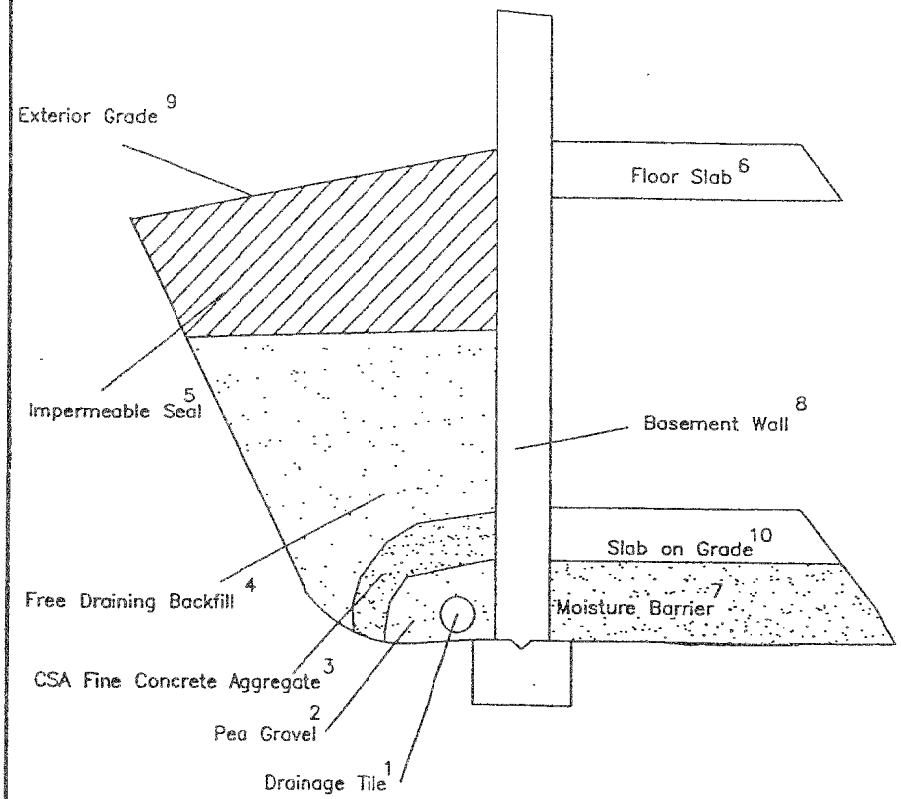
DRAINAGE AND BACKFILL RECOMMENDATIONS

(Not to Scale)



TYPICAL SECTION

NOTES:

1. Drainage tile to consist of 100 (4") diam. Weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be minimum 150mm (6") below underside of floor slab.
2. Pea gravel 150mm (6") top and sides of drain. If drain is not on footing, 100 mm (4") of pea gravel below drain. Clear 20mm (3/4") crushed stone may be used provided it is covered by an approved porous membrane (Terrafix 270R or equivalent).
3. C.S.A. Fine aggregate to act as filter material. Minimum 300 mm (12") top and sides of tile drain. This may be replaced by an approved porous plastic membrane as indicated in 2.
4. Free draining backfill - Class B pit-run gravel or equivalent compacted to 93 – 95 % Standard Proctor Maximum Dry Density (SPMDD).
5. Impermeable backfill seal compacted clay, clay silt or equivalent. If original soil is free draining seal may be omitted.
6. Do not backfill until wall is supported by basement and floor slab or adequate bracing.
7. Moisture barrier to consist of 20mm (3/4") compacted crushed stone. Layer to be 200mm (8") thick.
8. Basement walls to be damp proofed.
9. Exterior grade to slope away from wall.
10. Slab on grade should not be structurally connected to wall or footing.
11. Underfloor drain invert to be at least 300 (1') below underside of floor slab. Tiles to be placed in parallel rows 6-8m (20' – 25') centres one way.
12. do not connect the underfloor drains to perimeter drains.
13. If the 20mm (3/4") stone requires surface blinding, use 6mm (1/4") stone chips.

DRAWING NO. 3

APPENDIX A

BOREHOLE LOG SHEETS
(1 – 5)

Project No: 7451

Log of Borehole BH-1

Project: PROPOSED ADDITION - ALLAN A. MARTIN PUBLIC SCHOOL

Client: PDSB c/o HOSSACK ARCHITECTURE

Enclosure: 2

Location: 1390 OGDEN AVENUE, MISSISSAUGA, ON.

Depth (m)	Description of strata	Elevation (m)	Sample No.	Type	Blows/ft	Recovery	Blows/ft (20 40 60 80)	Water Content % (10 20 30)	Monitoring Well
0	Ground Surface	97.75							
	TOPSOIL/ORGANIC SOIL (±150 mm)	0.00	1	SS	8		8	9.8	
	FILL/DISTURBED SOIL brown sandy silt with minor pockets of organics, loose, moist.	96.99							
1	SANDY SILT loose, rust brown, moist.	0.76	2	SS	7		7	9.3	
	compact, wet.		3	SS	13		13	20.6	
2	with fine gravel, dense.		4	SS	100		100	18.3	
	SHALE TILL hard, grey, moist.	95.13 2.62							
3	WEATHERED SHALE hard, grey, moist.	94.70 3.05	5	SS	100		100	9.7	
	End of Borehole								
4									
5									

Remarks: Upon completion of drilling, the borehole was open to 2.6 m and water level was measured at 2.5 m below EGSL.

Drill Method: CME 55 - SOLID

Drill Date: NOV. 11, 2024

Datum: GEODETIC

FORWARD ENGINEERING & ASSOCIATES INC.
244 Brockport Drive, Unit 15, Toronto, Ontario, M9W 6X9

Engineer: P.R.

Checked by: G.S.

Sheet No. 1 of 1

Project No: 7451

Log of Borehole BH-2

Project: PROPOSED ADDITION - ALLAN A. MARTIN PUBLIC SCHOOL

Client: PDSB c/o HOSSACK ARCHITECTURE

Enclosure: 3

Location: 1390 OGDEN AVENUE, MISSISSAUGA, ON.

Depth (m)	Description of strata	Elevation (m)	Sample No.	Type	Blows/ft	Recovery	Blows/ft (20 40 60 80)	Water Content % (10 20 30)	Monitoring Well
	Ground Surface	97.80							
0	TOPSOIL/ORGANIC SOIL (±125 mm)	0.00	1	SS	3		3	9.8	
	FILL/DISTURBED SOIL brown sandy silt with occasional gravel, very loose, moist.	97.34 0.46							
1	SANDY SILT very loose to loose, rust brown, moist.		2	SS	7		7	9.3	
	compact, brown, wet.		3	SS	15		15	20.6	
2	with fine gravel.		4	SS	29		29	18.3	
3	WEATHERED SHALE hard, grey, moist.	94.75 3.05	5		100		100	9.7	
	End of Borehole								
4									
5									

Remarks: Upon completion of drilling, the borehole was open to 2.7 m and water level was measured at 2.5 m below EGSL.

Drill Method: CME 55 - SOLID

Drill Date: NOV. 11, 2024

Datum: GEODETIC

FORWARD ENGINEERING & ASSOCIATES INC.
244 Brockport Drive, Unit 15, Toronto, Ontario, M9W 6X9

Engineer: P.R.

Checked by: G.S.

Sheet No. 1 of 1

Project No: 7451

Log of Borehole BH-3

Project: PROPOSED ADDITION - ALLAN A. MARTIN PUBLIC SCHOOL

Client: PDSB c/o HOSSACK ARCHITECTURE

Enclosure: 4

Location: 1390 OGDEN AVENUE, MISSISSAUGA, ON.

Depth (m)	Description of strata	Elevation (m)	Sample No.	Type	Blows/ft	Recovery	Blows/ft (20 40 60 80)	Water Content % (10 20 30)	Monitoring Well
0	Ground Surface	98.05							
	PAVEMENT (±90 mm asphalt, ±75 mm granular)	0.00							
	FILL/DISTURBED SOIL brown sandy silt with occasional gravel, compact, moist.	97.43	1	SS	13		13	10.1	
		0.62							
1	SANDY SILT compact, rust brown, moist.		2	SS	10		10	11.7	
	loose, brown, wet.		3	SS	6		6	21.4	
2	compact.		4	SS	24		24	22.8	
3		94.77	5	SS	100		100	16.5	
	WEATHERED SHALE hard, grey, moist.	3.28							
	End of Borehole								
4									
5									

Remarks: Upon completion of drilling, the borehole was open to 2.6 m and water level was measured at 2.5 m below EGSL.

Drill Method: CME 55 - SOLID

Drill Date: NOV. 11, 2024

Datum: GEODETIC

FORWARD ENGINEERING & ASSOCIATES INC.
244 Brockport Drive, Unit 15, Toronto, Ontario, M9W 6X9

Engineer: P.R.

Checked by: G.S.

Sheet No. 1 of 1

Project No: 7451

Log of Borehole BH/MW-4

Project: PROPOSED ADDITION - ALLAN A. MARTIN PUBLIC SCHOOL

Client: PDSB c/o HOSSACK ARCHITECTURE

Enclosure: 5

Location: 1390 OGDEN AVENUE, MISSISSAUGA, ON.

Depth (m)	Description of strata	Elevation (m)	Sample No.	Type	Blows/ft	Recovery	Blows/ft (20 40 60 80)	Water Content % (10 20 30)
0	Ground Surface	98.00						
	PAVEMENT (±90 mm asphalt, ±110 mm granular)	0.00						
	FILL/DISTURBED SOIL brown sandy silt with occasional gravel, compact to loose, moist.		1	SS	10		10	5.2
1			2	SS	5		5	10.5
	with traces of crushed gravel, very moist.							
	SANDY SILT loose to compact, brown, wet.	96.30 1.70	3	SS	7		7	19.4
2			4	SS	14		14	20.4
3	SHALE TILL hard, grey, moist.	94.95 3.05	5	SS	37		37	10.3
4	WEATHERED SHALE hard, grey, moist.	93.43 4.57	6	SS	100		100	8.1
5	End of Borehole							

Monitoring Well: 2.17 m (Nov. 15, 2024)

Remarks: -Upon completion of drilling, the borehole was open to 4.5 m and water level was measured at 4.2 m below EGSL.
-On Nov. 15, 2024, the water level in the installed well was measured at 2.17 m below EGSL.

Drill Method: CME 55 - SOLID

Drill Date: NOV. 11, 2024

Datum: GEODETIC

FORWARD ENGINEERING & ASSOCIATES INC.
244 Brockport Drive, Unit 15, Toronto, Ontario, M9W 6X9

Engineer: P.R.

Checked by: G.S.

Sheet No. 1 of 1

Project No: 7451

Log of Borehole BH-5

Project: PROPOSED ADDITION - ALLAN A. MARTIN PUBLIC SCHOOL

Client: PDSB c/o HOSSACK ARCHITECTURE

Enclosure: 6

Location: 1390 OGDEN AVENUE, MISSISSAUGA, ON.

Depth (m)	Description of strata	Elevation (m)	No.	Type	Blows/ft	Recovery	Blows/ft (20 40 60 80)	Water Content % (10 20 30)	Monitoring Well
0	Ground Surface	98.10							
	PAVEMENT (±120 mm asphalt, ±150 mm granular)	0.00							
	FILL/DISTURBED SOIL brown sandy silt with occasional gravel, compact, moist.	97.83 0.27	1	SS	15		15	5.6	
1	SANDY SILT compact, rust brown, moist.	97.34 0.76	2	SS	10		10	8.8	
	with fine sand layer. loose, brown, wet.		3	SS	9		9	23.4	
2	compact.		4	SS	19		19	25.0	
3	SHALE TILL hard, grey, moist.	95.05 3.05	5	SS	41		41	14.2	
4	WEATHERED SHALE hard, grey, moist.	93.53 4.57	6	SS	100		100	7.7	
5	End of Borehole								

Remarks: Upon completion of drilling, the borehole was open to 4.0 m and water level was measured at 3.0 m below EGSL.

Drill Method: CME 55 - SOLID

Drill Date: NOV. 11, 2024

Datum: GEODETIC

FORWARD ENGINEERING & ASSOCIATES INC.
244 Brockport Drive, Unit 15, Toronto, Ontario, M9W 6X9

Engineer: P.R.

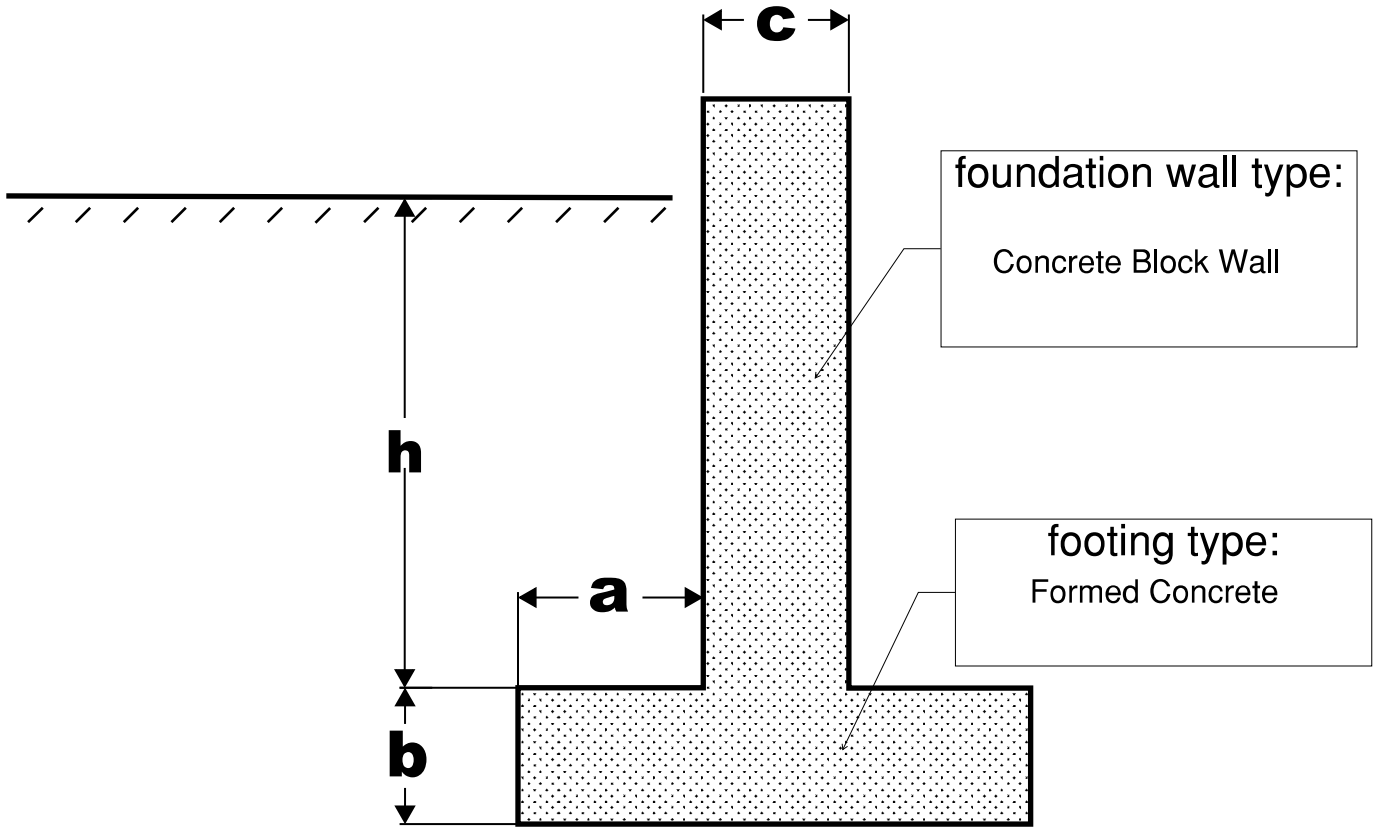
Checked by: G.S.

Sheet No. 1 of 1

APPENDIX B

TEST PIT OBSERVATION SHEET

Test Pit No.	a mm	b mm	c mm	h mm	Founding Material	Water Comment	Test Pit Ground Surface Elevation (m)
TP1	140	300	N/A	1040	Sandy Silt	No water No weeper	97.85



FORWARD ENGINEERING & Associates Inc.
Forward Engineering & Associates Inc.
244 Brockport Drive, Unit 15
Toronto, Ontario M9W 6X9
Tel: 416-798-3500 Fax: 416-798-8481
www.forwardengineering.ca

TEST PIT OBSERVATIONS

Project Name: PROPOSED ADDITION TO ALLAN A. MARTIN PUBLIC SCHOOL

Address: 1390 OGDEN AVENUE, MISSISSAUGA, ON.

PROJECT No. : 7451

DRAWING DATE :NOV. 22, 2024

DRAWN BY: P.R.

CHECKED BY: G.S.

NOTES:

7451

December 4, 2024

Hossack Architecture
105-1939 Ironoak Way
Oakville, Ontario
L6H 3V8

Attention: Mr. Guka Yogarajah, Dipl. Arch. Tech.

Dear Sir:

Re: Soil Chemical Testing Report
Alan A. Martin Public School
1390 Ogden Avenue
Mississauga, Ontario

1.0 INTRODUCTION

As requested, Forward Engineering & Associates Inc. (**Forward)** conducted a chemical testing program for the above project site.

The report of the chemical testing program is to be used for Characterization of the materials for disposal purposes only.

2.0 BACKGROUND

The purpose of this program is to test the materials to be excavated during the construction of the addition to the building.

3.0 FIELD WORKS

3.1 Sampling

The field sampling was carried out from the boreholes drilled on November 11, 2024.

Examination of the soil samples did not indicate visual and/or olfactory evidence of contamination.

Four [4] representative samples, obtained from the boreholes, were prepared for laboratory chemical testing.

4.0 ANALYTICAL TESTING PROGRAM

4.1 Soil Testing

The samples were prepared, and chemically tested, as presented in the following table:

Laboratory Sample ID	Field Sample ID	Tested Parameters
2447416-01	S1 (1/2)	Metals and Inorganics, PHC's F1-F4 + BTEX
2447416-02	S2 (2/2)	Metals and Inorganics, PHC's F1-F4 + BTEX
2447416-03	S3 (3/2)	Metals and Inorganics, PHC's F1-F4 + BTEX
2447416-04	S4 (4/2)	Metals and Inorganics, PHC's F1-F4 + BTEX

* S1 (1/2) stands for sample No. 1 obtained from Borehole No. 1, Split Spoon No. (2).

The soil samples were submitted to PARACEL Laboratories, Mississauga, Ontario, which are independent laboratories and are certified by the Canadian Association of Environmental Analytical Laboratories (CAEAL).

5.0 FINDINGS AND DISCUSSIONS

5.1 Soils Type and Condition

The tested materials consisted of fine texture materials (Sandy Silt).

5.2 Analytical Testing Results

5.2.1 Results Compared to Table 1 Residential/Parkland/ Industrial/Commercial Criteria

The results, enclosed in Appendix A, were compared to *Reg 406/19-Table1 Residential/Parkland/Industrial/Commercial/Community* Criteria.

The results met the above Table 1 Criteria except the following:

- "SAR" parameter for sample S4 (4/2).

5.2.2 Results Compared to Table 2.1 Agricultural Criteria

The results, enclosed in Appendix B, were compared to *Reg 406/19-Table 2.1 Agricultural* Criteria.

The results met the above Table 2.1 Criteria except the following:

- "pH" parameter for all samples.
- "SAR" parameter for sample S4 (4/2).

5.2.3 Results Compared to Table 2.1 Industrial/Commercial Criteria

The results, enclosed in Appendix C, were compared to *Reg 406/19-Table 2.1 Industrial Commercial* Criteria.

The results met the above Table 2.1 Criteria except the following:

- "pH" parameter for all samples.

For disposal purpose, it should be noted that the acceptance of fill materials depends on the discretion of the receiving site.

We trust this report meets our terms of reference. However, if any clarification is required, or if we can be of further assistance, please contact this office.

Sincerely yours,
FORWARD ENGINEERING & ASSOCIATES INC.

Juan Chahine, P. Eng.
Senior Project Manager

APPENDIX A

Laboratory Chemical Testing Results Compared to Table 1 Residential Criteria

TABLE 1		CLIENT: Forward Engineering & Associates Inc.					
PARACEL LABORATORIES LTD.		ATTENTION: George Semaan					
WORKORDER: 2447416		PROJECT: 7451					
REPORT DATE: 11/28/2024		REFERENCE: Standing Offer - ENV					
Parameter	Units	MDL	Regulation	Sample			
				S1 (1/2) 2447416-01	S2 (2/2) 2447416-02	S3 (3/2) 2447416-03	S4 (4/2) 2447416-04
Sample Date (m/d/y)			Reg 406/19 -T1 Res/Park/Ind/Com	11/19/2024 11:00 AM	11/19/2024 11:00 AM	11/19/2024 11:00 AM	11/19/2024 11:00 AM
Physical Characteristics							
% Solids	% by Wt.	0.1		90.3	88.5	92.4	91.0
General Inorganics							
SAR	N/A	0.01	2.4	0.82	0.16	2.37	6.55
Conductivity	mS/cm	0.005	0.57	0.097	0.052	0.184	0.339
Cyanide, free	ug/g dry	0.03	0.051	<0.03	<0.03	<0.03	<0.03
pH	pH Units	0.05		7.01	7.04	7.08	7.10
Metals							
Antimony	ug/g dry	1.0	1.3	<1.0	<1.0	<1.0	<1.0
Arsenic	ug/g dry	1.0	18	2.2	2.0	2.1	2.6
Barium	ug/g dry	1.0	220	10.7	9.0	15.2	13.1
Beryllium	ug/g dry	0.5	2.5	<0.5	<0.5	<0.5	<0.5
Boron, available	ug/g dry	0.5		<0.5	<0.5	<0.5	<0.5
Boron	ug/g dry	5.0	36	<5.0	<5.0	<5.0	<5.0
Cadmium	ug/g dry	0.5	1.2	<0.5	<0.5	<0.5	<0.5
Chromium (VI)	ug/g dry	0.2	0.66	0.2	0.3	0.3	<0.2
Chromium	ug/g dry	5.0	70	8.7	10.5	10.6	10.3
Cobalt	ug/g dry	1.0	21	2.3	2.1	2.5	2.6
Copper	ug/g dry	5.0	92	5.2	5.3	5.0	6.8
Lead	ug/g dry	1.0	120	2.8	2.4	2.5	6.5
Mercury	ug/g dry	0.1	0.27	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/g dry	1.0	2	<1.0	<1.0	<1.0	<1.0
Nickel	ug/g dry	5.0	82	<5.0	<5.0	5.3	5.6
Selenium	ug/g dry	1.0	1.5	<1.0	<1.0	<1.0	<1.0
Silver	ug/g dry	0.3	0.5	<0.3	<0.3	<0.3	<0.3
Thallium	ug/g dry	1.0	1	<1.0	<1.0	<1.0	<1.0
Uranium	ug/g dry	1.0	2.5	<1.0	<1.0	<1.0	<1.0
Vanadium	ug/g dry	10.0	86	21.1	26.2	27.2	23.9
Zinc	ug/g dry	20.0	290	<20.0	<20.0	<20.0	20.6
Volatiles							
Benzene	ug/g dry	0.02	0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	ug/g dry	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Toluene	ug/g dry	0.05	0.2	<0.05	<0.05	<0.05	<0.05
m/p-Xylene	ug/g dry	0.05		<0.05	<0.05	<0.05	<0.05
o-Xylene	ug/g dry	0.05		<0.05	<0.05	<0.05	<0.05
Xylenes, total	ug/g dry	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Hydrocarbons							
F1 PHCs (C6-C10)	ug/g dry	7	25	<7	<7	<7	<7
F2 PHCs (C10-C16)	ug/g dry	4	10	<4	<4	<4	<4
F3 PHCs (C16-C34)	ug/g dry	8	240	<8	<8	<8	<8
F4 PHCs (C34-C50)	ug/g dry	6	120	<6	<6	<6	<6

