

Contract for: **Wastewater Treatment Facility**

Between: **English River Enterprises Property
Management LP**

And: **Wright Construction Western Inc.**

Project: **7603-002-00**

Contract Date: **January 15, 2021**

Volume: **1 of 6**



**Addendum 4
To the Specifications for
English River Property Management
Wastewater Treatment Facility**

**MPE Engineering Ltd.
Unit 122, 103 Marquis Court
Saskatoon, Saskatchewan S7P 0C4**

November 24, 2020

File: 7603-002-00

1. Precedence.

This addendum forms an integral part of the specifications and drawings covering all aspects of this job and is to be read in conjunction therewith. However, should points arise which are at variance, this addendum shall take precedence, unless otherwise clarified by the engineer.

2. Purpose.

This addendum provides specific clauses to add to and/or amend the specifications and/or drawings.

3. Addendum 2, Item 12.

Delete:

2.8.2.4.7

Delete:

2.8.2.4.8.5

Replace with:

2.8.2.4.8.5 Relay: GemSensors # 27A1D0 or approved equal. Ensure relays are compatible with electrodes

Delete:

2.8.2.4.8.6

4. Addendum 2, Section 07466 Sheet Metal Cladding.

Delete:

2.1.1.

Replace with:

2.1.1 Interior Liner, Ceiling Cladding: standard steel liner, 28 gauge sheet thickness, low profile surface, prefinished to colour selected by Owner from standard colour range.

5. Closing Time on Bids & Tenders.

Clarification:

- .1 This is to confirm that the closing time for the bid is 2pm Saskatoon time (1pm MST). The Closing time on Bids and Tenders will be changed to 1pm MST which will correspond to 2pm local time in Saskatoon.

6. Section 00800 Supplementary Conditions.

Delete:

6.1.17 Building Permit

Clarification:

- .1 Building Permit is not required for this project.

7. Section 131312 Instrumentation – Field Instruments.

Delete:

2.15.3.2

Delete:

2.15.4

Replace With:

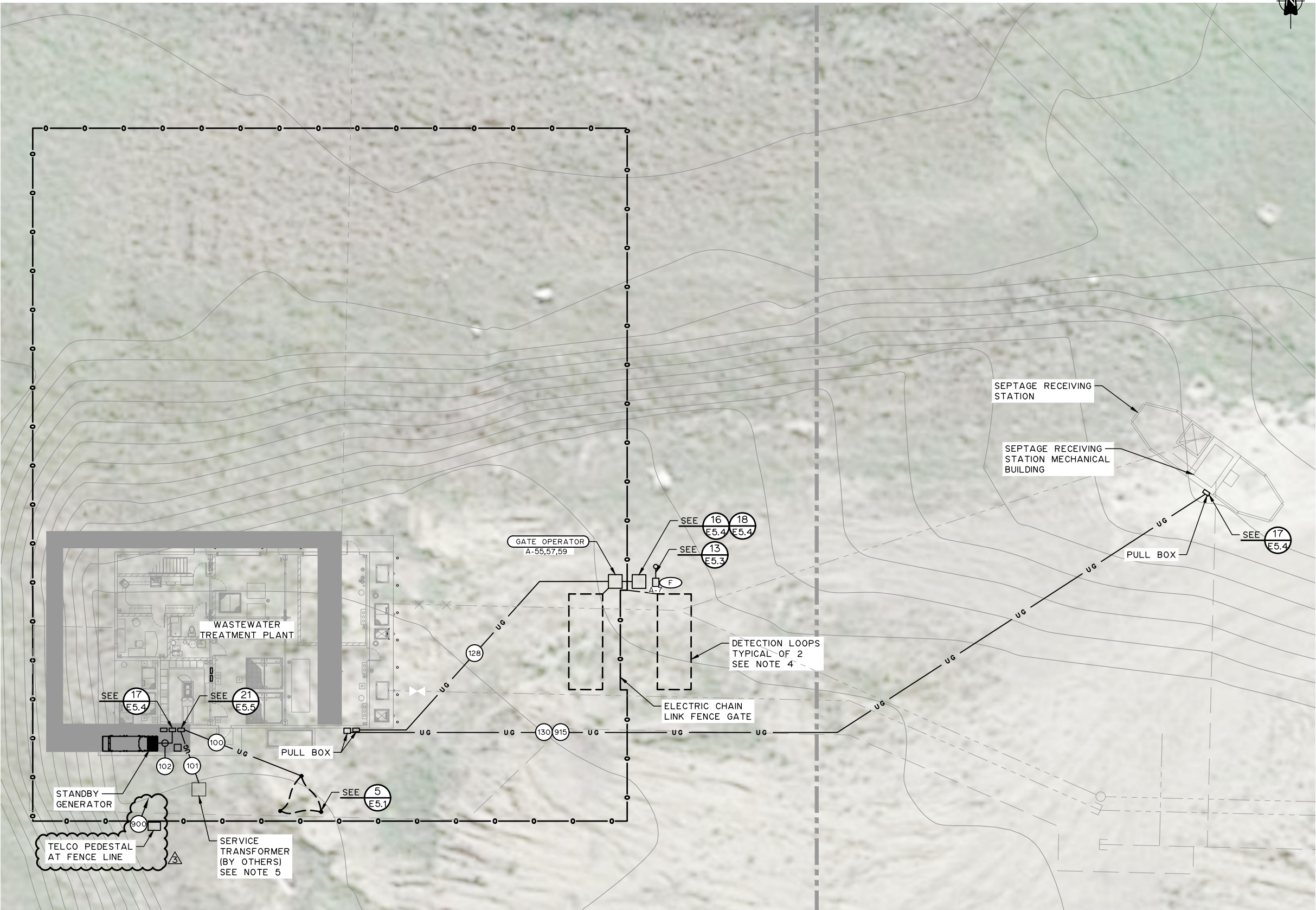
2.15.4 Type

- .1 SD 3414A: Commercial
- .2 SD 4614: Commercial
- .3 SD 9914A: Commercial
- .4 SD 9914B: Commercial
- .5 SD 9914C: Commercial
- .6 SD 9914D: Commercial

8. Drawing Revisions

<u>Drawing Revisions</u>		
<u>Drawing Number</u>	<u>Delete</u>	<u>Replace With</u>
E0.2	Issue 2: For Tender Addendum 2	Issue 3: For Tender Addendum 4
E2.12	Issue 1: For Tender	Issue 2: For Tender Addendum 4
E2.13	Issue 2: For Tender Addendum 2	Issue 3: For Tender Addendum 4

END OF ADDENDUM 4



- NOTES:
1. FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.
 2. SEE CONDUIT AND CABLE SCHEDULES ON E-DRAWING SERIES.
 3. SEE LUMINAIRE SCHEDULE.
 4. DETECTION LOOP AND GATE OPERATOR SUPPLIED BY GATE MANUFACTURER. ELECTRICAL CONTRACTOR TO PROVIDE AND INSTALL ALL WIRING, CONDUIT AND LOCAL WEATHERPROOF DISCONNECT.
 5. CONTRACTOR TO COORDINATE AND CONFORM TO ELECTRIC UTILITY REQUIREMENTS FOR NEW SERVICE INSTALLATION.

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS

3	20-11-24	FOR TENDER ADDENDUM 4
2	20-11-10	FOR TENDER ADDENDUM 2
1	20-10-15	FOR TENDER
ISSUE	YY-MM-DD	REVISION

Association of Professional Engineers & Geoscientists of Saskatchewan

CERTIFICATE OF AUTHORIZATION

MPE Engineering Ltd.

Number C1334

Permission to Consult held by:

Discipline: ELECTRICAL Sk. Reg. No. 32675 Signature: [Signature]

PROFESSIONAL ENGINEER

R.G. OFSHE

MEMBER 32675

2020-11-24

YR. MN. DAY

SASKATCHEWAN



ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
ELECTRICAL
SITE PLAN

DESIGNED	R.G.O.	JOB	7603-002-00
DRAWN	T.S.	SCALE	1:300
DATE	NOVEMBER 2020	DRAWING	E0.2

CONDUIT AND CABLE SCHEDULE										
COND. No.	COND. TAG	DESCRIPTION	LOCATION	CONDUIT SIZE AND TYPE	TAG / FROM	TO	WIRE TYPE	No. OF WIRES	WIRE SIZE	REMARKS
501	B	FULL VOLTAGE NON REVERSING STARTER (FVNR)	HEADWORKS	1-21ϕ RIGID ALUMINUM IN SLAB	FVNR 2501A	DS 2501A	R90	3	12 AWG	600 VAC POWER
	D			1-21ϕ RIGID ALUMINUM IN SLAB		ES 2501A	R90	4	14 AWG	120 VAC EMERGENCY STOP STATUS
	E			TECK		CP-1	R90	4	14 AWG	120 VAC STATUS AND CONTROL
	F			TECK			R90	4	14 AWG	24 VDC STATUS
502	B	FULL VOLTAGE NON REVERSING STARTER (FVNR)	HEADWORKS	1-21ϕ RIGID ALUMINUM IN SLAB	FVNR 2501B	DS 2501B	R90	3	12 AWG	600 VAC POWER
	D			1-21ϕ RIGID ALUMINUM IN SLAB		ES 2501B	R90	4	14 AWG	120 VAC EMERGENCY STOP STATUS
	E			TECK		CP-1	R90	4	14 AWG	120 VAC STATUS AND CONTROL
	F			TECK			R90	4	14 AWG	24 VDC STATUS
503	B	FULL VOLTAGE NON REVERSING STARTER (FVNR)	HEADWORKS	1-21ϕ RIGID ALUMINUM IN SLAB	FVNR 2202A	SC 2202A	R90	3	12 AWG	600 VAC POWER
	D			1-21ϕ RIGID ALUMINUM IN SLAB		ES 2202A	R90	4	14 AWG	120 VAC EMERGENCY STOP STATUS
	E			TECK		CP-1	R90	4	14 AWG	120 VAC STATUS AND CONTROL
	F			TECK			R90	4	14 AWG	24 VDC STATUS
504	B	FULL VOLTAGE NON REVERSING STARTER (FVNR)	HEADWORKS	1-21ϕ RIGID ALUMINUM IN SLAB	FVNR 2202B	SC 2202B	R90	3	12 AWG	600 VAC POWER
	D			1-21ϕ RIGID ALUMINUM IN SLAB		ES 2202B	R90	4	14 AWG	120 VAC EMERGENCY STOP STATUS
	E			TECK		CP-1	R90	4	14 AWG	120 VAC STATUS AND CONTROL
	F			TECK			R90	4	14 AWG	24 VDC STATUS
505	A	ANALYZER INDICATING TRANSMITTER - REMOTE DISPLAY	HEADWORKS	TECK	AIT 2224 / AIT 2225	AE 2225	BELDEN	1-PAIR	18 AWG	ELEMENT CABLE - H2S
	B			TECK		AE 2224	BELDEN	1-PAIR	18 AWG	ELEMENT CABLE - METHANE
	C			TECK		BCN 2225	R90	2	14 AWG	12 VDC POWER
	D			TECK		HN 2225	R90	2	14 AWG	12 VDC POWER
	E			TECK		CP-2	R90	2	14 AWG	120 VAC POWER
	F			TECK			R90	6	14 AWG	24 VDC STATUS
	G			TECK			BELDEN	2-PAIR	18 AWG	ANALOG STATUS
507	A	TEMPERATURE SWITCH HIGH	HEADWORKS	TECK	TSH 2215	CP-2	R90	2	14 AWG	24 VDC STATUS
508	A	TEMPERATURE TRANSMITTER	HEADWORKS	TECK	TT 2212	CP-2	BELDEN	1-PAIR	18 AWG	ANALOG STATUS
509	A	CONDUCTIVITY LEVEL SWITCH	HEADWORKS	TECK	LS 2217 RELAY	CP-2	R90	2	14 AWG	120 VAC POWER
	B			TECK			R90	2	14 AWG	24 VDC STATUS
	C			N/A		LS 2217 PROBES	PRE-MANUFACTURED CABLES		PROBE WIRING	
510	A	ALARM BEACON	HEADWORKS	TECK	BCN 2225-1	CP-2	R90	2	14 AWG	120 VAC CONTROL
512	A	MAGNETIC FLOW METER - REMOTE DISPLAY	HEADWORKS	TECK	FIT 2101	FE 2101	PRE-MANUFACTURED CABLE		ANALOG STATUS	
	B			TECK		CP-2	BELDEN	1-PAIR	18 AWG	HART STATUS - FLOW
	C			TECK			R90	2	14 AWG	120 VAC POWER
513	A	PNEUMATIC FLOW VALVE (FV)	HEADWORKS	TECK	FV 2268A	CP-1	R90	2	14 AWG	24 VDC CONTROL
514	A	PNEUMATIC FLOW VALVE (FV)	HEADWORKS	TECK	FV 2268B	CP-1	R90	2	14 AWG	24 VDC CONTROL
515	A	LEVEL SWITCH(S)	HEADWORKS	TECK	LSHH 2201A	CP-1	R90	2	14 AWG	24 VDC STATUS
516	A	LEVEL SWITCH(S)	HEADWORKS	TECK	LSHH 2201B	CP-1	R90	2	14 AWG	24 VDC STATUS
517	A	PNEUMATIC FLOW VALVE (FV)	HEADWORKS	TECK	FV 2269A	CP-1	R90	2	14 AWG	24 VDC CONTROL
518	A	PNEUMATIC FLOW VALVE (FV)	HEADWORKS	TECK	FV 2269B	CP-1	R90	2	14 AWG	24 VDC CONTROL
519	A	LEVEL SWITCH(S)	EQUALIZATION CHAMBER	TECK	LSHH 1126 / LSLL 1126	CP-2	R90	4	14 AWG	24 VDC STATUS
520	A	LEVEL INDICATING TRANSMITTER - REMOTE DISPLAY	EQUALIZATION CHAMBER	1-21ϕ RIGID ALUMINUM	LIT 1126	LIT 1126	PRE-MANUFACTURED CABLE		ELEMENT CABLE - LEVEL	
	B			TECK		CP-2	R90	2	14 AWG	24 VDC POWER
	C			TECK			BELDEN	1-PAIR	18 AWG	ANALOG STATUS - LEVEL
521	A	LEVEL SWITCH(S)	EQUALIZATION CHAMBER	TECK	LT 1126B	CP-2	BELDEN	1-PAIR	18 AWG	ANALOG STATUS - LEVEL

- NOTES:
- FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.
 - THE CONDUIT AND CABLE SCHEDULE IS INTENDED TO SHOW THE MAJORITY OF THE POWER AND INSTRUMENTATION CABLE RUNS. INSTALL AND CONNECT ALL CABLES AND CONDUIT TO PROVIDE A COMPLETE AND OPERATIONAL SYSTEM.
 - SEE ELECTRICAL PANEL AND MECHANICAL EQUIPMENT SCHEDULES FOR ADDITIONAL WIRING REQUIREMENTS.
 - LIKE VOLTAGE WIRING CAN BE COMBINED IN COMMON CONDUIT PROVIDING MINIMUM 25% SPARE IN ACCOUNTED FOR IN ADD IN TO CEC CONDUIT FILL REQUIREMENTS. SEPARATE CONDUITS ARE REQUIRED FOR 120VAC, 24VDC, ANALOG SIGNALS, COMMUNICATION.
 - ALL IN CONCRETE SLAB RIGID ALUMINUM (ALUM) CONDUIT TO HAVE OUTSIDE OF CONDUIT COVERED WITH CORROSION PROTECTIVE COATING BITUMASTIC, ASPHALT BASED PAINT OR PVC COATING.
 - IN CONCRETE SLAB CONDUITS TO BE RPVC OR RIGID ALUMINUM.
 - IN CEILING CONDUITS TO BE EMT.
 - SURFACE MOUNT CONDUITS TO BE RPVC AND ARE ONLY PERMITTED FOR VERTICAL RUNS INTO CEILING SPACE AND HORIZONTAL RUNS LESS THAN 600. INSTALL ALL CONDUITS IN WALLS, CEILINGS AND FLOORS UNLESS OTHERWISE INDICATED.
 - ALL CABLING SIZE BASED ON 75° TERMINATION TEMPERATURE.
 - PROVIDE AND INSTALL APPROPRIATELY SIZED GROUND CABLE FOR ALL CABLE RUNS.
 - ALL CABLES ARE TO BE COPPER UNLESS OTHERWISE NOTED.
 - CONTRACTOR TO LABEL ALL CONTROL AND INSTRUMENTATION WIRING AS PER DETAIL 3 ON E5.1.
 - CONTRACTOR TO LABEL ALL POWER CONDUIT AS PER DETAIL 4 ON E5.1.
 - WHERE CONDUIT AND CABLE IS MARKED FUTURE, CONTRACTOR IS TO INSTALL ONLY THE INDICATED CONDUIT BETWEEN THE FUTURE DEVICE AND THE CONDUIT SOURCE.

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2	20-11-24	FOR TENDER ADDENDUM 4
1	20-10-15	FOR TENDER
ISSUE	YY-MM-DD	REVISION


Association of Professional Engineers & Geoscientists of Saskatchewan


CERTIFICATE OF AUTHORIZATION

MPE Engineering Ltd.

Number C1334

Permission to Consult held by:

Discipline: ELECTRICAL Sk. Reg. No. 32675 Signature: 





ENGLISH RIVER PROPERTY MANAGEMENT


WASTEWATER TREATMENT PLANT
ELECTRICAL
CABLE AND CONDUIT SCHEDULE

DESIGNED	R.G.O	JOB	7603-002-00
DRAWN	T.S.	SCALE	N.T.S.
DATE	NOVEMBER 2020	DRAWING	E2.12

CONDUIT AND CABLE SCHEDULE										
COND. No.	COND. TAG	DESCRIPTION	LOCATION	CONDUIT SIZE AND TYPE	TAG / FROM	TO	WIRE TYPE	No. OF WIRES	WIRE SIZE	REMARKS
900	A	TELEPHONE AND INTERNET SERVICE	ELECTRICAL ROOM	1-53Φ RPVC	SASKTEL PEDESTAL	TELEPHONE DEMARCATION	PULL STRING			SEE E0.3 FOR DEVICE AND PORT DETAILS
	B			TECK	TELEPHONE DEMARCATION	NETWORK RACK DATA PATCH PANEL	2-CAT 6 ETHERNET			
901	A	CONTROL PANEL 1 NETWORK HEAD	ELECTRICAL ROOM	TECK	CP-1	NETWORK RACK DATA PATCH PANEL	1-SHIELDED CAT 6 ETHERNET			SEE E0.3 FOR DEVICE AND PORT DETAILS
902	A	CONTROL PANEL 1 NETWORK TAIL	ELECTRICAL ROOM	TECK	CP-1	NETWORK RACK DATA PATCH PANEL	1-SHIELDED CAT 6 ETHERNET			SEE E0.3 FOR DEVICE AND PORT DETAILS
903	A	CONTROL PANEL 2 NETWORK HEAD	ELECTRICAL ROOM	TECK	CP-2	NETWORK RACK DATA PATCH PANEL	2-SHIELDED CAT 6 ETHERNET			SEE E0.3 FOR DEVICE AND PORT DETAILS
904	A	CONTROL PANEL 11 NETWORK	PUMP ROOM	TECK	CP-11	CP-1	1-SHIELDED CAT 6 ETHERNET			SEE E0.3 FOR DEVICE AND PORT DETAILS
905	A	CONTROL PANEL 12 NETWORK	PUMP ROOM	TECK	CP-12	CP-1	1-SHIELDED CAT 6 ETHERNET			SEE E0.3 FOR DEVICE AND PORT DETAILS
906	A	CONTROL PANEL 11 TO 12 NETWORK	PUMP ROOM	TECK	CP-11	CP-12	1-SHIELDED CAT 6 ETHERNET			SEE E0.3 FOR DEVICE AND PORT DETAILS
907	A	WIRELESS ACCESS POINT	OFFICE	1-21Φ EMT	WAP-1	NETWORK RACK DATA PATCH PANEL	1-SHIELDED CAT 6 ETHERNET			SEE E0.3 FOR DEVICE AND PORT DETAILS
908	A	WIRELESS ACCESS POINT	TREATMENT ROOM	TECK	WAP-2	NETWORK RACK DATA PATCH PANEL	1-SHIELDED CAT 6 ETHERNET			SEE E0.3 FOR DEVICE AND PORT DETAILS
909	A	WIRELESS ACCESS POINT	PUMP ROOM	TECK	WAP-3	NETWORK RACK DATA PATCH PANEL	1-SHIELDED CAT 6 ETHERNET			SEE E0.3 FOR DEVICE AND PORT DETAILS
910	A	DEVICE BOX 1 - SCADA PC	OFFICE	1-27Φ EMT	DB-1	NETWORK RACK DATA PATCH PANEL	3-CAT 6 ETHERNET			SEE E0.3 FOR DEVICE AND PORT DETAILS
	B					TELEPHONE BIX	1-CAT 6 ETHERNET		SEE E0.3 FOR DEVICE AND PORT DETAILS	
911	A	DEVICE BOX 2 - INTERNET PC	OFFICE	1-27Φ EMT	DB-2	NETWORK RACK DATA PATCH PANEL	3-CAT 6 ETHERNET			SEE E0.3 FOR DEVICE AND PORT DETAILS
	B					TELEPHONE BIX	1-CAT 6 ETHERNET		SEE E0.3 FOR DEVICE AND PORT DETAILS	
912	A	DEVICE BOX 3 - PRINTER/FAX	OFFICE	1-21Φ EMT	DB-3	NETWORK RACK DATA PATCH PANEL	1-CAT 6 ETHERNET			SEE E0.3 FOR DEVICE AND PORT DETAILS
	B					TELEPHONE BIX	1-CAT 6 ETHERNET		SEE E0.3 FOR DEVICE AND PORT DETAILS	
913	A	DEVICE BOX 4 - LABORATORY 1	LABORATORY	1-21Φ EMT	DB-4	TELEPHONE BIX	1-CAT 6 ETHERNET			SEE E0.3 FOR DEVICE AND PORT DETAILS
				1-21Φ EMT		NETWORK DATA RACK	2-CAT 6 ETHERNET		SEE E0.3 FOR DEVICE AND PORT DETAILS	
914	A	DEVICE BOX 5 - LABORATORY 2	LABORATORY	1-21Φ EMT	DB-5	TELEPHONE BIX	1-CAT 6 ETHERNET			SEE E0.3 FOR DEVICE AND PORT DETAILS
				1-21Φ EMT		NETWORK DATA RACK	2-CAT 6 ETHERNET		SEE E0.3 FOR DEVICE AND PORT DETAILS	
915	A	SEPTAGE RECEIVING STATION	EXTERIOR	TECK	SEPTAGE RECEIVING STATION CONTROL PANEL	NETWORK RACK DATA PATCH PANEL	2-CAT 6 ETHERNET			SEE E0.3 FOR DEVICE AND PORT DETAILS

- NOTES:
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 - SEE ELECTRICAL PANEL AND MECHANICAL EQUIPMENT SCHEDULES FOR ADDITIONAL WIRING REQUIREMENTS.
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 - PROVIDE AND INSTALL APPROPRIATELY SIZED GROUND CABLE FOR ALL CABLE RUNS.
 - ALL CABLES ARE TO BE COPPER UNLESS OTHERWISE NOTED.
 - CONTRACTOR TO LABEL ALL CONTROL AND INSTRUMENTATION WIRING AS PER DETAIL 3 ON E5.1.
 - CONTRACTOR TO LABEL ALL POWER CONDUIT AS PER DETAIL 4 ON E5.1.
 - WHERE CONDUIT AND CABLE IS MARKED FUTURE, CONTRACTOR IS TO INSTALL ONLY THE INDICATED CONDUIT BETWEEN THE FUTURE DEVICE AND THE CONDUIT SOURCE.

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	20-11-24	FOR TENDER ADDENDUM 4
2	20-11-10	FOR TENDER ADDENDUM 2
1	20-10-15	FOR TENDER
ISSUE	YY-MM-DD	REVISION


Association of Professional Engineers & Geoscientists of Saskatchewan


CERTIFICATE OF AUTHORIZATION

MPE Engineering Ltd.

Number C1334

Permission to Consult held by:

Discipline	Sk. Reg. No.	Signature
ELECTRICAL	32675	





ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
ELECTRICAL
CABLE AND CONDUIT SCHEDULE

DESIGNED	R.G.O	JOB	7603-002-00
DRAWN	T.S.	SCALE	N.T.S.
DATE	NOVEMBER 2020	DRAWING	E2.13



**Addendum 3
To the Specifications for
English River Property Management
Wastewater Treatment Facility**

**MPE Engineering Ltd.
Unit 122, 103 Marquis Court
Saskatoon, Saskatchewan S7P 0C4**

November 19, 2020

File: 7603-002-00

1. Precedence.

This addendum forms an integral part of the specifications and drawings covering all aspects of this job and is to be read in conjunction therewith. However, should points arise which are at variance, this addendum shall take precedence, unless otherwise clarified by the engineer.

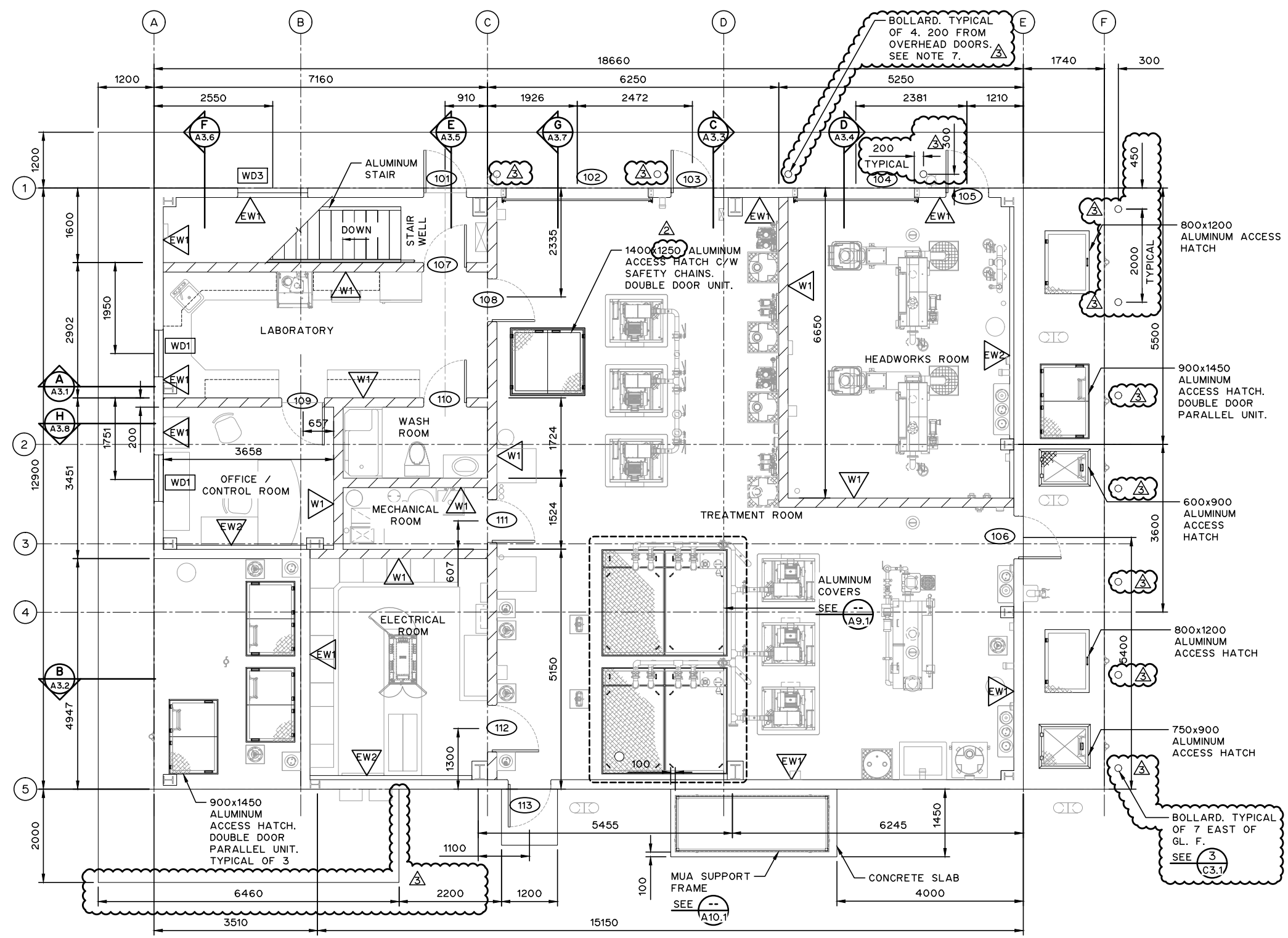
2. Purpose.

This addendum provides specific clauses to add to and/or amend the specifications and/or drawings.

3. Drawing Revisions

<u>Drawing Revisions</u>		
<u>Drawing Number</u>	<u>Delete</u>	<u>Replace With</u>
C1.4	Issue 2: For Tender Addendum 1	Issue 3: For Tender Addendum 3
A2.2	Issue 2: For Tender Addendum 1	Issue 3: For Tender Addendum 3
A4.1	Issue 1: For Tender	Issue 2: For Tender Addendum 3
S1.1	Issue 1: For Tender	Issue 2: For Tender Addendum 3
S1.2	Issue 2: For Tender Addendum 1	Issue 3: For Tender Addendum 3
M2.3	Issue 1: For Tender	Issue 2: For Tender Addendum 3
P2.5	Issue 1: For Tender	Issue 2: For Tender Addendum 3
P1.6	Issue 2: For Tender Addendum 1	Issue 3: For Tender Addendum 3

END OF ADDENDUM 3



- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. SEE STRUCTURAL DRAWINGS FOR LOCATION AND SIZE OF CONCRETE EQUIPMENT PADS.
 3. SEE DRAWING A4.1 FOR DOOR, AND WINDOW SCHEDULES.
 4. SEE DRAWING A4.1 FOR ROOM FINISH SCHEDULE.
 5. SEE STRUCTURAL DRAWINGS FOR DETAILS FOR ALL CONCRETE HOUSEKEEPING PADS AND CONCRETE EQUIPMENT PADS.
 6. COORDINATE WITH OTHER DISCIPLINES FOR LOCATION AND SIZE OF WALL AND FLOOR PENETRATIONS.
 7. PROVIDE POUR IN PLACE SAFETY BOLLARDS BY ULINE CANADA MODEL NO. H-7685 OR EQUAL. FILL WITH CONCRETE.

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS

3	20-11-18	FOR TENDER ADDENDUM 3
2	20-11-03	FOR TENDER ADDENDUM 1
1	20-10-15	FOR TENDER
ISSUE	YY-MM-DD	REVISION

Association of Professional Engineers & Geoscientists of Saskatchewan

CERTIFICATE OF AUTHORIZATION

MPE Engineering Ltd.

Number C1334

Permission to Consult held by:

Discipline: STRUCTURAL Sk. Reg. No. 34196 Signature: [Signature]

PROFESSIONAL ENGINEER

W. SUNG

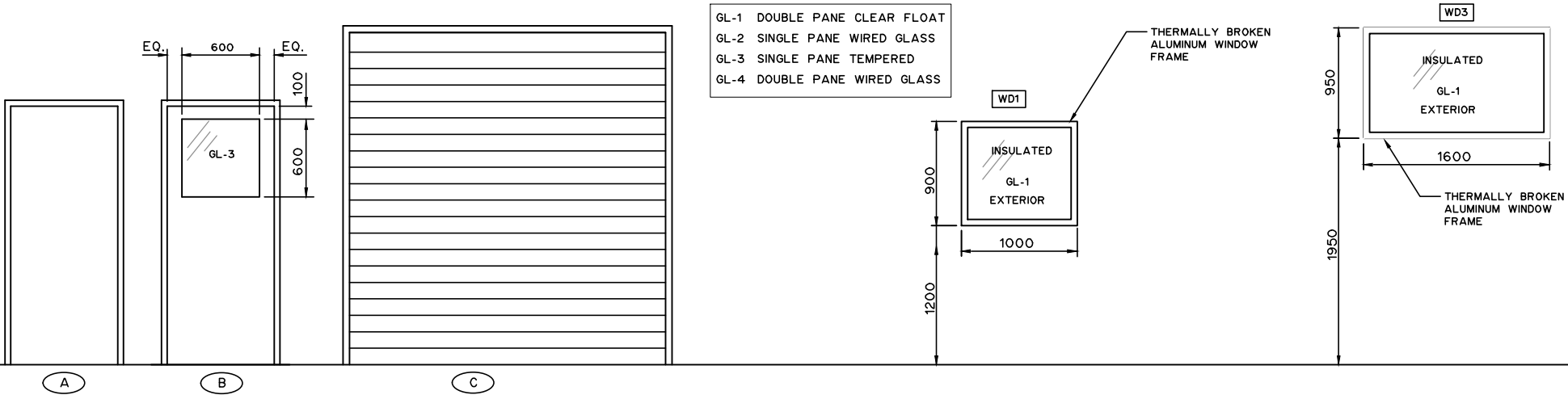
MEMBER 34196

2020/11/18

SKS KATCHEWAN



ENGLISH RIVER PROPERTY MANAGEMENT	
WASTEWATER TREATMENT PLANT ARCHITECTURAL	
MAIN FLOOR PLAN	
DESIGNED	W.W.L.S.
DRAWN	D.F.F.
DATE	NOVEMBER 2020
JOB	7603-002-00
SCALE	1:100
DRAWING	A2.2



MARK	NOMINAL SIZE	DOOR TYPE	MATERIAL DOOR-FRAME	FINISH DOOR-FRAME	FIRE RESIST. RATING (MIN)	GLAZING	COMMENTS
101	914x2134	A	HOLLOW METAL/STEEL	PAINT/PAINT	--	--	INSULATED DOOR AND FRAME
102	3050x3050	C	HOLLOW METAL/STEEL	PAINT/PAINT	--	--	INSULATED DOOR AND FRAME
103	914x2134	A	HOLLOW METAL/STEEL	PAINT/PAINT	--	--	INSULATED DOOR AND FRAME
104	2500x3050	C	HOLLOW METAL/STEEL	PAINT/PAINT	--	--	INSULATED DOOR AND FRAME
105	914x2134	A	HOLLOW METAL/STEEL	PAINT/PAINT	--	--	INSULATED DOOR AND FRAME
106	914x2134	A	HOLLOW METAL/STEEL	PAINT/PAINT	--	--	INSULATED DOOR AND FRAME
107	914x2134	A	HOLLOW METAL/STEEL	PAINT/PAINT	45	--	
108	914x2134	B	HOLLOW METAL/STEEL	PAINT/PAINT	--	TEMPERED	
109	914x2134	B	HOLLOW METAL/STEEL	PAINT/PAINT	--	TEMPERED	
110	914x2134	A	HOLLOW METAL/STEEL	PAINT/PAINT	--	--	
111	914x2134	A	HOLLOW METAL/STEEL	PAINT/PAINT	45	--	
112	914x2740	A	HOLLOW METAL/STEEL	PAINT/PAINT	45	--	
113	914x2134	A	HOLLOW METAL/STEEL	PAINT/PAINT	--	--	INSULATED DOOR AND FRAME

CEILING CONSTRUCTION ASSEMBLIES:

- C01** 45 MINUTE FIRE RESISTANCE RATING
16 PLYWOOD
38x235 @ 300 O.C.
2-16 TYPE X GYPSUM BOARD
- C02** 45 MINUTE FIRE RESISTANCE RATING
16 PLYWOOD
38x235 @ 300 O.C.
2-16 TYPE X GYPSUM BOARD
PREFINISHED METAL CLADDING
- C03** 16 PLYWOOD
38x235 @ 300 O.C.
SUSPENDED CEILING TILE

EXTERIOR WALL CONSTRUCTION ASSEMBLIES:

- EW1** PREFINISHED INTERIOR METAL LINER
PRE-ENGINEERED BUILDING WALL CONSTRUCTION
PRE-FINISHED EXTERIOR METAL CLADDING, ZINC GREY
(SEE ELEVATIONS FOR LOCATION OF STONE VENEER)
- EW2** PREFINISHED INTERIOR METAL LINER
2-16 TYPE X GYPSUM BOARD
38x89 @ 300 O.C.
PRE-ENGINEERED BUILDING WALL CONSTRUCTION
PRE-FINISHED METAL CLADDING, ZINC GREY (SEE ELEVATIONS FOR LOCATION OF STONE VENEER)

INTERIOR WALL CONSTRUCTION ASSEMBLIES:

- W1** 200 CONCRETE BLOCK WALL, PAINTED

- NOTES:
- ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS

ROOM FINISH SCHEDULE					
ROOM	FLOOR	BASE	WALLS - TYPE-FINISH	CEILING - TYPE-FINISH	COMMENTS
STAIRWELL	EPOXY	EPOXY	METAL LINER - PREFINISHED AND CONCRETE BLOCK PAINTED	DRYWALL - PAINTED	45-MIN FIRE SEPARATION ON INTERIOR WALLS AND CEILING
LAB/CONTROL ROOM	EPOXY	EPOXY	METAL LINER - PREFINISHED AND CONCRETE BLOCK PAINTED	SUSPENDED CEILING TILES	
OFFICE	EPOXY	EPOXY	METAL LINER - PREFINISHED AND CONCRETE BLOCK PAINTED	SUSPENDED CEILING TILES	
WASHROOM	EPOXY	EPOXY	CONCRETE BLOCK - PAINTED	SUSPENDED CEILING TILES	
MECHANICAL ROOM	EPOXY	EPOXY	CONCRETE BLOCK - PAINTED	DRYWALL - PAINTED	45-MIN FIRE SEPARATION ON INTERIOR WALLS AND CEILING
ELECTRICAL ROOM	EPOXY	EPOXY	CONCRETE BLOCK - PAINTED	DRYWALL - PAINTED	45-MIN FIRE SEPARATION ON INTERIOR WALLS AND CEILING
TREATMENT ROOM	EPOXY	EPOXY	METAL LINER - PREFINISHED AND CONCRETE BLOCK PAINTED	METAL LINER - PREFINISHED	
HEADWORKS ROOM	EPOXY	EPOXY	METAL LINER - PREFINISHED AND CONCRETE BLOCK PAINTED	METAL LINER - PREFINISHED	45-MIN FIRE SEPARATION ON INTERIOR WALLS AND CEILING
PUMP ROOM	EPOXY	--	SACK-RUBBED FINISHED CONCRETE	SMOOTH FORMED CONCRETE	APPLY CEMENTITIOUS WATERPROOFING ON TOP OF THE ENTIRE LOWER CONCRETE FLOOR, ON THE INSIDE FACE OF ALL EXTERIOR WALLS, ON THE WET SIDE OF THE WALLS BETWEEN PUMP ROOM AND ADJACENT WASTEWATER TREATMENT TANKS. EXTEND WATERPROOFING ON ADJACENT INTERIOR WALLS 1000 HORIZONTALLY FROM EXTERIOR WALLS AND PUMP ROOM WALLS. REFER TO SPECIFICATION SECTION 07150
WETWELL AND EQUALIZATION CHAMBER	SMOOTH FINISHED CONCRETE	--	SMOOTH FORMED CONCRETE	SMOOTH FORMED CONCRETE	
TWAS STORAGE	SMOOTH FINISHED CONCRETE	--	SMOOTH FORMED CONCRETE	SMOOTH FORMED CONCRETE	
EFFLUENT STORAGE	SMOOTH FINISHED CONCRETE	--	SMOOTH FORMED CONCRETE	SMOOTH FORMED CONCRETE	
ANOXIC TANK	SMOOTH FINISHED CONCRETE	--	SMOOTH FORMED CONCRETE	SMOOTH FORMED CONCRETE	
AEROBIC TANK 1	SMOOTH FINISHED CONCRETE	--	SMOOTH FORMED CONCRETE	SMOOTH FORMED CONCRETE	
AEROBIC TANK 2	SMOOTH FINISHED CONCRETE	--	SMOOTH FORMED CONCRETE	SMOOTH FORMED CONCRETE	
DISTRIBUTION BOX	SMOOTH FINISHED CONCRETE	--	SMOOTH FORMED CONCRETE	SMOOTH FORMED CONCRETE	
MEMBRANE TANK 1	CONCRETE TANK EPOXY LINER	--	CONCRETE TANK EPOXY LINER	--	
MEMBRANE TANK 2	CONCRETE TANK EPOXY LINER	--	CONCRETE TANK EPOXY LINER	--	
					SEE SPECIFICATION 03360 FOR PRODUCT INFORMATION
					SEE SPECIFICATION 03360 FOR PRODUCT INFORMATION

	20-11-18	FOR TENDER ADDENDUM 3
1	20-10-15	FOR TENDER
ISSUE	YY-MM-DD	REVISION

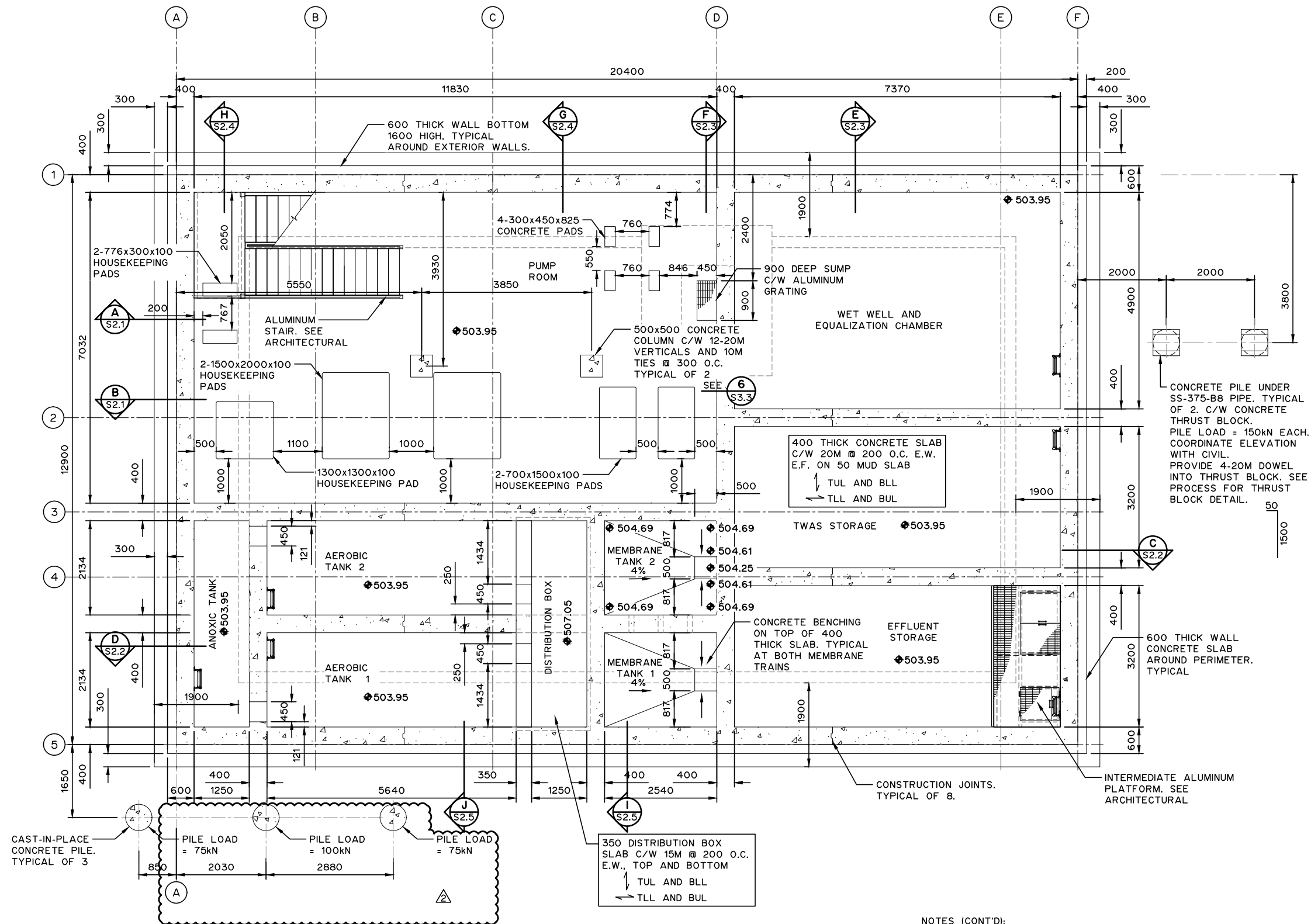
Association of Professional Engineers & Geoscientists of Saskatchewan
CERTIFICATE OF AUTHORIZATION
MPE Engineering Ltd.
Number C1334
Permission to Consult held by:
Discipline Sk. Reg. No. Signature
STRUCTURAL 34196



ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
ARCHITECTURAL
SCHEDULES

DESIGNED	W.W.L.S.	JOB	7603-002-00
DRAWN	D.F.F.	SCALE	
DATE	NOVEMBER 2020	DRAWING	A4.1



NOTES:

- ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
- 20 CHAMFER ALL EXPOSED CONCRETE EDGES.
- COORDINATE LOCATION OF ALL PENETRATIONS WITH PROCESS.
- CAST-IN SLEEVES C/W LEAK PLATE FOR ALL FLOOR AND WALL PENETRATIONS. SEE PROCESS FOR DETAILS AND LOCATIONS.
- CONCRETE PILES ARE TO BE DESIGNED BY PILE DESIGNER. FOLLOW RECOMMENDATIONS PROVIDED BY GEOTECHNICAL REPORT PROVIDED IN CONTRACT.
- REFER TO S4.1 FOR ADDITIONAL REINFORCING AROUND PENETRATIONS AND CONCRETE PADS.
- BOTTOM OF EXCAVATION IS TO BE REVIEWED BY GEOTECHNICAL ENGINEER PRIOR TO MUD SLAB. MUD SLAB MUST BE PLACED IMMEDIATELY FOLLOWING GEOTECHNICAL ENGINEER'S APPROVAL. MUD SLAB TO EXTEND FULL WIDTH OF EXCAVATION.
- TOP SLAB MUST BE IN-PLACED IN ITS ENTIRETY, EXCEPT FOR CANTILEVER SIDEWALKS PRIOR TO BACKFILLING AROUND LOWER LEVEL OR HYDROSTATIC PRESSURE TEST.
- SEE ARCHITECTURAL FOR CONCRETE FINISHES AND COATINGS.

(SEE BELOW FOR CONTINUATION)

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS

2	20-11-18	FOR TENDER ADDENDUM 3
1	20-10-15	FOR TENDER
ISSUE	YY-MM-DD	REVISION

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Discipline	Sk. Reg. No.	Signature
STRUCTURAL	34196	



ENGLISH RIVER PROPERTY MANAGEMENT

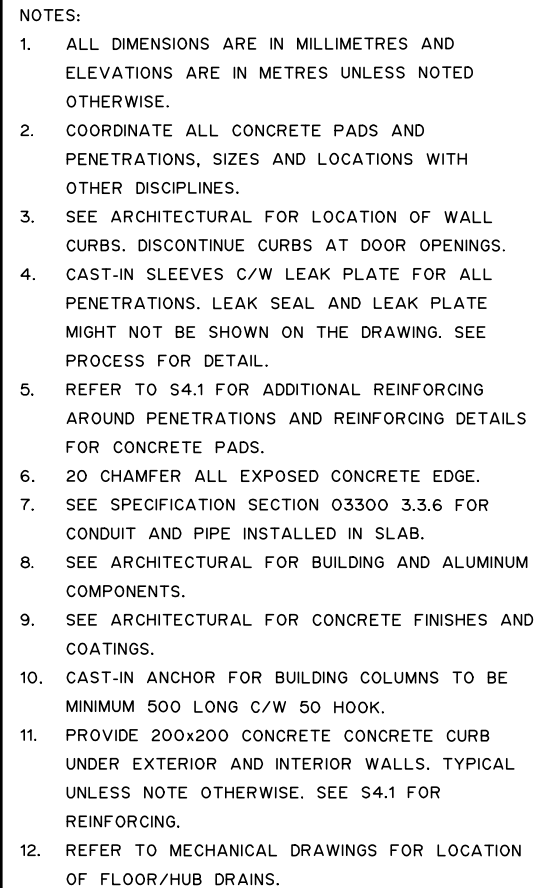
WASTEWATER TREATMENT PLANT
STRUCTURAL
LOWER FLOOR PLAN

NOTES (CONT'D):



- SEE ARCHITECTURAL FOR ALL ALUMINUM COMPONENTS. COORDINATE ALL CAST-IN ALUMINUM COMPONENTS.
- SLOPE FLOOR TO DRAINS
- REFER TO MECHANICAL DRAWINGS FOR LOCATION OF FLOOR/HUB DRAINS.


DESIGNED	W.W.L.S.	JOB	7603-002-00
DRAWN	D.F.F.	SCALE	1:100
DATE	NOVEMBER 2020	DRAWING	S1.1


DEAD LOAD = 10.6 kPa
LIVE LOAD = 15 kPa



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FROM ITS ORIGINAL SIZE. ALL SCALE
NOTATIONS INDICATED ARE BASED ON
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	20-11-18	FOR TENDER ADDENDUM 3
	20-11-03	FOR TENDER ADDENDUM 1
1	20-10-15	FOR TENDER
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Discipline <u>STRUCTURAL</u>	Sk. Reg. No. <u>34196</u>	Signature 
Date _____	Exp. _____	Validity _____





ENGLISH RIVER PROPERTY
MANAGEMENT

WASTEWATER TREATMENT PLANT
STRUCTURAL
MAIN FLOOR PLAN

DESIGNED	W.W.L.S.	JOB	7603-002-00
DRAWN	D.F.F.	SCALE	1:100
DATE	NOVEMBER 2020	DRAWING	S1.2

- NOTES:
1. FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.
 2. ALL PLUMBING SHALL BE INSTALLED TO NATIONAL PLUMBING CODE REQUIREMENTS.
 3. VENT ALL PLUMBING EQUIPMENT AND FIXTURES AS REQUIRED BY CODE. GROUP FIXTURE VENTS TO MINIMIZE ROOF OPENINGS.

4. 75Ø SANITARY VENT TO ATMOSPHERE. INCREASE TO 100Ø AT ROOF PENETRATION.
5. SANITARY WASTE AND DRAINAGE SYSTEM SHALL BE INSTALLED C/W SLOPES, CLEANOUTS, VENTS, TRAPS, TRAP PRIMERS, FIXTURE CONNECTIONS, ETC. TO MEET ALL CODE REQUIREMENTS.
6. ALL HUB DRAINS TO BE DR-38-E1 UNLESS NOTED OTHERWISE.
7. PLUMBING CONTRACTOR TO COORDINATE WITH STRUCTURAL CONTRACTOR TO ENSURE FLOOR SLOPES TOWARDS FLOOR DRAINS.
8. HUB DRAINS FOR PUMP SEAL FLUSH WATER TO BE INSTALLED WITHIN PUMP EQUIPMENT PAD. CONTRACTOR TO CO-ORDINATE WITH PROCESS MECHANICAL CONTRACTOR.
9. PROVIDE FIRE EXTINGUISHERS AS INDICATED ON PLANS, IN ACCORDANCE WITH NFPA 10 AND AS REQUIRED BY AUTHORITY HAVING JURISDICTION. EXTINGUISHERS TO BE 4.5kg ABC C/W WALL MOUNTING BRACKETS.
10. ALL SANITARY PIPING IN LOWER LEVEL TO BE CAST-IN PLACE. CAST-IN PLACE SANITARY PIPING IS TO BE LOCATED BETWEEN THE MATS OF STRUCTURAL STEEL.
11. ALL SANITARY PIPING LOCATED IN THE UPPER LEVEL IS TO BE BELOW THE STRUCTURAL SLAB. SANITARY PIPING IS TO BE SUPPORTED FROM HANGERS INSTALLED IN THE STRUCTURAL SLAB AND BEDDED IN PEA GRAVEL.
12. DRAWING IS DIAGRAMMATIC AND INDICATES INTENT ONLY.

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2	20-11-19	FOR TENDER ADDENDUM 3
1	20-10-15	FOR TENDER
ISSUE	YY-MM-DD	REVISION

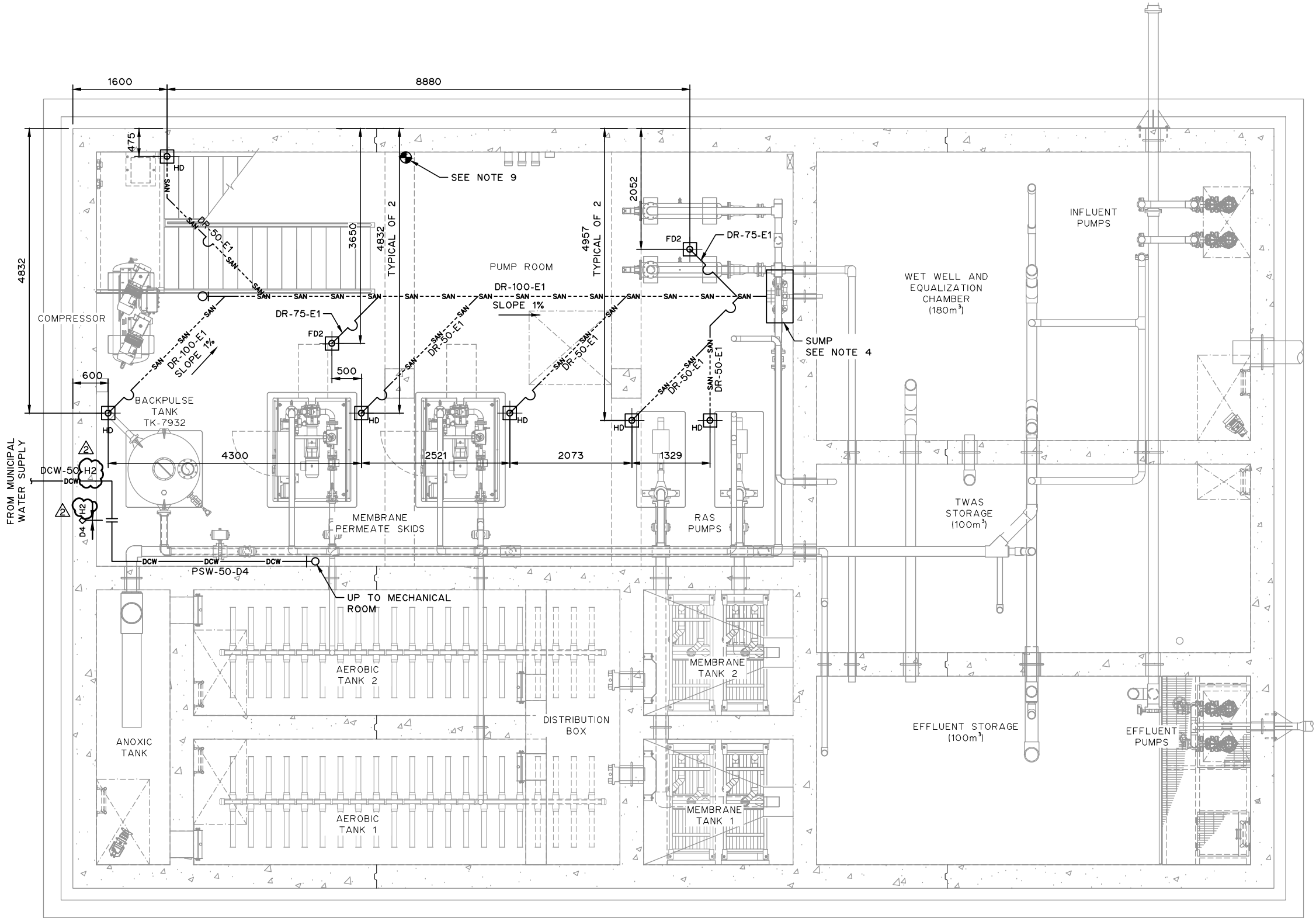
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MECHANICAL	24112	

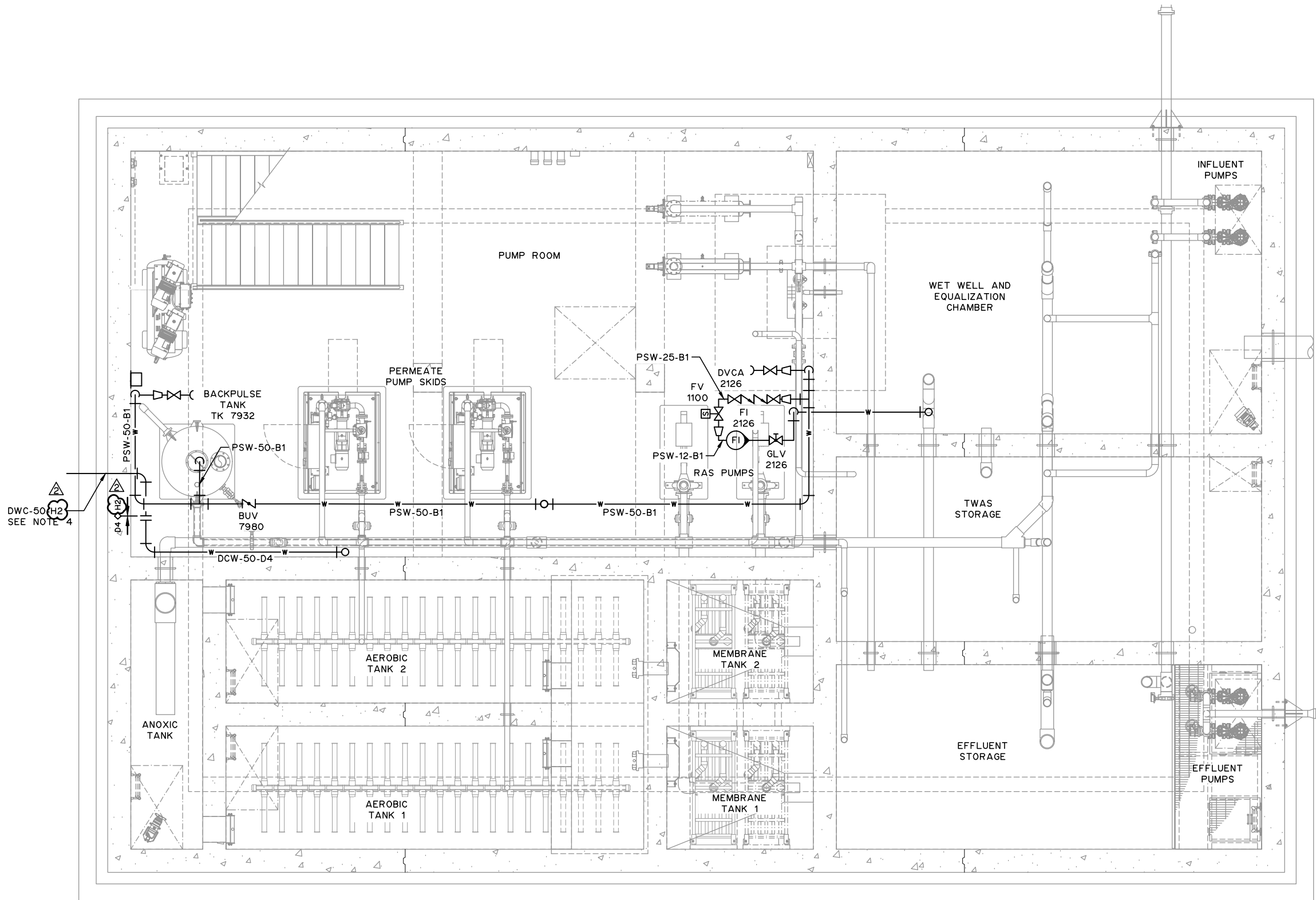


ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
MECHANICAL
PLUMBING, FIRE PROTECTION AND
SANITARY
LOWER LEVEL PLAN

DESIGNED	R.R.U.	JOB	7603-002-00
DRAWN	T.D.D.	SCALE	1:75
DATE	NOVEMBER 2020	DRAWING	M2.3





- NOTES:
1. CONTRACTOR TO PROVIDE SUPPORT FOR PIPING AND FITTINGS AS PER PIPING AND SUPPORT MANUFACTURER'S RECOMMENDATIONS.
 2. STEEL PIPES LARGER THAN 75Ø SHALL NOT BE SUPPORTED FROM THE ROOF SYSTEM UNLESS NOTED OTHERWISE.
 3. PVC PIPES LARGER THAN 150Ø SHALL NOT BE SUPPORTED FROM THE ROOF SYSTEM UNLESS NOTED OTHERWISE.
 4. CONTRACTOR TO CONNECT TO MUNICIPAL POTABLE WATERLINE. SEE DRAWING M2.4.
 5. PIPING IS SHOWN SCHEMATICALLY ONLY. CONTRACTOR TO MOUNT PIPE ON RACKS AND WALLS TO CARRY OUT WORK IN NEATEST POSSIBLE MANNER. CONTRACTOR TO COORDINATE WITH ENGINEER WITH RESPECT TO PIPING ROUTES PRIOR TO CARRYING OUT WORK.

- LEGEND
- W — PLANT SERVICE WATER
 - EMERGENCY SHOWER
 - HOSE REEL
 - X — HOSE BIBB

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20-11-19	FOR TENDER ADDENDUM 3
1	20-10-15 FOR TENDER
ISSUE	YY-MM-DD REVISION

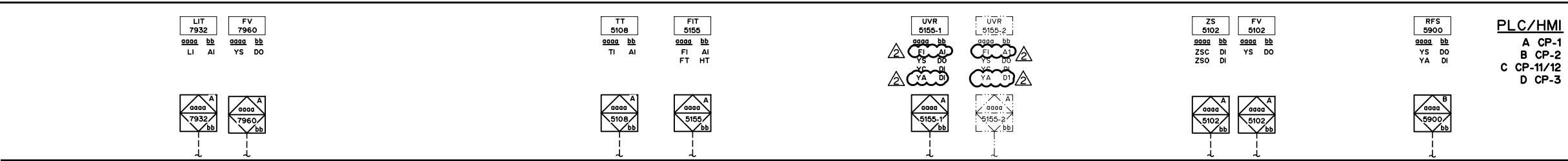
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MPE Engineering Ltd.
Number C1334
Permission to Consult held by:
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CIVIL 52886



ENGLISH RIVER PROPERTY MANAGEMENT

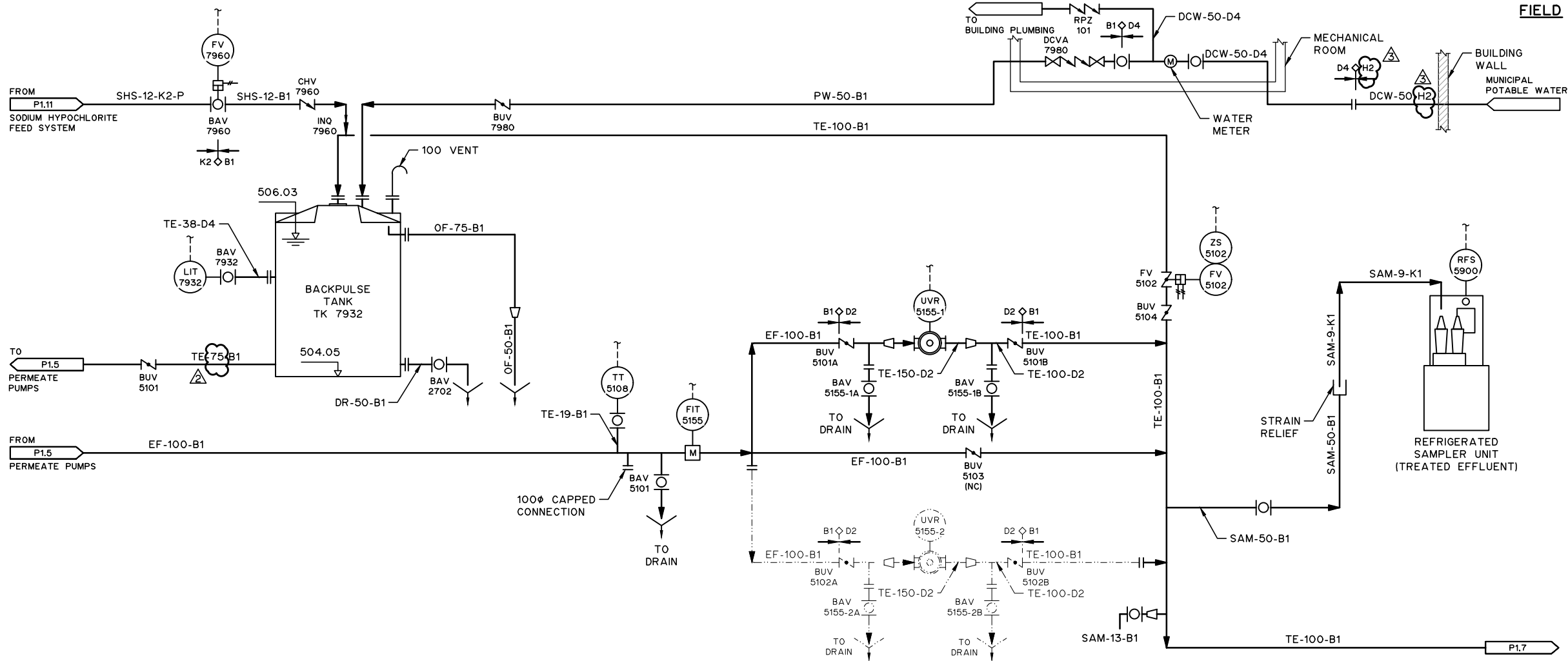
WASTEWATER TREATMENT PLANT
PROCESS PIPING
PLANT SERVICE WATER
PIPING SCHEMATIC
LOWER LEVEL FLOOR PLAN

DESIGNED	I.K.	JOB	7603-002-00
DRAWN	L.J.S.	SCALE	1:75
DATE	NOVEMBER 2020	DRAWING	P2.5



MCC
(VOLTAGE)

FIELD



NOTES:

- FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.

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3	20-11-19	FOR TENDER ADDENDUM 3
2	20-11-03	FOR TENDER ADDENDUM 1
1	20-10-15	FOR TENDER
ISSUE	YY-MM-DD	REVISION

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ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
PROCESS PIPING
PROCESS AND INSTRUMENTATION
DIAGRAM

BACKPULSE TANK AND UV
DISINFECTION

DESIGNED	I.K.	JOB	7603-002-00
DRAWN	L.J.S.	SCALE	NTS
DATE	NOVEMBER 2020	DRAWING	P1.6

DESIGN CRITERIA

FIT 5155

- RANGE: 0-20 L/s
- POWER: 120 VAC

PRV 7921

- SP: 40 psig

LIT 7932

- RANGE: 0-52 kPa (0-7.5 psi)
- POWER: 24 VDC

TK 7932

- BACKPULSE PERMEATE TANK
- CAPACITY: 15000 L

TT 5108

- RANGE: 0-40°C
- POWER: 24 VDC

UVR 5155-1/UVR 5155-2

- UV REACTOR
- DESIGN DOSE: 44.47 mJ/cm²
- TREATMENT CAPACITY: 7,700 m³/DAY
- HYDRAULIC CAPACITY: 11,900 m³/DAY
- NUMBER OF LAMPS: 4/UNIT
- 208VAC/1 PH
- 13.5 kVA, 10.8 kW



**Addendum 2
To the Specifications for
English River Property Management
Wastewater Treatment Facility**

MPE Engineering Ltd.
Unit 122, 103 Marquis Court
Saskatoon, Saskatchewan S7P 0C4

November 13, 2020

File: 7603-002-00

1. Precedence.

This addendum forms an integral part of the specifications and drawings covering all aspects of this job and is to be read in conjunction therewith. However, should points arise which are at variance, this addendum shall take precedence, unless otherwise clarified by the engineer.

2. Purpose.

This addendum provides specific clauses to add to and/or amend the specifications and/or drawings.

3. Addendum 1, Item 4

Clarification:

Taxes refers to GST and PST.

4. Section 00800 Supplementary Conditions.

Add:

25. Existing Elevations

- .1 All elevations on site will be at the rough grade elevations on drawing C1.5 prior to the start of construction. Contractor will be responsible for any final grading.

5. Section 01110 Summary of Work.

Delete:

- 1.2.1 j) Existing Building Modifications

6. Section 03300 Cast-In-Place Concrete, Subsection 3.18

Delete:

3.18

Replace With:**3.18 CONCRETE MIX SCHEDULE**

Component	Type*	Min. Comp. Strength @ 28 Days (MPa)	Max. Water/Cement Ratio	Air Content Range (%)	Slump Range** (mm)	Nominal Aggregate Size (mm)
Lower Floor Slab	HS	32	0.40	Max. 4	50-80	20-5
Reservoir Walls and Columns	HS	32	0.40	4-7	50-80	20-5
Interior Top floor Slab and Beams	HS	32	0.40	Max. 4	50-80	20-5
Interior Curbs, Interior Pads & Thrust Blocks	GU	32	0.45	Max.4	50-80	20-5
Exterior Slab	HS	32	0.40	5-8	50-80	20-5
Masonry Core Fill	GU	20	0.60	Max. 4	Max. 150	6

* Type HS formerly called Type 50. Type GU formerly called Type 10.

** Subject to Engineer's prior written approval, maximum slump may be increased beyond specified range by the use of chemical admixtures, except for zero slump mixes.

7. Section 05141 Structural Aluminum.**Delete:**

2.1.13.2.3.2.1

Replace With:

2.1.13.2.3.2.1 CKD - GT: AH 4100

Delete:

2.1.13.2.3.2.2

Replace With:

2.1.13.2.3.2.2 CKP - GT: AH 1200, AH 2100, AH 2200, AH 2300

8. **Section 07466 Sheet Metal Cladding**

ADD:

Specification Section 07466 Sheet Metal Cladding (attached)

9. **Section 08330 Insulated Overhead Coiling Doors, Subsection 2.2**

Delete:

“.1 Overhead Coiling Stormtite Insulated Service Doors: Overhead Door Corporation Model 625.”

Replace With:

“.1 Overhead Coiling Stormtite Insulated Service Doors: Overhead Door Corporation Model 625 or Engineer approved equal.”

10. **Section 10650 Laboratory Equipment.**

Add:

1.1.1.2.4

Or Approved Equal

11. **Section 11310 Chain Hoists.**

Delete:

1.1.1.1

Replace With:

1.1.1.1 Electric hoist c/w push button pendent control required at 1.2 meter above **main** floor attached to hoist.

Delete:

1.1.1.2

Delete:

2.1.1.4.5

Replace With:

2.1.1.4.5 Lift: 9.4 m (30.8 ft.)

Delete:

2.1.1.4.14.8.2

Replace With:

2.1.1.4.14.8.2 Control pendant, 1.2m from main floor level

12. Section 13312 Instrumentation.

Delete:

2.16.4

Replace With:

2.16.4 Type:

- .1 TSH 2215: Weatherproof, Explosion proof
- .2 TSH 3415A: NEMA 4X
- .3 TSH 4615: NEMA 4X
- .4 TSH 9915A: Commercial
- .5 TSH 9915B: Commercial
- .6 TSH 9915C: Commercial
- .7 TSH 9915D: Commercial

Delete:

2.8 CONDUCTIVITY LEVEL SWITCHES

Replace With:

2.8 CONDUCTIVITY LEVEL SWITCHES

.1 General:

- .1 Level switches are used for determining leaks in the WWTP. Contractor to install relays in control panel. Probe wiring to be run from location of measurement to panel.

