, wall or ceiling where the access door is required.
4. The Division 15/16 sub-contractors shall be responsible for providing the access doors required to be installed where required for valves, junction boxes, switches, etc. Refer to mechanical and electrical specifications for additional requirements.

End of Section 10520

1 GENERAL

1.1 GENERAL REQUIREMENTS

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

1.2 RELATED WORK SPECIFIED ELSEWHERE

1. Finish Hardware - Section 08710
2. Gypsum Drywall - Section 09250
3. Rough Carpentry - Section 06100
4. Finish Carpentry - Section 06200
5. Mechanical - Division 15
6. Electrical - Division 16
7. Painting - Section 09900
8. Tile Systems - Section 09300

1.3 SHOP DRAWINGS

1. Submit shop drawings or catalogue illustrations as required by The Architect.
2. Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details anchors for grab bars.

1.4 SUBMITTALS

1. Submit samples of all accessories for approval by the Architect.

1.5 DELIVERY, STORAGE AND HANDLING

1. Package accessories and label with description of contents and installation location. Each accessory to be individually wrapped complete with all fixings as required.

2. Deliver accessories where designated at Site by Contractor.

1.6 MAINTENANCE AND OPERATING INSTRUCTIONS

1. Provide for inclusion in data book, three (3) printed copies of maintenance and operating instructions of all accessories.

2 PRODUCTS

2.1 MATERIALS

.1 Sheet Steel: Commercial grade, stretcher levelled sheet steel to ASTM A526-71 (1975) with G90 zinc coating to ASTM A525-79.

.2 Stainless Steel Sheet: To ASTM A666-72 (1979) type 302 with No. 4 finish, minimum 0.9 mm (0.036"/20 gauge).

.3 Stainless Steel Tubing: AISI Type 304, commercial grade, seamless welded, 1.2mm (0.047") wall thickness.

.4 Fasteners: Screws and bolts hot dip galvanized. Expansion shields fibre, lead or rubber as recommended by fixture manufacturer for component and its intended use.

.5 Fasteners: Screws and bolts stainless steel. Expansion shields, lead or rubber as recommended by fixture manufacturer for component and its intended use.

2.2 FINISHES

1. Stainless steel, Satin - refer to Section 2.6

2. Baked enamel: condition metal by applying one coat of metal conditioner to CGSB 31-GP-107a, apply one coat Type 2 primer to CGSB 1-GP-81M and bake apply two coats Type 2 enamel to CGSB 1-GP-88e and bake to hard, durable finish. Sand between final coats. Colour selected from standard range by The Architect.

2.3 KEYING

1. All accessories to be keyed alike. Provide six keys.

2.4 TRADEMARKS AND LABELS

1. Trademarks and labels shall not be visible on the finish exposed surfaces.

2.5 MANUFACTURER

1. Provide accessory items manufactured by companies as noted or approved alternatives.

2. Acceptable manufacturers: Bobrick, Gamco, Frost, Franke, Tork, Purell, Pressalit.

2.6 ACCESSORIES

1. Universal Washroom:

.1 32mm dia. stainless steel, 610 mm long straight bar, standard flange position at back of water closet. Bobrick B-5806.99 series. Quantity 1

.2 L-shaped bar as detailed 32mm dia. stainless steel, 750mm long horizontal and vertical 750mm at side of water closet. Bobrick B-5898.99. Quantity 1.

.3 Fold-down grab bar 32mm dia. stainless steel, 760mm long at side of water closet. Gamco 125. Quantity 1.

.4 All grab bars to be 18 (1.2 mm) gauge stainless steel tubing, with Mandrel bends. Grab bars to have peaned grip finish full length of the tubing to

within 100 mm of ends of bends. Secure concealed fastening grab bars with 64 mm No. 14 screws to solid backing, capable of supporting a 225 kg pull. All accessories must comply with the Ontario Building Code as currently amended.

.5 Change Table: barrier-free, shower change table, electrically height adjustable, Pressalit SCT 3000. Quantity 1.

.6 Sanitary Napkin Disposal: barrier-free, surface mounted sanitary napkin disposal unit – Frost 625 handsfree – brushed stainless steel finish. Quantity 1.

.7 Sanitary Napkin Dispenser: Push Button Free Feminine Product Dispenser – Frost 618-3-FREE, with recessed frame to comply with ADA. Quantity 1.

.8 Soap Dispenser: barrier-free, surface mounted soap dispenser – Purell ES8 Touch-Free, Black finish. Quantity 1. Supplied by Owner, installed by GC.

.9 Coat Hook: barrier-free, collapsible coat hook – Bobrick B-983 or approved equivalent – brushed stainless steel finish. Quantity 1.

.10 Backrest: barrier-free toilet grab bar rail with backrest – Franke CM-16104-WM. Quantity 1.

.11 Toilet Tissue Dispenser: barrier-free, surface mounted toilet tissue dispenser – Bobrick B-2892 or approved alternate, stainless steel satin-finish. Quantity 1.

.12 Paper Towel Dispenser: Barrier Free, surface mounted hand towel dispenser. Tork Elevation PeakServe, Mini, Continuous Hand Towel Dispenser – Black-finish. Quantity 1. Supplied by Owner, installed by GC.

.13 Hand Sanitizer Dispenser (installed outside washroom): PURELL LTX-12 Dispenser, Touch-Free Dispenser for PURELL Hand Sanitizer. Quantity 1. Supplied by Owner, installed by GC.

.14 Waste Recepticle: Floor Standing, Stainless Steel Waste Recepticle – Bobrick-2260, Open Top. Quantity 1.

.15 Shelf: Surface mounted, stainless steel from Frost, Code 950-4x18. Quantity 1.