APPENDIX B

Laboratory Chemical Testing Results Compared to Table 2.1 Agricultural Criteria

TABLE 1		CLIENT: Forward Engineering & Associates Inc.					
PARACEL LABORATORIES LTD.		ATTENTION: George Semaan					
WORKORDER: 2447416		PROJECT: 7451					
REPORT DATE: 11/28/2024		REFERENCE: Standing Offer - ENV					
Parameter	Units	MDL	Regulation	Sample			
				S1 (1/2) 2447416-01	S2 (2/2) 2447416-02	S3 (3/2) 2447416-03	S4 (4/2) 2447416-04
Sample Date (m/d/y)			Reg 406/19 -T2.1 Agr	11/19/2024 11:00 AM	11/19/2024 11:00 AM	11/19/2024 11:00 AM	11/19/2024 11:00 AM
Physical Characteristics							
% Solids	% by Wt.	0.1		90.3	88.5	92.4	91.0
General Inorganics							
SAR	N/A	0.01	5	0.82	0.16	2.37	6.55
Conductivity	mS/cm	0.005	0.7	0.097	0.052	0.184	0.339
Cyanide, free	ug/g dry	0.03	0.051	<0.03	<0.03	<0.03	<0.03
pH	pH Units	0.05	5	7.01	7.04	7.08	7.10
Metals							
Antimony	ug/g dry	1.0	7.5	<1.0	<1.0	<1.0	<1.0
Arsenic	ug/g dry	1.0	11	2.2	2.0	2.1	2.6
Barium	ug/g dry	1.0	390	10.7	9.0	15.2	13.1
Beryllium	ug/g dry	0.5	4	<0.5	<0.5	<0.5	<0.5
Boron, available	ug/g dry	0.5	1.5	<0.5	<0.5	<0.5	<0.5
Boron	ug/g dry	5.0	120	<5.0	<5.0	<5.0	<5.0
Cadmium	ug/g dry	0.5	1	<0.5	<0.5	<0.5	<0.5
Chromium (VI)	ug/g dry	0.2	8	0.2	0.3	0.3	<0.2
Chromium	ug/g dry	5.0	160	8.7	10.5	10.6	10.3
Cobalt	ug/g dry	1.0	22	2.3	2.1	2.5	2.6
Copper	ug/g dry	5.0	140	5.2	5.3	5.0	6.8
Lead	ug/g dry	1.0	45	2.8	2.4	2.5	6.5
Mercury	ug/g dry	0.1	0.24	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/g dry	1.0	6.9	<1.0	<1.0	<1.0	<1.0
Nickel	ug/g dry	5.0	100	<5.0	<5.0	5.3	5.6
Selenium	ug/g dry	1.0	2.4	<1.0	<1.0	<1.0	<1.0
Silver	ug/g dry	0.3	20	<0.3	<0.3	<0.3	<0.3
Thallium	ug/g dry	1.0	1	<1.0	<1.0	<1.0	<1.0
Uranium	ug/g dry	1.0	23	<1.0	<1.0	<1.0	<1.0
Vanadium	ug/g dry	10.0	86	21.1	26.2	27.2	23.9
Zinc	ug/g dry	20.0	340	<20.0	<20.0	<20.0	20.6
Volatiles							
Benzene	ug/g dry	0.02	0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	ug/g dry	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Toluene	ug/g dry	0.05	0.2	<0.05	<0.05	<0.05	<0.05
m/p-Xylene	ug/g dry	0.05		<0.05	<0.05	<0.05	<0.05
o-Xylene	ug/g dry	0.05		<0.05	<0.05	<0.05	<0.05
Xylenes, total	ug/g dry	0.05	0.091	<0.05	<0.05	<0.05	<0.05
Hydrocarbons							
F1 PHCs (C6-C10)	ug/g dry	7	17	<7	<7	<7	<7
F2 PHCs (C10-C16)	ug/g dry	4	10	<4	<4	<4	<4
F3 PHCs (C16-C34)	ug/g dry	8	240	<8	<8	<8	<8
F4 PHCs (C34-C50)	ug/g dry	6	2800	<6	<6	<6	<6

APPENDIX C

Laboratory Chemical Testing Results Compared to Table 2.1 Industrial/Commercial Criteria

TABLE 1		CLIENT: Forward Engineering & Associates Inc.					
PARACEL LABORATORIES LTD.		ATTENTION: George Semaan					
WORKORDER: 2447416		PROJECT: 7451					
REPORT DATE: 11/28/2024		REFERENCE: Standing Offer - ENV					
Parameter	Units	MDL	Regulation	Sample			
				S1 (1/2) 2447416-01	S2 (2/2) 2447416-02	S3 (3/2) 2447416-03	S4 (4/2) 2447416-04
Sample Date (m/d/y)			Reg 406/19 -T2.1 Ind/Com	11/19/2024 11:00 AM	11/19/2024 11:00 AM	11/19/2024 11:00 AM	11/19/2024 11:00 AM
Physical Characteristics							
% Solids	% by Wt.	0.1		90.3	88.5	92.4	91.0
General Inorganics							
SAR	N/A	0.01	12	0.82	0.16	2.37	6.55
Conductivity	mS/cm	0.005	1.4	0.097	0.052	0.184	0.339
Cyanide, free	ug/g dry	0.03	0.051	<0.03	<0.03	<0.03	<0.03
pH	pH Units	0.05	5	7.01	7.04	7.08	7.10
Metals							
Antimony	ug/g dry	1.0	40	<1.0	<1.0	<1.0	<1.0
Arsenic	ug/g dry	1.0	18	2.2	2.0	2.1	2.6
Barium	ug/g dry	1.0	670	10.7	9.0	15.2	13.1
Beryllium	ug/g dry	0.5	8	<0.5	<0.5	<0.5	<0.5
Boron, available	ug/g dry	0.5	2	<0.5	<0.5	<0.5	<0.5
Boron	ug/g dry	5.0	120	<5.0	<5.0	<5.0	<5.0
Cadmium	ug/g dry	0.5	1.9	<0.5	<0.5	<0.5	<0.5
Chromium (VI)	ug/g dry	0.2	8	0.2	0.3	0.3	<0.2
Chromium	ug/g dry	5.0	160	8.7	10.5	10.6	10.3
Cobalt	ug/g dry	1.0	80	2.3	2.1	2.5	2.6
Copper	ug/g dry	5.0	230	5.2	5.3	5.0	6.8
Lead	ug/g dry	1.0	120	2.8	2.4	2.5	6.5
Mercury	ug/g dry	0.1	0.27	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/g dry	1.0	40	<1.0	<1.0	<1.0	<1.0
Nickel	ug/g dry	5.0	270	<5.0	<5.0	5.3	5.6
Selenium	ug/g dry	1.0	5.5	<1.0	<1.0	<1.0	<1.0
Silver	ug/g dry	0.3	40	<0.3	<0.3	<0.3	<0.3
Thallium	ug/g dry	1.0	3.3	<1.0	<1.0	<1.0	<1.0
Uranium	ug/g dry	1.0	33	<1.0	<1.0	<1.0	<1.0
Vanadium	ug/g dry	10.0	86	21.1	26.2	27.2	23.9
Zinc	ug/g dry	20.0	340	<20.0	<20.0	<20.0	20.6
Volatiles							
Benzene	ug/g dry	0.02	0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	ug/g dry	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Toluene	ug/g dry	0.05	0.2	<0.05	<0.05	<0.05	<0.05
m/p-Xylene	ug/g dry	0.05		<0.05	<0.05	<0.05	<0.05
o-Xylene	ug/g dry	0.05		<0.05	<0.05	<0.05	<0.05
Xylenes, total	ug/g dry	0.05	0.091	<0.05	<0.05	<0.05	<0.05
Hydrocarbons							
F1 PHCs (C6-C10)	ug/g dry	7	25	<7	<7	<7	<7
F2 PHCs (C10-C16)	ug/g dry	4	26	<4	<4	<4	<4
F3 PHCs (C16-C34)	ug/g dry	8	240	<8	<8	<8	<8
F4 PHCs (C34-C50)	ug/g dry	6	3300	<6	<6	<6	<6

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Certificate of Analysis

Forward Engineering & Associates Inc.
244 Brockport Dr., Unit 15
Toronto, ON M9W 6X9
Attn: George Semaan

Client PO:
Project: 7451
Custody:

Report Date: 28-Nov-2024
Order Date: 22-Nov-2024

Order #: 2447416

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2447416-01	S1 (1/2)
2447416-02	S2 (2/2)
2447416-03	S3 (3/2)
2447416-04	S4 (4/2)

Approved By:

Alex Enfield, MSc
Lab Manager

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Boron, available	MOE (HWE), EPA 200.8 - ICP-MS	25-Nov-24	25-Nov-24
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	22-Nov-24	25-Nov-24
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	25-Nov-24	26-Nov-24
Conductivity	MOE E3138 - probe @25 °C, water ext	26-Nov-24	26-Nov-24
Cyanide, free	MOE E3015 - Auto Colour, water extraction	25-Nov-24	25-Nov-24
Mercury by CVAA	EPA 7471B - CVAA, digestion	25-Nov-24	25-Nov-24
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	25-Nov-24	26-Nov-24
PHC F1	CWS Tier 1 - P&T GC-FID	22-Nov-24	25-Nov-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	22-Nov-24	26-Nov-24
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	25-Nov-24	25-Nov-24
SAR	Calculated	26-Nov-24	27-Nov-24
Solids, %	CWS Tier 1 - Gravimetric	22-Nov-24	25-Nov-24

Certificate of Analysis

Report Date: 28-Nov-2024

Client: **Forward Engineering & Associates Inc.**

Order Date: 22-Nov-2024

Client PO:

Project Description: 7451

	Client ID:	S1 (1/2)	S2 (2/2)	S3 (3/2)	S4 (4/2)	-	-
	Sample Date:	19-Nov-24 11:00	19-Nov-24 11:00	19-Nov-24 11:00	19-Nov-24 11:00		
	Sample ID:	2447416-01	2447416-02	2447416-03	2447416-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	90.3	88.5	92.4	91.0	-	-
General Inorganics							
SAR	0.01 N/A	0.82	0.16	2.37	6.55	-	-
Conductivity	0.005 mS/cm	0.097	0.052	0.184	0.339	-	-
Cyanide, free	0.03 ug/g	<0.03	<0.03	<0.03	<0.03	-	-
pH	0.05 pH Units	7.01	7.04	7.08	7.10	-	-
Metals							
Antimony	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Arsenic	1.0 ug/g	2.2	2.0	2.1	2.6	-	-
Barium	1.0 ug/g	10.7	9.0	15.2	13.1	-	-
Beryllium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	-	-
Boron	5.0 ug/g	<5.0	<5.0	<5.0	<5.0	-	-
Boron, available	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	-	-
Chromium (VI)	0.2 ug/g	0.2	0.3	0.3	<0.2	-	-
Chromium	5.0 ug/g	8.7	10.5	10.6	10.3	-	-
Cobalt	1.0 ug/g	2.3	2.1	2.5	2.6	-	-
Copper	5.0 ug/g	5.2	5.3	5.0	6.8	-	-
Lead	1.0 ug/g	2.8	2.4	2.5	6.5	-	-
Mercury	0.1 ug/g	<0.1	<0.1	<0.1	<0.1	-	-
Molybdenum	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Nickel	5.0 ug/g	<5.0	<5.0	5.3	5.6	-	-
Selenium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Silver	0.3 ug/g	<0.3	<0.3	<0.3	<0.3	-	-
Thallium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-

	Client ID:	S1 (1/2)	S2 (2/2)	S3 (3/2)	S4 (4/2)	-	-
	Sample Date:	19-Nov-24 11:00	19-Nov-24 11:00	19-Nov-24 11:00	19-Nov-24 11:00		
	Sample ID:	2447416-01	2447416-02	2447416-03	2447416-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Metals							
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Vanadium	10.0 ug/g	21.1	26.2	27.2	23.9	-	-
Zinc	20.0 ug/g	<20.0	<20.0	<20.0	20.6	-	-
Volatiles							
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene-d8	Surrogate	101%	101%	101%	101%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g	<8	<8	<8	<8	-	-
F4 PHCs (C34-C50)	6 ug/g	<6	<6	<6	<6	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics								
SAR	ND	0.01	N/A					
Conductivity	ND	0.005	mS/cm					
Cyanide, free	ND	0.03	ug/g					
Hydrocarbons								
F1 PHCs (C6-C10)	ND	7	ug/g					
F2 PHCs (C10-C16)	ND	4	ug/g					
F3 PHCs (C16-C34)	ND	8	ug/g					
F4 PHCs (C34-C50)	ND	6	ug/g					
Metals								
Antimony	ND	1.0	ug/g					
Arsenic	ND	1.0	ug/g					
Barium	ND	1.0	ug/g					
Beryllium	ND	0.5	ug/g					
Boron, available	ND	0.5	ug/g					
Boron	ND	5.0	ug/g					
Cadmium	ND	0.5	ug/g					
Chromium (VI)	ND	0.2	ug/g					
Chromium	ND	5.0	ug/g					
Cobalt	ND	1.0	ug/g					
Copper	ND	5.0	ug/g					
Lead	ND	1.0	ug/g					
Mercury	ND	0.1	ug/g					
Molybdenum	ND	1.0	ug/g					
Nickel	ND	5.0	ug/g					
Selenium	ND	1.0	ug/g					
Silver	ND	0.3	ug/g					
Thallium	ND	1.0	ug/g					
Uranium	ND	1.0	ug/g					
Vanadium	ND	10.0	ug/g					
Zinc	ND	20.0	ug/g					
Volatiles								
Benzene	ND	0.02	ug/g					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Ethylbenzene	ND	0.05	ug/g					
Toluene	ND	0.05	ug/g					
m,p-Xylenes	ND	0.05	ug/g					
o-Xylene	ND	0.05	ug/g					
Xylenes, total	ND	0.05	ug/g					
Surrogate: Toluene-d8	*8.11*		*%*	*101*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	0.94	0.01	N/A	0.82			13.6	30	
Conductivity	0.0986	0.005	mS/cm	0.0968			1.9	5	
Cyanide, free	ND	0.03	ug/g	ND			NC	35	
pH	7.09	0.05	pH Units	7.19			1.4	10	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g	ND			NC	30	
Metals									
Antimony	ND	1.0	ug/g	ND			NC	30	
Arsenic	2.5	1.0	ug/g	2.6			3.5	30	
Barium	12.3	1.0	ug/g	13.1			6.8	30	
Beryllium	ND	0.5	ug/g	ND			NC	30	
Boron, available	ND	0.5	ug/g	ND			NC	35	
Boron	ND	5.0	ug/g	ND			NC	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g	0.2			NC	35	
Chromium	9.7	5.0	ug/g	10.3			5.8	30	
Cobalt	2.5	1.0	ug/g	2.6			2.7	30	
Copper	6.5	5.0	ug/g	6.8			5.3	30	
Lead	5.6	1.0	ug/g	6.5			14.3	30	
Mercury	ND	0.1	ug/g	ND			NC	30	
Molybdenum	ND	1.0	ug/g	ND			NC	30	
Nickel	5.2	5.0	ug/g	5.6			8.3	30	
Selenium	ND	1.0	ug/g	ND			NC	30	
Silver	ND	0.3	ug/g	ND			NC	30	
Thallium	ND	1.0	ug/g	ND			NC	30	
Uranium	ND	1.0	ug/g	ND			NC	30	
Vanadium	22.8	10.0	ug/g	23.9			4.6	30	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Zinc	ND	20.0	ug/g	20.6			NC	30	
Physical Characteristics									
% Solids	88.4	0.1	% by Wt.	88.0			0.5	25	
Volatiles									
Benzene	ND	0.02	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
Surrogate: Toluene-d8	*8.96*		*%*		*100*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Cyanide, free	0.312	0.03	ug/g	ND	93.9	70-130			
Hydrocarbons									
F1 PHCs (C6-C10)	62	7	ug/g	ND	81.3	0-200			
F2 PHCs (C10-C16)	102	4	ug/g	ND	111	60-140			
F3 PHCs (C16-C34)	215	8	ug/g	ND	105	60-140			
F4 PHCs (C34-C50)	138	6	ug/g	ND	93.2	60-140			
Metals									
Antimony	41.4	1.0	ug/g	ND	82.8	70-130			
Arsenic	49.5	1.0	ug/g	1.0	97.0	70-130			
Barium	51.0	1.0	ug/g	5.3	91.5	70-130			
Beryllium	50.5	0.5	ug/g	ND	101	70-130			
Boron, available	4.33	0.5	ug/g	ND	86.6	70-122			
Boron	49.9	5.0	ug/g	ND	98.6	70-130			
Cadmium	46.3	0.5	ug/g	ND	92.6	70-130			
Chromium (VI)	4.6	0.2	ug/g	0.2	80.5	70-130			
Chromium	53.7	5.0	ug/g	ND	99.1	70-130			
Cobalt	51.1	1.0	ug/g	1.0	100	70-130			
Copper	53.0	5.0	ug/g	ND	100	70-130			
Lead	52.0	1.0	ug/g	2.6	98.8	70-130			
Mercury	1.53	0.1	ug/g	ND	102	70-130			
Molybdenum	47.7	1.0	ug/g	ND	95.2	70-130			
Nickel	51.6	5.0	ug/g	ND	98.6	70-130			
Selenium	47.3	1.0	ug/g	ND	94.6	70-130			
Silver	59.3	0.3	ug/g	ND	119	70-130			
Thallium	48.5	1.0	ug/g	ND	97.0	70-130			
Uranium	48.6	1.0	ug/g	ND	96.7	70-130			
Vanadium	58.9	10.0	ug/g	ND	98.6	70-130			
Zinc	57.0	20.0	ug/g	ND	97.4	70-130			
Volatiles									
Benzene	39.5	0.02	ug/g	ND	98.9	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Ethylbenzene	36.5	0.05	ug/g	ND	91.4	50-140			
Toluene	37.1	0.05	ug/g	ND	93.0	50-140			
m,p-Xylenes	75.5	0.05	ug/g	ND	94.4	50-140			
o-Xylene	37.0	0.05	ug/g	ND	92.6	50-140			
Surrogate: Toluene-d8	*8.77*		*%*		*96.3*	*50-140*			

Certificate of Analysis

Report Date: 28-Nov-2024

Client: **Forward Engineering & Associates Inc.**

Order Date: 22-Nov-2024

Client PO:

Project Description: 7451

Qualifier Notes:

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Soil results are reported on a dry weight basis unlesss otherwise noted.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.

- F1 range corrected for BTEX.

- F2 to F3 ranges corrected for appropriate PAHs where available.

- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.

- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

- When reported, data for F4G has been processed using a silica gel cleanup.

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Paracel ID: 2447416

Paracel Order Number (Lab Use Only)

Chain Of Custody (Lab Use Only)

Client Name: Forward Engineering & Associates Inc.	Project Ref: 7451	Page 1 of 1
Contact Name: George Semaan	Quote #:	**Turnaround Time**
Address: 244 Brockport Dr., Unit 15 Toronto ON M9W 6X9	PO #:	☐ 1 day ☐ 3 day ☐ 2 day ☑ Regular
Telephone: (416) 793-3500	E-mail: george@forwardengineering.ca	Date Required:

☐ REG 153/04 ☑ REG 406/19

Other Regulation

☐ Table 1 ☐ Res/Park ☐ Med/Fine ☐ REG 558 ☐ PWQO
☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ CCME ☐ MISA
☐ Table 3 ☐ Agri/Other ☐ SU - Sani ☐ SU - Storm
☐ Table ___ Mun: ___
For RSC: ☐ Yes ☐ No ☐ Other:

Matrix Type: S (Soil/Sec.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	METALS & INORGANICS				
1	S(1) (1/2)	S		2	Nov 19/2024	11 AM	✓							✓				
2	S(2) (2/2)	S		2	" "	11AM	✓							✓				
3	S(3) (3/2)	S		2	" "	11 AM	✓							✓				
4	S(4) (4/2)	S		2	" "	11 AM	✓							✓				
5																		
6																		
7																		
8																		
9																		
10																		

Required Analysis

Comments:

Method of Delivery: RABBEX

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab: AV	Verified By: AV
Relinquished By (Print): PABLO RIOS	Date/Time: 21-NOV-24 14:20	Date/Time: 11/22/24 11:30	Date/Time: 11/22/24 12:09
Date/Time:	Temperature: °C	Temperature: 7.9	pH Verified: ☐ By:

Part 1 General

1.1 RELATED WORK

.1	Summary of Work – Phasing and Sequencing	Section 00 22 00
.2	Site Grading	Section 31 23 13
.3	Excavating, Trenching and Backfilling	Section 31 23 10

1.2 SCOPE

.1 Refer to survey, site layout, site servicing, landscape and grading drawings and Geotechnical Report.

.2 Work to this section is anticipated to be carried out under a Site Alteration Permit (Fill Permit).

1.3 EXAMINATION

.1 Examine the Drawings, Specifications, and Geotechnical Report which summarize site soil conditions. Visit the site and determine the work extent and nature of the existing conditions. In no circumstances will any claims against the Owner be allowed resulting from failure to ascertain the work herein described or implied.

.2 Report to the Consultant in writing any conditions which will prejudice the proper completion of the work of this Section. Commencement of work constitutes acceptance of existing conditions.

1.4 BURIED SERVICES

.1 Before commencing work confirm no buried services remain on the site and locate all services adjacent to the site. Engage private locate firm for underground scan for all areas of work outside the property lines.

.2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services.

1.5 PROTECTION

.1 Establish locations of all electrical, telephone, or other service installations existing in the areas of site preparation by contacting the service owners and obtaining their approval to work in such areas. Contact the Municipality, the Region of Peel and local utilities to review proposed scheduling, work activities and regulations pertaining to all work beyond the limits of the property including but not limited to parking areas, storm water outlet and headwall and asphalt driveway entrances. Provide adequate markers or take protective measures to ensure that no damage will be caused under this Section. Repair or replace damaged work as required without cost to the Owner.

.2 Electronically locate, map and record location of services prior to doing any excavation.

1.6 DUST CONTROL

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

1.7 SILT CONTROL

.1 Refer to site Plans and any approved Plans issued with the Site Alteration Permit.

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

Part 2 Products

2.1 NOT APPLICABLE

Part 3 Execution

3.1 DISPOSAL OF WASTE AND SURPLUS MATERIALS

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

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Conform to the requirements stated in the General Conditions, Supplementary General Conditions of this Specification and all addenda for all work, including work outside the property line including work within Regional and Municipal right of way unless otherwise noted.

1.2. Related Work

1.	Site Grading	Section 31 23 13
2.	Water System	Section 33 11 17
3.	Storm Sewers	Section 33 44 00
4.	Aggregates: General	Section 31 05 17

1.3. Definitions

1. Common excavation: excavation of materials of whatever nature, including dense tills, hardpan, frozen materials and partially cemented materials which can be ripped and excavated with heavy hydraulic excavating equipment.
2. Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
3. Waste material: excavated material unsuitable for use in work or surplus to requirements.
4. Borrow material: Sub-soil material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of work. This material shall be of residential/agricultural origin and shall meet or exceed the confined fill material criteria as per MOE “Fill Quality Guidelines for Lake Filling in Ontario” of June 1992. Contractor shall provide consultant with one chemical test per source prior to hauling material to the site.
5. Unsuitable materials:
    1. Weak and compressible materials under excavated areas.
    2. Frost susceptible materials under excavated areas.
    3. Frost susceptible materials:
        1. Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.1
        2. Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.
6. Un-shrinkable fill: very weak mixture of Portland cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.4. Samples

1. Submit samples of bedding or other granular backfill materials in accordance with Section 01 33 00.
2. Inform Consultant prior to commencing work, of proposed source of fill materials and provide access for sampling.

1.5. **Protection Of Existing Features**

1. Existing buried utilities and structures:
    1. Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
    2. Prior to commencing excavation work, notify Consultant or authorities having jurisdiction, establish location and state of use of buried utilities and structures. Consultant or authorities having jurisdiction shall clearly mark such locations to prevent disturbance during work.
    3. Confirm locations of buried utilities by careful test excavations.
    4. Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered. Obtain direction of Consultant before moving or otherwise disturbing utilities or structures.
    5. Record location of maintained, re-routed and abandoned underground lines.

2. PRODUCTS

2.1. **Materials**

1. Granular Base: to Section 32 11 23.
2. Granular Sub-Base: to Section 32 11 19.
3. Fill concrete: to Section 03 30 00 and following requirements:
    1. Minimum compressive strength at 28 days: 15 MPa.
    2. Maximum slump at time and point of discharge: 100 mm.
4. Unshrinkable fill: to the following requirements.
    1. Maximum compression strength at 28 days: 0.4 MPa.
    2. Maximum cement content: 25 kg/m^3 of concrete mix.
    3. Slump at time and point of discharge: 150 to 200 mm.
    4. Air content: 4 to 6%
5. Crushed stone fill under slabs on grade: Clean, graded 19mm angular, natural clear crushed stone from approved source, free from shale.
6. Granular Backfill: Imported granular material conforming to a Granular ‘B’ Type I, as specified in OPSS 1010, or approved reclaimed granular materials free of organics.
7. Borrow material: See Part 1 – General, Definitions.

3. EXECUTION

3.1. All trenching, backfilling and compacting is to be completed in accordance with OPSS 514.

3.2. **Site Preparation**

1. Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
2. Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3. **Stockpiling**

1. Stockpile fill materials in areas designated by Consultant. Stockpile granular materials in manner to prevent segregation.
2. Protect fill materials from contamination.