.2 Applicable Equipment: LS 2217, LS 3417, LS 4617, LS 9917A

.1 Liquid Type:

- .1 Water: LS 2217, LS 3417, LS 4617, LS 9917A

.2 Location:

- .1 Headworks Room: LS 2217
- .2 Treatment Area: LS 3417
- .3 Pump Room: LS 4617
- .4 Mechanical Room: LS 9917A

.3 Specified Equipment: LS 3417, LS 4617, LS 9917A

- .1 Manufacturer: Ametek B/W Controls
- .2 Type: Shielded Wire Suspension Electrodes

- .3 Holder: Cord Grip
- .4 Wetted Parts Material: Stainless Steel
- .5 Relay Power: 120VAC
- .6 Relay Type:
 - .1 High Level Alarm
- .7 Relay Mounting: Standard 8 pin octal base
- .8 Part Numbers:
 - .1 Electrodes: 6013-W6
 - .2 Wire Connectors: 6013-C-SS
 - .3 Wire: 6013-SW-[length in feet as required]
 - .4 Cord Grip Electrode Holders: 6012-CG2
 - .5 Relay: 5400-A-L1
 - .6 Relay Base: 5400-SR
- .9 Mounting: As per manufacturer's requirements.

- .4 Specified Equipment: LS 2217
 - .1 Manufacturer: Ametek B/W Controls
 - .2 Type: Shielded Wire Suspension Electrodes
 - .3 Holder: Cord Grip
 - .4 Wetted Parts Material: Stainless Steel
 - .5 Relay Power: 120VAC
 - .6 Relay Type:
 - .1 High Level Alarm
 - .7 Relay Mounting: Standard 8 pin octal base
 - .8 Part Numbers:
 - .1 Electrodes: 6013-W6
 - .2 Wire Connectors: 6013-C-SS
 - .3 Wire: 6013-SW-[length in feet as required]
 - .4 Cord Grip Electrode Holders: 6012-CG2
 - .5 Relay: 5400-A-L1
 - .6 Relay Base: 5400-SR
 - .9 Mounting: As per manufacturer's requirements.
 - .10 **Classification: Intrinsic Safety, Explosion Proof**

- .5 Tag #'s: LS 2217, LS 3417, LS 4617, LS 9917A

13. **Section 16501 Lighting.**

Delete:

2.5.2 Carries an allowance of \$200 per alternate type, payable to the Owners Representative. Payment shall be made for additional work required by the Owner's Representative to review alternate equipment compliance with NECB and AHJ requirements.

14. **Section 16228 Generator Set.**

Delete:

2.13.5 Wind Rating: Wind rating shall be 195 kph.

Replace With:

2.13.5 Wind Rating: Wind rating shall be 160 kph.

15. Drawing Revisions

<u>Drawing Revisions</u>		
<u>Drawing Number</u>	<u>Delete</u>	<u>Replace With</u>
A1.1	Issue 1: For Tender	Issue 2: For Tender Addendum 2
A1.2	Issue 1: For Tender	Issue 2: For Tender Addendum 2
A5.1	Issue 1: For Tender	Issue 2: For Tender Addendum 2
A11.1	Issue 1: For Tender	Issue 2: For Tender Addendum 2
S1.3	Issue 1: For Tender	Issue 2: For Tender Addendum 2
S2.2	Issue 1: For Tender	Issue 2: For Tender Addendum 2
S3.4	Issue 1: For Tender	Issue 2: For Tender Addendum 2
S4.1	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E0.2	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E0.3	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E1.1	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E1.2	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E1.3	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E1.4	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E1.5	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E1.6	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E1.7	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E1.8	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E1.10	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E1.13	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E2.1	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E2.2	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E2.3	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E2.4	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E2.5	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E2.6	Issue 1: For Tender	Issue 2: For Tender Addendum 2

Drawing Revisions

<u>Drawing Number</u>	<u>Delete</u>	<u>Replace With</u>
E2.8	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E2.10	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E2.11	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E2.13	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E3.1	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E3.2	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E4.2	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E4.3	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E4.4	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E4.5	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E5.2	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E5.3	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E5.5	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E5.6	Issue 1: For Tender	Issue 2: For Tender Addendum 2
E5.8	Issue 1: For Tender	Issue 2: For Tender Addendum 2

END OF ADDENDUM 2

1. GENERAL

1.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- .1 Refer to Division 1 for requirements pertaining to product options and substitutions.

1.2 REFERENCE STANDARDS

- .1 Materials standards to CSA S136-94, ASTM A446 Grade G90, ASTM 446 Grade G90.

1.3 DESIGN

- .1 Design metal panels to provide for thermal movement of component materials caused by ambient temperature range of 120°C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.
- .2 Form metal panels in continuous lengths. Do not use horizontal lap joints.

1.4 SAMPLES

- .1 Submit duplicate samples in accordance with Division 1.
- .2 Samples to be representative of material, finish, colour and profile of specified work.

1.5 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Division 1.
- .2 Clearly indicate dimensions, siding profiles, attachment methods, schedule of wall elevations, trim and closure pieces, soffits, fascia, and related work.

1.6 DELIVERY/STORAGE

- .1 Protect materials from damage by weather or workmen.
- .2 Ensure packaging of prefinished materials permits ventilation.

2. PRODUCTS

2.1 MATERIALS

- .1 Interior Liner, Ceiling Cladding: standard and acoustic steel liner, 28 gauge sheet thickness, low profile surface, prefinished to colour selected by Owner from standard colour range.
- .2 Exterior Cladding: Refer to Section 05550 Steel Building Systems
- .3 Sealant: one component acrylic to CGSB 19-GP-5M, two component polysulphide to CAN/CGSB-19.24-M90, or one component silicone to CAN/CGSB-19.18-M87.

2.2 COMPONENTS

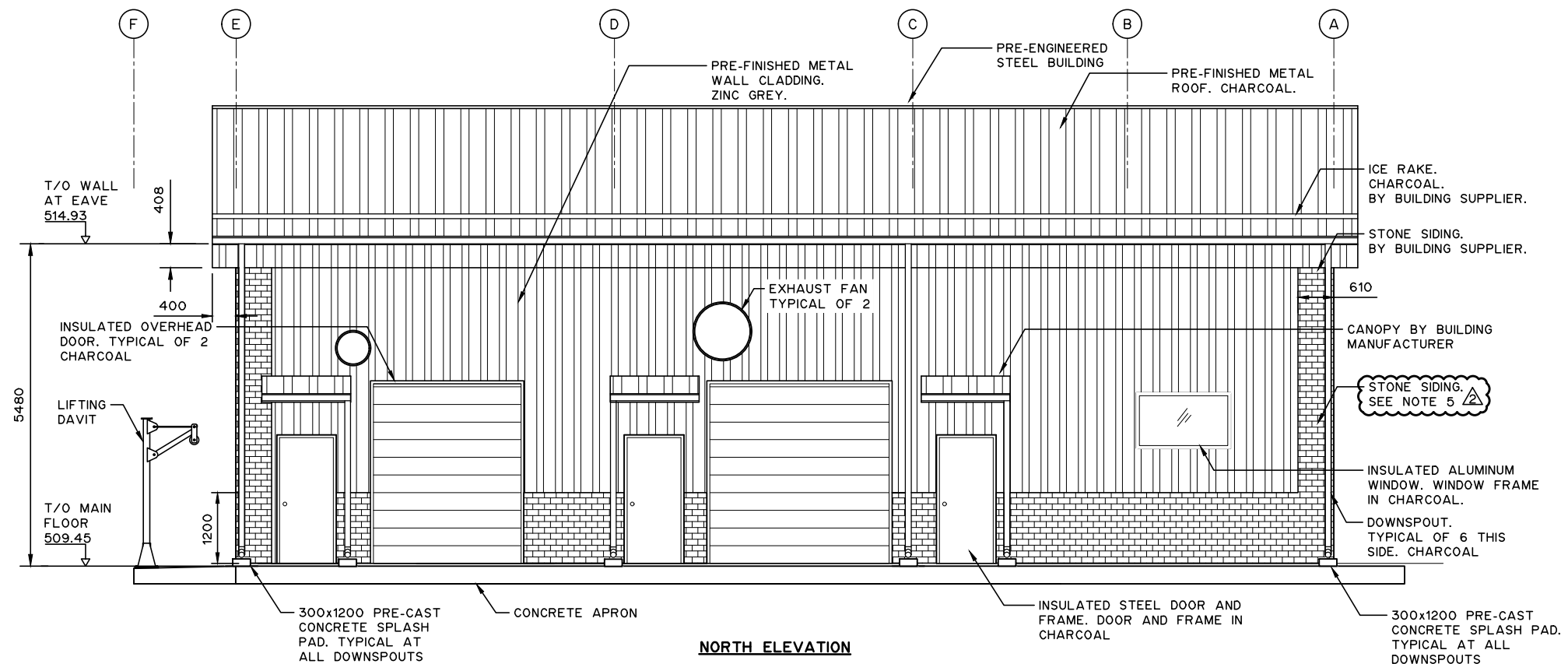
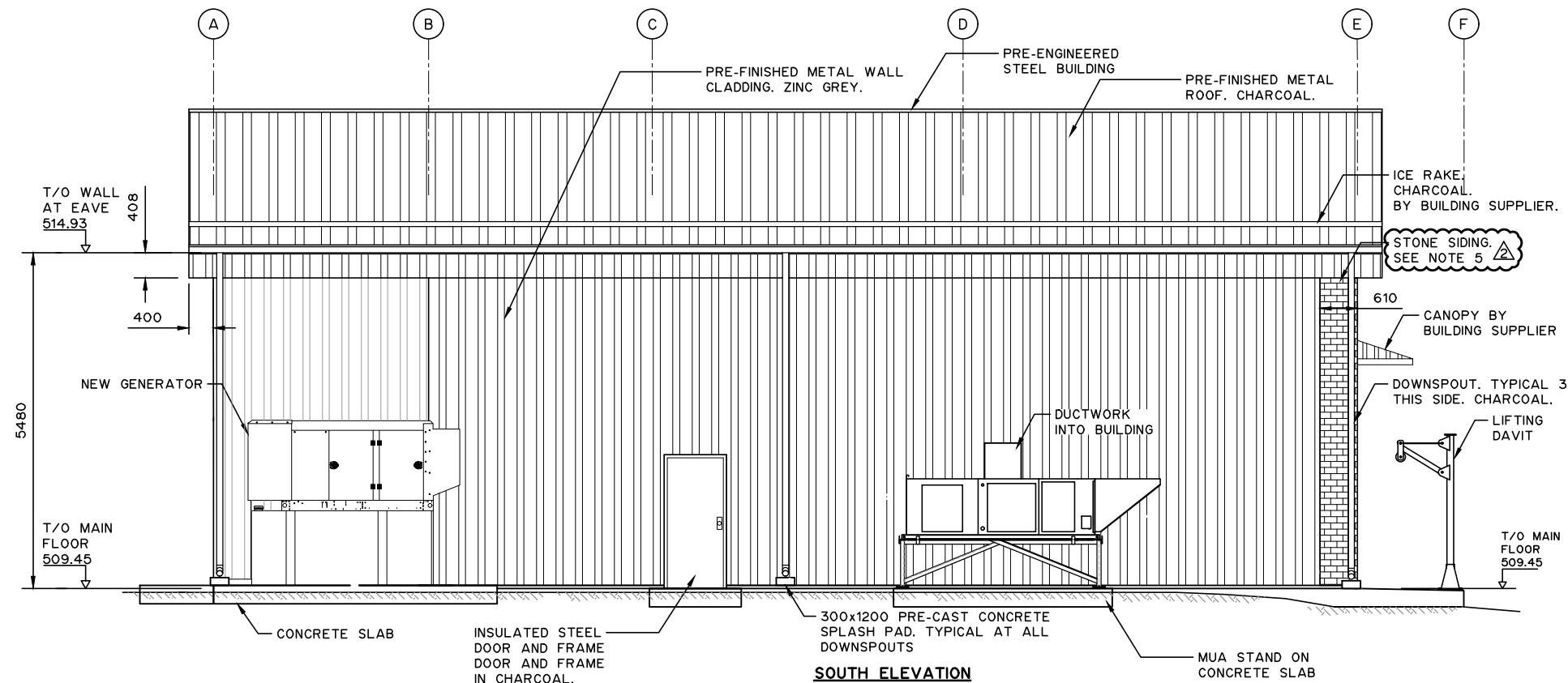
- .1 Exterior Steel Wall Cladding: Refer to Specification Section 05550 Steel Building Systems.
- .2 Exterior corners: of same profile, material and finish as adjacent material, shop cut and brake formed to right angle, concealed corner brace, hairline exposed joint, pop rivet connections with painted head to match siding.
- .3 Exposed joint: perpendicular to profile, ends of sheet shop cut clean and square, backed with tight fitting filler lapping back of joint, pop rivet connections, all exposed components shall be colour matched to roofing.
- .4 Soffit: Not applicable
- .5 Accessories: exposed trim, closures, cap pieces, etc. of same material and colour as associated cladding.

3. EXECUTION

3.1 INSTALLATION

- .1 Install sill flashings, starter strips, inside corners, edgings, and soffits.
- .2 Install wall cladding, roofing and interior liner to manufacturer/fabricators written instructions.
- .3 Install exterior corners, fillers and closure strips with carefully formed and profiled work. Install with concealed fasteners.
- .4 Maintain joints in exterior sheets, true to line, tight fitting.
- .5 Caulk joints, seams and junctions with dissimilar materials, with specified sealant. Refer to Section 07920 for caulking technique and workmanship.

END OF SECTION



NOTES:

- ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
- BUILDING EXTERIOR COLOUR FINISH AS FOLLOWS:
EXTERIOR WALL CLADDING: ZINC GREY
ROOF, ICE RAKE, FASCIA, EAVESTROUGH, DOWNSPOUT, DOOR (MANDOOR AND OVERHEAD DOORS) AND WINDOWS: CHARCOAL
ALL OTHER FINISH COLOURS NOT SPECIFIED. TO BE SELECTED BY OWNER FROM STANDARD RANGE.
- REFER TO OTHER DISCIPLINE'S DRAWINGS FOR EXACT LOCATIONS OF MECHANICAL, ELECTRICAL AND PROCESS EQUIPMENT.
- REFER TO CIVIL DRAWING FOR SITE GRADING DETAILS.
- STONE SIDING TO BE BEONSTONE PANELIZED STONE SIDING BY OLDCASTLE OR ENGINEER APPROVED EQUAL. CLASSIC COLLECTION. COLOUR TO BE SELECTED BY OWNER FROM ENTIRE RANGE AVAILABLE. COMPLETE WITH ALL NECESSARY ACCESSORIES INCLUDING SILL CAP AND METAL FURRING. FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS. COORDINATE WITH BUILDING MANUFACTURER FOR ADDITIONAL SUPPORTS BEHIND STONE SIDING. SUBMIT SAMPLE OF SIDING FOR REVIEW PRIOR TO ORDERING.

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS

1	20-10-15	FOR TENDER
ISSUE	YY-MM-DD	REVISION

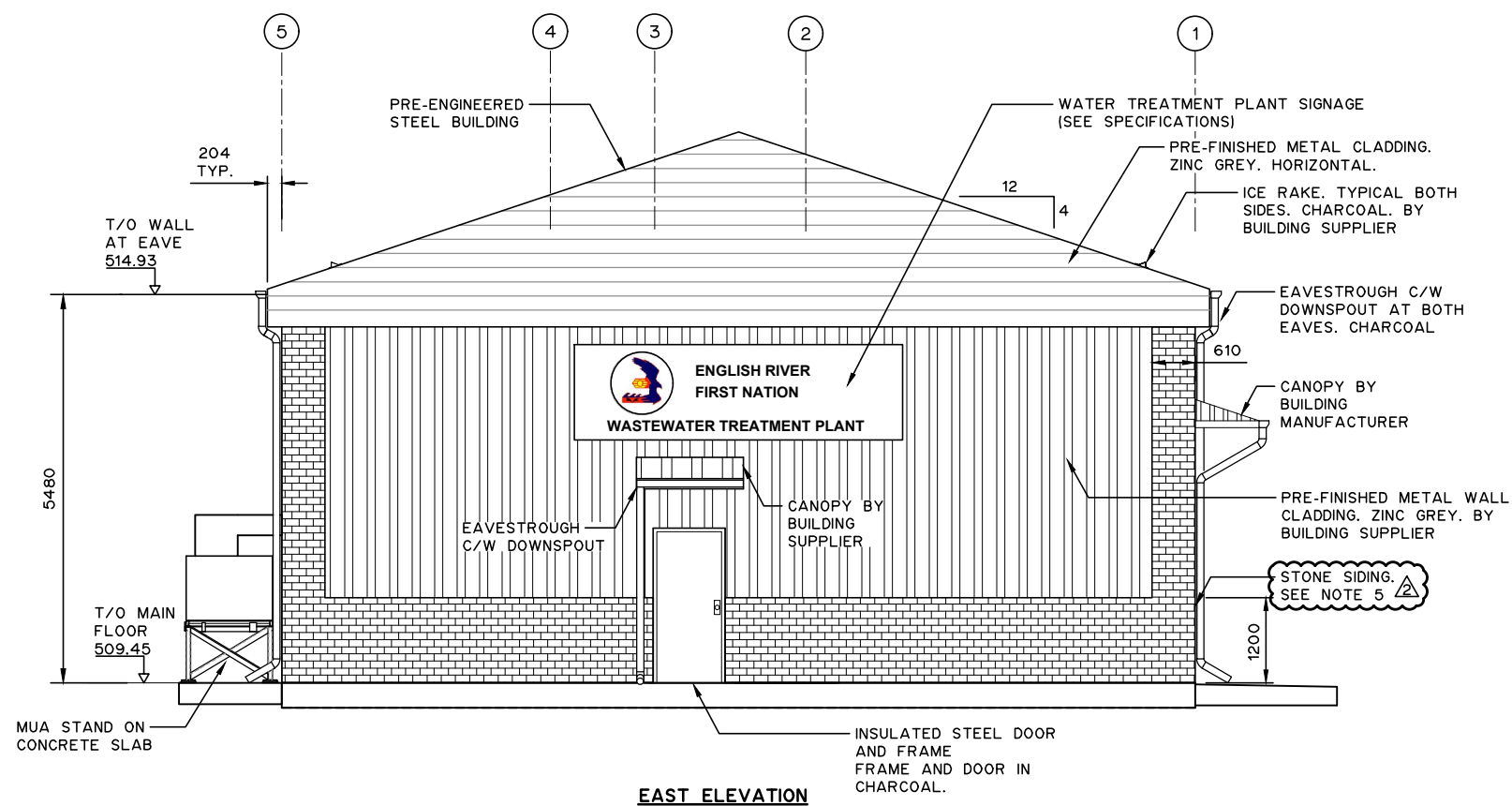
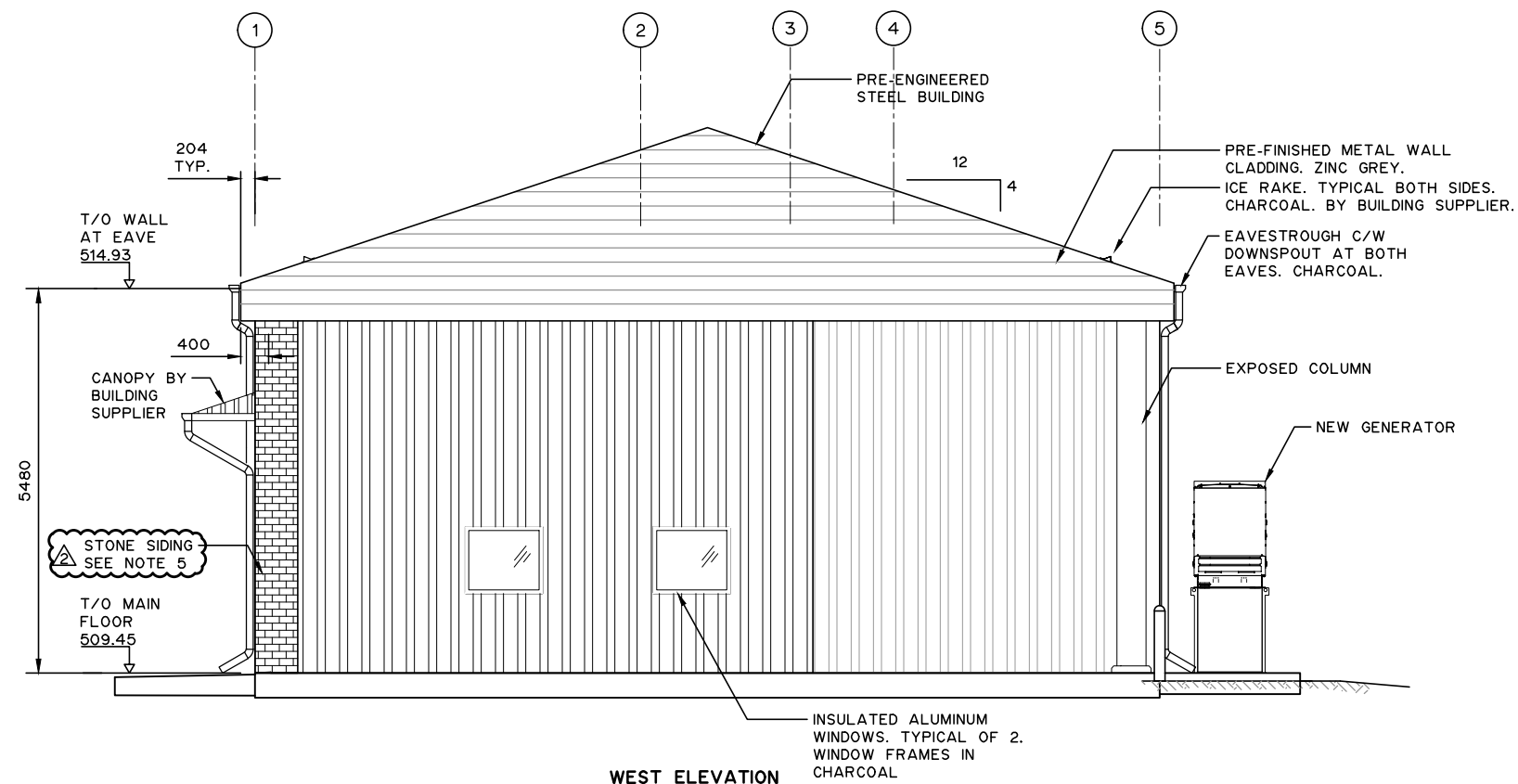
Association of Professional Engineers & Geoscientists of Saskatchewan			
CERTIFICATE OF AUTHORIZATION			
MPE Engineering Ltd. Number C1334			
Discipline	Sk. Reg. No.		Signature
STRUCTURAL	34196		



ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
ARCHITECTURAL
ELEVATIONS

DESIGNED	W.W.L.S.	JOB	7603-002-00
DRAWN	D.F.F.	SCALE	1:100
DATE	NOVEMBER 2020	DRAWING	A.11



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. BUILDING EXTERIOR COLOUR FINISH AS FOLLOWS:
EXTERIOR WALL CLADDING: ZINC GREY
ROOF, ICE RAKE, FASCIA, EAVESTROUGH, DOWNSPOUT, DOOR (MANDOOR AND OVERHEAD DOORS) AND WINDOWS: CHARCOAL
ALL OTHER FINISH COLOURS NOT SPECIFIED. TO BE SELECTED BY OWNER FROM STANDARD RANGE.
3. REFER TO OTHER DISCIPLINE'S DRAWINGS FOR EXACT LOCATIONS OF MECHANICAL, ELECTRICAL AND PROCESS EQUIPMENT.
4. REFER TO CIVIL DRAWING FOR SITE GRADING DETAILS.
5. STONE SIDING TO BE BEONSTONE PANELIZED STONE SIDING BY OLDCASTLE OR ENGINEER APPROVED EQUAL. CLASSIC COLLECTION. COLOUR TO BE SELECTED BY OWNER FROM ENTIRE RANGE AVAILABLE. COMPLETE WITH ALL NECESSARY ACCESSORIES INCLUDING SILL CAP AND METAL FURRING. FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS. COORDINATE WITH BUILDING MANUFACTURER FOR ADDITIONAL SUPPORTS BEHIND STONE SIDING. SUBMIT SAMPLE OF SIDING FOR REVIEW PRIOR TO ORDERING.

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ISSUE	YY-MM-DD	REVISION

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Number C1334

Permission to Consult held by

Discipline	Sk. Reg. No.	Signature
<u>STRUCTURAL</u>	<u>34196</u>	<u>[Signature]</u>
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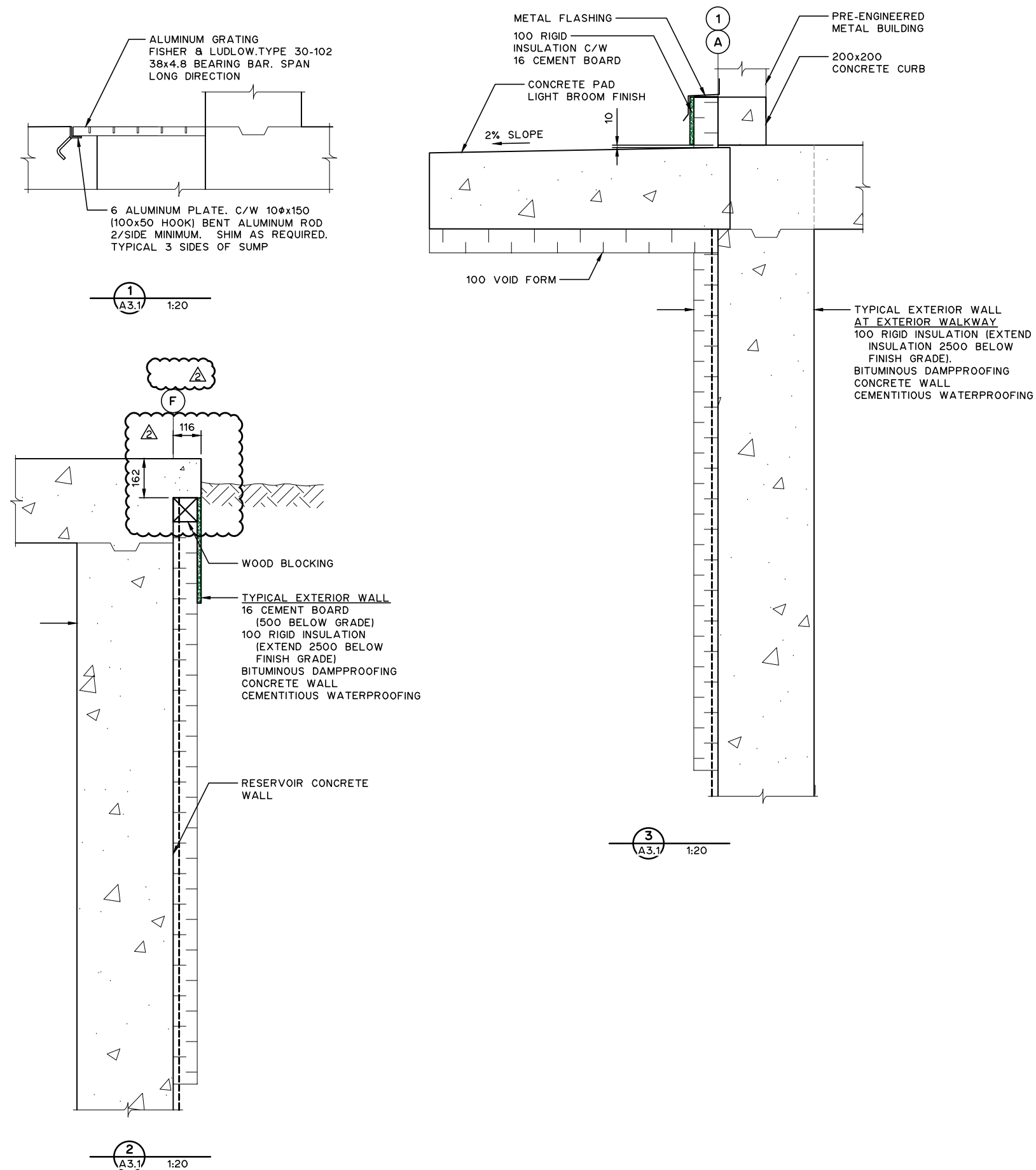
Stamp: PROFESSIONAL ENGINEER
W. SUNG
MEMBER 34196
2020 11 18
YR. MN. DAY
SASKATCHEWAN



ENGLISH RIVER PROPERTY
MANAGEMENT

WASTEWATER TREATMENT PLANT ARCHITECTURAL ELEVATIONS

DESIGNED	W.W.L.S.	JOB	7603-002-00
DRAWN	D.F.F.	SCALE	1:100
DATE	NOVEMBER 2020	DRAWING	A1.2



- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. BITUMEN COATING IS REQUIRED FOR ALL ALUMINUM SURFACE AREAS THAT ARE IN CONTACT WITH CONCRETE.

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DESIGNED	W.W.L.S.	JOB	7603-002-00
DRAWN	D.F.F.	SCALE	AS SHOWN
DATE	NOVEMBER 2020	DRAWING	A5.1

- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. CONTRACTOR TO PROVIDE HOISTS WITH SERIAL NUMBERS, LOADING RATES AND ENGINEERED DRAWINGS. MONORAIL AND HOISTS TO BE TESTED BY CERTIFIED AGENCY.

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS

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STRUCTURAL	34196	

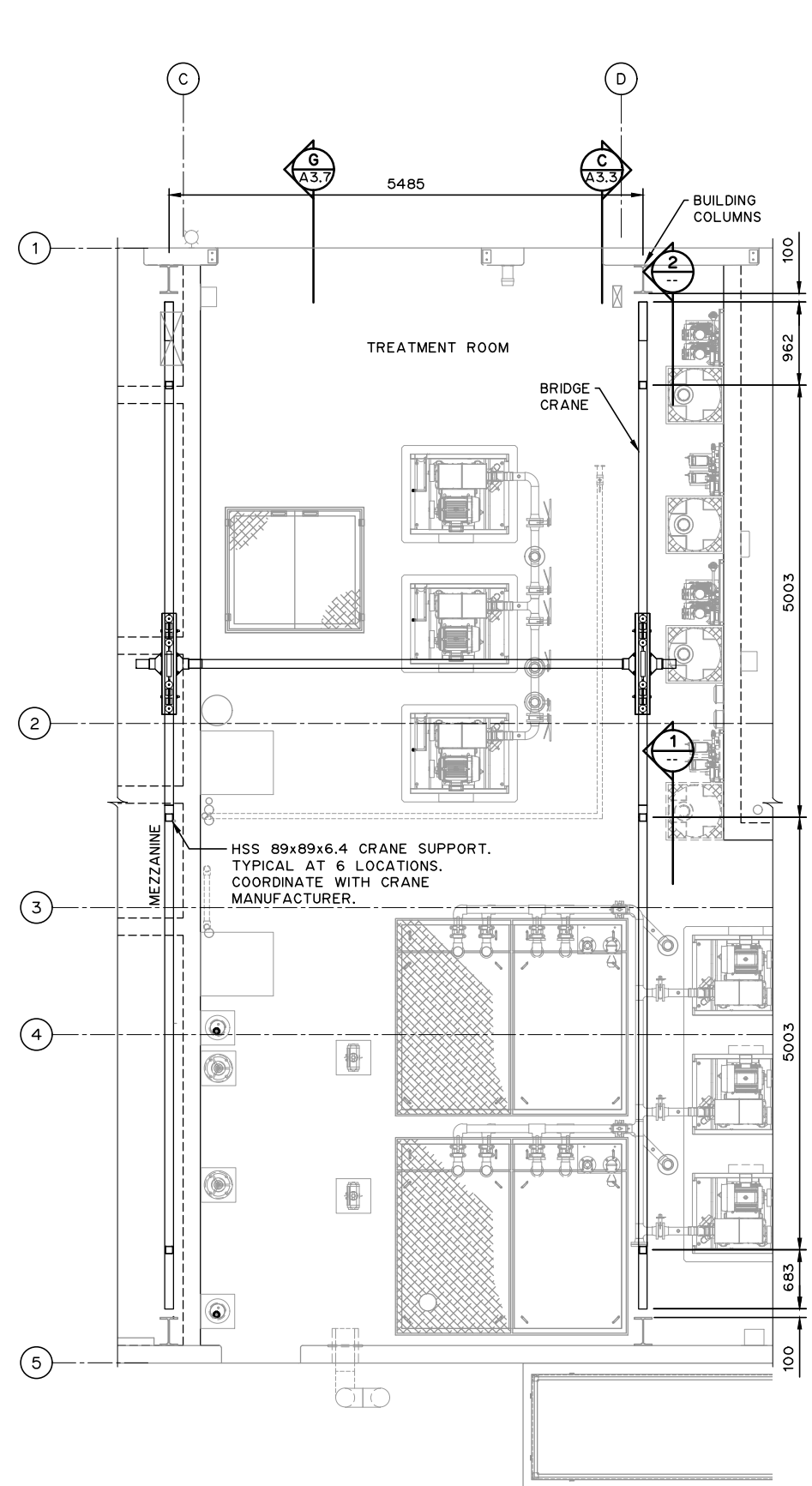
Engineering Ltd.

ENGLISH RIVER PROPERTY MANAGEMENT

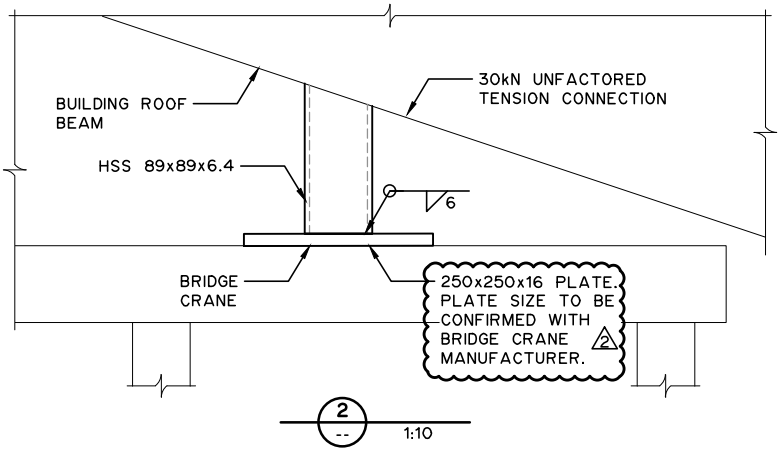
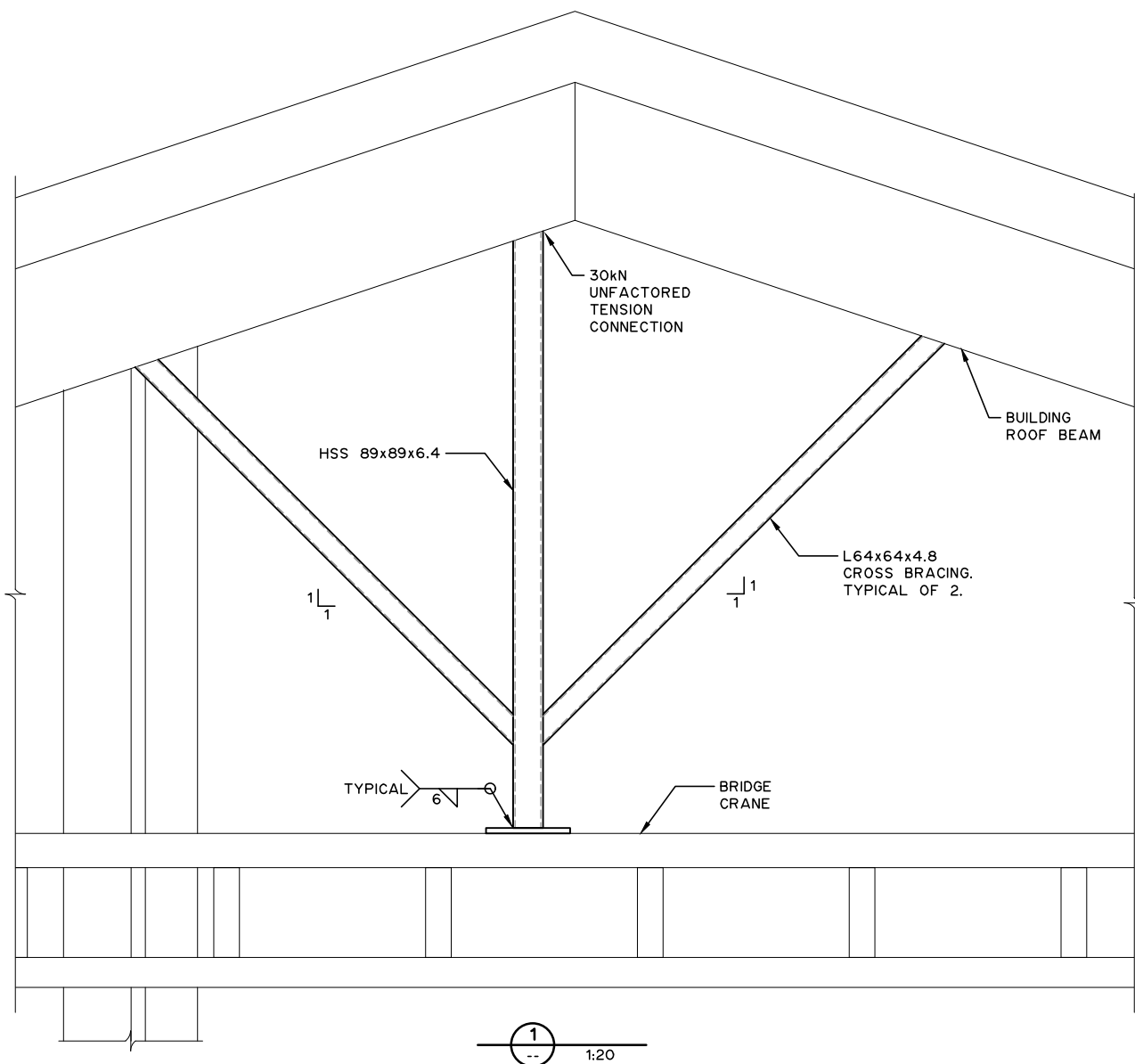
WASTEWATER TREATMENT PLANT ARCHITECTURAL

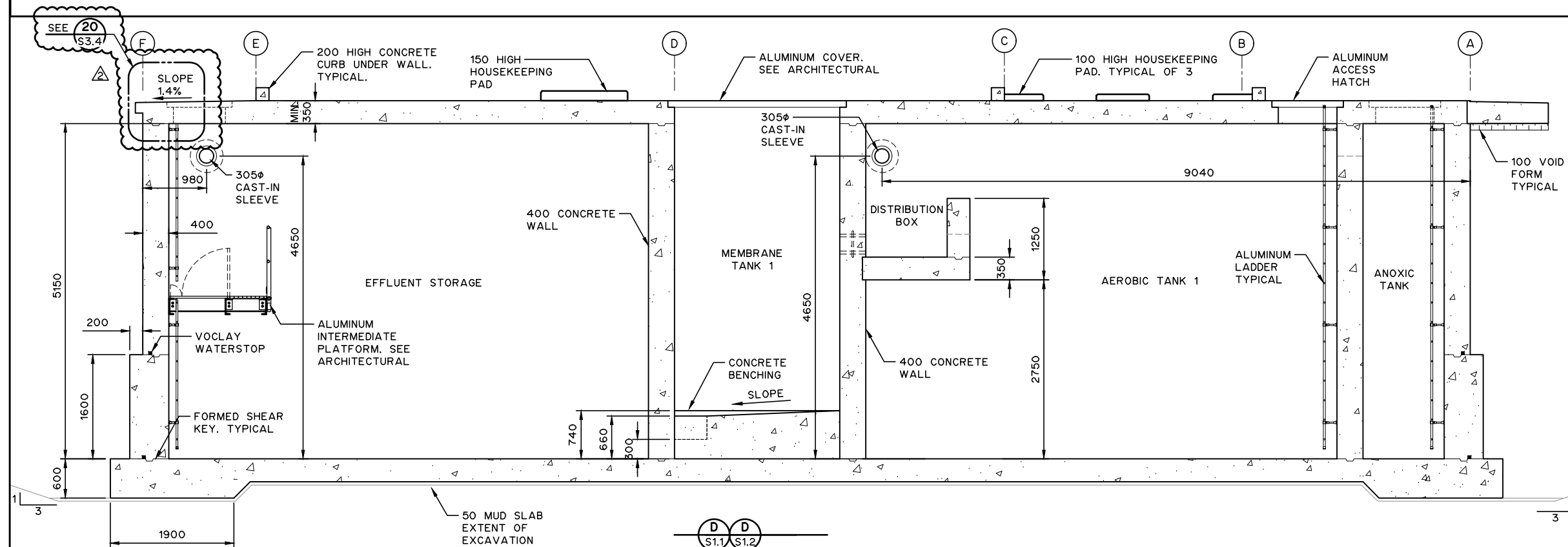
BRIDGE CRANE PLAN AND DETAILS

DESIGNED	W.W.L.S.	JOB	7603-002-00
DRAWN	D.F.F.	SCALE	AS SHOWN
DATE	NOVEMBER 2020	DRAWING	A11.1





BRIDGE CRANE DETAIL
1:75





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Discipline STRUCTURAL	S/E Reg. No. 34196	Signature 
		



WASTEWATER TREATMENT PLANT
STRUCTURAL
CONCRETE SECTIONS

DESIGNED	I.K., W.W.L.S.	JOB	7603-002-00
DRAWN	D.F.F.	SCALE	1:75
DATE	NOVEMBER 2020	DRAWING	S2.2

12. PROVIDE FORMED 38x89 SHEAR KEY AT ALL POUR BREAKS. PROVIDE VOCLAY WATERSTOP IN ALL CONSTRUCTION JOINTS IN EXTERIOR WALLS AND SLABS. PROVIDE VOCLAY WATERSTOP AT BOTTOM OF INTERIOR WALLS THAT SEPARATE PUMP ROOM AND ADJACENT RESERVOIRS.	13. CONTRACTOR TO ENSURE CONTINUITY OF WATERSTOPS, ESPECIALLY FROM VERTICAL TO HORIZONTAL.
---	--

- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. SEE DRAWING S4.1 FOR TYPICAL REINFORCING DETAILS.
 3. 20 CHAMFER ALL EXPOSED CONCRETE EDGES.
 4. COORDINATE ALL CAST-IN ALUMINUM COMPONENTS WITH ARCHITECTURAL.
 5. CAST-IN SLEEVE C/W LEAK PLATE FOR ALL PENETRATIONS. LEAK SEAL AND LEAK PLATE MIGHT NOT BE SHOWN IN THE DRAWING. SEE PROCESS FOR DETAIL.
 6. SEE SPECIFICATIONS SECTION 03300 3.3.6 FOR CONDUITS AND PIPES INSTALLED IN SLAB.
 7. PROVIDE FORMED 38x89 SHEAR KEY AT ALL POUR BREAKS. PROVIDE VOCLAY WATERSTOP IN ALL CONSTRUCTION JOINTS IN EXTERIOR WALLS AND SLABS. PROVIDE VOCLAY WATERSTOP AT BOTTOM OF INTERIOR WALLS THAT SEPARATE PUMP ROOM AND ADJACENT RESERVOIRS.

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STRUCTURAL	34196	

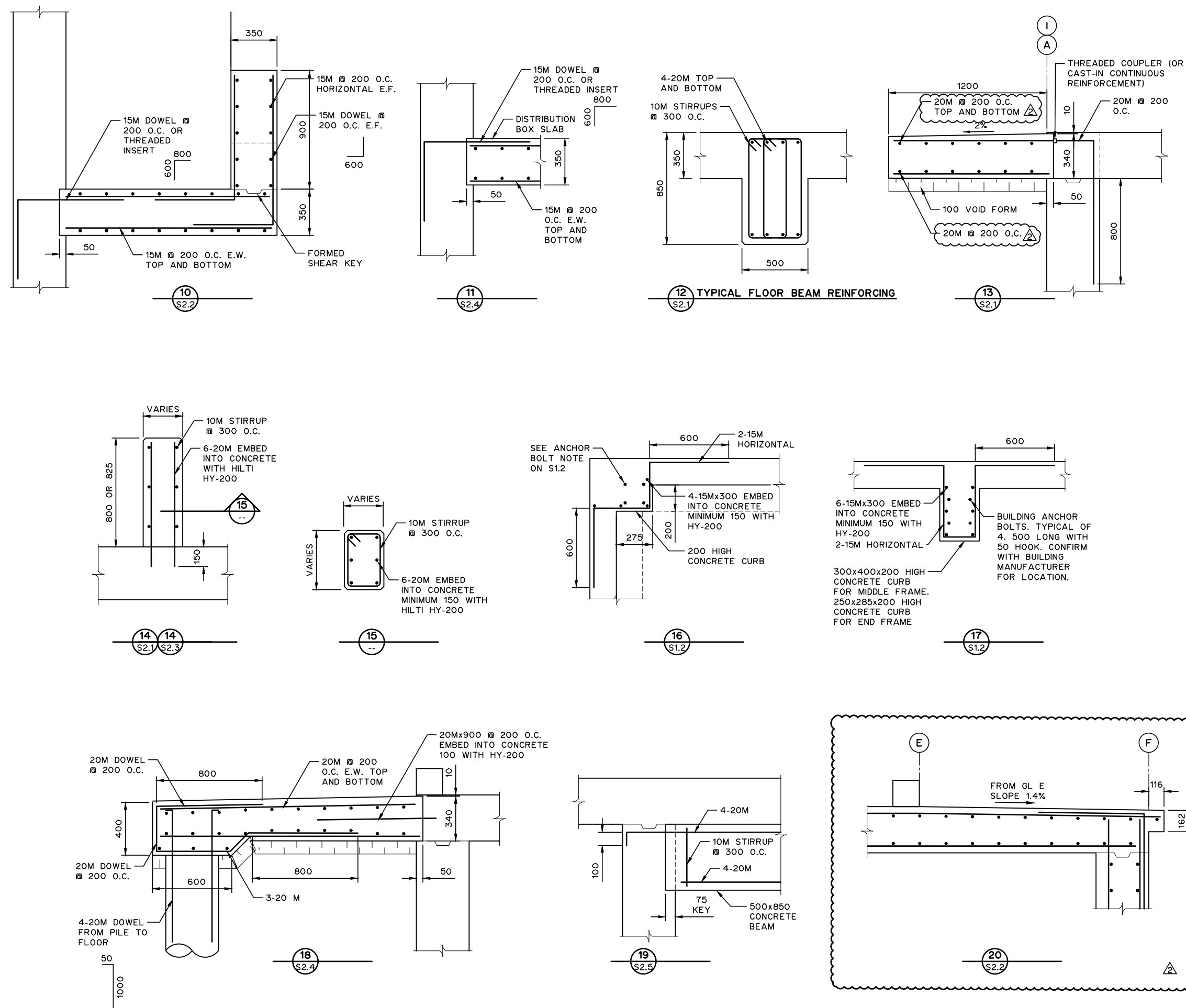
PROFESSIONAL ENGINEER
W. SUNG
MEMBER 34196
2020/11/18
YR. MNL. DAY
SASKATCHEWAN

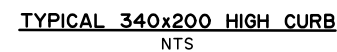
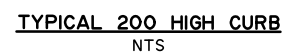
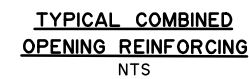
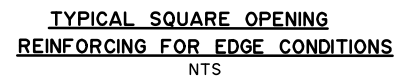
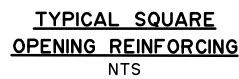
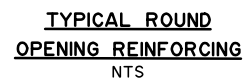


ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
STRUCTURAL
REINFORCING DETAILS

DESIGNED	W.W.L.S.	JOB	7603-002-00
DRAWN	D.F.F.	SCALE	1:30
DATE	NOVEMBER 2020	DRAWING	S3.4





2

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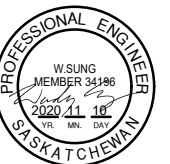
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Number C1334

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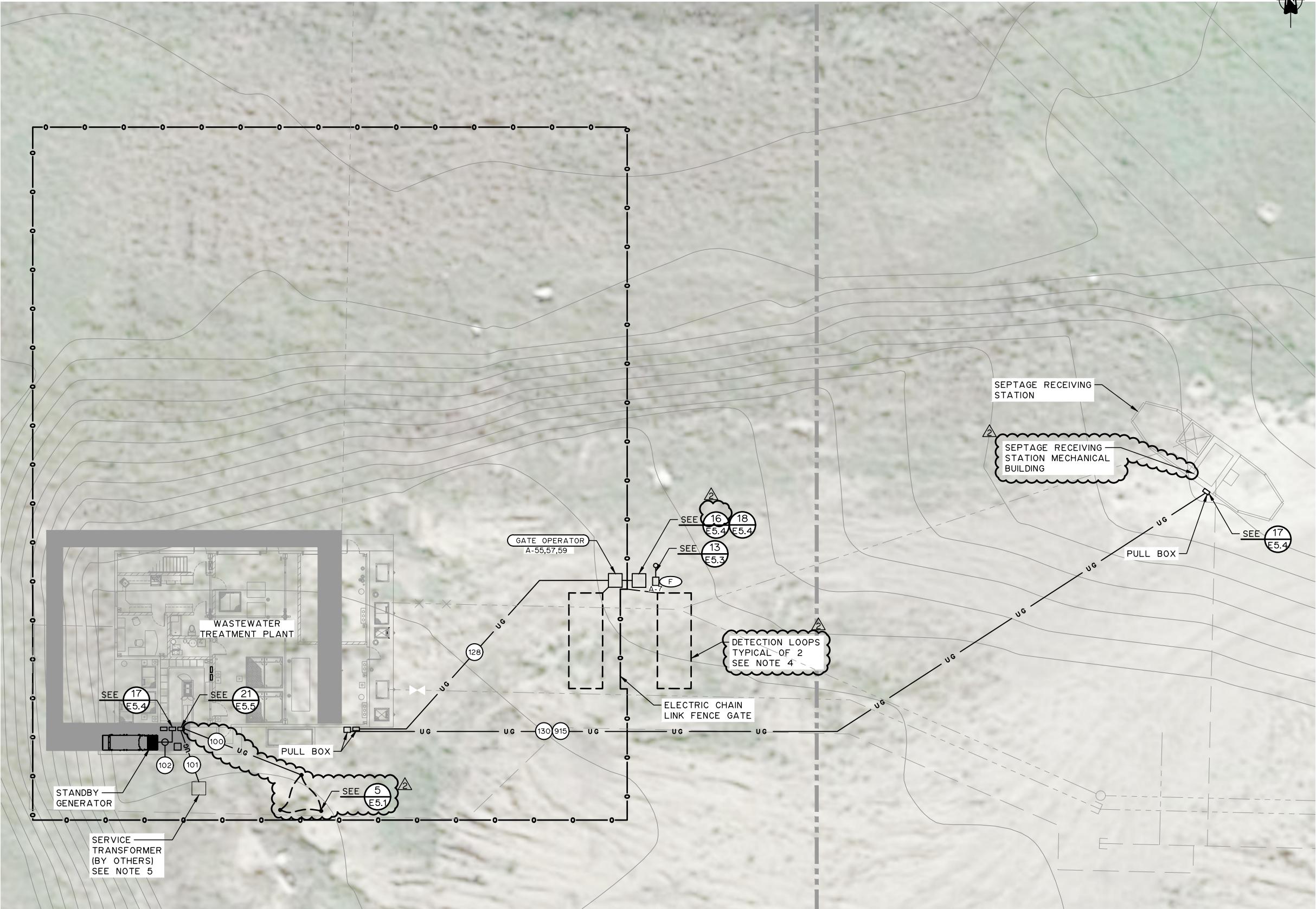
Discipline	Sk. Reg. No.	Signature
<u>STRUCTURAL</u>	<u>34196</u>	<u></u>
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ENGLISH RIVER PROPERTY
MANAGEMENT

WASTEWATER TREATMENT PLANT STRUCTURAL DETAILS

DESIGNED	W.W.L.S.	JOB	7603-002-00
DRAWN	D.F.F.	SCALE	1:30
DATE	NOVEMBER 2020	DRAWING	S4.1



- NOTES:
1. FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.
 2. --- SEE CONDUIT AND CABLE SCHEDULES ON E-DRAWING SERIES.
 3. ○ SEE LUMINAIRE SCHEDULE.
 4. DETECTION LOOP AND GATE OPERATOR SUPPLIED BY GATE MANUFACTURER. ELECTRICAL CONTRACTOR TO PROVIDE AND INSTALL ALL WIRING, CONDUIT AND LOCAL WEATHERPROOF DISCONNECT.
 5. CONTRACTOR TO COORDINATE AND CONFORM TO ELECTRIC UTILITY REQUIREMENTS FOR NEW SERVICE INSTALLATION.

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS

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MPE Engineering Ltd.

Number C1334

Permission to Consult held by:

Discipline Sk. Reg. No. Signature

ELECTRICAL 32675

PROFESSIONAL ENGINEER

R.G. OFSHE

MEMBER 32675

2020-11-12

YR. MN. DAY

SASKATCHEWAN

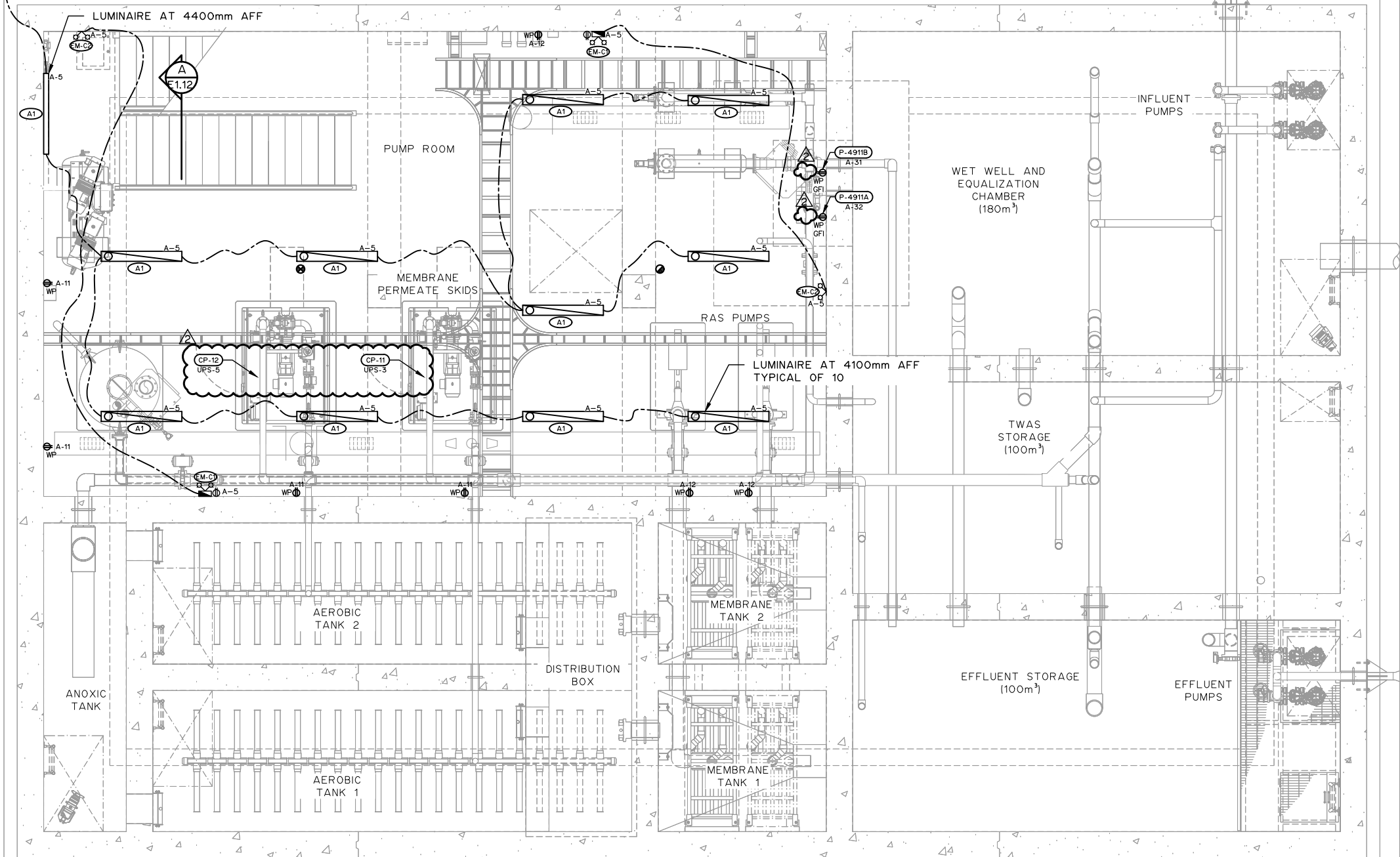


ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
ELECTRICAL
SITE PLAN

DESIGNED	R.G.O.	JOB	7603-002-00
DRAWN	T.S.	SCALE	1:300
DATE	NOVEMBER 2020	DRAWING	E0.2

CONTINUED
FROM DWG. E1.3

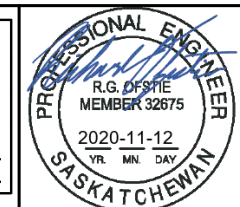


- NOTES:
1. FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.

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Discipline Sk. Reg. No. Signature
ELECTRICAL 32675



ENGLISH RIVER PROPERTY
MANAGEMENT

WASTEWATER TREATMENT PLANT
ELECTRICAL
LIGHTING AND RECEPTACLE LOWER
LEVEL PLAN


DESIGNED	R.G.O.	JOB	7603-002-00
DRAWN	T.S.	SCALE	N.T.S.
DATE	NOVEMBER 2020	DRAWING	E1.3



1. FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.
2. --- SEE CONDUIT AND CABLE SCHEDULES ON E-DRAWINGS SERIES.
3. CP-1 TO BE PROVIDED BY SUEZ. CONTRACTOR TO INSTALL CONTROL PANEL AND TERMINATE DEVICES ACCORDING TO PID P1.x SERIES DRAWINGS AND PANEL DRAWINGS.
4. CP-2 TO BE PROVIDED BY OTHERS. CONTRACTOR TO INSTALL CONTROL PANEL AND TERMINATE DEVICES ACCORDING TO PID P1.x SERIES DRAWINGS AND PANEL DRAWINGS. PANEL DRAWINGS TO BE PROVIDED AT TIME OF CONSTRUCTION.
5. INSTALL 900W x 1200H x 25D PLYWOOD BACKBOARD FOR TELCO EQUIPMENT. PAINT TO MATCH WALLS.

THIS DRAWING MAY HAVE BEEN MODIFIED
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NOTATIONS INDICATED ARE BASED ON
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Discipline ELECTRICAL	32675



2020-11-12

YR. MN. DAY



WASTEWATER TREATMENT PLANT

ELECTRICAL

ELECTRICAL ROOM LAYOUT

DESIGNED	R.G.O	JOB	7603-002-00
DRAWN	T.S.	SCALE	1:30
DATE	NOVEMBER 2020	DRAWING	E1.7



NOTES:
1. FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.

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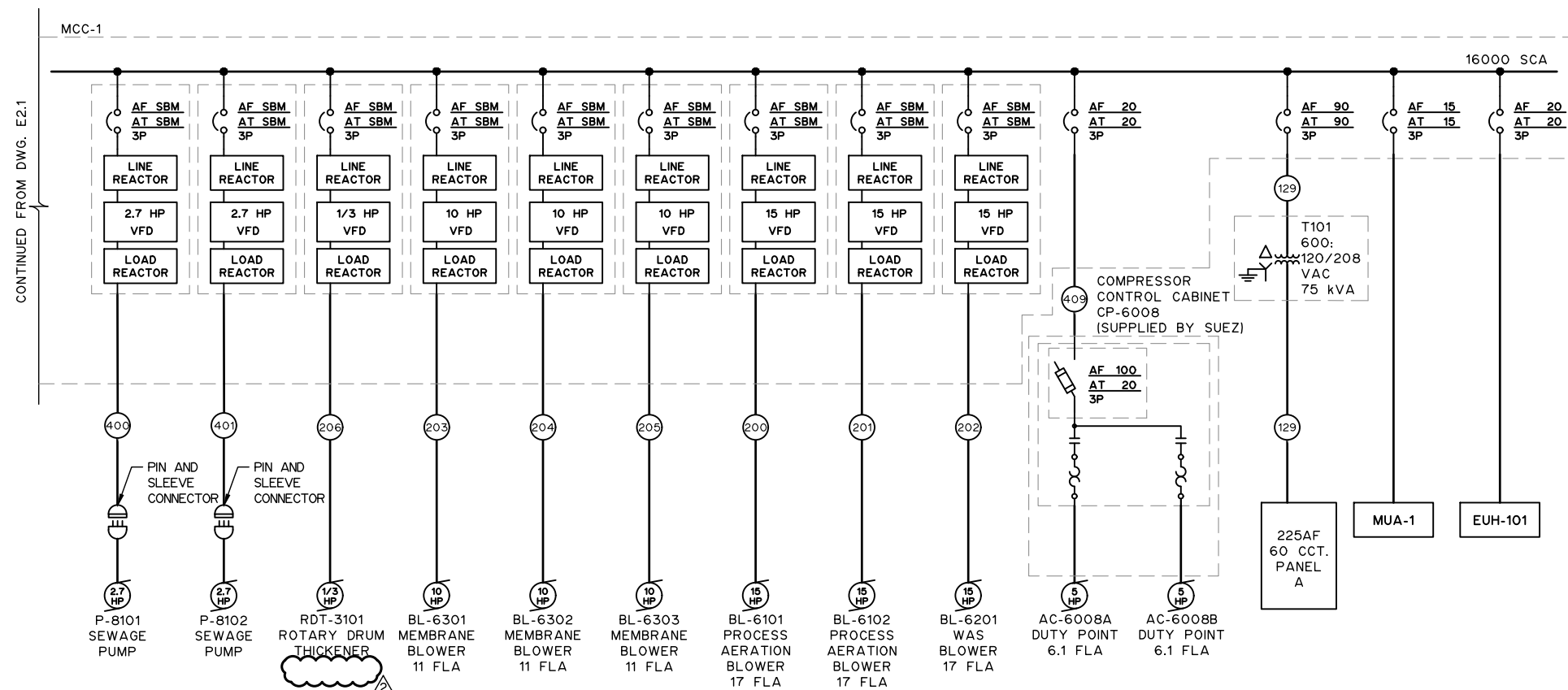
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Discipline Sk. Reg. No. Signature
ELECTRICAL 32875


PROFESSIONAL ENGINEER
R.G. OFS/IE
MEMBER 32875
2020-11-12
YR. MN. DAY
SASKATCHEWAN

ENGLISH RIVER PROPERTY MANAGEMENT

ELECTRICAL
ELECTRICAL ROOM SECTION


DESIGNED	R.G.O	JOB	7603-002-00
DRAWN	T.S.	SCALE	1:20
DATE	NOVEMBER 2020	DRAWING	E1.10



- NOTES:
1. FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.
 2. SBM = SIZED BY MANUFACTURER. SIZE OVER CURRENT DEVICE AND CABLING AS PER MANUFACTURERS RECOMMENDATIONS.
 3.  SEE CONDUIT AND CABLE SCHEDULES ON E-DRAWINGS SERIES.
 4. SEE MCC LINE UP FOR PROPOSED MCC LAYOUT AND DIMENSIONS.
 5. SEE MOTOR STARTER DETAILS ON E-DRAWING SERIES.