Refer to Mechanical Drawings for specifications and product list of faucets, valves, toilets, vanities, etc.

2.7 FABRICATION

1. Weld, ground flush and smooth joints of fabricated components. Use mechanical fasteners only when approved.

2. Form exposed surfaces from one sheet of stock, free of joints.

3. Brake-form sheet metal with 2 mm radius bends.

4. Form flat surfaces without distortion. Maintain flat surfaces without scratches or dents.

5. Paint back of components where contact is made with building finishes to prevent electrolysis.

6. Hot dip ferrous metal anchors and fastening devices to conform with CGSB G164.

7. Shop assemble and package components complete with anchors and fittings.

8. Deliver inserts and rough-in frames to site at appropriate time for building in. Provide templates or rough-in measurements as required.

9. Provide steel anchor plates and components for installation on studding and building framing.

10. All exposed stainless-steel edges to be hemmed.

11. All stainless-steel units to be double panned.

3 EXECUTION

3.1 INSTALLATION

1. Installation of all washroom accessories by this Section. Install all items to secure backing.

2. Securely fasten accessories level and plumb in the locations shown on the drawings and as specified herein. Mounting heights as shown on product installation instructions for ADA compliance, on drawings, or as directed by The Architect.

3. Co-ordinate installation with the work of trades providing adjacent construction as required to achieve the reveals or other edge conditions shown where front faces of units are flush with the finished wall surfaces.

4. Perform drilling of steel, masonry, and concrete necessary to install the accessories.

5. Insulate accessory surfaces to prevent electrolysis due to contact with masonry, concrete or dissimilar metal surfaces. Use bituminous paint, building paper or other approved means.

6. Clean all accessories in conformance with Division 1.

3.1 LOCATION

1. Locate accessories were indicated on drawings. Determine exact locations based on on-site dimensions. All dimensions to be verified by the GC prior to installation.

End of Section 10800

1 GENERAL

1.1 General Requirements

.1 Conform to Sections of Division 1 as applicable.

1.2 Related Work

.1 Division 3: Concrete
.2 Limestone Paving: Section 04540

1.3 REFERENCES

1. AODA/TADG guidelines and specifications (Latest Edition)
2. ISO 23599, "Assistive Products for Blind and Vision-Impaired Persons – Tactile Walking Surface Indicators".

1.4 Delivery, Storage and Handling

.1 Deliver materials to Site in original wrappings with labels intact and store in areas directed by Architect.
.2 Store insulation on raised platforms and protect with waterproof covers. Prevent exposure of insulation to sun.
.3 Store materials inside buildings for 24 hours prior to installation.

1.5 SAMPLES AND SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01300 Submittals. Submit sample of each material listed in Paragraph 2.1 below, for review and approval.

2 PRODUCTS

2.1 Materials

.1 Individual Tactile Domes: Detectable Warning Surface Indicators for warning and attention of people with visual impairments Mod. No. CSG316SSDM, 316L Stainless Steel as supplied by Cityscape Supply, 388 Carlaw Ave., Unit 202i Toronto, ON M4M 2T4. Colour to be selected by Architect from full range of availeable finishes.

.1 Size Specifications:
Diameter: 22mm (tolerance +0.2)
Thickness: 4.0mm (tolerance +0.2)
Diameter of leg: 5.0mm (tolerance +0.2)
Length of leg: 18mm (tolerance +0.2)

.2 Safety Treads: High-content aluminium oxide abrasive, colour contrasting grit strips, c/w 6063-T5 extruded aluminium base. Spectra Safety Treads - Wooster WP24, 2 1/16" wide, 3/8" thick, colour: Black. Epoxy/Abrasive filler shall be securely

bonded to the extruded aluminum base.

.3 Adhesive Anchor: FLO-ROK FR%MAX Injection Adhesive anchor by UCAN. Two components, high-strength, styrene free, epoxy acrylate adhesive.

3 EXECUTION

3.1 Installation

1 General

.1 Install materials in accordance with manufacturer's instructions.

.2 Individual Tactile Domes:

.1 Tactile walking surface indicators (individual flat-topped, stainless-steel domes) are to be installed at top of stair and shall extend for the full width of the stair, and for a depth of at least 920mm commencing one tread back from the stair. (Refer to drawings and AODA standards, latest edition)

.2 Carefully drill limestone paving in regular pattern with centreline spacing between 42mm – 61mm (for domes w/12mm top diameter of flat-topped dome) and to a depth as required by dome's manufacturer and installation instruction. (Refer to AODA/TADG standards, latest edition)

.3 Protect all exposed surfaces, fill drilled holes with adhesive anchor and press-fit domes into drilled hole. Clean thoroughly any adhesive spill over. Protect from traffic until dry, and structurally sound.

.3 Safety Treads

.1 Colour contrasting grit strips, (extruded aluminium base w/aluminium oxide abrasive, colour/textural contrasting strips) are to be installed at every limestone stair's tread and at slope changes in concrete ramp (on the level side) and extend for the full width of the stair and ramp. Refer to drawings for locations.

.2 Individual stone treads shall be pre-routed in the shop before installation to accommodate the strips as required (strips are installed recessed into the stone and flush with stair tread surface). Follow manufacturer's specification and installation instruction for anchoring.

.3 Contrasting strips at ramp shall be cast directly into concrete and flush with the finished ramp surface. Puddle the concrete, tamp the contrasting strip to insure proper concrete formation around the anchors. Follow manufacturer's specification and installation instruction for anchoring.

.4 Install all materials in accordance with the manufacturer's printed instructions unless otherwise specified herein.

End of Section 10900