3.4. **Dewatering**

1. Keep excavations free of water while work is in progress.
2. Protect open excavations against flooding and damage due to surface run-off.
3. Dispose of water in a manner not detrimental to public and private property, or any portion of work completed or under construction.
4. Continuously dewater the excavations to control surface runoff or perched water table seepage for concreting and other work to be carried out in the dry condition.
5. Submit for Consultant's review details of proposed dewatering methods, such as dikes or well points.

3.5. **Trench Excavation**

1. Excavate to lines, grades, locations, elevations and dimensions as indicated or directed by Consultant.
2. Remove excavated material and other obstructions encountered during excavation. Excavated trench material may be used as fill material on-site provided it is free from deleterious materials,
3. Excavation must not interfere with normal 45^{o} splay of bearing from bottom of any footing.
4. Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
5. Unless otherwise authorized by Consultant in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
6. Do not obstruct flow of surface drainage or natural watercourses.
7. Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
8. Notify Consultant when bottom of trench excavation is reached.
9. Obtain Consultant approval of completed excavation.
10. Remove unsuitable material from trench bottom to extent and depth as directed by Consultant.
11. Correct unauthorized over-excavation as follows:
    1. Fill under bearing surfaces and footings with concrete specified for footings.
    2. Fill under other areas with Granular 'B' material specified in Section 32 11 19.
12. Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil. Clean out rock seams and fill with concrete mortar or grout to approval of Consultant.

3.6. **Surplus Excavated Material and Removals**

1. The Contractor is to make his own arrangements for the disposal of all excavated materials, removals, grindings and all other debris not suitable for re-use in the construction. If the Contractor enters into an agreement with an individual for the use of land for the disposal of

excavated materials or for any other reason, a copy of the said Agreement clearly stating the obligation of all concerned and signed by all parties shall be submitted to the Consultant. The Contractor shall comply with the requirements of all Federal, Provincial and Municipal Laws, Acts, Ordinances, Regulations, Orders-in-Council and By-Laws, which could in any way pertain to the work outlined in the Contract. The items in the Form of Tender include all costs for disposal of unsuitable or excess material off the site and the Contractor shall make the arrangements for the disposal of the materials removed in accordance with MOE Reg. 558.

3.7. **Bedding And Surround Of Underground Services**

1. Place and compact granular material for bedding and surround of underground services as indicated and as specified.

2. Place bedding and surround material in unfrozen condition.

3.8. **Backfilling**

1. Do not proceed with backfilling operations until Consultant has inspected and approved installation.

2. Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

3. Trench backfill is to consist of Granular B Type I as specified in OPSS 1010 or reclaimed granular materials free of organics.

4. Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer to 98% SPMDD.

5. Backfill around installations.

    1. Place bedding and surround material as specified elsewhere.

    2. Do not backfill around or over cast-in-place concrete within 24 hr. after placing of concrete.

    3. Place layers simultaneously on both sides of installed work to equalize loading. Difference not to exceed 0.3 m.

    4. Where temporary unbalanced earth pressures are liable to develop on walls or other structures:

        1. Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Consultant or;

        2. If approved by Consultant, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Consultant.

6. Backfill within municipal right of way:

    1. Trench backfill for the storm, sanitary and water servicing connections to municipal servicing shall be un-shrinkable fill.

3.9. **Inspection And Testing**

1. Testing of materials and compaction will be carried out by testing laboratory designated by Consultant. Frequency of tests will be determined by Consultant.

2. The Owner will pay costs for inspection and testing.

3.10. **Restoration**

1. Upon completion of work, remove waste materials and debris, trim slopes, and correct defects as directed by Consultant. Any disturbed grassed areas are to be restored to original condition or better with 150 mm depth of topsoil, and sod. Damaged concrete or asphalt areas are to be restored

to original condition or better. Repaired asphalt areas are to be matched with adjacent asphalt and include a lab joint as per the drawing detail provided.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Conform to the requirements stated in the General Conditions, Supplementary General Conditions of this Specification and all addenda for all work, including work outside the property line including work within Regional and Municipal right of way unless otherwise noted.

1.2. Description

1. Provide all labour, materials, tools and equipment necessary for all excavation and backfill to the full extent of work shown on the plans and this specification, including but not limited to the following:
    1. Grading (cutting and filling) to subgrade elevations including compaction and fine grading of existing earth materials to +/- 25 mm of design subgrade elevations (not uniformly high or low) in accordance with OPSS 206.
    2. Proof rolling of subgrade with Geotechnical consultant present
    3. Excavation and disposal of all excess unsuitable materials off site.
    4. Supply and installation of earth borrow material as required to establish design subgrade elevations.

1.3. Related Work

1.	Excavating, Trenching and Backfilling	Section 31 23 10
2.	Aggregates: General	Section 31 05 17

1.4. Site Conditions

1. Protection:
    1. Provide protection (i.e. shoring, cribbing, bracing and planking) to ensure no damage occurs to existing facilities and equipment situated on site. In certain areas only hand tools may be used.
    2. Provide adequate protection around bench marks, layout markers, survey markers, and geodetic monuments.
    3. Protect bottom of excavations from freezing.
    4. Protect bottoms of excavations from softening. Should softening occur, remove softened soil and replace with lean concrete. Keep bottoms of excavations dry at all times.
    5. Direct discharge from pumps, when draining excavations, so that damage to site and adjacent property does not occur.
    6. Do not stockpile excavated material to interfere with site operation or drainage.
    7. Effect approved measures to minimize dust as a result of all grading work and all other construction activities related to this contract.
    8. Protect legal iron bars, bench marks, surface or underground utility lines which are to remain. If damaged, restore to original or better condition unless directed otherwise.
    9. Ensure sufficient quantities of wood sheeting, timbers, steel members and other materials are available at all times in order to support, brace or protect utilities, structure and properties near to or occurring within excavations.

2. The Contractor shall take all the necessary precautions to protect all utilities against damage. The Contractor shall carry out his work in a safe manner with due regard for roadway traffic to the satisfaction of the Consultant, and any authority having jurisdiction.

3. The Contractor shall have full and sole responsibility for the safety of all excavation performed under this Contract until final acceptance of the work.

4. Utility Lines:

    1. Before beginning work, establish location and extent of underground utility lines in area of excavation. Notify Consultant of all existing located services encountered, and do not continue with excavation without the Consultant's instructions. Repair and pay for damages to existing utility lines resulting from the work.

    2. Relocate existing lines in area of excavation which must remain active as indicated on the drawings.

    3. Remove abandoned utility lines, if any, to distance of 2 m from foundations. Cap lines at cut-off points.

    4. Record locations, if any, of maintained, re-routed and abandoned underground utility lines.

    5. Repair and pay for damage to existing underground lines as may result from this work.

5. Examination:

    1. Ensure in examination of the site that all possible factors concerning earthwork are investigated, and that the following are known in particular:

        1. Methods and means available for material handling, disposal, storage, and transportation.

        2. Physical conditions of site, including ground water table and drainage course, extent of removals and grading completed under a previous contract (demolition and site demolition).

    2. Unsatisfactory Soil Conditions:

    2. Any unsatisfactory or questionable soil conditions revealed during excavation shall be reported immediately to the Owner's Consultant and Geotechnical Engineer.

    3. All foundation and sub-structural work shall cease until the condition has been examined and approval to proceed has been issued.

6. Material Unsuitable for Backfill:

    1. The Contractor shall be responsible for all costs associated with the excavation and removal, off site, of all materials unsuitable for backfill or re-use.

7. Water:

    1. Keep excavation free from water at all times. Provide drainage trenches and sumps as necessary and pump water well away from excavation. Do not discharge water onto private property.

8. Inspection and Testing:

    1. Testing of materials and compaction will be carried out by testing laboratory designated by the Consultant.

1.5. **Environmental Requirements**

1. Protect and repair exposed excavations where required to prevent adverse effects of rain, freezing weather and other weather conditions on subgrade of subsequent work.

2. Suspend construction operation at times when satisfactory results cannot be obtained on account of rain, snow, freezing weather or other unsatisfactory conditions.

3. Do not carry out filling or backfilling in freezing weather unless authorized by Consultant. Do not use frozen material nor place material where the material in place is already frozen.

4. Dispose of excess or unsuitable earth materials generated from the site grading in accordance with Ontario Reg. 558. The items in the Form of Tender include all costs for disposal of excess or unsuitable material off the site and the Contractor shall make the arrangements for the disposal of the materials removed in accordance with MOE Reg. 558.

2. PRODUCTS

2.1. Materials

1. Earth Borrow

    1. Earth borrow shall be earth material obtained from outside the project limits that meets the requirements of Ontario Provincial Standard Specification (OPSS) MUNI 212.

2. Backfill

    1. Site or imported material containing no organic or foreign matter, and which the subcontractor can demonstrate is compactable to a density of 98% SPMDD.

2.2. Stockpiling

1. Fill Materials

    1. Temporarily Stockpile fill materials in areas designated by Owner. Stockpile granular materials to prevent segregation.

2. Protection

    1. Protect fill materials from contamination and freezing.

3. EXECUTION

3.1. Stripping of Topsoil

1. Do stripping of topsoil in accordance with this Section and Geotechnical Consultant requirements.

2. Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected as determined by Consultant.

3. Commence topsoil stripping of areas as indicated after area has been cleared of brush, weeds and grasses and removed from site.

4. Strip all topsoil. Avoid mixing topsoil with subsoil.

5. Stockpile sufficient topsoil for restoration of all grassed areas impacted by the construction.

6. Remove and dispose of surplus topsoil, off site.

7. All silt fence and erosion control measures to be in place before start of topsoil stripping operation.

3.2. Excavation/Grading

1. Grade to subgrade levels (to a tolerance +/- 25 mm but not consistently high or low) allowing for surface treatment as indicated.

2. Do not place material which is frozen nor place material on frozen surfaces.

3. Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

4. Excavation, placing and compacting of fill materials are to be carried out in accordance with Ontario Provincial Standard Specification (OPSS) MUNI 206.

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

6. If any soft areas are detected during the proof rolling process, and with the Consultant's direction, sub-excavate as per Geotechnical Consultant's recommendations. Sub-excavated areas are to be backfilled with suitable native material, or imported approved granular material.

3.3. **Proof Rolling**

1. Proof rolling shall be carried out on completed subgrade prior to installing granular sub-base materials.

2. Proof rolling shall be carried out using a roller with a minimum static weight of 5 tonnes, and shall consist of a minimum of four passes per unit area. Wet areas or deleterious materials identified during proof rolling shall be sub-excavated and be replaced with engineered fill, consisting of Granular B, Type I as per OPSS PROV 1010 or select native material, compacted to 98% SPMDD in maximum 200 mm lifts.

3.4. **Field Quality Control**

1. Inspection and testing of materials and compaction will be carried out by the Geotechnical Consultant engaged by the Owner for this project. Costs of tests will be paid by Owner.

2. Sieve Analysis

    1. Proposed fill materials will be tested to confirm suitability for intended use and conformity with specifications.

3. Reinstatement

    1. All disturbed areas must be reinstated to Consultant's and Owner's satisfaction.

    2. Any damage to the existing rail right-of-way, due to the Contractor's operations, shall be made good at the Contractor's expense.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Conform to the requirements stated in the General Conditions, Supplementary General Conditions of this Specification and all addenda for all work.

1.2. Related Work

1. Aggregates — Section 31 05 17

1.3. References

1. ASTM D4791-10, Test Method for Flat or Elongated Particles in Coarse Aggregate.
2. Ontario Provincial Standard Specification 1001.

2. PRODUCTS

2.1. Materials

1. Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.
2. Geotextile for siltation control fence shall be Class I non-woven geotextile fabric in accordance with OPSS PROV 1860.

2.2. Source Quality Control

1. Inform Consultant of proposed source of aggregates and provide access for sampling at least four weeks prior to commencing production.
2. If, in opinion of Consultant, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.
3. Advise Consultant four weeks in advance of proposed change of material source.
4. Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

3. EXECUTION

3.1. Installation

1. Silt Control Fence
    1. Install silt control fence along construction site perimeter including tee bars, geotextile filter fabric, clear stone along the upstream side of the fence in the instance the ground is frozen.

3.2. Maintenance

1. Maintain silt control fencing for the duration of the construction and replace as required until the site is stabilized.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 Section 31 23 13 - Rough Grading

1.2 QUALITY ASSURANCE

.1 Contractor

.1 The Contractor shall carry out all works in a true horticultural manner.

.2 The Contractor shall ensure that the hoarding is erected beyond the drip line of the trees and root systems of the trees to be protected.

.3 The Contractor shall supervise all work in this section including implementation and maintenance until final acceptance.

.4 The Contractor shall obtain approvals for suppliers, sub- contractors and all materials to be used in this section of Work.

.5 Comply with the City of Mississauga Guidelines, details and requirements for tree protection. Refer to detail on drawing.

.2 Maintenance

.1 Maintain all hoarding and accessories until final acceptance of Work. Maintenance includes all measures necessary to protect the existing trees.

1.3 PRODUCT DELIVERY. STORAGE. HANDLING

.1 Deliver hoarding in a timely manner prior to commencement of construction.

.2 The Contractor shall not be responsible for the cost of replacements resulting from theft, vandalism, carelessness or neglect on the part of others or any other causes due to circumstances beyond his control.

Part 2 Products

2.1 MATERIALS

.1 Hoarding: 4' x 8' sheets of ½ “ plywood or particle board or approved equal.

.2 Fencing: paige wire 1.2 m high.

.3 Stakes and braces: 4" x 4" spruce and metal ‘T’ bars.

.4 Siltation fence: woven geotextile with minimum equivalent opening size of 0.15mm and a maximum opening equivalent opening size of 0.25mm by Terrafix, Terrafence or

approved equal.

.5 Conform to Municipal details and requirements.

Part 3 Execution

3.1 INSPECTION

.1 Verify areas to receive work in this section and report any conditions or defects encountered to the Consultant. before Work commences.

.2 Do not commence Work until hoarding has been approved.

3.2. PROTECTION AND PRESERVATION OF EXISTING VEGETATION

.1 All existing trees which are to remain shall be fully protected with hoarding to height 1.2 m high or as indicated, i.e. erected beyond their "dripline" or as indicated on the drawings prior to the issuance of the Building Permit, to the satisfaction of the Consultant.. Groups of trees and other existing plantings to be protected, shall be treated in a like manner with hoarding around the entire clump(s). Areas within the protective fencing shall remain undisturbed and shall not be used for the storage of building materials or equipment.

.2 On city road allowance or where visibility must be maintained erect 1.2 m high orange plastic web snow fencing on 2" x 4" wood frames.

.3 No rigging cables shall be wrapped around or installed in trees and surplus soil, equipment, debris or materials shall not be placed over root systems of the trees within the protective fencing. No contaminants will be dumped or flushed where feeder roots of trees exist.

.4 The contractor shall take every precaution necessary to prevent damage to trees or shrubs to be retained.

.5 Where limbs or portions of trees are removed to accommodate construction work, they will be removed carefully in accordance with accepted arbor cultural practice.

.6 Where root systems of trees are exposed directly adjacent to or damaged by construction work, they shall be trimmed neatly and the area backfilled with appropriate material to prevent desiccation. Prune tree(s) to restore the balance between roots and top growth or to restore the appearance of the tree(s).

.7 Trees that have died due to improper protection and maintenance or have been damaged beyond repair, shall be removed and replaced by the Contractor at this own expense with trees of a size and species as approved by the Consultant.

.8 If grades around trees to be protected are likely to change, the Contractor shall be required to take such precautions as dry welling, retaining walls and root feeding, as approved by the Consultant.

3.3 HOARDING/SILTATION CONTROL FENCE

.1 Install fence as located on drawings and as per details.

.2 Install fabric and paige wire fence in uphill side of posts.

.3 Overlap geotextile 1.0 m at joints.

.4 Bury geotextile 150 mm into grade at bottom of fence and backfill.

3.3 FINAL ACCEPTANCE

.1 Remove tree protection and hoarding/siltation prior to final acceptance.

END

1. GENERAL

1.1. General Requirements

1. Conform to the requirements stated in the General Conditions, Supplementary General Conditions of this Specification and all addenda for all work, including work outside the property line including work within Regional and Municipal right of way unless otherwise noted.

1.2. Related Work

1.	Site Grading	Section 31 23 13
2.	Excavation, Trenching and Backfilling	Section 31 23 10
3.	Aggregates: General	Section 31 05 17
4.	Granular Base	Section 32 11 23

1.3. References

1. ASTM C 117-17, Test Method for Material Finer than 0.075 mm Sieve in Mineral Aggregates by Washing.
2. ASTM C 131/C131M-14, Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
3. C 136/C136M-14, Method for Sieve Analysis of Fine and Coarse Aggregates.
4. ASTM D 422 (1990), Method for Particle-Size Analysis of Soils.
5. ASTM D698-12e2, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 12,400 ft-1lf/ft^3 600 kN-m/m^3.
6. CAN/CGSB-81.-88, Sieves Testing, Woven Wire, Inch Series.
7. CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric.
8. Ontario Provincial Standard Specification 1010.

1.4. Delivery, Storage and Handling

1. Refer to Section 32 11 23.

2. PRODUCTS

2.1. Materials

1. Granular sub-base material: Granular ‘B’, Type I or Type II, OPSS 1010, Section 31 05 17 and following requirements.
    1. Crushed, pit run or screened stone, gravel or sand consisting of hard durable angular particles free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
    2. Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1.

Sieve Designation	% Passing Type I
150 mm	100
26.5 mm	50-100
4.75 mm	20-100

1.18 mm	10-100
0.300 mm	2-65
0.075 mm	0-8

2. Other Properties as follows.

    1. Plasticity Index ASTM D4318-84.0.

    2. Crushed particles: at least 100% of particles by mass within each of the following sieve designation ranges to have at least 1 freshly fractured face for Type II. Not applicable for Type I material to be divided into ranges using methods of ASTM C135-84a.

    3. Petrographic Number MTO LS609 Maximum 250.

Passing	Retained on
26.5	4.75 MM

    4. Particles smaller than 0.02 mm AASHTO T88-78 maximum 3%.

    5. Soaked CBR AASHTO T193-72 Min 40 when compacted to 100% of AASHTO T180.74 Method D.

    Where indicated**, structural soil** is to be installed in lieu of granular sub-base. Structural soil as detailed later in this specification.

3. EXECUTION

3.1. Placing

1. Compact subgrade to 95% of SPMDD. Excavate all weak and soft spots as required and replace with granular sub-base compacted uniformly to 100% of SPMDD.
2. Place granular sub-base after subgrade is inspected and approved by Consultant.
3. Construct granular sub-base to depth and grade in areas indicated.
4. Ensure no frozen material is placed.
5. Place material only on clean unfrozen surface, free from snow or ice.
6. Place granular sub-base materials using methods which do not lead to segregation or degradation.
7. For spreading and shaping materials, use spreader boxes having adjustable templates or screens which will place material in uniform layers of required thickness.
8. Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
9. Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
10. Remove and replace portion of layer in which material has become segregated during spreading.

3.2. Compaction

1. Compaction equipment to be capable of obtaining required material densities.
2. Efficiency of equipment not specified to proved at least as efficient as specified equipment at no extra cost and written approval must be received from Consultant before use.
3. Equipped with device that records hours of actual work, not motor running hours.
4. Compaction in accordance with ASTM D698 and ASTM D1577.
    1. Pavement Sub-base: Compact to density of not less than 100% SPMDD.
    2. Backfill of subgrade weak or soft spots: Compact to density of not less than 98% of

SPMDD.

5. Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.

6. Apply water as necessary during compaction to obtain specified density.

7. In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Consultant.

8. Correct surface irregularities by loosening and adding or removing material unit surface is within specified tolerance.

3.3. **Site Tolerances**

1. Finished sub-base surface to be within 10 mm of elevation as indicated but not uniformly high or low.

3.4. **Inspection and Testing**

1. Testing of materials and compaction will be carried out by testing laboratory designated by Owner. Frequency of tests will be determined by Consultant.

2. Owner will pay costs for inspection and testing.

3.5. **Protection**

1. Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by Consultant.

SAMPLES AND SUBMITTALS

A. At least 30 days prior to ordering materials, the Contractor shall submit to the Engineer's representative samples, certificates, manufacturers literature and certified tests for materials specified below. No materials shall be ordered until the required samples, certificates, manufacturer's literature and test results have been reviewed and approved by the Engineer. Delivered materials shall closely match the approved samples. Approval shall not constitute final acceptance. The Engineer reserves the right to reject, on or after delivery, any material that does not meet these specifications.

1.02 DELIVERY, STORAGE AND HANDLING

A. Do not deliver or place soil in frozen, wet, or muddy conditions. Material shall be delivered at or near optimum compaction moisture content as determined by AASHTO T 99 (ASTM D 698). Do not deliver or place materials in an excessively moist condition (beyond 2 percent above optimum compaction moisture content as determined by AASHTO T 99 (ASTM D 698).

B. Protect soils and mixes from absorbing excess water and form erosion at all times. Do not store materials unprotected from large rainfall events. Do not allow excess water to enter site prior to compaction. If water is introduced into the material after grading, allow material to drain or aerate to optimum compaction moisture content.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Conform to the requirements stated in the General Conditions, Supplementary General Conditions of this Specification and all addenda for all work, including work outside the property line including work within Regional and Municipal right of way unless otherwise noted.

1.2. Related Work

1.	Site Grading	Section 31 23 13
2.	Excavation, Trenching and Backfilling	Section 31 23 10
3.	Aggregates: General	Section 31 05 17
4.	Granular Sub-base	Section 32 11 19

1.3. References

1. ASTM C 117-17, Test Method for Material Finer than 0.075 mm Sieve in Mineral Aggregates by Washing.
2. ASTM C 131/C131M-14, Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
3. C 136/C136M-14, Method for Sieve Analysis of Fine and Coarse Aggregates.
4. ASTM D698-12e2, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 12,400 ft-1lf/ft^3 600 kN-m/m^3.
5. CAN/CGSB-81.-88, Sieves Testing, Woven Wire, Inch Series.
6. CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric.
7. Ontario Provincial Standard Specification 1010.

1.4. Delivery, Storage and Handling

1. Deliver and stockpile aggregates in accordance with Section 31 05 17 – Aggregates General. Stockpile minimum 50% of total aggregate required prior to commencing operation.
2. Store cement in weathertight bins or silos that provide protection from dampness and easy access for inspection and identification of each.

2. PRODUCTS

2.1. Materials

1. Granular base material: Granular ‘A’ Type I or Type II OPSS 1010, Section 31 05 17 and following requirements:

1. Crushed pit-run or screened stone, gravel or sand consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

2. Gradations to be within limits of specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1.

Sieve Designation	% Passing
26.5 mm	100
19 mm	85 - 100
13.2 mm	65 - 90
9.5 mm	50 - 73
4.75 mm	35 - 55
1.18 mm	15 - 40
0.300 mm	5 - 22
0.150 mm	-
0.075 mm	2 - 8

3. Plasticity Index ASTM D4318-17e1.

4. Los Angeles Abrasion ASTM C131/C131M-14 Gradation 'A' Max. % loss by weight: 60.

5. Crushed particles: at least 50% of particles by mass within each of following sieve designation ranges to have at least 10 freshly fractured face. Material to be divided into ranges using methods of ASTM C136-84a.

Passing	Retained on
19 mm	26.5 mm
4.75 mm	19 mm

6. Petrographic number MTO LS 69, Maximum 250.

7. Soaked CBR: AASHTO T193-72 when compacted to 100% of AASHTO T180-774 Method D, Min 80 for use under Portland cement and Min 100 for use under asphalt concrete.

3. EXECUTION

3.1. Sequence Of Operation

1. Place granular base after finished sub-base surface or subgrade is inspected and approved by Consultant.

2. Placing

    1. Construct granular base to depth and grade in areas indicated.

    2. Ensure no frozen material is placed.

    3. Place material only on clean unfrozen surface, free from snow and ice.

    4. Place material using methods which do not lead to segregation or degradation of aggregate.

    5. Place material to full width in uniform layers not exceeding 150 mm compacted thickness.

    6. Shape each layer to smooth contour and compact to specified density before succeeding

layer is placed.

7. Remove and replace that portion of layer in which material becomes segregated during spreading.

3. Compaction Equipment

1. Compaction equipment to be capable of obtaining required material densities.

2. Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from Consultant before use.

3. Equipped with device that records hours of actual work, not motor running hours.

4. Compacting in accordance with ASTM D 698 and ASTM D 1557.

1. Compaction of Pavement Base: Compact to density of not less than 100% SPMDD.

2. Compaction of Concrete Slab on Grade or Concrete Sidewalks Base: Compact to density of not less than 100% of SPMDD.

3. Shape and roll alternately to obtain smooth, even and uniformly compacted base.

4. Apply water as necessary during compacting to obtain specified density.

5. In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Consultant.

6. Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.2. Site Tolerances

1. Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.3. Proof Rolling

1. For proof rolling use roller of 45,400 kg gross mass with four pneumatic tires each carrying 11,350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 915 mm maximum.