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Discipline ELECTRICAL	Sk. Reg. No. 32675	Signature 
2020-11-12 YR. MN. DAY		



ENGLISH RIVER PROPERTY
MANAGEMENT

WASTEWATER TREATMENT PLANT
ELECTRICAL
SINGLE LINE DIAGRAM


DESIGNED	R.G.O	JOB	7603-002-00
DRAWN	T.S.	SCALE	N.T.S.
DATE	NOVEMBER 2020	DRAWING	E2.2

CONDUIT AND CABLE SCHEDULE										
COND. No.	COND. TAG	DESCRIPTION	LOCATION	CONDUIT SIZE AND TYPE	TAG / FROM	TO	WIRE TYPE	No. OF WIRES	WIRE SIZE	REMARKS
100	A	GROUND	WWTP EXTERIOR	N/A	GROUND GRID	MAIN BREAKER	BARE COPPER	1	6 AWG	GROUND GRID
101	A	SECONDARY SERVICE CONDUCTORS	WWTP EXTERIOR	2-63ø DB2 IN CONCRETE DUCT BANK 2-53ø RIGID STEEL	SERVICE TRANSFORMER	SERVICE ENTRANCE SPLITTER	R90 AL	4 IN EACH	250 KCMIL	600 VAC POWER
					SERVICE ENTRANCE SPLITTER	MAIN BREAKER	R90	4 IN EACH	3/0 AWG	600 VAC POWER
102	A	GENERATOR	WWTP EXTERIOR	TECK	GEN 9910	ATS 9919	R90	4	250 KCMIL	600 VAC POWER
	B			TECK			R90	4	14 AWG	GENERATOR START SIGNAL (2 SPARE)
	D			TECK		CP-2	R90	6	14 AWG	120 VAC STATUS
	E						R90	3	6 AWG	60A BREAKER PANEL
	F			TECK		NETWORK RACK DATA PATCH PANEL	1-SHIELDED CAT 6 ETHERNET			ETHERNET/IP COMMUNICATIONS
103	A	AUTOMATIC TRANSFER SWITCH	ELECTRICAL ROOM	-	ATS 9919	GENERATOR	-	-	-	SEE GENERATOR
	B			TECK		CP-2	R90	5	14 AWG	24 VDC STATUS (2 SPARE)
104	A	ACTIVE HARMONIC FILTER	ELECTRICAL ROOM	1-63ø RPVC IN SLAB	AHF 101	MCC-1	R90	4	4/0 AWG	600 VAC POWER
	B			1-35ø RPVC IN SLAB			R90	6	10 AWG	CURRENT TRANSFORMER
	C			TECK		CP-2	R90	2	14 AWG	24 VDC STATUS
105	A	SURGE PROTECTION DEVICE (SPD)	ELECTRICAL ROOM	TECK	SPD 101	CP-2	R90	2	14 AWG	24 VDC STATUS
106	A	POWER QUALITY MONITOR	ELECTRICAL ROOM	TECK	PQM 101	CP-2	R90	2	14 AWG	24 VDC STATUS
	B			TECK		NETWORK RACK DATA PATCH PANEL	1-SHIELDED CAT 6 ETHERNET			ETHERNET COMMUNICATIONS
107	A	UNINTERRUPTABLE POWER SUPPLY	ELECTRICAL ROOM	TECK	UPS 101	CP-2	R90	4	14 AWG	24 VDC STATUS
	B			TECK		PANEL A	R90	3	8 AWG	120/208 VAC 1PH POWER
	C			TECK		PANEL UPS	R90	3	8 AWG	120/208 VAC 1PH POWER
108	A	ACCESS CONTROL SYSTEM POWER SUPPLY - ACS PSU	ELECTRICAL ROOM	TECK	ACS PSU	PANEL UPS	R90	2	12 AWG	120 VAC POWER
109	A	ACCESS CONTROL SYSTEM (ACS) MASTER CONTROLLER	ELECTRICAL ROOM	1-27ø EMT	ZS 9911	CP-2	R90	6	14 AWG	24 VDC STATUS AND CONTROL
	B			1-21ø EMT		ACS PSU	R90	2	14 AWG	24 VDC POWER
	C			TECK		NETWORK RACK DATA PATCH PANEL	1-SHIELDED CAT 6 ETHERNET			ETHERNET COMMUNICATIONS
	D						1-21ø EMT	ACS SLAVE 1	BELDEN	1-PAIR
	E		STAIRWELL	1-27ø RPVC - TRANSITION TO 1-27ø EMT IN OFFICE AREAS	ACS MASTER	DOOR 101	HONEYWELL 3206	6	22 AWG	CARD READER
							HONEYWELL 3115	4	18 AWG	ELECTRIC STRIKE
							HONEYWELL 3102	2	22 AWG	DOOR CONTACT
							HONEYWELL 3104	4	22 AWG	MOTION RTE
	F		TREATMENT ROOM	1-27ø RPVC - TRANSITION TO 1-27ø EMT IN OFFICE AREAS	ACS MASTER	DOOR 103	HONEYWELL 3206	6	22 AWG	CARD READER
							HONEYWELL 3115	4	18 AWG	ELECTRIC STRIKE
							HONEYWELL 3102	2	22 AWG	DOOR CONTACT
							HONEYWELL 3104	4	22 AWG	MOTION RTE
A	ELECTRICAL ROOM	1-21ø EMT		ACS PSU	R90	2	14 AWG	24 VDC POWER		
		1-21ø EMT		ACS MASTER	BELDEN	1-PAIR	18 AWG	RS 485 COMMUNICATIONS		
110	C	ACCESS CONTROL SYSTEM (ACS) SLAVE CONTROLLER	TREATMENT ROOM	1-27ø RPVC	ACS SLAVE 1	DOOR 106	HONEYWELL 3206	6	22 AWG	CARD READER
							HONEYWELL 3115	4	18 AWG	ELECTRIC STRIKE
							HONEYWELL 3102	2	22 AWG	DOOR CONTACT
							HONEYWELL 3104	4	22 AWG	MOTION RTE
	D		TREATMENT ROOM	1-27ø RPVC		DOOR 113	HONEYWELL 3206	6	22 AWG	CARD READER
							HONEYWELL 3115	4	18 AWG	ELECTRIC STRIKE
							HONEYWELL 3102	2	22 AWG	DOOR CONTACT
							HONEYWELL 3104	4	22 AWG	MOTION RTE
A	ELECTRICAL ROOM	1-21ø EMT		ACS PSU	R90	2	14 AWG	24 VDC POWER		
		1-21ø EMT		ACS SLAVE 2	BELDEN	1-PAIR	18 AWG	RS 485 COMMUNICATIONS		
111	C	ACCESS CONTROL SYSTEM (ACS) SLAVE CONTROLLER	HEADWORKS	1-27ø RIGID ALUMINUM	ACS SLAVE 2	DOOR 105	HONEYWELL 3206	6	22 AWG	CARD READER
							R90	2	14 AWG	PNEUMATIC STRIKE
							HONEYWELL 3102	2	22 AWG	DOOR CONTACT
							HONEYWELL 3102	2	22 AWG	PUSH TO EXIT BUTTON

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 - SEE ELECTRICAL PANEL AND MECHANICAL EQUIPMENT SCHEDULES FOR ADDITIONAL WIRING REQUIREMENTS.
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 - ALL IN CONCRETE SLAB RIGID ALUMINUM (ALUM) CONDUIT TO HAVE OUTSIDE OF CONDUIT COVERED WITH CORROSION PROTECTIVE COATING BITUMASTIC, ASPHALT BASED PAINT OR PVC COATING.
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Association of Professional Engineers & Geoscientists of Saskatchewan	
CERTIFICATE OF AUTHORIZATION	
MPE Engineering Ltd.	
Number C1334	
Permission to Consult held by:	
Discipline Sk. Reg. No. Signature	
ELECTRICAL 32875	



ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
ELECTRICAL
CABLE AND CONDUIT SCHEDULE



DESIGNED	R.G.O	JOB	7603-002-00
DRAWN	T.S.	SCALE	N.T.S.
DATE	NOVEMBER 2020	DRAWING	E2.5

CONDUIT AND CABLE SCHEDULE										
COND. No.	COND. TAG	DESCRIPTION	LOCATION	CONDUIT SIZE AND TYPE	TAG / FROM	TO	WIRE TYPE	No. OF WIRES	WIRE SIZE	REMARKS
112	A	ACCESS CONTROL SYSTEM (ACS) SLAVE CONTROLLER	ELECTRICAL ROOM	1-21Φ EMT	ACS SLAVE 3	ACS PSU	R90	2	14 AWG	24 VDC POWER
	B			1-21Φ EMT		ACS SLAVE 6	BELDEN	1-PAIR	18 AWG	RS 485 COMMUNICATIONS
	C		HEADWORKS	1-21Φ RIGID ALUMINUM		OVERHEAD DOOR 104	HONEYWELL 3102	2	22 AWG	DOOR CONTACT
	D		TREATMENT ROOM	1-21Φ RPVC		OVERHEAD DOOR 102	HONEYWELL 3102	2	22 AWG	DOOR CONTACT
	E		LAB	1-21Φ RPVC - TRANSITION TO 1-21Φ EMT IN OFFICE AREAS		OFFICE MOTION DETECTOR	HONEYWELL 3104	4	22 AWG	MOTION DETECTOR
	F		OFFICE	1-21Φ RPVC - TRANSITION TO 1-21Φ EMT IN OFFICE AREAS		LAB MOTION DETECTOR	HONEYWELL 3104	4	22 AWG	MOTION MOTION DETECTOR
113	A	SMOKE DETECTOR	ELECTRICAL ROOM	1-21Φ RPVC	SD 9914C	CP-2	R90	2	14 AWG	24 VDC POWER
114	A	TEMPERATURE SWITCH HIGH	ELECTRICAL ROOM	1-21Φ RPVC	TSH 9915C	CP-2	R90	2	14 AWG	24 VDC STATUS
115	A	SMOKE DETECTOR	LABORATORY	1-21Φ EMT	SD 9914B	CP-2	R90	2	14 AWG	24 VDC POWER
116	A	TEMPERATURE SWITCH HIGH	LABORATORY	1-21Φ EMT	TSH 9915B	CP-2	R90	2	14 AWG	24 VDC STATUS
117	A	SMOKE DETECTOR	OFFICE	1-21Φ EMT	SD 9914D	CP-2	R90	2	14 AWG	24 VDC POWER
118	A	TEMPERATURE SWITCH HIGH	OFFICE	1-21Φ EMT	TSH 9915D	CP-2	R90	2	14 AWG	24 VDC STATUS
119	A	SMOKE DETECTOR	MECHANICAL ROOM	1-21Φ EMT	SD 9914A	CP-2	R90	2	14 AWG	24 VDC POWER
120	A	TEMPERATURE SWITCH HIGH	MECHANICAL ROOM	1-21Φ EMT	TSH 9915A	CP-2	R90	2	14 AWG	24 VDC STATUS
121	A	CONDUCTIVITY LEVEL SWITCH	MECHANICAL ROOM	1-21Φ EMT	LS 9917A RELAY	CP-2	R90	2	14 AWG	120 VAC POWER
	B			1-21Φ EMT		CP-2	R90	2	14 AWG	24 VDC STATUS
	C			N/A		LS 9917A PROBES	PRE-MANUFACTURED CABLES		PROBE WIRING	
124	A	TEMPERATURE TRANSMITTER	WWTP EXTERIOR	1-21Φ EMT	TT 9912	CP-2	BELDEN	1-PAIR	18 AWG	ANALOG STATUS - TEMPERATURE
125	A	MAKE UP AIR UNIT	WWTP EXTERIOR	TECK	MUA 101	MCC-1	SEE MECHANICAL SCHEDULE			
	B			TECK		CP-2	R90	3	14 AWG	24 VDC STATUS
126	A	EXHAUST FAN	WWTP EXTERIOR	TECK	EF 101	FVNR EF 101	SEE MECHANICAL SCHEDULE			
	B			TECK		CP-2	R90	3	14 AWG	24 VDC STATUS
127	A	EXHAUST FAN	WWTP EXTERIOR	TECK	EF 102	FVNR EF 102	SEE MECHANICAL SCHEDULE			
	B			TECK		CP-2	R90	3	14 AWG	24 VDC STATUS
128	A	PERIMETER GATE OPERATOR	WWTP EXTERIOR	TECK	PERIMETER GATE OPERATOR	PANEL A	R90	3	12 AWG	208 VAC POWER
	B			TECK		CP-2	R90	4	14 AWG	24 VAC CONTROL
	C			TECK		KEYPAD PEDESTAL	R90	2	14 AWG	24 VAC POWER
	D			TECK			BELDEN	1-PAIR	18 AWG	GATE OPEN COMMAND
	E			TECK		DETECTION LOOP 1	PRE-MANUFACTURED CABLE		VEHICLE DETECTION LOOP	
	F			TECK		DETECTION LOOP 2	PRE-MANUFACTURED CABLE		VEHICLE DETECTION LOOP	
	G			TECK		NETWORK RACK DATA PATCH PANEL	1-CAT 6 ETHERNET		ETHERNET COMMUNICATIONS (SPARE)	
129	A	TRANSFORMER	ELECTRICAL ROOM	TECK	T-101	MCC-1	R90	3	3 AWG	600 VAC POWER
	B			TECK		PANEL A	R90	4	350 KCMIL	120/208 VAC POWER
130	A	SEPTAGE RECEIVING STATION	EXTERIOR	TECK	SEPTAGE RECEIVING STATION	PANEL A	R90	3	2 AWG	120/208 VAC POWER

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ISSUE	YY-MM-DD	REVISION

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Permission to Consult held by:			
Discipline	Sk. Reg. No.	Signature	
<u>ELECTRICAL</u>	<u>32875</u>	<u></u>	
_____	_____	_____	




ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
ELECTRICAL
CABLE AND CONDUIT SCHEDULE


DESIGNED	R.G.O	JOB	7603-002-00
DRAWN	T.S.	SCALE	N.T.S.
DATE	NOVEMBER 2020	DRAWING	E2.6

CONDUIT AND CABLE SCHEDULE										
COND. No.	COND. TAG	DESCRIPTION	LOCATION	CONDUIT SIZE AND TYPE	TAG / FROM	TO	WIRE TYPE	No. OF WIRES	WIRE SIZE	REMARKS
200	A	VARIABLE FREQUENCY DRIVE (VFD)	TREATMENT ROOM	1-35Φ RPVC IN SLAB	VFD 6101	BL 6101	R90	3	12 AWG	600 VAC POWER
	B			1-21Φ RPVC IN SLAB		ES 6101	R90	4	14 AWG	120 VAC EMERGENCY STOP STATUS
	C			TECK		NETWORK RACK DATA PATCH PANEL	1-SHEILDED CAT 6 ETHERNET		ETHERNET/IP COMMUNICATIONS	
	D			TECK		CP-1	R90	2	14 AWG	120 VAC STATUS
	E	FLOW SWITCH LOW		1-35Φ RPVC IN SLAB	FSL 6101		R90	3	14 AWG	24 VDC STATUS AND POWER
201	A	VARIABLE FREQUENCY DRIVE (VFD)	TREATMENT ROOM	1-35Φ RPVC IN SLAB	VFD 6102	BL 6102	R90	3	12 AWG	600 VAC POWER
	B			1-21Φ RPVC IN SLAB		ES 6102	R90	4	14 AWG	120 VAC EMERGENCY STOP STATUS
	C			TECK		NETWORK RACK DATA PATCH PANEL	1-SHEILDED CAT 6 ETHERNET		ETHERNET/IP COMMUNICATIONS	
	D			TECK		CP-1	R90	2	14 AWG	120 VAC STATUS
	E	FLOW SWITCH LOW		1-35Φ RPVC IN SLAB	FSL 6102		R90	3	14 AWG	24 VDC STATUS AND POWER
202	A	VARIABLE FREQUENCY DRIVE (VFD)	TREATMENT ROOM	1-35Φ RPVC IN SLAB	VFD 6201	BL 6201	R90	3	12 AWG	600 VAC POWER
	B			1-21Φ RPVC IN SLAB		ES 6201	R90	4	14 AWG	120 VAC EMERGENCY STOP STATUS
	C			TECK		NETWORK RACK DATA PATCH PANEL	1-SHEILDED CAT 6 ETHERNET		ETHERNET/IP COMMUNICATIONS	
	D			TECK		CP-1	R90	2	14 AWG	120 VAC STATUS
	E	FLOW SWITCH LOW		1-35Φ RPVC IN SLAB	FSL 6201		R90	3	14 AWG	24 VDC STATUS AND POWER

CONDUIT AND CABLE SCHEDULE										
COND. No.	COND. TAG	DESCRIPTION	LOCATION	CONDUIT SIZE AND TYPE	TAG / FROM	TO	WIRE TYPE	No. OF WIRES	WIRE SIZE	REMARKS
300	A	ROTARY DRUM THICKENER POLYMER SYSTEM	TREATMENT ROOM	1-21ø RPVC IN SLAB	CP 7341	PANEL A	 R90	2	12 AWG	120 VAC POWER
	B			1-27ø RPVC IN SLAB		CP-2	R90	16	14 AWG	24 VDC STATUS AND CONTROL
	C			1-21ø RPVC IN SLAB			BELDEN	3-PAIRS	18 AWG	ANALOG CONTROL
301	A	CHEMICAL METERING PUMP (SODIUM HYPOCHLORITE)	TREATMENT ROOM	TECK	P 7741A	PANEL A	R90	2	12 AWG	120 VAC POWER
	B			TECK		CP-1	R90	2	14 AWG	24 VDC STATUS
	C			TECK			BELDEN	1-PAIR	18 AWG	ANALOG CONTROL
302	A	CHEMICAL METERING PUMP (SODIUM HYPOCHLORITE)	TREATMENT ROOM	TECK	P 7741B	PANEL A	R90	2	12 AWG	120 VAC POWER
	B			TECK		CP-1	R90	2	14 AWG	24 VDC STATUS
	C			TECK			BELDEN	1-PAIR	18 AWG	ANALOG CONTROL
303	A	CHEMICAL METERING PUMP (CITRIC ACID)	TREATMENT ROOM	TECK	P 7541A	PANEL A	R90	2	12 AWG	120 VAC POWER
	B			TECK		CP-1	R90	2	14 AWG	24 VDC STATUS
	C			TECK			BELDEN	1-PAIR	18 AWG	ANALOG CONTROL
304	A	CHEMICAL METERING PUMP (CITRIC ACID)	TREATMENT ROOM	TECK	P 7541B	CP-1	R90	2	12 AWG	120 VAC POWER
	B			TECK			R90	2	14 AWG	24 VDC STATUS
	C			TECK			BELDEN	1-PAIR	18 AWG	ANALOG CONTROL
305	A	CHEMICAL METERING PUMP (ALUM)	TREATMENT ROOM	TECK	P 7141A	CP-1	R90	2	12 AWG	120 VAC POWER
	B			TECK			R90	2	14 AWG	24 VDC STATUS
	C			TECK			BELDEN	1-PAIR	18 AWG	ANALOG CONTROL
306	A	CHEMICAL METERING PUMP (ALUM)	TREATMENT ROOM	TECK	P 7141B	CP-1	R90	2	12 AWG	120 VAC POWER
	B			TECK			R90	2	14 AWG	24 VDC STATUS
	C			TECK			BELDEN	1-PAIR	18 AWG	ANALOG CONTROL
307	A	CHEMICAL METERING PUMP (SODIUM HYDROXIDE)	TREATMENT ROOM	TECK	P 7641A	CP-1	R90	2	12 AWG	120 VAC POWER (FUTURE)
	B			TECK			R90	2	14 AWG	24 VDC STATUS (FUTURE)
	C			TECK			BELDEN	1-PAIR	18 AWG	ANALOG CONTROL (FUTURE)
308	A	CHEMICAL METERING PUMP (SODIUM HYDROXIDE)	TREATMENT ROOM	TECK	P 7641A	CP-1	R90	2	12 AWG	120 VAC POWER (FUTURE)
	B			TECK			R90	2	14 AWG	24 VDC STATUS (FUTURE)
	C			TECK			BELDEN	1-PAIR	18 AWG	ANALOG CONTROL (FUTURE)
311	A	WEIGHT INDICATING TRANSMITTER - REMOTE DISPLAY	TREATMENT ROOM	TECK	WIT 7739 / 7539	WE 7739	PRE-MANUFACTURED CABLE		ELEMENT CABLE - LOAD CELLS	
	B			TECK		WE 7539	PRE-MANUFACTURED CABLE		ELEMENT CABLE - LOAD CELLS	
	C			TECK		CP-2	R90	2	14 AWG	120 VAC POWER
312	A	LEVEL SWITCH(S)	TREATMENT ROOM	TECK	LSL 7739	CP-1	BELDEN	2-PAIRS	18 AWG	ANALOG STATUS - WEIGHT
313	A	LEVEL SWITCH(S)	TREATMENT ROOM	TECK	LSL 7539	RI0-1	R90	4	14 AWG	24 VDC POWER AND STATUS
314	A	WEIGHT INDICATING TRANSMITTER - REMOTE DISPLAY	TREATMENT ROOM	TECK	WIT 7132 / 7641	WE 7132	PRE-MANUFACTURED CABLE		ELEMENT CABLE - LOAD CELLS	
	B			TECK		WE 7641	PRE-MANUFACTURED CABLE		ELEMENT CABLE - LOAD CELLS (FUTURE)	
	C			TECK		CP-2	R90	2	14 AWG	120 VAC POWER
315	A	LEVEL SWITCH(S)	TREATMENT ROOM	TECK	LSL 7132	CP-1	BELDEN	2-PAIRS	18 AWG	ANALOG STATUS - WEIGHT
316	A	LEVEL SWITCH(S)	TREATMENT ROOM	TECK	LSL 7641	CP-1	R90	4	14 AWG	24 VDC POWER AND STATUS
317	A	MAGNETIC FLOW METER - REMOTE DISPLAY	TREATMENT ROOM	TECK	FIT 7120	FE 7120	PRE-MANUFACTURED CABLE		ANALOG STATUS	
	B			TECK		CP-1	BELDEN	1-PAIR	18 AWG	HART STATUS - FLOW
	C			TECK			R90	2	14 AWG	120 VAC POWER
318	A	MAGNETIC FLOW METER - REMOTE DISPLAY	TREATMENT ROOM	TECK	FIT 7320	FE 7320	PRE-MANUFACTURED CABLE		ANALOG STATUS	
	B			TECK		CP-2	BELDEN	1-PAIR	18 AWG	HART STATUS - FLOW
	C			TECK			R90	2	14 AWG	120 VAC POWER
320	A	LEVEL SWITCH(S)	TREATMENT ROOM	TECK	LSLL 7326	CP-2	R90	4	14 AWG	24 VDC POWER AND STATUS
321	A	WEIGHT INDICATING TRANSMITTER - REMOTE DISPLAY	TREATMENT ROOM	TECK	WIT 7339	WE 7339	PRE-MANUFACTURED CABLE		ELEMENT CABLE - LOAD CELLS	
	B			TECK		CP-2	R90	2	14 AWG	120 VAC POWER
	C			TECK			BELDEN	1-PAIR	18 AWG	ANALOG STATUS - WEIGHT

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Association of Professional Engineers & Geoscientists of Saskatchewan

CERTIFICATE OF AUTHORIZATION

MPE Engineering Ltd.

Number C1334

Permission to Consult held by:

Discipline ELECTRICAL Sk. Reg. No. 32675 Signature 

PROFESSIONAL ENGINEER

R.G. OFS/IE

MEMBER 32675

2020-11-12

YR. MN. DAY

SASKATCHEWAN



ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
ELECTRICAL
CABLE AND CONDUIT SCHEDULE

DESIGNED	R.G.O	JOB	7603-002-00
DRAWN	T.S.	SCALE	N.T.S.
DATE	NOVEMBER 2020	DRAWING	E2.8

CONDUIT AND CABLE SCHEDULE										
COND. No.	COND. TAG	DESCRIPTION	LOCATION	CONDUIT SIZE AND TYPE	TAG / FROM	TO	WIRE TYPE	No. OF WIRES	WIRE SIZE	REMARKS
900	A	TELEPHONE AND INTERNET SERVICE	ELECTRICAL ROOM	1-53Φ RPVC	SASKTEL PEDESTAL	TELEPHONE DEMARCATION	PULL STRING		PULL STRING	
	B			TECK	TELEPHONE DEMARCATION	NETWORK RACK DATA PATCH PANEL	2-CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
901	A	CONTROL PANEL 1 NETWORK HEAD	ELECTRICAL ROOM	TECK	CP-1	NETWORK RACK DATA PATCH PANEL	1-SHIELDED CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
902	A	CONTROL PANEL 1 NETWORK TAIL	ELECTRICAL ROOM	TECK	CP-1	NETWORK RACK DATA PATCH PANEL	1-SHIELDED CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
903	A	CONTROL PANEL 2 NETWORK HEAD	ELECTRICAL ROOM	TECK	CP-2	NETWORK RACK DATA PATCH PANEL	2-SHIELDED CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS (1 SPARE)	
904	A	CONTROL PANEL 11 NETWORK	PUMP ROOM	TECK	CP-11	CP-1	1-SHIELDED CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
905	A	CONTROL PANEL 12 NETWORK	PUMP ROOM	TECK	CP-12	CP-1	1-SHIELDED CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
906	A	CONTROL PANEL 11 TO 12 NETWORK	PUMP ROOM	TECK	CP-11	CP-12	1-SHIELDED CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
907	A	WIRELESS ACCESS POINT	OFFICE	1-21Φ EMT	WAP-1	NETWORK RACK DATA PATCH PANEL	1-SHIELDED CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
908	A	WIRELESS ACCESS POINT	TREATMENT ROOM	TECK	WAP-2	NETWORK RACK DATA PATCH PANEL	1-SHIELDED CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
909	A	WIRELESS ACCESS POINT	PUMP ROOM	TECK	WAP-3	NETWORK RACK DATA PATCH PANEL	1-SHIELDED CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
910	A	DEVICE BOX 1 - SCADA PC	OFFICE	1-27Φ EMT	DB-1	NETWORK RACK DATA PATCH PANEL	3-CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
	B					TELEPHONE BIX	1-CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
911	A	DEVICE BOX 2 - INTERNET PC	OFFICE	1-27Φ EMT	DB-2	NETWORK RACK DATA PATCH PANEL	3-CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
	B					TELEPHONE BIX	1-CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
912	A	DEVICE BOX 3 - PRINTER/FAX	OFFICE	1-21Φ EMT	DB-3	NETWORK RACK DATA PATCH PANEL	1-CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
	B					TELEPHONE BIX	1-CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
913	A	DEVICE BOX 4 - LABORATORY 1	LABORATORY	1-21Φ EMT	DB-4	TELEPHONE BIX	1-CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
				1-21Φ EMT		NETWORK DATA RACK	2-CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
914	A	DEVICE BOX 5 - LABORATORY 2	LABORATORY	1-21Φ EMT	DB-5	TELEPHONE BIX	1-CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
				1-21Φ EMT		NETWORK DATA RACK	2-CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS	
915	A	SEPTAGE RECEIVING STATION	EXTERIOR	TECK	SEPTAGE RECEIVING STATION CONTROL PANEL	NETWORK RACK DATA PATCH PANEL	2-CAT 6 ETHERNET		SEE I1.1 FOR DEVICE AND PORT DETAILS (1 SPARE)	

- NOTES:
- FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.
 - THE CONDUIT AND CABLE SCHEDULE IS INTENDED TO SHOW THE MAJORITY OF THE POWER AND INSTRUMENTATION CABLE RUNS. INSTALL AND CONNECT ALL CABLES AND CONDUIT TO PROVIDE A COMPLETE AND OPERATIONAL SYSTEM.
 - SEE ELECTRICAL PANEL AND MECHANICAL EQUIPMENT SCHEDULES FOR ADDITIONAL WIRING REQUIREMENTS.
 - LIKE VOLTAGE WIRING CAN BE COMBINED IN COMMON CONDUIT PROVIDING MINIMUM 25% SPARE IN ACCOUNTED FOR IN ADD IN TO CEC CONDUIT FILL REQUIREMENTS. SEPARATE CONDUITS ARE REQUIRED FOR 120VAC, 24VDC, ANALOG SIGNALS, COMMUNICATION.
 - ALL IN CONCRETE SLAB RIGID ALUMINUM (ALUM) CONDUIT TO HAVE OUTSIDE OF CONDUIT COVERED WITH CORROSION PROTECTIVE COATING BITUMASTIC, ASPHALT BASED PAINT OR PVC COATING.
 - IN CONCRETE SLAB CONDUITS TO BE RPVC OR RIGID ALUMINUM.
 - IN CEILING CONDUITS TO BE EMT.
 - SURFACE MOUNT CONDUITS TO BE RPVC AND ARE ONLY PERMITTED FOR VERTICAL RUNS INTO CEILING SPACE AND HORIZONTAL RUNS LESS THAN 600. INSTALL ALL CONDUITS IN WALLS, CEILINGS AND FLOORS UNLESS OTHERWISE INDICATED.
 - ALL CABLING SIZE BASED ON 75° TERMINATION TEMPERATURE.
 - PROVIDE AND INSTALL APPROPRIATELY SIZED GROUND CABLE FOR ALL CABLE RUNS.
 - ALL CABLES ARE TO BE COPPER UNLESS OTHERWISE NOTED.
 - CONTRACTOR TO LABEL ALL CONTROL AND INSTRUMENTATION WIRING AS PER DETAIL 3 ON E5.1.
 - CONTRACTOR TO LABEL ALL POWER CONDUIT AS PER DETAIL 4 ON E5.1.
 - WHERE CONDUIT AND CABLE IS MARKED FUTURE, CONTRACTOR IS TO INSTALL ONLY THE INDICATED CONDUIT BETWEEN THE FUTURE DEVICE AND THE CONDUIT SOURCE.

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS

△	20-11-10	FOR TENDER ADDENDUM 2
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Association of Professional Engineers & Geoscientists of Saskatchewan

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Number C1334

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ELECTRICAL - 32875

PROFESSIONAL ENGINEER

R.G. OFSHE

MEMBER 32875

2020-11-12

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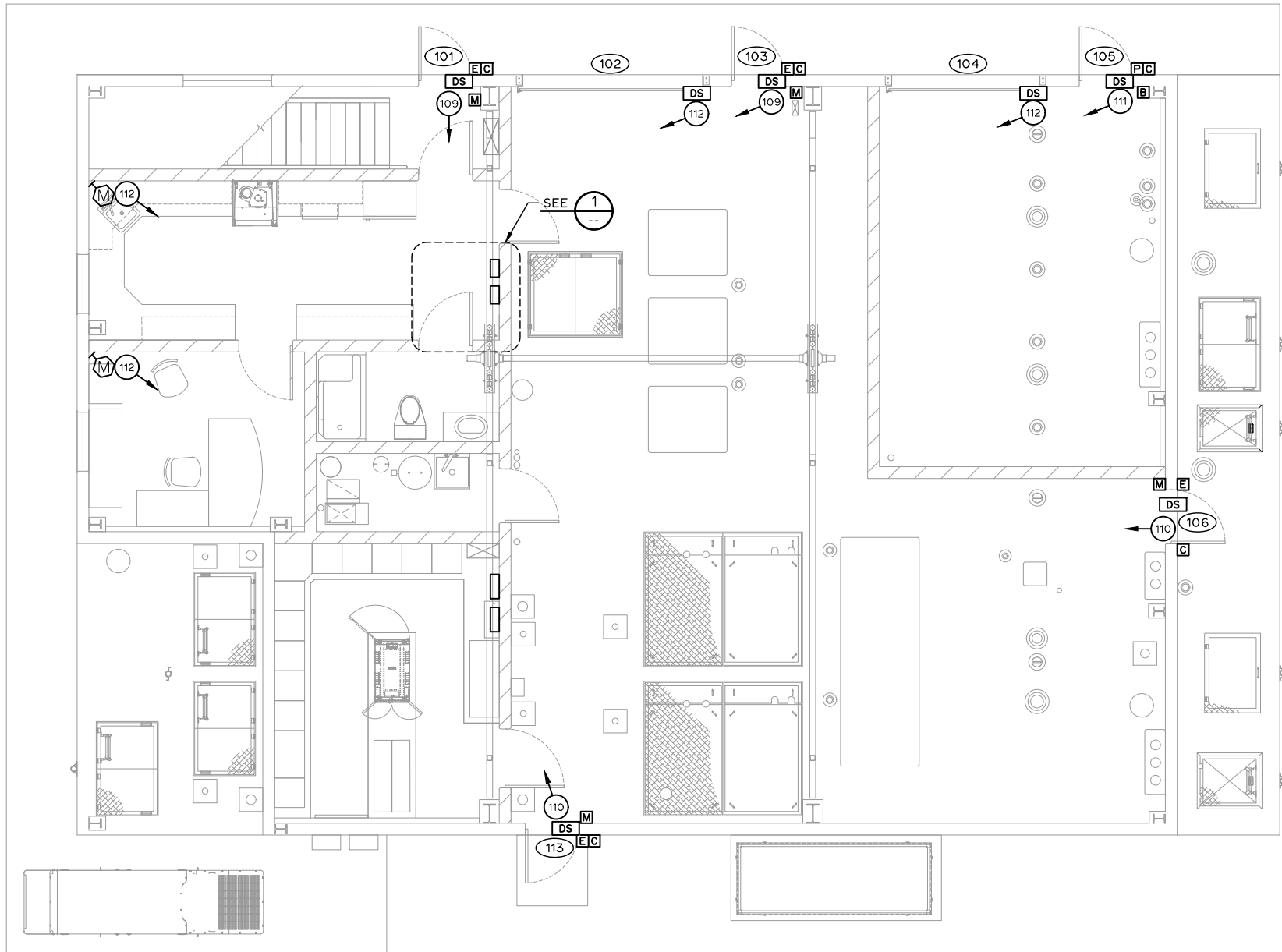
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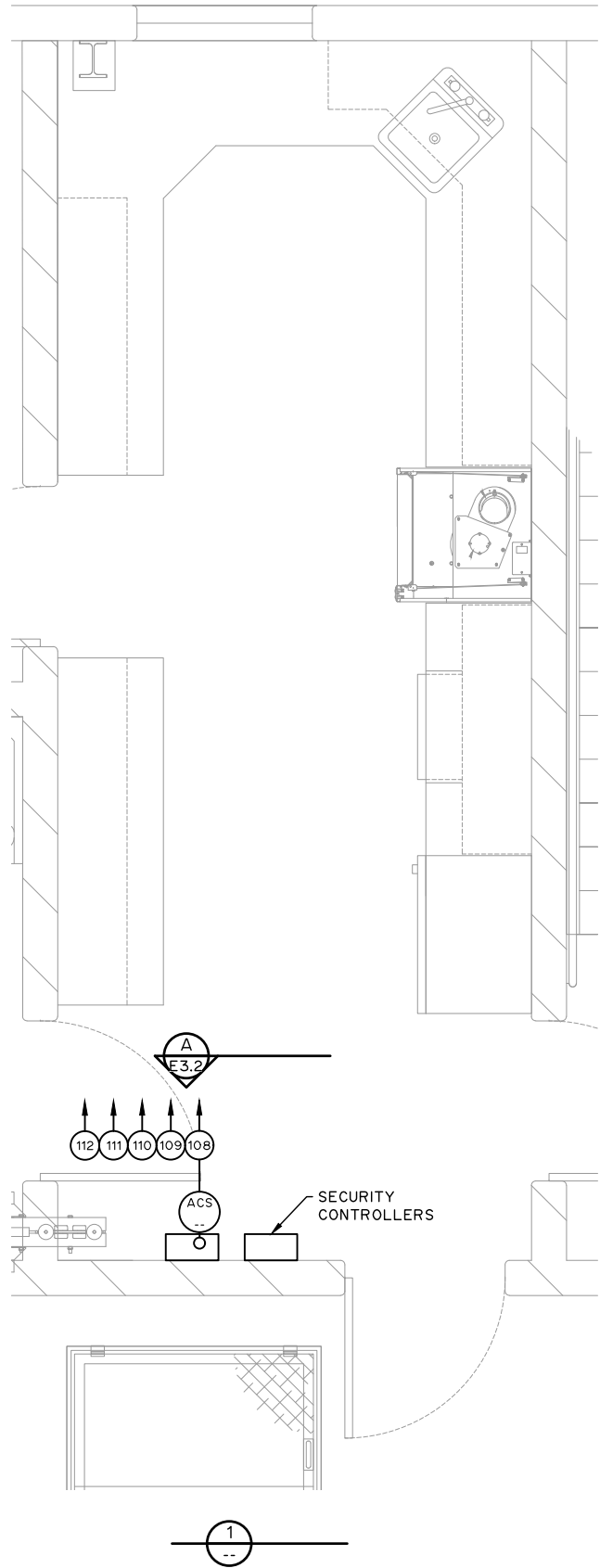
WASTEWATER TREATMENT PLANT
ELECTRICAL
CABLE AND CONDUIT SCHEDULE

DESIGNED	R.G.O	JOB	7603-002-00
DRAWN	T.S.	SCALE	N.T.S.
DATE	NOVEMBER 2020	DRAWING	E2.13



ACCESS CONTROL LAYOUT PLAN

SEE 1
E3.2



- NOTES:
1. FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.
 2. SBM = SIZED BY MANUFACTURER. SIZE OVER CURRENT DEVICE AND CABLING AS PER MANUFACTURERS RECOMMENDATIONS.
 3. (C) SEE CONDUIT AND CABLE SCHEDULES ON E-DRAWINGS SERIES.
 3. (XXX) DOOR TAG. REFER TO ARCHITECTURAL DRAWINGS
 4. HEIGHT TO BE CONFIRMED ON SITE.

- LEGEND:
- (C) WALL MOUNTED CARD READER
 - (M) WALL MOUNTED MOTION SENSOR
 - (DS) DOOR POSITION SWITCH (DOOR CONTACT)
 - (E) ELECTRIC STRIKE
 - (P) PNEUMATIC STRIKE
 - (M) MOTION RTE
 - (B) ZONE 2 RATED PUSH BUTTON RTE

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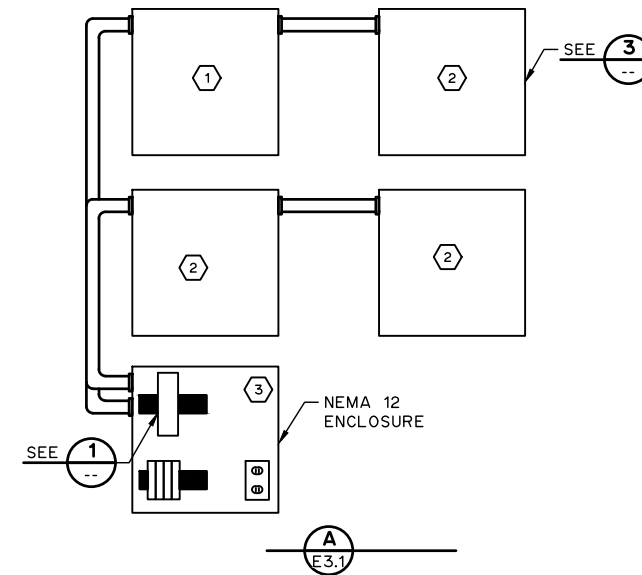
WASTEWATER TREATMENT PLANT
ELECTRICAL
ACCESS CONTROL LAYOUT

DESIGNED	R.G.O	JOB	7603-002-00
DRAWN	T.S.	SCALE	N.T.S.
DATE	NOVEMBER 2020	DRAWING	E3.1

TYPICAL SINGLE DOOR SECURE SIDE

TYPICAL SINGLE DOOR PUBLIC SIDE

HEADWORKS SINGLE DOOR SECURE SIDE



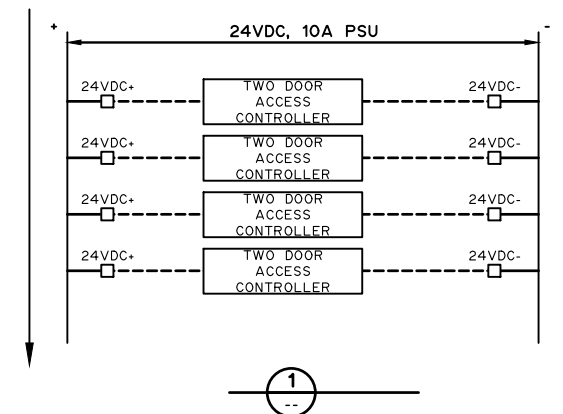
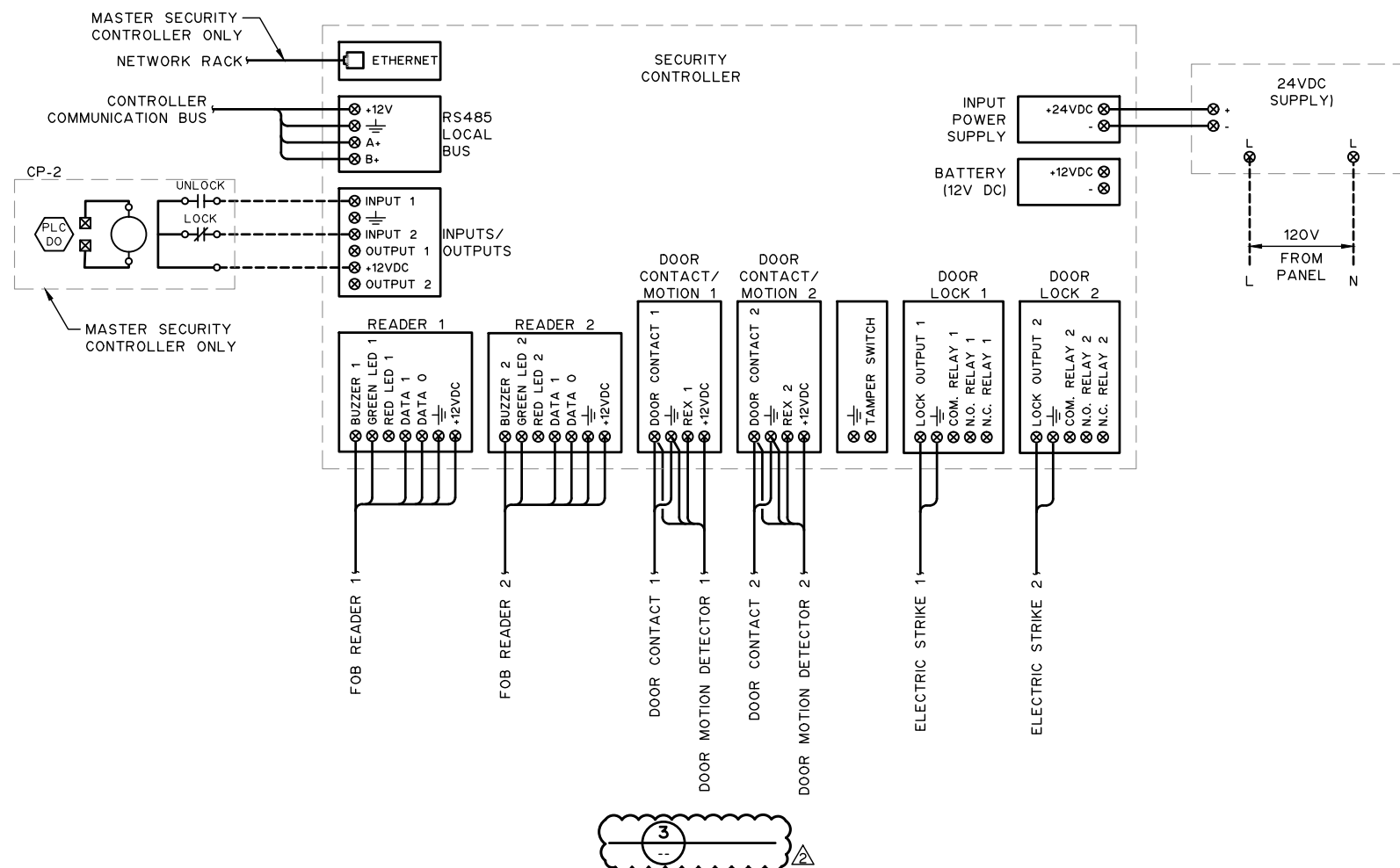
NOTES:

1. FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.
2. THIS DETAIL SHOWS CABLE REQUIREMENTS FOR SECURITY SYSTEM COMPONENTS ONLY. ARCHITECTURAL REQUIREMENTS AND DOOR HARDWARE MAY BE DIFFERENT THAN INDICATED. ELECTRICAL CONTRACTOR TO CONFIRM ALL ELECTRICAL ROUGH-IN MOUNTING HEIGHTS AND LOCATIONS FOR ACCESS CONTROL COMPONENTS. CONFIRM COMPATIBILITY WITH DOOR HARDWARE BEFORE ORDERING.
3. COORDINATE WIRING WITH DOOR HARDWARE INSTALLATION.
4. HEIGHT TO BE CONFIRMED ON SITE.
5. INSTALL 24VDC PSU INTO NEMA 12 ENCLOSURE C/W TERMINALS AND DIN RAIL AS REQUIRED.

KEY ITEMS:


- 1 MASTER 2 DOOR CONTROLLER
2 SLAVE 2 DOOR CONTROLLER
3 ACS POWER SUPPLY. SEE NOTE 5

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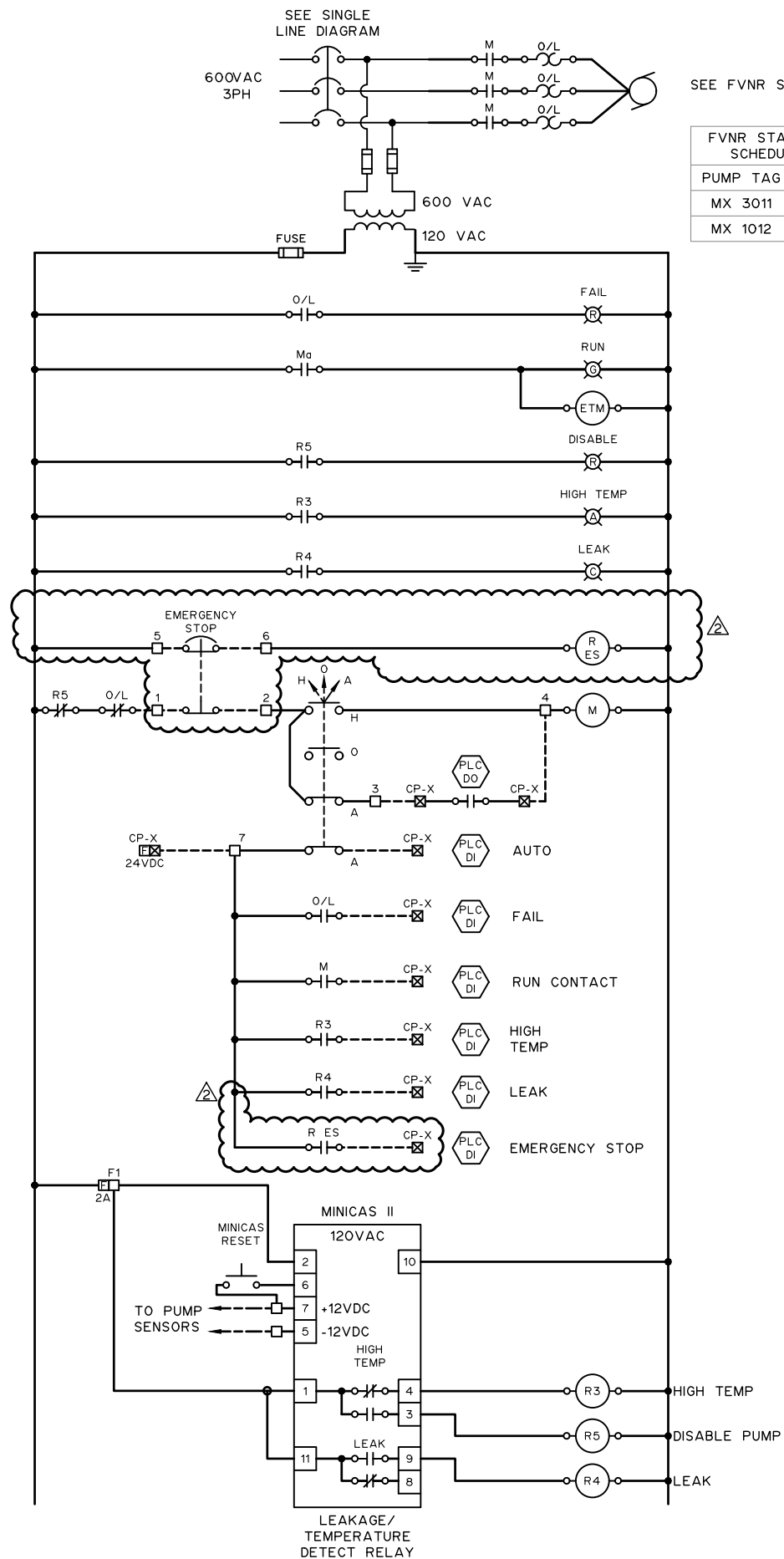
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 MEMBER 32675
 2020-11-12
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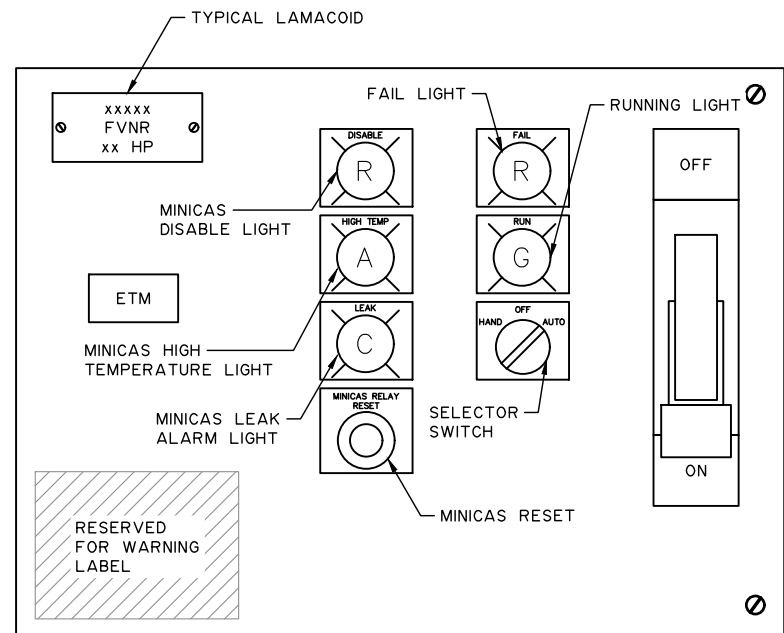
WASTEWATER TREATMENT PLANT
ELECTRICAL
ACCESS CONTROL DETAILS

DESIGNED	R.G.O	JOB	7603-002-00
DRAWN	T.S.	SCALE	N.T.S.
DATE	NOVEMBER 2020	DRAWING	E3.2



SEE FVNR SCHEDULE

FVNR STARTER SCHEDULE		
PUMP	TAG	HP
MX	3011	2.4
MX	1012	2.4



TYPICAL FULL VOLTAGE NON REVERSING STARTER WITH MINICAS FRONT PANEL

TYPICAL FULL VOLTAGE NON REVERSING STARTER WITH MINICAS

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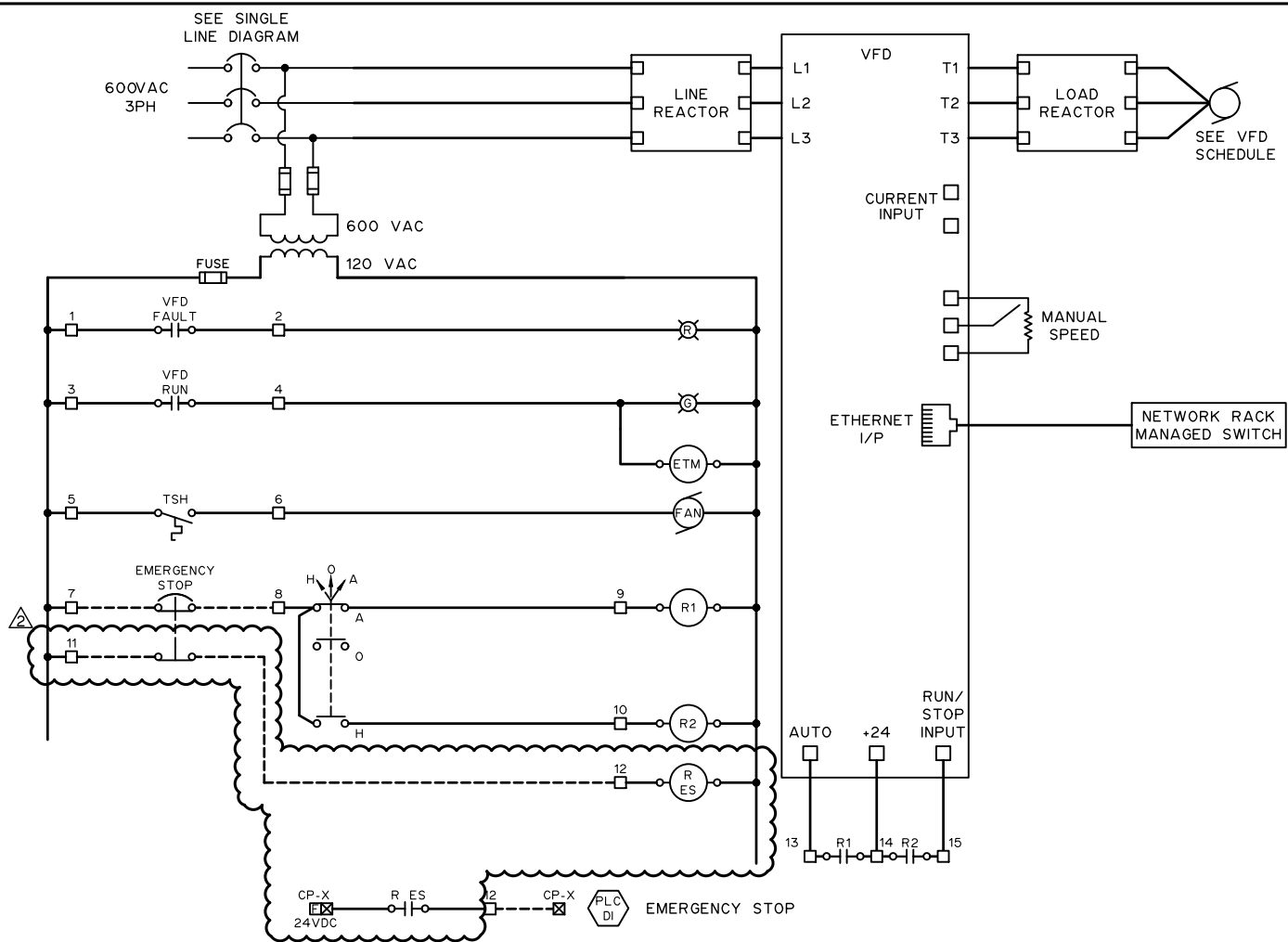
ELECTRICAL 32675



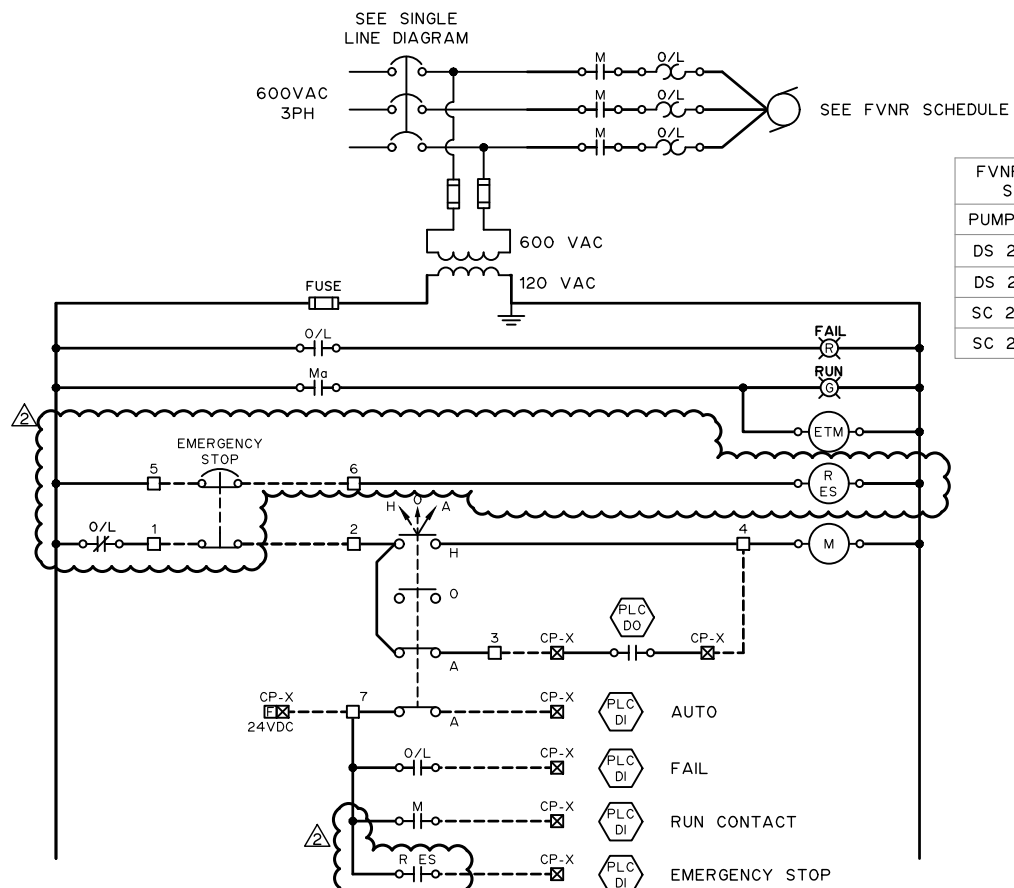
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WASTEWATER TREATMENT PLANT ELECTRICAL SCHEMATICS

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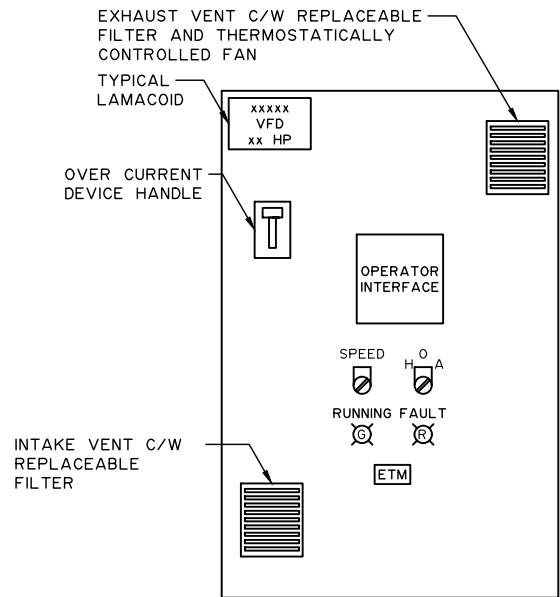


TYPICAL VFD WIRING

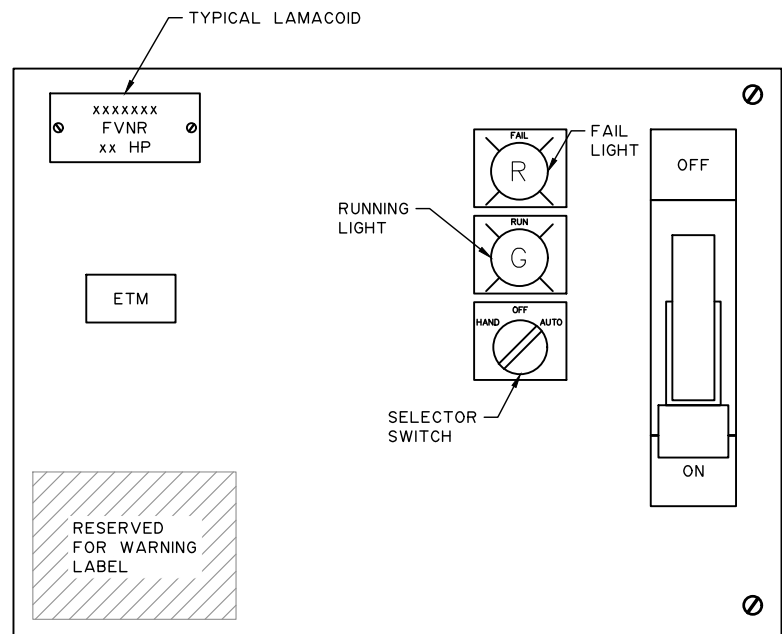


TYPICAL FULL VOLTAGE NON REVERSING STARTER

VFD SCHEDULE	
TAG	HP
BL 6301	10
BL 6302	10
BL 6303	10
BL 6201	15
BL 6101	15
BL 6102	15
P 4901-1	2.5
P 4901-2	2.5
RD 3101	1/3



TYPICAL VFD FRONT PANEL



TYPICAL FULL VOLTAGE NON REVERSING STARTER FRONT PANEL

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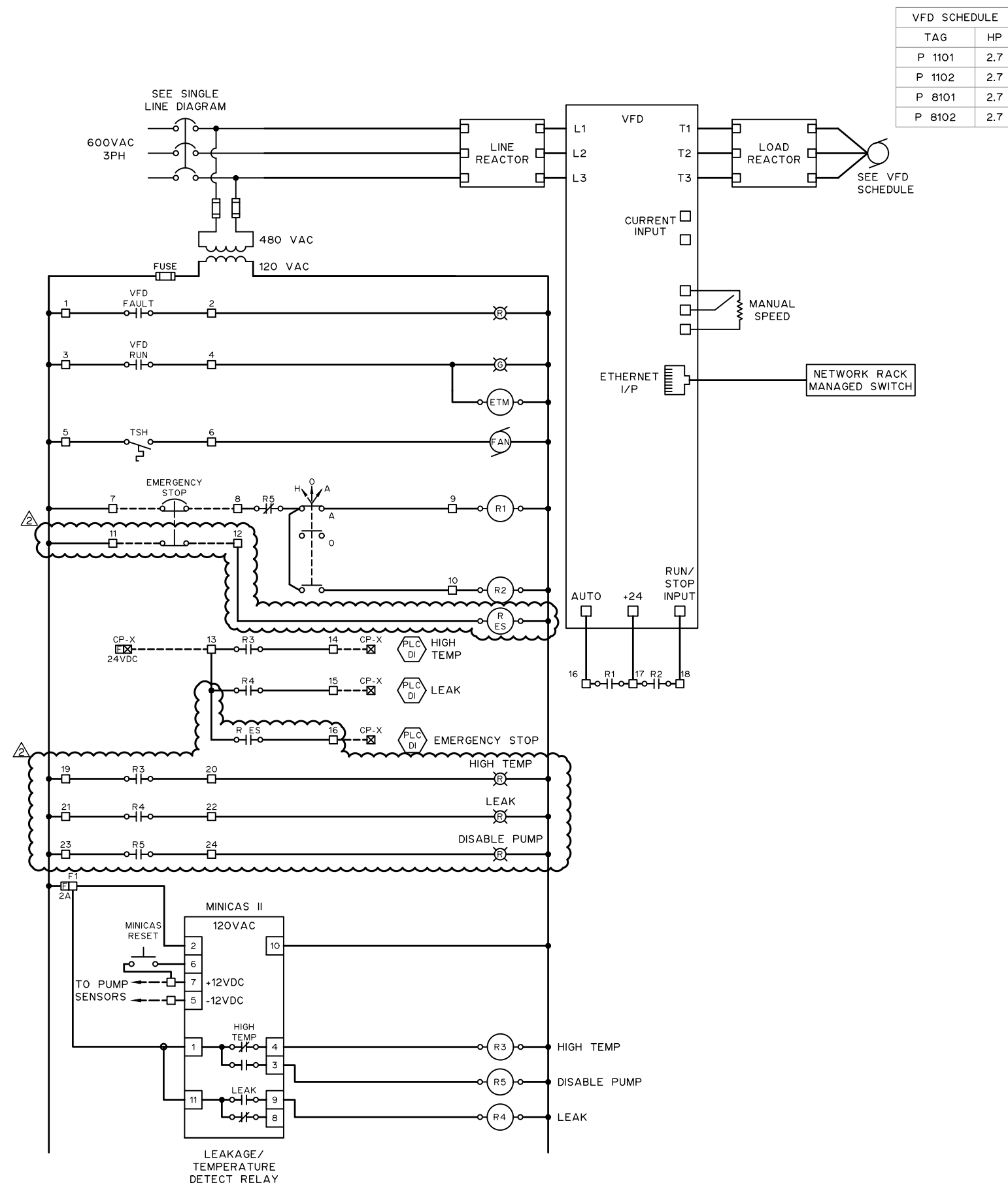
Discipline: ELECTRICAL Sk. Reg. No. 32875 Signature: [Signature]



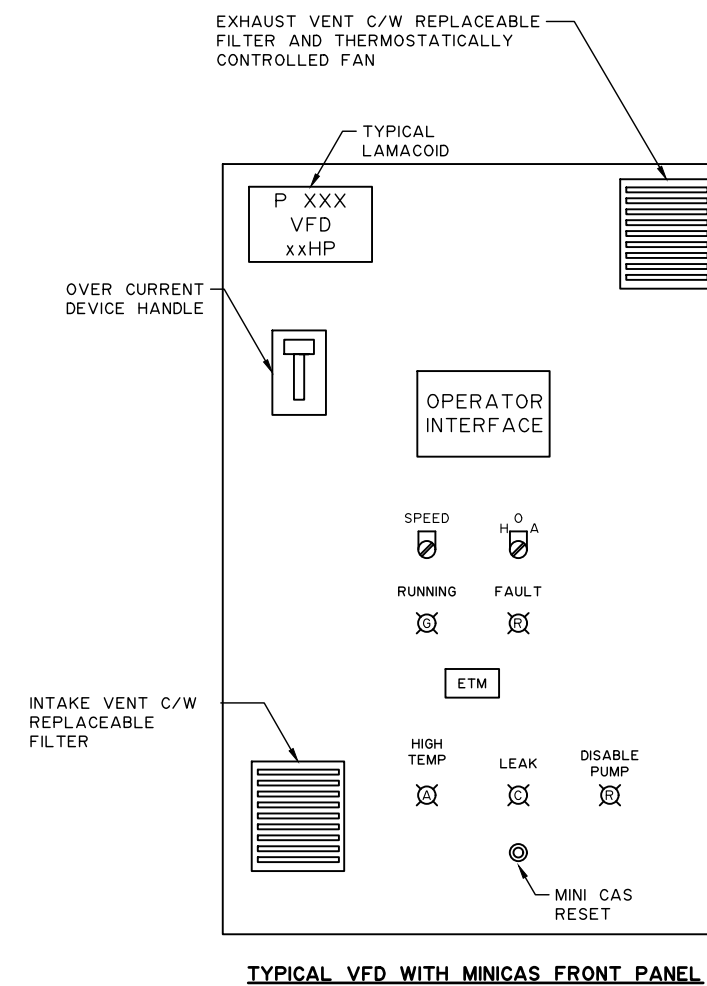
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WASTEWATER TREATMENT PLANT ELECTRICAL SCHEMATICS

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DATE	NOVEMBER 2020	DRAWING	E4.3




VFD SCHEDULE	
TAG	HP
P 1101	2.7
P 1102	2.7
P 8101	2.7
P 8102	2.7




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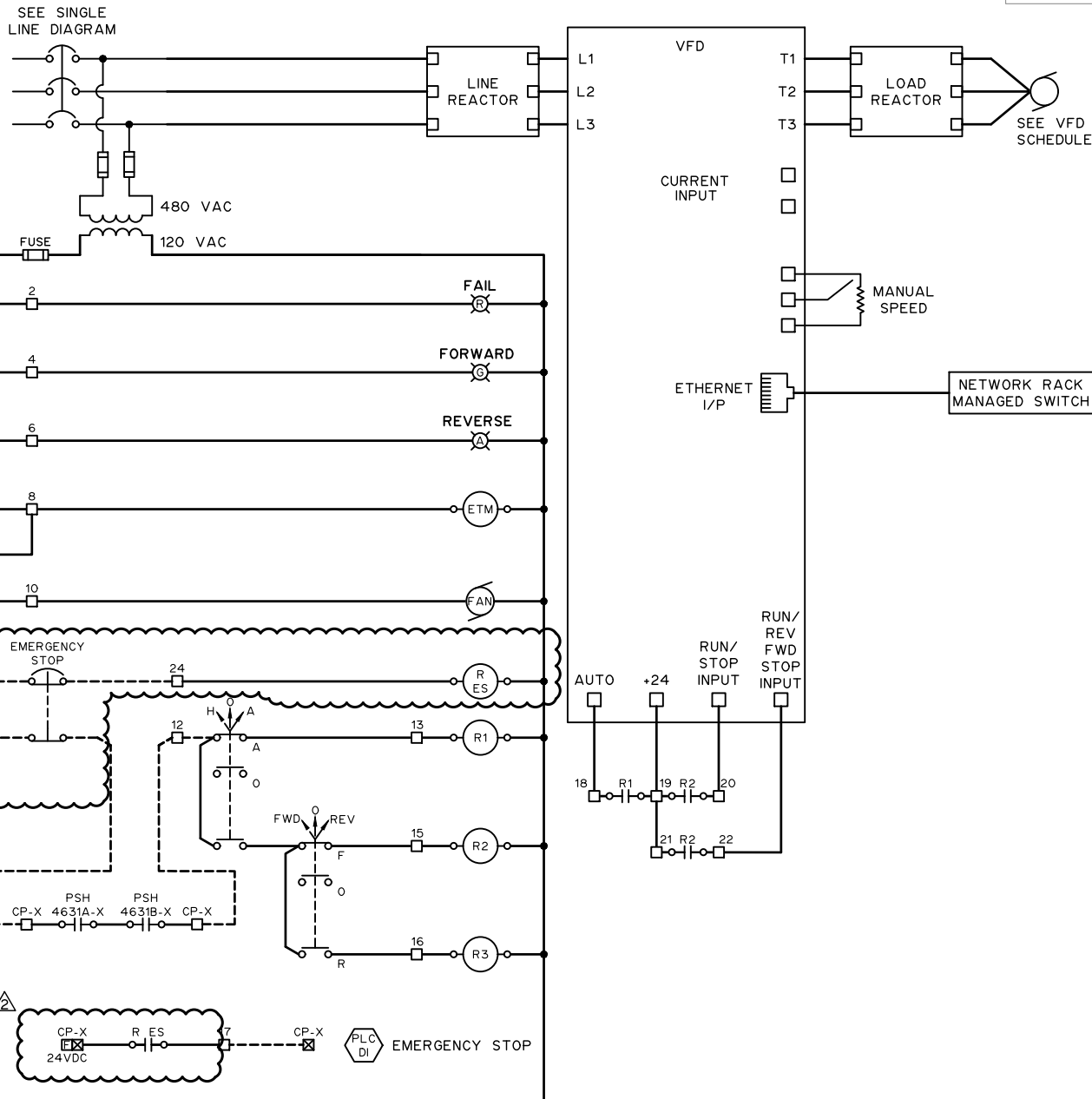


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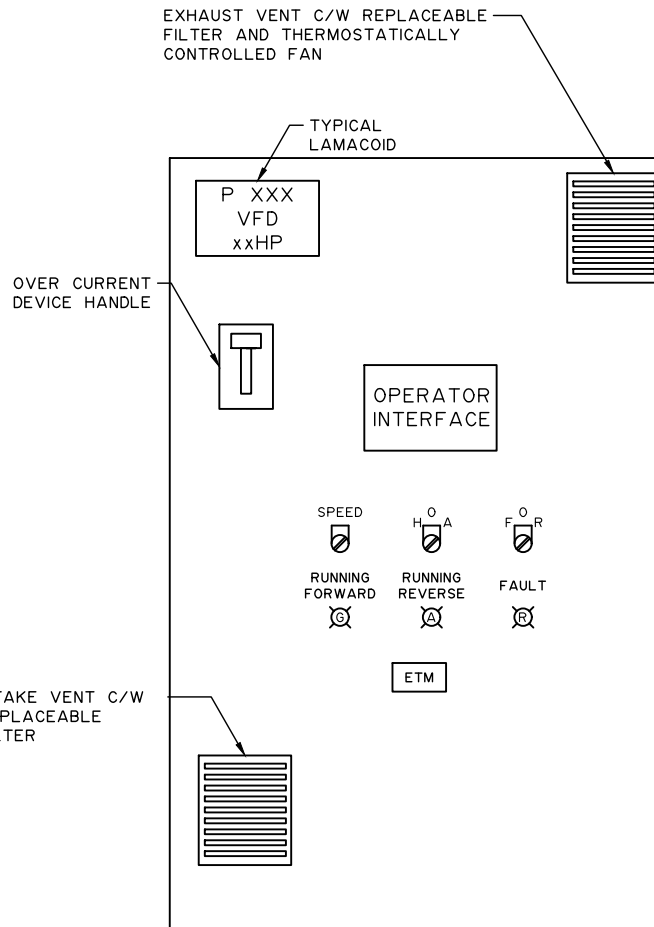
WASTEWATER TREATMENT PLANT
ELECTRICAL
SCHEMATICS

DESIGNED	R.G.O.	JOB	7603-002-00
DRAWN	T.S.	SCALE	N.T.S.
DATE	NOVEMBER 2020	DRAWING	E4.4

VFD SCHEDULE	
TAG	HP
P 4611-1	7.5
P 4611-2	7.5



TYPICAL PERMEATE VFD WIRING



TYPICAL VFD WITH MINICAS FRONT PANEL

NOTES:

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2020-11-12
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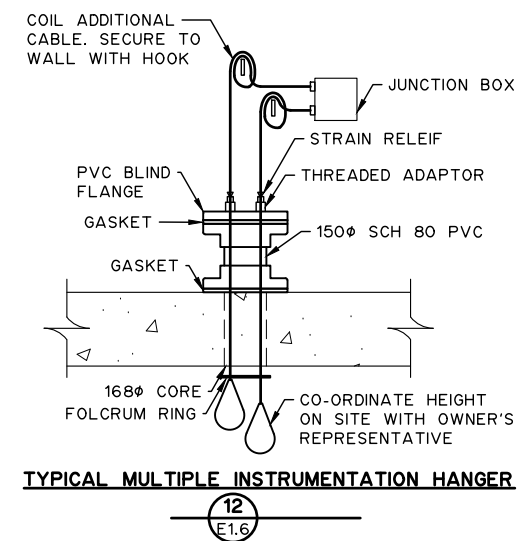
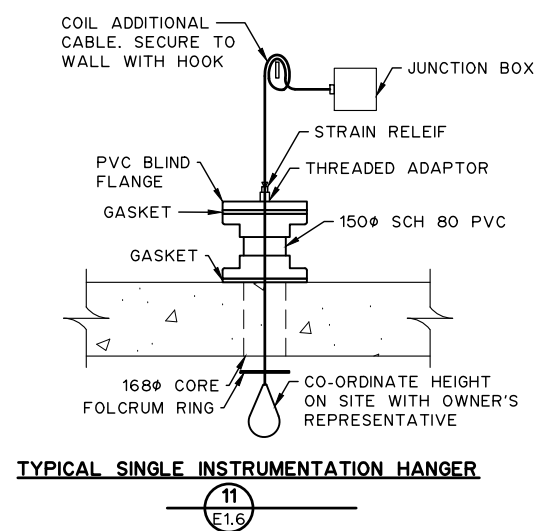
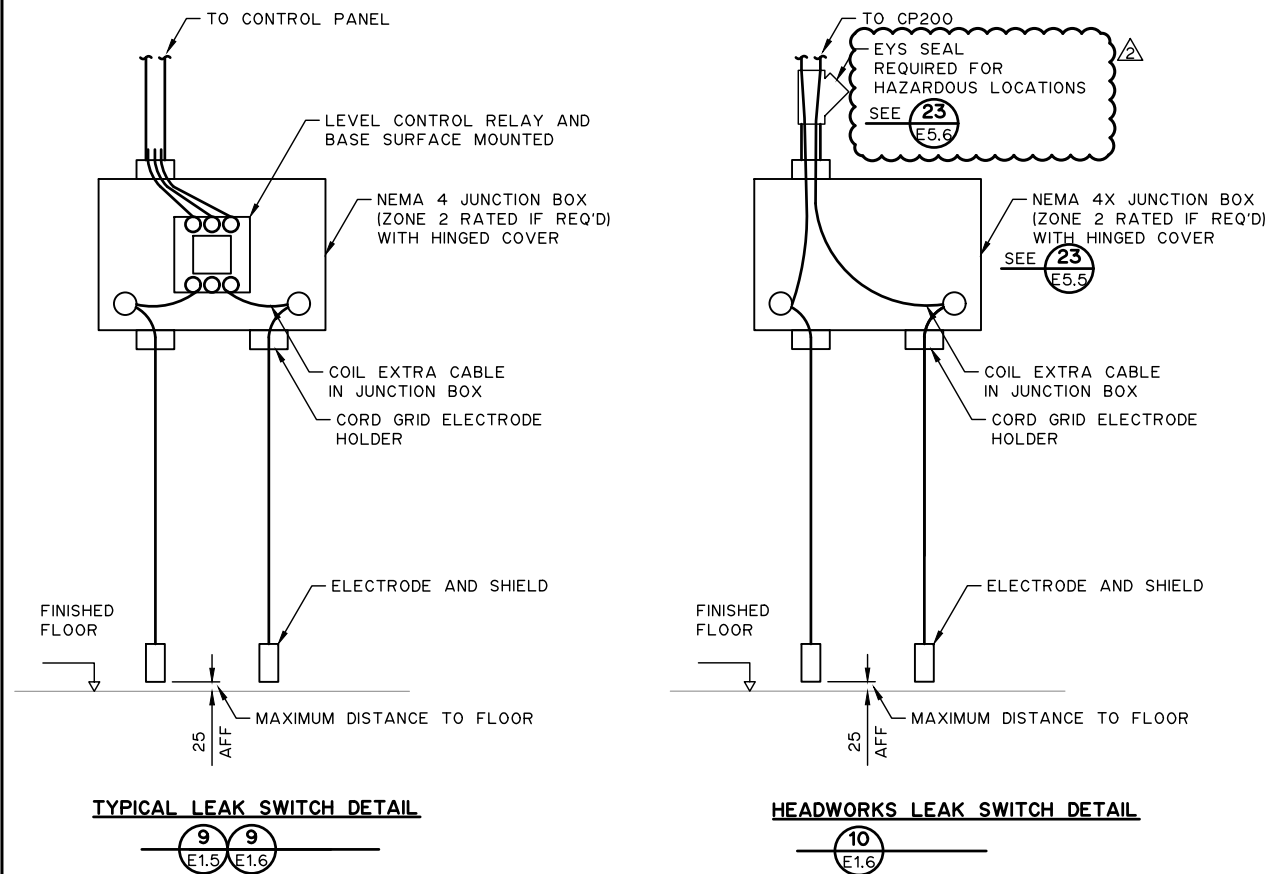
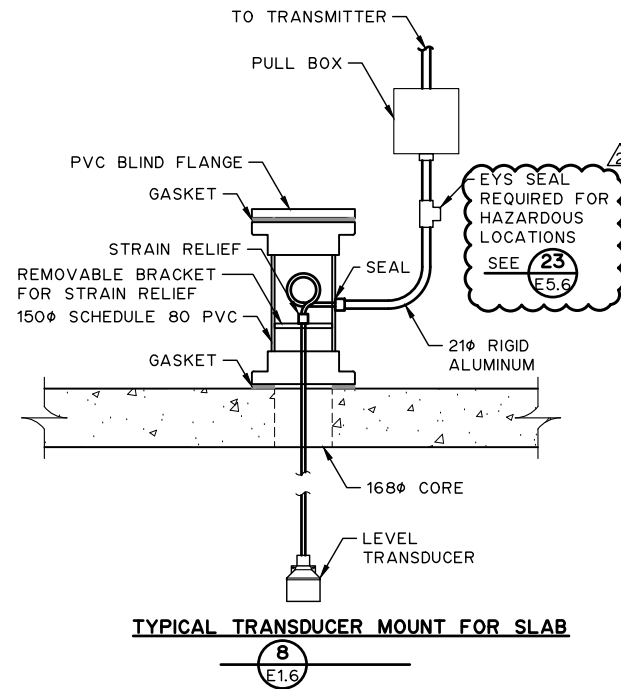
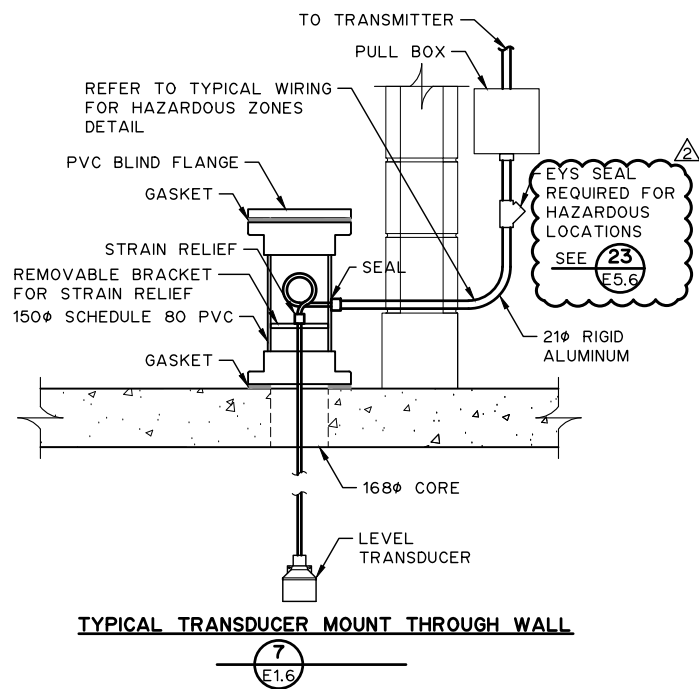
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MANAGEMENT

WASTEWATER TREATMENT PLANT ELECTRICAL SCHEMATICS

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DATE	NOVEMBER 2020	DRAWING	E4.5



NOTES:

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PROFESSIONAL ENGINEER

R.G. OFSHE

MEMBER 32675

2020-11-12

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ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
ELECTRICAL
ELECTRICAL DETAILS

DESIGNED	R.G.O.	JOB	7603-002-00
DRAWN	T.S.	SCALE	N.T.S.
DATE	NOVEMBER 2020	DRAWING	E5.2

TYPICAL LIGHT STANDARD DETAIL

13
E0.2

MOTOR CONNECTION SEPARATE POWER AND CONTROL CABLES DETAIL

14
E1.1

EMERGENCY STOP STATION DETAIL

15
E1.1

- NOTES:
1. FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.
 2. POLE TO BE CECO CE 5SQH SERIES HINGED POLE C/W ALL ACCESSORIES REQUIRED FOR A COMPLETE INSTALLATION. FINISH TO BE DARK BRONZE.
 3. COORDINATE PIVOT DIRECTION TO AVOID INTERFERENCE WITH OTHER ELEMENTS.