2. Consultant may authorize use of other acceptable proof rolling equipment.

3. Proof roll top of base upon completion of fine grading and compaction.

4. Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

5. Where proof rolling reveals defective areas:

1. Remove base, sub-base and subgrade material to depth and extent directed by Consultant.

2. Backfill excavated subgrade with sub-base material and compact in accordance with Section 31 23 10.

3. Replace sub-base material and compact in accordance with Sections 31 23 10 and 32 11 19.

4. Replace base material and compact in accordance with this Section.

3.4. Inspection and Testing

1. Testing of materials and compaction will be carried out under Cash Allowance by testing laboratory designated by Consultant. Frequency of tests will be determined by Consultant.

3.5. **Protection**

1. Maintain finished base in condition conforming to this section until succeeding material is applied or until acceptance by Consultant.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Conform to the requirements stated in the General Conditions, Supplementary General Conditions of this Specification and all addenda for all work, including work outside the property line including work within Regional and Municipal right of way unless otherwise noted.

1.2. Related Work

1.	Site Grading	Section 31 23 13
2.	Aggregates: General	Section 31 05 17
3.	Granular Base	Section 32 11 23
4.	Granular Sub-Base	Section 32 11 19
5.	Pavement Markings	Section 32 17 23

1.3. Quality Assurance

1. Plant requirements: Facilities for production and transportation or asphaltic mixture shall conform to OPSS Form 310.
2. Equipment Requirements: Self-powered mechanical pavers conforming to OPSS Form 310.
3. Rollers conforming to OPSS Form 310.

1.4. Inspection

1. Examine areas to receive the work of this Section and do not proceed until unsatisfactory conditions are corrected.
2. Notify the Consultant at least 24 hours prior to commencing work.
3. Do not commence work until the Consultant has inspected and approved surfaces to receive asphalt paving.

1.5. Condition of Surfaces

1. Prior to delivery of mixture, base surface shall be dry and free of all loose and foreign material.

1.6. Temperature Requirements

1. Prior to placing asphalt, air temperature at the base surface shall be a minimum of 7º C and rising.
2. Temperature of mixture shall not be less than 118º C immediately after spreading prior to initial rolling.
3. The asphalt cement shall be heated at the mixing plant only to the temperature required for satisfactory mixing and shall not exceed 162º C.

1.7. Protection

1. Conduct work without damaging other work. If other work is damaged, it shall be corrected to the approval of the Consultant without cost to the Owner.

2. PRODUCTS

2.1. Materials

1. Asphalt cement: conform to OPSS Form 1101.
2. Aggregates: conform to OPSS Form 1000 and 310.
3. Emulsified Asphalt: SS-1 emulsion conforming to OPSS Form 1103.

2.2. Asphalt Mixes

1. Asphalt Binding Course: HL8 conforming to OPSS Form 310.
2. Asphalt Surface Course: HL3 conforming to OPSS Form 310.

3. EXECUTION

3.1. Preparation

1. Clean surfaces of all loose and foreign materials.
2. Paint cold contact surfaces with emulsified asphalt.

3.2. Installation

1. Place asphalt paving in accordance with OPSS Form 310.
2. Compact asphalt to a minimum of 92% Maximum Theoretical Relative Density (MTRD).
3. Rolling shall continue until all roller marks are eliminated and no further compression is possible.
4. Hand tamp the asphalt with vibrating compactors adjacent to buildings, manhole covers and concrete curbs.
5. At the end of each day's work, or prolonged stoppage of asphalt paving, joints hall be formed by laying the asphalt and rolling it against a horizontal edge board of the proper thickness, placed across the entire width of the pavement.
6. Finished asphalt surfaces shall be straight and true to established levels, free from cracks, undrained areas or depressions exceeding 3 mm as measured with a 3 m straight edge in any direction. Asphalt thickness specified shall be maintained as minimum at any point.
7. Edges shall be neat and straight or properly curved as indicated, without broken, disintegrated or loose edges.
8. Backfill all curbs and pathways when complete in accordance with section 31 23 10

3.3. Cleaning

1. Remove asphalt stains from adjacent finished surfaces.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Conform to the requirements stated in the General Conditions, Supplementary General Conditions of this Specification and all addenda for all work, including work outside the property line including work within Regional and Municipal right of way unless otherwise noted.

1.2. Related Work

1.	Excavating, Trenching and Backfilling	Section 31 23 10
2.	Granular Base	Section 32 11 23
3.	Granular Sub-Base	Section 32 11 19
4.	Asphalt Paving	Section 32 12 16

1.3. References

1. Canadian Standards Association (CSA)
    1. CAN/CSA-A23.1-94, Concrete Materials and Methods of Concrete Construction.
2. Canadian General Standards Board (CGSB)
    1. CAN/CGSB-1.2-M89, Boiled Linseed Oil
    2. CAN/CGSB-3.3-M89, Kerosene
3. American Society for Testing and Materials (ASTM).
    1. ASTM D698-12e2, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-1lf/ft^3) (600 kN-m/m^3)
4. Ontario Provincial Standard Specification 353.

2. PRODUCTS

2.1. Materials

1. Concrete mixes and material shall conform to Ontario Provincial Standard Specifications 1301, 1302, 1303, 1305, 1306, 1308, 1315, and 1350. Concrete for curb and toe wall construction shall have a minimum compressive strength of 30 MPa after 28 days.
2. Granular Base and Sub-Base: to Section 32 11 23and 32 11 19 respectively.
3. Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water soluble soap.
4. Fill material: to Section 31 23 10.
5. Boiled linseed oil: to CAN/CGSB-1.2.
6. Kerosene: to CAN/CGSB-3.3.

3. EXECUTION

3.1. Grade Preparation & Sub-Base Course

1. Grading: to Section 32 23 13.
2. Place sub-base course of OPSS Granular ‘B’, Type I in maximum 150 mm loose lifts and compact

to a minimum of 100% of SPMDD.

3.2. **Granular Base**

1. Obtain Consultant's approval of subbase before placing granular base.
2. Place compacted OPSS Granular 'A' to depth, lines and widths as indicated.
3. Compact granular base to a minimum of 100% of SPMDD.

3.3. **Concrete**

1. Obtain Consultant's approval of granular base.
2. Do concrete curb construction in accordance with OPSS MUNI 353.
3. Provide 1.0m. wide depressions in curb where specified on the drawings as required to allow surface drainage to be conveyed to adjacent bio-swale areas.

3.4. **Tolerances**

1. Finish surfaces to within 3 mm in 3 m as measured with 3 m straightedge placed on surface.

3.5. **Expansion and Contraction Joints**

1. Joints are to be constructed in accordance with OPSS 353.07.07

3.6. **Curing**

1. Cure concrete by adding moisture continuously in accordance with CAN/CSA-A23.1 to exposed finished surfaces for at least 1 day after placing or sealing moisture in by curing compound approved by Consultant.
2. Where burlap is used for moist curing, place two prewetted layers on concrete surface and keep continuously wet during curing period.
3. Apply curing compound evenly to form continuous film. In accordance with manufacturer's requirements.
4. Concrete curing is to be in accordance with OPSS MUNI 904.

3.7. **Linseed Oil Treatment**

1. After concrete has cured for specified curing time and when surface of concrete is dry, apply two coats of linseed oil mixture uniformly to surfaces of curbs, walks and gutters.

3.8. **Backfill**

1. Allow concrete to cure for 7 days prior to backfilling.
2. Backfill to designated elevations with material approved by Consultant. Compact and shape to required contours as indicated or as directed by Consultant.

3.9. **Defective Concrete**

1. Concrete is defective when:
    1. Containing excessive honeycombing or embedded debris.
    2. Concrete damaged by freezing or which is unsatisfactory due to placement at too high a temperature.
    3. Average 28-day strength of any three consecutive strength tests is less than specified minimum 28-day strength.
    4. Any 28-day strength test result is more than 3.5 MPa below the specified minimum 28-day strength.
2. Repair of defective concrete work:

1. Repair defective areas while concrete is still plastic, otherwise wait until curing is completed. Use repair methods approved by Consultant.

2. Grind off high surface variations where directed by Consultant.

3. Remove and replace defective concrete where directed by Consultant:

1. Remove between joints by sawing through concrete across full width.

2. Replace with new concrete to this Section as directed by Consultant.

3. Construct contraction joint between sawn face of existing concrete and face of new concrete.

4. Install tie bars between old and new concrete as directed by Consultant.

3.10. **Field Quality Control**

1. Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Consultant in accordance with CAN/CSA-A23.1.

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

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Conform to the requirements stated in the General Conditions, Supplementary General Conditions of this Specification and all addenda for all work, including work outside the property line including work within Regional and Municipal right of way unless otherwise noted.

1.2. Related Work

1.	Excavating, Trenching and Backfilling	Section 31 23 10
2.	Granular Base	Section 32 11 23
3.	Granular Sub-Base	Section 32 11 19
4.	Asphalt Paving	Section 32 12 16

1.3. References

1. Canadian Standards Association (CSA)
    1. CAN/CSA-A23.1-94, Concrete Materials and Methods of Concrete Construction.
2. Canadian General Standards Board (CGSB)
    1. CAN/CGSB-1.2-M89, Boiled Linseed Oil
    2. CAN/CGSB-3.3-M89, Kerosene
3. American Society for Testing and Materials (ASTM).
    1. ASTM D698-12e2, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-1lf/ft^3) (600 kN-m/m^3)
    2. Ontario Provincial Standard Specifications 1301, 1302, 1303, 1306, 1308, 1315, and 1350.
    3. Ontario Provincial Standards Drawing No. 310.010

2. PRODUCTS

2.1. Materials

1. Concrete mixes and material: to Section 03 30 00.
2. Joint filler and Curing Compound: to Section 03 30 00.
3. Granular Base and Sub-Base: to Section 32 11 23 and 32 11 19 respectively.
4. Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water soluble soap.
5. Fill material: to Section 31 23 10.
6. Boiled linseed oil: to CAN/CGSB-1.2.
7. Kerosene: to CAN/CGSB-3.3.

3. EXECUTION

3.1. Grade Preparation & Sub-Base Course

1. Grading: to Section 31 23 13.

2. Compact subgrade to 95% of Standard Proctor Maximum Dry Density (SPMDD). Excavate and fill all weak and soft spots as required and backfill with compacted granular 'B', Type I to 100% SPMDD.

3.2. **Concrete**

1. Obtain Consultant's approval of granular base and reinforcing steel prior to placing concrete.
2. Do concrete work in accordance with Section 03 30 00.
3. Immediately after floating, give concrete walkway surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to centre line.
4. Provide edging as indicated with 10 mm radius edging tool.
5. Slip-form pavers equipped with string line system for line and grade control may be used if quality of work acceptable to Consultant can be demonstrated. Hand finish surfaces when directed by Consultant.

3.3. **Tolerances**

1. Finish surfaces to within 3 mm in 3 m as measured with 3 m straightedge placed on surface.

3.4. **Expansion and Contraction Joints - Concrete Walkways**

1. Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, at intervals of 1.5 m.
2. Install expansion joints at intervals of 6 m.
3. Install expansion joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.
4. Seal expansion joints with sealant approved by Consultant.

3.5. **Curing**

1. Cure concrete by adding moisture continuously in accordance with CAN/CSA-A23.1 to exposed finished surfaces for at least 1 day after placing, or sealing moisture in by curing compound approved by Consultant.
2. Where burlap is used for moist curing, place two prewetted layers on concrete surface and keep continuously wet during curing period.
3. Apply curing compound evenly to form continuous film. In accordance with manufacturer's requirements.

3.6. **Linseed Oil Treatment**

1. After concrete has cured for specified curing time and when surface of concrete is dry, apply two coats of linseed oil mixture uniformly to surfaces of curbs, walks and gutters.

3.7. **Backfill**

1. Allow concrete to cure for 7 days prior to backfilling.
2. Backfill to designated elevations with material approved by Consultant. Compact and shape to required contours as indicated or as directed by Consultant.

3.8. **Defective Concrete**

1. Concrete is defective when:
    1. Containing excessive honeycombing or embedded debris.

2. Concrete damaged by freezing or which is unsatisfactory due to placement at too high a temperature.

3. Average 28-day strength of any three consecutive strength tests is less than specified minimum 28-day strength.

4. Any 28-day strength test result is more than 3.5 MPa below the specified minimum 28-day strength.

2. Repair of defective concrete work:

1. Repair defective areas while concrete is still plastic, otherwise wait until curing is completed. Use repair methods approved by Consultant.

2. Grind off high surface variations where directed by Consultant.

3. Remove and replace defective concrete where directed by Consultant:

1. Remove between joints by sawing through concrete across full width.

2. Replace with new concrete to this Section as directed by Consultant.

3. Construct contraction joint between sawn face of existing concrete and face of new concrete.

4. Install tie bars between old and new concrete as directed by Consultant.

3.9. **Field Quality Control**

1. Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Consultant in accordance with CAN/CSA-A23.1.

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 32 92 23 - Sodding.

.2 Section 32 93 10 – Landscape Planting and Maintenance.

.3 Section 31 23 13 - Rough Grading.

1.2 DEFINITIONS

.1 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) (50)), and contain no toxic or growth inhibiting contaminates. Composed bio-solids must meet the requirements of the Guidelines for Compost Quality, Category (A) (B) produced by the Canadian Council of the Ministers of the Environment (CCME), January 1996.

.2 "Topsoiling" consists of placing and spreading topsoil to the depths specified, for areas to be sodded or seeded.

.3 "Fine Grading" consists of shaping and smoothing the topsoil surface to the finished grades, eliminating surface irregularities, to achieve a smooth even surface and consistent depth.

.4 "Fertilizing" consists of applying and working into the soil surface, the specified fertilizer.

.5 "Raking Out" consists of hand raking areas to remove minor surface irregularities.

.6 **Imported Topsoil**: Submit nutrient analysis, acidity analysis, and herbicide residue (known as "Garden Package") analysis for topsoil obtained off site. Testing should be carried out by the topsoil supplier. The contractor is to warrant that the topsoil supplied to the site is that from which representative samples were taken.

.7 Topsoil shall be tested by an approved prior to delivery to site or spread from stockpile as case may be. All topsoil must conform to the sample provided.

1.3 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Topsoil shall be tested for N.P.K, minor elements, acidity (pH), herbicide, atrazine, organic matter content, clay / silt / sand / gravel composition or texture, and fertilizer requirements.

.3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.4 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

1.4 SITE CONDITIONS

.1 Do not proceed with any work under this section without the consultant's prior approval of the rough grading.

.2 Do not proceed with spreading or fine grading of topsoil when the site or material is saturated and clodding or rutting would occur.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 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 TOPSOIL

.1 There is no existing topsoil stock piled on site following a PreGrading contract by others. As part of the base bid tender, Contractor shall assume all specified topsoil shall be imported.

.2 Should existing topsoil or organics be found on site as part of final excavation or grading under this contract, it shall be removed from the site as part of excess material unless approved by Consultant.

.3 Topsoil for sodded or seeded areas is to be imported sandy loam, screened and shredded, and uncontaminated with subsoil, roots, stones, and any organic matter which is not decomposed.

.4 All imported topsoil shall be **shredded and screened**, fertile, friable neither heavy clay nor of a light sandy nature, consisting of 60% sand, 30% silt, 10% clay, a minimum 4% organic matter content prior to mixing, with acidity value between pH 6.0 and 7.5, free from admixtures of subsoil, clay lumps, stones and roots over 50 mm, free of toxic substances or any other foreign matter which would inhibit growth.

.5 Topsoil/sand mix shall be augmented with nutrients, fertilizers and additives as recommended by the topsoil report.

.6 Imported topsoil required to meet specified depths, in the case of a deficit in quantity of existing topsoil, is subject to rejection based on the results of the testing for nutrients, acidity and herbicide residue.

7 For depths of planting beds refer to Section 32 93 10.

2.2 SOIL AMENDMENTS

.1 Fertilizer:

.1 Fertilizer is to be commercial grade, granular fertilizer, in originally packaged containers, marked as to contents, analysis and weight.

.2 Analysis ratio and rate of fertilizer application shall be subject to the nutrient testing results but, otherwise, shall be as recommended by manufacturer for newly seeded/sodded areas.

2.3 SOURCE QUALITY CONTROL

.1 Advise Consultant of sources of imported topsoil proposed to be utilized with sufficient lead time for testing.

.2 Contractor is responsible for amendments to supply topsoil as specified.

Part 3 Execution

3.1 SURFACE PREPARATION

.1 Scarify the rough grade, to a depth of 100mm prior to placement of topsoil.

.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

3.2 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

.1 Place topsoil on areas to be sodded or seeded in sufficient quantity to allow for a finished and compacted depth of 150mm.

.2 Compaction for sodded or seeded areas is to be 85% S.P.D. (topsoil layer only), consistent throughout the areas.

3.3 FINISH GRADING

.1 Finish grading is to be done to create the slopes and levels indicated by the contours and spot elevations on the drawings, and as directed and approved by the consultant.

.2 The finished surface is to be smooth and even, with no ruts, clods or contaminants.

.3 Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.

.4 Coordinate the scheduling of hand raking with the consultant to ensure that sodding can occur as soon as possible after hand raking.

3.4 FERTILIZING

.1 Apply fertilizer of the specified ratio and rate and work into the top 50mm.

3.5 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 32 91 21 - Topsoil Placement and Grading.

.3 Section 32 93 10 – Landscape Planting and Maintenance.

.4 Section 01 56 00 – Temporary Barriers and Enclosures.

.5 Areas to be sodded are indicated on plans.

1.2 DELIVERY AND STORAGE

.1 Schedule deliveries in order to keep storage at job site to minimum without causing delays.

.2 Deliver sod to site within 24 hours of being lifted and lay sod within 36 hours of being lifted.

.3 Do not deliver small, irregular or broken pieces of sod.

.4 During wet weather protect sod from drying and water sod as necessary to ensure its vitality and prevent dropping of soil in handling. Dry sod will be rejected.

1.3 SUBMITTALS

.1 Samples.

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

.2 Submit:

.1 Sod for each type specified.

.1 Install approved samples in one square metre mock-ups and maintain in accordance with maintenance requirements during establishment period.

.3 Obtain approval of samples by Consultant.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

1.5 SCHEDULING

.1 Schedule sod laying to coincide with topsoil operations. **Schedule sodding as early as possible to allow minimum 6 weeks for sod to establish, prior to owner take over**. In any case, sod shall be placed not later than June 30, 2017 to allow for this period.

.2 **Cautionary Note**: Refer to also to Section 01 56 00 and 01 11 00 for temporary fence conditions. When sod is installed in the following spring, the contractor shall be responsible for the erection and maintenance of a temporary, leased, perimeter "Mod-U-Lock" fence around the sodded areas to remain until the consultant at no additional cost to the owner.

.3 Schedule sod installation when frost is not present in ground.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Divert unused fertilizer from landfill to official hazardous material collections site.

.2 Do not dispose of unused fertilizer into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

Part 2 Products

2.1 MATERIALS

.1 Nursery Sod: Quality and source to comply with standards outline in Metric Guide Specifications for Nursery Stock, Section 17, 1984 Edition, published by Canadian Nursery Trades Association. Number One Kentucky Bluegrass sod grown from minimum mixture of Kentucky Bluegrass cultivars.

.2 Water: Potable.

.3 Fertilizer: Time release commercial fertilizer 20:20:20 or as per topsoil test recommendations.

2.2 SOURCE QUALITY CONTROL

.1 Obtain approval from Consultant of sod at source.

.2 When proposed source of sod is approved, use no other source without written authorization from Consultant.

Part 3 Execution

3.1 PREPARATION

.1 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.

.2 Fine grade surface free of humps and hollows to smooth, even grade, elevations indicated, to tolerance of plus or minus 8 mm, for Turf Grass Nursery Sod and plus or minus 15 mm for Commercial Grade Turf Grass Nursery, surface to drain naturally.

.3 Remove and dispose of weeds; debris; stones 50mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site.

3.2 SOD PLACEMENT

.1 Obtain approval of topsoil grade and depth before starting sodding.

.2 Lay sod during growing season.

.3 Lay sod in rows, perpendicular to slope, smooth and even with adjoining areas, and with joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with a sharp knife.

.4 Sod is to be pegged on slopes in excess of three horizontal to one vertical.

.5 Provide close contact between sod and soil by means of light roller. Heavy rolling to correct irregularities in grade is not permitted.

.6 Water immediately after sod laying to obtain moisture penetration through sod into 100 mm of topsoil.

.7 Provide adequate protection of sodded areas against erosion and mechanical damage. Remove protection after lawn areas have been accepted.

.8 Apply fertilizer immediately following sodding (prior to watering) at a rate of 2 lbs/1000 sq.ft.

3.3 MAINTENANCE BEFORE ACCEPTANCE

.1 Maintain all sodded areas from time of installation until acceptance. This period shall not be less than **48** days after installation.

.2 Check sodded areas for evidence of weeds and disease. Take immediate measures to remedy.

.3 Be responsible for protection of sodded areas until end of maintenance period. Perform following operations from time of installation until acceptance.

.4 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.

.5 Regularly cut grass to 60 mm when it reaches height of 80 mm. Remove clippings which will smother grassed areas.

.6 Install protective barriers and signs where necessary. Remove at end of maintenance period.

.7 Maintain sodded areas weed free. Eliminate weeds and disease by chemical means in strict accordance with manufacturer's recommendations, the Pesticides Act, and federal, provincial and municipal regulations. Be fully responsible for the use of such chemicals, including the repair or replacement of all damage as a result of the use of such chemicals. Obtain all necessary permits.

.8 Fertilize areas in accordance with soil test report recommendations. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

.9 Repair all damages, erosion and wash-outs resulting from weather, faulty installation or other causes.

.10 Notify Architect in writing of all damages arising from vandalism or other causes beyond the Contractor's control.

3.4 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Notwithstanding Maintenance before acceptance, this maintenance period to be minimum 6 weeks prior to occupancy in September 2011 or later if sod not installed 6 weeks prior to occupancy.

.2 Perform following operations from time of installation until acceptance.

.3 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 100 mm.

.4 Cut grass to 60mm when or prior to it reaching height of 80 mm. Remove clippings which will smother grassed areas.

.5 Maintain sodded areas weed free 95%.

3.5 ACCEPTANCE

.1 Sodded areas will be accepted no sooner than the date at which the project is declared fit for occupancy provided that the following criteria are meet:

.1 Sodded areas are properly established. (6 weeks minimum).

.2 Sod is free of bare and dead spots and without weeds.

.3 No surface soil is visible when grass has been cut to a height of 60 mm.

.4 Sodded areas have been cut a minimum of 2 times and within 24 h prior to acceptance. Cut height to be 60 mm.

.5 Fertilizing in accordance with soil test report recommendations has been carried out at least once.

3.6 PROTECTION/TEMPORARY FENCING

.1 For requirements of Temporary Fence refer to Section 01 56 00 – Temporary Barriers and Enclosures, Section 1.13.

.2 Following installation of sod to the playfield areas, supply & install a temp. leased 1800 high "Mod U Lok" fence. Stake w/iron "T" at min. 2400 o.c. and maintain for min. 6 weeks while sod is maintained as part of this contract and is deemed established.

3.7 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Conform to the requirements stated in the General Conditions, Supplementary General Conditions of this Specification and all addenda for all work, including work outside the property line including work within Regional and Municipal right of way unless otherwise noted.

1.2. Related Work

1.	Site Grading	Section 31 23 13
2.	Excavating, Trenching and Backfilling	Section 31 23 10
3.	Storm Sewers	Section 33 44 00
4.	Aggregates: General	Section 31 05 17

1.3. References

1. ASTM A48/A48M-03 (2016), Specification for Gray Iron Castings.
2. ASTM C139-18 (1989), Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.
3. ASTM C478M-90, Specification for Precast Reinforced Concrete Manhole Sections
4. CSA A3000, Portland Cement.
5. CSA A3000, Masonry Cement.
6. CAN/CSA-A23.1-M90, Concrete Materials and Methods for Concrete Construction.
7. CSA A82.56-M1976, Aggregate for Masonry Mortar.
8. CAN3-A165 Series-M85, CSA Standards on Concrete Masonry Units.
9. CAN/CSA-G30.18-M92, Billet Steel Bars for Concrete Reinforcement.
10. CAN/CSA-G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.
11. Ontario Provincial Standard Specification 407.

2. PRODUCTS

2.1. Materials

1. Precast manhole units: to ASTM C478M, circular or oval. Top sections eccentric cone or flat slab top type with opening offset for vertical ladder installation. Monolithic bases to be approved by Consultant and set on concrete slabs cast in place.
    1. 1200 mm diameter manhole as per OPSD 701.010.
2. Precast catch basins: to ASTM C478M.
    1. Catch basins as per OPSD 705.010
3. Joints: to be made watertight using rubber rings or cement mortar.
4. Mortar:
    1. Aggregate: to CSA A82.56.
    2. Cement: to CAN/CSA-A8.
5. Ladder rungs: to CAN/CSA-G30.18, No. 25M billet steel deformed bars, hot dipped galvanized to CAN/CSA G164 Rungs to be safety pattern (drop step type).

6. Adjusting rings: to ASTM C478M.

7. Concrete Brick: to CAN3-A165 Series.

8. Frames, gratings, covers to dimensions as indicated and following requirements:

    1. Metal gratings and covers to bear evenly on frames. A frame with grating or cover to constitute one unit. Assemble and mark unit components before shipment.

    2. Gray iron castings: to ASTM A48, strength class 30B.

    3. Castings: coated with two applications of asphalt varnish.

    4. Storm manhole frames and covers: heavy duty municipal type for road service. Cover cast without perforations and complete with two 25 mm square lifting holes, as per OPSD 400.010, unless otherwise specified.

    5. Catchbasin frame and cover: as per OPSD 400.010.

    6. Manhole frame and cover as per OPSD 401.010 Type A.

9. Granular bedding and backfill: Granular B Type I: to OPSD 1010 and Section 02701 – Aggregates: General and to Section 02315 – Excavating, Trenching and Backfilling.

10. Unshrinkable fill: to Section 02315 – Excavating, Trenching and Backfilling.

3. EXECUTION

3.1. Excavation and Backfill

1. Excavate and backfill in accordance with Section 31 23 10 – Excavating, Trenching and Backfilling.

2. Obtain approval of Consultant before installing manholes or catch basins.

3.2. Installation

1. Construct units in accordance with details indicated, plumb and true to alignment and grade.

2. Complete units as pipe laying progresses. Maximum of three units behind point of pipe laying will be allowed.

3. Dewater excavation free of standing water or as directed by Consultant and remove soft and foreign material before placing concrete base.

4. Set precast concrete base on 150 mm minimum of granular bedding compacted to 100% Corrected Maximum Dry Density.

5. Precast units.

    1. Set bottom section of precast unit in bed of cement mortar and bond to concrete slab or base. Make each successive joint watertight with rubber ring gaskets, cement mortar, or combination thereof.

    2. Clean surplus mortar and joint compounds from interior surface of unit as work progresses.

    3. Plug lifting holes with precast concrete plugs set in cement mortar or mastic compound.

6. For sewers:

    1. Place stub outlets and bulkheads at elevations and in positions indicated.

    2. Bench to provide a smooth U-shaped channel in manholes.

7. Compact granular backfill to 98% Corrected Maximum Dry Density.

8. Place frame and cover on top section to elevation as indicated. If adjustment required use concrete ring.

9. Clean units of debris and foreign materials. Remove fins and sharp projections. Prevent debris from entering system.

3.3. **Leakage Test**

1. Visual inspection of leakage will be carried out. If any leakage is observed, correct leakage as directed by Consultant at no additional cost.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Conform to the requirements stated in the General Conditions, Supplementary General Conditions of this Specification and all addenda for all work, including work outside the property line including work within Regional and Municipal right of way unless otherwise noted.

1.2. Description

1. The work included in this Section includes for all labour, equipment and materials required for the watermain construction within the site, and watermain construction within the municipal right of way connecting to existing municipal servicing.
2. Included in the work is coordination and cooperation with Municipal forces as required to complete the work including providing temporary blow offs, isolation valves, pressure testing and chlorination as required by Municipal forces.

1.3. Related Work

1. Excavating, Trenching and Backfilling — Section 31 23 10

1.4. References

1. The Municipality Standards and Specifications for watermain construction.

1.5. Scheduling Of Work

1. Schedule work to minimize interruptions to existing services.

2. PRODUCTS

1. All products utilized within the water system to comply with the Municipality Standards and Specifications.

3. EXECUTION

3.1. Preparation

1. Clean pipes, fittings, and appurtenances of accumulated debris and water before installation. Carefully inspect materials for defects to approval of Consultant. Remove defective materials from site as directed by Consultant.

3.2. Trenching

1. Do trenching work in accordance with Section 31 23 10 – Excavating, Trenching and Backfilling.
2. Trench depth to provide cover over pipe of not less than 1.75 metres from finished grade or as indicated.
3. Trench alignment and depth require Consultants' approval prior to placing bedding material and pipe.

3.3. **Granular Bedding**

1. Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth of 300 mm below bottom of pipe or to depth as indicated.
2. Do not place material in frozen condition.
3. Shape bed true to grade to provide continuous uniform bearing surface for pipe.
4. Shape transverse depressions in bedding as required to suit joints.
5. Compact each layer full width of bed to at least 95% of corrected maximum dry density.
6. Fill authorized or unauthorized excavation below design elevation of bottom of specified bedding in accordance with Section 31 23 10 – Excavating, Trenching and Backfilling with compacted bedding material.

3.4. **Pipe Installation**

1. Lay pipes to ANSI/AWWA C600 Manual of Practice and manufacturer's standard instructions and specifications. Do not use blocks except as permitted in 3.3.2.
2. Join pipes in accordance with ANSI/AWWA C600, ANSI/AWWA C206, AWWA Manual of Practice and manufacturer's recommendations.
3. Bevel or taper ends of PVC pipe to match fittings.
4. Handle pipe by methods approved by Engineer recommended by pipe manufacturer. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends.
5. Lay pipes on prepared bed, true to line and grade. Ensure barrel of each pipe is in contact with shaped bed throughout its full length. Take up and replace defective pipe. Correct pipe which is not in true alignment or grade or pipe which shows differential settlement after installation greater than 10 mm in 3 m.
6. Face socket ends of pipe in direction of laying. For mains on a grade of 2% or greater, face socket ends upgrade.
7. Do not exceed permissible deflection at joints as recommended by pipe manufacturer.
8. Keep jointing materials and installed pipe free of dirt and water and other foreign materials. Whenever work is stopped, install a removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
9. Position and join pipes with equipment and methods approved by Consultant.
10. Cut pipes in an approved manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
11. Align pipes carefully before jointing.
12. Install gaskets to manufacturer's recommendations. Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
13. Avoid displacing gasket or contaminating with dirt or other foreign material. Gaskets so disturbed or contaminated shall be removed, cleaned, lubricated and replaced before jointing is attempted again.
14. Complete each joint before laying next length of pipe.
15. Minimize deflection after joint has been made.
16. Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations.
17. Ensure completed joints are restrained by compacting bedding material alongside and over

installed pipes or as otherwise approved by the Consultant.

18. Provide necessary fittings and adaptors as required between existing watermain pipe materials and proposed watermain pipe materials.

19. When stoppage of work occurs, block pipes in an approved manner to prevent creep during down time.

20. Recheck plastic pipe joints assembled above ground after placing in trench to ensure that no movement of joint has taken place.

21. Do not lay pipe on frozen bedding.

22. Contractor responsible for satisfactory completion of hydrostatic and leakage testing to Consultant's approval. Contractor also responsible for degree of backfilling complete prior to hydrostatic and leakage testing as well as isolation and correction of any leaks resulting in failed tests.

23. Backfill remainder of trench.

3.5. Cathodic Protection And Tracer Wire

1. Install as per Municipal Standards,

3.6. Hydrostatic And Leakage

1. Provide labour, equipment and materials required to perform hydrostatic and leakage tests hereinafter described as required by the Municipality standards.

2. Notify Consultant at least 24 h in advance of all proposed tests. Perform tests in presence of Consultant.

3. Where any section of system is provided with concrete thrust blocks, conduct tests at least 5 days after placing concrete or 2 days if high early strength concrete is used.

4. Test pipeline in sections not exceeding 365 m in length, unless otherwise authorized by Consultant.

5. Upon completion of pipe laying and after Consultant has inspected work in place, surround and cover pipes between joints with approved granular material placed to dimensions indicated or directed by Consultant.

6. Leave hydrants, valves, backflow preventer, water meter, joints and fittings exposed.

7. When testing is done during freezing weather, protect hydrants, valves, backflow preventer, water meter, joints and fittings from freezing.

8. Strut and brace caps, bends, tees, and valves, to prevent movement when test pressure is applied.

9. Open valves.

10. Expel air from main by slowly filling main with potable water. Install corporation stops at high points in main where no air-vacuum release valves are installed. Remove stops after satisfactory completion of test and seal holes with plugs.

11. Thoroughly examine exposed parts and correct for leakage as necessary.

12. Examine exposed pipe, joints, fittings and appurtenances while system is under pressure.

13. Remove joints, fittings and appurtenances found defective and replace with new sound material and make watertight.

14. Repeat hydrostatic test until all defects have been corrected.

15. Apply a leakage test pressure of equal to design pressure after complete backfilling of trench, based on elevation of lowest point in main and corrected to elevation of gauge, for period of 2 h.

16. Define leakage as amount of water supplied from water meter in order to maintain test pressure for

2 h.

17. Do not exceed allowable leakage of 0.03 L/mm diameter per 300 m of pipe, including lateral connections, per hour.

18. Locate and repair defects if leakage is greater than amount specified.

19. Repeat test until leakage is within specified allowance for full length of water main.

Pipe Surround

20. Upon completion of pipe laying and after Consultant has inspected work in place, surround and cover pipes as indicated.

21. Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated. Do not dump material within 5 m of pipe.

22. Place layers uniformly and simultaneously on each side of pipe.

23. Do not place material in frozen condition.

24. Compact each layer from pipe invert to mid height of pipe to at least 95% of SPMDD to ASTM D698.

25. Compact each layer from (mid height) of pipe to underside of backfill to at least 95% of SPMDD and in accordance with Geotechnical Report for site.

3.7. **Backfill**

1. Place backfill material above pipe surround in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.

2. Do not place backfill in frozen condition.

3. Compact native backfill to at least 95% of SPMDD.

3.8. **Flushing And Disinfecting**

1. The Municipality shall perform all chlorination works.

2. Flush water mains through available outlets with a sufficient flow of potable water to produce a velocity of 1.5 m/s, within pipe for 10 min., or until foreign materials have been removed and flushed water is clear.

3. Flushing flows shall be as follows:

Pipe Size NPS	Flow (L/s) Minimum
6 and below	38
8	75

4. Provide connections and pumps for flushing as required.

5. Open and close valves, hydrants and service connections to ensure thorough flushing.

6. Complete flushing to satisfaction of Consultant and The Municipal forces.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Conform to the requirements stated in the General Conditions, Supplementary General Conditions of this Specification and all addenda for all work, including work outside the property line including work within Regional and Municipal right of way unless otherwise noted.

1.2. Related Work

1.	Site Grading	Section 31 23 13
2.	Excavating, Trenching and Backfilling	Section 31 23 10
3.	Manholes and Catchbasins	Section 33 05 14
4.	Aggregates: General	Section 31 05 17

1.3. References

1. ASTM D3034, Specification for Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and fittings.
2. CAN/CSA-B182.2, PVC Sewer Pipe and Fittings (PSM Type),
3. CAN/CSA-B182.11, Recommended Practice for the Installation of Plastic Crain and Sewer Pipe and Pipe Fittings.
4. Ontario Provincial Standard Specification MUNI 410.

1.4. Material Certification

1. Submit manufacturer's test data and certification at least 2 weeks prior to commencing work.
2. Certification to be marked on pipe.

1.5. Scheduling of Work

1. Schedule work to minimize interruptions to existing services and to maintain existing flow during construction.

2. PRODUCTS

2.1. PVC Pipe

Poly Vinyl Chloride pipe as specified in the Contract Drawings shall be in accordance with OPSS 410, Pipe Sewer Installation in Open Cut.

2.2. Pipe Bedding, Surround and Cover Materials

1. Granular embedment materials to Section 31 05 17 – Aggregates.

2.3. Backfill Material

1. Backfill to Section 31 23 10 – Excavation, Trenching and Backfilling
2. Backfill within the public right of way to be un-shrinkable fill.

2.4. Joint Mortar

1. Portland cement: to CAN/CSA-A5, normal type 10.
2. Mortar: one part Portland cement to two parts clean sharp sand mixed with minimum amount of water to obtain optimum consistency for use intended. Do not use additive..

3. EXECUTION

3.1. Preparation

1. Clean pipes and fittings of debris and water before installation, and remove defective materials from site.

3.2. Trenching

1. Do trenching work in accordance with Section 31 23 10 – Excavating, Trenching and Backfilling.
2. Do not allow contents of any sewer or sewer connection to flow into trench.
3. Trench alignment and depth to approval of Consultant prior to placing bedding material and pipe.

3.3. Granular Bedding

1. Place granular bedding material to details indicated in bedding detail OPSD 802.010 to OPSD 802.054, depending on type of soil and pipe. Use Class B bedding and place bedding in unfrozen condition. Type of soil to be defined in the field as Type 1, 2, 3, or 4 as per Health and Safety Act and Regulations for Construction Projects.
2. Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness.
3. Compact each layer full width of bed to at least 95% corrected maximum dry density.
4. Shape bed true to grade and to provide continuous, uniform bearing surface for pipe. Do not use blocks when bedding pipes.
5. Shape transverse depressions as required to suit joints.
6. Fill excavation below bottom of specified bedding adjacent to manholes or catch basins with compacted common backfill.

3.4. Installation of Sanitary Sewer Pipes

1. Lay and join pipe in accordance with manufacturer's recommendations and to approval of Consultant.
2. Handle pipe using methods approved by Consultant. Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.
3. Commence laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.
4. Do not exceed maximum joint deflection recommended by pipe manufacturer.
5. Do not allow water to flow through pipes during construction except as may be permitted by Consultant.
6. Whenever work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
7. PVC Pipe as specified in the Contract Drawings shall be installed in accordance with OPSS MUNI 410, Pipe Sewer Installation in Open Cut.
8. When any stoppage of work occurs, restrain pipes as directed by Consultant, to prevent "creep" during down time.
9. Cut pipes as required for special inserts, fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
10. Make watertight connections to manholes and catch basins. Use shrinkage compensating grout when suitable gaskets are not available. Support connections as per OPSD 708.020.

11. Use prefabricated saddles or approved field connections for connecting pipes to existing sewer pipes. Joint to be structurally sound and watertight.

12. Temporarily plug open upstream ends of pipes with removable watertight concrete, steel or plastic bulkheads.

3.5. **Pipe Surround**

1. Place surround material in unfrozen condition.

2. Upon completion of pipe laying, and after Consultant has inspected pipe joints, surround and cover pipes as indicated.

3. Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated. Pipe surround material to extend 300 mm above crown of pipe.

4. Place layers uniformly and simultaneously on each side of pipe.

5. Compact each layer from pipe invert to mid height of pipe to at least 95% corrected maximum dry density.

3.6. **Backfill**

1. Place backfill material in unfrozen condition.

2. Place backfill material above pipe surround in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.

3.7. **Field Testing**

1. Repair or replace pipe, pipe joint or bedding found defective.

2. When directed by Consultant, draw tapered wooden plug with diameter of 50 mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction.

3. Remove foreign material from sewers and related appurtenances by flushing with water.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Conform to the requirements stated in the General Conditions, Supplementary General Conditions of this Specification and all addenda.

1.2. Related Work

1.	Excavating, Trenching and Backfilling	Section 31 23 10
2.	Manholes and Catchbasins	Section 33 05 14
3.	Aggregates: General	Section 31 05 17

1.3. References

1. ASTM C14, Specification for Concrete Sewer, Storm Drain and Culvert Pipe.
2. ASTM C76, Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe
3. ASTM C443M-85a (1990), Specification for Joints for Circular Concrete Sewer and Culvert Pipe, using Rubber Gaskets.
4. CSA A3000, Portland Cement.
5. CAN/CSA-A257, Series M92, Standards for Concrete Pipe.
6. CAN3-G401-M81, Corrugated Steel Pipe products.
7. Ontario Provincial Standard Specification MUNI 410.

1.4. Material Certification

1. Certification to be marked on pipe.

1.5. Scheduling of Work

1. Schedule work to minimize interruptions to existing services and to maintain existing flow during construction.

2. PRODUCTS

2.1. Concrete Pipe

1. Non-reinforced circular concrete pipe and fittings: to CAN/CSA-A-257-2, ASTM C14M, Class 3 designed for flexible rubber gasket joints to ASTM C443 M and CAN/CSA A257.
2. Reinforced circular concrete pipe and fittings: to CAN/CSA-A257, ASTM C76M, strength classification as indicated in the Contract Drawings, designed for flexible rubber gasket joints to ASTM C443M and CAN/CSA A257.
3. Manufactured tees for pipe-to-pipe connections.
4. Lifting holes:
    1. Pipe 900 mm and less diameter: no lift holes.
    2. Pipe greater than 900 mm diameter: lift holes not to exceed two in piece of pipe.

3. Provide pre-fabricated plugs to effectively seal lift holes after installation of pipe.

2.2. PVC Pipe

Poly Vinyl Chloride pipe as specified in the Contract Drawings shall be in accordance with OPSS MUNI 410, Pipe Sewer Installation in Open Cut.

2.3. Trench drains

Trench drains as specified in the Contract Drawings shall be in accordance with manufacturers requirements.

2.4. Pipe Embedment, Surround and Cover Materials

1. Granular material to Section 31 05 17 – Aggregates.
2. Granular A to Section 31 23 13 – Site Grading
3. Pipe embedment shall be in accordance with OPSD 802.010

2.5. Backfill Material

1. Backfill shall be granular material as specified in Section 31 23 10 – Excavation, Trenching and Backfilling.

2.6. Joint Mortar

1. Portland cement: to CAN/CSA-A5, normal type 10.
2. Mortar: one part Portland cement to two parts clean sharp sand mixed with minimum amount of water to obtain optimum consistency for use intended. Do not use additives.

3. EXECUTION

3.1. Preparation

1. Clean pipes and fittings of debris and water before installation and remove defective materials from site.

3.2. Trenching

1. Do trenching work in accordance with Section 31 23 10 – Excavating, Trenching and Backfilling.
2. Do not allow contents of any sewer or sewer connection to flow into trench.
3. Trench alignment and depth to approval of Consultant prior to placing bedding material and pipe.

3.3. Granular Bedding

1. Place granular bedding material to details indicated in bedding detail OPSD 802.010 to OPSD 802.054, depending on type of soil and pipe. Use Class B bedding and place bedding in unfrozen condition.

Type of soil to be defined in the field as Type 1, 2, 3, or 4 as per Health and Safety Act and Regulations for Construction Projects.

2. Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness.

3. Compact each layer full width of bed to at least 95% corrected maximum dry density.

4. Shape bed true to grade and to provide continuous, uniform bearing surface for pipe. Do not use blocks when bedding pipes.

5. Shape transverse depressions as required to suit joints.

6. Fill excavation below bottom of specified bedding adjacent to manholes or catch basins with compacted granular backfill.

3.4. Installation of Storm Drainage Pipes

1. Lay and join pipe in accordance with manufacturer's recommendations and to approval of Consultant.

2. Handle pipe using methods approved by Consultant. Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.

3. Commence laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.

4. Do not exceed maximum joint deflection recommended by pipe manufacturer.

5. Do not allow water to flow through pipes during construction except as may be permitted by Consultant.

6. Whenever work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.

7. Joints

1. Poly Vinyl Chloride Pipe

PVC Pipe as specified in the Contract Drawings shall be installed in accordance with OPSS MUNI 410, Pipe Sewer Installation in Open Cut.

8. When any stoppage of work occurs, restrain pipes as directed by Consultant, to prevent "creep" during down time.

9. Cut pipes as required for special inserts, fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.

10. Make watertight connections to manholes and catch basins. Use shrinkage compensating grout when suitable gaskets are not available. Support connections as per OPSD 708.020.

11. Use prefabricated saddles or approved field connections for connecting pipes to existing sewer pipes. Joint to be structurally

sound and watertight.

12. Temporarily plug open upstream ends of pipes with removable watertight concrete, steel or plastic bulkheads.

3.5. Pipe Surround

1. Place surround material in unfrozen condition.
2. Upon completion of pipe laying, and after Consultant has inspected pipe joints, surround and cover pipes as indicated.
3. Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated. Pipe surround material to extend 300 mm above crown of pipe.
4. Place layers uniformly and simultaneously on each side of pipe.
5. Compact each layer from pipe invert to mid height of pipe to at least 95% corrected maximum dry density.

3.6. Backfill

1. Place backfill material in unfrozen condition.
2. Place backfill material above pipe surround in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.
3. Trench backfill shall be imported granular material consisting of Granular B Type I, or reclaimed granulars free of organics.
4. Trench backfill within the public right of way is to be un-shrinkable fill.

3.7. Field Testing

1. Repair or replace pipe, pipe joint or bedding found defective.
2. When directed by Consultant, draw tapered wooden plug with diameter of 50 mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction.
3. Remove foreign material from sewers and related appurtenances by flushing with water.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Conform to the requirements stated in the General Conditions, Supplementary General Conditions of this Specification and all addenda.

1.2. Related Work

1.	Excavating, Trenching and Backfilling	Section 31 23 10
2.	Aggregates: General	Section 31 05 17

1.3. References

1. OPSS 1801 – Corrugated Steel Pipe Products
2. OPSS 1840 – Polyethylene Pipe Products
3. OPSS 1860 – Geotextiles
4. CSA G164-M1981 – Hot Dip Galvanizing of Irregularly Shaped Articles.
5. CGSB 41-GP-29Ma-1983 - Tubing, Plastic, Corrugated, Drainage

1.4. Material Certification

1. Certification to be marked on pipe.

1.5. Scheduling of Work

1. Schedule work to minimize interruptions to existing services and to maintain existing flow during construction.

2. PRODUCTS.

2.1. PVC Pipe

Poly Vinyl Chloride pipe as specified in the Contract Drawings shall be in accordance with OPSS 410, Pipe Sewer Installation in Open Cut.

2.2. Pipe Embedment, Surround and Cover Materials

1. Granular material to Section 31 05 17 – Aggregates.
2. Pipe embedment shall be in accordance with OPSD 802.010

2.3. Backfill Material

1. Backfill shall be granular material as specified in Section 31 23 10 – Excavation, Trenching and Backfilling.

3. EXECUTION

3.1. Preparation

1. Clean pipes and fittings of debris and water before installation, and remove defective materials from site.

3.2. Trenching

1. Do trenching work in accordance with Section 31 23 10 – Excavating, Trenching and Backfilling.

2. Do not allow contents of any sewer or sewer connection to flow into trench.

3. Trench alignment and depth to approval of Consultant prior to placing bedding material and pipe.

3.3. Granular Pipe Surround

1. Granular materials surrounding the pipe shall be in accordance with OPSS MUNI 1010.

3.4. Installation of Subdrains

1. Installation of subdrains is to be in accordance with OPSS MUNI 405.

3.5. Pipe Surround

1. Place surround material in unfrozen condition.

2. Pipe surround material shall be HL-8 Coarse Bedding Stone

3.6. Backfill

1. Place backfill material in unfrozen condition.

2. Place backfill material above pipe surround in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.

3. Trench backfill shall be imported granular material consisting of Granular B Type I, or reclaimed granulars free of organics.

4. Trench backfill within the public right of way is to be un-shrinkable fill.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and installation for foundation and underslab drainage.

1.2 RELATED SECTIONS

.1 Section 31 23 10 - Excavating, Trenching and Backfilling.

.2 Section 03 30 00 – Cast-in-Place Concrete.

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM D698-[00a], Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-34.22-[94], Asbestos-Cement Drain Pipe.

.3 Canadian Standards Association (CSA International)

.1 CSA-A23.1/A23.2-[00(June 2001)], Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

.2 CSA B1800-[02], Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).

.1 CSA B182.2-[02], PVC Sewer Pipe and Fittings (PSM Type).

.3 CSA-G401-[01], Corrugated Steel Pipe Products.

.4 Department of Justice Canada (Jus)

.1 Canadian Environmental Protection Act, 1999 (CEPA)

.5 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act, 1992 (TDGA)

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling.

.3 Divert unused concrete materials from landfill to local facility as approved by Consultant.

.4 Divert unused aggregate materials from landfill to facility for reuse.

.5 Divert unused metal materials from landfill to metal recycling facility for disposal.

.6 Divert unused geotextiles from landfill to plastic recycling facility for disposal.

.7 Place materials defined as hazardous or toxic in designated containers.

.8 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

.9 Dispose of unused asbestos cement pipe in accordance with regulations governing the disposal of hazardous materials.

1.5 SITE CONDITIONS

.1 Examine sub-surface investigation report which is bound into specifications.

.2 Known underground utility lines and buried objects are as indicated on plans.

Part 2 Products

2.1 BEDDING AND SURROUND MATERIALS

.1 Coarse filter aggregate: to CSA-A23.1/A23.2, Group 1, 15 mm.