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ENGLISH RIVER PROPERTY
MANAGEMENT

WASTEWATER TREATMENT PLANT
ELECTRICAL
ELECTRICAL DETAILS

DESIGNED	R.G.O.	JOB	7603-002-00
DRAWN	T.S.	SCALE	N.T.S.
DATE	NOVEMBER 2020	DRAWING	E5.3

NOTES:
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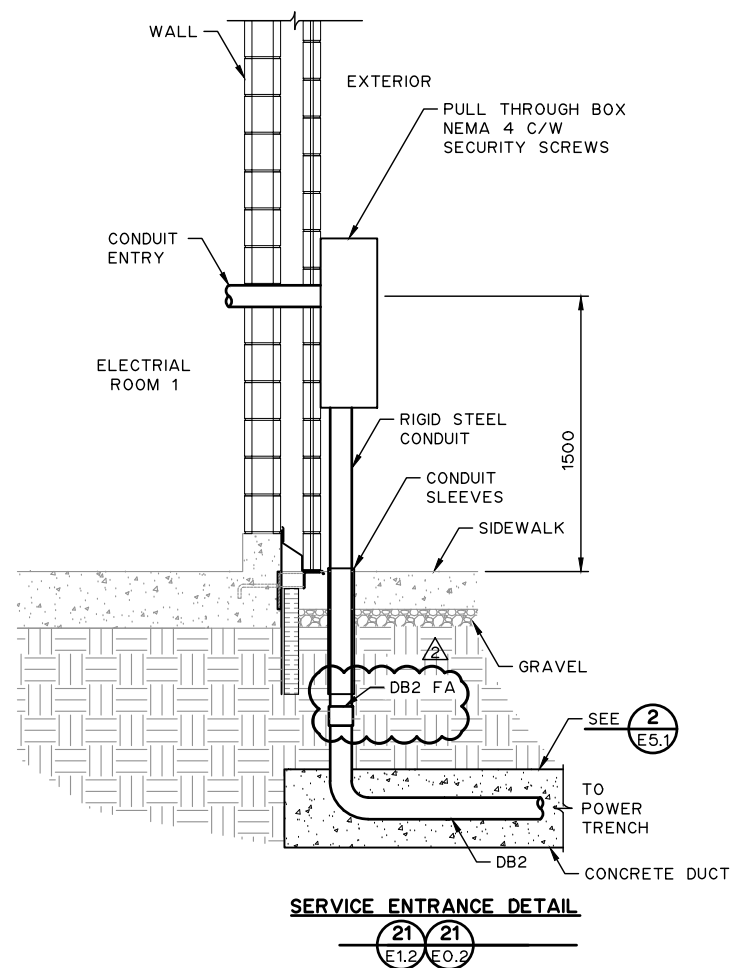
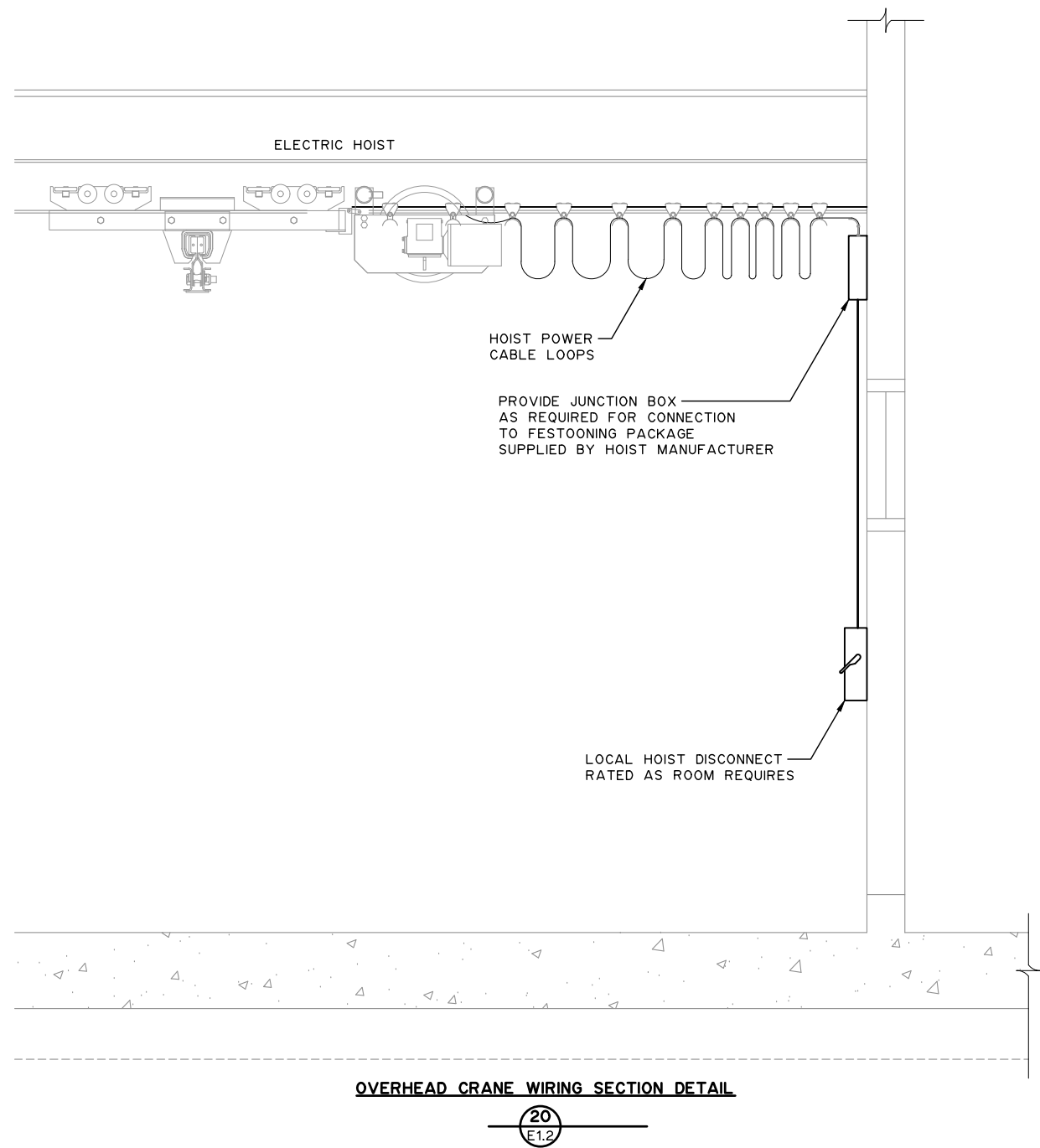
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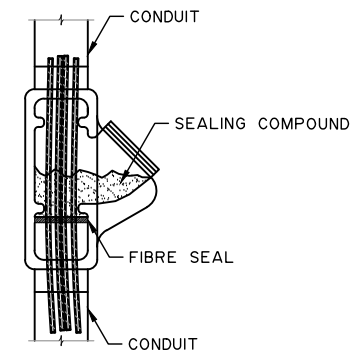
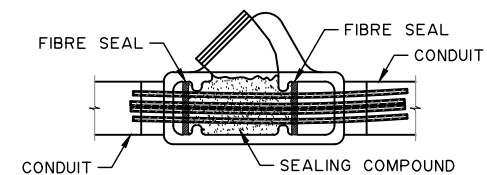
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WASTEWATER TREATMENT PLANT
ELECTRICAL
ELECTRICAL DETAILS

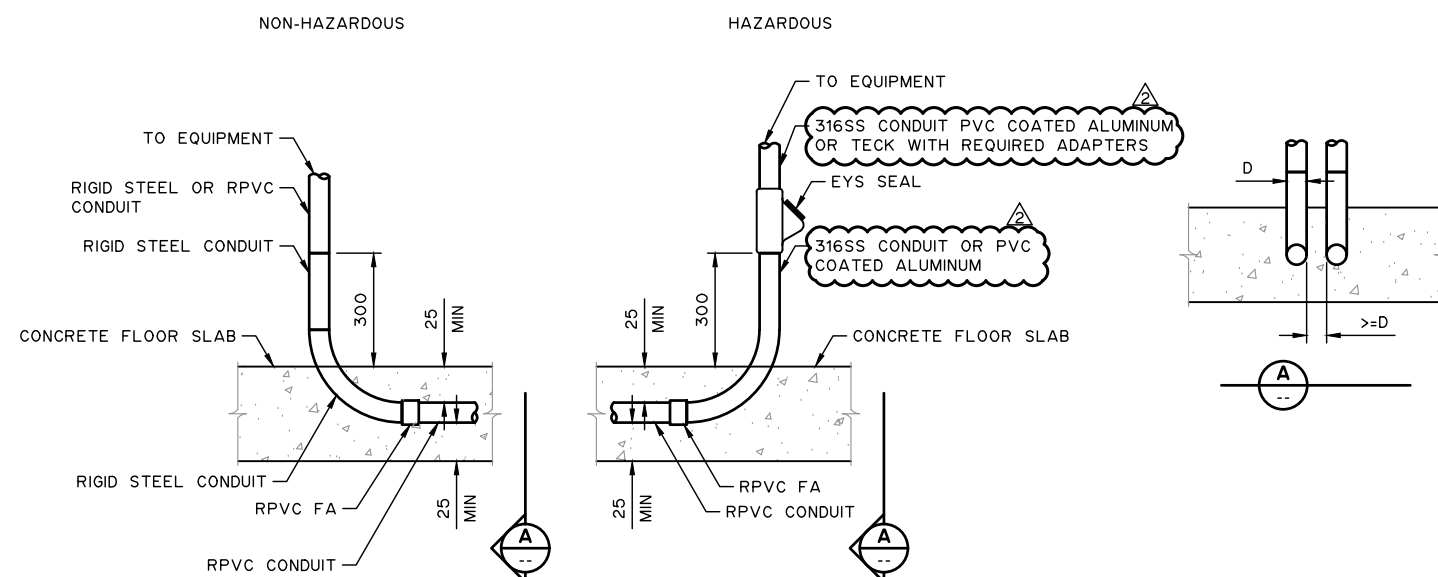
DESIGNED	R.G.O.	JOB	7603-002-00
DRAWN	T.S.	SCALE	N.T.S.
DATE	NOVEMBER 2020	DRAWING	E5.5



TYPICAL WIRING FOR HAZARDOUS ZONES DETAIL



HAZARDOUS CONDUIT SEAL DETAIL



IN SLAB CONDUIT INSTALLATION FOR HAZARDOUS AND NON HAZARDOUS ZONES DETAIL

NOTES:

1. FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.

THIS DRAWING MAY HAVE BEEN MODIFIED
FROM ITS ORIGINAL SIZE. ALL SCALE
NOTATIONS INDICATED ARE BASED ON
11"x17" FORMAT DRAWINGS

2	20-11-10	FOR TENDER ADDENDUM 2
1	20-10-15	FOR TENDER
ISSUE	YY-MM-DD	REVISION

Association of Professional Engineers & Geoscientists
of Saskatchewan

CERTIFICATE OF AUTHORIZATION

MPE Engineering Ltd.
Number C1334

Permission to Consult held by:

Discipline	SK. Reg. No.	Signature
<u>ELECTRICAL</u>	<u>32675</u>	<u>[Signature]</u>





ENGLISH RIVER PROPERTY
MANAGEMENT

WASTEWATER TREATMENT PLANT
ELECTRICAL
ELECTRICAL DETAILS

DESIGNED	R.G.O.	JOB	7603-002-00
DRAWN	T.S.	SCALE	N.T.S.
DATE	NOVEMBER 2020	DRAWING	E5.6



- (11) POWER DISTRIBUTION MODULE (PDM)
- (12) TWO 6X12 CABINET-MOUNTING BRACKET SCREWS TYPICAL
- (13) TWO 6X12 RAIL-MOUNTING SCREWS TYPICAL
- (14) TERMINATE PATCH CABLES FROM PATCH PANEL TO ROUTER AS PER COMMUNICATION ARCHITECTURE AND CABLE AND CONDUIT SCHEDULE.
- (15) NETWORK ATTACHED STORAGE DEVICE (NAS).
- (16) INTERNET SERVICE PROVIDER MODEM. SUPPLIED BY ISP. CONTRACTOR TO INSTALL AND TERMINATE PATCH CABLES INATE OATCH CABLES.
- (17) 42U NETWORK RACK. CONTRACTOR TO SUPPLY ALL CABLE MANAGEMENT DEVICES AND MOUNTING HARDWARE REQUIRED FOR A COMPLETE, NEAT AND WORKMANLIKE INSTALLATION.
- (18) SEPTAGE RECEIVING STATION RACK MOUNTED SERVER. SUPPLIED BY SEPTAGE RECEIVING STATION VENDOR, INSTALLED BY CONTRACTOR.

DESIGNED	R.G.O.	JOB	7603-002-00
DRAWN	T.S.	SCALE	N.T.S.
DATE	NOVEMBER 2020	DRAWING	E5.8



**Addendum 1
To The Specifications For
English River Property Management
Wastewater Treatment Facility**

**MPE Engineering Ltd.
Unit 122, 103 Marquis Court
Saskatoon, Saskatchewan S7P 0C4**

November 5, 2020

File: 7603-002-00

1. Precedence.

This addendum forms an integral part of the specifications and drawings covering all aspects of this job and is to be read in conjunction therewith. However, should points arise which are at variance, this addendum shall take precedence, unless otherwise clarified by the engineer.

2. Purpose.

This addendum provides specific clauses to add to and/or amend the specifications and/or drawings.

3. Section 00001 Cover and Title Page (Volumes 1-5).

Delete:

“Closing Date: 2:00:00 PM, Thursday, November 12th, 2020 local time.”

Replace With:

“Closing Date: 2:00:00 PM, Thursday, November 26th, 2020 local time.”

4. Section 00200 Instruction to Bidders:

Add

3.10 Taxes will be automatically applied to the Total Contract Amount in the Summary Table of the Schedule of Prices. Each unit price stated in the Bid Form and Schedule of Prices should not include taxes. The Bidder is responsible for verifying the Total Contract Amount stated in the Summary Table prior to submission.

5. Section 00431 Schedule of Prices.

Delete:

Section 00431

Replace With:

Section 00431 as attached

Clarification:

Schedule of Prices form on Bids & Tenders has been updated

6. Section 00525: Agreement Form

Delete:

ARTICLE 3: CONTRACT TIME

Replace With:

ARTICLE 3: CONTRACT TIME

The Contractor shall attain Substantial Performance of the Work by the following date: 15th day of September 2022.

The Contractor shall attain Total Performance of the Work by the following date: 30th day of September 2022.

Delete:

ARTICLE 4: CONTRACT PRICE

Replace With:

ARTICLE 4: CONTRACT PRICE

The Contract Price is dollars.
(\$.....) in Canadian funds (**GST & PST included**).

7. Section 00725: General Conditions

Delete:

6.14.1.2.3

Replace with:

6.14.1.2.3 the impacts of the Province of Saskatchewan withdrawing or deferring the advancement of any or all portions of their committed funding to the Project;

Delete:

6.14.1.2.4

Replace with:

6.14.1.2.4 the impacts of self-isolation/quarantine or regulated quarantine as ordered by the Province of Saskatchewan;

8. Section 00800: Supplementary Conditions

Delete:

6.1.18

Replace With:

6.1.18 Working in proximity to and crossing of utilities including Saskatchewan One-Call notification, third party locations and hydrovacing / hand exposure as required.

Delete:

11.2

Replace With:

11.2 English River Property Management personnel shall operate all valves and hydrants only, unless specifically authorised otherwise.

Delete:

11.3

Replace With:

11.3 Contractor to notify English River Property Management at least 48 hours in advance of any required interruption to or operation of utilities.

Delete:

23.1

Replace With:

23.1 The Owners have made application for the proposed work to SaskPower. No work shall commence on the project until approval has been obtained by the Owner. It is the Contractors responsibility to comply with these requirements for the construction of this project.

9. Section 01110: Summary of Work

Delete:

1.3.3

Replace With:

1.3.3 Attain Substantial Performance of the Work by September 15th, 2022.

Delete:

1.3.4

Replace With:

1.3.4 Attain Total Performance of the Work by September 30th, 2022.

10. Section 01280: Measurement Schedule

Add:

2.2.2.1.d 375mm PVC SDR35 Sanitary – Item 2.1d.

- .1 Scope: Scope: Includes supply and installation of all Pipe and Fittings, which includes the hauling, loading, unloading, stringing, laying, trenching, excavating, sorting stockpiling, loading, hauling, dumping, shoring, trench boxes, bracing, backfilling, compaction to standard proctor density as noted on the drawings, pipe bedding, granular, clay plugs, haunching, stainless steel pipe, flanges, couplers, pipe supports, hydrovac or hand exposure and protection of all existing lines, utility locates, video inspection, site restoration, topsoil and subsoil stripping, topsoil and subsoil replacement, grass seeding where required, site restoration and all related work for which payment is not included elsewhere.
- .2 Measurement: Shall be the length measured to the nearest metre at grade for pipe installed.
- .3 Payment: Unit Price per metre installed.

11. Section 03400: Precast Concrete Structures

Delete:

2.1.2

Replace With:

2.1.2 Submit the structural design of the precast concrete structures, including connections, to the Owner for review. The structural design must be stamped by a Professional Engineering registered in the Province of Saskatchewan.

12. Section 05141: Structural Aluminium

Delete:

2.1.13.2.3.3.1

Replace With:

2.1.13.2.3.3.1 1250 mm x 1400 mm: AH 4100

13. Section 05550: Steel Building Systems

Add:

1.1.6 Approved Manufacturers:

- .1 Behlen Steel Buildings
c/o Steve Pollock
Janzen Steel Buildings
(306) 291-0052
- .2 or as approved by Engineer
 - .1 Alternates to be reviewed during shop drawing period and must meet or exceed the standards provided in the specifications.

Delete:

2.1.2

Replace With:

- 2.1.2 Exterior Sheet: **24** Gauge, 4 in. panel ribs, steel sheet to ASTM A445 or ASTM 446 Grade G90, factory prefinished. Colour: to be selected by owner from stock colours.

Delete:

2.5.1

Replace With:

- 2.5.1 Exterior sheet-roof: factory preformed steel sheet minimum **24 gauge** base metal, aluminum- zinc alloy coated complete with clear acrylic coating from manufacturer's standard profiles. Include closures, gaskets, caulking, flashing and fasteners to effect weather tight installation. Cut ends of sheets square and clean.

Delete:

2.5.3

Replace With:

- 2.5.3 Interior sheet-ceiling: factory preformed prefinished steel sheet minimum **24 gauge** base metal, aluminum-zinc alloy coated complete with clear acrylic coating of manufacturer's standard profile, with male and female side lap. Install sealant material in female lap, where liner sheet is to be used as a vapour barrier. Cut ends of sheets square and clean.

14. Section 07840: Firestopping

Delete:

1.1.1

Replace With:

1.1.1 Provide firestopping to meet or exceed requirements of the National Building Code as specified in this Section.

Delete:

1.2.1

Replace With:

1.2.1 National Building Code, current edition.

15. Section 11217: Submersible Sewage and Effluent Pumps

Delete:

2.1.3.12.1

Replace With:

2.1.3.12.1 Three phase; **575 VAC**; 60 Hz; 1160 rpm; 2.7 HP; SF 1.15.

Delete:

2.2.3.12.1

Replace With:

2.2.3.12.1 Three phase; **575 VAC**; 60 Hz; 1160 rpm; 2.7 HP; SF 1.15.

16. Section 11229: Novated Equipment Supply

Delete:

2.1.2.5

Replace With:

2.1.2.5 The total value of the Contract is \$1,317,670.00 before GST and PST.

Delete:

2.1.2.6

Replace With:

2.1.2.6 The remaining value of the Contract is \$1,250,670.00 before GST and PST.

17. Section 16005: Basic Electrical Requirements

Delete:

2.1

Replace With:

2.1 Unless otherwise indicated, all references to "Canadian Electrical Code" or "CEC" shall mean the edition of the Canadian Electrical Code, Part I, CSA C22.1, and the variations made thereto by Saskatchewan regulation, which are in force on the date of bid closing for the Contract..

18. Section 16690: Variable Frequency Drives

Delete:

2.7.1

Replace With:

2.7.1 Qualifications: service and parts facilities in the Province of Saskatchewan with 24 hour service experienced in installation and operation of VFD's.

19. APPENDIX A:

Clarification:

Sections from 4.4.2 of the project Geotechnical Report: "It should be noted that the bottom 2 m of the stockpile in contact with the native soil contains variable contents of topsoil, sand, and low plastic silt."... "Existing site clay fill, mixed with organic material that is greater than approximately 5% by mass, should be stockpiled separately from general engineered fill and only used for landscape fill. The native clay below the clay fill and silt has some natural moisture contents in excess of 40%. Moisture conditioning of this material will likely be required and may be difficult without exceptional drying conditions."

MPE has provided the following additional comments for clarity. Some portions of the stockpiled clay fill near the original ground surface may be contaminated with organic material (greater than 5%). This should be anticipated by the Contractor. Contaminated clay fill pockets and the potential buried topsoil layer (indicated on 20BH001) should be stockpiled separately and used for landscape fill. The native silt and high plastic clay below the stockpile and topsoil, may be used as common excavation. The Engineer has noted that the moisture conditioning and compaction of this material will be difficult. The Contractor should be prepared for this and, when available, the remaining stockpile clay fill is preferred for backfill.

20. Drawing Revisions

<u>Drawing Revisions</u>		
<u>Drawing Number</u>	<u>Delete</u>	<u>Replace With</u>
C.1.2	Issue 1: For Tender	Issue 2: For Tender Addendum 1
C1.4	Issue 1: For Tender	Issue 2: For Tender Addendum 1
A2.2	Issue 1: For Tender	Issue 2: For Tender Addendum 1
S1.2	Issue 1: For Tender	Issue 2: For Tender Addendum 1
M2.1	Issue 1: For Tender	Issue 2: For Tender Addendum 1
M2.2	Issue 1: For Tender	Issue 2: For Tender Addendum 1
P1.2	Issue 1: For Tender	Issue 2: For Tender Addendum 1
P1.3	Issue 1: For Tender	Issue 2: For Tender Addendum 1
P1.4	Issue 1: For Tender	Issue 2: For Tender Addendum 1
P1.5	Issue 1: For Tender	Issue 2: For Tender Addendum 1
P1.6	Issue 1: For Tender	Issue 2: For Tender Addendum 1
P1.8	Issue 1: For Tender	Issue 2: For Tender Addendum 1
P1.10	Issue 1: For Tender	Issue 2: For Tender Addendum 1
P1.12	Issue 1: For Tender	Issue 2: For Tender Addendum 1
P1.13	Issue 1: For Tender	Issue 2: For Tender Addendum 1
P4.1	Issue 1: For Tender	Issue 2: For Tender Addendum 1
P4.4	Issue 1: For Tender	Issue 2: For Tender Addendum 1
P4.5	Issue 1: For Tender	Issue 2: For Tender Addendum 1
P4.8	Issue 1: For Tender	Issue 2: For Tender Addendum 1
P4.10	Issue 1: For Tender	Issue 2: For Tender Addendum 1

END OF ADDENDUM 1

SCHEDULE A**English River Property Management
Wastewater Treatment Facility**

The undersigned, having carefully read these Specifications, hereby agrees to supply all labour, superintendence, plant and materials for the completion of the Works described in these Specifications. Payment for Work described by these Specifications will include the following items:

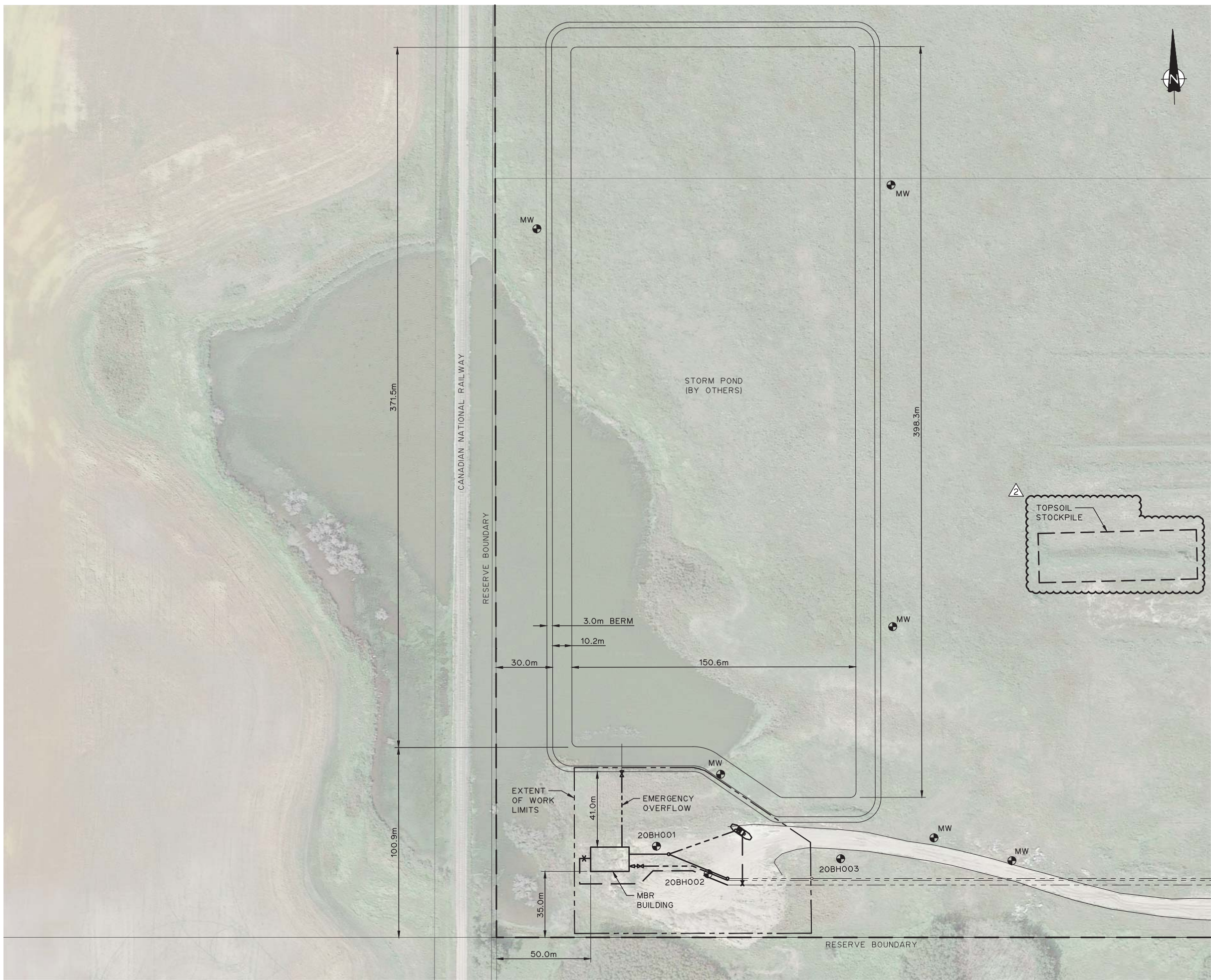
	Description	Qty	Unit
1.	Division 0 and Division 1: Conditions of Contract and General Requirements	1	L.S.
2.	Division 2:		
	1. Supply and Install Pipe and Fittings:		
	a) 50mm HDPE DR11 Waterline	130	m
	b) 150mm HDPE DR11 Overflow and Forcemain	100	m
	c) 200mm PVC SDR35 Sanitary	40	m
	d) 375mm PVC SDR35 Sanitary	55	m
	2. Structures:		
	a) 1200mm Precast Sanitary Manhole Complete	8	v.m
	b) 50 mm Gate Valve	2	each
	c) 150 mm Gate Valve	2	each
	3. Site Work		
	a) Common Excavation	500	m ³
	b) Compacted Fill	500	m ³
	c) Wastewater Treatment Plant Excavation and Backfill	1	LS
	d) Granular Type 108, 50mm Compacted Depth	3700	m ²
	e) Granular Type 33, 250mm Compacted Depth	3700	m ²
	f) Topsoil Placement, 150mm Thick	7500	m ²
	g) Grass Seeding	1	LS
	4. Miscellaneous		
	a) Chain Link Fencing, 1.8m high, c/w security top	160	m
	b) 16 m wide cantilever sliding gate	1	each
	c) 300mm CSP Culvert Complete	1	each
	d) Bollards	14	each
	e) Truck/Trailer Dump Complete	1	LS
3.	Division 3: Concrete	1	LS
4.	Division 4: Masonry	1	LS

5.	Division 5: Metals	1	LS
6.	Division 6: Wood and Plastics	1	LS
7.	Division 7: Thermal and Moisture Protection	1	LS
8.	Division 8: Doors and Windows	1	LS
9.	Division 9: Finishes	1	LS
10.	Division 10: Specialties	1	LS
11.	Division 11: Equipment	1	LS
12.	Division 13: Special Construction	1	LS
13.	Division 15: Mechanical	1	LS
14.	Division 16: Electrical	1	LS

Allowances:

1.	Novation Equipment Supply & Deliver Contract: MBR Treatment Equipment	\$1,250,670.00
2.	Prime Cost: Control Panel Software and Hardware Supply	\$100,000.00
3.	Prime Cost: Control System Setup and Programming	\$85,000.00
4.	Prime Cost: Commissioning	\$90,000.00
5.	Prime Cost: Arc Flash and Coordination Study	\$20,000.00

SUB-TOTAL**G.S.T. (5%)****P.S.T. (6%)****TOTAL AMOUNT**



- NOTES:
1. FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, SYMBOLS AND ABBREVIATIONS REFER TO THE LEGEND AND ABBREVIATIONS DRAWINGS.
 2. CONTRACTOR TO EXPOSE EXISTING UTILITY LINES BY HYDROVAC EXCAVATION AND CONFIRM ELEVATIONS.
 3. STRIP SITE AS NECESSARY TO PREVENT CONTAMINATION OF MATERIALS.
 4. PROTECT ALL EXISTING SITE FEATURES UNLESS OTHERWISE NOTED.

20BHXXX BOREHOLE NUMBER
MW MONITORING WELL

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS

2	20-11-03	FOR TENDER ADDENDUM 1
1	20-10-15	FOR TENDER
ISSUE	YY-MM-DD	REVISION

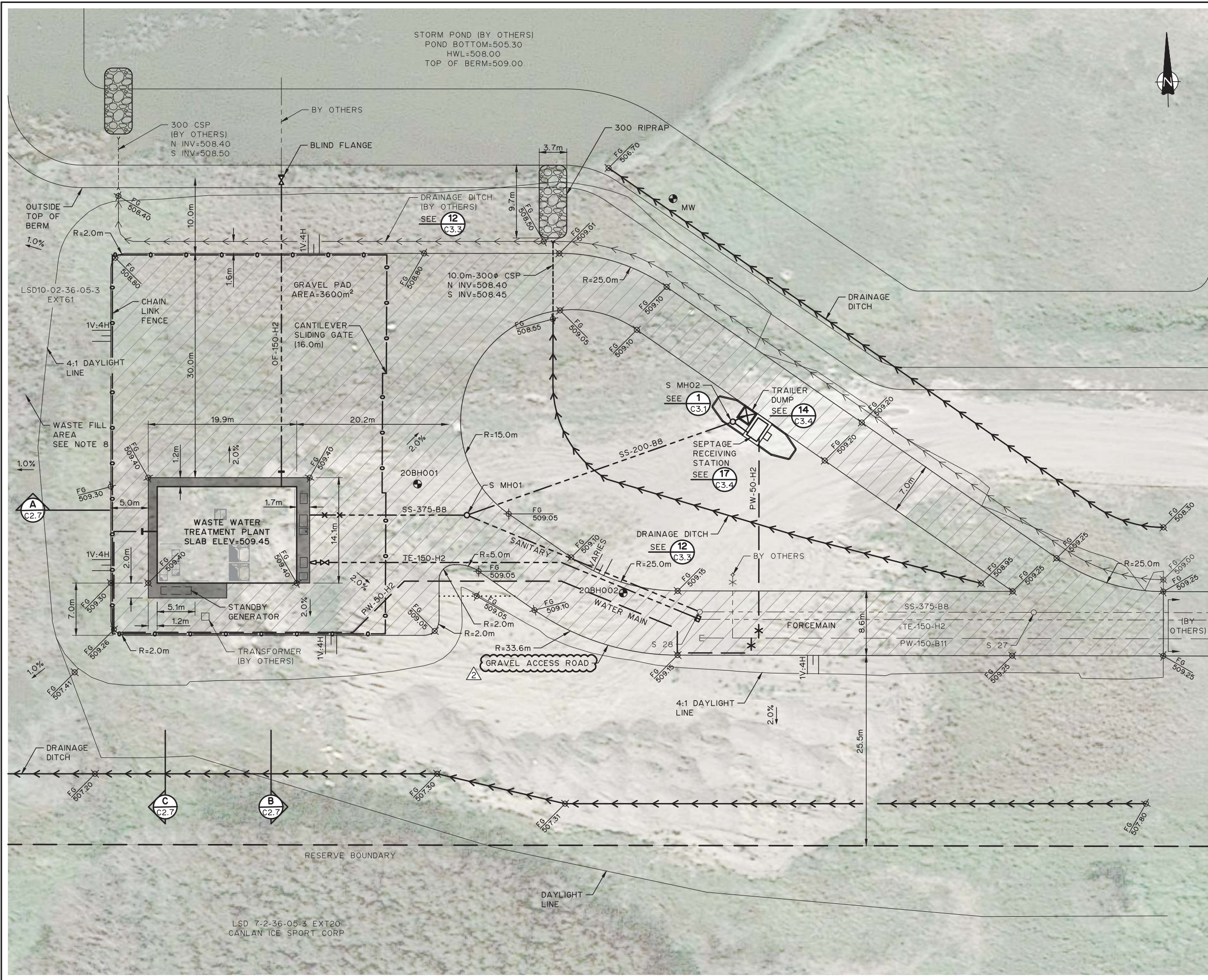
Association of Professional Engineers & Geoscientists of Saskatchewan		
CERTIFICATE OF AUTHORIZATION		
MPE Engineering Ltd.		
Number C1334		
Permission to Consult held by:		
Discipline	Sk. Reg. No.	Signature
ENV	22727	
CIVIL	22727	



ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
CIVIL
OVERALL SITE PLAN

DESIGNED	I.K.	JOB	7603-002-00
DRAWN	T.D.D.	SCALE	1:2000
DATE	OCTOBER 2020	DRAWING	C1.2



- NOTES:
1. FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, SYMBOLS AND ABBREVIATIONS REFER TO THE LEGEND AND ABBREVIATIONS DRAWINGS.
 2. CONTRACTOR TO EXPOSE EXISTING UTILITY LINES BY HYDROVAC EXCAVATION AND CONFIRM ELEVATIONS.
 3. STRIP SITE AS NECESSARY TO PREVENT CONTAMINATION OF MATERIALS.
 4. PROTECT ALL EXISTING SITE FEATURES UNLESS OTHERWISE NOTED.
 5. ALL DISTURBED AREAS TO BE RESTORED WITH 150mm TOPSOIL & SEED UNLESS OTHERWISE NOTED.
 6. ALL GRADES SHOWN ARE TO FINISHED GRADE.
 7. UNSUITABLE MATERIAL TO BE REMOVED AND DISPOSED OF BY CONTRACTOR.
 8. CONTRACTOR TO BLEND WASTE FILL AREA AND ENSURE POSITIVE DRAINAGE.

20BHXXX BOREHOLE NUMBER
MW MONITORING WELL

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1	20-10-15	FOR TENDER
ISSUE	YY-MM-DD	REVISION

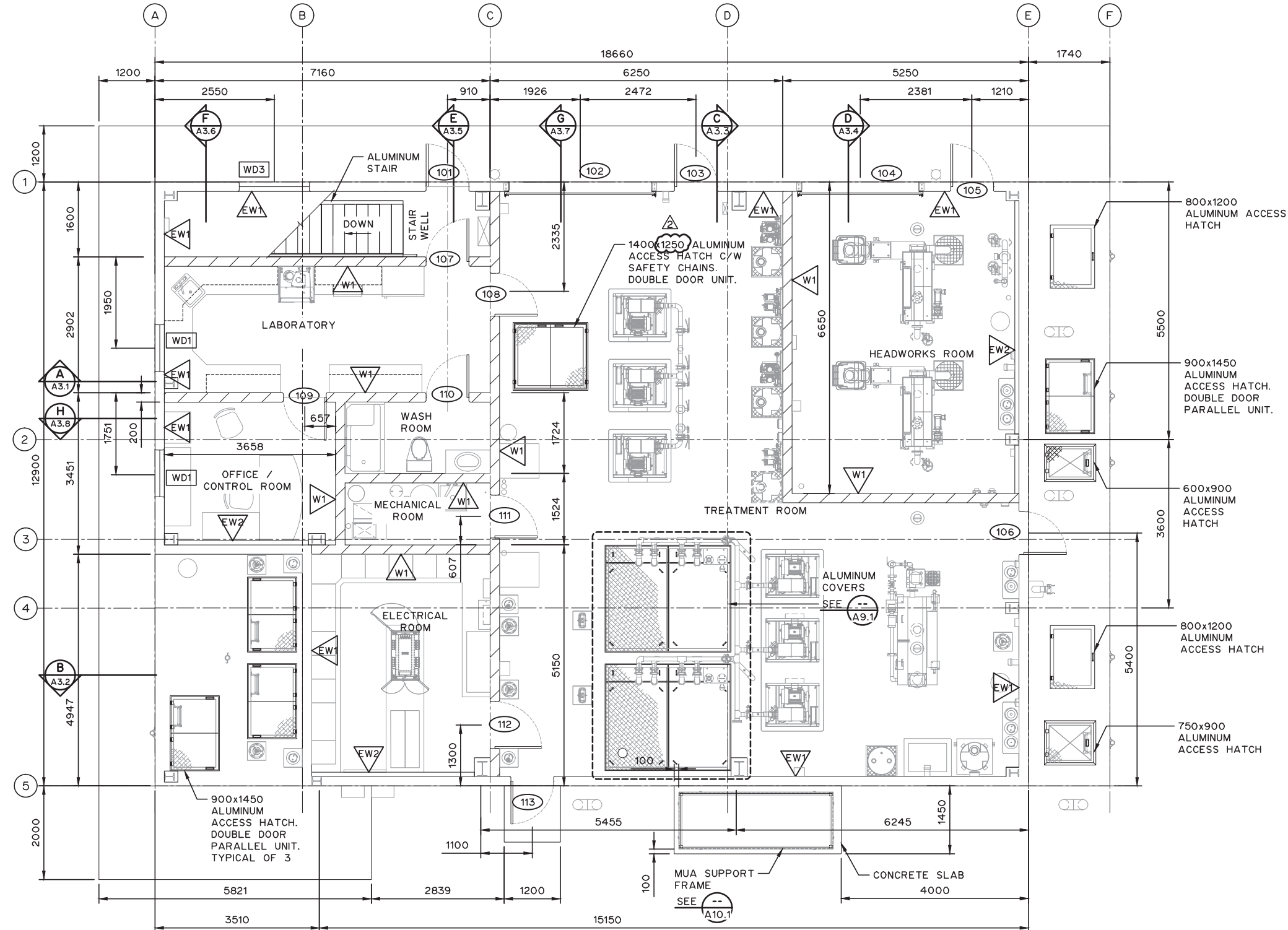
Association of Professional Engineers & Geoscientists of Saskatchewan
CERTIFICATE OF AUTHORIZATION
MPE Engineering Ltd.
Number C1334
Permission to Consult held by:
Discipline Sk. Reg. No. Signature
ENV 22727
CIVIL 22727



ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
CIVIL
SITE GRADING PLAN

DESIGNED	I.K.	JOB	7603-002-00
DRAWN	T.D.D.	SCALE	1:500
DATE	OCTOBER 2020	DRAWING	C1.4



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. SEE STRUCTURAL DRAWINGS FOR LOCATION AND SIZE OF CONCRETE EQUIPMENT PADS.
3. SEE DRAWING A4.1 FOR DOOR, AND WINDOW SCHEDULES.
4. SEE DRAWING A4.1 FOR ROOM FINISH SCHEDULE.
5. SEE STRUCTURAL DRAWINGS FOR DETAILS FOR ALL CONCRETE HOUSEKEEPING PADS AND CONCRETE EQUIPMENT PADS.
6. COORDINATE WITH OTHER DISCIPLINES FOR LOCATION AND SIZE OF WALL AND FLOOR PENETRATIONS.

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20-11-03	FOR TENDER ADDENDUM 1
20-10-15	FOR TENDER
YY-MM-DD	REVISION

Association of Professional Engineers & Geoscientists of Saskatchewan
 CERTIFICATE OF AUTHORIZATION
 MPE Engineering Ltd.
 Number C1334
 Permission to Consult held by:
 Discipline Sk. Reg. No. Signature
 STRUCTURAL 34196

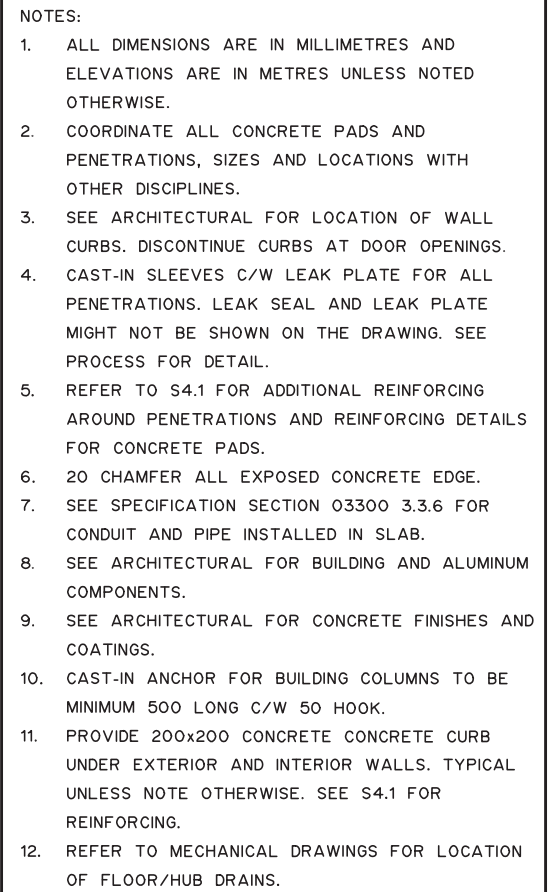


ENGLISH RIVER PROPERTY MANAGEMENT


WASTEWATER TREATMENT PLANT
 ARCHITECTURAL
 MAIN FLOOR PLAN


DESIGNED W.W.L.S.	JOB 7603-002-00
DRAWN D.F.F.	SCALE 1:100
DATE OCTOBER 2020	DRAWING A2.2


DEAD LOAD = 10.6 kPa
LIVE LOAD = 15 kPa



THIS DRAWING MAY HAVE BEEN MODIFIED
FROM ITS ORIGINAL SIZE. ALL SCALE
NOTATIONS INDICATED ARE BASED ON
11"x17" FORMAT DRAWINGS

	20-11-03	FOR TENDER ADDENDUM 1
1	20-10-15	FOR TENDER
ISSUE	YY-MM-DD	REVISION

Association of Professional Engineers & Geoscientists of Saskatchewan		
CERTIFICATE OF AUTHORIZATION		
MPE Engineering Ltd. Number C1334		
Permission to Consult held by:		
Discipline <u>STRUCTURAL</u>	Sk. Reg. No. <u>34196</u>	Signature 
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ENGLISH RIVER PROPERTY
MANAGEMENT

WASTEWATER TREATMENT PLANT
STRUCTURAL
MAIN FLOOR PLAN

DESIGNED	W.W.L.S.	JOB	7603-002-00
DRAWN	D.F.F.	SCALE	1:100
DATE	OCTOBER 2020	DRAWING	S1.2

- NOTES:
1. FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.



2. SUPPLY AND INSTALL MANUFACTURER'S CONCENTRIC VENT KIT.
3. EACH GAS CONNECTION TO AN APPLIANCE SHALL BE MADE WITH A UNION, ISOLATION GAS COCK AND DIRT LEG. GAS LINES TO BE SIZED TO CAN/CSA B149.1-05.
4. PROVIDE DUCTING AND MISCELLANEOUS FITTINGS WHERE REQUIRED TO PROVIDE A COMPLETE AND OPERATIONAL SYSTEM.
5. HEATING AND VENTILATION EQUIPMENT SHALL BE INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS INCLUDING MEETING ALL CLEARANCE REQUIREMENTS.
6. DRAWING IS DIAGRAMMATIC AND INDICATES INTENT ONLY. PROVIDE ALL VERTICAL AND HORIZONTAL OFFSETS NOT NECESSARILY IDENTIFIED IN THE DRAWING IN A MANNER THAT MEETS CODE REQUIREMENTS.
7. ALL DUCT AND FLUE PENETRATIONS THROUGH FIRE RATED WALLS AND CEILINGS ARE TO BE COMPLETE WITH FIRE DAMPERS AND CONFORMING ACCESS PANEL. FIRE DAMPERS ARE TO BE UL LISTED AND MANUFACTURED AS REQUIRED BY CAN/ULC-S112.2-07.
8. UNIT HEATERS TO BE INSTALLED AT 4200 ABOVE FINISHED FLOOR. COORDINATE ON SITE WITH PROCESS EQUIPMENT. SUPPLY AND INSTALL MANUFACTURER'S CONCENTRIC VENT KIT. VENT TO RUN ALONG CEILING TO NORTH WALL AND PENETRATE MAIN FLOOR SLAB. RUN VENT AS CLOSE AS POSSIBLE TO NORTH WALL.
9. PVC DUCT THROUGH FLOOR C/W LINK SEAL. DUCT TO EXTEND 50 BELOW FINISHED CEILING.
10. PVC DUCT TO EXTEND 50 BELOW GRATING.

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS

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1	20-10-15	FOR TENDER
ISSUE	YY-MM-DD	REVISION

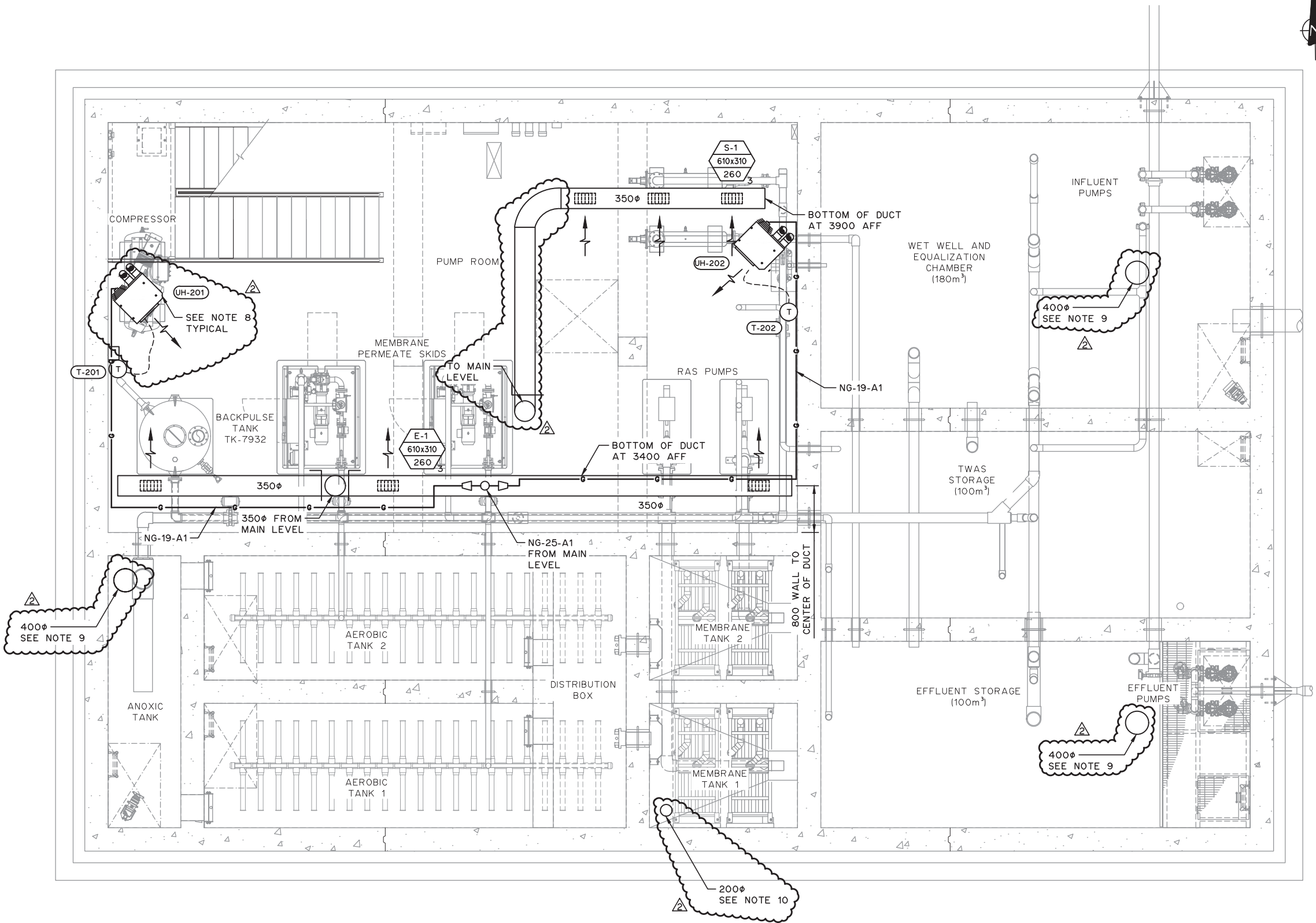
Association of Professional Engineers & Geoscientists of Saskatchewan
CERTIFICATE OF AUTHORIZATION
MPE Engineering Ltd.
Number C1334
Permission to Consult held by:
Discipline Sk. Reg. No. Signature
MECHANICAL 24112



ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
MECHANICAL - HVAC
LOWER LEVEL
PLAN

DESIGNED	R.R.U.	JOB	7603-002-00
DRAWN	T.D.D.	SCALE	1:75
DATE	OCTOBER 2020	DRAWING	M2.1

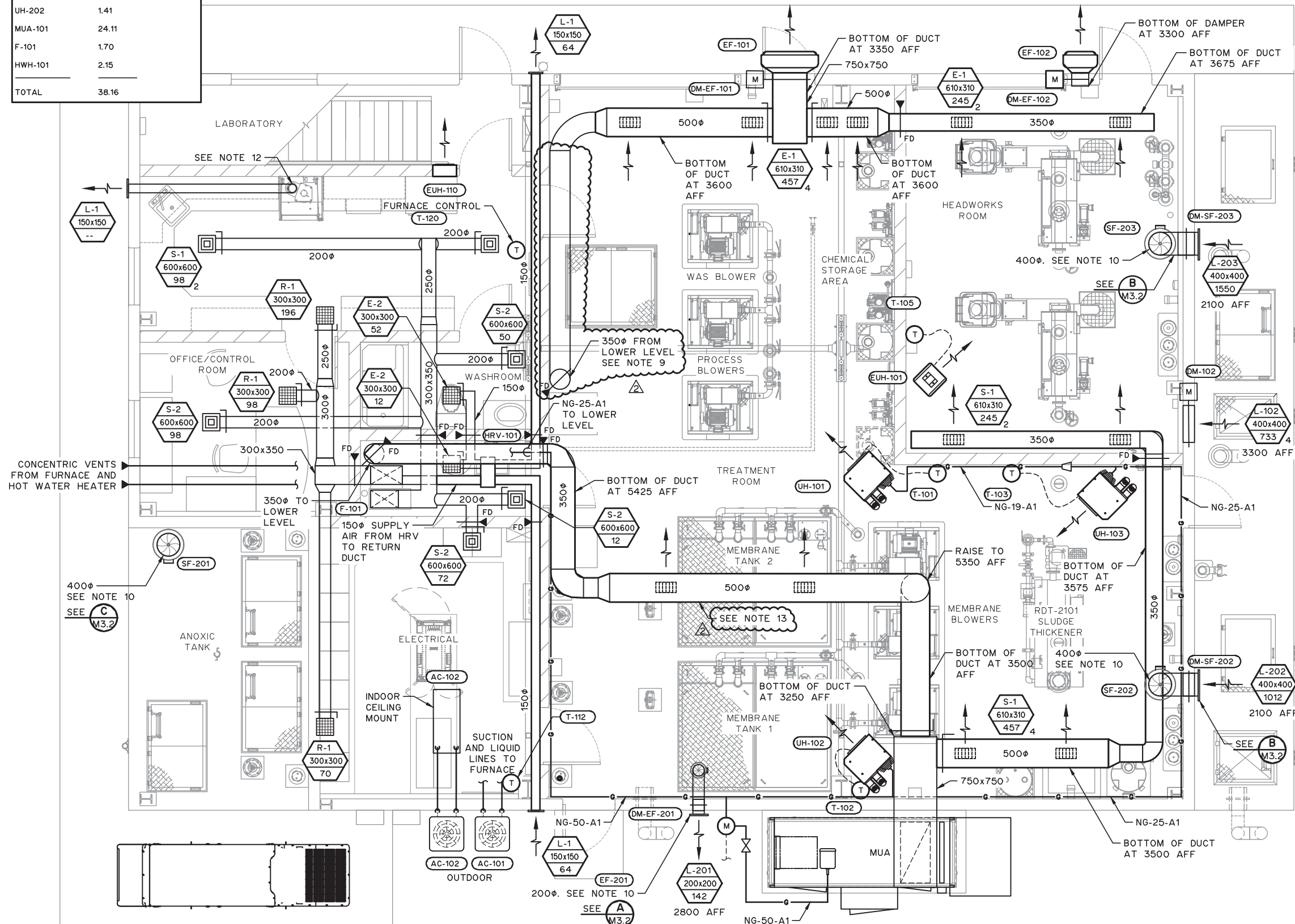


GAS SCHEDULE

EQUIPMENT	CONSUMPTION (m3/hr)
UH-101	2.46
UH-102	2.46
UH-103	2.46
UH-201	1.41
UH-202	1.41
MUA-101	24.11
F-101	1.70
HWH-101	2.15
TOTAL	38.16

NOTES:

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- SUPPLY AND INSTALL MANUFACTURER'S CONCENTRIC VENT KIT.
- EACH GAS CONNECTION TO AN APPLIANCE SHALL BE MADE WITH A UNION, ISOLATION GAS COCK



- AND DIRT LEG. GAS LINES TO BE SIZED TO CAN/CSA B149.1-05.
- PROVIDE DUCTING AND MISCELLANEOUS FITTINGS WHERE REQUIRED TO PROVIDE A COMPLETE AND OPERATIONAL SYSTEM.
- HEATING AND VENTILATION EQUIPMENT SHALL BE INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS INCLUDING MEETING ALL CLEARANCE REQUIREMENTS.
- DRAWING IS DIAGRAMMATIC AND INDICATES INTENT ONLY. PROVIDE ALL VERTICAL AND HORIZONTAL OFFSETS NOT NECESSARILY IDENTIFIED IN THE DRAWING IN A MANNER THAT MEETS CODE REQUIREMENTS.
- ALL DUCT AND FLUE PENETRATIONS THROUGH FIRE RATED WALLS AND CEILINGS ARE TO BE COMPLETE WITH FIRE DAMPERS AND CONFORMING ACCESS PANEL. FIRE DAMPERS ARE TO BE UL LISTED AND MANUFACTURED AS REQUIRED BY CAN/ULC-S112.2-07.
- UNIT HEATERS TO BE INSTALLED AT 3000 ABOVE FINISHED FLOOR. COORDINATE ON SITE WITH PROCESS EQUIPMENT.
- INSTALL FIRE DAMPER ABOVE FLOOR TO PUMP ROOM.
- PVC DUCT TO TANK BELOW.
- GAS PRESSURE WILL BE 7-IN W.C. FROM UTILITY TO BUILDING. CONTRACTOR TO COORDINATE GAS SERVICE CONNECTION WITH UTILITY.
- CONNECT 150Ø EXHAUST DUCT TO FUME HOOD.
- SUPPLY DUCT TO BE INSTALLED BETWEEN ROOF JOISTS AND AS CLOSE TO THE SOUTH WALL AS THE ROOF PITCH ALLOWS.

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20-11-03	FOR TENDER ADDENDUM 1
1	20-10-15 FOR TENDER
ISSUE	YY-MM-DD REVISION

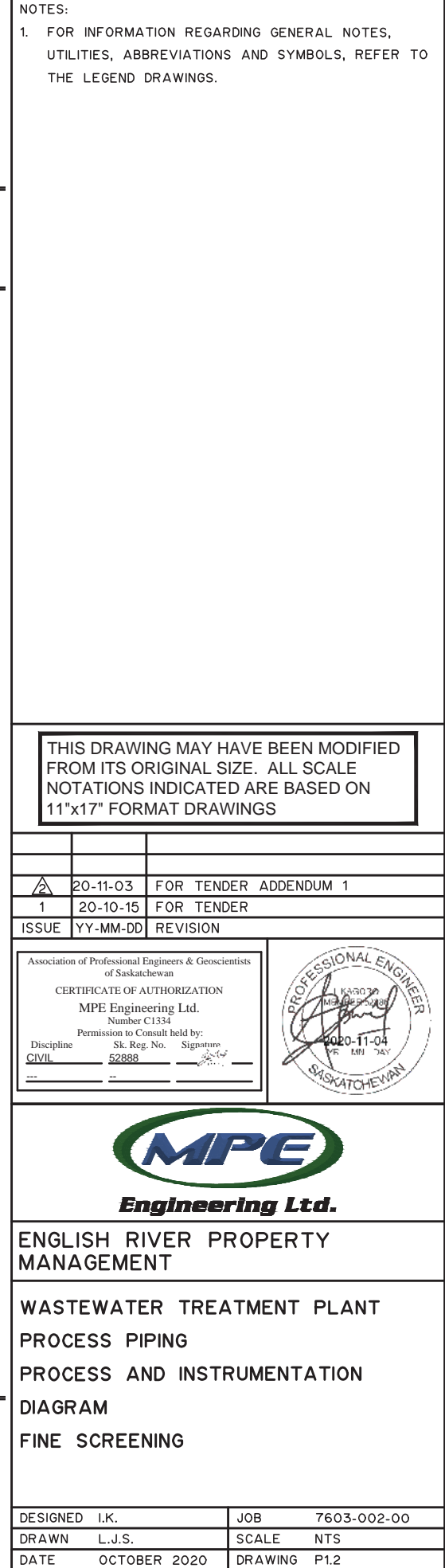
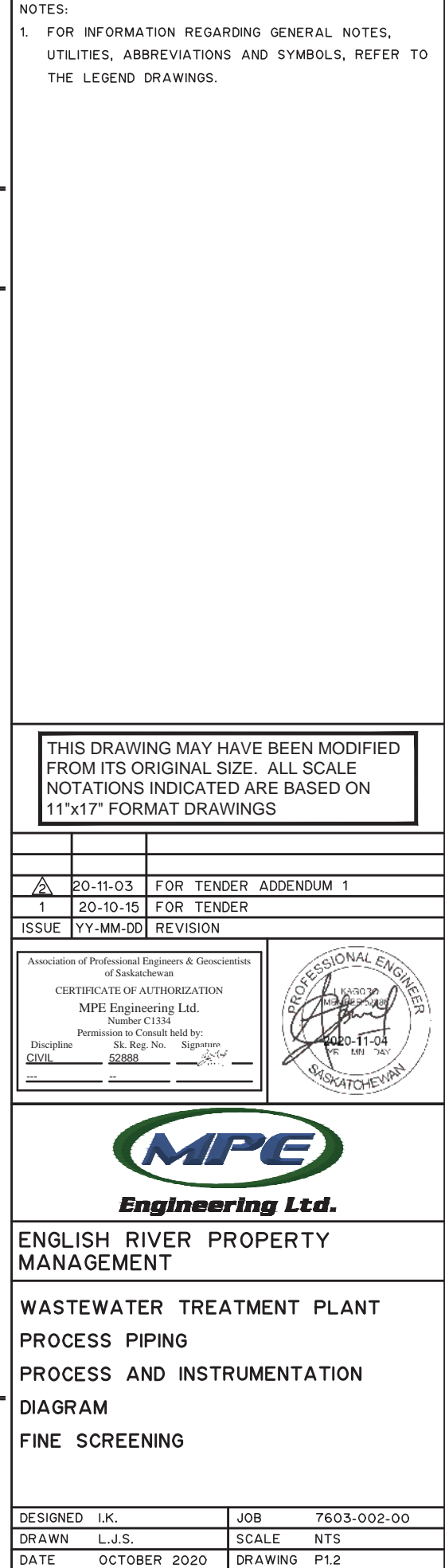
Association of Professional Engineers & Geoscientists of Saskatchewan
 CERTIFICATE OF AUTHORIZATION
 MPE Engineering Ltd.
 Number C1334
 Permission to Consult held by:
 Discipline Sk. Reg. No. Si
 MECHANICAL 24112



ENGLISH RIVER PROPERTY MANAGEMENT

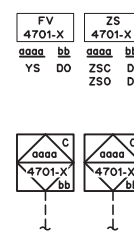
WASTEWATER TREATMENT PLANT
 MECHANICAL
 HEATING AND VENTILATION
 MAIN LEVEL PLAN

DESIGNED R.R.U.	JOB 7603-002-00
DRAWN T.D.D.	SCALE 1:75
DATE OCTOBER 2020	DRAWING M2.2

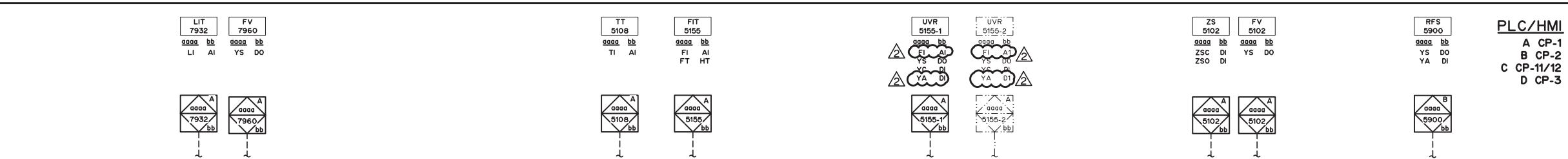


DESIGN CRITERIA

DESIGNED	I.K.	JOB	7603-002-00
DRAWN	L.J.S.	SCALE	NTS
DATE	OCTOBER 2020	DRAWING	P1.2

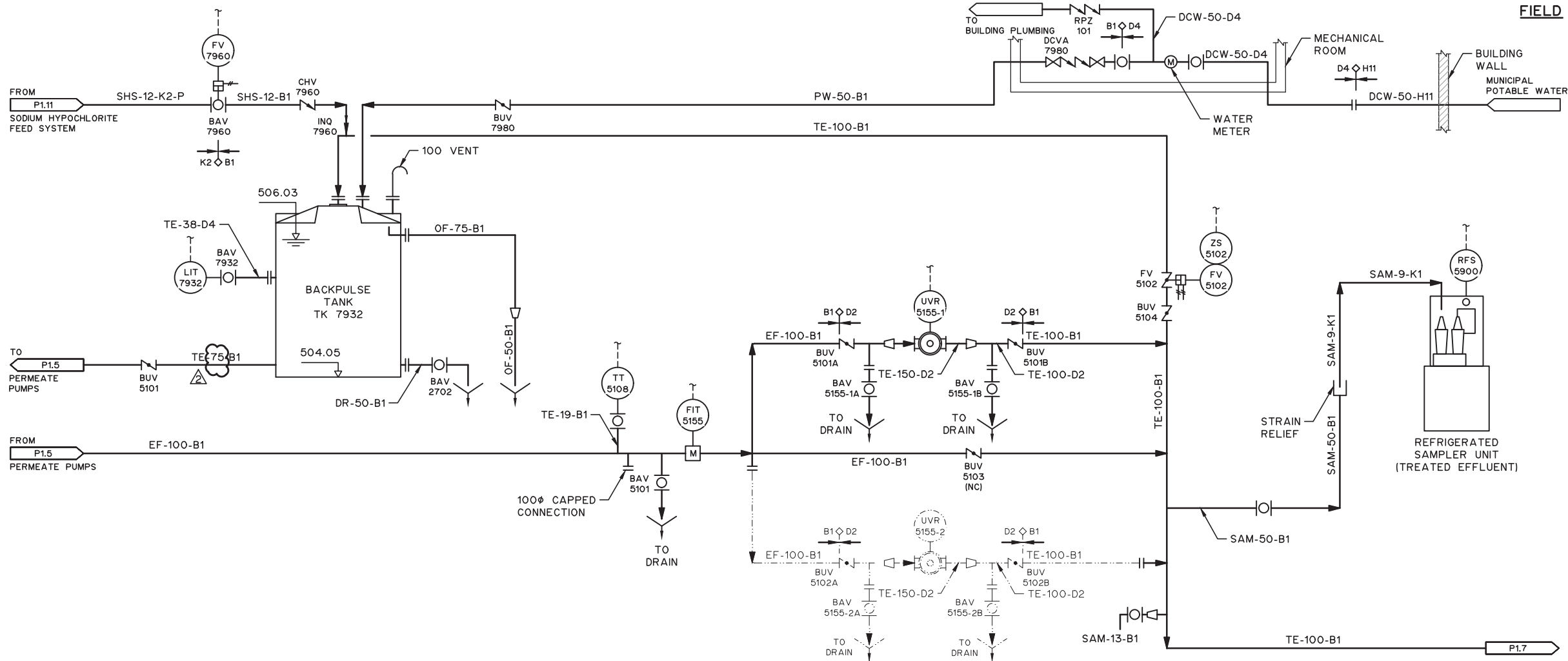


DESIGN CRITERIA



MCC
(VOLTAGE)

FIELD

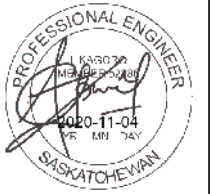


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CIVIL 52888



ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
PROCESS PIPING
PROCESS AND INSTRUMENTATION
DIAGRAM
BACKPULSE TANK AND UV
DISINFECTION

DESIGNED	I.K.	JOB	7603-002-00
DRAWN	L.J.S.	SCALE	NTS
DATE	OCTOBER 2020	DRAWING	P1.6

DESIGN CRITERIA

FIT 5155

- RANGE: 0-20 L/s
- POWER: 120 VAC

PRV 7921

- SP: 40 psig

LIT 7932

- RANGE: 0-52 kPa (0-7.5 psi)
- POWER: 24 VDC

TK 7932

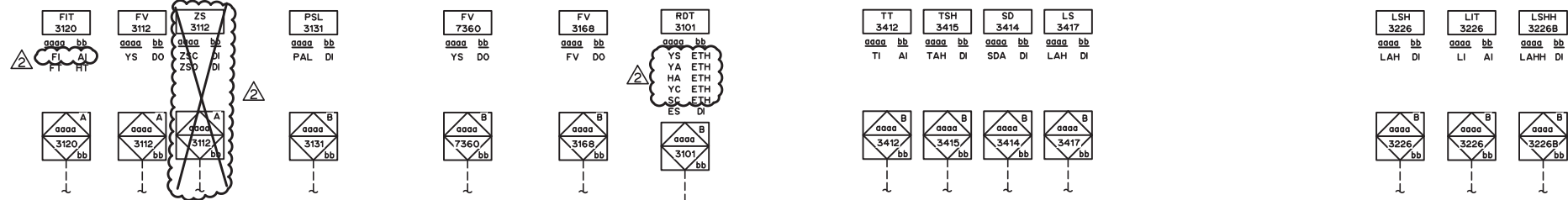
- BACKPULSE PERMEATE TANK
- CAPACITY: 15000 L