.2 Fine filter aggregate: to CSA-A23.1/A23.2.

.3 Flexible plastic tubing and fittings. Corrugated, Non-perforated, nominal inside diameter 100 and 150 mm. Type 1 for discharge lines, Type 2 perforated and wrapped with filter fabric for collector lines.

.4 Geodrains: “Terradrain” 600 by Terrafix or approved equal.

.5 Filter Fabric: “Terrafix” 270R or Mirafi 140.

2.2 BACKFILL MATERIAL

.1 In accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.

.2 Excavated or graded material existing on site may be suitable to use if approved by Consultant.

Part 3 Execution

3.1 EXAMINATION

.1 Ensure graded subgrade conforms with required drainage pattern before placing bedding material.

.2 Ensure improper slopes, unstable areas, areas requiring additional compaction or other unsatisfactory conditions are corrected to approval of Consultant.

.3 Ensure foundation wall damp proofing and rigid insulation have been installed and approved by Consultant before placing bedding material.

3.2 BEDDING PREPARATION

.1 Cut trenches in subgrade and place bedding material in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.

.2 Shape bed true to grade and to provide continuous, uniform bearing surface for tubing.

.3 Shape transverse depressions, as required, to suit joints.

.4 Compact each layer full width of bed to at least 95% of corrected maximum dry density.

.5 Fill excavation below design elevation of bottom of specified bedding with compacted bedding material.

3.3 INSTALLATION AT PERIMETER OF BUILDING AND AREAS WITHIN FOUNDATION PERIMETER

.1 Place a min. 100 mm of coarse filter material.

.2 At planter locations, install geodrain against wall from finish grade to weeping tile invert elevation – temporary hold it in place until backfilled.

.3 Lay wrapped perforated pipe directly on coarse filter material. Invert of pipe to be minimum of 250 mm below underside of floor slab. Provide pipes sloping to drains as shown on drawings. Minimum slope 1%.

.4 Install minimum 150 mm of coarse filter material to sides and top of perforated pipe for perimeter drainage.

.5 Install minimum 300 mm Granular "B" all around coarse filter material (sides and top).

.6 Install minimum 150 mm coarse filter material cover on all sides of non-perforated pipe.

.7 Ensure pipe interior and coupling surfaces are clean before laying.

.8 Do not use concrete, masonry, stones, wood or any type of shim to establish pipe slope.

.9 Connect pipes using manufacturer's recommended fittings and seal joints with sewer compound.

.10 Piping to be connected to nearby catchbasin/storm sewer. Confirm location with Consultant.

.11 Protect pipe ends from damage and ingress of foreign material at each end of each day's work or work stoppage.

.12 Place filter material after pipe installation has been inspected.

.13 Place filter material by hand in 150 mm lifts. Consolidate by tamping lightly. Prevent displacement of pipe.

.14 Backfill trench (1 m wide minimum) with Granular "B" lightly compacted to 95% standard density (except under paved and slab on grade areas: 98%) up to 700 mm below finished grade.

.15 In landscaped areas place 600 mm of impermeable backfill seal compacted clay prior to the placing of top soil.

3.4 INSTALLATION UNDER PAVED AREAS

.1 Trench for weeping tile will be 300 mm wide and extend to a depth of 350 mm minimum in the subgrade below granular base.

.2 Line trench with filter cloth. Filter cloth shall be wide enough to overlap 150 mm minimum after backfilling.

.3 Place 40 mm of clear crushed aggregate and compact to 98% standard proctor maximum dry density.

.4 Lay 150 mm diameter perforated pipe directly on compacted granular material. Minimum slope 0.5%.

.5 Where weeping tile pipe joins into other piping or material at storm drains or catch basins and at all direction changes, use specifically designed fittings and seal joints with sewer compound in accordance with manufacturer's instructions.

.6 Fold filter cloth over compacted granular. Overlap 150 mm minimum.

.7 Backfill trench up to subgrade elevation with clear crushed aggregate compacted to 98% standard proctor maximum dry density.

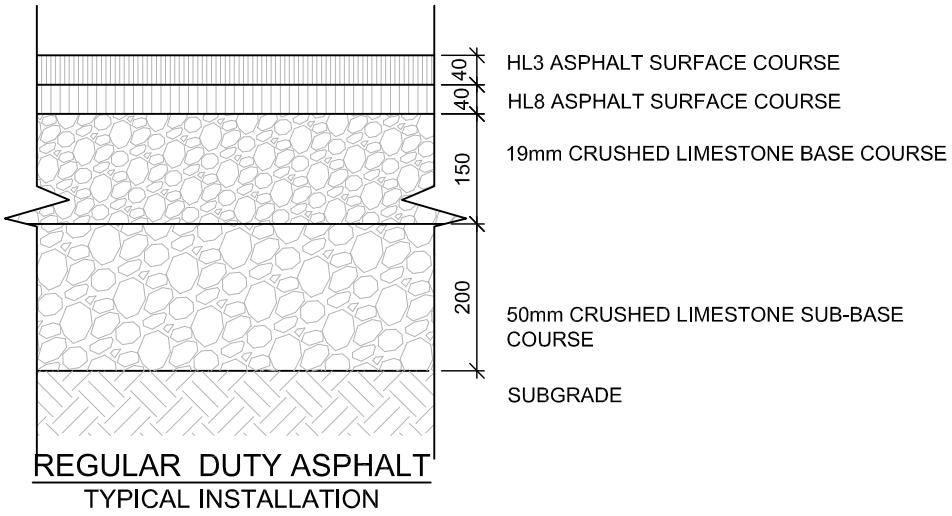
.8 Weepers to be installed under pavement at edge of perimeter concrete curbing in parking area.

3.5 BACKFILL MATERIAL

.1 Place backfill material above [pipe] [tubing] surround in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.

.2 Under paving and walks, compact backfill to at least 95% corrected maximum dry density. In other areas, compact to at least 90% corrected maximum dry density.

END OF SECTION



REGULAR DUTY ASPHALT
TYPICAL INSTALLATION

NOTE:
REFER TO SOILS REPORT TO CONFIRM THAT ADDITIONAL DEPTH IS NOT REQUIRED AND THAT DEPTHS/MATERIALS OF ASPHALT AND SUBGRADE COMPONENTS MATCH THESE MINIMUM STANDARDS.

ASPHALT DETAILS

PROJ:	24126
SCALE:	1:10
DRAWN:	GY
DATE:	1 APR 2025

HOSSACK
ARCHITECTURE
105 - 1939 IRONOAK WAY
OAKVILLE ON L6H 3V8

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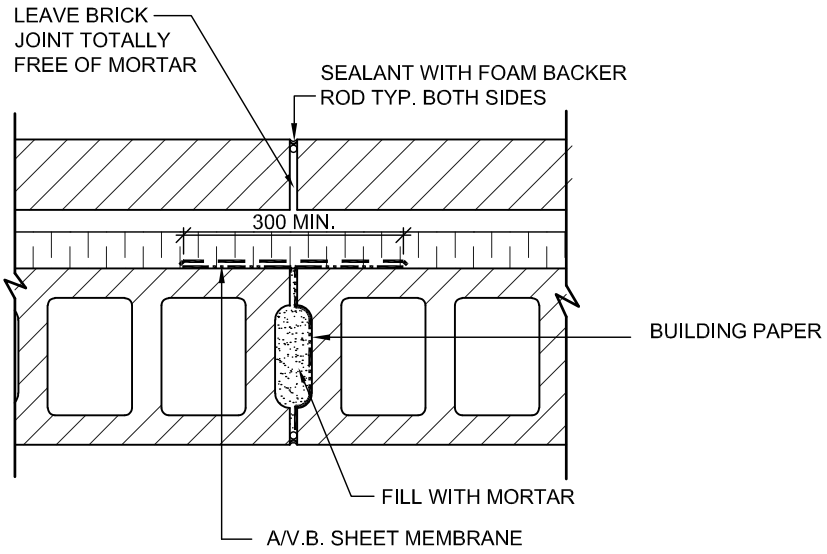
200

WALL CONSTRUCTION:
FACE BRICK
AIR SPACE
INSULATION
CONC. BLOCK



EXTERIOR CAVITY WALL CONTROL JOINT DETAIL

PROJ:	24126
SCALE:	AS NOTED
DRAWN:	GY
DATE:	1 APR 2025

HOSSACK ARCHITECTURE

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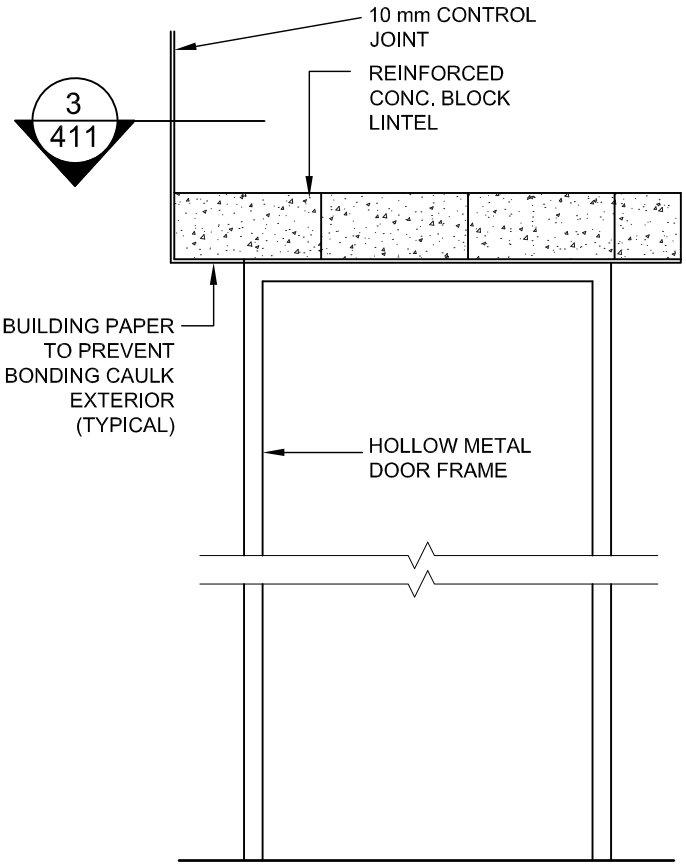
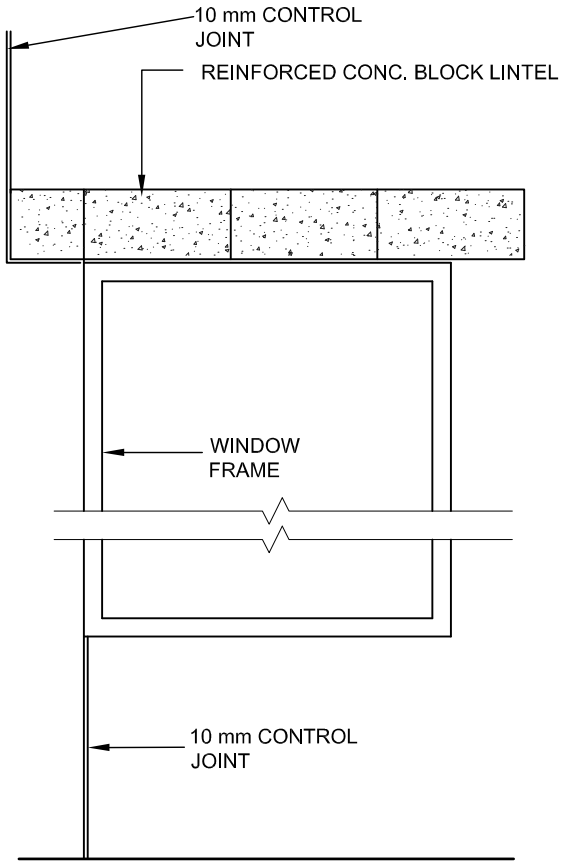
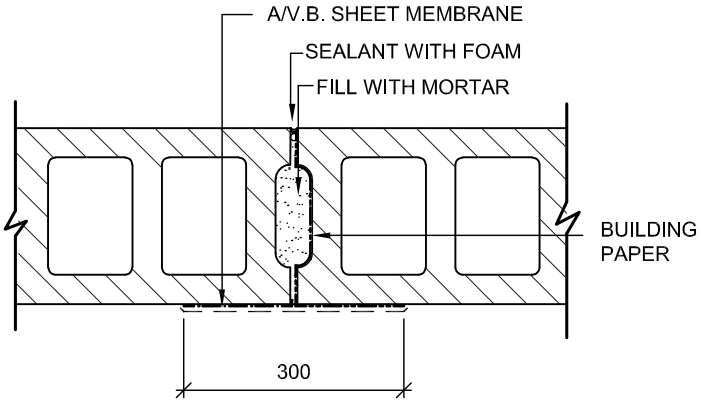


1 AD411 DOOR CONTROL JOINT
SCALE 1:20



2 AD411 WINDOW CONTROL JOINT
SCALE 1:20



3 AD411 PLAN DETAIL
SCALE 1:10

WALL CONTROL JOINT DETAILS INTERIOR SIDE

PROJ:	24126
SCALE:	NOTED
DRAWN:	GY
DATE:	1 APR 2025

HOSSACK ARCHITECTURE

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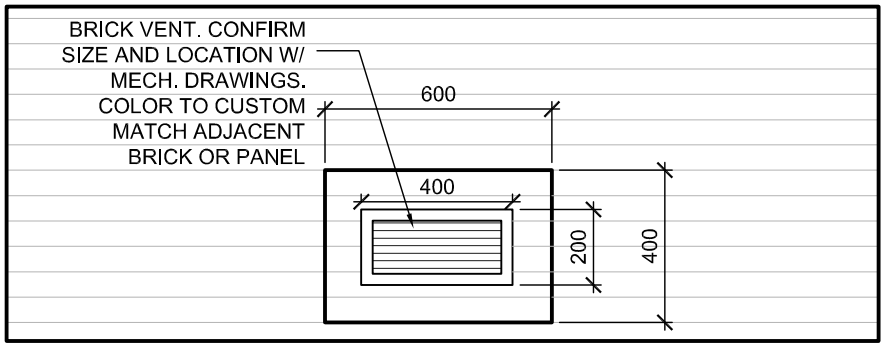
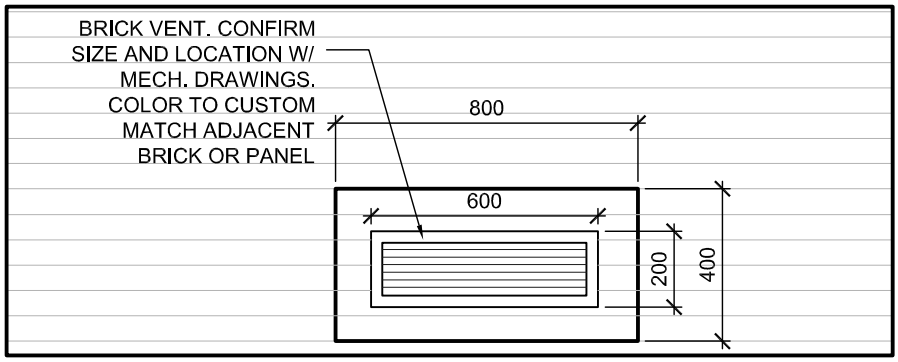
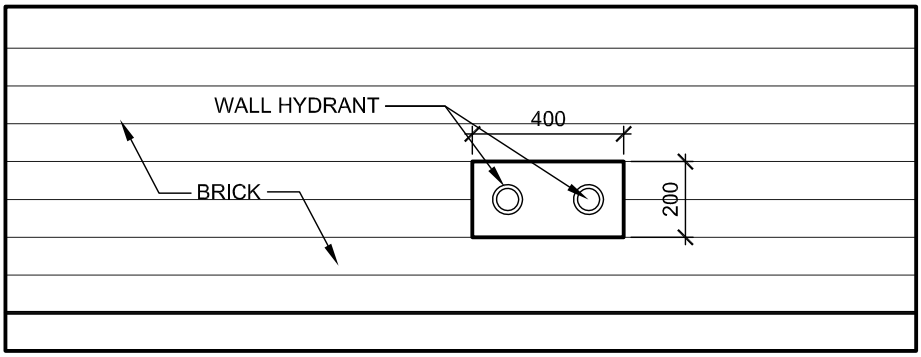


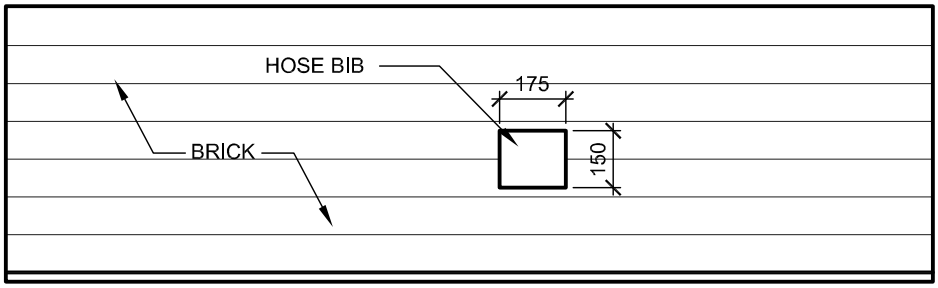
1 AD412 BRICK VENT DETAIL



2 AD412 BRICK VENT DETAIL



3 AD412 WALL HYDRANT DETAIL



4 AD412 HOSE BIB DETAIL

BRICK VENT DETAILS

PROJ:	24126
SCALE:	1:20
DRAWN:	GY
DATE:	1 APR 2025

HOSSACK ARCHITECTURE

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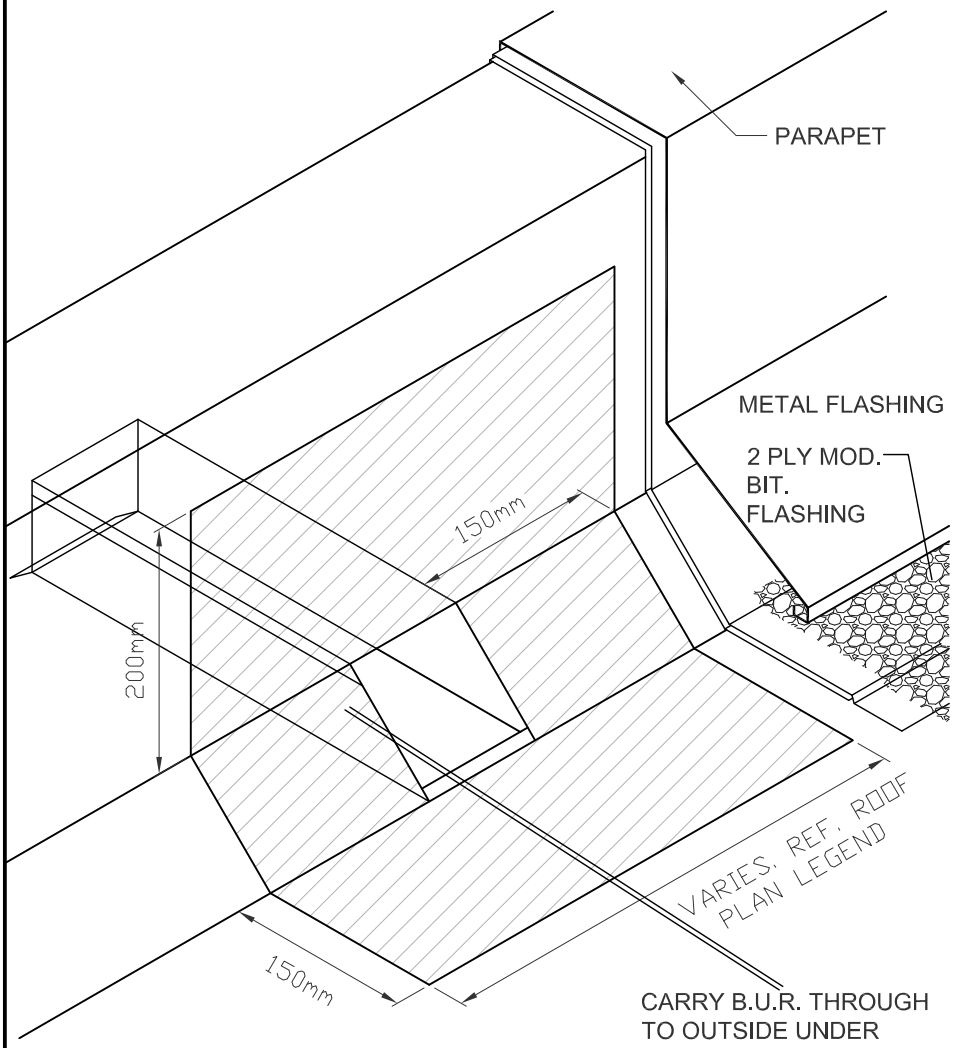
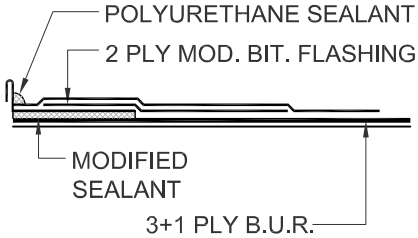
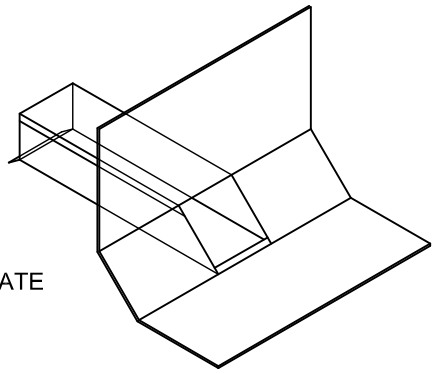


CARRY B.U.R. THROUGH TO OUTSIDE UNDER SCUPPER & FLASH UP INSIDE VERTICAL SURFACES.



NOTES:

1. FABRICATE SCUPPER FROM 454gm (16oz) COPPER OR 26ga. STAINLESS STEEL.
2. ALL SEAMS TO BE CONTINUOUSLY SOLDERED OR WELDED.
3. EXTEND SCUPPER MIN. 200mm BEYOND OUTSIDE FACE OF EAVE
4. REFER TO STRUCTURAL FOR STEEL PLATE REQUIRED TO SUPPORT BRICK/BLOCK ABOVE OPENING.