TT 5108

- RANGE: 0-40°C
- POWER: 24 VDC

UVR 5155-1/UVR 5155-2

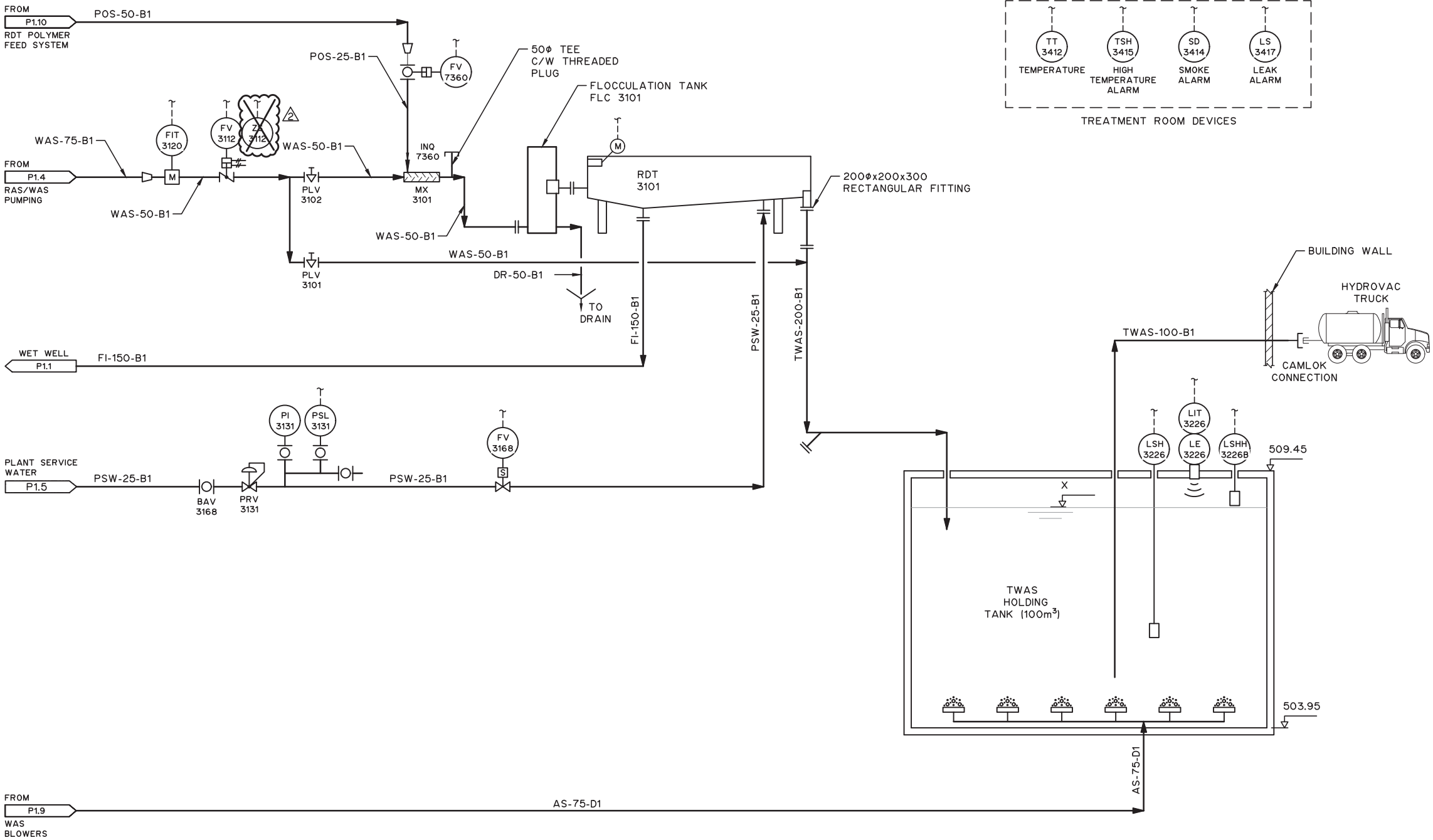
- UV REACTOR
- DESIGN DOSE: 44.47 mJ/cm²
- TREATMENT CAPACITY: 7,700 m³/DAY
- HYDRAULIC CAPACITY: 11,900 m³/DAY
- NUMBER OF LAMPS: 4/UNIT
- 208VAC/1 PH
- 13.5 kVA, 10.8 kW



PLC/HMI
A CP-1
B CP-2
C CP-11/12
D CP-3

MCC
(VOLTAGE)

FIELD



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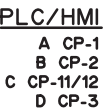
ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
PROCESS PIPING
PROCESS AND INSTRUMENTATION
DIAGRAM
SLUDGE THICKENING AND HOLDING
TANK

DESIGN CRITERIA

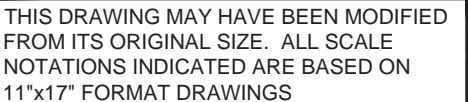
FIT 3120 - RANGE: 0-342 L/hr - POWER: 120 VAC	MX 3101 -	RDY 3101 - ROTARY DRUM THICKENER - CAPACITY: 3.2 m³/hr (25 USGPM) - 1% TS (57.2 kg/hr DRY) - 1/3 HP 1750 RPM - 575 VAC/3 PH/60 Hz - TEFC	PRV 3131 - RANGE: 25-75 psig - SP: 50 psig	PSL 3131 - SP: 35 psig - RANGE: 0-100 psi	LIT 3226 - RANGE: 0-10 m - POWER: 24 VDC
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DESIGNED	I.K.	JOB	7603-002-00
DRAWN	L.J.S.	SCALE	NTS
DATE	OCTOBER 2020	DRAWING	P1.8



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FIELD



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_____	_____	_____
_____	_____	_____



WASTEWATER TREATMENT PLANT PROCESS PIPING PROCESS AND INSTRUMENTATION DIAGRAM

DESIGNED	I.K.	JOB	7603-002-00
DRAWN	L.J.S.	SCALE	NTS
DATE	OCTOBER 2020	DRAWING	P1.10

DESIGN CRITERIA

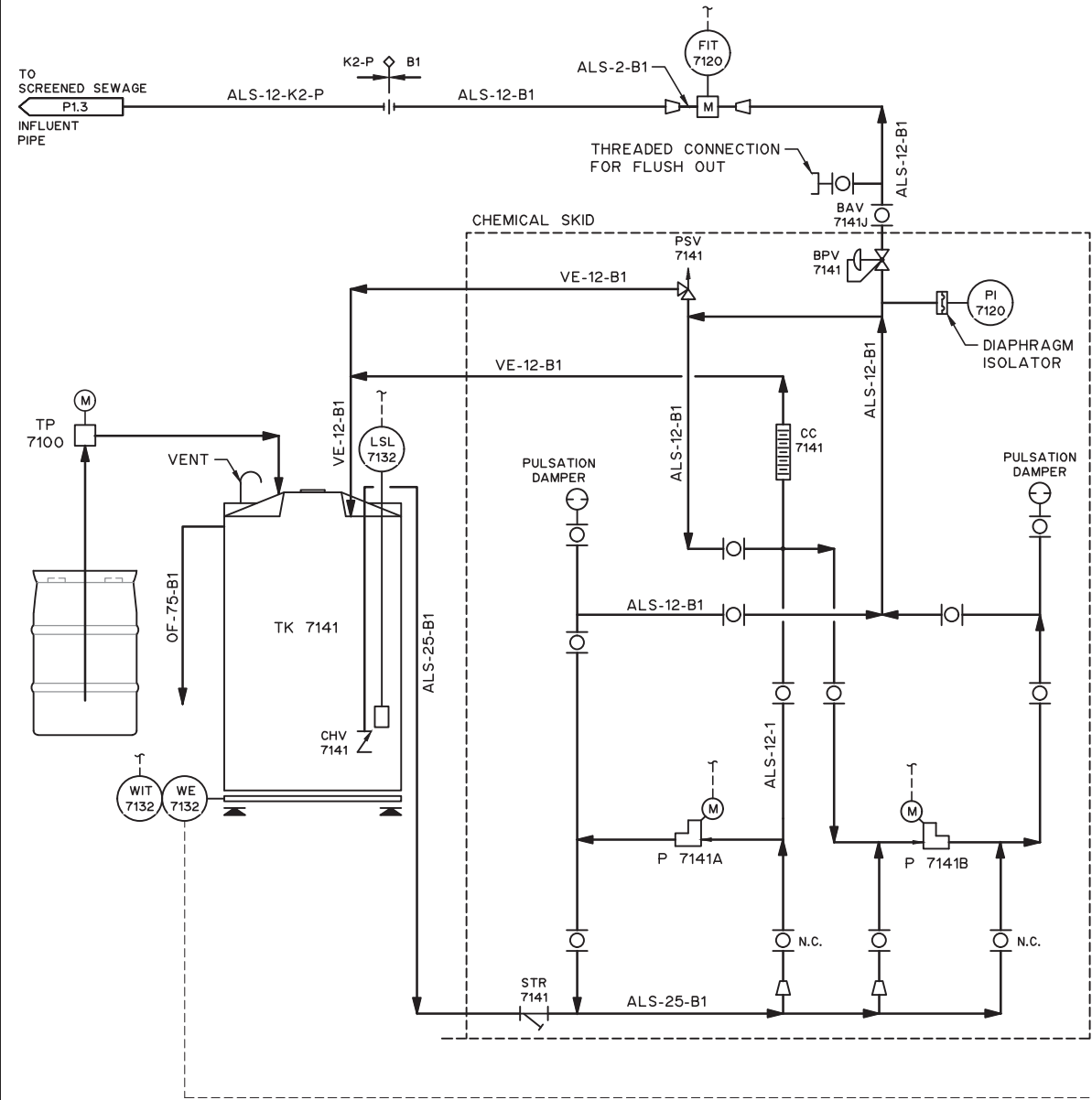
DESIGN CRITERIA



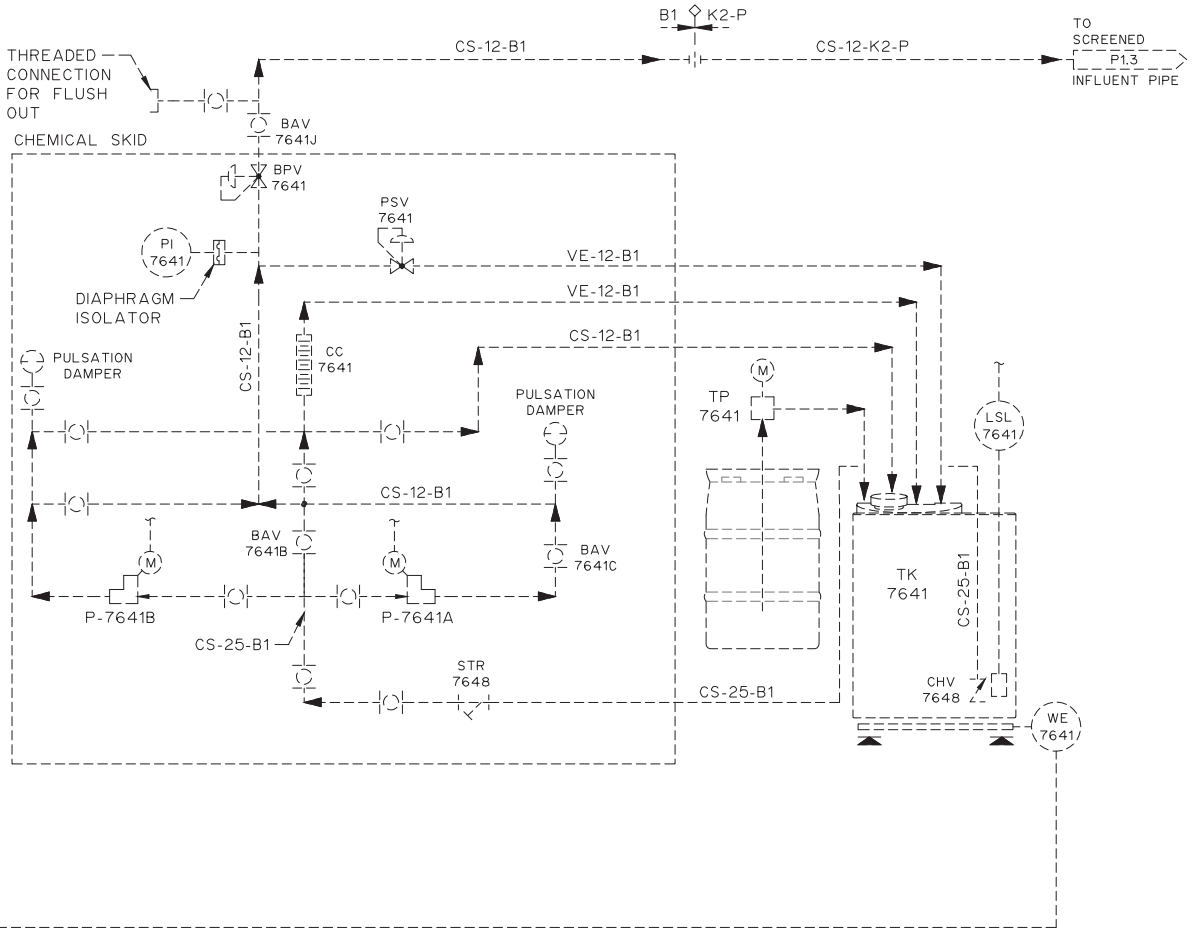
PLC/HMI
A CP-1
B CP-2
C CP-11/12
D CP-3

MCC
(VOLTAGE)

FIELD



ALUM FEED SYSTEM



SODIUM HYDROXIDE SYSTEM
(FUTURE)

P 7141A/B

- CAPACITY: 19 L/hr @ 145 psi
- 1/8 HP
- 115 VAC/1 PH/60 Hz

TP 7100

- CHEMICAL TRANSFER PUMP
- DUTY POINT: 2.8 L/s (45 gal/min)
- 120 VAC/1 PH/60 Hz

TK 7141

- ALUM BULK TANK
- CAPACITY: 9 000 L

WIT 7132

- RANGE: 0-500 kg
- POWER: 120 VAC

PSV 7141

- SP: 50 psig

FIT 7120

- RANGE: 0-5 L/hr
- POWER: 120 VAC

P 7641A/B

- DUTY: 18 L/min @ 30 psi
- 0.5 HP
- 120 VAC/3 PH/60 Hz

TP 7641

- CHEMICAL TRANSFER PUMP
- DUTY POINT: 2.8 L/s (45 gal/min)
- 120 VAC/1 PH/60 Hz

TK 7641

- SODIUM HYDROXIDE DAY TANK
- CAPACITY: XX L

PSV 7641

- SP: XX psig

DESIGN CRITERIA

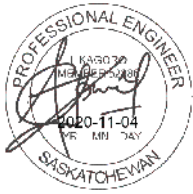
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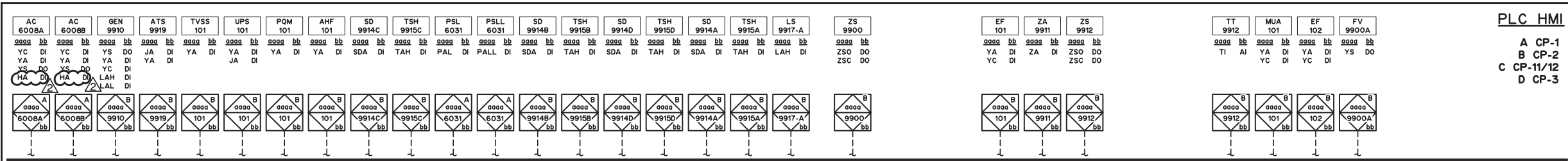
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CIVIL 52888



ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
PROCESS PIPING
PROCESS AND INSTRUMENTATION
DIAGRAM
ALUM AND SODIUM HYDROXIDE FEED SYSTEMS

DESIGNED	I.K.	JOB	7603-002-00
DRAWN	L.J.S.	SCALE	NTS
DATE	OCTOBER 2020	DRAWING	P1.12

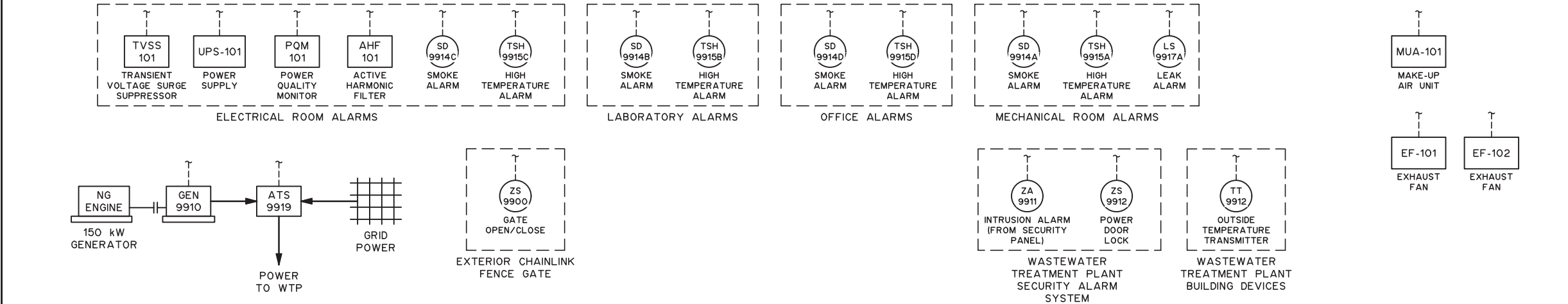


PLC HMI
A CP-1
B CP-2
C CP-11/12
D CP-3

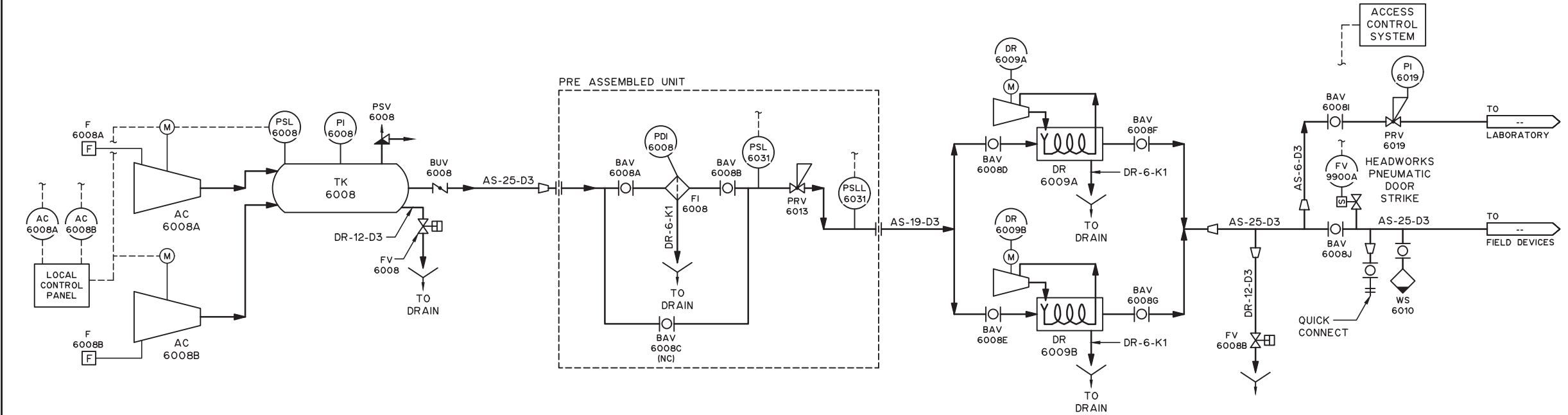
NOTES:
1. FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.

MCC
(VOLTAGE)

FIELD



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F 6008A/F 6008B
- POWER: 120VAC

AC 6008A/AC 6008B
- DUTY POINT: 25 CFM @ 150 psig
- 5.0 HP, 1800 RPM
- 600 VAC/3 PH/60 Hz

PSV 6008
- SP: 200 psig

TK 6008
- 454 L (120 US gpm)
- WET RECEIVER

PSL 6008
- SP HIGH: 145 psig
- SP LOW: 110 psig

WS 6008
- CAPACITY: 25 SCFM

FI 6008
- 1 MICRON FILTER
- CAPACITY: 25 SCFM

DR 6009A/DR 6009B
- CAPACITY: 0-25 CFM
- 0.25Hp, 120 VAC/1 PH/60 Hz

PSL 6031
- SP: 90 psi

PSLL 6031
- SP: 70 psi

PRV 6013
- SP: 90 psig

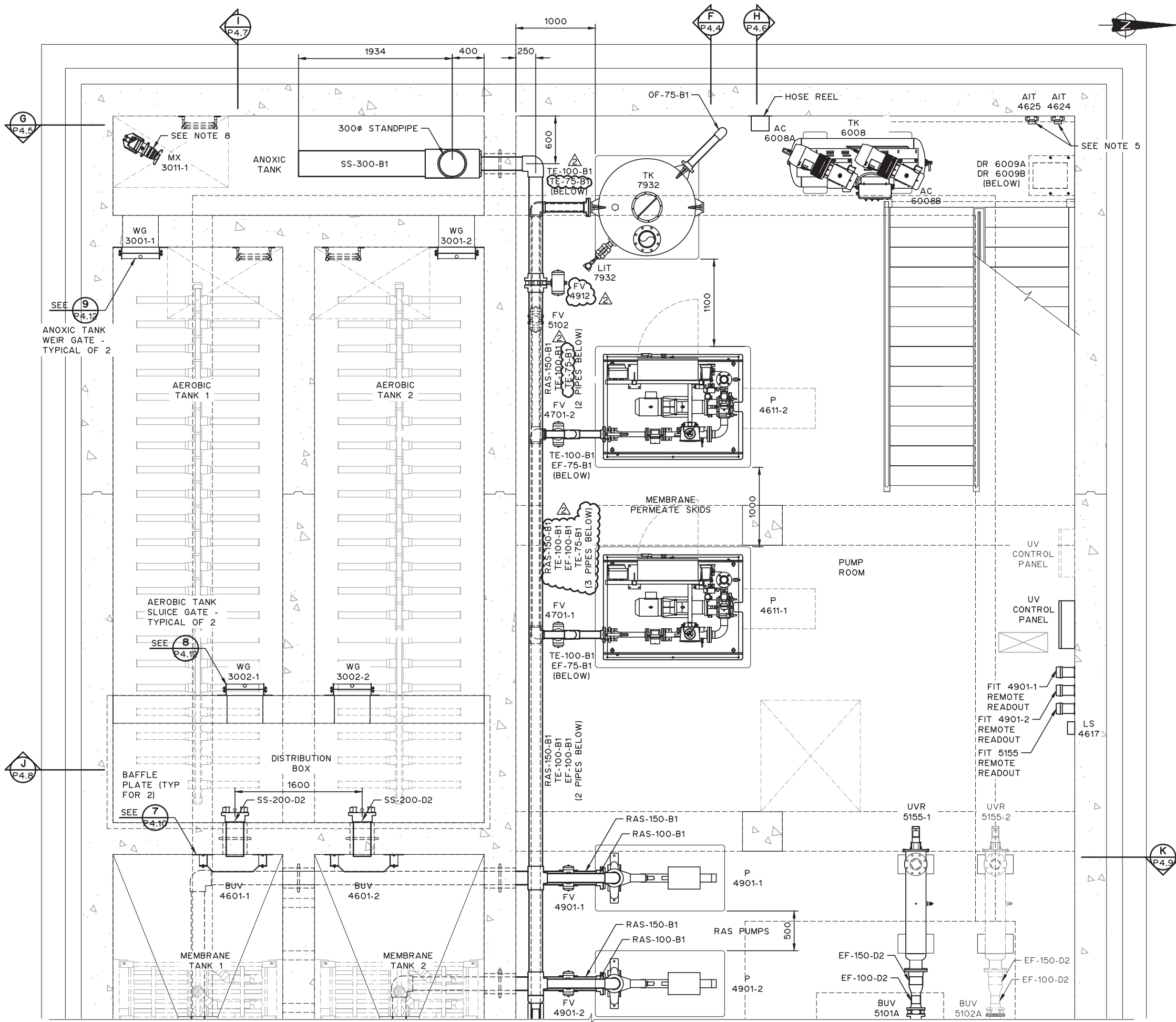
PRV 6019
- SP: 50 psig

DESIGN CRITERIA

ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
PROCESS PIPING
PROCESS AND INSTRUMENTATION
DIAGRAM
COMPRESSOR AND AUXILLARY
SYSTEMS

DESIGNED	I.K.	JOB	7603-002-00
DRAWN	L.J.S.	SCALE	NTS
DATE	OCTOBER 2020	DRAWING	P1.13



- NOTES:
1. FOR INFORMATION REGARDING GENERAL NOTES, UTILITIES, ABBREVIATIONS AND SYMBOLS, REFER TO THE LEGEND DRAWINGS.
 2. CONTRACTOR TO PROVIDE SUPPORT FOR PIPING AND FITTINGS AS PER PIPING AND SUPPORT MANUFACTURER'S RECOMMENDATIONS.
 3. STEEL PIPES LARGER THAN 75φ SHALL NOT BE SUPPORTED FROM THE ROOF SYSTEM UNLESS NOTED OTHERWISE.
 4. PVC PIPES LARGER THAN 150φ SHALL NOT BE SUPPORTED FROM THE ROOF SYSTEM UNLESS NOTED OTHERWISE.
 5. AIT 4625 AND AIT 4624 BEACONS AND HORNS ARE TO BE INSTALLED IN THE STAIRWELL LANDING SO AS TO BE VISIBLE TO ANY PERSON(S) AT THE TOP OF THE STAIRS.
 6. ALL PIPE SUPPORTS AND PIPE HANGERS TO BE 316 SS.
 7. STAINLESS STEEL ISOLATION BALL VALVES REQUIRED AT ALL PNEUMATIC FIELD DEVICES AND SKID CONNECTIONS.
 8. CONTRACTOR TO PROVIDE TUBING GUIDE AND CABLE SUPPORT FOR MIXER.

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ISSUE	YY-MM-DD	REVISION

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PROFESSIONAL ENGINEER

[Signature]

2020-11-04

VR MM JAY

SASKATCHEWAN



ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT

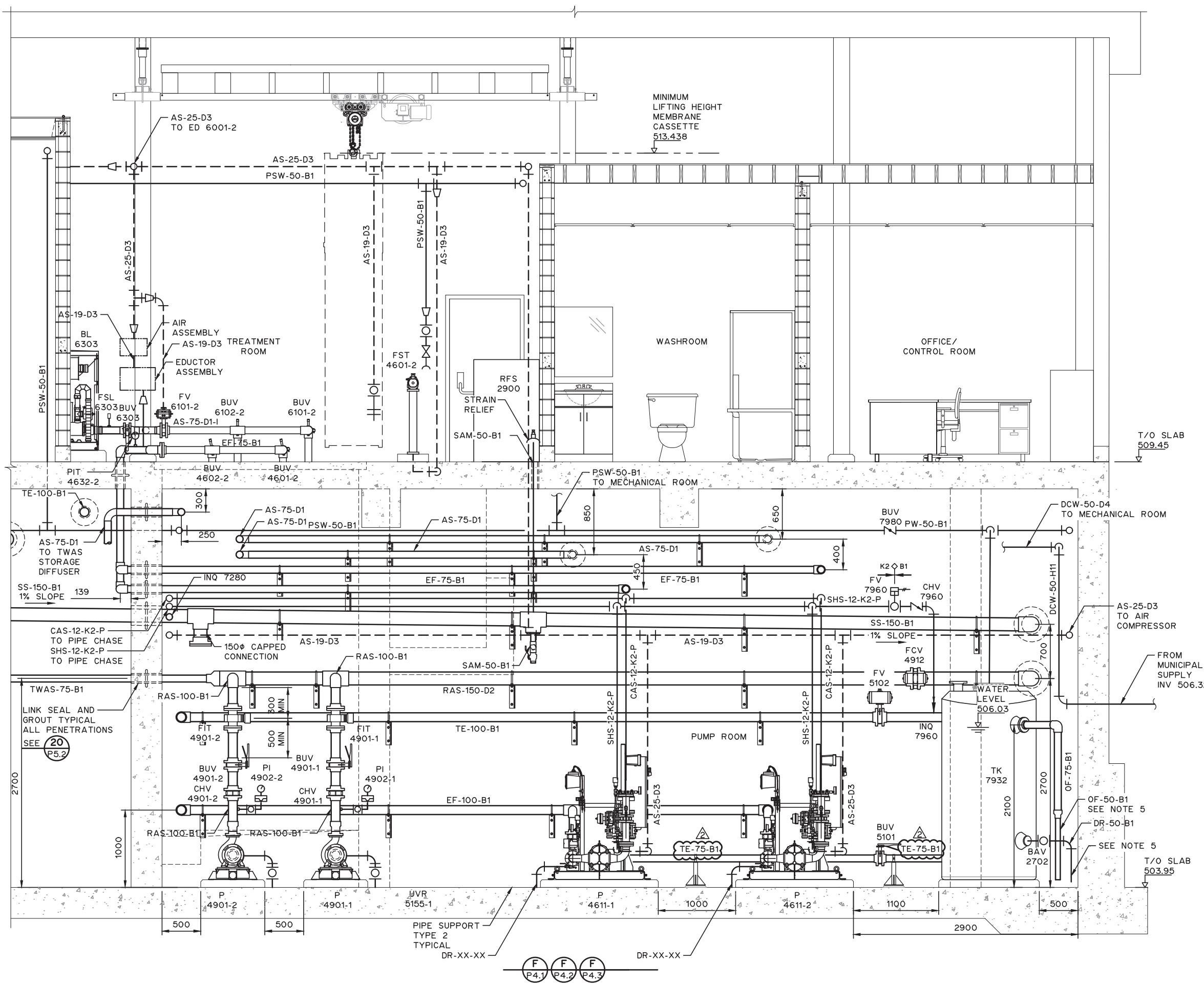
PROCESS PIPING

BIOREACTOR AND PUMP ROOM

LOWER LEVEL PLAN

LOWER PIPING

DESIGNED	I.K.	JOB	7603-002-00
DRAWN	L.J.S.	SCALE	1:50
DATE	OCTOBER 2020	DRAWING	P4.1



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 3. STEEL PIPES LARGER THAN 75Ø SHALL NOT BE SUPPORTED FROM THE ROOF SYSTEM UNLESS NOTED OTHERWISE.
 4. PVC PIPES LARGER THAN 150Ø SHALL NOT BE SUPPORTED FROM THE ROOF SYSTEM UNLESS NOTED OTHERWISE.
 5. CONTRACTOR TO NEATLY PLUMB DRAIN LINE TO THE NEAREST FLOOR DRAIN.

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2020-11-04

PROFESSIONAL ENGINEER

SASKATCHEWAN



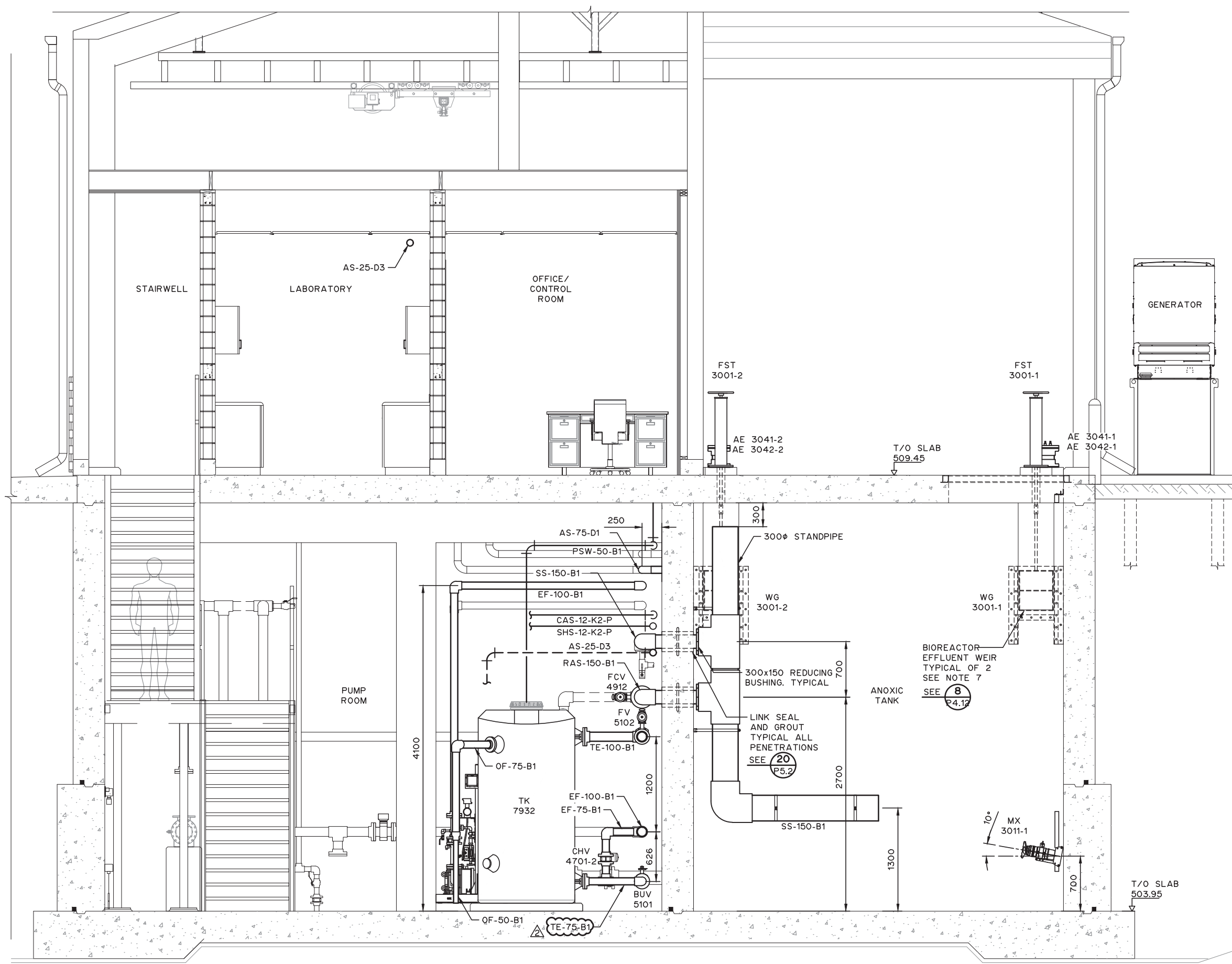
ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT

PROCESS PIPING

BIOREACTOR AND PUMP ROOM SECTIONS

DESIGNED	I.K.	JOB	7603-002-00
DRAWN	C.A.Z.	SCALE	1:50
DATE	OCTOBER 2020	DRAWING	P4.4



- NOTES:
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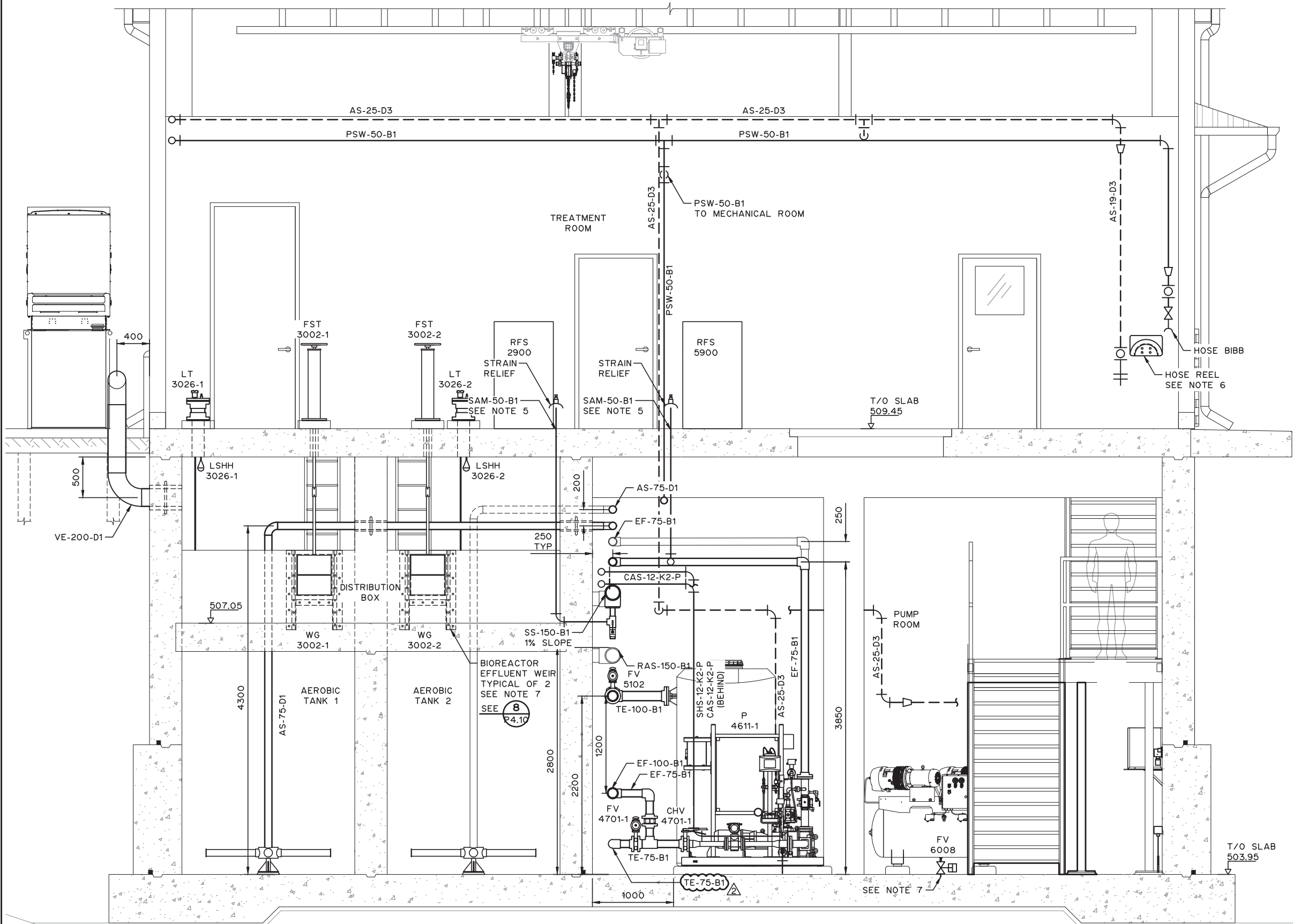
2020-11-04

PROFESSIONAL ENGINEER

SASKATCHEWAN



ENGLISH RIVER PROPERTY MANAGEMENT	
WASTEWATER TREATMENT PLANT	
PROCESS PIPING	
BIOREACTOR AND PUMP ROOM	
SECTIONS	
DESIGNED	I.K.
DRAWN	C.A.Z.
DATE	OCTOBER 2020
JOB	7603-002-00
SCALE	1:50
DRAWING	P4.5

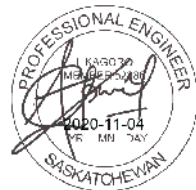


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 - PVC PIPES LARGER THAN 150Ø SHALL NOT BE SUPPORTED FROM THE ROOF SYSTEM UNLESS NOTED OTHERWISE.
 - 50Ø SCHEDULE 40 PVC CONDUIT CAST IN SLAB FOR PLANT INFLUENT SAMPLE TUBING. CONDUIT TO COME WITH LONG RADIUS 90° ELBOWS. CAULK OPENING AROUND TUBING TO ENSURE GAS TIGHT SEAL.
 - SEE STANDARD DETAIL IN SECTION 15015 C/W 25Ø HOSE.
 - CONTRACTOR TO NEATLY PLUMB DRAIN LINE TO NEAREST FLOOR DRAIN.

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1	20-10-15 FOR TENDER
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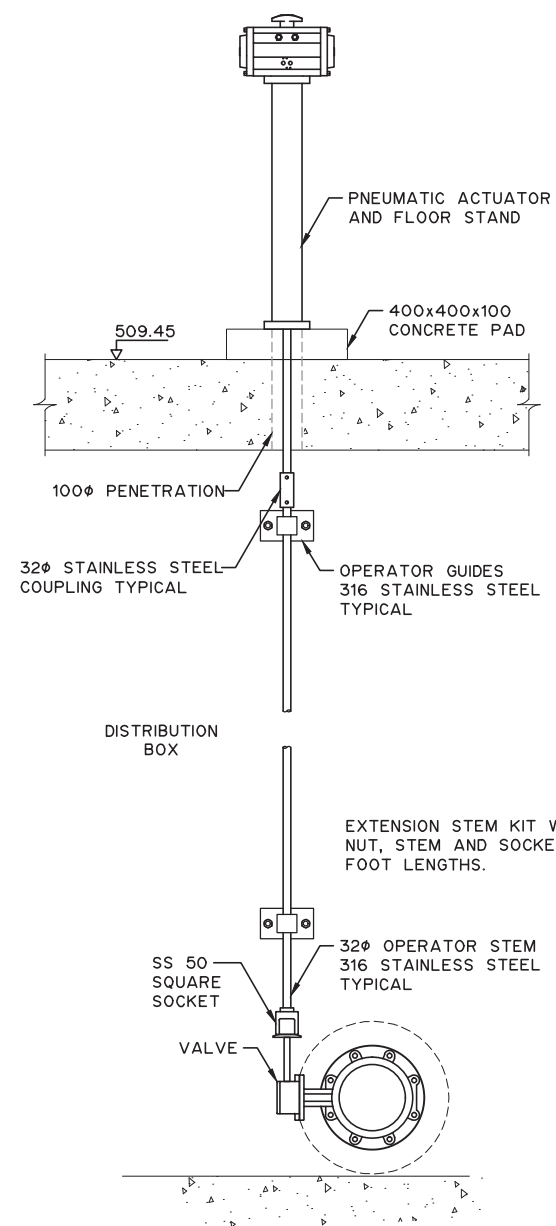
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ENGLISH RIVER PROPERTY MANAGEMENT

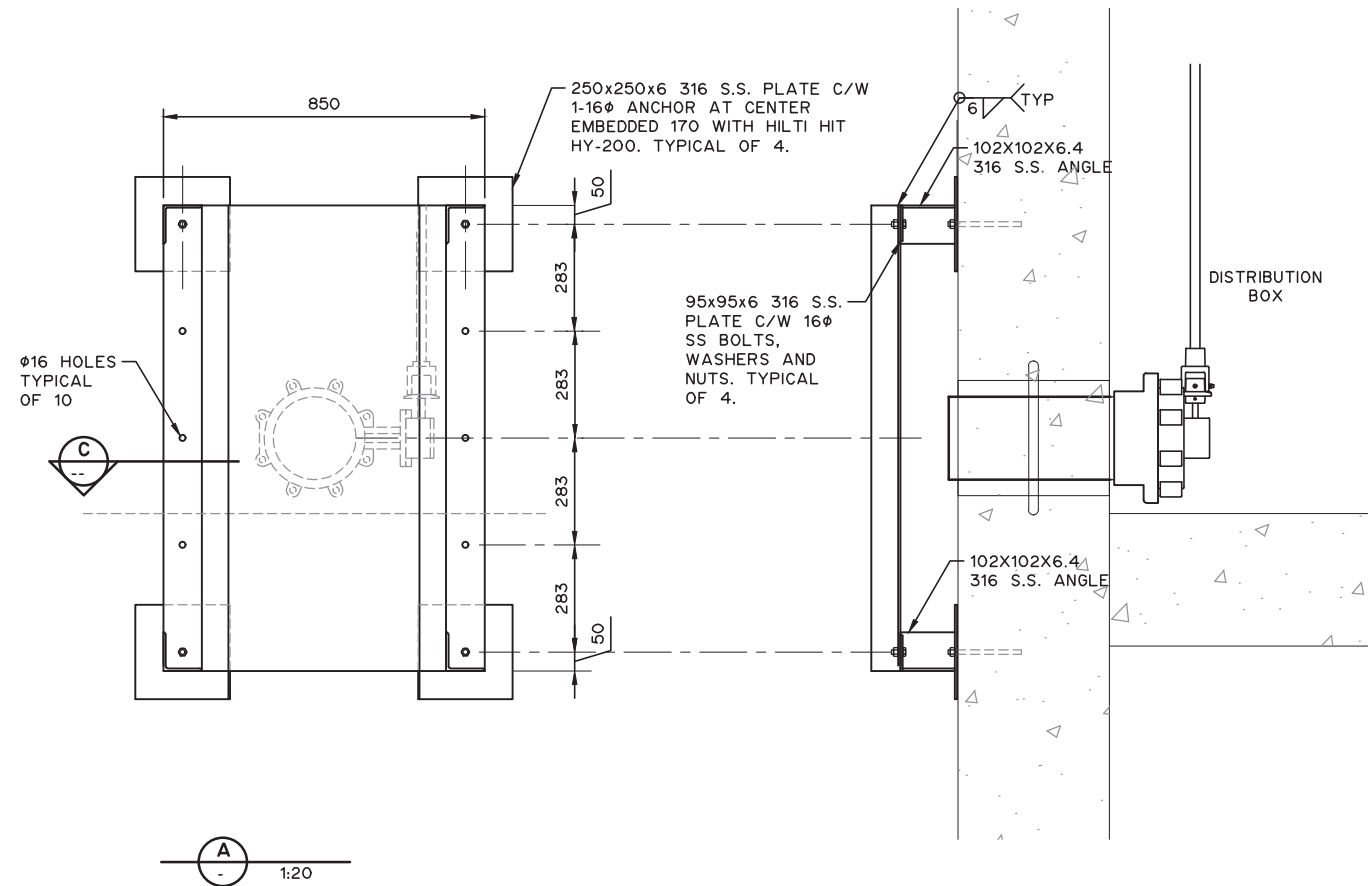
WASTEWATER TREATMENT PLANT
PROCESS PIPING
BIOREACTOR AND PUMP ROOM
SECTIONS

DESIGNED	I.K.	JOB	7603-002-00
DRAWN	L.J.S.	SCALE	1:50
DATE	OCTOBER 2020	DRAWING	P4.8

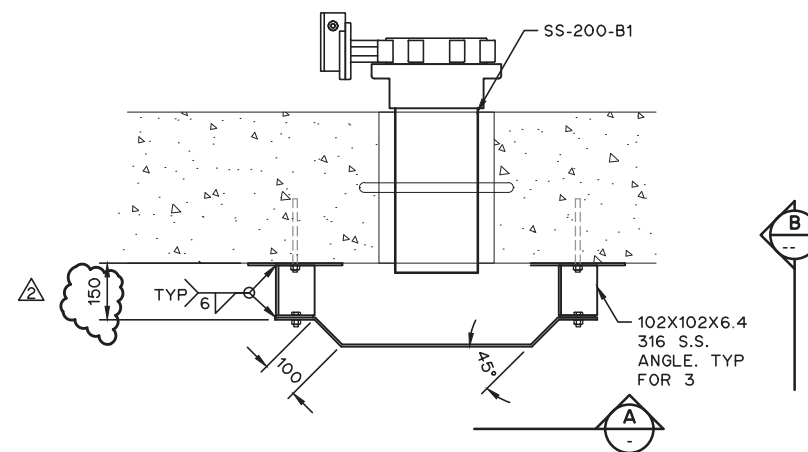


SUBMERGED VALVE WITH PNEUMATIC OPERATOR DETAIL

6 6
P4.3 P4.7 1:25



A 1:20



MEMBRANE TANK BAFFLE PLATE

7 7 7
P3.1 P4.1 P4.2 1:20

NOTES:

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PROFESSIONAL ENGINEER KASO 30 MPE 2020-11-04 YR MM DAY SASKATCHEWAN		



ENGLISH RIVER PROPERTY MANAGEMENT

WASTEWATER TREATMENT PLANT
PROCESS PIPING
BIOREACTOR AND PUMP ROOM
SUBMERGED VALVE DETAILS

DESIGNED	I.K.	JOB	7603-002-00
DRAWN	L.J.S.	SCALE	SHOWN
DATE	OCTOBER 2020	DRAWING	P4.10

English River Property Management

Wastewater Treatment Facility



Association of Professional Engineers & Geoscientists
of Saskatchewan

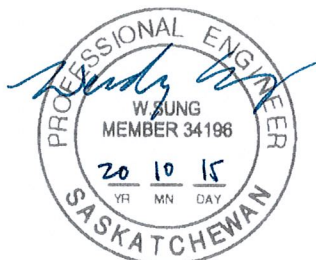
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Discipline	Sk. Reg. No.	Signature
CIV	22727	<i>[Signature]</i>
ENV	22727	<i>[Signature]</i>

Project Manager, Civil



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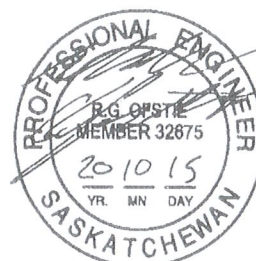
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STRUCTURAL	34196	<i>[Signature]</i>

Structural/Architectural



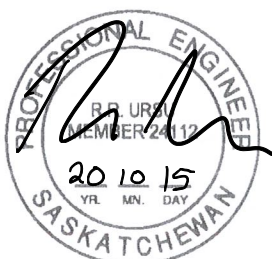
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Permission to Consult held by:

Discipline	Sk. Reg. No.	Signature
ELECTRICAL	32875	<i>[Signature]</i>

Electrical/Instrumentation
& Controls

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MECHANICAL	24112	<i>[Signature]</i>

Mechanical/HVAC



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CIVIL	52886	<i>[Signature]</i>

Process

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PREAMBLE

The format of these Specifications is based on "MasterFormat" published jointly by Construction Specifications Canada and The Construction Specifications Institute. This Table of Contents generally reflects the "MasterFormat" division and section arrangement.

Where it is indicated that a division of "MasterFormat" is "Not Used", or where a division heading is omitted entirely, this means only that the division has not been included in the Specification. It does not necessarily mean that the work normally specified in that division is not required.

SEPARATE VOLUMES

The Specifications and Contract Information Documents for this contract are bound in five separate volumes as follows:

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Volume 2 of 5:	Divisions 13 to 16 and Appendices A - C
Volume 3 of 5:	Appendices D1 – D5
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1. BID SUBMISSION

- .1 Bidders must submit bids through the Online Bidding System <https://mpe.bidsandtenders.ca/>.
- .2 Bidders may submit bids only before the time and date set by for receiving bids on the Online Bidding System.
- .3 The time as indicated by the declining time clock on the Online Bidding System shall be the official time for closing. Bids submitted after the Online Bidding System closing time will not be allowed by the Online Bidding System.
- .4 Hard copy, oral, telephone, telegram, fax, or e-mail bids will not be accepted nor acknowledged.
- .5 The foregoing states the date and time before which bids will be received hereinafter called the "bid closing time." The Owner may extend the bid closing time by addendum.
- .6 Bids shall be prepared and submitted and the bidding process will be administered in accordance with these bidding requirements.

2. SUMMARY

- .1 The intent of this bid call is to solicit and receive formal offers for:
English River Property Management - Wastewater Treatment Facility
- .2 Refer to Section 01110 - Summary of Work for a summary of the Project, including requirements pertaining to Contract Time.

3. BASIS OF BID - UNIT PRICE

- .1 Bids shall be on a unit price basis.
- .2 The unit prices, lump sums and allowances stated in the Bid Form and Schedule of Prices shall form the basis of the bid price.
- .3 Make entries in the Bid Form and Schedule of Prices in figures only. Ensure that figures are legible.
- .4 Where, in the Owner's opinion, there is a question as to the legibility of figures entered by the Bidder, the Owner will make a determination as to legibility. The Owner may, at the Owner's sole discretion, declare as invalid and reject any bid that contains figures which, in the Owner's opinion, are illegible or open to dispute.
- .5 Extensions of unit prices and addition of extended unit prices, lump sums and allowances entered in the Schedule of Prices will be checked by the Owner. If arithmetical errors are discovered, the unit prices shall be considered as representing the Bidder's intentions and the unit price extensions and the total amount entered in the Bid Form and Schedule of Prices will be corrected by the Owner. The Bidder shall be bound to such corrected amounts.

- .6 If no unit price is stated for an item, but an extended amount is stated, a unit price determined by dividing the extended amount by the estimated quantity shall be considered as representing the Bidder's intentions.
- .7 The total amount of the bid shall be the arithmetically correct sum of the arithmetically correct unit price extensions, lump sums and allowances in the Bid Form and Schedule of Prices.
- .8 Each unit price stated in the Bid Form and Schedule of Prices shall be a reasonable price for that item of work.
- .9 Unless otherwise indicated, quantities specified in the Bid Form and Schedule of Prices are estimated quantities and shall not be considered as actual quantities of work to be performed. Subject to Contract terms, unit prices stated in the Bid Form and Schedule of Prices shall be applied to actual quantities of work performed as measured in accordance with the Contract.

4. SUFFICIENCY OF BID

- .1 The submission of a bid shall constitute an incontrovertible representation by the Bidder that:
 - .1 The Bidder has complied with all bidding requirements,
 - .2 The Bidder is qualified and experienced to perform the Work in accordance with the Bid Documents,
 - .3 The bid is based upon performing the Work in accordance with the Bid Documents, without exception, and
 - .4 The price or prices stated in the bid cover all the Bidder's obligations under the Contract and all matters and things necessary for the performance of the Work in accordance with the Bid Documents.

5. BID DOCUMENTS

- .1 The Bid Documents are the documents issued or made available to Bidders by the Owner for the purpose of preparing a bid. The Bid Documents consist of the following:
 - .1 Instructions to Bidders.
 - .2 Bid Security.
 - .3 Pre-Bid Meeting.
 - .4 Bid Form Supplements.
 - .5 Agreement Form.
 - .6 Definitions.
 - .7 Payment Conditions.

- .8 Contract Performance Security.
- .9 Security for Payment of Claims.
- .10 Insurance Conditions.
- .11 General Conditions of Contract.
- .12 Supplementary Conditions.
- .13 Specifications, Divisions 1 to 16 inclusive.
- .14 Drawings.
- .15 Addenda issued during the bid period.
- .16 Contract Information Documents.

6. BID FORM SUPPLEMENTS

- .1 Prepare and submit the Bid Form and Schedule of Prices on the Online Bidding System
- .2 The Owner may, after bid closing time and before contract award, require any Bidder to submit, in a form prescribed by or acceptable to the Owner, supplementary information about any aspect of the Bidder's bid which, in the Owner's opinion, is necessary for bid evaluation purposes.

7. BID WITHDRAWAL AND ACCEPTANCE

- .1 A bid may be withdrawn through the Online Bidding System at any time before the bid closing time.
- .2 Withdrawn bids may be resubmitted in accordance with these bidding requirements providing the resubmitted bid is received through the Online Bidding System as indicated in 1.1, before the bid closing time.
- .3 A bid may not be withdrawn at or after bid closing time and shall be open to acceptance by the Owner until:
 - .1 Some other Bidder has entered into a contract with the Owner for the Work, or
 - .2 60 days after the bid closing time,whichever occurs first.
- .4 The 60 day period referred to above shall commence at midnight of the date of the bid closing and shall terminate at midnight of the 60th day thereafter. If the 60th day falls on a statutory holiday, such day, and any subsequent contiguous holidays, shall be omitted from the computation.
- .5 The 60 day acceptance period referred to above may be extended at the Owner's request and subject to the Bidder's written agreement to the extension.

- .6 The Contract shall be established upon the Owner issuing to the successful Bidder, a letter accepting the bid without qualification or, if the letter accepting the bid contains one or more qualifications, upon the Bidder's written acceptance of all such qualifications.
- .7 The lowest or any bid will not necessarily be accepted and the Owner may reject any and all bids.
- .8 The Owner may negotiate contract terms with the Bidder submitting the lowest valid bid, provided that the negotiated changes to the Bid Documents result in either no change to the bid price or a reduced bid price. Such changes may be formalized in the form of a Post-Bid Addendum that, upon written acceptance by the Bidder, shall form part of the Contract Documents.

8. BID OPENING

- .1 Bids will be opened on the Online Bidding System immediately after the bid closing time.
- .2 The name of each Bidder and the bid price will be displayed. The displaying of a bid price shall not be considered a representation or warranty that the price is correct or that the bid is valid.

9. IRREGULARITIES

- .1 A bid that is informal, incomplete, qualified, non-compliant with the requirements of the Bid Documents, or otherwise irregular in any way, may be declared invalid and rejected.
- .2 The Owner may accept or waive a minor and inconsequential irregularity, or where practicable to do so, the Owner may, as a condition of bid acceptance, request a Bidder to correct a minor and inconsequential irregularity with no change in the bid price.
- .3 The determination of what is, or is not, a minor and inconsequential irregularity, the determination of whether to accept, waive or require correction of an irregularity, and the final determination of the validity of a bid, shall be at the Owner's sole discretion.
- .4 Discrepancies between words and figures will be resolved in favour of words.

10. SAFETY PREQUALIFICATION

- .1 Prime Contract Bidders should possess a valid Certificate of Recognition (COR) or Temporary Letter of Certification (TLC) as issued by the Saskatchewan Construction Safety Association (SCSA) or another certifying organization authorized to issue CORs.
- .2 Prospective Bidders who do not possess a COR, and wish to obtain information about obtaining a COR or TLC, are advised to contact:

The Saskatchewan Construction Safety Association online at <http://www.scsaonline.ca/>.

11. AVAILABILITY OF BID DOCUMENTS

- .1 Bid Documents are available on the Online Bidding System at <https://mpe.bidsandtenders.ca/>.
- .2 A Bid Document deposit is not required.
- .3 The Owner will assume no responsibility or liability for the completeness of any Bid Documents obtained from a source other than the Online Bidding System.

12. EXAMINATION OF BID DOCUMENTS AND THE SITE

- .1 Bidders shall, before submitting a bid:
 - .1 Examine and read the Bid Documents thoroughly,
 - .2 Visit the site and its surroundings and other locations to become familiar with local and other conditions affecting the Work,
 - .3 Consider the effect of regulatory requirements applicable to the Work,
 - .4 Study and correlate Bidder's Site observations with the Bid Documents,
 - .5 Immediately notify the Owner of all perceived omissions and discovered conflicts, errors and discrepancies in the Bid Documents, and
 - .6 Understand the Bid Documents and be competent to undertake and complete the Work.
- .2 Refer to Section 00300 – Information Documents which identifies available information pertaining to the Project and specifies the status of and the extent, if any, to which the Bidder may rely upon such Information Documents.
- .3 Before submitting a bid, each Bidder shall, at the Bidder's expense, make or obtain any additional examinations, investigations, explorations, tests and studies and obtain any additional information and data which pertain to the conditions at, under, or contiguous with the site, which may affect performance of the Work and which the Bidder deems necessary to determine its bid for performing the Work in accordance with the Bid Documents. Bidders shall obtain the Owner's prior approval for access to the site for the purpose of carrying out any such activities. Bidders shall restore the site to a condition acceptable to the Owner upon completion of such activities.
- .4 Lands upon which Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by the Contractor in performing the Work are identified in the Bid Documents. Additional lands and access thereto required for performance of the Work shall be provided by Contractor.
- .5 When Section 00250 - Pre-Bid Meeting, is included in the Bid Documents, a pre-bid meeting is arranged by the Owner to take place during the bid period. The date and time of the meeting will be indicated on the cover of the Bid Documents.

13. BID SECURITY

- .1 Provide and submit the bid security specified in Section 00210 - Bid Security.

14. CONSENT OF SURETY

- .1 Provide and submit a Consent of Surety Form in the amount equal to fifty (50%) percent of the Contract sum.

15. CONTRACT PERFORMANCE SECURITY

- .1 Provide and include in the bid price for the security specified in Section 00612 - Contract Performance Security.

16. SECURITY FOR PAYMENT OF CLAIMS

- .1 Provide and include in the bid price for the security specified in Section 00616 - Security for Payment of Claims.

17. EVIDENCE OF ABILITY TO PROVIDE SECURITY

- .1 The Owner may, after the bid submission and before the contract award, require a Bidder to submit evidence of the Bidder's ability to provide the security specified in the Bid Documents.

18. ALLOWANCES

- .1 Include in the bid price all allowances specified in Section 01280.

19. PRODUCT OPTIONS AND SUBSTITUTIONS

- .1 Product options: Comply with the requirements of Section 01621.
- .2 Substitutions:
 - .1 Comply with the requirements of Section 01621.
 - .2 Where products are specified by a proprietary specification, and substitutions are permitted, Bidders may base their bids on a named product or manufacturer or on unnamed substitutions, subject to the requirements specified for substitutions in Section 01621.
 - .3 During the bid period, it is the sole responsibility of each Bidder to determine whether a substitution meets the requirements specified in Section 01621.
 - .4 The Owner will not consider requests for approval of substitutions from Bidders during the bid period.

- .5 Substitutions will be evaluated and approved or rejected by the Owner after the contract award.
- .3 Product Acceptability:
 - .1 The Owner may, after the bid submission and before the contract award, require any Bidder to submit proof that a product proposed for use complies with the requirements of the Bid Documents. Such proof shall be in the form of product data as specified in Section 01621.
 - .2 Should the Owner determine that a proposed product does not meet the requirements of the Bid Documents, the Bidder shall propose a product which, in the Owner's opinion, does meet requirements of Bid Documents, otherwise such Bidder's bid may be declared invalid and rejected.

20. AGREEMENT

- .1 The successful Bidder will be required to enter into a formal Agreement with the Owner for the performance of the Work.

21. DIVISION OF WORK

- .1 Work specified in the Specifications is divided into Divisions and Sections for reference purposes only. Except as may be otherwise specified in the Bid Documents, the division of the Work among the Contractor, Subcontractors, Sub-subcontractors and suppliers is the Bidders' responsibility.

22. INTERPRETATION AND MODIFICATION OF BID DOCUMENTS

- .1 Submit questions about the meaning and intent of the Bid Documents to the Owner at the office identified under "Inquiries". Interpretations and modifications considered necessary by the Owner in response to such questions will be issued by the Owner in writing in the form of an Addendum.
- .2 Addenda may also be issued by the Owner to modify the Bid Documents as deemed necessary by the Owner.
- .3 Submit questions as early as possible in the bid period. The Owner may not respond to questions received too close to the bid closing time to permit issuance of an Addendum.
- .4 Submit inquiries as early as possible in the bid period. If an inquiry requires an interpretation or modification of the Bid Documents, but is received too close to the bid closing time to permit issuance of an Addendum, the Owner may be unable to respond to that inquiry.
- .5 Any replies to inquiries or interpretations or modifications of the Bid Documents made verbally, by e-mail, or by any manner other than in the form of a written Addendum, shall not be binding.

23. ADDENDA

- .1 Addenda, when issued, will become part of the Bid and Contract Documents.
- .2 Each Bidder shall ascertain before bid submission, that it has received all Addenda issued by the Owner, and shall indicate in the Bid Form, the Addendum number(s) of all Addenda received.
- .3 During the Bid period, all Addenda issued by the Owner will be published on the Online Bidding System.
- .4 Bidders who have obtained Bid Documents from any another source may not automatically receive addenda.

24. INQUIRIES

- .1 Direct inquiries during bid period to:

Ivan Kagoro, P.Eng.
Email: ikagoro@mpe.ca

END OF SECTION

1. TYPE AND AMOUNT OF BID SECURITY

- .1 Provide bid security in the form of a digital bid bond (e-bond) in an amount not less than 10% of the bid price.
- .2 Submit bid security with bid on the Online Bidding System. Bids not accompanied by bid security will be rejected.

2. BID BONDS

- .1 Bid bonds shall be in accordance with the Canadian Construction Documents Committee (CCDC) Standard Form of Bid Bond, CCDC Document No. 220.
- .2 Bid bonds shall be issued by a duly incorporated surety company authorized to transact business of suretyship in the Province of Saskatchewan.
- .3 Bid bonds shall be properly electronically executed by both the Bidder and the surety.

3. DEFAULT BY BIDDER

- .1 If a Bidder whose bid is accepted by the Owner in writing, without qualification, and within the acceptance period specified in the Bid Documents, refuses or fails within 21 days after the date of issuance of the written acceptance of the bid:
 - .1 To sign a formal Agreement with the Owner for the performance of the Work, and
 - .2 To provide contract performance security, or security for payment of claims, or both, if and as required by the Bid Documents,

the Bidder shall be liable to the Owner for the difference between the amount of its bid and the greater amount for which a contract for the Work is entered into with some other Bidder, up to the maximum amount of the bid security provided.

END OF SECTION

1. PRE-BID MEETING AND SITE INSPECTION

- .1 A pre-bid meeting will be held at the time and place noted below and will also be available through a video conference call using Microsoft Teams. Bidders are welcome to attend the pre-bid meeting at the address noted on the cover letter.

Date and time: Tuesday October 27, 2020 @ 1:00pm

Location: MPE Engineering Ltd.
Unit 122, 103 marquis Court
Saskatoon, SK
S7P 0C4

- .2 There will NOT be a general site visit, however, Bidders are welcome to visit the site at their own convenience. Site access is not restricted
- .3 Purpose is to provide bidders an opportunity to familiarize themselves with the scope of Work for the project.
- .4 All prime contract and major subcontract Bidders are strongly advised to attend at location specified or join the video conference. Others are invited to attend.
- .5 No information provided by the Owner or any of his representatives at the pre-bid meeting shall be binding unless such information is included in an Addendum.
- .6 How to join the meeting from your computer, tablet, or smartphone:

[Join Microsoft Teams Meeting](#)

[+1 437-703-5283](#) Canada, Toronto (Toll)

Conference ID: 974 228 891#

END OF SECTION

1. RELATED REQUIREMENTS

- .1 Site visit and inspection prior to bidding: Section 00200
- .2 Information Documents: Definitions and Interpretations.

2. CONTRACT INFORMATION DOCUMENTS

- .1 Contract Information Documents listed in 4.1 are incorporated into the Contract.
- .2 The Bidder is entitled to rely upon the factual information or factual data contained in Contract Information Documents, or parts thereof, which have been obtained principally for the purposes of study and design and believed to be correct, within normal limits inherent in gathering such information and data, but the Bidder shall draw its own conclusions from such factual information or factual data and shall not rely on opinions or interpretations contained therein.
- .3 Contract Information Documents shall not be considered a representation or warranty that information contained therein is complete or appropriate for construction.
- .4 Information contained in Contract Information Documents may be time sensitive and dates and times shall be considered when interpreting such information.
- .5 The Bidder is encouraged to obtain specialist advice with respect to Contract Information Documents. The Owner assumes no responsibility for such interpretations and conclusions.

3. OTHER INFORMATION DOCUMENTS

- .1 Other Information Documents means information documents not listed in 4.1 herein, and are not part of the Contract Documents.
- .2 The Bidder is not entitled to rely upon the factual information or factual data in any Other Information Documents, nor any opinions or interpretations contained therein. Other Information Document shall not be considered accurate, complete, or appropriate.
- .3 Other Information Documents are made available to the Bidder for the purpose of providing the Bidder with access to the information available to the Owner.

4. LIST OF CONTRACT INFORMATION DOCUMENTS

- .1 Contract Information Documents comprise the following:
 - .1 N/A

5. ACCESS TO INFORMATION DOCUMENTS

- .1 Contract Information Documents and Other Information Documents not issued to Bidders with the Bid Documents are available for examination at:

MPE Engineering Ltd.
#122, 103 Marquis Court
Saskatoon, SK
S7P 0C4

- .2 Direct enquiries during the bid period to the person identified in Instructions to Bidders to receive enquiries.

END OF SECTION

SCHEDULE A**English River Property Management
Wastewater Treatment Facility**

The undersigned, having carefully read these Specifications, hereby agrees to supply all labour, superintendence, plant and materials for the completion of the Works described in these Specifications. Payment for Work described by these Specifications will include the following items:

	Description	Qty	Unit
1.	Division 0 and Division 1: Conditions of Contract and General Requirements	1	L.S.
2.	Division 2:		
	1. Supply and Install Pipe and Fittings:		
	a) 50mm HDPE DR11 Waterline	130	m
	b) 150mm HDPE DR11 Overflow and Forcemain	100	m
	c) 200mm PVC SDR35 Sanitary	95	m
	2. Structures:		
	a) 1200mm Precast Sanitary Manhole Complete	8	v.m
	b) 50 mm Gate Valve	2	each
	c) 150 mm Gate Valve	2	each
	3. Site Work		
	a) Common Excavation	500	m ³
	b) Compacted Fill	500	m ³
	c) Wastewater Treatment Plant Excavation and Backfill	1	LS
	d) Granular Type 108, 50mm Compacted Depth	3700	m ²
	e) Granular Type 33, 250mm Compacted Depth	3700	m ²
	f) Topsoil Placement, 150mm Thick	7500	m ²
	g) Grass Seeding	1	LS
	4. Miscellaneous		
	a) Chain Link Fencing, 1.8m high, c/w security top	160	m
	b) 16 m wide cantilever sliding gate	1	each
	c) 300mm CSP Culvert Complete	1	each
	d) Bollards	14	each
	e) Truck/Trailer Dump Complete	1	LS
3.	Division 3: Concrete	1	LS
4.	Division 4: Masonry	1	LS
5.	Division 5:	1	LS

Metals

6.	Division 6: Wood and Plastics	1	LS
7.	Division 7: Thermal and Moisture Protection	1	LS
8.	Division 8: Doors and Windows	1	LS
9.	Division 9: Finishes	1	LS
10.	Division 10: Specialties	1	LS
11.	Division 11:		
	1. Equipment	1	LS
	2. Novation Equipment Supply & Deliver Contract		
	a) MBR Treatment Equipment	1	LS
12.	Division 13: Special Construction	1	LS
13.	Division 15: Mechanical	1	LS
14.	Division 16: Electrical	1	LS

Prime Cost Allowance:

1.	Control Panel Software and Hardware Supply	\$100,000.00
2.	Control System Setup and Programming	\$85,000.00
3.	Commissioning	\$90,000.00
4.	Arc Flash and Coordination Study	\$20,000.00

7603-002-00 - English River Property Management - Wastewater Treatment Facility

Vendor Details

Company Name: Wright Construction Western Inc.
2919 Cleveland Avenue
Address: Saskatoon, Saskatchewan S7K 8A9
Contact: Ashley French
Email: tender@wrightconstruction.ca
Phone: 306-934-0440
Fax: 306-934-4747
HST#: GST #R104736491

Submission Details

Created On: Tuesday October 27, 2020 13:13:52
Submitted On: Thursday November 26, 2020 12:54:02
Submitted By: Ashley French
Email: tender@wrightconstruction.ca
Transaction #: 72c7a0ec-65e3-4ff4-833b-4426b4d56a50
Submitter's IP Address: 184.71.93.82

Schedule of Prices

The Bidder hereby Bids and offers to enter into the Contract referred to and to supply and do all or any part of the Work which is set out or called for in this Bid, at the unit prices, and/or lump sums, hereinafter stated. Taxes are additional.

* Denotes a "**MANDATORY**" field

Do not enter \$0.00 dollars unless you are providing the line item at zero dollars to the Owner.

If the line item and/or table is "**NON-MANDATORY**" and you are not bidding on it, leave the table and/or line item blank. Do not enter a \$0.00 dollar value.

SCHEDULE A

It is understood and agreed that with respect to the submission of this Schedule of Prices, the following shall apply: Items of Work are priced in accordance with the Bid Documents, including Section 00630 - Payment Conditions, Section 01275 - Measurement Rules, and Section 01280 - Measurement Schedule.

	Description		Qty	Unit	Unit Price *	Extension	
1. Division 0 and Division 1:		Conditions of Contract and General Requirements	1	L.S.	\$460,149.5800	\$ 460,149.58	*
2. Division 2:	1. Supply and Install Pipe and Fittings:	a) 50mm HDPE DR11 Waterline	130	m	\$80.0000	\$ 10,400.00	*
		b) 150mm HDPE DR11 Overflow and Forcemain	100	m	\$250.0000	\$ 25,000.00	*
		c) 200mm PVC SDR35 Sanitary	40	m	\$260.0000	\$ 10,400.00	*
		d) 375mm PVC SDR35 Sanitary	55	m	\$320.0000	\$ 17,600.00	*
	2. Structures:	a) 1200mm Precast Sanitary Manhole Complete	8	v.m	\$2,800.0000	\$ 22,400.00	*
		b) 50mm Gate Valve	2	each	\$900.0000	\$ 1,800.00	*
		c) 150mm Gate Valve	2	each	\$2,100.0000	\$ 4,200.00	*
	3. Site Work:	a) Common Excavation	500	m3	\$22.0000	\$ 11,000.00	*
		b) Compacted Fill	500	m3	\$28.0000	\$ 14,000.00	*
		c) Wastewater Treatment Plant Excavation and Backfill	1	L.S.	\$50,000.0000	\$ 50,000.00	*
		d) Granular Type 108, 50mm Compacted Depth	3700	m2	\$4.5000	\$ 16,650.00	*
		e) Granular Type 33, 250mm Compacted Depth	3700	m2	\$21.5000	\$ 79,550.00	*
		f) Topsoil Placement, 150mm Thick	7500	m2	\$1.5000	\$ 11,250.00	*
		g) Grass Seeding	1	L.S.	\$3,000.0000	\$ 3,000.00	*
	4. Miscellaneous:	a) Chain Link Fencing, 1.8m High, c/w Security Top	160	m	\$67.7000	\$ 10,832.00	*
		b) 16m wide cantilever sliding gate	1	each	\$13,739.0000	\$ 13,739.00	*
		c) 300mm CSP Culvert Complete	1	each	\$7,000.0000	\$ 7,000.00	*
		d) Bollards	14	each	\$585.0000	\$ 8,190.00	*
		e) Truck/Trailer Dump Complete	1	L.S.	\$109,000.0000	\$ 109,000.00	*
3. Division 3: Concrete			1	L.S.	\$727,046.5800	\$ 727,046.58	*
4. Division 4: Masonry			1	L.S.	\$43,405.0000	\$ 43,405.00	*
5. Division 5: Metals			1	L.S.	\$332,832.4500	\$ 332,832.45	*
6. Division 6: Woods and Plastics			1	L.S.	\$25,008.0000	\$ 25,008.00	*
7. Division 7: Thermal and Moisture Protection			1	L.S.	\$30,876.0000	\$ 30,876.00	*
8. Division 8: Doors and Windows			1	L.S.	\$37,663.0000	\$ 37,663.00	*
9. Division 9: Finishes			1	L.S.	\$65,042.0000	\$ 65,042.00	*
10. Division 10: Specialties			1	L.S.	\$124,056.0000	\$ 124,056.00	*
11. Division 11: Equipment			1	L.S.	\$44,950.0000	\$ 44,950.00	*
12. Division 13: Special Construction			1	L.S.	\$250,000.0000	\$ 250,000.00	*
13. Division 15: Mechanical			1	L.S.	\$787,888.0000	\$ 787,888.00	*
14. Division 16: Electrical			1	L.S.	\$528,710.0000	\$ 528,710.00	*
Subtotal:						\$ 3,883,637.61	

ALLOWANCES

It is understood and agreed that with respect to the submission of this Schedule of Prices, the following shall apply: Items of Work are priced in accordance with the Bid Documents, including Section 00630 - Payment Conditions, Section 01275 - Measurement Rules, and Section 01280 - Measurement Schedule.

	Description	Unit Price	Extension
1.	Novation Equipment Supply & Deliver Contract: MBR Treatment Equipment	\$1,250,670.0000	\$ 1,250,670.00
2.	Prime Cost: Control Panel Software and Hardware Supply	\$100,000.0000	\$ 100,000.00
3.	Prime Cost: Control System Setup and Programming	\$85,000.0000	\$ 85,000.00
4.	Prime Cost: Commissioning	\$90,000.0000	\$ 90,000.00
5.	Prime Cost: Arc Flash and Coordination Study	\$20,000.0000	\$ 20,000.00
Subtotal:			\$ 1,545,670.00

Summary Table

Bid Form	Amount
SCHEDULE A	\$ 3,883,637.61
ALLOWANCES	\$ 1,545,670.00
GST & PST (11%)	\$ 597,223.84
Total Contract Amount:	\$ 6,026,531.45

Documents

It is your responsibility to make sure the uploaded file(s) is/are not defective or corrupted and are able to be opened and viewed by the Owner. If the attached file(s) cannot be opened or viewed, your Bid Call Document may be rejected.

1. Prime Contract Bidders should possess a valid Certificate of Recognition (COR), Small Employer Certificate of Recognition (SECOR) or Temporary Letter of Certification (TLC) as issued by the Saskatchewan Construction Safety Association (SCSA) or another certifying organization authorized to issue CORs.
2. Prospective Bidders who do not possess a COR or SECOR, and wish to obtain information about obtaining a COR, SECOR or TLC, are advised to contact:

The Saskatchewan Construction Safety Association online at <http://www.scsaonline.ca/>.

- [COR Certificate](#) - COR Sept 30 2021.pdf - Tuesday October 27, 2020 13:15:43

BONDING UPLOAD SECTION

Bidders shall submit with their on-line bid a Digital copy of both the Bid Deposit in the amount of ten (10%) percent of the Sub Total Contract Amount and An Undertaking to provide a Bond or a Letter of Credit in the amount of fifty (50%) of the Sub Total Contract Bid Amount.

Provide and submit the bid security specified in Section 00210 - Bid Security.

Note: Must be a Digital Bid Bond (E-Bond), NOT a scanned copy of a paper Bid Bond.

- [Bid Bond](#) - BidBondCCDC-51_135947.pdf - Wednesday November 25, 2020 13:34:58
- [Consent of Surety](#) - BidBondCCDC-51_135947.pdf - Wednesday November 25, 2020 13:35:16

Addenda, Terms and Conditions

1. We, the undersigned, having examined and read the Bid Documents for the above noted contract, and having visited the site and examined all conditions affecting the Work, are satisfied we understand the Bid Documents and declare ourselves competent to undertake and complete the Work and do hereby irrevocably bid and agree to carry out the Work in accordance with the Bid Documents, for the unit prices, lump sums and allowances set out in the Schedule of Prices.
2. We acknowledge and agree that any issued Addendum/Addenda forms part of the Bid Documents.
3. If notified in writing by the Owner of the acceptance of this bid within 60 days after the bid closing time, the undersigned will, within 21 days after date of issuance of such notification, execute a formal Agreement with the Owner for the performance of the Work for the submitted bid price and comply with all other requirements of the Bid Documents.

☒ I/WE agree to be bound by the terms and conditions and have authority to bind the Corporation and submit this Bid on behalf of the Bidder.
- Ashley French, Chief Estimator, Wright Construction Western Inc.

The bidder shall declare any potential conflict of interest that could arise from bidding on this bid. Do you have a potential conflict of interest? ☒ Yes ☒ No

The Bidder acknowledges and agrees that the addendum/addenda below form part of the Bid Document

Please check the box in the column "I have reviewed this addendum" below to acknowledge each of the addenda.

File Name	I have reviewed the below addendum and attachments (if applicable)	Pages
Notice of Addendum 04 Tue November 24 2020 02:45 PM	<input checked="" type="checkbox"/>	1
Notice of Addendum 03 Thu November 19 2020 03:25 PM	<input checked="" type="checkbox"/>	1
Notice of Addendum 02 Fri November 13 2020 02:37 PM	<input checked="" type="checkbox"/>	1
Notice of Addendum 01 Thu November 5 2020 01:30 PM	<input checked="" type="checkbox"/>	1

7603-002-00

**AGREEMENT BETWEEN ENGLISH RIVER ENTERPRISES PROPERTY MANAGEMENT LP
AND CONTRACTOR**

This Agreement made in triplicate on the 15th day of January 2021

between

English River Enterprises Property Management LP, hereinafter called the "Owner"

and

Wright Construction Western Inc.

2919 Cleveland Avenue

Saskatoon, SK S7K 8A9

hereinafter called the "Contractor"

witnesses: that the parties agree as follows:

ARTICLE 1: THE WORK

The Contractor shall perform the Work required by the Contract Documents for:

**English River Enterprises Property Management LP
Wastewater Treatment Facility**

and do and fulfill everything required by this Agreement.

ARTICLE 2: CONTRACT DOCUMENTS

The Contract Documents referred to in Article 1 of this Agreement shall be as defined in the Contract Documents. Terms used in the Contract Documents which are defined in the Definitions and Interpretation Section shall have the meanings designated therein.

ARTICLE 3: CONTRACT TIME

The Contractor shall attain Substantial Performance of the Work by the following date: 15th day of March 2022.

The Contractor shall attain Total Performance of the Work by the following date: 31st day of March 2022.

ARTICLE 4: CONTRACT PRICE

The Contract Price is Six Million Twenty Six Thousand Five Hundred and Thirty One Dollars and Forty Five Cents

(\$6,026,531.45) in Canadian funds (**GST & PST included**).

ARTICLE 5: TAXES AND DUTIES

Unless otherwise stated in the Contract Documents, the Contractor shall pay all government sales taxes, customs duties and excise taxes with respect to the Contract.

Any increase or decrease in costs to the Contractor due to changes in such taxes and duties, after the closing date of the Tender submissions, shall increase or decrease the Contract Price accordingly.

Where an exemption from or recovery of government sales taxes, duties or excise taxes is applicable to the Contract, the procedure shall be as established in the Payment conditions and other applicable provisions in the Contract Documents.

ARTICLE 6: PAYMENT

The Owner shall make payment in Canadian funds to the Contractor on account of the Contract Price in accordance with the Payment Conditions and other applicable provisions in the Contract Documents.

The Owner shall hold back an amount equal to 10% from each progress payment as provided for in the Payment Conditions of the Contract Documents.

ARTICLE 7: RIGHTS AND REMEDIES

The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law. No action or failure to act by the Owner or Contractor shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

ARTICLE 8: LANGUAGE AND LAW OF THE CONTRACT

The language of the Contract is English and the Contract shall be construed and interpreted accordingly. The law prevailing in the Province of Saskatchewan, Canada shall govern the interpretation of the Contract.

ARTICLE 9: SUCCESSION

The Contract Documents are to be read into and form part of this Agreement and the whole shall constitute the Contract between the parties and subject to law and the provisions of the Contract Documents shall ensure to the benefit of and be binding upon the parties hereto, their respective heirs, legal representatives, successors and permitted assigns.

ARTICLE 10: NOTICES

Notices to be given under the Contract shall be addressed to the parties as follows:

The Owner at:

English River Enterprises Property Management LP
301 – 2555 Grasswood Road
Saskatoon, SK
S7T 0K1

Telephone: (306) 649-6104

The Owner's Representative at:

MPE Engineering Ltd.
122, 103 Marquis Court
Saskatoon, SK
S7P 0C4

Telephone: (306) 668-1966

Facsimile: (306) 668-1968

The Contractor at:

Wright Construction Western Inc.
2919 Cleveland Avenue
Saskatoon, SK
S7K 8A9

Telephone: (306) 934-0440

Facsimile: (306) 934-4747

7603-002-00

In witness whereof the parties hereto have executed this Agreement under their respective seals and by the hands of their proper officers thereunto duly authorized.

SIGNED, SEALED AND DELIVERED in the presence of:

CONTRACTOR

Wright Construction Western Inc.

.....

.....

Signature of Authorized Signing Officer

.....

Name of Officer

Title of Officer

Corporate Seal

OWNER

English River Enterprises Property Management LP

.....

.....

Signature of Authorized Signing Officer

.....

Name of Officer

Title of Officer

Corporate Seal

END OF SECTION

1. DEFINITIONS

In the Contract, the following terms shall have the meanings assigned to them:

- .1 "Additional Instruction" means a written instruction, issued by the Owner to the Contractor, clarifying or finalizing requirements of the Contract Documents and not involving a change in the Contract Price or the Contract Time.
- .2 "Agreement Form" means the document which, when executed by the Owner and the Contractor, formalizes the Contract.
- .3 "Bid" means the Contractor's priced offer to the Owner for the performance of the Work in accordance with the provisions of the Contract, as accepted by the Letter of Acceptance.
- .4 "Certificate of Total Performance" means the certificate issued by the Owner's Representative, when to the best of his knowledge, information and belief, the entire Work has been performed to the requirements of the Contract Documents, except for defects in the Work not discovered by the Owner's Representative and the making good of faulty workmanship or materials during the maintenance period.
- .5 "Certificate of Warranty Performance" means the certificate issued by the Owner's Representative following a period of twelve (12) months from the date of the Certificate of Substantial Performance, or, if a Certificate of Substantial Performance is not issued, following a period of twelve (12) months from the date of the Certificate of Total Performance, which twelve (12) month period is hereafter referred to as the "maintenance period", certifying that to the best of his knowledge, information and belief the performance of the Work (except for defects in the Work not discovered by the Owner's Representative) has been completed.
- .6 "Change Order" means a written instruction, issued by the Owner to the Contractor on or after the date of execution of the Agreement Form, authorizing or ordering a Change in the Work or a change in the Contract Price or the Contract Time or any combination thereof.
- .7 "Change in the Work" means an addition to, deletion from or other modification of the Work consistent with the scope and intent of the Contract.
- .8 "Construction Equipment" means equipment, appliances and things required for the performance of the Work, but does not include Permanent Work or Temporary Work.
- .9 "Contemplated Change" means a written communication, issued by the Owner to the Contractor on or after the date of execution of the Agreement Form, containing a contemplated Change in the Work and requiring the Contractor to submit a quotation for executing such contemplated change, including the Contractor's proposed changes to either or both the Contract Price or the Contract Time.
- .10 "Contract" means the undertaking by the Owner and the Contractor to perform their respective duties, responsibilities and obligations as prescribed in the Contract Documents and represents the entire agreement between the Owner and the Contractor. The Contract Documents form the Contract.

- .11 "Contract Deficiency" means a deficiency in the Work, or part thereof, for which the Contractor is responsible under the Contract and includes a deficiency in any design for which the Contractor is responsible.
- .12 "Contract Documents" means: - the Letter of Acceptance; - the executed Agreement Form; - Instructions to Bidders, completed Bid Form, Schedule of Prices, and Supplements to Bid Form; - Information Documents specifically incorporated into the Contract Documents; - Definitions and Interpretation, Payment Conditions, Security Conditions, Insurance Conditions, General Conditions, Supplementary Conditions; - the Specifications; - the Drawings; - Addenda; - and such other documents as may be identified as Contract Documents, and shall include amendments thereto made pursuant to the provisions of the Contract.
- .13 "Contract Price" means the total amount payable by the Owner to the Contractor under the Contract as stated in the Agreement Form, including authorized adjustments thereto.
- .14 "Contract Time" means the period of time specified in the Contract for attainment of substantial Performance of the Work, including authorized adjustments thereto.
- .15 "Contractor" means the person, firm or corporation contracting directly with the Owner to perform the Work.
- .16 "Cost Plus Work" means a contractual arrangement that prescribes the cost of the work plus an allowance for overhead and profit, as expressly defined in the Contract, as payment for performance of the item of work to which it relates.
- .17 "Day" means a calendar day.
- .18 "Drawings" means the graphic and pictorial portions of the Contract Documents showing the design, location or dimensions of the Work, generally including plans, elevations, sections, details and diagrams.
- .19 "Engineer" means the person or persons named in these Contract Documents as the Owner's representative. Words importing persons shall include firms, corporations and joint ventures.
- .20 "Information Documents" means information of any type and in any form related to the Project and identified in the Contract Documents as such, but which does not form part of the Contract unless specifically incorporated therein.
- .21 "Invention" means any new and useful practice, process, machine, device, manufacture or composition of matter, or any new and useful improvement thereof.
- .22 "Letter of Acceptance" means the formal acceptance by the Owner of the Contractor's Bid, including any modifications to the Bid agreed to by the Owner and the Contractor and incorporated therein.
- .23 "Lump Sum Work" means a contractual arrangement that prescribes a lump sum as payment for performance of the item of work to which it relates.
- .24 "Online Bidding System" means the Bids&Tenders Online Bidding System available at <https://mpe.bidsandtenders.ca/>.

- .25 "Other Contractor" means any person, firm or corporation employed by or having a separate contract with the Owner for work related to the project other than that required by the Contract Documents.
- .26 "Owner" means the Owner as named elsewhere in these Contract Documents and includes a person acting for, or in place of, the Owner.
- .27 "Owner's Representative" means the employee or Engineer identified in writing by a duly authorized officer to represent the Owner under the Contract.
- .28 "Permanent Work" means any structure, Product or thing constructed, manufactured or installed in the performance of the Work, but does not include Temporary Work.
- .29 "Products" means material, components, elements, machinery, equipment, fixtures, systems and other items forming the Work or part thereof but does not include Construction Equipment. "Products" is synonymous with "Materials".
- .30 "Project" means the total construction of which the Work to be provided under the Contract may be the whole or a part.
- .31 "Regulatory Requirements" means laws, ordinances, rules, regulations, orders, codes, and other legally enforceable requirements in effect and applicable to the performance of the Work.
- .32 "Schedule of Prices" means the completed Schedule of Prices submitted by the Contractor with his Bid, as accepted by the Letter of Acceptance.
- .33 "Site" means the designated Site or location of the Work and any other places as may be specifically designated in the Contract as forming part of the Site.
- .34 "Specifications" means that portion of the Contract Documents comprising Divisions 1 to 16 of the specification format including the General Requirements and technical specifications.
- .35 "Subcontractor" means a person, firm or corporation having a contract with the Contractor for the performance of a part of the Work at the Site.
- .36 "Sub-subcontractor" means a person, firm or corporation having a contract with a Subcontractor for the performance of a part of the Work at the Site.
- .37 "Substantial Performance of the Work" means the time when the prerequisites to Substantial Performance of the Work required by the Contract are fulfilled and the Work is ready for use or is being used for the purpose intended and the state of the work is so declared, in writing, by the Owner.
- .38 "Supplier" means a person, firm or corporation having a contract with the Contractor, a Subcontractor or a Sub-subcontractor for the supply of goods or services to be incorporated into or utilized in the performance of the Work.
- .39 "Temporary Work" means site offices, temporary structures, facilities and controls and other temporary things required for the performance of the Work, but does not include Construction Equipment.

- .40 "Total Performance of the Work" means the time when the prerequisites to Total Performance of the Work required by the Contract are fulfilled and the entire Work, except those items arising from the warranty provisions of the Contract, has been performed to the requirements of the Contract Documents and is so declared, in writing, by the Owner.
- .41 "Unit Price" means the amount payable by the Owner to the Contractor under the Contract for a single unit of each separately identified item of work for which a unit price is prescribed as the basis of payment, as stated in the Schedule of Prices.
- .42 "Unit Price Work" means a contractual arrangement that prescribes the product of a Unit Price multiplied by a number of units of measurement of a class as payment for performance of the item of work to which it relates.
- .43 "Warranty Performance of the Work" means the time when the prerequisites to Warranty Performance of the Work required by the Contract are fulfilled and all items arising from the warranty period or periods required by the Contract have been corrected by the Contractor and the state of the Work is so declared, in writing, by the Owner.
- .44 "Work" means the total construction and related services required by the Contract Documents.

2. INTERPRETATION

The Contract shall be interpreted as follows:

- .1 The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all.
- .2 Words importing the singular also include the plural and the masculine includes the feminine and vice-versa where the context requires.
- .3 "Herein", "hereby", "hereof", "hereunder" and similar expressions refer to the Contract as a whole and not to a particular part thereof, unless the context indicates otherwise.
- .4 Words and abbreviations which have well known technical meanings are used in the Contract in accordance with such recognized meanings.
- .5 Words importing persons or parties shall include firms and corporations and any organization having legal capacity.
- .6 In the interest of brevity, the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an", but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.
- .7 The imperative mood is used extensively in the Contract Documents, particularly the Specifications. Such language is always directed to the Contractor, and it is the Contractor's responsibility to perform the Work specified in the imperative mood, unless specifically stated otherwise.

- .8 Unless the context indicates otherwise, where a term is defined in the Contract Documents, other parts of speech or grammatical forms of the same word or expression have corresponding meanings.
- .9 Unless the context indicates otherwise, all monetary amounts shall be interpreted as amounts in the lawful currency of Canada.
- .10 When provision is made for the giving or issue of any notice, consent, approval, certificate or determination by any person, unless otherwise specified, such notice, consent, approval, certificate or determination shall be in writing and the words "notify", "certify" or "determine" shall be construed accordingly. Any such consent, approval, certificate or determination shall not unreasonably be withheld or delayed.
- .11 When provision is made for a communication to be "written" or "in writing" this means any handwritten, typewritten or printed communication, including facsimile transmissions.
- .12 Except in relation to a change in the Contract Time, any period of time in the Contract within which the Owner or the Contractor is to take action or decide anything may be extended by agreement, notwithstanding that the period of time has expired.
- .13 The term "including" or "includes" shall be construed as inclusive and not exclusive, and shall be interpreted to mean including but not necessarily limited to the items referred to.
- .14 In the event of ambiguities, discrepancies and conflicts between the several documents forming the Contract Documents the following order of precedence shall apply:
 - .1 Executed Agreement Form.
 - .2 Letter of Acceptance.
 - .3 Addenda.
 - .4 Supplementary Conditions.
 - .5 Conditions of Contract, including General, Payment, Security and Insurance Conditions.
 - .6 Specifications.
 - .7 Drawings.
 - .8 Drawings of larger scale shall govern over those of smaller scale of the same date.
 - .9 Figured dimensions shown on a Drawing shall govern even though they may differ from dimensions scaled on the same Drawing.

Notwithstanding the foregoing, documents of later date shall always govern over the documents amended.

END OF SECTION

1. TYPE AND AMOUNT OF SECURITY

- .1 Contractor shall provide security for performance of the Contract in the form of one of the following:
 - .1 Certified Cheque or equivalent in the amount of 10% of the Contract Price.
 - .2 Performance Bond for 50% of the Contract Price.
- .2 Security in the form of a bank letter of credit is not acceptable.
- .3 Submit security to the Owner within 21 days after date of issuance of Letter of Acceptance.

2. BANK DRAFT

- .1 Certified cheques shall be drawn on a financial institution authorized to conduct business in the Province of Saskatchewan and shall be made payable to the Owner.
- .2 After receipt Owner will present certified cheques to the bank for payment. Contractor shall not be entitled to accrued interest on a certified cheque provided as security.

3. SURETY BOND

- .1 Performance bond shall be in accordance with the Canadian Construction Documents Committee (CCDC) Standard Form of Performance Bond, CCDC Document No. 221. Consign performance bond to the Owner.

4. RELEASE OF SECURITY

- .1 When security is in the form of a bank draft, such security shall be released progressively as follows:
 - .1 Four months after Substantial Performance of the Work, not more than one third of the amount of the security shall be released to the Contractor.
 - .2 Eight months after Substantial Performance of the Work, a further amount not exceeding one third of the amount of the security shall be released.
 - .3 After the warranty period has expired the balance of the security shall be released, subject to deficiencies in materials and workmanship arising during the warranty period having been corrected to the Owner's satisfaction.
- .2 Progressive releases of security shall be made only upon written request by the Contractor.

END OF SECTION

1. TYPE AND AMOUNT OF SECURITY

- .1 Contractor shall provide security for payment to claimants for labour and material used or reasonably required for use in the performance of the Contract. Such security shall be in the form of one of the following:
 - .1 Certified Cheque or equivalent in the amount of 10% of the Contract Price.
 - .2 Labour and Material Payment Bond for 50% of the Contract Price.
- .2 Security in the form of a bank letter of credit is not acceptable.
- .3 Submit security to Owner within 21 days after date of issuance of Letter of Acceptance.

2. CERTIFIED CHEQUES

- .1 Certified cheques shall be drawn on a financial institution authorized to conduct business in the Province of Saskatchewan and shall be made payable to the Owner.
- .2 After receipt Owner will present certified cheques to the bank for payment. Contractor shall not be entitled to accrued interest on a certified cheque provided as security.

3. SURETY BOND

- .1 Labor and Material bond shall be in accordance with the Canadian Construction Documents Committee (CCDC) Standard Form of Labour and Material, CCDC Document No. 221. Consign Labour and Material bond to the Owner.

4. RELEASE OF SECURITY

- .1 When security is provided in the form of a certified cheque, such security shall be released to Contractor provided:
 - .1 Owner has issued a Certificate of Substantial Performance,
 - .2 Builders Lien Act claims period of 40 days from date of Substantial Performance or the Work has expired,
 - .3 third party claims received by Owner have been resolved, or addressed and course of action agreed to between Owner and Contractor,
 - .4 Contractor has submitted to Owner, completed Statutory Declaration.

END OF SECTION



SASKATCHEWAN
CONSTRUCTION SAFETY
ASSOCIATION



CERTIFICATE OF RECOGNITION

THIS CERTIFICATE RECOGNIZES THAT

Wright Construction Western Inc.

IN KEEPING WITH THE PRINCIPLES OF THE CERTIFICATE OF
RECOGNITION HAS, AS OF THIS DATE

August 29, 1997

DEVELOPED AND IMPLEMENTED A HEALTH AND SAFETY PROGRAM AND MET THE
STANDARDS OF THE CERTIFICATE OF RECOGNITION THROUGH AN INDEPENDENT
EVALUATION OF THEIR HEALTH AND SAFETY PROGRAM.

September 30, 2021

EXPIRY DATE

00039

CERTIFICATE #

A handwritten signature in black ink, likely belonging to the President of the Saskatchewan Construction Safety Association.

SASKATCHEWAN CONSTRUCTION
SAFETY ASSOCIATION INC.



1. RELATED REQUIREMENTS

- .1 Hold Harmless Agreement: General Conditions.

2. GENERAL REQUIREMENTS FOR INSURANCE

- .1 Without restricting the generality of the hold harmless provisions of the General Conditions of Contract and without limiting the obligations or liabilities under the Contract, Contractor shall, provide, maintain, and pay for the insurance coverages specified in this Section.
- .2 Form: Insurance policies shall be placed with Insurers who comply with the Insurance Act (Saskatchewan) and be in forms acceptable to the Owner.
- .3 Duration: Unless otherwise specified, required insurance coverages shall be maintained continuously from date of commencement of the Work until date of Total Performance of the Work.
- .4 Waiver of Recourse: Contractor waives all rights of recourse against Owner for damages to Contractor's property.
- .5 Deductible: Amount of deductible on any insurance provided by Contractor shall be reasonable and shall be subject to Owner's approval.
- .6 Notice of Change to Policy: Each required policy shall be endorsed to provide the Owner with not less than 30 Days advance written notice of cancellation or material change restricting coverage.
- .7 Proof of Insurance: Prior to commencement of any activities on site, Contractor shall provide Owner with proof that insurance coverages are in effect and meet specified conditions. In addition, Contractor shall at any time upon request, promptly file certified true copy of any insurance policy and shall otherwise provide proof of any required insurance, in a form acceptable to the Owner.
- .8 Subcontractors' Insurance: Contractor shall ensure that Subcontractors provide their own General Liability Insurance, Automobile Liability Insurance, where such risks exist, Aircraft and Watercraft Liability Insurance, and Other Insurance equivalent to that specified herein. With respect to General Liability Insurance, Contractor may alternatively provide such insurance on a wrap-up basis insuring himself, his Subcontractors, and anyone employed directly or indirectly by himself or his Subcontractors to perform a part of the Work.

3. GENERAL LIABILITY INSURANCE

- .1 General Liability Insurance shall be in the joint name of the Contractor, the Owner and the Owner's Representative with the limits of not less than five million dollars inclusive per occurrence for bodily injury, death and damage to property including loss of use thereof. The insurance coverage and the form of this insurance shall be at least equal to the latest edition of CCDC Form 101 and shall be maintained continuously from commencement of the Work until the date of the Final Date of Completion, and with respect to Completed Operations Coverage for a period of not less than twelve (12) months from the Date of the Final Acceptance Certificate. Should the Contractor decide not to employ subcontractors for operations requiring the use of explosives for blasting; or pile driving or caisson work; or removal or weakening of support of property, building or land; Form CCDC 101 as required shall include Endorsement Form 101-2. The Insurance shall be primary insurance and shall not require pro rata sharing of loss by the Owner of any other insurer of the Owner.

4. AUTOMOBILE LIABILITY INSURANCE

- .1 Automobile Liability Insurance in respect of licensed vehicles shall have limits of not less than two million dollars inclusive per occurrence for bodily injury, death, and damage to property, in the following forms endorsed to provide the Owner with not less than thirty (30) days written notice in advance of any cancellation or change or amendment restricting coverage:
 - .1 Standard Non-Owned Automobile Policy including Standard Contractual Liability Endorsement.
 - .2 Standard Owner's Form Automobile Policy providing Third Party Liability and Accident Benefits Insurance and covering licensed vehicles owned or operated by or on behalf of the Contractor.

5. COURSE OF CONSTRUCTION AND BOILER INSURANCE

- .1 All Risk Property Insurance shall be in the joint names of the Contractor, the Owner and the Owner's Representative, insuring not less than the sum of the Contract Price and the full value, as stated in the General Requirements, of products that are specified to be provided by the Owner for incorporation into the Work. The insurance coverage and the form of insurance shall be at least equal to the latest edition of CCDC Form 201 and shall be maintained continuously until ten (10) days after the date of the Final Completion Certificate.
- .2 Boiler Insurance insuring the interests of the Contractor, the Owner and the Owner's Representative for not less than the replacement value of boilers and pressure vessels forming part of the Work. The insurance coverage and the form of insurance shall be at least equal to the latest edition of CCDC Form 301 and shall be maintained continuously from the commencement of use or operation of the property insured and until ten (10) days after the date of the Final Completion Certificate.

- .3 Should the Owner wish to use or occupy part or all of the Work he shall give thirty (30) days written notice to the Contractor of the intended purpose and extent for such use or occupancy. Prior to such use or occupancy the Contractor shall notify the Owner in writing of the additional premium cost, if any, to maintain such insurance which shall be at the Owner's expense. If because of such use or occupancy the Contractor is unable to provide coverage, the Owner, upon written notice from the Contractor and prior to such use or occupancy, shall assume the responsibility to provide, maintain and pay for Property and Boiler Insurance insuring the full value of the Work, as in (a) and (b) above, in Forms CCDC 210 and 310, including coverage for such use or occupancy and the Contractor shall refund to the Owner the unearned premiums applicable to the Contractor's Policies upon termination of coverage.
- .4 The Policies shall provide that, in the event of a loss or damage, payment shall be made to the Owner and the Contractor as their respective interests may appear. The Contractor shall act on behalf of the Owner and himself for the purpose of adjusting the amount of such loss or damage payment with the Insurers. When the extent of the loss or damage is determined the Contractor shall proceed to restore the Work. Loss or damage shall not affect the rights and obligations of either party under the Contract except that the Contractor will be entitled to such reasonable extension of time for completion of the Work as the Owner's Representative may decide in accordance with Article 36 thereof.
- .5 Payment for Loss or Damage:
 - .1 When the property insurance has been obtained by the Contractor in accordance with the requirements of this Section: The Contractor shall be entitled to receive from the payments made by the Insurer the amount of his interest in the restoration of the work. In addition the Contractor shall be entitled to receive from the Owner (in addition to the amount due under the Contract) the amount in which the Owner's interest in the restoration of the Work has been appraised, such amount to be paid upon receipt of payment or payments from the Insurer in accordance with the Owner's Representative's certificates for payment.
 - .2 When the property insurance has been obtained by the Owner pursuant to the terms of the Contract Documents: The Contractor shall be entitled to receive from the payments made by the Insurer the amount of the Contractor's interest in the restoration of the Work. In addition the Contractor shall be entitled to receive from the Owner (in addition to the amount due under the Contract) the amount in which the owner's interests in the restoration of the Work has been appraised, such amount to be paid as the restoration of the Work proceeds and in accordance with the requirements of Article 24 and 25.
- .6 The Contractor shall be responsible for deductible amounts under the policies.

6. CONTRACTORS' EQUIPMENT INSURANCE

- .1 All Risks Contractors' Equipment Insurance covering construction machinery and equipment owned or rented and used by the Contractor and/or Subcontractors for the performance of the Work, including Boiler Insurance on temporary boilers and pressure vessels, shall be in the form acceptable to the Owner and shall not allow subrogation claims by the Insurer against the Owner. The policies shall be endorsed to provide the Owner with not less than thirty (30) days written notice in advance of cancellation, change or amendment restricting coverage.

7. OTHER INSURANCE

- .1 Contractor shall provide, maintain and pay for any additional insurance required to be provided by law, or which he considers necessary to cover risks not otherwise covered by insurance specified in the Contract Documents.

END OF SECTION

1. FEDERAL GOODS AND SERVICES TAX AND PROVINCIAL SALES TAX

- .1 Monies payable by the Owner to the Contractor shall be inclusive of the Federal Goods and Services Tax (GST) and Provincial Sales Tax (PST).

2. BASIS OF PAYMENT

- .1 Payment for Lump Sum Work shall be based on the prices in the Contract and, when required by the Contract, the approved schedule of values for such work.
- .2 Payment for Unit Price Work shall be based on the Unit Prices in the Contract.
- .3 Payment for Cost Plus Work shall be based on the cost of such work, as specified herein, plus a fee in the amount of 10% of the cost of such work for the Contractor's overhead and profit except that no fee shall be applied to the cost of Construction Equipment when such cost is based on rates which already include the Contractor's overhead and profit.
- .4 The cost of Cost Plus Work shall be computed as the sum of the following cost elements as applicable to such work:

- .1 Cost of labour (other than labour costs included in other cost elements) comprised of payroll costs for employees in the direct employ of the Contractor. Such employees shall include the superintendent and foremen at the Site. Payroll costs shall include salary, fringe benefits and statutory charges paid by Contractor. Fringe benefits shall include health care, vacations with pay, sick time allowance, and pension plan, life and disability insurance, dental and medication plan contributions. Statutory charges shall include contributions for Canada Pension Plan, Workers' Compensation, statutory holidays and Unemployment Insurance. Labour rates shall be consistent with rates actually paid for equivalent job classifications in the normal performance of Lump Sum Work or Unit Price Work or, if there are no such equivalencies, under a schedule of job classifications and labour rates agreed upon by the Owner and the Contractor, if possible before labour costs are incurred.

- .2 Cost of Products supplied and incorporated into Permanent Work, including cost of transportation and storage thereof and Supplier's site services required in connection therewith. Cash discounts shall accrue to the Contractor. Trade discounts, rebates and refunds and returns from sale of surplus Products shall accrue to the Owner.

- .3 Cost of Construction Equipment:

Cost of Construction Equipment shall be paid at the rates specified in the current edition of the Equipment Rental Rates Guide published by the Saskatchewan Heavy Construction Association, hereinafter called the "Rates Guide", subject to the following:

- .1 Rates specified in the Rates Guide shall be deemed to include all overhead and profit, regardless of whether Construction

- Equipment is provided by the Contractor, Subcontractors or Sub-subcontractors.
- .2 Rates specified in the Rates Guide shall be deemed to include cost of owning, operating, loading, unloading, assembling, erecting, and dismantling.
 - .3 When applicable rates are not included in the Rates Guide, costs shall be paid at the rates agreed upon by the Owner and the Contractor, if possible before such costs are incurred.
 - .4 Cost of moving Construction Equipment to and from the Site shall not be payable, unless such cost is solely attributable to the Work and is approved as such by the Owner.
 - .5 Except for Construction Equipment traveling under its own power, travel time for Construction Equipment shall not be payable. Unless otherwise approved by the Owner, Construction Equipment shall be moved by the most economical method.
- .5 Cost of Temporary Work, including cost of transportation and maintenance thereof, used and consumed in the performance of the Work and the cost less fair market value of such work used but not consumed which shall remain the property of the Contractor.
- .6 Cost of special services, including the cost of architects, engineers, specifiers, surveyors, testing laboratories and inspection agencies.
- .7 Supplemental costs, including:
- .1 Travel and subsistence costs of Contractor's employees;
 - .2 Statutory charges, including fees, cost of permits and licenses and custom duties;
 - .3 Cost of rights-of-way and other land related costs;
 - .4 Royalty payments and patent license fees;
 - .5 Deposits lost for causes other than the Contractor's fault or negligence.
- .8 Subcontract and Sub-subcontract costs, including payments made by the Contractor to Subcontractors and by Subcontractors to Sub-subcontractors in accordance with the requirements of such contracts. Subcontractors' and Sub-subcontractors' costs and fee for overhead and profit for Cost Plus Work to be performed under such contracts shall be determined in the same manner as the Contractor's cost and fee.
- .9 With respect to Cost Plus Work:
- .1 Costs payable by Owner shall be directly related to or shall have been necessarily and properly incurred in the performance of such work.
 - .2 Overhead shall include the Contractor's costs related to the operation and maintenance of his head office and branch offices, administration at head office and branch offices, general management, legal, audit and accounting services, buying organization, corporate tax, financing and other bank charges, company

directors, salaries and other compensation of personnel stationed off-site, design of Construction Equipment and Temporary Work, planning and scheduling of work, expendable and unexpendable small tools, including maintenance thereof, and recruitment and training of site staff.

- .3 Contractor shall obtain the Owner's prior approval to subcontract or enter into other agreements for Cost Plus Work.
- .4 The Owner may refuse to pay all or part of the cost of any Work item under any cost element, where the item in question was, in the Owner's opinion, unsuitable for the Work performed.

3. MEASUREMENT FOR PAYMENT

- .1 Unless otherwise specified in the Contract, the Owner shall measure the Work for the purpose of determining payment to the Contractor in accordance with the measurement provisions of the Contract.

4. PROGRESS PAYMENTS

- .1 Prior to Substantial Performance of the Work, the Owner shall make monthly payments to the Contractor.
- .2 Within 7 days after the end of each monthly payment period, the Contractor shall submit to the Owner:
 - .1 Completed Statutory Declaration Form 00630A, at and after the second monthly payment period,
 - .2 Any data requested by the Owner to assist the Owner to determine the amount due and payable to the Contractor, and
 - .3 For Products stored by the Contractor on the Site for incorporation in Permanent Work but not incorporated in such Work, proof of purchase price and delivery to the Site, along with a statement of the quantity of such Products and the Schedule of Prices item to which the Products relate.
- .3 The Owner shall, within 45 days after the end of each monthly payment period and subject to having received within the time specified any required information referred to in clause 4.2, pay to the Contractor the amount which the Owner determines to be due and payable to the Contractor, up to the end of the monthly payment period in respect of:
 - .1 The value of Work executed;
 - .2 The value of Work executed pursuant to authorized Changes in the Work;
 - .3 The value of Products stored by the Contractor on the Site for incorporation in Permanent Work but not incorporated in such Work;

- .4 Adjustments due to changes in Regulatory Requirements or price fluctuation provisions of the Contract, if applicable;
 - .5 Any other amount determined by the Owner; and
 - .6 Subject to:
 - any deductions under clause 10;
 - any withholdings under clause 11; and
 - retention of the holdback amount calculated by applying the holdback percentage referred to in clause 5 to the amount payable to the Contractor under clause 4.3 after any deductions and withholdings.
- .4 For Unit Price Work, Owner may, at his discretion, make partial payment based on partial completion of the scope of a single unit of an item of Work.
- .5 If, after receipt of a progress payment from the Owner, the Contractor disagrees with the amount of such payment, such amount shall nevertheless be considered to be correct unless the Contractor, within 7 days after such receipt, notifies the Owner of the respects in which such payment is claimed by him to be incorrect. On receipt of such notice, the Owner shall review the amount of the payment and either confirm or vary it. If the Owner varies the payment, such variance shall be added to the next progress payment.
- .6 Notwithstanding the terms of this clause or any other clause of the Contract no amount shall be paid by the Owner until the contract security and proof of insurance, if required under the Contract, have been provided by the Contractor.

5. **HOLDBACK**

- .1 The Owner shall hold back the percentage specified in the Agreement Form from each progress payment referred to in clause 4.
- .2 Forty (40) days after the date of a Certificate of Substantial Performance, if issued, the Owner will pay to the Contractor, the unpaid balance of holdback moneys then due, provided:
 - .1 Third party claims, received by the Owner pursuant to the Builders Lien Act or applicable requirements of the Contract have been resolved, or addressed and a course of action agreed to by the Owner and the Contractor,
 - .2 The Contractor has submitted to the Owner, within 7 days after the date of Substantial Performance, a letter of clearance from the Workers' Compensation Board and a completed Statutory Declaration Form,
 - .3 The Contractor has submitted to the Owner, a letter from the Contractor's Surety (if any) approving the release of the holdback,
 - .4 The Contractor has submitted to the Owner, all Record Documents, showing changes as constructed, Operating and Maintenance Manuals, guarantees,

warranties, certificates, reports, spare parts and spare material required by the Contract Documents,

- .5 The Contractor has submitted to the Owner, a statement verifying that "all payment quantities on the completed portion of the Contract have been accepted; and all claims, all demands for Extra Work, or otherwise, under or in connection with the completed portion of the Contract have been presented to the Engineer".
- .3 Forty (40) days after the date of Total Performance, the Owner will pay to the Contractor, the unpaid balance of holdback moneys then due, provided:
 - .1 Third party claims, received by the Owner pursuant to the Builders Lien Act or applicable requirements of the Contract have been resolved, or addressed and a course of action agreed to by the Owner and the Contractor,
 - .2 The Contractor has submitted to the Owner, within 7 days after the date of Substantial Performance, a letter of clearance from the Workers' Compensation Board and a completed Statutory Declaration Form,
 - .3 The Contractor has submitted to the Owner, a letter from the Contractor's Surety (if any) approving the release of the holdback,
 - .4 The Contractor has submitted to the Owner, all Record Documents, showing changes as constructed, Operating and Maintenance Manuals, guarantees, warranties, certificates, reports, spare parts and spare material required by the Contract Documents,
 - .5 The Contractor has submitted to the Owner, a statement verifying that "all payment quantities on the completed portion of the Contract have been accepted; and all claims, all demands for Extra Work, or otherwise, under or in connection with the completed portion of the Contract have been presented to the Engineer".

6. FINAL PAYMENT

- .1 Upon the accepted date of Total Performance, the Owner will pay to the Contractor the unpaid balance of any monies then due under the Contract or on account of subsequently discovered evidence, nullify the whole or any part of any certificate to such an extent as may be necessary to protect the Owner from loss on account of:
 - .1 The Contractor's unsatisfactory prosecution of the Work.
 - .2 Defective or damaged Work requiring correction or replacement.
 - .3 Claims or liens filed or reasonable evidence indicating the probable filing of claims or liens.
 - .4 Failure of the Contractor to make payments promptly to subcontractors or for materials or labour.

- .5 A reasonable doubt that the Contract can be completed for balance unpaid.
- .6 Damage to an Other Contractor's Work which has not been settled which may result in the Other Contractor whose Work has been damaged bringing action against the Owner. In case of action, the Contractor will bear the expense of same.

When the above conditions are resolved to the satisfaction of the Owner, payment shall be made for the amounts withheld because of them.

- .2 If the final statement is considered by the Contractor to be incorrect, the Contractor shall submit to the Owner a notice of claim, including substantiation, notwithstanding the time provisions of clause 10 of the General Conditions.
- .3 If the Owner does not receive a notice of claim pursuant to clause 6.5 within the time specified, the final statement shall be considered correct.
- .4 The final payment shall represent full and final settlement of all monies due to the Contractor pursuant to the Contract except with respect to unresolved claims, if any.

7. OWNER'S LIABILITY

- .1 After the final payment issued has been made, the Owner shall not be liable to the Contractor for any matter or thing arising out of or in connection with the Contract, except as may be provided elsewhere in the Contract, unless the Contractor shall have made a claim in respect therefor prior to or within the time specified in the Builders Lien Act.

8. DELAY IN MAKING PAYMENT

- .1 In respect of progress payments, payment after Substantial Performance of the Work, payment of holdback, and final payment, the Owner shall pay the Contractor an amount that the Owner considers to be due to the Contractor, pursuant to the Contract, within the time specified.

9. RIGHT OF SET-OFF

- .1 Without limiting any right of set-off, deduction or recovery given or implied by law or elsewhere in the Contract, the Owner may set off any amount payable to the Owner by the Contractor, or recoverable from the Contractor by the Owner, under the Contract or under any other current contract against any amount payable to the Contractor under this Contract.
- .2 For the purposes of these Payment Conditions, "other current contract" means a contract between the Owner and the Contractor under which the Contractor has an undischarged obligation to perform or supply work, labour, or material, or in respect of which the

Owner has, since the date of execution of the contract agreement, exercised any right to take the work that is the subject of the contract out of the Contractor's hands.

10. DEDUCTIONS FROM PAYMENTS

- .1 Owner may deduct from any amount claimed by or payable to Contractor:
 - .1 An amount at least equal to the value, as determined by Owner, of Work not in accordance with Contract Documents,
 - .2 The amount of any unresolved third party claim submitted pursuant to the Builders Lien Act or applicable requirements of the Contract,
 - .3 The amount of any unpaid and overdue statutory account related to the Contract and of which the Owner has received notice and which is enforceable against the Owner,
 - .4 The amount of any overpayment made by the Owner to the Contractor, and
 - .5 Any other amount recoverable by the Owner from the Contractor under the Contract.

11. WITHHOLDING OF PAYMENT

- .1 Owner may withhold all or part of any amount payable to Contractor in order to protect the Owner or third parties from loss due to Contractor's:
 - .1 Failure to make payments properly to Subcontractors or for labour, materials or equipment,
 - .2 Failure to ensure that Subcontractors make payments properly to Sub-subcontractors or for labour, materials or equipment,
 - .3 Inability to complete the Work within the Contract Time,
 - .4 Inability to complete the Work for the unpaid balance of the Contract Price,
 - .5 Persistent failure to perform the Work in accordance with the Contract Documents.
- .2 When the causes for withholding payment pursuant to 11.1 are removed to the Owner's satisfaction, the Owner shall pay the Contractor the amount previously due and payable with the next progress payment.

12. TITLE TO AND ACCEPTANCE OF WORK

- .1 Contractor warrants that title to work and Products covered by any payment made by the Owner to the Contractor will pass to the Owner, at the time of payment, free and clear of all claims, interests and encumbrances.
- .2 Contractor further warrants that Products stored at the Site and for which payment has been received, shall not be removed from the Site and shall be kept secure and protected.
- .3 Payments made by Owner shall not be construed as an acceptance that the Work, Products, or any part thereof is complete, is satisfactory or is in accordance with the Contract Documents.

END OF SECTION

Statutory Declaration of Payment Distribution

Identification of Contract

Contract Name (location and description of the Work as it appears in the Contract Documents)

Date of This Application for Payment
Month Day Year
Date of Last (Immediate Preceding) Application for Payment
Month Day Year

Identification of Declarant (person making the declaration)

Full Name of Declarant	Position or Title (of office held with Contractor)		
Business Name (Name of Contractor)			
Business Address			
City or Town	Province	Postal Code	

Declaration

I, the undersigned, solemnly declare that as of the date of this application for payment:

- .1 all the Contractor's lawful obligations to subcontractors and suppliers, in respect of work contracted for and performed before the date of the last (immediate preceding) application for payment, are fully discharged, except for (i) hold back monies properly retained, and (ii) payments deferred by agreement;
- .2 all the Contractor's lawful obligations to workers, in respect to work contracted for, are fully discharged;
- .3 all assessments and payments required to be made by the Contractor under law have been made in full; and that
- .4 I am an authorized signing officer of the Contractor and have personal knowledge of the contract identified and the facts stated in this statutory declaration.

I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.

Making a false or fraudulent declaration is a contravention of the Criminal Code of Canada, and could carry, upon conviction, penalties including fines, imprisonment, or both.

Signature of declarant

Attestation (to be completed by a person empowered to receive declarations, e.g. Commissioner of Oaths, Notary Public, etc.)

DECLARED before me at _____ this _____ day of _____ 20 _____		
City/Town and Province		
_____ Signature of person before whom declaration is made	_____ Authority to receive solemn declarations	_____ Expiry date
_____ Name (please print)	Any changes or corrections on this Statutory Declaration must be initialled by the person before whom the declaration is made.	

1. OWNER AND OWNER'S REPRESENTATIVE

- 1.1** Owner's Duties and Authority
- 1.2** Owner's Representative
- 1.3** Appointment of Assistants
- 1.4** Instructions in Writing
- 1.5** Owner Interpreter of Contract
- 1.6** Owner's Determinations
- 1.7** Owner's Review

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- 2.2** Subcontracting
- 2.3** Nominated Subcontractors and Suppliers

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- 3.1** Property and Use of Contract Documents
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- 4.3** Site Operations and Methods of Construction
- 4.4** Differing Physical Conditions or Obstructions
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- 4.6** Contractor's Superintendence
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- 4.8** Owner May Object
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- 4.10** Owner's Responsibilities for Safety

- 4.11** Care of Work

- 4.12** Responsibility to Rectify Loss or Damage

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- 4.14** Regulatory Requirements

- 4.15** Artifacts and Fossils

- 4.16** Patent Rights

- 4.17** Royalties

- 4.18** Other Contractors

- 4.19** Permanent Work Designed by Contractor

- 4.20** Records and Audit

- 4.21** Record of Labour and Construction Equipment

- 4.22** Customs

- 4.23** Urgent Remedial Work

5. QUALITY OF PRODUCTS AND WORK

- 5.1** Products and Workmanship

- 5.2** Cost of Samples

- 5.3** Cost of Tests Provided For

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- 5.5** Inspection and Testing

- 5.6** Dates for Inspection and Testing

- 5.7** Rejection

- 5.8** Cost for Inspection and Testing

- 5.9** Independent Inspection

- 5.10** Examination of Work Before Covering Up

- 5.11** Uncovering and Making Openings

- 5.12** Removal of Improper Work or Products

6. COMMENCEMENT, COMPLETION, CONTRACT TIME AND DELAYS

- 6.1** Commencement of Work
- 6.2** Possession of Site and Access to Site
- 6.3** Contract Time
- 6.4** Extension of Contract Time
- 6.5** Contractor to Provide Notification and Details
- 6.6** Interim Determination of Extension of Time
- 6.7** Rate of Progress
- 6.8** Substantial Performance of the Work
- 6.9** Substantial Performance of Part or Parts of Work
- 6.10** Total Performance of the Work
- 6.11** Warranty Performance of the Work
- 6.12** Acceleration
- 6.13** Damages for Delay
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7. WARRANTY

- 7.1** Warranty Period
- 7.2** Completion of Outstanding Work
- 7.3** Remedying Defects
- 7.4** Contractor's Failure to Carry Out Instructions
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- 8.1** Changes in the Work
- 8.2** Instructions for Changes in the Work
- 8.3** Valuation of Changes in the Work
- 8.4** Impact of Changes in the Work
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9. CHANGES IN COST AND REGULATORY REQUIREMENTS

- 9.1** Increase or Decrease in Cost
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- 10.1** Notice of Claims
- 10.2** Contemporary Records
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- 10.6** Claims Against Owner Only

11. RELEASE FROM PERFORMANCE

- 11.1** Frustration
- 11.2** Removal of Construction Equipment on Termination
- 11.3** Payment if Contract Terminated

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- 12.1** Suspension of Work
- 12.2** Owner's Determination Following Suspension
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13. DEFAULT OF CONTRACTOR

- 13.1** Default
- 13.2** Valuation at Date of Termination
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14. DEFAULT OF OWNER

- 14.1** Failure of Owner to Pay
- 14.2** Removal of Construction Equipment
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- 14.4** Contractor May Suspend Work
- 14.5** Resumption of Work

15. SETTLEMENT OF DISPUTES

- 15.1** Disputes
- 15.2** Notice of Dispute
- 15.3** Negotiated Settlement
- 15.4** Mediation
- 15.5** Arbitration

1. OWNER AND OWNER'S REPRESENTATIVE

1.1 OWNER'S DUTIES AND AUTHORITY

The Owner shall carry out the duties and exercise the authority specified in the Contract.

1.2 OWNER'S REPRESENTATIVE

The Owner shall appoint a representative who shall, unless the Contractor is expressly advised otherwise by the Owner, have full authority to act on behalf of and bind the Owner under the Contract.

1.3 APPOINTMENT OF ASSISTANTS

- .1 The Owner's Representative may appoint any number of persons to assist him in carrying out his duties. He shall notify the Contractor of the names, duties and scope of authority of such persons.
- .2 The failure of any assistants appointed pursuant to clause 1.3.1 to disapprove any work shall not prejudice the authority of the Owner to disapprove such work and to give instructions for the rectification thereof.

1.4 INSTRUCTIONS IN WRITING

The Contractor shall take instructions only from the Owner or any assistants appointed pursuant to clause 1.3. Instructions given by the Owner shall be in writing, provided that if the Owner considers it necessary to give any instruction orally, the Contractor shall comply with such instruction. Confirmation in writing of such oral instruction given by the Owner, whether before or after the carrying out of the instruction, shall be deemed to be an instruction within the meaning of this clause. Provided that if the Contractor, within 7 days, confirms in writing to the Owner any oral instruction of the Owner and such confirmation is not contradicted in writing within 7 days by the Owner, it shall be deemed to be an instruction of the Owner.

1.5 OWNER INTERPRETER OF CONTRACT

The Owner in the first instance shall be the interpreter of the Contract and the judge of the Contractor's performance.

1.6 OWNER'S DETERMINATIONS

When the Owner is required to exercise his discretion by giving his decision, opinion or consent, or expressing his satisfaction or approval, or determining value, or otherwise taking action which may affect the rights and obligations of the Contractor he shall exercise such discretion within the terms of the Contract after due consultation with the Contractor and shall promptly notify the Contractor of such decision, opinion, consent, approval or determination.

1.7 OWNER'S REVIEW

Any review, comment, consent, acceptance or approval, or lack thereof, by the Owner, shall not relieve the Contractor of any of its responsibilities or liabilities under the

Contract.

2. ASSIGNMENT, SUBCONTRACTING AND NOMINATION

2.1 ASSIGNMENT

- .1 The Contractor shall not assign the Contract, either in whole or in part, without the previous written consent of the Owner, which consent, notwithstanding other provisions of the Contract, shall be at the Owner's sole discretion.
- .2 The Owner shall not be bound by any assignment by the Contractor of any monies payable or to become payable to the Contractor under the Contract, without the written consent of the Owner, which consent:
 - .1 will not be given for a general assignment of book debts, but
 - .2 may, at the Owner's sole discretion, be given for a specific assignment of all or part of monies payable to the Contractor under the Contract, subject however, in all cases, to the provisions of the Financial Administration Act (Sask).

2.2 SUBCONTRACTING

- .1 The Contractor:
 - .1 shall not sublet the Contract as a whole,
 - .2 shall not subcontract any part of the Work without the Owner's prior consent, which shall not be unreasonably withheld,
 - .3 shall provide such details of any Subcontractor he wishes to engage as the Owner may require,
 - .4 shall contract with those Subcontractors proposed by him and accepted by the Owner and such Subcontractors shall not be changed without the Owner's prior consent.
- .2 The Owner may, for reasonable cause, object to the use of a proposed Subcontractor and require the Contractor to contract with another Subcontractor.
- .3 If the Owner requires a change from a proposed Subcontractor, the Contract Price shall be adjusted by any difference in cost and markup occasioned by such required change, except where such change is required due to the Contractor's default or negligence, in which case there shall be no change in the Contract Price.
- .4 The Owner may, upon reasonable request and at his discretion, provide to a Subcontractor information as to the percentage or quantity of the Subcontractor's work for which payment has been approved.
- .5 Nothing contained in the Contract shall create a contractual relationship between a Subcontractor and the Owner and subcontracting part of the Work shall not relieve the Contractor from any liability or obligation under the Contract and he shall be responsible for the acts, defaults and neglects of any Subcontractor, his agents, servants or workers as fully as if they were his own.
- .6 The Contractor shall enter into contracts or written agreements with his Subcontractors to

require them to perform their work in accordance with the Contract, and the Contractor shall incorporate the terms and conditions of the Contract Documents, to the extent that they apply, into all subcontracts.

2.3 NOMINATED SUBCONTRACTORS AND SUPPLIERS

- .1 A nominated Subcontractor or nominated Supplier means a person, firm or corporation with whom the Contract requires the Contractor to enter into a contract for the performance of a subcontract or the supply of things related to the Work.
- .2 Nothing contained in the Contract shall create a contractual relationship between the Owner and a nominated Subcontractor or nominated Supplier and such nomination shall not relieve the Contractor from any liability or obligation under the Contract and he shall be responsible for the acts, defaults and neglects of any nominated Subcontractor or nominated Supplier, his agents, servants or workers as fully as if they were his own.

3. DOCUMENTS

3.1 PROPERTY AND USE OF CONTRACT DOCUMENTS

The Contract Documents are the sole property of the Owner and unless it is necessary for the purposes of the Contract, the Contract Documents shall not, without the consent of the Owner, be used by or communicated to a third party by the Contractor.

3.2 REPORTING OF CONFLICTS, ERRORS AND DISCREPANCIES

- .1 If the Contractor finds a conflict, error or discrepancy in the Contract Documents, the Contractor shall so report to the Owner in writing at once and, before proceeding or continuing with the Work affected thereby, shall obtain a written interpretation or clarification from the Owner; however, the Contractor shall not be liable to the Owner for failure to report any conflict, error or discrepancy in the Contract Documents unless the Contractor had actual knowledge thereof or should reasonably have known thereof.
- .2 The Contractor shall obtain from the Owner any dimensions required but not indicated in figures in the Contract Documents nor calculable from figures in the Contract Documents. Scaling of Drawings, for any purpose, shall be at the Contractor's risk.

3.3 DISRUPTION OF PROGRESS

- .1 The Contractor shall notify the Owner when planning or execution of the Work is likely to be delayed or disrupted unless any further document or instruction required of the Owner under the Contract is issued by the Owner within a reasonable time. The notice shall include details of the document or instruction required and of why and by when it is required and of any delay or disruption likely to be suffered if it is late.
- .2 If, by reason of any failure or inability of the Owner to issue, within a reasonable time, any document or instruction for which notice has been given by the Contractor in accordance with clause 3.3.1, the Contractor suffers delay or incurs costs then the Owner shall determine:
 - .1 any extension of time to which the Contractor is entitled under clause 6.4, and

.2 the amount of such costs, which shall be added to the Contract Price.

- .3 If the failure or inability of the Owner to issue any documents or instruction is caused in whole or in part by the failure of the Contractor to submit documents, which he is required to submit under the Contract, the Owner shall take such failure by the Contractor into account when making his determination pursuant to clause 3.3.2.

3.4 ADDITIONAL INSTRUCTIONS

The Owner shall have authority to issue to the Contractor, from time to time, such Additional Instructions as may be necessary for the proper performance of the Work. The Contractor shall carry out and be bound by such Additional Instructions.

3.5 FORMS

Forms to be used pursuant to the Contract or as otherwise may be required for the administration of the Contract shall be as prescribed or approved by the Owner.

4. GENERAL OBLIGATIONS

4.1 CONTRACTOR'S RESPONSIBILITIES:

- .1 The Contractor shall, with due care and diligence, design, to the extent provided for by the Contract, execute and complete the Work and remedy any defects therein in accordance with the provisions of the Contract. This shall include the provision of superintendence, labour, Products, Construction Equipment, Temporary Work and all other things, whether of a temporary or permanent nature, required in and for such design, execution, completion and remedying of any defects. The Contractor shall comply with and adhere strictly to the Owner's instructions on any matter, whether mentioned in the Contract or not, concerning the Work.

4.2 CONTRACT SECURITY

- .1 The Contractor shall, if required by the Bid Documents, provide either or both contract performance security or security for payment of claims for labour and material.
- .2 Surety bonds shall be issued by a duly incorporated surety company authorized to transact business of suretyship in the Province of Saskatchewan.
- .3 The Owner may, for reasonable cause, object to use of the surety company proposed by the Contractor, and may require the Contractor to provide a surety bond issued by another surety company acceptable to the Owner, with no change in Contract Price.

4.3 SITE OPERATIONS AND METHODS OF CONSTRUCTION

- .1 The Contractor shall be fully responsible for the adequacy, stability and safety of all Site operations and methods of construction.
- .2 The Contractor shall submit at such times and in such detail as the Owner may require such information pertaining to the methods of construction (including Temporary Work and the use of Construction Equipment) which the Contractor proposes to use and such

calculations of stresses, strains and deflections that will arise, in the Permanent Work or any part thereof, from the use of such methods during execution of the Work.

- .3 The Owner shall, on request from the Contractor, provide to the Contractor such design criteria relevant to the Permanent Work or any Temporary Work designed by the Owner as may be necessary to enable the Contractor to comply with clause 4.3.2.
- .4 For the purposes of this clause, "method of construction" means a method, means, technique, sequence or procedure of construction.

4.4 DIFFERING PHYSICAL CONDITIONS OR OBSTRUCTIONS

- .1 If, during the execution of the Work, the Contractor encounters physical obstructions or physical conditions, including sub-surface obstructions or conditions, other than weather conditions or conditions due to weather conditions, on the Site, which, in his opinion, differ substantially from those indicated in the Contract and which were not reasonably foreseeable, the Contractor shall as soon as possible give notice thereof to the Owner. On receipt of such notice, the Owner shall, if in his opinion such obstructions or conditions differ substantially from those indicated in the Contract Documents and could not have been reasonably foreseen, determine:
 - .1 any extension of time to which the Contractor is entitled under clause 6.4, and
 - .2 the amount of any costs, valued in accordance with clause 8.3, which may have been incurred by the Contractor by reason of such obstructions or conditions having been encountered, which shall be added to the Contract Price.
- .2 A determination by the Owner pursuant to clause 4.4.1 shall take account of:
 - .1 the time of the Contractor's notice to the Owner of a differing physical condition or obstruction,
 - .2 any instruction which the Owner may have issued to the Contractor in connection therewith, and
 - .3 any proper and reasonable measures acceptable to the Owner, which the Contractor may have taken in the absence of specific instructions from the Owner.

4.5 CLIMATIC AND WEATHER CONDITIONS

The relevant climatological records and related information published by the Canadian Climate Centre of Environment Canada, for one or more locations in the vicinity of the Site, shall be used as a basis for any evaluations and determinations concerning climate and weather.

4.6 CONTRACTOR'S SUPERINTENDENCE

- .1 The Contractor shall provide all necessary superintendence during the execution of the Work and as long thereafter as the Owner may consider necessary for the proper fulfilling of the Contractor's obligations. The Contractor, or a competent and authorized representative approved of by the Owner, which approval may at any time be withdrawn, shall give his whole time to the superintendence of the Work. Such authorized representative shall receive, on behalf of the Contractor, instructions from the Owner.

- .2 If approval of the Contractor's representative is withdrawn by the Owner, the Contractor shall, as soon as is practicable, after receiving notice of such withdrawal, remove the representative from the Work and shall not employ him again on the Work in any capacity and shall replace him by another representative approved by the Owner.

4.7 CONTRACTOR'S EMPLOYEES

- .1 The Contractor shall provide on the Site in connection with the execution and completion of the Work and the remedying of any defects therein:
 - .1 technical assistants who are skilled and experienced in their respective trades and such foremen and others as are competent to give proper superintendence of the Work, and
 - .2 labour as is necessary for the proper and timely fulfilling of the Contractor's obligations.

4.8 OWNER MAY OBJECT

The Owner may object to and require the Contractor to remove forthwith from the Site any person who, in the opinion of the Owner, misconducts himself, or is incompetent or negligent in the proper performance of his duties, or whose presence is otherwise considered by the Owner to be undesirable, and such person shall not be allowed on the Site without the consent of the Owner.

4.9 SAFETY, SECURITY AND PROTECTION OF THE ENVIRONMENT

- .1 The Contractor shall, throughout the execution of the Work and the remedying of any defects therein:
 - .1 have full regard for the health and safety of all persons upon the Site and keep the Site and the Work, to the extent that they are under his control, in an orderly state appropriate to the avoidance of danger to such persons, and
 - .2 provide and maintain at his own cost all temporary facilities and controls when and where necessary or required by the Owner or by any duly constituted authority, for the protection of the Work or for the safety and convenience of the public or others, and
 - .3 take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or any other causes arising as a consequence of his methods of operation.
- .2 The Contractor shall appoint a person at the Site who shall manage an accident prevention program. This person shall be Contractor's superintendent unless another person is appointed and approved by the Owner.

4.10 OWNER'S RESPONSIBILITIES FOR SAFETY

- .1 If under clause 4.18 the Owner carries out work on the Site with his own workers he shall, in respect of such work and subject to clause 4.9:
 - .1 have full regard to the safety of all persons upon the Site, and
 - .2 keep the Site in an orderly state appropriate to the avoidance of danger to such

persons.

- .2 If under clause 4.18 the Owner contracts with Other Contractors on the Site he shall require them to have the same regard for safety and avoidance of danger.

4.11 CARE OF WORK

- .1 The Contractor shall take full responsibility for the care of the Work from the date of commencement of Work at the Site until the date of issue of the certificate of Substantial Performance of the Work, when the responsibility for such care shall pass to the Owner, provided that:
 - .1 except where otherwise specified in the Contract, if the Owner accepts a certificate of Substantial Performance for part of the Permanent Work the Contractor shall cease to be liable for the care of that part from the date of issue of such certificate, then the responsibility for the care of that part shall pass to the Owner, and
 - .2 the Contractor shall take full responsibility for the care of any outstanding Work which he undertakes to finish during the warranty period until such outstanding Work has been completed.

4.12 RESPONSIBILITY TO RECTIFY LOSS OR DAMAGE

If there is any loss or damage to the Work, or any part thereof, or to Products for incorporation therein, during the period for which the Contractor is responsible for the care thereof, from any cause whatsoever, the Contractor shall, at his own cost, rectify such loss or damage so that the Work conforms with the provisions of the Contract to the satisfaction of the Owner. The Contractor shall also be liable for any loss or damage to the Work occasioned by him in the course of any operations carried out by him for the purpose of complying with his obligations under the warranty provisions of the Contract.

4.13 HOLD HARMLESS AGREEMENT:

The Third Party agrees to indemnify and save harmless Canada, Saskatchewan, the Recipient, their officers, servants, employees or agents from and against all claims, demands, loss, expenditures, damages, actions, suits, or other proceedings by whomsoever brought or prosecuted in any manner based upon, or occasioned by an injury to persons, damage to or loss or destruction of property, economic loss or infringement of rights caused by or arising directly or indirectly from:

- I. This Contract;
- II. The performance of a contract or the breach of any term or condition of it by the Third Party, its officers, servants, employees or agents; or
- III. Any omission or other willful or negligent act of the Third Party, their representative officers, servants, employees or agents.

The Third Party agrees that nothing in this Contract is to be construed as authorizing the Third Party to contract for or to incur any obligation on behalf of Canada, Saskatchewan or the Recipient or to act as agent for them.

4.14 REGULATORY REQUIREMENTS

- .1 The Contractor shall conform in all respects, including by the giving of all notices and the paying of all fees, with the provisions of:
 - .1 any Regulatory Requirements, and
 - .2 the rules and regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the Work, and the Contractor shall keep the Owner indemnified against all penalties and liability of every kind for breach of any such provisions.
- .2 The Owner shall be responsible for obtaining any planning, zoning or other similar permission required for the Project to proceed.
- .3 Without limiting the Contractor's obligations under clause 4.14.1, the Contractor shall:
 - .1 comply with all requirements of and pay all fees in connection with the Workers' Compensation Act (Saskatchewan),
 - .2 comply with the Occupational Health and Safety Act (Saskatchewan) and all safety requirements as contained in the regulations thereto,
 - .3 ensure that wages, hours of work and other conditions of employment of all persons employed by the Contractor in the performance of any work required by the Contract are in compliance with the requirements of the Employment Standards Code (Saskatchewan), the Labour Relations Code (Saskatchewan) and any other applicable law, rule, regulation or order, and
 - .4 pay all fees and charges levied by a municipal authority in respect of applicable permits and licences.

4.15 ARTIFACTS AND FOSSILS

- .1 Coins, fossils, artifacts, structures and other remains or things of geological or archaeological interest discovered on the Site shall, as between the Owner and the Contractor, be deemed to be the property of the Owner. The Contractor shall take reasonable precautions to prevent his workers or any other persons from removing or damaging any such article or thing and shall, immediately upon discovery thereof and before removal, inform the Owner of such discovery and carry out the Owner's instructions for dealing with same. If, by reason of such instructions, the Contractor suffers delay or incurs costs then the Owner shall determine:
 - .1 any extension of time to which the Contractor is entitled under clause 6.4, and
 - .2 the amount of such costs, which shall be added to the Contract Price.

4.16 PATENT RIGHTS

The Contractor shall indemnify the Owner from and against all claims and proceedings for or on account of infringement of any patent rights, design trademark or name or other protected rights in respect of any Product, Construction Equipment, Temporary Work or other thing used for or in connection with or for incorporation in the Work and from and against all damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto, except where such infringement results from compliance with the design or specification provided by the Owner.

4.17 ROYALTIES

- .1 Except as otherwise provided in the Contract, the Contractor shall be liable for all tonnage and other royalties, rent and other payments or compensation, if any, for obtaining stone, sand, gravel, clay or other materials required for the Work.
- .2 The Contractor shall be liable for all payments or other compensation, if any, levied in relation to the dumping of all or part of any waste materials.

4.18 OTHER CONTRACTORS

- .1 The Contractor shall, in accordance with the requirements of the Owner, afford all reasonable opportunities for carrying out their work to:
 - .1 any Other Contractors of the Owner and their workers,
 - .2 the workers of the Owner, and
 - .3 the workers of any duly constituted authorities who may be employed in the execution on or near the Site of any work not included in the Contract or of any contract which the Owner may enter into in connection with or ancillary to the Work.
- .2 Pursuant to clause 4.18.1, and except as may be provided in the Contract, the Contractor shall, on the request of the Owner:
 - .1 make available to any person referred to in clause 4.18.1, any roads or ways for the maintenance of which the Contractor is responsible, or
 - .2 permit the use, by any such persons, of Temporary Work or Construction Equipment on the Site, or
 - .3 provide any other service for any such person, the Owner shall determine an addition to the Contract Price in accordance with clause 8.3.

4.19 PERMANENT WORK DESIGNED BY CONTRACTOR

- .1 Where the Contract provides that part of the Permanent Work shall be designed by the Contractor, he shall submit to the Owner, for review:
 - .1 such drawings, specifications, calculations and other information as is necessary for the Owner's review, and
 - .2 operation and maintenance manuals, as applicable, together with drawings of the Permanent Work as completed, in sufficient detail to enable the Owner to operate, maintain, dismantle, reassemble and adjust the Permanent Work incorporating that design, and such design and any alterations thereto shall be performed by a qualified design professional licensed to practice in Saskatchewan.
- .2 The Contractor shall not commence any work to which the information referred to in clause 4.19.1 relates unless such information has been reviewed by the Owner, and the Contractor shall not thereafter alter such design without the Owner's review.

4.20 RECORDS AND AUDIT

- .1 With respect to Cost Plus Work, the Contractor shall:

- .1 keep accurate records of estimated and actual costs, payments made and time spent;
 - .2 keep record copies of bids, quotations, contracts, correspondence, invoices, receipts and vouchers related thereto;
 - .3 make such records available for inspection and audit by the Owner for a period of at least 2 years after the date of Total Performance of the Work;
 - .4 provide the Owner with copies and extracts therefrom when requested by the Owner; and
 - .5 afford facilities for audit and inspection by the Owner at mutually agreeable times and places.
- .2 The Contractor shall cause Subcontractors and other persons directly or indirectly controlled by or affiliated with the Contractor and persons directly or indirectly having control of the Contractor to comply with clause 4.20.1 as if they were the Contractor.

4.21 RECORD OF LABOUR AND CONSTRUCTION EQUIPMENT

The Contractor shall, if required by the Owner, deliver to the Owner a record in detail, in such form and at such intervals as the Owner may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such information respecting Construction Equipment as the Owner may require.

4.22 CUSTOMS

- .1 With respect to the importation and re-export of Construction Equipment, Temporary Work, Products and other things required for the Work, the Contractor shall:
- .1 be liable for all applicable customs, import duties, taxes and brokerage fees, and
 - .2 be responsible for obtaining clearance through Customs. If requested by the Contractor, the Owner may assist in obtaining such clearance.

4.23 URGENT REMEDIAL WORK

- .1 If, due to any accident, or failure, or other event occurring to, in, or in connection with the Work, or any part thereof, either during the execution of the Work, or during the warranty period, any remedial or other work is, in the opinion of the Owner, urgently necessary for the safety of the Work, persons or property and the Contractor is unable or unwilling at once to do such work, the Owner may employ other persons or contract with other firms or corporations to carry out such work as the Owner may consider necessary.
- .2 If the work or repair done by the Owner pursuant to clause 4.23.1 is work which, in the opinion of the Owner, the Contractor was liable to do at his own cost under the Contract, then all costs consequent thereon or incidental thereto shall be determined by the Owner and shall be recoverable from the Contractor by the Owner.