ROOF SCUPPER

PROJ:	24126
SCALE:	NTS
DRAWN:	GY
DATE:	1 APR 2025

HOSSACK ARCHITECTURE

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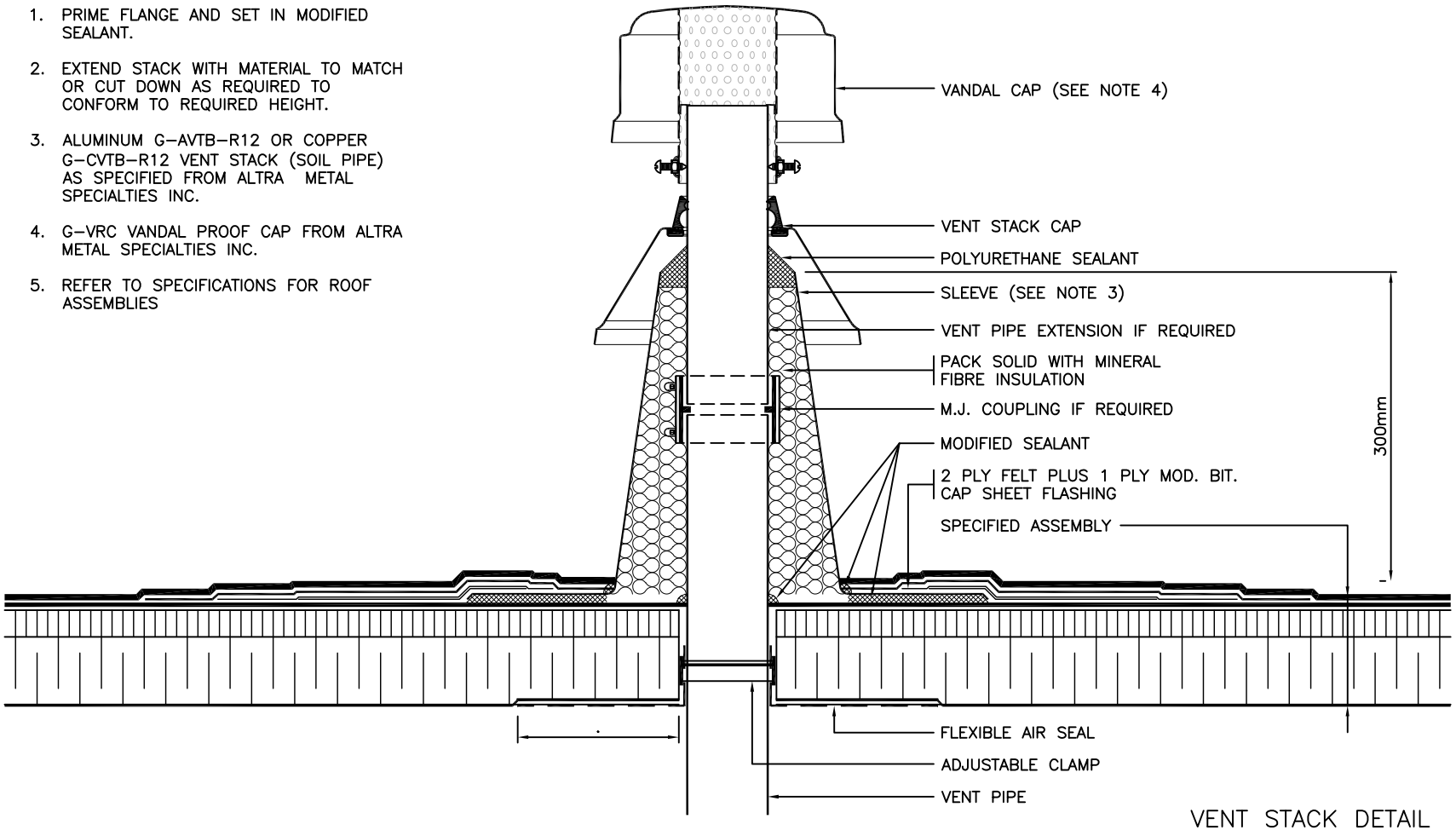
AD 451

VENT STACK DETAIL

NOTES:

1. PRIME FLANGE AND SET IN MODIFIED SEALANT.
2. EXTEND STACK WITH MATERIAL TO MATCH OR CUT DOWN AS REQUIRED TO CONFORM TO REQUIRED HEIGHT.
3. ALUMINUM G–AVTB–R12 OR COPPER G–CVTB–R12 VENT STACK (SOIL PIPE) AS SPECIFIED FROM ALTRA METAL SPECIALTIES INC.
4. G–VRC VANDAL PROOF CAP FROM ALTRA METAL SPECIALTIES INC.
5. REFER TO SPECIFICATIONS FOR ROOF ASSEMBLIES



VENT STACK DETAIL

PROJ:	24126
SCALE:	NTS
DRAWN:	GY
DATE:	1 APR 2025

HOSSACK ARCHITECTURE

AD 459

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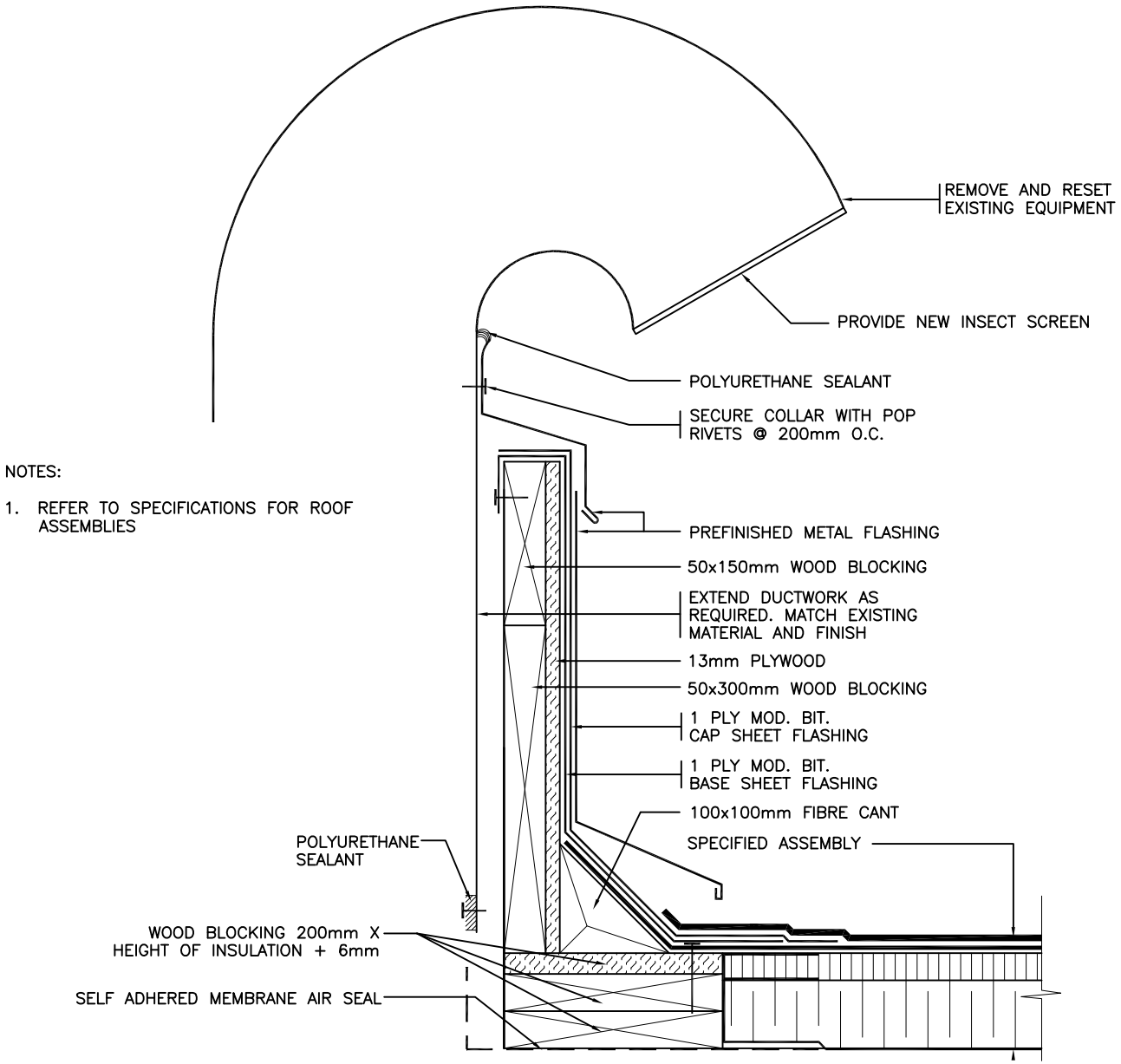
GOOSENECK CURB DETAIL



NOTES:

1. REFER TO SPECIFICATIONS FOR ROOF ASSEMBLIES

GOOSENECK CURB DETAIL

PROJ:	24126
SCALE:	NTS
DRAWN:	GY
DATE:	1 APR 2025

HOSSACK ARCHITECTURE

AD 460

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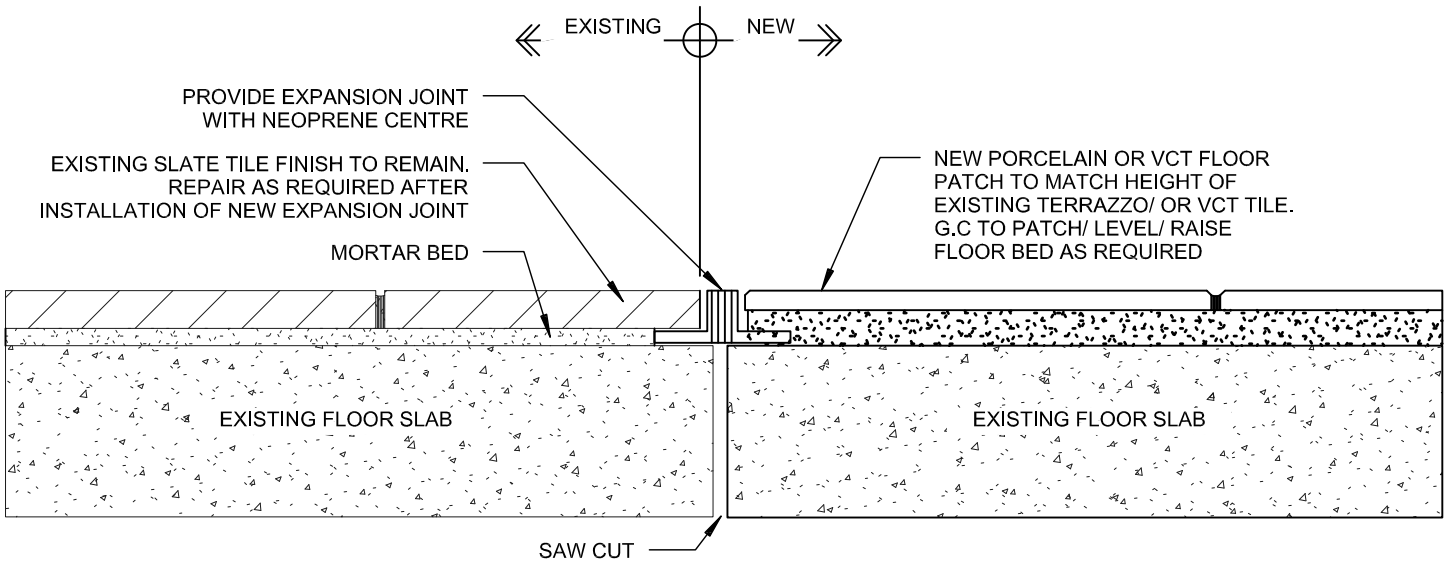

EXISTING FLOOR CONNECTION

PROJ:	24126
SCALE:	NTS
DRAWN:	GY
DATE:	1 APR 2025

HOSSACK ARCHITECTURE

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OAKVILLE ON L6H 3V9

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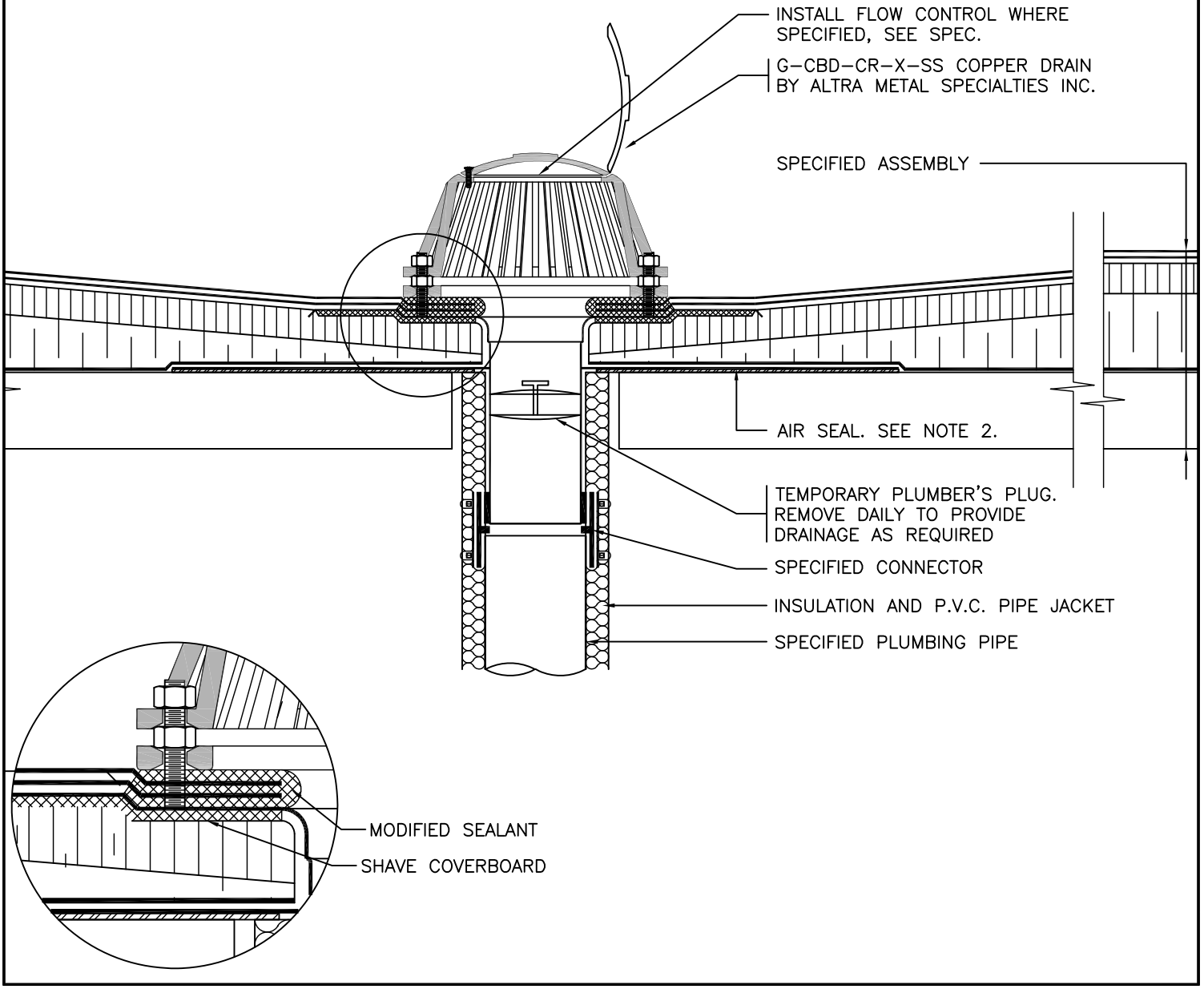
NOTES:

1. GENERAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING REQUIRED DECK OPENING. SIZE OPENING 63mm LARGER THAN DRAIN SIZE.
2. AIR SEAL: 18 ga. GALV. METAL PLATE, SIZE 600x600mm, WITH HOLE CENTRED 25mm LARGER THAN DRAIN SIZE. COVER PLATE WITH AIR SEAL MEMBRANE KEPT TIGHT TO DRAIN.
3. INSTALL SLOPED INSULATION AS PER TAPERED INSULATION PLAN.
4. SHAVE TOP SURFACE OF COVERBOARD TO ALLOW DRAIN FLANGE TO SIT SNUG AND LEVEL.
5. PRIME FLANGE AND SET IN MODIFIED SEALANT BEFORE FLASHING.
6. ENSURE PLUMBER'S PLUG IS IN PLACE AND DRAIN IS LEAK FREE UNTIL PLUMBING IS COMPLETED.
7. PROVIDE NEW PIPE AND INSULATION AND CONNECT TO EXISTING EXTERNAL DRAINAGE SYSTEM (BY SECTION 15000).



DRAIN DETAIL

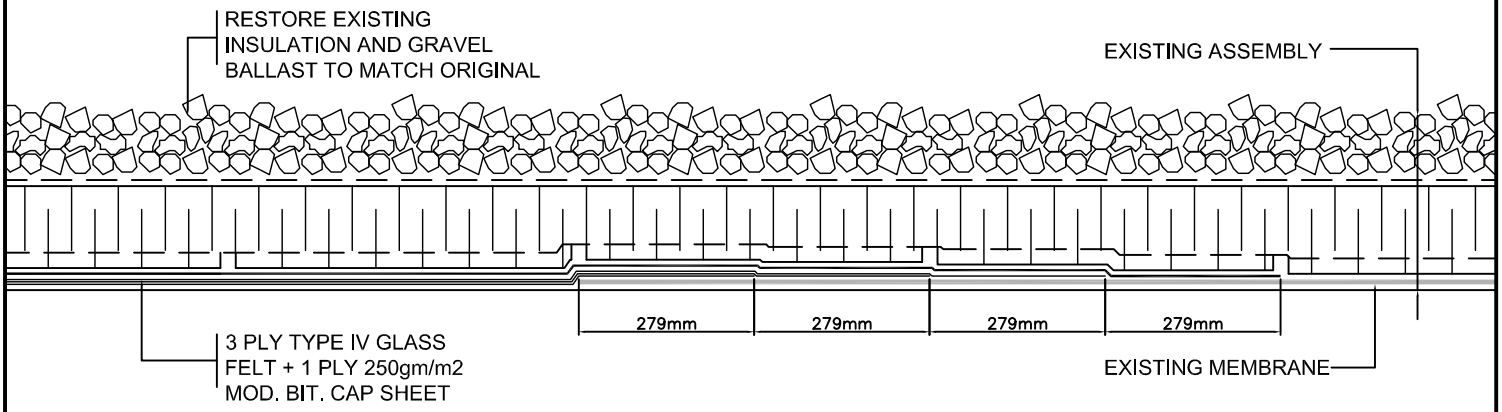
PROJ:	24126
SCALE:	NTS
DRAWN:	GY
DATE:	1 APR 2025

HOSSACK ARCHITECTURE

105 - 1939 IRONOAK WAY OAKVILLE ON L6H 3V8

ISSUE/REV. 00

AD 518



ROOF TIE-IN DETAIL

PROJ:	24126
SCALE:	1:10
DRAWN:	GY
DATE:	1 APR 2025

HOSSACK ARCHITECTURE

105 - 1939 IRONOAK WAY
OAKVILLE ON L6H 3V8
(905) 815-5284 admin@hossackarch.com

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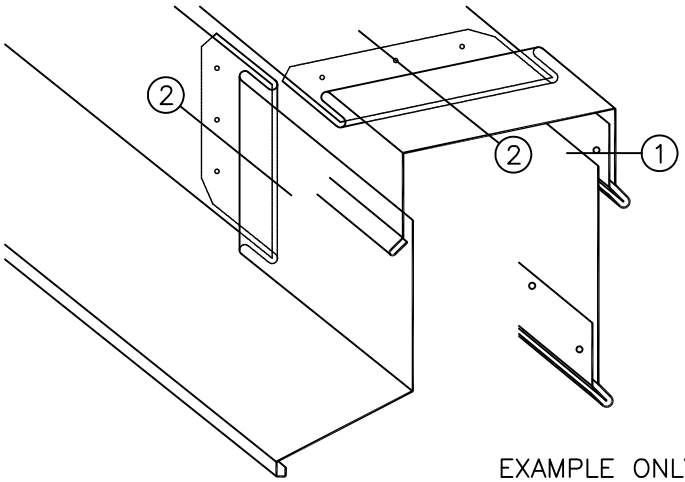
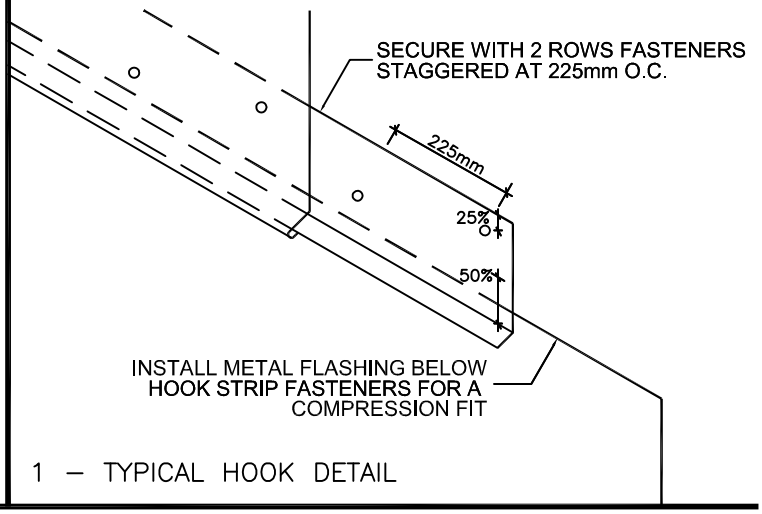
1

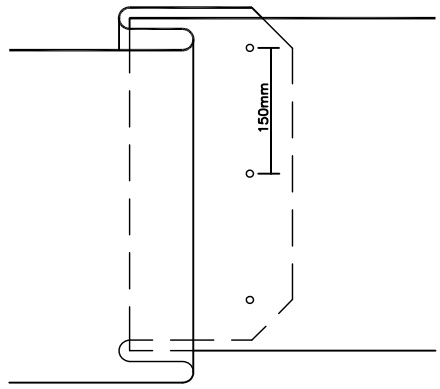
AD
523



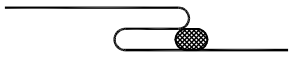
EXAMPLE ONLY



1 – TYPICAL HOOK DETAIL

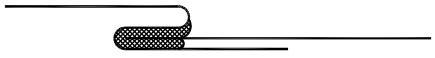


STEP 1 SECURE FLASHINGS INTO PLACE AT S-LOCK JOINT.



STEP 2 INSTALL BEAD OF POLYURETHANE CAULKING CONTINUOUSLY ALONG LOCK JOINT AND TURN DOWN VERTICAL FACE APPROXIMATELY 25mm.

STEP 3 LOOSELY FIT NEXT SHEET OF FLASHING AND INSTALL INTO S-LOCK APPROXIMATELY 6mm. CAULK TOP SIDE OF FLASHING AS NOTED IN STEP 2.



STEP 4 PUSH FLASHING INTO JOINT AS TO ALLOW FOR SOME MOVEMENT OF THE FLASHING DUE TO THERMAL EXPANSION AND CONTRACTION. CLEAN OFF ANY EXCESS CAULKING WHERE EXPOSED TO VIEW.

2 – EXAMPLE PROCEDURE FOR SECURING & SEALING METAL FLASHING

TYPICAL HOOK & S-LOCK JOINT.DETAIL

PROJ:	24126
SCALE:	1:10
DRAWN:	GY
DATE:	1 APR 2025

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105 - 1939 IRONOAK WAY
OAKVILLE ON L6H 3V8

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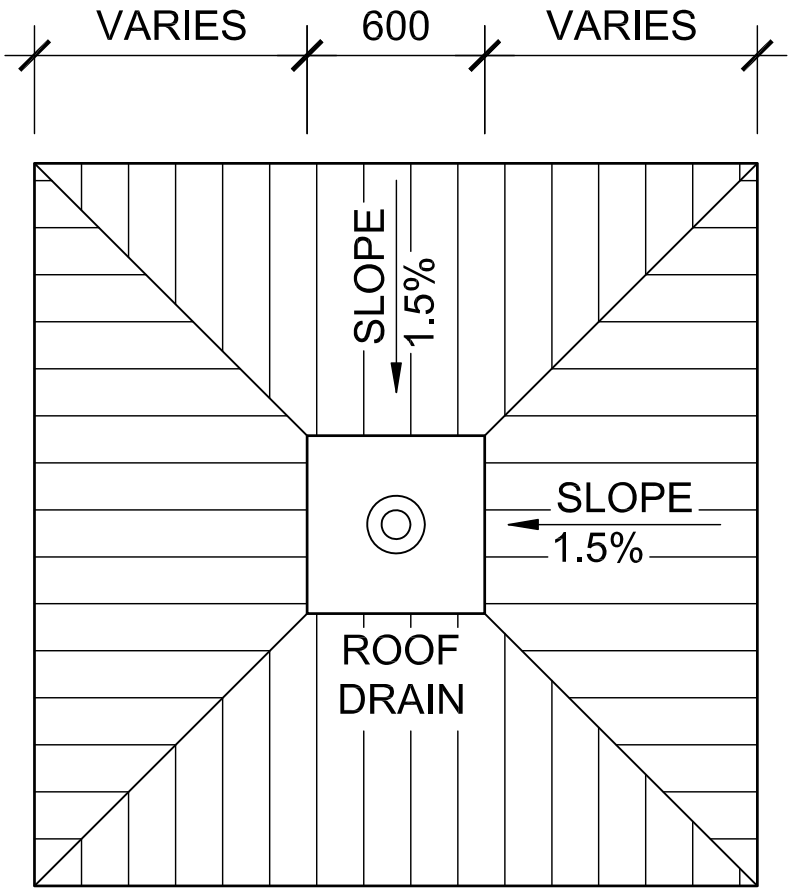

ENLARGED ROOF DRAIN DETAIL

PROJ:	24126
SCALE:	1:10
DRAWN:	GY
DATE:	1 APR 2025

HOSSACK
ARCHITECTURE
105 - 1939 IRONOAK WAY
OAKVILLE ON L6H 3V8

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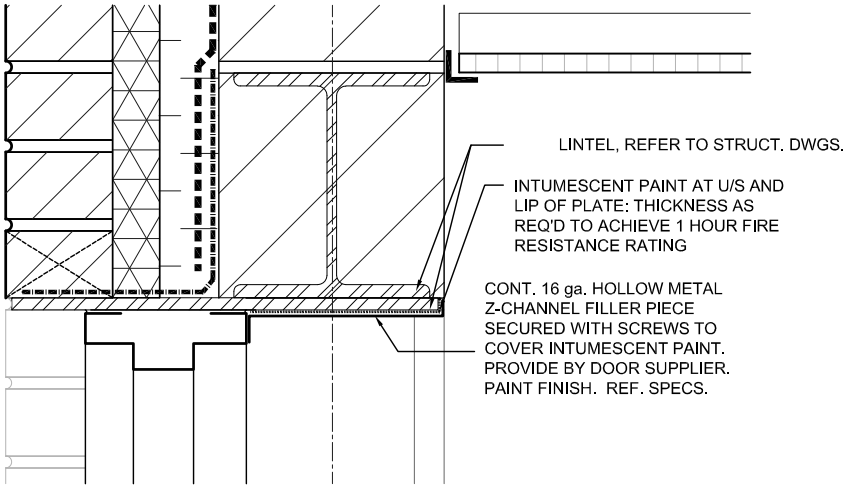
1