5. QUALITY OF PRODUCTS AND WORK

5.1 PRODUCTS AND WORKMANSHIP

- .1 Products and workmanship shall be:

- .1 of the respective kinds described in the Contract, and
 - .2 subjected from time to time to such tests as the Owner may require at the place of manufacture, fabrication or preparation, or on the Site or at such other place or places as may be specified in the Contract, or at all or any of such places.
- .2 The Contractor shall:
 - .1 at his cost provide all things necessary for examining, measuring, and testing Products including labour, electricity, fuels, stores, apparatus and instruments, and
 - .2 supply samples of materials, before incorporation in the Work, for testing as may be selected and required by the Owner.

5.2 COST OF SAMPLES

All samples shall be supplied by the Contractor at his own cost if the supply thereof is provided for in the Contract.

5.3 COST OF TESTS PROVIDED FOR

- .1 The cost of making any test shall be borne by the Contractor if such test is:
- .2 specified in the Contract to be performed by the Contractor, or
- .3 in cases of a test under load or of a test to ascertain whether the design of any finished or partially finished work is appropriate for the purposes which it was intended to fulfill, specified in the Contract in sufficient detail to enable the Contractor to price or allow for the same in his Bid.

5.4 COST OF TESTS NOT PROVIDED FOR

- .1 If the Owner requires any test which is not provided for in the Contract and such test shows the Products or workmanship not to be in accordance with the Contract, then the cost of such test shall be borne by the Contractor, but in any other case clause 5.4.2 shall apply.
- .2 Where, pursuant to clause 5.4.1, this clause applies, the Owner shall determine:
 - .1 any extension of time to which the Contractor is entitled under clause 6.4, and
 - .2 the amount of any costs incurred by the Contractor, which shall be added to the Contract Price.

5.5 INSPECTION AND TESTING

- .1 The Owner shall at reasonable times have access to the Site and to all workshops and places where Products are being manufactured, fabricated or prepared for the Work and the Contractor shall afford every facility for, and every assistance in, obtaining the right to such access.
- .2 The Owner shall be entitled, during manufacture, fabrication or preparation to inspect and test the Products to be supplied under the Contract. If Products are being manufactured, fabricated or prepared in workshops or places other than those of the Contractor, the

Contractor shall obtain permission for the Owner to carry out such inspection and testing in those workshops or places. Such inspection or testing shall not release the Contractor from any obligation under the Contract.

5.6 DATES FOR INSPECTION AND TESTING

The Contractor shall agree with the Owner on the time and place for the inspection or testing of any Products as provided in the Contract. The Owner shall give the Contractor not less than 48 hours notice of his intention to carry out the inspection or to attend the tests. If the Owner does not attend on the date agreed, the Contractor may, unless otherwise instructed by the Owner, proceed with the tests. The Contractor shall forthwith forward to the Owner certified copies of the test results.

5.7 REJECTION

If, at the time and place agreed in accordance with clause 5.6, Products are not ready for inspection or testing or if, as a result of the inspection or testing referred to in clause 5.5, the Owner determines that the Products are defective or otherwise not in accordance with the Contract, he may reject the Products and shall notify the Contractor thereof immediately. The notice shall state the Owner's objections with reasons. The Contractor shall then promptly make good the defect or ensure that rejected Products comply with the Contract. If the Owner so requests, inspection and testing of rejected Products shall be made or repeated under the same terms and conditions.

5.8 COST FOR INSPECTION AND TESTING

All costs incurred by the Owner because of rescheduling, or undue delay of inspection and testing, and for which the Contractor is responsible, shall be determined by the Owner and shall be recoverable from the Contractor by the Owner.

5.9 INDEPENDENT INSPECTION

Inspection and testing of Products to be carried out by the Owner may be delegated to an independent agency. Any such delegation shall be effected in accordance with clause 1.3 and for this purpose such independent agency shall be considered as an assistant of the Owner.

5.10 EXAMINATION OF WORK BEFORE COVERING UP

The Contractor shall afford full opportunity for the Owner to examine and measure any part of the Work which is about to be covered up or put out of view and to examine exposed or excavated surfaces before any part of the Work is placed thereon. The Contractor shall give notice to the Owner whenever any such part of the Work or exposed or excavated surface is or are ready or about to be ready for examination and the Owner shall, without unreasonable delay, unless he considers it unnecessary and advises the Contractor accordingly, attend for the purpose of examining and measuring such part of the Work or of examining such surfaces.

5.11 UNCOVERING AND MAKING OPENINGS

The Contractor shall uncover any part of the Work or make openings in or through the same as the Owner may from time to time instruct and shall reinstate and make good such

part. If any such part has been covered up or put out of view after compliance with the requirement of clause 5.9 and is found to be executed in accordance with the Contract, the Owner shall determine the amount of the Contractor's costs in respect of such uncovering, making openings in or through, reinstating and making good, which shall be added to the Contract Price. In any other case all costs shall be borne by the Contractor.

5.12 REMOVAL OF IMPROPER WORK OR PRODUCTS

- .1 The Owner shall have authority to issue instructions for:
 - .1 the removal from the Site, within such time or times as may be specified in the instruction, of any Products which, in the opinion of the Owner, are not in accordance with the Contract,
 - .2 the substitution of proper and suitable Products, and
 - .3 the removal and proper re-execution, notwithstanding any previous test thereof or progress payment therefor, of any work which is not in accordance with the Contract.
- .2 In case of default by the Contractor in carrying out instructions pursuant to clause 5.12.1 within the time specified therein or, if none, within a reasonable time, the Owner may employ other persons or contract with other firms or corporations to carry out the same, and all costs consequent thereon or incidental thereto shall be determined by the Owner and shall be recoverable from the Contractor by the Owner.

6. COMMENCEMENT, COMPLETION, CONTRACT TIME AND DELAYS

6.1 COMMENCEMENT OF WORK

The Contractor shall commence the Work as soon as is reasonably possible in accordance with the instructions contained in the Letter of Acceptance and other provisions of the Contract. Thereafter, the Contractor shall proceed with the Work without delay.

6.2 POSSESSION OF AND ACCESS TO SITE

- .1 If the Contractor suffers delay or incurs costs from failure of the Owner to give possession of the Site or part thereof in accordance with the provisions of the Contract, the Owner shall determine:
 - .1 any extension of time to which the Contractor is entitled under clause 6.4, and
 - .2 the amount of such costs, which shall be added to the Contract Price.
- .2 The Contractor shall bear all costs and charges for special or temporary rights-of-way required by him in connection with the Work. The Contractor shall also provide at his own cost any additional facilities outside the Site required by him for the purposes of the Work.

6.3 CONTRACT TIME

- .1 The Contractor shall achieve Substantial Performance of the Work as a whole within the Contract Time.

- .2 When the Contractor is required to achieve Substantial Performance of part or parts of the Work prior to achieving Substantial Performance of the Work as a whole, the Contractor shall achieve Substantial Performance of such part or parts of the Work within the time or times specified and such time or times shall be considered to be the Contract Time or Times for such part or parts.

6.4 EXTENSION OF CONTRACT TIME

- .1 In the event of:
 - .1 a change in the Work made under clause 8.1, or
 - .2 any cause of delay referred to in the Contract, or
 - .3 abnormally adverse weather conditions, abnormal weather being defined as temperature, precipitation, humidity or wind that is outside of plus or minus one standard deviation from the mean, for the time period in question, determined pursuant to clause 4.5, or
 - .4 any delay, impediment or prevention by the Owner, or
 - .5 other special circumstances which may occur, other than through a default of or breach of Contract by the Contractor or for which he is responsible, being such as to affect an activity on the critical path of the Contractor's schedule, the Owner shall determine the extension of the Contract Time for the whole or part of the Work, to which the Contractor may be entitled.

6.5 CONTRACTOR TO PROVIDE NOTIFICATION AND DETAILS

- .1 The Owner shall not be bound to make any determination pursuant to clause 6.4 unless the Contractor has:
 - .1 within 7 days after such event has first arisen notified the Owner, and
 - .2 within 14 days, or such other reasonable time as may be agreed by the Owner after such notification, submitted to the Owner details of any extension of time to which he may consider himself entitled in order that such submission may be investigated at the time.

6.6 INTERIM DETERMINATION OF EXTENSION OF TIME

Where an event has a continuing effect such that it is not practicable for the Contractor to submit details within the period of 14 days referred to in clause 6.5.1.2, he may claim for an extension of time provided that he has submitted to the Owner interim details at intervals of not more than 14 days and final details within 14 days of the end of the effects resulting from the event. On receipt of such interim details, the Owner may make an interim determination of extension of time and, on receipt of the final details, the Owner shall review all the circumstances and may determine an overall extension of time in regard to the event. No final review shall result in a decrease of any extension of time already determined by the Owner. The Owner may determine an extension of the Contract Time notwithstanding that the Contract Time may have passed without being extended.

6.7 RATE OF PROGRESS

If for any reason, which does not entitle the Contractor to an extension of time, the rate of progress of the Work or any part is at any time, in the opinion of the Owner, too slow to

comply with the Contract Time, the Owner may notify the Contractor who shall immediately take such steps as are necessary, subject to the consent of the Owner, to expedite progress so as to comply with the Contract Time. The Contractor shall not be entitled to any additional payment for taking such steps. If any steps, taken by the Contractor in meeting his obligations under this clause, involve the Owner in additional costs, such costs shall be determined by the Owner and shall be recoverable from the Contractor by the Owner.

6.8 SUBSTANTIAL PERFORMANCE OF THE WORK

- .1 When the whole of the Work has been substantially performed and any pre-requisites to Substantial Performance of the Work prescribed by the Contract have been met, the Contractor may so submit to the Owner a Substantial Performance Certificate, accompanied by a written undertaking to finish without delay any outstanding work during the warranty period. Such notice and undertaking shall be deemed to be a request by the Contractor for the Owner to accept or reject the Substantial Performance Certificate.
- .2 The Owner shall, within 21 days after the date of receipt of the certificate referred to in clause 6.8.1, either issue to the Contractor, a letter, stating the date on which, in his opinion, the Work was substantially performed in accordance with the Contract, or give instructions in writing to the Contractor specifying all the work which, in the Owner's opinion, is required to be done by the Contractor before the acceptance of such certificate. The Owner shall also notify the Contractor of any defects in the Work affecting substantial performance that may appear after such instructions and before completion of the Work specified therein. The Contractor shall be entitled to receive such notification within 21 days after completion, to the satisfaction of the Owner, of the Work so specified and remedying all defects so notified. The Owner may specify the date for Total Performance of the Work in such notice.

6.9 SUBSTANTIAL PERFORMANCE OF PART OR PARTS OF WORK

- .1 In accordance with the procedure set out in clause 6.8, the Contractor may submit a Substantial Performance Certificate to the Owner in respect of any substantial part of the Permanent Work which has been substantially completed and which has been or will be occupied or used by the Owner or an Other Contractor prior to Substantial Performance of the Work as a whole, whether or not such prior occupation or use is provided for in the Contract.

6.10 TOTAL PERFORMANCE OF THE WORK

- .1 When the whole of the Work has been totally performed and any pre-requisites to Total Performance of the Work prescribed by the Contract have been met, the Contractor may so submit written notice to the Owner. Such notice shall be deemed to be a request by the Contractor for the Owner to issue a certificate of Total Performance of the Work.
- .2 The Owner shall, in accordance with the procedure set out in clause 6.8.2, either issue a certificate of Total Performance of the Work or give instructions.

6.11 WARRANTY PERFORMANCE OF THE WORK

The Work of the Contract shall only be considered as completed when a certificate of

Warranty Performance of the Work has been signed by the Owner and delivered to the Contractor, stating the date on which the Contractor has completed his obligations to execute and complete the Work and remedy any defects therein to the Owner's satisfaction. The certificate of Warranty Performance of the Work shall be given by the Owner within 28 days after the expiration of the warranty period, or, if different warranty periods are applicable to different parts of the Permanent Work, the expiration of the latest such period, or as soon thereafter as any Work instructed, pursuant to clause 7, has been completed to the satisfaction of the Owner.

6.12 ACCELERATION

- .1 If the Owner wishes to reduce the Contract Time for the Work or any part thereof, he shall issue to the Contractor a notice thereof and an instruction requiring the Contractor to submit to him within the period specified in the instruction:
 - .1 the Contractor's priced proposals for reducing the Contract Time, together with any consequential modifications to the construction schedule, or
 - .2 the Contractor's explanation why he is unable to reduce the Contract Time.
- .2 If the Owner accepts the Contractor's proposals submitted pursuant to clause 6.12.1.1, including amendments thereto agreed by both parties, the Owner shall issue instructions to the Contractor modifying the Contract accordingly. Such instructions shall include:
 - .1 the revised Contract Time or Times,
 - .2 the modifications to the construction schedule,
 - .3 the revised Contract Price, and
 - .4 any other relevant modifications to the Contract.
- .3 The Contractor may at any time submit to the Owner proposals to reduce the Contract Time for the Work or part thereof. The Owner shall consider such proposals and if he accepts them he shall take action as in clause 6.12.2.

6.13 DAMAGES FOR DELAY

- .1 Without prejudice to any other right the Owner may have with respect to damages, if the Contractor fails to achieve Substantial Performance of the Work or, if applicable, of part of the Work, within the Contract Time or Times, at discretion of the owner the Contractor shall pay to the Owner an amount equal to the sum of:
 - .1 **Five Hundred Dollars (\$500)** as liquidated damages and not as a penalty for each calendar day the Work is not substantially complete after the substantial date of completion. The said sum being a fair estimate of the actual damages the Owner will incur if the Work is not completed by the said Substantial Completion Date.
 - .2 **Five Hundred Dollars (\$500)** as liquidated damages and not as a penalty for each calendar day the Work remains uncompleted after the date of final completion. The said sum being a fair estimate of the actual damages the Owner will incur if the Work is not completed by the said Completion Date.
 - .3 All other costs and damages incurred or sustained by the Owner as a result of the Contractor's failure to achieve Substantial Performance of the Work or part thereof within the Contract Time or Times.

- .2 The Owner may, without prejudice to any other method of recovery, deduct the amount referred to in clause 6.13.1 from any monies due or to become due to the Contractor under the Contract. The payment or deduction of such amount shall not relieve the Contractor from his obligation to complete the Work or from any other of his contractual obligations.
- .3 For the purposes of this clause, "period of delay" means the period commencing on the date specified in the Contract for Substantial Performance of the Work or part thereof and ending on the day immediately preceding the date on which Substantial Performance of the Work or part thereof is actually achieved.

6.14 COVID-19 PANDEMIC RESPONSE AND MITIGATION

- .1 The Contractor and the Owner acknowledge the presence of the COVID-19 virus in Canada and other jurisdictions forming part of the supply chain for materials and labour required for the Project (the "COVID-19 Pandemic").
- .2 Known Impacts – The consequences and impacts of the COVID-19 Pandemic existing as of the date of this Contract include, without restriction:
 - .1 Orders, directives and recommendations of any government authority issued up to and including the date of this Contract, and respecting public health or other requirements related to response to and prevention of infection by the COVID-19 virus;
 - .2 impacts to availability of labour or materials required in order to carry out the Work, arising from the COVID-19 Pandemic;
 - .3 the impacts of the Province of Alberta withdrawing or deferring the advancement of any or all portions of their committed funding to the Project;
 - .4 the impacts of self-isolation/quarantine or regulated quarantine as ordered by the Province of Alberta;

(the "**Known Impacts**"), and are known to the Contractor and to the Owner, and have been accounted for by the Contractor within the construction schedule, as well as the Contract Price.
- .3 Notwithstanding anything contained within the Contract, the Contractor and the Owner covenant and agree as follows:
 - .1 no extension of the Contract Time or schedule shall be made and no adjustment to the Contract Price shall be made due to any Known Impacts.
 - .2 for greater clarity and without limiting the generality of clause 6.14.3.1,
 - .1 the Contractor shall not be entitled to any reimbursement of any costs and expenses incurred by the Contractor necessitated by a suspension or delay under clause 12 where the suspension is due to any Known Impacts;
 - .2 notwithstanding anything contained within clause 12, a suspension of the Work because of any Known Impacts whether ordered by the Owner or

- the Owner's Representative or not, shall not be deemed to be a suspension of the Work within the meaning of clause 12;
- .3 notwithstanding anything contained within clause 6, no extension of the Contract Time shall be made and no adjustment in the Contract Price shall be made for any delay caused by a compliance with any order, directive or recommendation of any government authority related to the COVID-19 Pandemic, and/or caused by any other Known Impacts, whether ordered by the Owner or the Owner's Representative or not;
 - .4 notwithstanding anything contained within clause 6, no extension of Contract Time shall be made and no adjustment in the Contract Price shall be made for any delay Claim that is based on the concept of the cumulative impact of any Known Impacts;
 - .5 no extension of the Contract Time shall be made and no adjustment to the Contract Price shall be made due to any requirement that an employee of the Contractor or any Subcontractor self-isolate or quarantine as a result of a diagnosis or potential diagnosis as being COVID-19 positive;
- .3 Any Claims for adjustment in the Contract Price arising from or related to the COVID-19 Pandemic shall be net of any and all compensation schemes, support programs or other financial aids made available to the Contractor by any government authority.

7. WARRANTY

7.1 WARRANTY PERIOD

- .1 In the Contract the term "warranty period" shall mean a period of one (1) year, or such longer period as may be provided elsewhere in the Contract, calculated from:
- .1 the date of Substantial Performance of the Work, certified by the Owner in accordance with clause 6.8, or
 - .2 in the event of more than one certificate having been issued by the Owner under clause 6.9, the respective dates so certified, or
 - .3 in the case of outstanding work to be completed after the date or dates of Substantial Performance referred to in clauses 7.1.1.1 and 7.1.1.2, the date upon which such work is certified as complete by the Owner, and in relation to the warranty period the term "the Work" shall be construed accordingly.

7.2 COMPLETION OF OUTSTANDING WORK

The Contractor shall complete work outstanding at the date of Substantial Performance of the Work within the time specified by the Owner in the certificate of Substantial Performance of the Work.

7.3 REMEDYING DEFECTS

- .1 The Contractor shall, during or as soon as practicable after the expiration of the warranty period, remedy any defects in the Work and execute any work of modification or reconstruction related thereto, as the Owner may, during the warranty period or within 14 days after its expiration instruct the Contractor to do.

- .2 Work referred to in clause 7.3.1 shall be executed by the Contractor at his own cost if the necessity thereof is, in the opinion of the Owner, due to:
- .1 defects in Products or workmanship, or defects in design for which the Contractor is responsible,
 - .2 the neglect or failure on the part of the Contractor to comply with any obligation, expressed or implied, on the Contractor's part under the Contract. If, in the opinion of the Owner, such necessity is due to any other cause, he may determine an addition to the Contract Price in accordance with clause 8.

7.4 CONTRACTOR'S FAILURE TO CARRY OUT INSTRUCTIONS

If the Contractor defaults in carrying out instructions issued pursuant to clause 7.2 or 7.3, the Owner may employ other persons or contract with other firms or corporations to carry out the same. If such work is work, which, in the opinion of the Owner, the Contractor was liable to do at his own cost, then all costs consequent thereon or incidental thereto shall be determined by the Owner and shall be recoverable from the Contractor by the Owner.

7.5 CONTRACTOR TO SEARCH

If any defect in the Work appears at any time prior to the end of the warranty period, the Owner may instruct the Contractor to search for the cause thereof. If such defect is one for which the Contractor is liable, the cost of the work carried out in searching shall be borne by the Contractor and he shall in such case remedy such defect at his own cost in accordance with the provisions of clauses 7.3 and 7.4. If such defect is one for which the Contractor is not liable under the Contract, the Owner shall determine the amount of the costs of such search incurred by the Contractor, which shall be added to the Contract Price.

8. CHANGES AND VARIATIONS

8.1 CHANGES IN THE WORK

- .1 Consistent with the Work, the Owner may make changes in the Work or any part thereof, and he shall have the right to instruct the Contractor to make such changes and the Contractor shall make such changes, which may include:
- .1 increasing or decreasing the quantity of any work included in the Contract,
 - .2 omitting any work, but not if the omitted work is to be carried out by the Owner or by an Other Contractor except by reason of the Contractor's default or negligence,
 - .3 changing the character or quality or kind of any work,
 - .4 changing the levels, lines, position and dimensions of any part of the Work,
 - .5 executing additional work of any kind necessary for the completion of the Work,
 - .6 changing any specified sequence or timing of construction of any part of the Work.
- .2 No such change shall invalidate the Contract, but the effect, if any, of such changes on the Contract Price shall be valued in accordance with clause 8.3 and any extension of the Contract Time shall be determined in accordance with clause 6.4. Where an instruction to change the Work is necessitated by default or negligence of the Contractor or for which he is responsible, any cost and time attributable to such default or negligence shall

be borne by the Contractor.

8.2 INSTRUCTIONS FOR CHANGES IN THE WORK

- .1 The Contractor shall not make any changes in the Work without a written instruction from the Owner.
- .2 No instruction shall be required for:
 - .1 an increase or decrease in the quantity of any work where such increase or decrease is not the result of an instruction given under this clause, but is the result of quantities exceeding or being less than those stated in the Schedule of Prices, and
 - .2 a change or adjustment in lines, levels, grades or elevations when such change or adjustment is already provided for in the Contract.

8.3 VALUATION OF CHANGES IN THE WORK

- .1 Changes referred to in clause 8.1 and any changes to the Contract Price which are required to be determined in accordance with this clause (for the purposes of this clause referred to as "changed work"), shall be valued, at the Owner's option:
 - .1 at the rates and prices set out in the Contract if, in the opinion of the Owner, these are applicable, or
 - .2 if the rates and prices set out in the Contract are not applicable to the changed work, at rates and prices deduced or extrapolated from such rates and prices, or
 - .3 by acceptance by the Owner of rates and prices submitted by the Contractor or other rates and prices as may be agreed by negotiation, or
 - .4 by acceptance by the Owner of a lump sum quotation submitted by the Contractor or other lump sum as may be agreed by negotiation, or
 - .5 as Cost Plus Work in accordance with the provisions of Section 00565 - Payment Conditions.
- .2 If there is disagreement on the value of changed work, the Owner shall fix such rates or prices as are, in his opinion, appropriate and shall notify the Contractor accordingly. Until such time as rates or prices are agreed or fixed, the Owner shall determine provisional rates or prices to enable on-account payments to be made in accordance with the payment conditions of the Contract.

8.4 IMPACT OF CHANGES IN THE WORK

- .1 If in the opinion of the Owner or the Contractor the nature or amount of any changed work relative to the nature or amount of the whole of the Work or to any part thereof, is such that the rate or price contained in the Contract for any item of the Work is, by reason of such changed work, rendered inappropriate or inapplicable, then, after due consultation by the Owner with the Contractor, a suitable rate or price may be agreed upon between the Owner and the Contractor.
- .2 If there is disagreement on the rates or prices referred to in clause 8.4.1 the Owner shall fix such rate or price as is, in his opinion, appropriate and shall notify the Contractor. Until such time as rates or prices are agreed or fixed, the Owner shall determine provisional rates or prices to enable on-account payments to be made in accordance with the payment conditions of the Contract.

8.5 QUANTITY VARIATIONS

- .1 The quantities set out in the Schedule of Prices are approximate only and no claim shall be made by the Contractor against the Owner on account of any excess or deficiencies absolute or relative, in the same.
- .2 The price or prices provided in the Contract whether stipulated sum or unit price or both shall be accepted by the Contractor, as full compensation for everything furnished and done by the Contractor under the Contract, including all Work required but not included in the items herein mentioned, and also for all loss or damages arising out of the nature of the Work or the action of the weather, elements, or any unforeseen obstruction or difficulty encountered in the prosecution of the work, and for all risks of every description connected with the Work, and for all expenses incurred by or in the consequence of any delay or suspension or discontinuance of the work as herein specified, and for well and faithfully completing the Work as provided in the Contract.

9. CHANGES IN COST AND REGULATORY REQUIREMENTS

9.1 INCREASE OR DECREASE IN COST

Subject to clause 9.2, the Contract Price shall not be subject to any adjustment in respect of rise or fall in the cost of labour, Products or any other matters affecting the cost of execution of the Contract.

9.2 CHANGES IN REGULATORY REQUIREMENTS

- .1 If, after the latest date for submission of Bids for the Contract, there is a change to any Regulatory Requirement, or a new Regulatory Requirement is introduced, which causes additional or reduced cost to the Contractor in the execution of the Contract, such additional or reduced cost shall be determined by the Owner and shall be added to or deducted from the Contract Price.
- .2 When a Regulatory Requirement is changed or introduced during the period of time referred to in clause 9.2.1 but public notice thereof has been given by the applicable authority before the commencement of such period of time, the change or introduction shall be deemed to have occurred before the commencement of such period of time.

10. CLAIMS

10.1 NOTICE OF CLAIMS

- .1 If the Contractor intends to claim any additional payment he shall give notice of his intention to the Owner within 7 days after the event giving rise to the claim has first arisen.
- .2 Upon the occurrence of the event referred to in clause 10.1.1 the Contractor shall take all reasonable measures required to mitigate any loss or damage, which may be incurred as a result of such event.

10.2 CONTEMPORARY RECORDS

Upon the occurrence of the event referred to in clause 10.1, the Contractor shall keep such contemporary records as may reasonably be necessary to support any claim he may subsequently wish to make, including records of time and cost relating to labour, products, construction equipment and other resources used in the work. The Contractor shall permit the Owner to inspect all records kept pursuant to this clause and shall supply him with copies thereof as and when the Owner so instructs.

10.3 SUBSTANTIATION OF CLAIMS

Within 14 days, or such other reasonable time as may be agreed by the Owner, of giving notice under clause 10.1, the Contractor shall send to the Owner an account giving detailed particulars of the amount claimed and the grounds upon which the claim is based. Where the event giving rise to the claim has a continuing effect, such account shall be considered to be an interim account and the Contractor shall, at such intervals as the Owner may reasonably require, send further interim accounts giving the accumulated amount of the claim and any further grounds upon which it is based. In cases where interim accounts are sent to the Owner, the Contractor shall send a final account within 14 days after the end of the effects resulting from the event.

10.4 PAYMENT OF CLAIMS

The Contractor shall be entitled to have included in any progress payment such amount in respect of any claims as the Owner may consider due to the Contractor. If information is insufficient to substantiate the whole of the claim, the Contractor shall be entitled to payment in respect of such part of the claim as such information may substantiate to the satisfaction of the Owner.

10.5 OBLIGATIONS TO AND CLAIMS OF THIRD PARTIES

- .1 The Contractor shall, with respect to lawful obligations of and lawful claims against the Contractor or any Subcontractor arising from the Contract:
 - .1 discharge such obligations of and satisfy such claims against the Contractor, and
 - .2 ensure the discharge of such obligations of and the satisfaction of such claims against Subcontractors.
- .2 The Contractor shall, when requested by the Owner, make a statutory declaration deposing to the existence and condition of any obligations and claims referred to in Clause 10.5.1.
- .3 If a third party sends written notice to the Owner of an undischarged obligation or unsatisfied claim referred to in Clause 10.5.1, the Owner may, 30 days after giving written notice to the Contractor, and surety where applicable:
 - .1 pay any amount that is due and payable to the Contractor pursuant to the Contract directly to the obligees of and the claimants against the Contractor or the Subcontractor, and
 - .2 where security for payment of claims has been provided in the form of a security deposit, the Owner may deduct such amount from the security deposit, or
 - .3 where a security deposit has not been provided or insufficient monies are available in the security deposit, the Owner may deduct such amount, or portion

thereof, from the amount payable to the Contractor under the Contract.

- .4 Clause 10.5.3 shall apply only when written notice of the obligation or claim is sent to Owner as set out in the Builders Lien Act.

10.6 CLAIMS AGAINST OWNER ONLY

Any claims, demands or actions by the Contractor, arising out of alleged errors, omissions or misrepresentations in the Contract Documents or arising out of acts or omissions of the Owner's Representative or his assistants during the execution of the Work, shall be made only to or against the Owner. The Contractor waives any right to commence or carry on such claims, demands or actions against any person or party other than the Owner.

11. RELEASE FROM PERFORMANCE

11.1 FRUSTRATION

If any circumstance outside the control of both the Owner and the Contractor arises after the award of the Contract which renders it impossible or unlawful for either party to fulfill his contractual obligations, then the Owner or the Contractor may terminate the Contract by giving notice to the other party and, upon such notice, the Contract shall, except as to the rights of the parties under this clause and to the operation of clause 15, terminate, but without prejudice to the rights of either party in respect of any antecedent breach thereof.

11.2 REMOVAL OF CONSTRUCTION EQUIPMENT ON TERMINATION

If the Contract is terminated pursuant to clause 11.1, the Contractor shall remove from the Site all Construction Equipment.

11.3 PAYMENT IF CONTRACT TERMINATED

- .1 If the Contract is terminated pursuant to clause 11.1, the Contractor shall be paid by the Owner, insofar as such amounts or items have not already been covered by payments on account made to the Contractor, for all Work executed prior to the date of termination at the rates and prices provided in the Contract and in addition:
- .1 the cost of Products reasonably ordered for the Work which have been delivered in acceptable condition to the Contractor or of which the Contractor is liable to accept delivery, such Products becoming the property of the Owner upon such payments being made by him,
 - .2 the amount of any expenditure reasonably incurred by the Contractor in the expectation of completing the whole of the Work insofar as such expenditure has not been covered by any other payments referred to in this clause,
 - .3 such proportion of the cost as may be reasonable, taking into account payments made or to be made for work executed, for removal of Construction Equipment under clause 11.2. provided that against any payment due from the Owner under this clause, the Owner shall be credited with any amounts which, at the date of termination, were recoverable by the Owner from the Contractor.

- .2 Any amount payable under this clause shall be determined by the Owner.

12. SUSPENSION AND TERMINATION BY OWNER

12.1 SUSPENSION OF WORK

- .1 The Contractor shall, on the instructions of the Owner, suspend the progress of the Work or any part thereof for such time and in such manner as the Owner may consider necessary and shall, during such suspension, properly protect and secure the Work or such part thereof so far as is necessary in the opinion of the Owner. Clause 12.2 shall apply unless such suspension is:
- .1 otherwise provided for in the Contract, or
 - .2 necessary by reason of some default of or breach of contract by the Contractor or for which he is responsible, or
 - .3 necessary by reason of normal weather conditions on the Site, or
 - .4 necessary for the proper execution of the Work or for the safety of the Work or any part thereof, except to the extent that such necessity arises from any act or default by the Owner, in which case such suspension shall be at the Contractor's expense.

12.2 OWNER'S DETERMINATION FOLLOWING SUSPENSION

- .1 Where, pursuant to clause 12.1, this clause applies the Owner shall determine:
- .1 any extension of time to which the Contractor is entitled under clause 6.4, and
 - .2 the amount, which shall be added to the Contract Price, in respect of the cost incurred by the Contractor by reason of such suspension.

12.3 SUSPENSION LASTING MORE THAN 91 DAYS

If the progress of the Work or any part thereof is suspended on the written instructions of the Owner and if permission to resume work is not given by the Owner within a period of 91 days after the date of suspension then, unless such suspension is the Contractor's responsibility pursuant to clauses 12.1.1.1 to 12.1.1.4, the Contractor may give notice to the Owner requesting permission, within 28 days from the receipt thereof, to proceed with the Work or that part thereof in regard to which progress is suspended. If, within such time, such permission is not granted, the Contractor may elect to treat the suspension, where it affects only part of the Work, as an omission of such part under clause 8.1 by giving a further notice to the Owner to that effect, or, where it affects the whole of the Work, treat the suspension as an event of default by the Owner and terminate the Contract in accordance with the provisions of clause 14, in which case the provisions of clauses 14.2 and 14.3 shall apply.

12.4 TERMINATION OF CONTRACT

- .1 The Owner may terminate the Contract at any time by giving a notice of termination to the Contractor. When such a notice is received by the Contractor he shall, subject to the provisions of such notice, forthwith cease all operations in performance of the Contract.
- .2 If the Owner terminates the Contract pursuant to clause 12.4.1 the Owner shall be under the same obligations to the Contractor in regard to payment as if the Contract had been

terminated under the provisions of clause 14.

13. DEFAULT OF CONTRACTOR

13.1 DEFAULT

- .1 If the Contractor:
 - .1 is deemed by law unable to pay his debts as they fall due, or becomes insolvent, or
 - .2 enters into voluntary or involuntary bankruptcy, liquidation or dissolution (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), or
 - .3 if any act is done or event occurs with respect to the Contractor or his assets which, under any applicable law, has a similar effect to any of the foregoing, or if he
 - .4 has contravened clause 2.1, or
 - .5 has repudiated the Contract, then the Owner may, upon written notice, enter upon the Site and the Work and immediately terminate the Contractor's right to continue with the Work.
- .2 If the Owner determines, that, in his opinion, the Contractor without reasonable excuse:
 - .1 has failed to commence and proceed with the Work or any part thereof in accordance the provisions of the Contract, or
 - .2 has failed to comply with a notice issued pursuant to clause 6.7 or an instruction issued pursuant to clause 6.12 within 14 days after receiving it, or
 - .3 despite previous warning from the Owner, in writing, is otherwise persistently or flagrantly neglecting to comply with any of his obligations under the Contract, or
 - .4 has contravened clause 2.2, or
 - .5 has failed to attain Substantial Performance of the Work or part or parts of the Work within the Contract Time or Times pursuant to clause 6.3, then the Owner may, after giving 14 days notice to the Contractor, and unless the Contractor has within such period remedied the default, enter upon the Site and the Work and terminate the Contractor's right to continue with the Work in whole or in part.
- .3 If the Owner terminates the Contractor's right to continue with the Work, in whole or in part, pursuant to clause 13.1.1 or clause 13.1.2, such termination shall not release the Contractor from any of his obligations or liabilities under the Contract, and shall not affect the rights and authorities conferred on the Owner by the Contract, and the Owner may complete the Work or part thereof, or may contract with any Other Contractor to complete the Work or part thereof. The Owner or such Other Contractor may use for such completion so much of the Construction Equipment, Temporary Work and Products as he or they may think proper.

13.2 VALUATION AT DATE OF TERMINATION

- .1 The Owner shall, as soon as practicable after any entry and termination by the Owner pursuant to clause 13.1, determine:
 - .1 what amount (if any) had, at the time of such entry and termination, been

- reasonably earned by or would reasonably accrue to the Contractor in respect of work then actually done by him under the Contract, and
- .2 the value of any unused or partially used Products, any Construction Equipment and any Temporary Work.

13.3 PAYMENT AFTER TERMINATION

If the Owner terminates the Contractor's right to continue with the Work in whole or in part under clause 13.1, he shall not be liable to pay to the Contractor any further amount in respect of the Contract until the expiration of the warranty period and thereafter until the costs of execution, completion and remedying of any defects, damages for delay in completion (if any) and all other expenses incurred by the Owner have been determined. The Contractor shall then be entitled to receive only such sum (if any) as the Owner may determine would have been payable to him upon due completion by him after deducting the said amount. If such amount exceeds the sum which would have been payable to the Contractor on due completion by him, then the Contractor shall, upon demand, pay to the Owner the amount of such excess and it shall be deemed a debt due by the Contractor to the Owner and shall be recoverable accordingly.

13.4 ASSIGNMENT OF BENEFIT OF AGREEMENT

The Contractor shall, if so instructed by the Owner within 14 days of the entry and termination referred to in clause 13.1, assign to the Owner the benefit of any agreement for the supply of any goods or materials or services and/or for the execution of any work for the purposes of the Contract, which the Contractor may have entered into.

14. DEFAULT OF OWNER

14.1 FAILURE OF OWNER TO PAY

If the Owner fails to pay to the Contractor any amount due under the Contract within 28 days after the expiry of the time stated in the Payment Conditions within which payment is to be made, the Contractor may terminate the Contract by giving notice to the Owner. Such termination shall take effect 14 days after the giving of such notice unless payment is received within such period.

14.2 REMOVAL OF CONSTRUCTION EQUIPMENT

Upon the termination of the Contract referred to in clause 14.1, the Contractor shall remove promptly from the Site all Construction Equipment.

14.3 PAYMENT ON TERMINATION

In the event of termination pursuant to clause 14.1 the Owner shall be under the same obligations to the Contractor in regard to payment as if the Contract had been terminated under the provisions of clause 11, but, in addition to the payments specified in clause 11.3, the Owner shall pay to the Contractor the amount of any loss or damage, including reasonable profit, to the Contractor directly arising out of or in connection with or by consequence of such termination.

14.4 CONTRACTOR MAY SUSPEND WORK

- .1 As an alternative to termination under clause 14.1 but without prejudice to the Contractor's entitlement to terminate under clause 14.1, the Contractor may, after giving 14 days' prior notice to the Owner, suspend work or reduce the rate of work.
- .2 If the Contractor suspends or reduces the rate of work pursuant to clause 14.4.1 and thereby suffers delay or incurs cost the Owner shall determine:
 - .1 any extension of time to which the Contractor is entitled under clause 6.4, and
 - .2 the amount of such costs, which shall be added to the Contract Price.

14.5 RESUMPTION OF WORK

When the Contractor suspends work or reduces the rate of work pursuant to clause 14.4.1 and the Owner subsequently pays the amount due, the Contractor's entitlement under clause 14.1 shall, if notice of termination has not been given, lapse and the Contractor shall resume normal working as soon as is reasonably possible.

15. SETTLEMENT OF DISPUTES

15.1 DISPUTES

- .1 If a dispute of any kind arises between the Owner and the Contractor in connection with, or arising out of, the Contract or the execution of the Work, whether during the execution of the Work or after its completion and whether before or after repudiation or other termination of the Contract, including any dispute as to any opinion, instruction, determination, certificate or valuation of the Owner, the matter in dispute shall be settled in accordance with the provisions of this clause 15.
- .2 Unless the Contract has already been repudiated or terminated, the Contractor shall, during the course of any dispute settlement, and without prejudice to any claim the Contractor may have:
 - .1 proceed with the Work without delay, and
 - .2 comply with any instructions issued by the Owner with respect thereto, unless and until such instructions are revised, as hereinafter provided, in a negotiated settlement or an arbitral or judicial award.

15.2 NOTICE OF DISPUTE

A dispute shall be deemed to arise when the Owner or the Contractor serves on the other party a written notice of dispute stating the nature of the dispute. No notice of dispute shall be served by either party unless all other applicable provisions of the Contract have been invoked.

15.3 NEGOTIATED SETTLEMENT

- .1 The Owner and the Contractor shall make bona fide efforts to settle any dispute arising between them by negotiations, in accordance with this clause 15.3, and provide timely disclosure of all relevant facts, information and documents to such negotiations.

- .2 Within 14 days after the serving of a notice of dispute by one party on the other pursuant to clause 15.2, the parties shall commence negotiations for the purposes of settling the dispute. Such settlement process may include, if both parties agree, the use of mediation.
- .3 If, after 28 days, or such longer period as the parties and the mediator, if any, may agree, after the commencement of negotiations pursuant to clause 15.3.2, the parties have not settled the dispute, it shall be referred to arbitration, unless the parties mutually agree otherwise.

15.4 MEDIATION

If, in their efforts to reach a negotiated settlement, the parties agree to use mediation pursuant to clause 15.3.2, such mediation shall be conducted by a single mediator acceptable to both parties and under terms-of-reference established by both parties and the mediator. The parties shall share equally the cost of mediation.

15.5 ARBITRATION

- .1 A reference to arbitration pursuant to clause 15.3.3 shall be effected by either party serving on the other party a notice to refer the dispute to arbitration and such dispute shall be referred to a single arbitrator agreed for that purpose or, in default of agreement within a reasonable time, appointed at the request of the Owner or the Contractor by the Saskatchewan Arbitration and Mediation Society.
- .2 A reference to arbitration under this clause shall be a reference to which the Arbitration Act (Saskatchewan) applies and any award pursuant thereto shall bind the parties, except as otherwise provided by the Act.

END OF SECTION

1. SUPPLEMENTARY CONDITIONS

- .1 These Supplementary Conditions provide information relative to specific items not covered in other sections.

2. WATER SECURITY AGENCY / INAC

- .1 The Owners have made application for the proposed work under the Environmental Management and Protection Act. No work shall commence on the project until the *Permit for Construction of Waterworks or Sewage Works* has been obtained by the Owner.

3. UTILITIES

- .1 The Owners have made crossing agreement applications for the proposed work. No work shall commence on the project until all applicable crossing agreements have been obtained by the Owner.

4. WARRANTY

- .1 The Warranty Period for all work is One (1) Year, except for roads, lanes, sidewalks, valve and manhole adjustments, for which the Warranty Period is Two (2) Years.
- .2 Thirty to sixty days prior to the end of the Warranty Period the Contractor shall apply to the Owner for acceptance of the Warranty Performance of the Work. The Owner will review the work and advise the Contractor of any defects that require remedy under the Contract. The Owner will issue a certificate of Warranty Performance of the Work, after all defects have been remedied.
- .3 No extra payment will be made for these required maintenance items.

5. CONSTRUCTION PROGRAM

- .1 Review construction program shall be subject at all times to review by the Engineer. The capacity of the Contractor's construction plant, sequence of operations, and methods of operation shall be such as to ensure the completion of the Work within the period of time specified.
- .2 Within seven (7) calendar days after execution of the Contract, furnish the Engineer with his proposed program of Operations.
- .3 Advise the Engineer of any proposed changes in his construction program. If, in the opinion of the Engineer, any construction program submitted is inadequate to secure the completion of the work within the specified period of time, or is not otherwise in accordance with the Contract Documents, or if the work is not being adequately or properly executed in any respect, the Engineer shall have the right to require the Contractor to submit a new construction program, providing the proper and timely completion of the work. No claim for additional compensation on account of such requirement.

- .4 No claim for additional compensation on account of such requirement.

6. INCIDENTAL ITEMS

- .1 The following items are incidental to the contract and no separate payment will be made for this work:
- .1 Contractor shall be responsible for all Road Restoration in all areas which have been damaged or disturbed by the Work.
 - .2 Contractor shall be responsible for all Site Restoration in all areas which have been damaged or disturbed by the Work.
 - .3 Locating, protecting, and reconnecting where necessary all existing utilities (underground and overhead) and service connections, existing trees, fences, buildings, etc.
 - .4 Road/lane closure and traffic control, providing access to existing residences, businesses or facilities as required or to provide nearby alternate parking.
 - .5 Clearing and grubbing.
 - .6 Proof rolling.
 - .7 Dust control.
 - .8 Thrust Blocking.
 - .9 Care of Water.
 - .10 Removal and replacement of fencing, necessary to complete the work.
 - .11 Removal and replacement of signs, necessary to complete the work.
 - .12 Pruning of tree limbs and roots to ensure the survival of trees and to facilitate the work to be performed within the project area.
 - .13 Observance of local noise bylaws.
 - .14 Dewatering.
 - .15 Installation and removal of cofferdams.
 - .16 Sewage Bypass Pumping.
 - .17 Building Permit
 - .18 Working in proximity to and crossing of utilities including Alberta One-Call notification, third party locations and hydrovacing / hand exposure as required.

- .19 Public Notification program.
- .20 Coordination of solid waste (garbage) collection with residents and the Public Works Department.
- .21 Observance of local noise bylaws.
- .22 Coordination of connection with utilities.
- .23 Buried Pipeline Crossing
- .24 Sequencing of Construction
- .25 All Submittals

7. DISPOSAL OF WASTE MATERIAL

- .1 Unless otherwise indicated in these documents, salvaged materials which are re-useable will be the property of the Owner. The Contractor shall obtain authorization prior to removing any materials from the project site and shall obtain written verification from the Owner as to what removed materials are to be salvaged and what removed materials are to be disposed as waste. The Contractor will be responsible for transporting salvaged materials to the Owner's Public Works Yard. There will be no separate payment for salvaging or transferring to storage of these items.
- .2 Unless indicated otherwise, non-salvageable materials will be excavated, transported and disposed of at the nearest sanitary landfill site. Burning or burying of non-salvageable materials will not be allowed under any circumstances.
- .3 The Contractor is to use the services of a waste management company approved by the Owner for the disposal of non-salvageable materials.
- .4 When practical, minimize the amount of waste generated from construction operations and demolitions by salvaging materials for recycling. Salvage and segregate metal, plastic, paper, cardboard, and glass and transfer them to the nearest appropriate collection facility identified by the Owner.
- .5 There will be no separate payment for Disposal of Waste Materials. The cost of Disposal of Waste Materials including the cost of materials, labour, equipment supply, excavation, handling, hauling, and disposal, shall be included in the prices bid in the Tender Form.

8. EXISTING LANDSCAPE

- .1 Minimize damage to trees, plants and shrubs during the course of construction.

- .2 Attend to damaged trees, plants, or shrubs by qualified personnel.

9. EXISTING UTILITIES

- .1 There may be existing utilities (gas, telephone, power, storm sewer, sanitary sewer, water mains, etc.) in the location of the contract work. Due care and attention is required in safeguarding these utilities.
- .2 Locate all buried utilities which will be affected by construction. Exposing and crossing of the utility lines to be in accordance with the requirements of the utility Owner.
- .3 At no time interfere with the operations of the Wastewater Lagoon.
- .4 Contractor to notify the Owner at least 48 hours in advance, prior to any interruption to, or operation required of, utilities.
- .5 No separate payment will be made for this work, unless specifically noted otherwise within the Contract Documents.

10. TELEPHONE AND GAS

- .1 The Contractor is responsible for the cost of crossing any gas lines, telephone cable or fibre optic line.
- .2 Servicing costs for the new gas supply for the wastewater treatment plant will be paid for by the Owner.
- .3 Servicing costs for the new electrical supply for the wastewater treatment plant will be paid for by the Owner.

11. OPERATION OF EXISTING WATER MAIN VALVES AND HYDRANTS

- .1 Do not operate any existing water main valves and hydrants.
- .2 Town of Assiniboia personnel shall operate all valves and hydrants only, unless specifically authorised otherwise.
- .3 Contractor to notify Town of Assiniboia at least 48 hours in advance of any required interruption to or operation of utilities.
- .4 Advise the proper authorities including the Fire Department of hydrants which will be out of service so that alternate fire protection can be provided for.
- .5 No separate payment will be made for this work.

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12. MAINTAINING EXISTING TRAFFIC AND DETOURS

- .1 Portions of the work may be located within existing urban streets. These streets are used on a daily basis to serve residential and local businesses within the area.
- .2 Supply, install and maintain all necessary detour signs and barricades for the project including signs directing customers to specific local businesses as required.
- .3 Notify the proper authorities of any detours and/or road closures prior to implementing the detour or closure.
- .4 Detour traffic around any construction whenever possible. If detours are not possible, submit a road closure plan to the Engineer for review and comment. Road closures must be approved at least 48 hours in advance so that the appropriate arrangements could be made for detours.
- .5 Maintain all temporary road surfaces to ensure public safety.
- .6 Replace all permanent signs removed during construction.
- .7 The Owner will not provide any traffic accommodation, detour or construction zone signage, barricade, flasher or such items.
- .8 No separate payment will be made for this work.

13. PRIME COST ALLOWANCE

- .1 Control Panels Software and Hardware Supply
 - .1 This allowance is for the supply of control panels, PLCs, RIOS, HMIs, and panel drawings. This work will be performed and administered by MPE Engineering Ltd. Invoices for the work will be issued to the Contractor for payment. Contractor will not mark-up invoices.
- .2 Control System Setup and Programming Prime Cost Allowance
 - .1 This allowance is for Control System Setup and Programming of PLC and HMI. This work will be performed and administered by MPE Engineering Ltd. Invoices for the work will be issued to the Contractor for payment. Contractor will not mark-up invoices.
- .3 Arc Flash and Coordination Study Prime Cost Allowance
 - .1 This prime cost allowance is for performing both an Arc Flash Study and Coordination Study on the electrical distribution equipment to be installed at this site. This work will be performed and administered by MPE Engineering Ltd. Invoices for the work will be issued to the Contractor for payment. Contractor will not mark-up invoices.

.4 **Commissioning Prime Cost Allowance**

- .1 This allowance is for Commissioning. This work will be performed and administered by MPE Engineering Ltd. Invoices for the work will be issued to the Contractor for payment. Contractor will not mark-up invoices.

14. SITE CONDITIONS

- .1 A Geotechnical report for the site has been included in the Contract Documents and is attached at the end of this document as Appendix A. The Engineer offers no interpretation of the information provided. It is the responsibility of the Contractor to determine how the construction will proceed and to provide all necessary equipment and labour for such construction. Any unforeseen delays or costs as a result of the underground or aboveground site conditions are the responsibility of the Contractor. Should the Contractor deem it necessary to consult qualified geotechnical personnel or to have such personnel on site during the execution of this Contract, it is the Contractor's responsibility to coordinate and pay for these services.

15. PIPE, FITTING, AND EQUIPMENT SUPPORTS

- .1 Pipe, duct, conduit, and equipment supports may not all be necessarily shown on the Contract Drawings. The Contractor is responsible to ensure sufficient supports are supplied, fabricated, and installed to properly secure all pipe, fittings, and equipment to satisfy piping and equipment manufacturer's recommendations. No separate payment will be made for this work.

16. RELOCATION OR CONNECTION TO UTILITIES

- .1 The Contractor shall arrange for and coordinate the installation of all utility servicing to the project facilities.
- .2 Arrange for and coordinate any required relocation of utilities required by project construction.
- .3 Direct costs from the utility company for service connections or relocations will be paid by the Owner.
- .4 Any usage or consumption of utilities to the project site during construction will be the responsibility of the Contractor and will not be paid for by the Owner.

17. SCHEDULING OF WORK

- .1 Contractor to provide Engineer with schedule of work for review. Provide updates to schedule of work as required.

- .2 Contractor shall coordinate work with the Owner.
- .3 No separate payment will be made for this work.

18. CLEARING AND GRUBBING

- .1 Clearing and grubbing will take place only within the Construction Easement.
- .2 Clearing and grubbing does not imply complete removal of all trees and vegetation within the Construction Easement. It is the intent of this project to maintain as much of the trees and vegetation as possible and to remove only what is required to complete the Work.
- .3 Coordinate and cooperate with the Owner in identifying what trees and vegetation are to be removed and what are to be maintained.

19. COORDINATION OF WORK WITH OTHERS

- .1 The Contractor is advised that other contract work is proceeding in the vicinity of the proposed Work. The construction of a potable water pipeline is being carried out by other contractors.
- .2 The Contractor shall co-ordinate his work with the other Contractor.
- .3 The Owner will assume no responsibilities for the co-ordination of the various work activities and will not be involved in scheduling of the work if there is a conflict in work schedules.
- .4 No separate payment will be made for this work.

20. PIPE, FITTING, AND EQUIPMENT SUPPORTS

- .1 Pipe, duct, conduit, and equipment supports are not all necessarily shown on the Contract Drawings. The Contractor is responsible to ensure sufficient supports are supplied, fabricated, and installed to properly secure all pipe, fittings, and equipment to satisfy piping and equipment manufacturer's recommendations. No separate payment will be made for this work.

21. WARRANTY PERIOD

- .1 The Warranty Period shall begin on the date of Substantial Completion of the Work. For the duration of the Warranty Period the Contractor shall be responsible for maintenance and corrections, which are a result of faulty material and/or workmanship. In general, maintenance covers damage from defective materials or improper installation of all worksspecified within the Contract Documents.

- .2 The Warranty Period for all work is One (1) Year, except for roads, lanes, sidewalks, valve and manhole adjustments, for which the Warranty Period is Two (2) Years.
- .3 No extra payment will be made for these required maintenance items.

22. VARIATION OF INFORMATION

- .1 Information shown on the drawings or described in the specifications, including topographic lines, locations of existing facilities, ground surveys and soil conditions is approximate only.
- .2 The Owner assumes no responsibility for the accuracy of the information described above, nor does the Owner represent that materials or conditions other than those indicated will not be encountered.
- .3 The Contractor shall understand that and borings or other investigations made by the Engineer and which may be shown on the Drawings or as Appendices to the Specifications are for the Engineer's own information.
- .4 If any information as to the character of the materials likely to be encountered in performing the Work, or any other information as to the condition of the site is taken from this information, it shall be distinctly understood that the Engineer shall not be responsible if the information does not correctly set forth the facts or if the boring sheets or other written documents provided by the Engineer do not correctly set forth the results of borings or other investigations made.
- .5 Each Bidder or Contractor must make himself personally acquainted with the location, extent and purpose of the proposed Work.
- .6 Each Bidder or Contractor shall inform himself by borings, test pits, or by such other means as he may prefer as to the actual conditions of the subsurface and the Work prior to submitting his tender.
- .7 The Contractor shall assume all risk arising from, or out of, the nature of the materials to be excavated or used.

23. SASK POWER

- .1 The Owners have made application for the proposed work to SASK Power. A copy of the approval has been appended to these documents. No work shall commence on the project until approval has been obtained by the Owner. It is the Contractors responsibility to comply with these requirements for the construction of this project.

24. SASK GAS

- .1 The Owners have made application for the proposed work to SASK Gas. No work shall commence on the project until approval has been obtained by the Owner. It is the Contractors responsibility to comply with these requirements for the construction of this project. It is the Contractors responsibility to comply with these requirements for the construction of this project.

END OF SECTION

1. GENERAL

1.1 WORK OF THE PROJECT

- .1 Work of the Project, of which Work of this Contract is a part, comprises the following:
 - .1 Wastewater Treatment Facility
- .2 The Owner may subdivide, consolidate, add to, or otherwise modify the above contract packages.
- .3 Co-ordinate and connect the work of this Contract to accommodate the work of Other Contractors.

1.2 WORK OF THIS CONTRACT

- .1 The main items of Work of this Contract include the following:
 - a) Structural concrete;
 - b) Site utilities and civil work;
 - c) Metals;
 - d) Pre-Engineered building;
 - e) Architectural features and elements;
 - f) Thermal and moisture protection;
 - g) Process mechanical systems;
 - h) Building mechanical systems;
 - i) Electrical;
 - j) Instrumentation and controls and;
 - k) Standby generator.
 - l) Existing Building Modifications
- .2 The Site of the Work of this Contract is located in Grasswoods, Saskatchewan.

1.3 CONTRACT TIME

- .1 The Contract will commence on the date on which the Letter of Acceptance is issued.
- .2 Upon receipt of the Letter of Acceptance, promptly, and without undue delay, commence work at the Site.
- .3 Attain Substantial Performance of the Work by March 15th, 2022.
- .4 Attain Total Performance of the Work by March 31st, 2022

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1.4 WORK RESTRICTION/MILESTONE DATES

- .1 Contractor to follow construction sequencing as per Contract Drawings.

1.5 PERMANENT SERVICE LINES AND CONNECTIONS

- .1 N/A

1.6 USE OF THE SITE

- .1 The Site Limits are specified in the Contract Documents.
- .2 Approximate locations of existing utility lines within the Site that are known to the Owner are specified in the Contract Documents.
- .3 Site Limits to allow for construction access are specified in the Contract Documents.
- .4 Use of the areas within the Site described below are subject to the following conditions:
 - .1 Maintain public access as specified in Section 01552 – Existing and Temporary Roads.
- .5 Assume responsibility for the care and protection of the existing work.
- .

1.7 PUBLIC ROADS

- .1 Determine the condition and availability of public roads, clearances, restrictions, bridge load limits, bond requirements, conditions of use, and other limitations that may affect ingress to and egress from the Site.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL

1.1 MEASUREMENT SYSTEM

- .1 This section specifies the measurement rules that will generally be used for payment purposes unless otherwise specified in the Contract Documents. In case of conflict between the method of measurement specified in this section and the requirements specified in Section 01280 – Measurement Schedule, the latter will govern.
- .2 Work will be measured in the International System of Units (SI) in accordance with CAN/CSA–Z234.1–89 Canadian Metric Practice Guide.
- .3 When used in the Contract, the following abbreviations and symbols have the meaning assigned to them.

Abbreviation/Symbol	Meaning
µm	micrometre or micron
mm	millimetre
m	metre
mm ² or mm2	square millimetre
m ² or m2	square metre
ha	hectare
kPa	kilopascal
MPa	megapascal
m ³ or m3	cubic metre
L	litre
L.S.	lump sum
g	gram
kg	kilogram
N	newton
kN	kilonewton
t	tonne
no.	number (quantity)
min	minute (time)
h	hour
d	day
wk	week
%	percent
>	greater than
≥	greater than or equal to
<	less than
≤	less than or equal to
\$	Canadian dollars
°	degree (angle)
°C	degree Celsius

1.2 METHOD OF MEASUREMENT

.1 Unless otherwise indicated in the Contract Documents:

- .1 earthwork materials will be measured net in place after compaction, with no allowance for bulking, shrinkage, compression, foundation settlement, or waste;
- .2 products will be measured net, with no allowance for waste;
- .3 dimensions used in calculating quantities will be rounded to the nearest unit of dimension as follows:

Quantity	Dimension
Volume of earth	centimetre
Volume of concrete	millimetre
Length of pipe	centimetre
Area of land	decimetre

- .4 the survey station grid system adopted will be at 10 linear metres spacing on curves and 20 linear metres spacing on tangent sections for measuring earthwork quantities, respectively;
- .5 contours may be based on aerial photograph interpretation and are approximate only. Actual ground elevations and location co-ordinates will be determined in the field during the course of the Work for measurement purposes; and
- .6 measurement and payment will not be made for work carried out beyond measurement and payment lines and limits specified in the Contract Documents.

.2 When boundaries between different items of Work are not specified in the Contract Documents, such boundaries will be established by the Owner.

.3 Mass:

- .1 Mass will be measured by weigh scale or by estimated or theoretical mass taken from reference documents, as specified.
- .2 Mass will be measured to 3 decimal places.

.4 Length:

- .1 Length will be measured at the item centreline or mean chord.
- .2 Items to be measured by linear dimension will be measured parallel to the base or foundation upon which such items are placed.
- .3 Items to be measured by station will be measured horizontal to the base or foundation upon which such items are placed.

- .4 Centre line for pipes, ducts, culverts, and similar items will be the line equidistant between inside faces of pipe walls.
- .5 Area:
 - .1 For rectangular and regular shaped objects, area will be measured using mean length and width or radius.
 - .2 For irregular objects, area will be measured by the sum of squares, triangles, and circles, etc., as selected by the Owner.
- .6 Volume:
 - .1 Unless otherwise indicated, volume will be measured using mean length, width, and height or thickness.
 - .2 Excavation and fill volumes will be computed using a digital terrain modelling computer software program.
- .7 Time:
 - .1 Construction Equipment to be paid for on a time basis will be measured in hours of actual working time, and necessary travelling time, when under its own power to the nearest tenth thereof.
 - .2 Hauling equipment to be paid for on a time basis will be measured in hours of actual working time to the nearest tenth thereof.
- .8 Number of items will be measured on a per item basis.
- .9 Lump Sum items will not be measured for payment.
- .10 When standard manufactured items are identified by their physical characteristics, such characteristics will be considered as nominal. Unless more stringently controlled by specified tolerances, manufacturing tolerances established by the industry involved will be accepted.
- .11 Overhaul:
 - .1 Haul Distance will be the shortest distance, calculated as the difference between stations along the design centreline of the canal, between the centre of volume of the material in-place before excavation and the centre of volume of this material at its final point of deposition.
 - .2 Overhaul Distance means the Haul Distance minus the specified Freehaul Distance.

- .3 The Haul Distance is not the actual distance along the haul route used by the Contractor. The actual haul distance used by the Contractor will not be measured for payment
- .12 Borrow Overhaul:
 - .1 Borrow Haul Distance will be calculated by adding the sums of:
 - .1 the shortest perpendicular distance between the centre of volume of the material in-place before Borrow Excavation and the intersection point with the design centreline upon entering the project works, and
 - .2 the shortest distance between the intersection point as referenced above, and the centre of volume of this material at its final point of deposition, calculated as the difference between stations along the design centreline.
 - .2 Borrow Overhaul Distance means the Borrow Haul Distance minus the specified Free haul Distance.
 - .3 The Borrow Haul Distance is not the actual distance along the haul route used by the Contractor. The actual haul distance used by the Contractor will not be measured for payment.

1.3 MEASUREMENT COMPUTATION

- .1 Formulae and computer programs used for measurement computation will be as specified or, when not specified, as selected by the Owner.

1.4 MEASUREMENT OF WORK

- .1 Unless otherwise specified, the Owner will measure the Work for the purpose of determining payment to the Contractor.
- .2 The Owner will request the Contractor to attend with the Owner in making measurements.
- .3 If the Contractor does not attend pursuant to Paragraph 1.4.2, measurements made or approved by the Owner will be considered to be the correct measurement for such part of the Work.
- .4 The Owner will prepare survey records and drawings for payment purposes as the Work progresses. The Owner will request the Contractor to attend, within 14 days, to examine and verify such records and drawings. If the Contractor does not attend to examine and verify such records and drawings, they will be considered to be correct.
- .5 If, after attending pursuant to Paragraph 1.4.2 or 1.4.4, the Contractor disagrees with such measurements or records or drawings, they will nevertheless be considered correct until the Contractor notifies the Owner of the aspects in which they are considered incorrect.

On receipt of such notice, the Owner will review the measurements or records or drawings and either confirm or vary them.

1.5 QUANTITIES

- .1 Unless otherwise indicated, quantities specified in the Schedule of Prices for Unit Price Work are estimated quantities and will not be considered as actual quantities of Work to be performed. Subject to the Contract terms, unit prices stated in the Schedule of Prices will be applied to actual quantities of Work performed as measured in accordance with the Contract Documents.
- .2 When it is stated that the Contractor will be paid only for the quantity specified for an item of Work, such quantity will be considered as a fixed quantity and the Contractor will be paid for the quantity specified, regardless of the actual quantity performed. If a change in the Work directed by the Owner results in a change in a fixed quantity, the quantity will be adjusted in accordance with the Contract Documents and payment will be made for the adjusted quantity.

1.6 SCALES

- .1 Unless otherwise indicated, provide weigh scales, certified by Industry Canada, for measurement purposes.
- .2 Provide scales that are accurate to within 0.5% of correct mass throughout the range of use. Spring balances will not be permitted.
- .3 Prior to use and at any time requested by the Owner, provide the services of a qualified independent person, acceptable to the Owner, for the testing and servicing of weigh scales. Perform baseline tests and record results. Service and adjust weigh scales to meet requirements of Industry Canada and the Contract Documents. Submit a final report of weigh scale tests, services, and adjustments.
- .4 Scales indicating more than true mass will not be permitted to operate and material measured subsequent to the last previous correct accuracy test will be reduced by the percentage of error in excess of 0.5%.
- .5 Scales indicating less than true mass will be adjusted and no additional payment will be made for materials previously scaled and recorded.

1.7 SCHEDULE OF PRICES

- .1 The Schedule of Prices is divided into items for purposes of measurement and payment of Work. Price each item in accordance with the methods of measurement specified in the Contract.
- .2 Item names in the Schedule of Prices identify the work covered by the respective item, but do not define the size or nature of the unit.

- .3 Read item names in the Schedule of Prices as part of the item scope, measurement, and payment requirements to which they apply in the Measurement Schedule.
- .4 For each price specified in the Schedule of Prices include all costs and charges required to perform the Work including overhead charges and profit, and all costs of all related Work for which payment is not specified elsewhere.
- .5 Subject to the provisions of the Contract Documents, the total amount of the Schedule of Prices shall cover all of the Contractor's obligations under the Contract and all matters and things necessary for performance of the Work in accordance with the Contract Documents.
- .6 Payment will be made only for items specified in the Schedule of Prices. Costs and charges not directly provided for in the Schedule of Prices will be deemed to be included therein.
- .7 Work or material included in any one item will not also be measured for payment under another item. No item will be paid for more than once.
- .8 Omissions or errors in any item including quantities in the Schedule of Prices will not invalidate the Contract nor release the Contractor from any of his obligations or liabilities under the Contract.

1.8 LUMP SUM ITEMS

- .1 Breakdown of Lump Sum Items
 - .1 If requested, submit to the Owner a breakdown of each Lump Sum item included in the Schedule of Prices, within 21 days after the commencement date of the Contract.
 - .2 Provide sufficient details as required by the Owner to identify the principal components of the Work and to permit ready valuation of Work performed.
- .2 Lump Sum Items Paid in Accordance with a Schedule
 - .1 For Mobilization and Demobilization, Existing and Temporary Roads, and Care of Water, where payment of the respective Lump Sum amount will be made in accordance with a schedule as specified in Section 01280 – Measurement Schedule, the measurement of the completed Work by the Owner will include the amount of any work completed for Mobilization and Demobilization, Existing and Temporary Roads, and Care of Water.

1.9 SCHEDULE OF PRICES – DIVIDED BID ITEMS

- .1 Where Divided Bid items are included in the Schedule of Prices or the Measurement Schedule, such items shall be excluded from the provisions for variations specified in the General Conditions.

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- .2 Include in the Unit Price for the first quantity of the divided item:
 - .1 costs and profit for each unit of first quantity, and
 - .2 Contractor's fixed costs for the total quantity of the divided item specified in the Schedule of Prices plus additional quantities as specified in 1.9.4 Contractor's fixed costs shall include fixed costs for labour, Products, Construction Equipment, Temporary Work and overhead.
- .3 Include in the Unit Price for the quantity of Work over the first quantity, hereinafter called the 'second quantity', cost and profit for each unit of Work, excluding fixed costs included in 1.9.2.2.
- .4 Where the actual total quantity of the Divided Bid item is less than 120% of the estimated total quantity specified in the Schedule of Prices, the Unit Prices bid for the second quantity shall apply to all quantities in excess of the first quantity.
- .5 Where the actual total quantity of the Divided Bid item is more than 120% of the estimated total quantity of the Divided Bid Item, the Contractor's fixed costs per unit of Work shall be calculated by the Owner as follows:

Fixed costs per Unit of work = $((\text{FQUP} - \text{SQUP}) \times \text{FQ}) / \text{TQ}$

Where:

- FQUP – First Quantity Unit Price bid
- SQUP – Second Quantity Unit Price bid
- FQ – First Quantity in the Schedule of Prices
- TQ – Total Quantity in the Schedule of Prices

Payment for the actual quantity which exceeds 120% of the total quantity in the Schedule of Prices shall be based on the Unit Price bid for the second quantity plus the fixed costs calculated by the Owner.

- .6 The Unit Price for the second quantity of Work shall not exceed the Unit Price for the first quantity. Where a Unit Price for the second quantity of Work is greater in amount than the Unit Price for the first quantity, the Unit price and its extension will be corrected by the Owner to the Unit Price of the first quantity. Accordingly, the Bid will be evaluated and the Work will be paid for at the Unit Price of the first quantity. Contractor shall be bound to such corrected amounts.

2. **PRODUCTS** – **NOT USED**

3. **EXECUTION** – **NOT USED**

END OF SECTION

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1. INTENT

- .1 Requirements specified in this Section apply to the scope and measurement of work for purposes of determining payment under the Contract.

2. MEASUREMENT SCHEDULE

.1 Allowances:

.1 Control Panel and Hardware Supply Prime Cost Allowance

- .1 Scope: Supply of Control Panel and Hardware Supply Only.
- .2 Payment: Allowance based on the price included in the Contract.

.2 Control System Setup and Programming Prime Cost Allowance

- .1 Scope: Includes design, coordination and programming of PLC's and SCADA, and man machine interfaces.
- .2 Payment: Allowance based on the price included in the Contract.

.3 Commissioning Prime Cost Allowance

- .1 Scope: Includes Commissioning.
- .2 Payment: Allowance based on the price included in the Contract."

.4 Arc Flash and Coordination Study Prime Cost Allowance

- .1 Scope: Includes performing an Arch Flash Study and Coordination Study.
- .2 Payment: Allowance based on the price included in the Contract.

.2 MEASUREMENT SCHEDULE A-Construction Facilities and Temporary Controls:

**.1 Division 0 – Conditions of Contract
Division 1 – General Requirements**

- .1 Scope: Includes the following sections: Certification Page, Table of Contents, Instructions to Bidders, Bid Security, Pre-Bid Meeting, Information Documents, Schedule of Prices, Agreement Form, Definitions and Interpretation, Contract Performance Security, Security for Payment of Claims, Insurance Conditions, Payment Conditions, Statutory Declaration, General Conditions, Supplementary Conditions,

Summary of Work, Measurement Rules, Measurement and Payment Schedule, Management and Coordination, Contract Meetings, Network Analysis Construction Schedule, Submittals, Shop Drawings, Product Data and Samples, Environmental Protection, Regulatory Requirements, Work Site Safety, Quality Control and Quality Assurance, Existing and Temporary Utilities, Construction Facilities, Existing and Temporary Roads, Products and Execution, Product Options and Substitutions, Site Surveying, Final Clean-Up, Contract Acceptance Procedures, Contract Record Documents, Operation and Maintenance Manuals, Spare Parts and Maintenance Materials, and Startup and Commissioning.

.2 Measurement: This item will not be measured for payment.

.3 Payment: Lump sum payment as follows:

- .1 When 5% of original contract amount is earned, 25% of lump sum bid will be paid.
- .2 When 10% of original contract amount is earned, 25% of lump sum bid will be paid.
- .3 When 25% of original contract amount is earned, 10% of lump sum bid will be paid.
- .4 When 50% of original contract amount is earned, 10% of lump sum bid will be paid.
- .5 Upon Substantial Performance the unpaid balance of the lump sum bid in the Schedule of Prices for Division 0 and Division 1 will be paid.

.2 Division 2 – Site Work

.1 Supply and Install Pipe and Fittings

.a 50mm DR11 HDPE Waterline – Item 2.1a

- .1 Scope: Scope: Includes supply and installation of all Pipe and Fittings, which includes the hauling, loading, unloading, stringing, laying, trenching, fusing, excavating, sorting stockpiling, loading, hauling, dumping, shoring, trench boxes, bracing, backfilling, compaction to standard proctor density as noted on the drawings, pipe bedding, granular, clay plugs, haunching, couplers, pressure testing, flanges pipe supports, hydrovac or hand exposure and protection of all existing lines, utility locates, site restoration, topsoil and subsoil stripping, topsoil and subsoil replacement, grass seeding where required, site restoration and all related work for which payment is not included elsewhere.
- .2 Measurement: Shall be the length measured to the nearest metre at grade for pipe installed.

.3 Payment: Unit Price per metre installed.

.b 150mm DR11 HDPE Overflow and Forcemain – Item 2.1b

.1 Scope: Scope: Includes supply and installation of all Pipe and Fittings, which includes the hauling, loading, unloading, stringing, laying, trenching, fusing, excavating, sorting stockpiling, loading, hauling, dumping, shoring, trench boxes, bracing, backfilling, compaction to standard proctor density as noted on the drawings, pipe bedding, granular, clay plugs, haunching, couplers, pressure testing, flanges pipe supports, hydrovac or hand exposure and protection of all existing lines, utility locates, site restoration, topsoil and subsoil stripping, topsoil and subsoil replacement, grass seeding where required, site restoration and all related work for which payment is not included elsewhere.

.2 Measurement: Shall be the length measured to the nearest metre at grade for pipe installed.

.3 Payment: Unit Price per metre installed.

.c 200mm PVC SDR35 Sanitary – Item 2.1c

.1 Scope: Scope: Includes supply and installation of all Pipe and Fittings, which includes the hauling, loading, unloading, stringing, laying, trenching, excavating, sorting stockpiling, loading, hauling, dumping, shoring, trench boxes, bracing, backfilling, compaction to standard proctor density as noted on the drawings, pipe bedding, granular, clay plugs, haunching, stainless steel pipe, flanges, couplers, pipe supports, hydrovac or hand exposure and protection of all existing lines, utility locates, video inspection, site restoration, topsoil and subsoil stripping, topsoil and subsoil replacement, grass seeding where required, site restoration and all related work for which payment is not included elsewhere.

.2 Measurement: Shall be the length measured to the nearest metre at grade for pipe installed.

.3 Payment: Unit Price per metre installed.