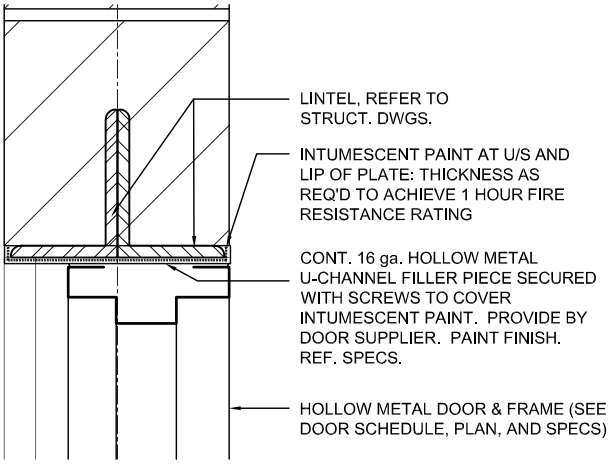
AD
528

NOTES:

1. Refer to Door Schedule notes for locations required at interior and exterior doors



Fire Protection at Exterior Door Head



Fire Protection at Interior Door Head

FIRE PROTECTION AT WINDOW AND DOOR HEAD

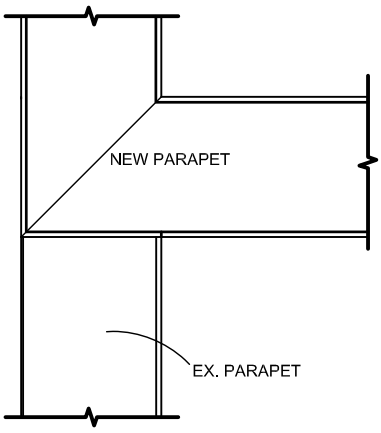
PROJ:	24126
SCALE:	1:10
DRAWN:	GY
DATE:	1 APR 2025

HOSSACK ARCHITECTURE

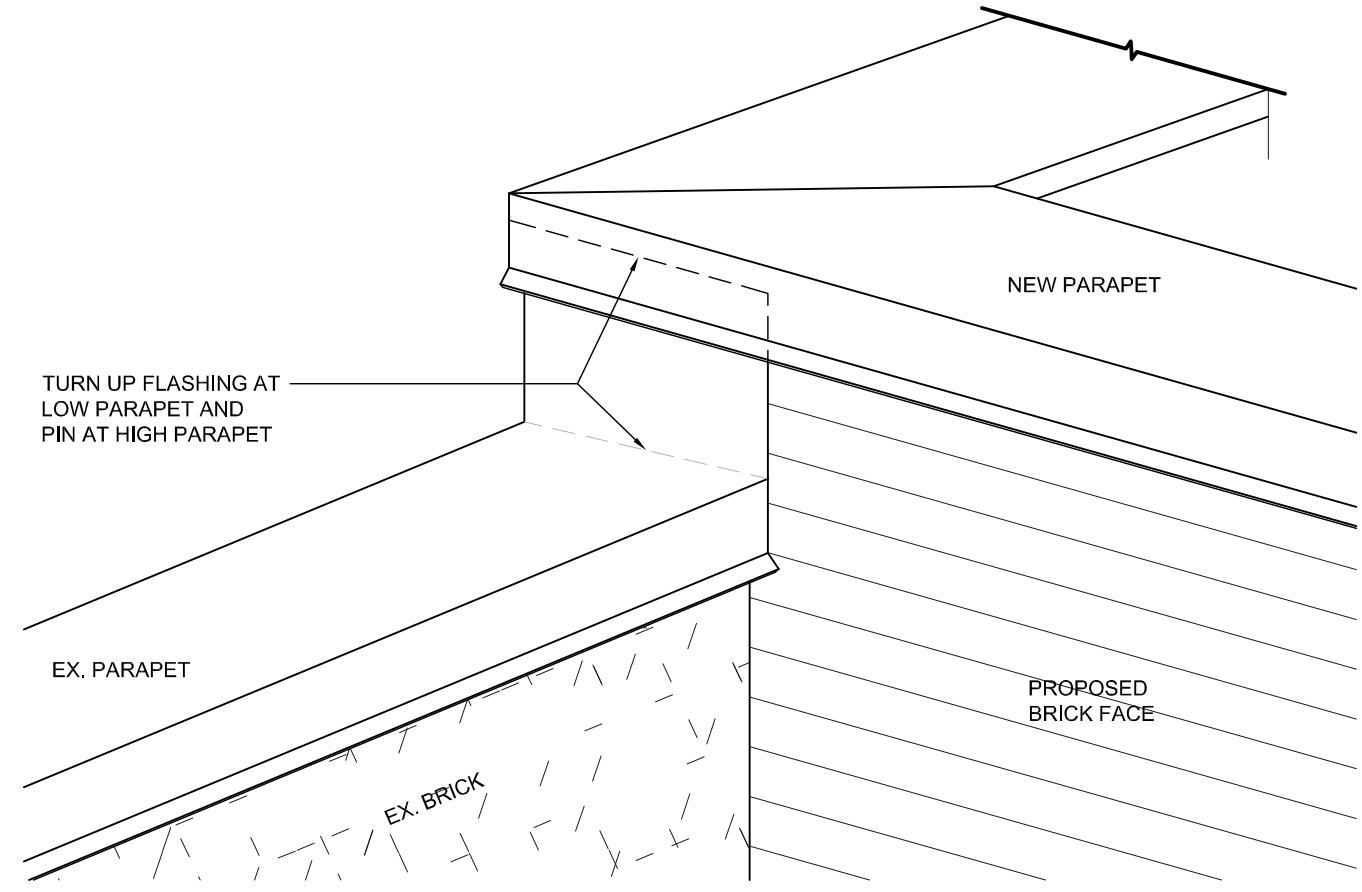
105 - 1939 IRONOAK WAY OAKVILLE ON L6H 3V8

ISSUE/REV. 1

AD 529



Plan Detail



Axonometric Detail

ROOF PARAPET CONNECTION

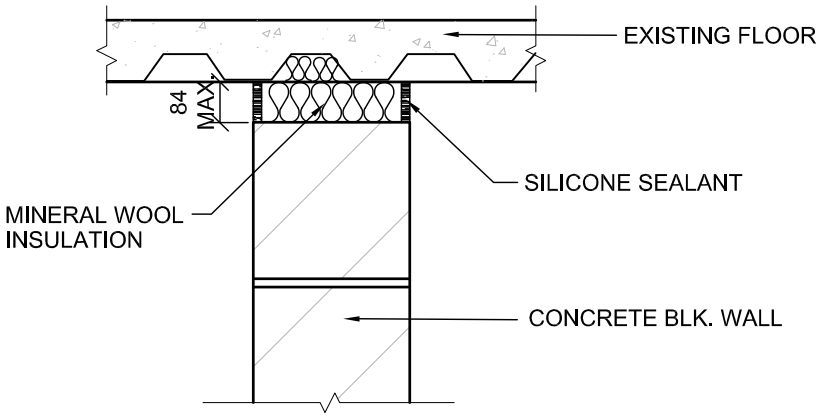
PROJ:	24126
SCALE:	1:10
DRAWN:	GY
DATE:	1 APR 2025

HOSSACK ARCHITECTURE

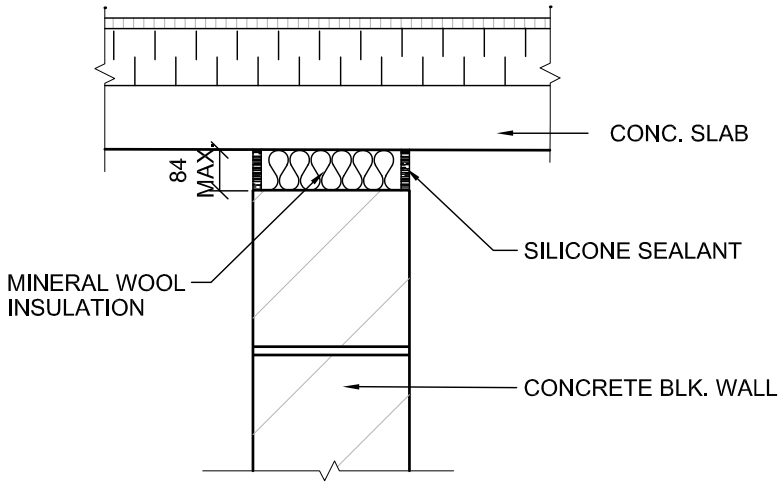
105 - 1939 IRONOAK WAY OAKVILLE ON L6H 3V8

ISSUE/REV. 1

AD 530



CONDITION AT FLOOR

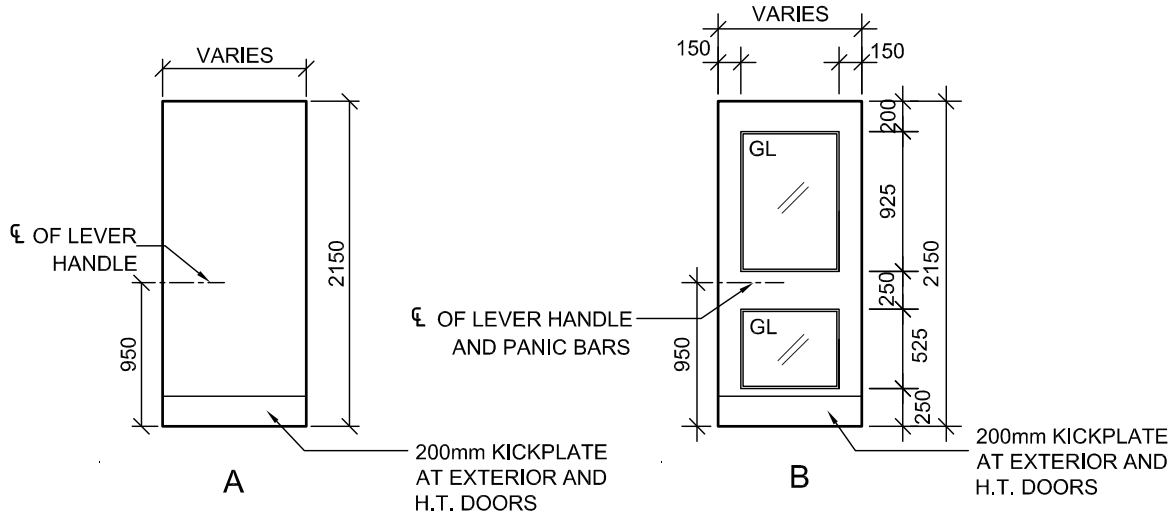


CONDITION AT ROOF

NOTE:
ADJUST STEEL STUD SIZES TO SUIT
BLOCK WALL CONDITION

NOTE: TYPICAL FOR ALL RATED AND NON-RATED FIRE SEPARATIONS

TOP OF WALL DETAILS	PROJ: 24126 SCALE: NTS DRAWN: GY DATE: 1 APR 2025	HOSSACK ARCHITECTURE	ISSUE/REV. 00 AD 725



NOTES:

1. REFER TO SPECIFICATIONS AND DOOR SCHEDULE FOR GLAZING TYPE
2. ALL DOORS AND FRAMES ARE VIEWED FROM EXTERIOR OF ROOM OR AREA SERVED
3. NOTE: ALL EX. DOORS TO BE PAINTED, WILL BE PAINTED BOTH SIDES, TYP.

DOOR TYPES

PROJ:	24126
SCALE:	1:50
DRAWN:	GY
DATE:	1 APR 2025

HOSSACK ARCHITECTURE

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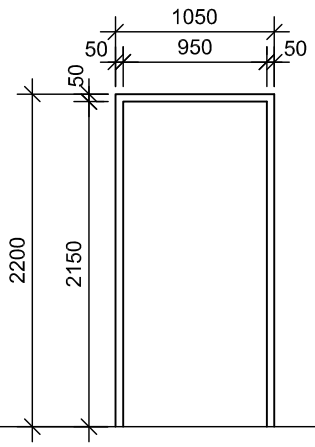
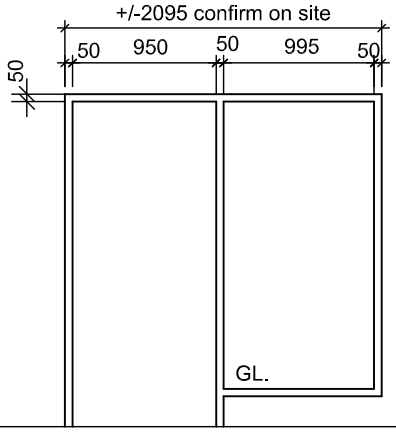
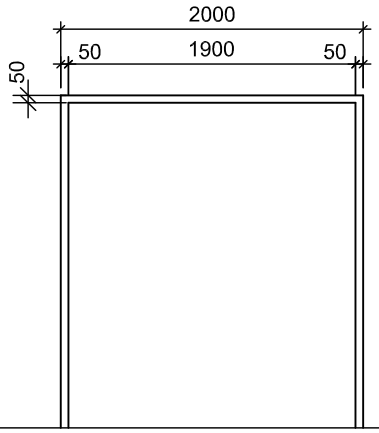


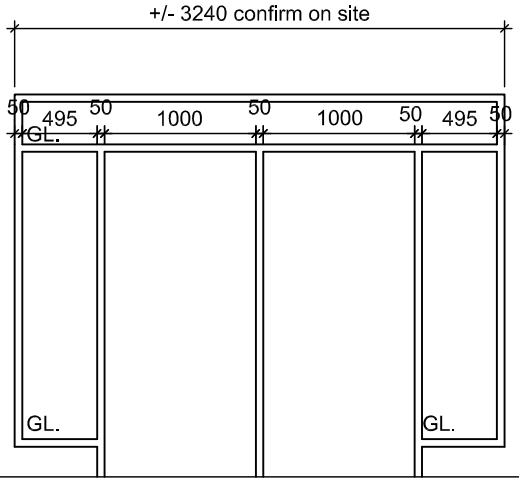
TYPE 1
H.M. INT/EXT



TYPE 2
H.M. INT



TYPE 3
H.M. INT



TYPE 4
H.M. INT

NOTES:

1. REFER TO SPECIFICATIONS AND DOOR SCHEDULE FOR GLAZING TYPE
2. ALL DOORS AND FRAMES ARE VIEWED FROM EXTERIOR OF ROOM OR AREA SERVED
3. NOTE: ALL EX. DOORS TO BE PAINTED, WILL BE PAINTED BOTH SIDES, TYP. IN RENOVATING AREA.

FRAME TYPES

PROJ:	24126
SCALE:	1:50
DRAWN:	GY
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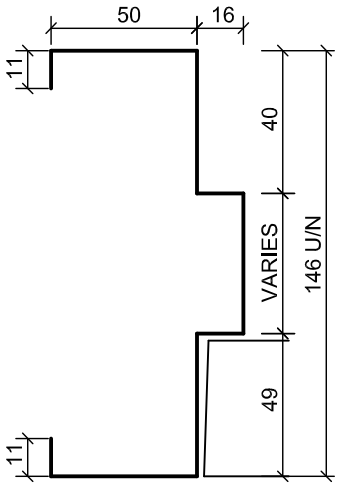
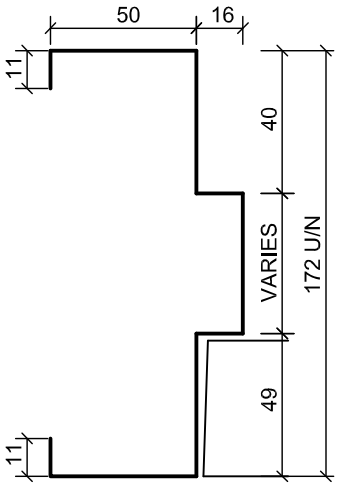
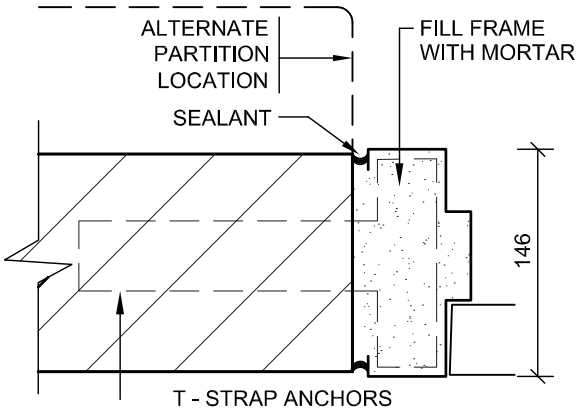


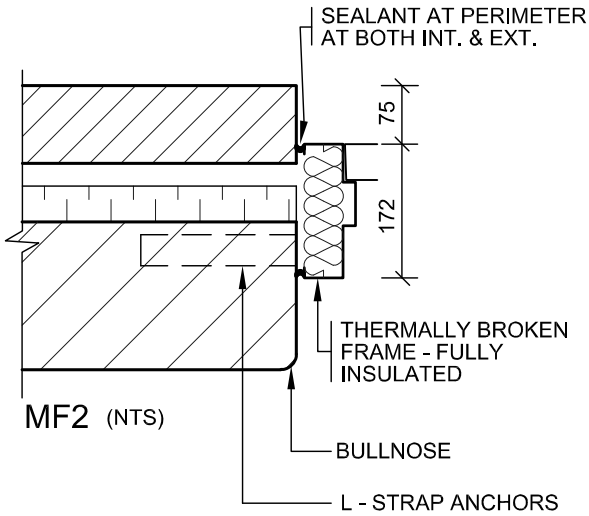
FRAME PROFILE FP1
METAL FRAME SECTION
(FOR INTERIOR DOORS)



FRAME PROFILE FP2
METAL FRAME SECTION
(FOR EXTERIOR DOORS)



MF1 (NTS)



MF2 (NTS)

DOOR JAMB SECTIONS

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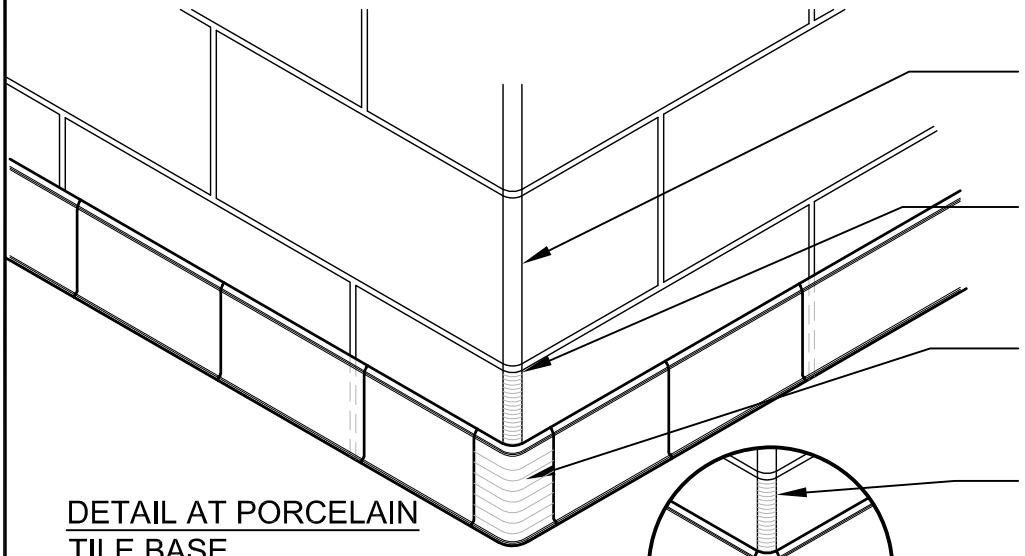
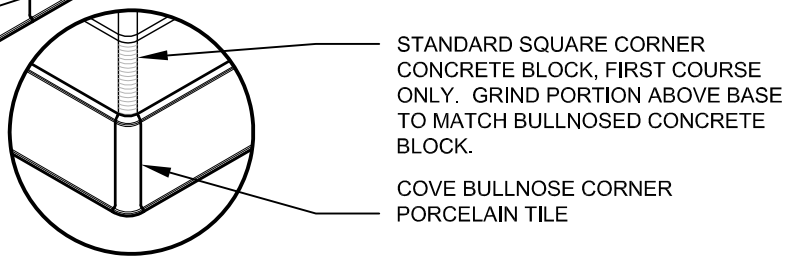
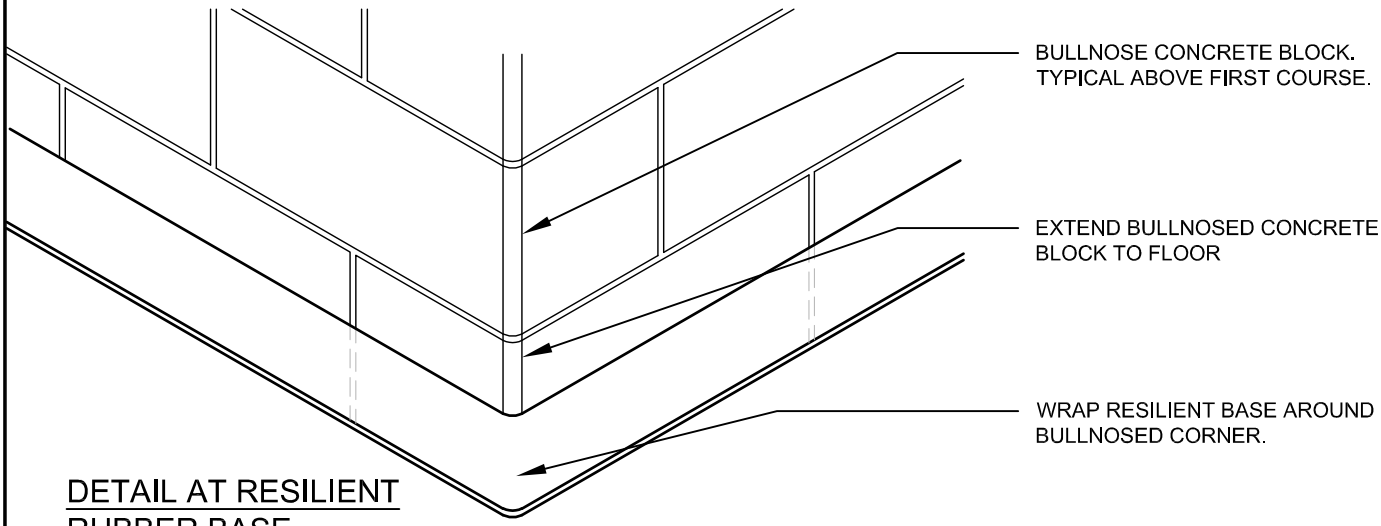


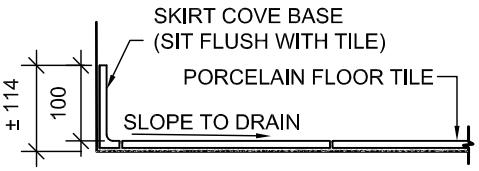
DETAIL AT PORCELAIN TILE BASE



OPTIONAL PORCELAIN TILE BASE

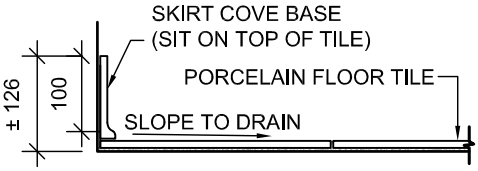


DETAIL AT RESILIENT RUBBER BASE



BASE INSTALLATION DETAIL 1

NOTE: THIS IS THE PREFERRED INSTALLATION METHOD IF TILE SELECTION PERMITS.



BASE INSTALLATION DETAIL 2

PORCELAIN TILE AND RESILIENT RUBBER BASE DETAILS

PROJ:	24126
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DRAWN:	GY
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NOTES:
1. WHERE APPLICABLE, THE DIMENSION IS TO THE OPERATOR.
2. REFER TO PROJECT FLOOR PLANS AND INTERIOR ELEVATIONS FOR WASHROOM FIXTURE LAYOUT

ABBREVIATIONS

HK	COAT HOOK
CS	CONVENIENCE SHELF
HD	HAND DRYER
GB	GRAB BAR (STRAIGHT)
GBL	GRAB BAR 'L' SHAPE
PTD	PAPER TOWEL DISPENSER
PTD	PAPER TOWEL DISPENSER
SN	SANITARY NAPKIN DISPOSAL
M	MIRROR
TD	TOILET PAPER DISPENSER

ACCESSIBLE WASHROOM FIXTURE MOUNTING HEIGHTS

PROJ:	24126
SCALE:	1:50
DRAWN:	GY
DATE:	1 APR 2025

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