.2 Structures:

.a 1200mm Precast Sanitary Manhole, complete – Item 2.2a

- .1 Scope: Provision of all equipment, material and labour required for the supply and installation of a precast concrete manhole, complete. The work includes excavation; waste excavation; concrete; manhole base; manhole barrels; ladder rungs; slab top; collars; frame & cover; stub outs; coring; grouting; all pipe tie-ins; couplers; adaptors; link seals, geotextile, granular materials; backfilling; compacting, moisture conditioning, topsoil stripping and replacement, shop drawings; clean-up; and all related work for which payment is not included elsewhere.
- .2 Measurement: Shall be made on a per vertical metre basis measured from the lowest invert to rim for each complete precast concrete manhole installed.
- .3 Payment: Shall be at the unit price bid therefor in the Schedule of Prices.

.b 50mm Gate Valve – Item 2.2b

- .1 Scope: Includes supply and installation of all materials, labor and equipment including all pipe, fittings, valves, valve boxes, cathodic protection, marker posts, and granular materials as shown on the contract drawings. Includes locating and confirming connection point with the engineer, coring, grounding, excavation, backfilling, compacting, topsoil stripping, topsoil replacement, seeding and site restoration, compaction of trenches, pipes, and fittings, and all related work for which payment is not included elsewhere.
- .2 Measurement: Will not be measured for payment.
- .3 Payment: Unit price per gate valve installed.

.c 150mm Gate Valve – Item 2.2c

- .1 Scope: Includes supply and installation of all materials, labor and equipment including all pipe, fittings, valves, valve boxes, cathodic protection, marker posts, and granular materials as shown on the contract drawings. Includes locating and confirming connection point with the engineer, coring, grounding, excavation, backfilling, compacting, topsoil stripping, topsoil replacement, seeding and site restoration, compaction of trenches, pipes, and fittings, and all related work for which payment is not included elsewhere.
- .2 Measurement: Will not be measured for payment.

- .3 Payment: Unit price per gate valve installed.

.3 Site Work:

.a Common Excavation – Item 2.3a

- .1 Scope: Includes excavating to the lines, grades and elevations specified in the contract documents, shaping and trimming to finished excavation surfaces; subgrade preparation, temporary stockpiling and rehandling, if required; sorting, loading and hauling materials; dumping and initial spreading of suitable materials in fill placement areas; and all related work and materials for which payment is not included elsewhere.

- .2 Measurement: Shall be made on a per cubic metre basis of cut excavation, determined by surveys and volume calculations.

No separate measurement will be made for excavation and replacement of unsuitable or unstable materials unless specified otherwise.

No separate measurement will be made for unnecessary excavation or excavation work performed beyond established lines or grades unless otherwise authorized by the Owner's Representative.

No separate measurement will be made for damages or for unstable soil conditions caused by surface drainage after the commencement of construction and during maintenance period.

- .3 Payment: Shall be at the unit price bid therefor in the Schedule of Prices.

.b Compacted Fill – Item 2.3b

- .1 Scope: Provision of all equipment, material and labour for the placement of Compacted Fill, sorting, spreading, subgrade preparation, moisture conditioning, loading, unloading and hauling materials, compacting to 98% SPD and trimming material to the lines, grades, elevations and dimensions as specified and all related work as defined within the specifications and as shown on the drawings for which payment is not included elsewhere.

- .2 Measurement: Shall be made on a per cubic metre basis of compacted fill, determined by surveys and volume calculations.

No separate measurement will be made for moisture conditioning of material.

No separate measurement will be made for damages or for unstable soil conditions caused by surface drainage after the commencement of construction and during maintenance period.

- .3 Payment: Shall be at the unit price bid therefor in the Schedule of Prices.

.c Wastewater Treatment Plant Excavation and Backfill – Item 2.3c

- .1 Scope: Includes excavating to the lines, grades and elevations specified in the contract documents, temporary stockpiling and rehandling, if required; sorting, loading and hauling materials; dumping and spreading of unsuitable materials in waste fill placement area, and placement of suitable fill for backfilling of wastewater treatment plant excavation, sorting, spreading, subgrade preparation, moisture conditioning, compacting to 98% SPD and trimming material to the lines, grades, elevations and dimensions as specified all related work and materials for which payment is not included elsewhere.

- .2 Measurement: This item will not be measured for payment.

- .3 Payment: Lump Sum.

.d Granular Type 108, 50mm Compacted Depth – Item 2.3d

- .1 Scope: Provision of all equipment, materials, and labour required to supply and install the base granular material in accordance with limit lines, densities, moisture contents and grades, to a compacted depth of 50mm. The work includes supplying, procuring, spreading, processing, loading, hauling, placing, shaping, grading, compacting, subgrade preparation, moisture conditioning, and proof rolling of the granular material; and all related work for which payment is not included elsewhere.

- .2 Measurement: Will be on a per cubic metre basis of Type 108 Granular material installed.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.e Granular Type 33, 250mm Compacted Depth – Item 2.3e

- .1 Scope: Provision of all equipment, materials, and labour required to supply and install the road granular material in accordance with limit lines, densities, moisture contents and grades, to a compacted depth of 250mm. The work includes supplying, procuring, spreading, processing, loading, hauling, placing, shaping, grading, compacting, subgrade preparation, moisture conditioning, and proof rolling of the granular material; and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per cubic metre basis of type 33 Granular material installed.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.f Topsoil Placement, 150mm Thick – Item 2.3f

- .1 Scope: Provision of all equipment, material and labour for the placement of 150mm depth of stockpiled topsoil, complete. The work includes loading, hauling, placing, spreading, grading, preparation of stockpiled topsoil; and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per square metre basis of topsoil placed.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.g Grass Seeding – Item 2.3g

- .1 Scope: Includes supply of all materials and seeding of disturbed construction areas as specified by the Engineer. Includes all related work for which payment is not included elsewhere.
- .2 Measurement: This item will not be measured for payment.
- .3 Payment: Lump Sum.

.4 Miscellaneous:**.a Chain Link Fencing, 1.8m high, c/w gates and security top – Item 2.4a**

- .1 Scope: Provision of all equipment, material and labour required to supply and install chain link fence and gates, complete. The work includes posts; fence mesh; rails; tension wire; cantilever gates; hardware; excavation; granular materials; concrete; backfill; hardware; clean-up; and all related work for which payment is not included elsewhere.
- .2 Measurement: Shall be on a per linear meter basis of chain link fence installed.
- .3 Payment: Shall be at the unit price bid therefor in the Schedule of Prices.

.b 16m Wide Cantilever Sliding Gate – Item 2.4b

- .1 Scope: Provision of all equipment, material and labour required to supply and install 16m wide cantilever gate, c/w operator and 1.2m man gate, complete. The work includes posts; fence mesh; rails; tension wire; rollers; hardware; excavation; granular materials; concrete; backfill; clean-up; cantilever gate operator; detection loops; provision of remote openers; and all related work for which payment is not included elsewhere.
- .2 Measurement: Shall be on a per unit basis for each complete 16m wide cantilever gate, c/w operator and man gate installed.
- .3 Payment: Shall be at the unit price bid therefor in the Schedule of Prices.

.c 300mm CSP Culvert, Complete– Item 2.4c

- .1 Scope: Provision of all equipment, material and labour to supply and install a corrugated steel pipe culvert, complete. The work includes excavation; compaction, loading, hauling, dumping, placing, shaping, moisture conditioning, waste excavation; corrugated steel pipe; couplers; gaskets; galvanizing paint; clay plug ends; bevelled ends; granular materials; backfilling; clean-up; and all related work for which payment is not included

elsewhere.

- .2 Measurement: Will be made on a per linear metre basis for corrugated steel pipe installed, as specified in the Schedule of Prices. The length will be measured horizontally and to the nearest tenth of a metre.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.d Bollards – Item 2.4d

- .1 Scope: Provision of all equipment, material and labour for the supply and installation of a concrete bollard, complete. The work includes excavation; waste excavation; concrete; 150mm steel pipe; 150mm x 6mm LDPE post sleeves; backfilling; clean up; and all related work for which payment is not included elsewhere.
- .2 Measurement: Shall be on a per unit basis for each complete bollard installed.
- .3 Payment: Shall be at the unit price bid therefor in the Schedule of Prices.

.e Truck/Trailer Dump Complete – Item 2.4e

- .1 Scope: Scope: Provision of all equipment, materials and labour required for the supply and installation of the Truck/Trailer Dump. Includes supply and installation of all materials, labor and equipment including all pipe, fittings, valves, marker posts, concrete curbing, concrete catch basins as shown on the contract drawings. Includes locating and confirming connection point with the engineer, coring, grounding, granular, excavation, backfilling, topsoil stripping, topsoil replacement, seeding and site restoration, compaction of trenches, pipes, and fittings, installation of signs as per the contract drawings and all related work for which payment is not included elsewhere. Includes connection to existing sanitary collection system.
- .2 Measurement: This item will not be measured for payment.
- .3 Payment: Lump Sum.

.3 Division 3 – Concrete

- .1 Scope includes the following sections: Cast-in-Place Concrete, Concrete Tank Liner, and Precast Concrete Structures
- .2 Measurement: This item will not be measured for payment.
- .3 Payment: Lump Sum.

.4 Division 4 – Masonry

- .1 Scope includes the following section: Masonry Units
- .2 Measurement: This item will not be measured for payment.
- .3 Payment: Lump Sum.

.5 Division 5 – Metals

- .1 Scope: Includes the following sections: Structural Steel, Structural Aluminum, Miscellaneous Steel, and Steel Building Systems.
- .2 Measurement: This item will not be measured for payment.
- .3 Payment: Lump Sum.

.6 Division 6 – Wood and Plastics

- .1 Scope: Includes the following sections: Architectural Woodwork.
- .2 Measurement: This item will not be measured for payment.
- .3 Payment: Lump Sum.

.7 Division 7 – Thermal and Moisture Protection

- .1 Scope: Includes the following sections: Concrete Waterproofing, Bituminous Dampproofing, Rigid Board Insulation, Firestopping, and Joint Sealants.
- .2 Measurement: This item will not be measured for payments.
- .3 Payment: Lump Sum.

.8 Division 8 – Doors and Windows

- .1 Scope: Includes the following sections: Hollow Metal Frames, Hollow Metal Doors, Insulated Overhead Coiling Doors, Aluminum Windows, Door Hardware, Glass and Glazing General Requirements, and Glazing.

.2 Measurement: This item will not be measured for payment.

.3 Payment: Lump Sum.

.9 Division 9 – Finishes

.1 Scope: Includes the following sections: Acoustic Unit Ceilings, Epoxy Flooring, Painting and Finishing, Exterior Painting and Finishing Schedule, Interior Painting and Finishing Schedule, Painting of Building Mechanical and Electrical Work, and Painting of WWTP Process Piping and Equipment.

.2 Measurement: This item will not be measured for payment.

.3 Payment: Lump Sum.

.10 Division 10 – Specialties

.1 Scope: Includes the following sections: Spill Containment, Fall Arrest, Handheld Fire Extinguishers, Laboratory Equipment, Refrigerated Sampler, Laboratory and Washroom Accessories, Aluminum Signs, Pallet Trucks, and Refrigerator.

.2 Measurement: This item will not be measured for payment.

.3 Payment: Lump Sum.

.11 Division 11 – Equipment

.1 Equipment

.1 Scope: Includes the following sections: Submersible Sewage and Effluent Pumps, Sump Pumps, Submersible Mixing Equipment, Novated Equipment Supply & Delivery, Polyethylene Storage Tanks, Polymer Feed Equipment, Sludge Thickening Equipment, Miscellaneous Process Equipment, Chain Hoists, and Septage Receiving Station.

.2 Measurement: This item will not be measured for payment.

.3 Payment: Lump Sum.

.2 Novated Equipment Supply & Delivery

a) Membrane Bioreactor Treatment Equipment – item 11.2.a

.1 Scope: Includes the following sections: Novated Equipment Supply and Installation

.2 Measurement: Payment to be made based on invoices as provided by SUEZ to the upset limit as listed in section 00431 Schedule of Prices.

.3 Payment: Lump Sum

.12 Division 13 – Special Construction

.1 Scope: Includes the following sections: Control and Instrumentation – General, Instrumentation – Wiring, Instrumentation – Field Instruments, Instrumentation – Control Panels, and Programmable Logic Controllers.

.2 Measurement: This item will not be measured for payment.

.3 Payment: Lump Sum.

.13 Division 15 – Mechanical

.1 Scope: Includes the following sections: Mechanical General Requirements, Detailed Piping Specifications, Mechanical Spare Parts and Maintenance Manuals, Hangers and Supports, Vibration Isolation, Mechanical Identification, Ductwork and Breeching Insulation, Piping and Equipment Insulation, Channel Slide Gates, Valves, Flow Indicators, Pressure Indicators, Miscellaneous Mechanical Equipment, Tanks, Hydrostatic and Pressure Testing, Disinfection of Potable Water Piping and Storage Facilities, Hot Water Heaters, Plumbing Fixtures, Plumbing Specialties, Surface Drainage System, Unit Heaters, Forced Air Furnaces, Direct Fired Units, Heat Recovery Ventilator, Air Conditioning Units, Ductwork, Ductwork Accessories, Fans, Air Outlets, Louvers and Dampers, General Mechanical Starting and Testing Requirements, Mechanical Equipment Starting and Testing, Mechanical Systems Starting and Testing, Balancing and Adjusting of Mechanical Equipment and Systems, Pressure Testing, and Mechanical Equipment and Systems Demonstration and Instruction.

.2 Measurement: This item will not be measured for payment.

.3 Payment: Lump Sum.

.14 Division 16 – Electrical

.1 Scope: Includes the following sections: Basic Electrical Requirements, Grounding, Electrical Identification, Wire and Cable, Conduit, Cable Trays, Boxes and Fittings, Cabinets and Enclosures, Wiring Devices, Service and Distribution, Power Generation – Diesel, Automatic Transfer Equipment, Transformers, Disconnects, LV Motor Starters, Motor Control Centers, Overcurrent Protection Devices, Lighting, Variable Frequency Drives, Active Harmonic Filters, Voice and Data Cabling, Voice and Data Cabling Testing, Door Access Control, and Electrical Starting and Testing.

.2 Measurement: This item will not be measured for payment.

.3 Payment: Lump Sum.

END OF SECTION

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1. GENERAL

1.1 CO-ORDINATION

- .1 Co-ordinate all construction activities to provide efficient and orderly construction of each and every part of the Work.
- .2 Where construction of one part of the Work is dependent on construction of other parts, schedule and co-ordinate construction activities in the sequence needed to obtain the best results.
- .3 Where availability of space is limited, co-ordinate construction of different parts of the Work to provide maximum accessibility for maintenance, service, and repair.
- .4 Make adequate provisions to accommodate Work scheduled for later construction by Other Contractors or by the Owner's own forces.

1.2 COMMUNICATION EQUIPMENT

- . 1 Provide suitable computer equipment and software at the Contractor's office specified in this section for exchange of electronic data by e-mail of the following types of documents:
 - .1 Letters and Memos Microsoft® Word
 - .2 Document Readers Adobe Acrobat® Reader
 - .3 Schedules Microsoft® Project
 - .4 Drawings AutoCAD®
 - .5 Communication Microsoft® Outlook

1.3 COMMUNICATION METHODS

- .1 Communications will be sufficiently given by any one of the following methods:
 - .1 Delivered personally to the Contractor, the Contractor's representative, or left at the Contractor's address as specified in this section.
 - .2 Mailed at any post office to the Contractor's address as specified in this section.
 - .3 Couriered to the Contractor's address as specified in this section.
 - .4 Transmitted by facsimile to the Contractor's facsimile number as specified in this section.
 - .5 Transmitted by Internet to the Contractor's e-mail address as specified in this section.

1.4 CONTRACT ADMINISTRATION

- .1 Co-ordinate scheduling and timing of administrative procedures with other construction activities to avoid delays and provide orderly progress of the Work. Administrative

procedures include the following:

- .1 Preparation and monitoring of schedules.
- .2 Co-ordination of construction and removal of temporary facilities.
- .3 Co-ordination, review, and processing of submittals.
- .4 Participation in project meetings.
- .5 Following Contract acceptance procedures.
- .6 Preparation of change order proposals.

1.5 CONTRACTOR'S ADDRESS FOR CORRESPONDENCE

- .1 Submit the name, address, telephone number, facsimile number, and e-mail address to be used for correspondence with the Contractor within 10 days of the date of commencement of the Contract. Update whenever information changes during the Contract.

1.6 OWNER'S ADDRESS FOR CORRESPONDENCE

- .1 The Owner will provide to the Contractor the name, address, telephone number, facsimile number, and e-mail address to be used for correspondence with the Owner within 10 days of the date of commencement of the Contract. This information will be updated as required during the Contract.

1.7 CONTRACTOR'S REPRESENTATIVES AND SITE MANAGEMENT

- .1 Submit an organization chart showing the names, positions, telephone numbers, and responsibilities and levels of authority for the Contractor's representatives and site management organization, within 10 days of the date of commencement of the Contract, and update whenever information changes during the Contract.

1.8 OWNER'S REPRESENTATIVES AND ASSISTANTS

- .1 The Owner will provide to the Contractor an organization chart showing the names, positions, telephone numbers, and responsibilities and levels of authority for the Owner's Representative and assistants, within 10 days of the date of commencement of the Contract, and will update whenever information changes during the Contract.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL

1.1 ADMINISTRATIVE RESPONSIBILITIES

- .1 The Owner will be responsible for administrative requirements for the following Contract meetings:
 - .1 Pre–construction
 - .2 Construction Progress
 - .3 Environment
- .2 The Contractor shall be responsible for administrative requirements for the following Contract meetings:
 - .1 Workplace Orientation
 - .2 Safety
- .3 The Owner or the Contractor may request additional meetings related to installation of equipment, commissioning progress, warranty, dispute resolution, environmental issues. Unless otherwise specifically requested by the Contractor, the Owner will be responsible for administrative duties related to these meetings. The agenda for these meetings may be combined with that of the construction progress meetings.

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 The administrative requirements for Contract meetings include the following:
 - .1 Scheduling and administering the Contract meetings throughout the progress of the Work.
 - .2 Preparing the agenda for the meetings.
 - .3 Distributing to the relevant attendees written notice of each meeting and the proposed agenda at least 3 days in advance of the meeting date.
 - .4 Presiding at the meetings.
 - .5 Recording the minutes including attendance, significant proceedings and decisions, and action required by the parties.
 - .6 Reproducing and distributing copies of the minutes within 7 days after each meeting to the meeting participants and affected parties not in attendance.
- .2 Representatives of the Contractor, Subcontractors, and Suppliers shall attend meetings as necessary and be authorized to act on behalf of the party each represents.

1.3 PRE-CONSTRUCTION MEETING

- .1 Frequency: Within 15 days after award of the Contract and prior to commencement of activities at the Site.
- .2 Purpose: To review personnel assignments, responsibilities, schedules, submissions, and administrative and procedural requirements.
- .3 Attendees:
 - .1 Contractor's representatives: senior management, site superintendent, major Subcontractors, and others as necessary.
 - .2 Owner's representatives: as determined by the Owner.
- .4 Agenda may include the following:
 - .1 Appointment of representatives of participants in the Work.
 - .2 Schedule of the Work and progress scheduling.
 - .3 Schedule of submittals.
 - .4 Requirements for temporary facilities, site signage, offices, storage sheds, utilities, and fences.
 - .5 Schedule of equipment delivery.
 - .6 Site safety and security.
 - .7 Contemplated changes, change orders, approvals required, costing and mark-up percentages permitted, time extensions, overtime, and administrative requirements.
 - .8 Products and materials provided by the Owner.
 - .9 Record documents.
 - .10 Maintenance manuals.
 - .11 Takeover procedures, acceptance, and warranties.
 - .12 Monthly progress claims, administrative procedures, and holdbacks.
 - .13 Inspection and testing.
 - .14 Insurance and transcripts of policies.
 - .15 Environmental management principles.
 - .16 Mobilization to the Site.

1.4 CONSTRUCTION PROGRESS MEETINGS

- .1 Frequency: Weekly during the course of the Work.
- .2 Purpose: To monitor construction progress, to identify problems and actions required for their solution, and to expedite the Work.
- .3 Attendees:
 - .1 Contractor's representatives: site superintendent and, when so requested by the Owner, Subcontractors, Suppliers, and other parties involved in the Work.
 - .2 Owner's representatives: as determined by the Owner.
- .4 Agenda may include the following:
 - .1 Review and approval of minutes of the previous meeting.
 - .2 Review of the Work progress since the previous meeting.
 - .3 Field observations, problems, and conflicts.
 - .4 Problems that impede the construction schedule.
 - .5 Off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain the Contract schedule.
 - .7 Revisions to the construction schedule.
 - .8 Progress and schedule for the succeeding work period.
 - .9 Submittal schedules.
 - .10 Adherence to quality standards.
 - .11 Contemplated changes effect on the construction schedule and Contract Time.
 - .12 Contentious items of the Work.
 - .13 Contract closeout issues.
 - .14 Safety and security issues.
 - .15 Environmental issues.
 - .16 Other business.

1.5 WORKPLACE ORIENTATION MEETINGS

- .1 Frequency: As required for all new workers prior to commencement of Work on the Site.
- .2 Purpose: To familiarize new workers with site conditions, rules, regulations, safety, and security requirements.
- .3 Attendees: All new Contractor and Owner personnel scheduled to work on the Site.
- .4 Agenda may include the following:
 - .1 Project description including areas of work and other concurrent construction contracts.
 - .2 Hazardous areas including open excavations, construction equipment traffic, blasting, and chemical or explosive storage, etc.
 - .3 Safety equipment to be worn by workers, including areas with special requirements.
 - .4 Traffic routes on the Site.
 - .5 Evacuation procedures.
 - .6 First aid procedures.
 - .7 Excavation or work permit procedures.
 - .8 WHMIS (Workplace Hazardous Materials Information System) requirements for handling and storage of chemicals.
 - .9 Fire safety rules and regulations.
 - .10 Rules and regulations regarding wildlife, environmental concerns, drugs, alcohol, etc.

1.6 SAFETY MEETINGS

- .1 Frequency: Weekly during the course of the Work for each area of work.
- .2 Purpose: To review safety concerns and implement preventive safety measures.
- .3 Attendees: Contractor's and Owner's personnel for each area of work.
- .4 Agenda may include the following:
 - .1 Review and discussion of safety concerns, accidents, and "near misses."
 - .2 Remedial or preventive actions to be taken.

1.7 ENVIRONMENTAL MEETINGS

- .1 Frequency: During the course of Work, schedule environment meetings weekly or as required by the Owner to deal with issues that may arise. Dependent on the issues, the Owner may combine the agenda for environmental meetings with that of the construction progress meetings.
- .2 Purpose: To review environment issues and implement mitigative measures.
- .3 Attendees:
 - .1 Contractor's representatives: Contractor's site superintendent and when so requested by Owner, subcontractors, suppliers and other parties involved in the Work. Contractor's representatives shall be qualified and authorized to act on behalf of the party each represents.
 - .2 Owner's representatives: as determined by Owner.
- .4 Agenda to include the following:
 - .1 Review and discussion of environment concerns, accidents and "near misses".
 - .2 Identify environmental emergency notification procedures.
 - .3 Identify remedial or preventative action to be taken.
- .5 All employees must attend environmental orientation.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL**1.1 FORMAT OF SCHEDULE**

- .1 Base the format of the Network Analysis Construction Progress Schedule, hereinafter referred to as the “NACP Schedule,” on one of the following formats:
 - .1 Critical Path Method.
 - .2 Project Evaluation and Review Technique.
- .2 Incorporate legends as required to identify symbols used.
- .3 Incorporate appropriate time scales covering calendar and working days, months, and years.
- .4 As a minimum requirement, indicate the earliest start date, earliest finish date, and total float time for each activity. Indicate work restriction and milestone dates, and the Contract Time specified in Section 01110 – Summary of Work. Clearly identify the critical path and first level sub-critical paths broken down by activity.

1.2 QUALITY OF SCHEDULE

- .1 Prepare the NACP Schedule by personnel or organizations specializing in such work.
- .2 Prepare the NACP Schedule using Microsoft Project.
- .3 Include concise and appropriate activity descriptions.
- .4 Separate the Contractor’s workforce from the Subcontractors’ workforces.
- .5 Break down activities to provide a level of detail that enables ready interpretation and facilitates performance monitoring.
- .6 Break down long duration activities and sub-activities that are continuous, repetitive, or sequential in nature, representing the actual construction activity planned. Include separate sub-network diagrams as appropriate.

1.3 SUBMITTALS

- .1 Provide the following submittals.
- .2 NACP Schedule including sub-network diagrams:
 - .1 An initial NACP Schedule, and required sub-network diagrams, for the Owner’s review within 15 days after the date of commencement of the Contract.

- .2 Within 15 days of receipt, the Owner will either return the submitted construction schedule to the Contractor with no exceptions taken or require revisions to the construction schedule. Provide a revised construction schedule within 7 days of receiving the Owner's comments, if any.
- .3 Progress revisions within 7 days after receiving notice to do so from the Owner.
- .4 Updated NACP Schedule within 5 days after the end of each month.

1.4 USE OF THE NACP SCHEDULE

- .1 Adhere to, and require all Subcontractors and Suppliers to adhere to, the NACP Schedule.
- .2 Requests for an extension to Contract Time will be based on the most recent accepted NACP Schedule.

1.5 PROGRESS REVISIONS

- .1 Revise the NACP Schedule upon request by the Owner, if in the Owner's opinion:
 - .1 the progress of the Work is substantially different from the latest NACP Schedule and the date of Substantial Performance of the Work appears to be in jeopardy;
 - .2 the Work is being performed in a sequence that is not in keeping with the general work sequence of the latest NACP Schedule; or
 - .3 a revision is necessary to reflect a required adjustment to the Contract Time that has been authorized by the Owner.
- .2 Outline methods to be used to complete the Work within the Contract Time.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

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1. GENERAL

1.1 DEFINITIONS

- .1 “Administrative Submittals” means data presented for review to ensure administrative requirements of the Contract are met.
- .2 “Shop Drawings” means technical data specifically prepared for work of this Contract including drawings, diagrams, schedules, templates, patterns, and similar information not in standard printed form.
- .3 “Product Data” means standard printed information describing materials, products, equipment, and systems not specifically prepared for work of this Contract. Product Data consisting of manufacturers’ standard schematic drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations, and descriptive data will be accepted in lieu of Shop Drawings provided that:
 - .1 information not applicable to the work of this Contract is deleted; and
 - .2 standard information is supplemented with information specifically applicable to the Work of this Contract.
- .4 “Samples” means cuts or containers of materials or partial sections of manufactured or fabricated components that are physically identical to products proposed for use.
- .5 “Field Samples” means volumes of materials as specified, which are physically representative of the materials proposed for use.

1.2 SCHEDULE OF SUBMITTALS

- .1 Submittals required for the Contract are specified in each section of the Contract Documents.
- .2 Submittals required by this section are appended to this section.

1.3 SUBMITTAL PREPARATION

- .1 Determine and verify:
 - .1 Field measurements.
 - .2 Field construction criteria.
 - .3 Catalogue numbers and similar data.
 - .4 Compliance with the Contract Documents.
- .2 Co-ordinate each submittal with requirements of the Work and the Contract Documents.
- .3 Notify the Owner, in writing, on the submittal and at the time of submission, of any deviations from the requirements of the Contract Documents.

1.4 SUBMITTAL REQUIREMENTS

- .1 Make submittals within the times required by the Contract Documents and sufficiently in advance of the date that reviewed submittals will be required, and in such sequence as to cause no delay in the Work.
- .2 Make submittals in the form specified or in a form considered as an industry standard.
- .3 Provide a transmittal letter with each submittal containing:
 - .1 Date.
 - .2 Project Name.
 - .3 Contract Name.
 - .4 Tender Number.
 - .5 Contractor's name and address.
 - .6 Number of each Shop Drawing, Product Data, and Sample submitted.
 - .7 Other pertinent data.
- .4 Include in the submittals:
 - .1 Date and revision dates.
 - .2 Project Name.
 - .3 Contract Name.
 - .4 Tender Number.
 - .5 Name of:
 - .1 Contractor.
 - .2 Subcontractor.
 - .3 Supplier.
 - .4 Manufacturer.
 - .5 Name of detailer when details are not prepared by the Contractor, Subcontractor, or Supplier.
 - .6 The Contractor's stamp, signed, certifying its review of the submittal, verification of field measurements, and compliance with the Contract

Documents, or that deviations, if incorporated, will be compatible with other elements of the Work.

1.5 REVIEW OF SUBMITTALS

- .1 The Owner will review each submittal within 10 working days of receipt of the submittal unless specified otherwise in the Contract Documents.
- .2 Make corrections or changes to reviewed submittals and resubmit as specified for the initial submission.
- .3 Until a reviewed submittal is received, do not proceed with the Work related to the submittal.
- .4 The Owner's review of any submittal does not relieve the Contractor from responsibility for errors and omissions, nor deviations from the requirements of the Contract Documents.

1.6 CASH FLOW FORECAST

- .1 Submit to Owner for review, 15 days before submission of first application for payment, a forecast of approximate progress payments for the duration of the Contract.
- .2 Submit revised cash flow forecasts of progress payments as the Work progresses and as requested by Owner.

1.7 LIST OF SUPPLIERS

- .1 Submit a list of suppliers to Owner for review 15 days prior to commencement of activities at the Site.
- .2 Submit revised list of suppliers as the work progresses and as requested by the Owner.

1.8 LIST OF CONSTRUCTION EQUIPMENT

- .1 Submit a list of construction equipment to Owner for review 15 days prior to commencement of activities at the Site.
- .2 Submit revised list of construction equipment as the work progresses and as requested by the Owner.

1.9 SCHEDULE OF WORKERS

- .1 Not applicable.

1.10 SITE MANAGEMENT PERSONNEL

- .1 Submit a list of site management personnel to Owner for review 15 days prior to commencement of activities at the Site.
- .2 Submit revised site management personnel as the work progresses and as requested by the

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Owner.

1.11 MANPOWER SCHEDULES

.1 Not applicable.

1.12 LOCAL LABOUR, GOODS AND SERVICES

.1 Not applicable.

1.13 METHOD STATEMENT

.1 Not applicable.

1.14 PRODUCTS LIST

.1 Not applicable.

1.15 FIELD REPORTS

.1 Not applicable.

1.16 PHOTOGRAPHS

.1 Not applicable.

1.17 CONSTRUCTION NOTIFICATIONS - PUBLIC

.1 Seven days prior to construction, notify all affected businesses, institutions, facilities and residents informing them in writing of the nature of the work to be performed, how long the inconvenience will last, who to contact in the event of damages to the home, business or property, and what to do for access and alternative parking arrangements. The Contractor shall submit the proposed notification to the Owners Representative for review before issuance.

1.18 GUARANTEES

.1 The Contractor shall issue a written and signed document in the name of the Owner by way of a maintenance bond certifying the work shall remain in place and free from any workmanship defects for a period of one (1) year starting from the date of final completion of work.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL

- .1 Submit for review, shop drawings, product data and samples called for by the Contract Documents and for such other items as the Engineer may reasonably request.
- .2 Until submittal is reviewed, do not proceed with work involving the relevant product.

2. SHOP DRAWINGS

- .1 Shop drawings means technical data specially prepared for work of this Contract; including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements and similar information not in standard printed form.
- .2 Present shop drawings in a clear and thorough manner to appropriately illustrate the work.
- .3 Identify field dimensions on drawings.
- .4 Identify shop drawings by appropriate references to sheet, detail, schedule or room numbers.
- .5 Maximum drawing size: 860 x 1120 mm.
- .6 Leave a clear space of 100 mm x 75 mm on each sheet of shop drawings for placement of Engineer's review stamp.
- .7 Submit one set of sepia for each required shop drawing.

3. PRODUCT DATA

- .1 Product data means standard printed information describing materials, products, equipment and systems; not specially prepared for work of this Contract, other than the designation of selections.
- .2 Clearly mark product data to identify products.
- .3 Manufacturer's standard schematic drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations and descriptive data will be accepted in lieu of shop drawings provided that:
 - .1 information not applicable to work of this Contract is deleted, and
 - .2 standard information is supplemented with information specifically applicable to the work of this Contract.

- .4 Submit clear reproducible information as follows:
 - .1 One copy when product data is submitted as:
 - .1 Data sheets larger than 216 mm x 355 mm. Submit mylars.
 - .2 Unbound data sheets 216 mm x 355 mm or smaller. Submit printed or photocopied sheets.
 - .2 Four copies when product data is submitted as follows:
 - .1 Information that cannot be duplicated using a photocopier with an automatic document feeder, such as bound or multi-fold information.
 - .2 Information containing photographs or other information that does not reproduce well on a commercial photocopier.

4. SAMPLES

- .1 Samples means cuts or containers of materials or partial sections of manufactured or fabricated components which are physically identical to products proposed for use and which establish minimum standards by which the work will be judged.
- .2 Label samples as to origin and intended use in the Work.

5. SUBMITTAL PREPARATION

- .1 Review, date and sign, shop drawings, product data and samples, prior to submission.
- .2 Determine and verify:
 - .1 Field measurements.
 - .2 Field construction criteria.
 - .3 Catalogue numbers and similar data.
 - .4 Conformance with Contract Documents.
- .3 Coordinate each submittal with requirements of work and Contract documents. Individual drawings will not be reviewed until all related shop drawing and product data are available.
- .4 Notify Engineer, in writing, on the submittal and at the time of submission, of deviations from requirements of Contract Documents.

6. SUBMISSION REQUIREMENTS

- .1 Make submittals sufficiently in advance of date that reviewed submittals will be required and in such sequence as to cause no delay in the Work.
- .2 Accompany submittals with transmittal letter, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Number of each shop drawing, product data and sample submitted.
 - .5 Other pertinent data.
- .3 Submittals shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name of:
 - .1 Contractor.
 - .2 Subcontractor.
 - .3 Supplier.
 - .4 Manufacturer.
 - .5 Name of detailer when details not prepared by Contractor, sub-contractor, or supplier.
 - .4 Contractor's stamp, initialed or signed, certifying review of submittal, verification of field measurements, and compliance with Contract Documents.
- .4 Make corrections or changes to rejected submittals and resubmit, as specified for initial submission.

7. RESPONSIBILITY FOR ERRORS, OMISSIONS AND DEVIATIONS

- .1 Engineer's review of submittals does not relieve Contractor from responsibility for errors and omissions, nor deviations from requirements of the Contract Documents.

8. REPRODUCTION OF SUBMITTALS

- .1 After final review, Engineer will reproduce at his expense, the number of copies he requires, and return reviewed reproducible documents. Contractor shall reproduce at his expense the number of copies required for performance of the Work.

END OF SECTION

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1. GENERAL

1.1 RELATED SECTIONS:

.1 N/A

1.2 SURFICIAL AQUATIC RESOURCES

.1 Physical:

- .1 Unless otherwise provided for in the Contract Documents, do not divert, alter, or disrupt water flows in rivers, streams, and other surface bodies of water.
- .2 Conform to the Environmental Construction Operations Plan as specified in Section 01390 – Environmental Construction Operations Plan. If applicable.
- .3 Prevent bark, slash, wood chips, sawdust, ashes, organic debris, topsoil, fuel and lubricants, or other substances harmful to aquatic life from entering a river, stream, or other surface bodies of water.
- .4 Do not perform construction operations within the wetted perimeter of a river, stream, and other surface bodies of water unless such work is part of the Permanent Work or Temporary Work.
- .5 Do not deepen by excavation or place fill material on the river or stream bed or other surface bodies of water unless such work is part of the Permanent Work or Temporary Work.
- .6 Manage construction operations to limit equipment crossings of rivers and streams and prevent turbidity and siltation during crossings. Install temporary culverts or bridge structures where frequent crossings are required.
- .7 Use clean granular fill with less than 5% fines passing the 80µm sieve size when exposed to a river or stream for Temporary Work such as cofferdams, causeways, and access ramps. Fine-grained soils may be used, provided only clean granular fill is exposed to the body of water at any time during construction and restoration operations.
- .8 Remove Temporary Work, including culverts and bridges, and reclaim river and stream banks and bed, and other disturbed areas, prior to attaining Substantial Performance of the Work unless specified otherwise.

.2 Biological:

- .1 Protect fish and fish habitat in rivers, streams, and other surface bodies of water located within the Site in accordance with the Contract Documents and Regulatory Requirements.

1.3 GROUND WATER RESOURCES

- .1 Physical:
 - .1 Do not change ground water levels in wells located on adjacent lands.
- .2 Biological:
 - .1 Do not change ground water quality in adjacent landowner wells.
- .3 Silt Fence Management:
 - .1 Be responsible for and maintain silt fences until date of Warranty Performance of the Work.
 - .2 Inspect silt fencing at intervals appropriate to weather events. Based on inspections maintain silt fencing in functional condition, remove silt accumulations and dispose on site at locations acceptable to the Owner.
 - .3 Removal and disposal of silt materials collected at silt fencing will be valued in accordance with Section 00725 – General Conditions, Article 8.3 – Valuation of Changes in the Work.
 - .4 Unless otherwise specified in the Contract Documents, or otherwise requested by the Owner, remove temporary silt fencing within 30 days after date of Warranty Performance of the Work.

1.4 TERRESTRIAL RESOURCES

- .1 Wildlife:
 - .1 Do not allow pets on the Site.
 - .2 Do not allow firearms, hunting, or shooting on the Site.
 - .3 Prevent livestock from entering the Site by:
 - .1 installing new fences specified in the Contract Documents; and
 - .2 installing temporary fences as necessary.
 - .4 Do not harass wildlife.
- .2 Vegetation and Weed Control:
 - .1 Remove or control existing and new adverse vegetation that affects adjacent landowners and their croplands, construction operations, or the function of the Permanent Work.

- .2 Do not import any materials to the Site that are contaminated with weed seeds. Clean dirty construction and reclamation equipment to prevent importing weed seeds.
 - .3 Notify the Owner prior to commencing adverse vegetation control measures.
 - .4 Be responsible for damage to crops, both on and off the Site, resulting from the Contractor's use of herbicides, or other adverse vegetation control measures.
 - .5 Maintain records of the types and amounts of herbicides purchased, delivered, stored, mixed, and used, and the means of disposal of all excess. Maintain the records current and accurate, and make them available for review by the Owner.
 - .6 Monitor the site for early detection of weed growth during the growing season.
 - .7 Control weeds once by mechanical equipment before they go to seed, but not before August 1, and at no extra cost to the Owner.
- .3 Waste Management:
- .1 Remove construction waste, including demolition waste, from the Site unless otherwise specified. Dispose of such waste at the waste disposal facility identified in the Environmental Management Plan.
 - .2 Do not burn, bury or otherwise discharge construction or demolition waste on the Site unless specified otherwise.
 - .3 When practical, minimize the amount of waste generated from construction operations and demolitions by salvaging materials for recycling. Salvage and segregate metal, plastic, paper, cardboard, and glass and transfer them to the nearest appropriate collection facility.
- .4 Hazardous Materials:
- .1 Transport hazardous materials to and from the Site in accordance with Regulatory Requirements.
 - .2 Use and store hazardous materials in accordance with Regulatory Requirements.
 - .3 Remove spilled hazardous materials, including hazardous liquid wastes, in accordance with Regulatory Requirements, and reclaim land and other property. Report spills to Saskatchewan Environment and the Owner.
 - .4 Dispose of hazardous waste materials, including hazardous liquid wastes, in accordance with Regulatory Requirements.
- .5 Handling of Construction Equipment Fuels and Lubricants:
- .1 Employ persons qualified to handle construction equipment fuels and lubricants.

- .2 Carry the following protection materials in all fuel and service vehicles:
 - .1 10 kg of suitable sorbent material.
 - .2 30 m² of 6 mil polyethylene.
 - .3 A shovel.
 - .4 An empty fuel barrel with the lid removed.
- .3 Maintain a setback distance of 100 m between stored Construction Equipment fuels and lubricants and rivers, streams, and other surface bodies of water.
- .4 Prevent handling and fuelling operations from contaminating the ground, surface water, and ground water. Use containment berms and an impermeable base course or other system to contain spilled fuel.
- .5 Clearly mark and barricade fuel storage areas and non-portable transfer lines. Use markers that are visible under all weather conditions.
- .6 Store waste Construction Equipment lubricants in a tank or closed container, and dispose of off-Site in accordance with the Regulatory Requirements.

1.5 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

- .1 Protect known heritage resources specified in the Contract Documents with the specified fencing and marking devices.
- .2 Protect new heritage resources found during the Contract Time. Flag an area of 15 m beyond the edge, and surrounding, a new found heritage resource, and report the finding immediately to the Owner.
- .3 Additional work required to protect new found heritage resources will be authorized by Change Order and valued in accordance with Section 00725 – General Conditions, Article 8.3 – Valuation of Changes in the Work.

1.6 SOCIO-ECONOMIC

- .1 Air Pollution:
 - .1 Prevent the discharge of atmospheric contaminants from construction operations in accordance with Regulatory Requirements.
 - .2 Do not operate equipment, including Construction Equipment, that shows excessive emissions of exhaust gases until corrective repairs or adjustments are made.

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.3 Control dust on the Site, and prevent dust from the Site from damaging crops, orchards, cultivated fields, and dwellings, or causing a nuisance to persons. Be responsible for damages from dust caused by construction operations.

.2 Light:

.1 Direct all stationary floodlights to shine downward at an angle less than horizontal. Provide shielding for all floodlights and do not direct at residences.

2. PRODUCTS - NOT USED

3. EXECUTION - NOT USED

END OF SECTION

1. GENERAL

1.1 REGULATORY RESPONSIBILITY

- .1 Conform to Regulatory Requirements and pay all fees and give all notices required by them.
- .2 Obtain approvals necessary for the Work and the Contract from the regulatory agencies having jurisdiction, except those approvals obtained by the Owner as identified in this section.
- .3 The Owner will obtain the approvals necessary for the Project that involve agreement between the Owner and the regulatory agency having jurisdiction.

1.2 VARIATIONS BETWEEN THE CONTRACT DOCUMENTS AND THE REGULATORY REQUIREMENTS

- .1 If the Contract Documents are at variance with Regulatory Requirements, notify the Owner in writing, requesting direction, immediately after such variance becomes known.
- .2 The Owner may make Changes in the Work due to Regulatory Requirements, and such changes will be authorized by Change Order and valued in accordance with Section 00725 - General Conditions, Article 8.3 – Valuation of Changes in the Work.
- .3 If the Contractor fails to notify the Owner in writing and obtain the Owner's direction related to variations in Regulatory Requirements and performs work knowing it to be contrary to Regulatory Requirements, the Contractor accepts responsibility for correcting violations thereof, and bears the costs, expenses, and damages attributable to the Contractor's failure to comply with the provisions of such Regulatory Requirements.

1.3 CONTRACT DOCUMENTS

- .1 Contractor shall not be responsible for verifying that Contract Documents comply with regulatory requirements. If Contract Documents are at variance therewith, or changes which require modification to Contract Documents are made to regulatory requirements, by authorities having jurisdiction, subsequent to date of tender closing, Contractor shall notify Engineer in writing, requesting direction, immediately such variance or change becomes known to him. Engineer may make changes required to Contract Documents and any resulting change in Contract Price or Contract Time will be made in accordance with the General Conditions of Contract.
- .2 If Contractor fails to notify Engineer in writing and obtain Engineer's direction as required in paragraph 1.3.1 and performs work knowing it to be contrary to regulatory requirements, Contractor shall be responsible for and shall correct violations thereof and shall bear costs, expenses and damages attributable to his failure to comply with provisions of such regulatory requirements.

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1.4 NATIONAL BUILDING CODE

- .1 Conform to and perform work in accordance with the National Building Code, except as otherwise indicated in the Contract Documents.

1.6 PERMITS

- .1 Development Permit: Owner will apply for, obtain, and pay for development permit if required.
- .2 Building Permit:
 - .1 Apply for, obtain and pay for building permit and other permits required for the Work and its various parts.
 - .2 Display the building permit and such other permits in a conspicuous location at the Place of the Work.
- .3 Occupancy Permits:
 - .1 Where required by authority having jurisdiction, apply for, obtain, and pay for occupancy permits, including partial occupancy permits.
 - .2 Where Contract Document deficiencies are required to be corrected in order to obtain occupancy permits, including partial occupancy permits, Engineer will issue appropriate instructions to correct the Work.
 - .3 Turn occupancy permits over to Engineer.

1.7 LINEAR LAND RECLAMATION

- .1 Adhere to all requirements as stipulated by Water Security Agency relative to linear land reclamation of pipeline right of ways.

2. PRODUCTS - NOT USED

3. EXECUTION - NOT USED

END OF SECTION

1. GENERAL

1.1 WORK SITE SAFETY – THIS CONTRACTOR IS “PRIME CONTRACTOR”

- .1 For the purposes of the *Occupational Health and Safety Act* (Saskatchewan), and for the duration of the Work of this Contract:
 - .1 be the “prime contractor” for the “work site”; and
 - .2 do everything that is reasonably practicable to establish and maintain a system or process that complies with the Act and its regulations, and as required to provide for the health and safety of all persons at the “work site.”
- .2 Direct all Subcontractors, Sub-subcontractors, Other Contractors, employers, workers, and any other persons at the “work site” on safety related matters, to the extent required to fulfill “prime contractor” responsibilities pursuant to the Act, regardless of:
 - .1 whether or not any contractual relationship exists between the Contractor and any of these entities; and
 - .2 whether or not such entities have been specifically identified in this Contract.

1.2 CERTIFICATE OF RECOGNITION (COR)

- .1 The Owner may require the Contractor maintain a valid COR for the duration of the Work of this Contract.

1.3 SAFETY REQUIREMENTS

- .1 Establish and maintain a system or process to provide for the safety for all persons at the Site during the Contract Time, including:
 - .1 the development and implementation of satisfactory safety plans for all aspects of work and the co-ordination of all plans;
 - .2 the establishment of a safety committee; and
 - .3 conducting safety meetings and workplace orientation meetings.
- .2 Communicate and co-operate on safety matters with the Owner and Occupational Health and Safety.
- .3 Comply with federal, provincial, and municipal legislation, including the Workplace Hazardous Materials Information System.
- .4 Rectify unsafe conditions, and be responsible for all related costs and delays.
- .5 Advise the Owner as soon as possible of all accidents.

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- .6 Investigate any accident that causes injury, and complete accident forms and prepare accident reports.
- .7 Provide and maintain a first aid room and equipment as required by the Occupational Health and Safety Regulations.
- .8 Maintain first aid supplies, space, and trained personnel on Site as required by the Occupational Health and Safety Regulations.
- .9 Have at least one qualified first aider on Site for each work shift.

1.4 SUBMITTALS

- .1 Provide the following submittals.
- .2 The Certificate of Recognition (COR) prior to commencing Work at the Site may be required.
- .3 The Contractor's safety plan, including the Contractor's safety policy, safety procedures, and a safety education program, at least 10 days prior to commencing Work at the Site.
- .4 The name of the person responsible for supervision of the Contractor's safety plan at the Site prior to commencing Work at the Site.
- .5 The names of workers qualified as first aiders prior to commencing Work at the Site including monthly updates.
- .6 At the end of each month, a list of accidents including lost time injuries incurred for the month, and a cumulative summary of all accidents and total lost time including a comparison with the total work time since the start of the Contract.
- .7 Completed accident forms and reports as soon as possible.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

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1. GENERAL

1.1 QUALITY CONTROL

- .1 Establish and maintain an effective quality control system including quality control procedures and testing to ensure compliance with the requirements of the Contract Documents.
- .2 Conduct tests incorporated in the quality control system and as required in the Specifications.
- .3 Engage qualified personnel, professional engineers, and independent CSA certified materials engineering and testing companies to carry out designs and to perform tests when required by the Specifications.

1.2 QUALITY ASSURANCE

- .1 The Owner will perform quality assurance testing and inspection as the Owner deems appropriate.
- .2 Co-operate with the Owner and provide assistance required by the Owner for testing, inspection, and sampling; provide access including off-Site locations; and provide equipment and labour to obtain samples.
- .3 If the quality assurance testing identifies quality deficiencies, the extent of removal and replacement of potentially deficient materials will be at the discretion of the Owner and will include, at least, all related materials placed after the Owner's previous quality assurance testing indicated acceptable quality.
- .4 If the quality assurance testing identifies ongoing quality deficiencies, submit to the Owner in writing, proposed revisions to the quality control procedures and testing that will prevent quality deficiencies. Continue the work only when the proposed quality control revisions have been reviewed with no exceptions taken by the Owner and implemented by the Contractor.

1.3 TESTING BY CONTRACTOR

- .1 Contractor shall furnish to Engineer, upon request, test results from testing performed by Contractor.

1.4 TESTING BY OWNER

- .1 Owner reserves the right to employ services of independent testing agencies to establish if work complies with Contract Documents. Owner will appoint and pay for services of such testing agency.
- .2 Where tests or inspections, by Owner appointed testing agency, indicate work is not in accordance with the Contract Documents, additional tests or inspections, as Owner may require, to verify acceptability of corrected work, shall be paid for by Contractor.

1.5 REFERENCE STANDARDS

- .1 Within the text of these specifications, reference may be made to the following standards:
 - .1 ANSI - American National Standards Institute
 - .2 ASTM - American Society for Testing and Materials
 - .3 CGSB - Canadian General Standards Board
 - .4 CSA - Canadian Standards Association
 - .5 CAN 2- National Standard of Canada (published by CGSB)
 - .6 FM - Factory Mutual Engineering Corporation
 - .7 ULC - Underwriters Laboratories of Canada
 - .8 CAN 3 – National Standard of Canada (publish by CSA)
- .2 The testing of materials may be requested by the Owner, to prove conformance with Standards, and shall be paid for by the Contractor.
- .3 The referenced standard and any amendments in force on the day of receipt of tenders shall be applicable to the work during the duration of the Contract.

2. PRODUCTS - NOT USED

3. EXECUTION - NOT USED

END OF SECTION

1. GENERAL

1.1 EXISTING UTILITIES

.1 Contractor's General Responsibilities

- .1 The approximate existence of service lines known to the Owner are indicated in the Contract Documents. Confirm the number, type, location and elevation of all existing service lines. Contact the appropriate Utility to locate all lines, conduits, and other such structures. Notify the Owner if any service lines have been omitted from or are incorrectly specified in the Contract Documents.
- .2 Identify, stake, and flag all existing service line locations and elevations. Maintain staking and flagging.
- .3 Notify the appropriate Utility prior to carrying out operations in the vicinity of the service lines. Comply with the requirements of, and co-operate fully with, each Utility for the location and protection of the service lines during the Work.
- .4 Be responsible to the Utility for any claims resulting from damage to the service lines as a result of the Contractor's construction operations.
- .5 Promptly notify the Utility and the Owner in the event of any damage or interruption to any services caused by the Contractor's construction operations. Co-operate with the Utility in the restoration of service as promptly as possible and bear all costs arising from the damage or interruption.
- .6 Excavation adjacent to power poles may require the poles to be supported. Contact the Owner of the power poles to determine if pole supporting is required for the construction methodology employed. Support power poles as necessary to complete the work.
- .7 At no time interfere with the operations of existing utilities.
- .8 Notify the utility owner at least 48 hours in advance of any interruption required for purposes of the work of an affected utility.
- .9 Co-ordinate the timing of the connections with the affected Owner of the specific utilities as required for the construction works.
- .10 Do not operate any existing water main valves and hydrants.
- .11 Only the utility owner's personnel shall operate the utility.
- .12 Advise the proper authorities and Fire Departments of hydrants which will be out of commission, so that alternate fire protection can be provided for.
- .13 Install a non-shrink grout plug at each end of any abandoned pipe that is not removed during construction.

- .14 Meet Occupational Health and Safety (OH&S) regulations and requirements for all work associated with asbestos cement water materials.
- .2 Utility Crossings
 - .1 The shallow Utility Owner(s) shall complete all relocation, modification, and repair work as highlighted in the drawings. The costs of shallow utility relocations, modifications, and repairs undertaken by the shallow Utility Owner(s) and shown on the drawings shall be borne by the Owner. All other shallow utility relocations, modifications, and repairs shall be borne by the Contractor.
 - .2 Co-ordinate all relocation, modification and repair work with the construction schedule and assist the utility Owner where needed. No separate payment will be made for this work.
- .3 Hydro Excavation
 - .1 Hydro excavation shall be used to locate and expose existing utilities to be crossed by the underground utility works.
 - .2 The hydro excavation work includes locates; hydro excavation; measuring and recording of the hydro excavation information; securing and protecting the locate holes; and sand backfill.
 - .3 No separate payment will be made for relocating of existing utilities that were previously hydro excavated and measured for payment.
 - .4 No separate payment will be made for hydro excavating of shallow utilities related to roadwork unless approved by the Owners representative.
 - .5 Provide monthly written statements to the Owners representative for the hydro excavation hours for review and approval. Keep a running total of approved hydro excavation hours to date and shall provide that information to the Owners representative upon request.

1.2 TEMPORARY UTILITIES

- .1 Provide the specified temporary utilities and as otherwise required in order to execute the Work expeditiously. Remove the temporary utilities from the Site upon completion of the Work unless specified otherwise.
- .2 Co-ordinate and pay for all required temporary utility work.
- .3 Temporary Power and Light
 - .1 Provide power for the Owner's Site office, as applicable.

- .2 Arrange for connection with the appropriate Utility. Pay all costs for installation, maintenance, power consumption, and removal.
- .3 Provide and maintain sufficient temporary power for all construction equipment required to carry out the Work.
- .4 Provide and maintain adequate lighting to safely perform the Work. Provide white light for night construction. Avoid light pollution off the Site.
- .5 Where failure of the normal lighting system would endanger workers, provide an emergency lighting system capable of producing sufficient dependable illumination to enable the workers to:
 - .1 leave the worksite;
 - .2 initiate emergency shut-down procedures; or
 - .3 restore normal lighting.
- .4 Temporary Heating and Ventilation
 - .1 Provide temporary heating for the Owner's Site office (as applicable) including maintenance and fuel consumption during the period of construction up to the date of Substantial Performance. Design the heating system for a temperature differential of 60°C and to be capable of maintaining a minimum temperature of 16°C.
 - .2 Provide temporary heating for construction as specified in the Contract Documents.
- .5 Temporary Water Supply
 - .1 Provide a continuous supply of potable water for the Owner's Site office, as applicable.
 - .2 Provide a continuous supply of potable water to affected residence, institutions and businesses as required in order to execute the work expeditiously. Remove the temporary utilities from the site upon completion of the work unless specified otherwise.
 - .3 Pay all costs of providing the temporary works and the potable water used for construction purposes.
 - .4 Provide and maintain appropriate temporary fire protection equipment during the performance of the work as required.
- .6 Temporary Sanitation Facilities
 - .1 Provide and maintain temporary sanitary facilities on site for work as required by

legislation.

- .2 Provide sanitation facilities for the Owner's Site office, as applicable.
- .3 Arrange and pay all costs for installation, maintenance, and removal.
- .4 Re-establish sanitary services to affected residences, institutions and businesses as required to execute the work as quickly as possible.
- .7 Temporary Natural Gas or Propane Supply
 - .1 Provide a continuous supply of natural gas or propane for the Owner's Site office, as applicable.
 - .2 Arrange for connection with the appropriate Utility and pay all costs for installation, maintenance, and removal.
 - .3 Pay for utility charges.

1.3 CROSSING AGREEMENTS

- .1 Owner has made application for all required utility crossing agreements. Do not commence work on the utility crossings portion of the project until the Owner has obtained the agreements.
- .2 Meet the requirements of the applicable crossing agreements when undertaking all utility crossing work.
- .3 A copy of the crossing agreement will be provided to the Contractor once issued.
- .4 The Owner's representative and the Owner offer no interpretation of the crossing agreements. It is the responsibility of the Contractor to determine how to utilize the information provided to determine how the proposed work will be installed; and to provide all necessary equipment and labour for such installation. Any unforeseen delays or costs as a result of the crossings are the responsibility of the Contractor.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

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1. GENERAL

1.1 GENERAL

- .1 Provide and maintain temporary buildings required to perform the Work.
- .2 Locate temporary buildings within the specified area.

1.2 SITE OFFICE

- .1 Provide a separate building for the Contractor's Site office in accordance with the following:
 - .1 Provide Contractor's Site Office with at least two rooms consisting of a room for the Contractor's Site office and a meeting room.
 - .2 Provide area for meeting space for 8 persons with tables and chairs for site meetings.
 - .3 Provide janitorial service for the building.
 - .4 Provide temporary utilities as specified in Section 01510 – Existing and Temporary Utilities.
 - .5 Maintain Contractor's Site Office on site during the period between the start of construction and the date of Substantial Performance.
- .2 Provide a separate room for the Engineer's Site office within the Contractor's Site office in accordance with the following:
 - .1 Provide Engineer's Site Office with a minimum floor area of 20 m² consisting of one room.
 - .2 Furnish the Engineer's Site Office with one office desk, one layout table for plans, one filing cabinet, two chairs, shelves, waste baskets, etc.
 - .3 Provide temporary utilities as specified in Section 01510 – Existing and Temporary Utilities. In addition, provide the following:
 - .1 High speed internet access.
 - .2 Access to fax machine (fax machine may be located in Contractor's Site office).

1.3 FIRE PROTECTION

- .1 Provide and maintain appropriate temporary fire protection equipment during the performance of the Work as required by Regulatory Requirements.

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2. **PRODUCTS** – **NOT USED**

3. **EXECUTION** – **NOT USED**

END OF SECTION

1. GENERAL

1.1 REFERENCES

- .1 Provide traffic accommodation in accordance with the latest edition and revisions of the Ministry of Highways and Infrastructure – “Traffic Control Device Manual for Work Zones”, unless otherwise specified.
- .2 All traffic accommodation signage shall be in accordance with the latest edition of the “Manual of Uniform Traffic Control Devices for Canada” by the Traffic Association of Canada (TAC).

1.2 EXISTING ROADS

- .1 Protect the integrity of existing road structures including using suitably sized equipment and implementing construction procedures that will minimize damage to the structures.
- .2 Determine the condition and availability of public roads, clearances, restrictions, bridge load limits, bond requirements, conditions of use, and other limitations that may affect ingress to and egress from the site.
- .3 Complete a detailed video survey of all roadways and private property that may be used or impacted by the construction activities, prior to commencing any construction activities. The video survey will establish the condition of those areas prior to construction and will be the basis for any restoration work that may arise. Provide a copy of the video survey to the Owners Representative within 7 days of commencement of work.
- .4 Clean existing roads impacted by the construction activities, as directed by the Owners Representative and at no cost to the Owner.
- .5 Motor scrapers, rock trucks or tracked equipment are not permitted to travel on highways, bridges, irrigation works, paved roadways and lanes.
- .6 Do not block or impede access roads or driveways to local landowner residences located adjacent to the work sites.

1.3 TEMPORARY ACCESS ROADS, HAUL ROADS AND DETOURS

- .1 Design and construct all temporary roads, crossings across existing irrigation works, temporary bridges, and drainage structures required for construction operations.
- .2 Provide detours required for the execution of the Work.
- .3 Confine construction traffic to the limits of temporary roads and avoid disturbances to adjacent lands.
- .4 Contain hauled material in vehicles, and keep routes clear of mud, fallen rock, and debris resulting from construction operations.

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- .5 Control dust, remove snow, and maintain road surfaces daily or at frequent intervals depending upon weather or traffic and as required by the Owner.
- .6 Reclaim all haul roads when they are no longer required. Scarify, grade to original contours, cultivate, replace topsoil, and seed to grass.

1.4 TRAFFIC ACCOMMODATION STRATEGY

- .1 Comply with all requirements of the road authority having jurisdiction over public roads used by the Contractor in the execution of the Work.
- .2 Determine the condition and availability of public highways and roads, clearances, restrictions, bridge load limits, bond requirements, and other limitations that may affect ingress to and egress from the Site.
- .3 Comply with applicable load regulations during hauling of materials and equipment over public highways, roads, or bridges. Minimize interference with local traffic.
- .4 Keep public highways and roads impacted by the Work open to traffic and passable at all times.
- .5 Retain qualified personnel or organizations specializing in such work to develop a Traffic Accommodation Strategy in accordance with Ministry of Highways and Infrastructure – “Traffic Control Device Manual for Work Zones” documents and the requirements of other road authorities having jurisdiction.
- .6 The Traffic Accommodation Strategy work includes all equipment, material and labour required for the preparation, notification, implementation, modification, maintenance and removal component works necessary to complete the contract work.
- .7 The major components of the Traffic Accommodation works includes the following:
 - .1 Preparation:
 - .1 Utilize any traffic accommodation plans provided in the contract drawings as a basis to develop a plan for their work schedule. Assume ownership of any information from the provided traffic accommodation plan that is used to develop the traffic accommodation plan work.
 - .2 Prepare and provide the Owners Representative a copy of their proposed traffic accommodation plan for review and comment a minimum of 14 days prior to implementation. Accommodating review comments is considered incidental.

- .3 Undertake a detailed video survey of all highway, bridges, irrigation works, roadways, and lanes to be used or impacted by the Traffic Accommodation Strategy work. The video survey will establish the condition of those areas as the basis for any restoration work that may arise. Provide a copy of the video survey to the Owners Representative within 7 days of commencement of traffic accommodation works.
- .2 Notifications:
 - .1 At least 14 days prior to implementation of the traffic accommodation plan, provide written notification to the proper authorities including emergency services of proposed traffic accommodation works, detours, road closures and alternate traffic routes.
 - .2 Seven days prior to implementation of the traffic accommodation plan, distribute written construction notifications to all affected residences, businesses, institutions and facilities informing them the nature of the work to be performed, how long the inconvenience will last, who to contract to register any complaint/claim. Submit the proposed notification to Owners Representative for review and comment prior to distribution to the public.
- .3 Implementation:
 - .1 Supply and install all detours, construction signage, traffic control and information signage required by their traffic accommodation plan and that is necessary to protect the work site and the safety of the workers and the public. The signage may include arrow boards, traffic signalization, barricades, delineators, glow posts, flashers, flashing lights, flagmen and associated items.
 - .2 Supply and install all protective measures required by their traffic accommodation plan necessary to protect the work site and the safety of the workers and the public. The protective measures may include barricades, protective barriers, fences, delineators, glow posts, flashers, flashing lights, flagmen and associated items.
 - .3 Provide qualified flagmen to control traffic at all locations where the Contractor's operations interfere with public highways, roads, and detours.
 - .4 The Owner will not provide any signage, protective measures or such items.
 - .5 Provide and maintain a barrier between his work site and the public, where possible.
 - .6 Safeguard all on-site equipment and materials.

.4 Modification:

- .1 Supplement, modify and/or improve the traffic accommodation works on an ongoing basis to meet any vehicle and/or pedestrian traffic issues that may arise. This may include the addition or deletion of signage, protective measures and associated works. All modifications must be documented, submitted and reviewed by the Owners Representative prior to implementation.

.5 Maintenance:

- .1 When working onsite, check and maintain all traffic accommodation signage and protective measures work at least three times daily or as required. All maintenance items shall be remedied immediately upon notification.
- .2 When not working onsite, check and maintain all traffic accommodation signage and protective measures work at least twice daily or as required. All maintenance items shall be remedied immediately upon notification.
- .3 Check, maintain and repair all traffic accommodation signage and protective measures for the duration of the work to ensure a safe protected route for both pedestrian and vehicular traffic at all times.
- .4 Promptly provide dust control and repair any damage to public highways, roads, and bridges resulting from traffic accommodation works in order to maintain public safety, access and use.

.6 Removal:

- .1 At the completion of the contract work, remove all traffic accommodation signage and protective measures. All covered/salvaged permanent signage removed during construction shall be uncovered/re-installed.
- .2 Upon achieving substantial performance of the Contract work, the Contractor, Owners Representative and Owner shall review all traffic accommodation works and detour routes to determine if any corrective works are required. Any corrective work will be included in the project deficiency list. All corrective work is considered incidental.

2. **PRODUCTS** – **NOT USED**

3. **EXECUTION** – **NOT USED**

END OF SECTION

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1. GENERAL

1.1 REFERENCES

- .1 Reference are made to standards as listed in the Specifications.
 - .1 Conform to these standards, in whole or in part, as required in the Specifications.
 - .2 Conform to the latest date of issue of the standards in effect on the date of the submission of bids, except where another date or issue is specified.

1.2 SUBMITTALS

- .1 Provide the following submittals.
- .2 When requested by the Owner, a complete description of the procedures for installing the product.
- .3 When requested by the Owner, appropriate design calculations for the products to be installed.

1.3 DELIVERY, STORAGE, AND HANDLING

- .1 Inspect each shipment of products and timely replace any missing or damaged items.
- .2 Handle and store products in a manner to prevent damage, alteration, deterioration, and soiling, and in accordance with the manufacturer's written instructions when applicable.
- .3 Store packaged or bundled products in original and undamaged condition with the manufacturer's seal and label intact. Do not remove products from packaging or bundling until required in the Work.
- .4 Store products subject to damage from weather in weatherproof enclosures.

2. PRODUCTS

2.1 PRODUCT QUALITY

- .1 Provide products that conform to the Contract Documents, are new, not damaged or defective, and of the best quality (compatible with the Specifications) for the purpose intended. If requested by the Owner, furnish evidence as to the type, source, and quality of products provided.
- .2 Defective products, whenever identified prior to the completion of the Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility from the Contractor, but provides a precaution against oversight or error.

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- .3 Unless otherwise indicated in the Contract Documents, maintain uniformity of manufacture for any particular or like items.
- .4 Do not place permanent labels, trademarks, or nameplates on products in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

2.2 PRODUCT AVAILABILITY

- .1 Immediately upon signing Contract, review Product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of Products are foreseeable, notify the Owner's Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In the event of failure to notify the Owner's Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Owner's Representative reserves the right to substitute more readily available Products of similar character, at no increase in Contract Price.

3. EXECUTION

3.1 PRODUCT CONTROL

- .1 Maintain an inventory of all products delivered to the Site and placed in temporary storage.
- .2 Record the use of products during the course of construction.
- .3 When requested by the Owner, provide inventory records for verification of quantities.

3.2 TRANSPORTATION, STORAGE, HANDLING AND PROTECTION

- .1 Pay costs of transportation of products required in the performance of Work.
- .2 Handle and store products in a manner to prevent damage, alteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .3 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and label intact. Do not remove from packaging or bundling until required in the Work.
- .4 Store products subject to damage from weather in weatherproof enclosures.
- .5 Store cementitious products clear of earth or concrete floors, and away from structures or undrained depressions.
- .6 Store and handle miscellaneous steel products and reinforcing steel by methods such that materials are not contaminated by mud, soil, dust or other debris.

- .7 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .8 Stockpile sand, gravel or processed granular materials on a well drained prepared pad with low exposure to dust accumulation.
- .9 Store sheet materials and lumber in flat, solid supports and keep clear of ground. Slope to shed moisture.
- .10 Remove and replace damaged products at own expense and to the satisfaction of the Owner.

3.3 INSTALLATION STANDARDS

- .1 Unless otherwise specified in the Contract Documents, install products in accordance with the manufacturer's instructions. Do not rely on labels or enclosures provided with the products. Obtain written instructions directly from the manufacturers.
- .2 Notify the Owner, in writing, of conflicts between the Contract Documents and the manufacturer's instruction, so that the Owner may establish a course of action.

3.4 REMEDIAL WORK

- .1 Repair or replace the parts or portions of the Work identified by the Owner as defective or unacceptable.
- .2 Retain specialists familiar with the products affected to perform remedial work in a manner that neither damages nor endangers any portion of the Work.

END OF SECTION

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1. GENERAL

1.1 DEFINITIONS

- .1 “Proprietary Specification” means a specification that lists one or more proprietary names of products or manufacturers and may also include descriptive language, references to standards, or lists performance requirements, or any combination thereof.
- .2 “Non–proprietary Specification” means a specification that uses descriptive language, references to standards, or lists performance requirements, or any combination thereof, but does **not** include proprietary names of products or manufacturers.
- .3 “Substitute Product” means a product not specified by proprietary name that may be acceptable in place of a product which is specified by proprietary name.
- .4 “Substitute Manufacturer” means a manufacturer not specified by proprietary name that may be acceptable in place of manufacturer which is specified by proprietary name.
- .5 “Substitution” means a Substitute Product or Substitute Manufacturer.

1.2 PRODUCT OPTIONS

- .1 For products specified by Non–proprietary Specification:
 - .1 select any product by any manufacturer that meets the requirements of the Contract Documents.
- .2 For products specified by Proprietary Specification:
 - .1 select any product or manufacturer named; or
 - .2 select a substitute product or manufacturer in accordance with Article 1.3.
- .3 For products specified by Proprietary Specification and accompanied by words indicating that substitutions will not be accepted:
 - .1 select any product or manufacturer named; Substitutions will not be permitted.

1.3 SUBSTITUTIONS

- .1 Where Substitute Products are permitted, unnamed products will be authorized by the Owner, subject to the following:
 - .1 Substitute Products shall be the same types as, be capable of performing the same functions as, and meet or exceed the standards of quality and performance of the named product(s). Substitute Products shall not require revisions to the Contract Documents nor to work of Other Contractors.
- .2 Do not order or install Substitutions without the Owner’s authorization.

- .3 If, in the Owner's opinion, a Substitution does not meet the requirements of the Contract Documents, provide a product that, in the Owner's opinion, does meet the requirements of the Contract Documents.

1.4 CHANGES TO AUTHORIZED PRODUCTS AND MANUFACTURERS

- .1 Do not change products or manufacturers, authorized by the Owner for use in performance of the Work, without the Owner's written authorization.
- .2 Submit requests to change authorized products and manufacturers to the Owner in writing, including the product data indicated in Article 1.5.

1.5 PRODUCT DATA

- .1 When requested by the Owner, submit complete data substantiating compliance of a product with the requirements of the Contract Documents. Include the following:
 - .1 Product identification, including the manufacturer's name and address.
 - .2 Manufacturer's literature providing product description, applicable reference standards, and performance and test data.
 - .3 Samples, as applicable.
 - .4 Name and address of projects where the product has been used and the date of each installation.
 - .5 For Substitutions and requests for changes to authorized products, include, in addition to the above, the following:
 - .1 Itemized comparison of the substitution with the named product(s). List significant variations.
 - .2 Availability of maintenance services and sources of replacement products and parts.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL**1.1 SURVEY REFERENCE POINTS**

- .1 Primary horizontal and vertical survey reference points have been established by the Owner as specified in the Contract Documents. The Owner is responsible for the accuracy of the primary survey reference points.
- .2 Locate, confirm, and protect primary reference points prior to starting Work on the Site. Preserve permanent reference points during construction.
- .3 Make no changes to or relocations of the primary survey reference points without prior written authorization of the Owner.
- .4 Report to the Owner when a reference point is lost or damaged, or requires relocation because of the Work.
- .5 Replace damaged reference points in accordance with the original survey control.

1.2 CONTRACTOR SURVEY WORK

- .1 Employ qualified construction surveyors to perform survey work.
- .2 Record survey data in accordance with standard survey methods in a form acceptable to the Owner.
- .3 Establish secondary survey reference points required for laying out and staking the Work and for checking tolerances. Be solely responsible for the accuracy of the secondary survey reference points and the layout, staking, and checking of the Work.
- .4 Establish lines, grades, and elevations, and locate and lay out the Work.
- .5 Provide final grade staking of each line, grade or elevation required for the Owner's checking of the work and for measurement for payment purposes, as defined in Section 01280 – Measurement Schedule, for checking by the Owner. Maintain final grade stakes in place until the Owner has authorized their removal.
- .6 Provide such assistance as may be required by the Owner for carrying out surveys in Article 1.4.
- .7 Establish and maintain survey reference points in all work areas, including elevations and locations relative to established stationing and offset systems or otherwise required by the Owner. Provide reference points within 50 m horizontal distance and 2 m vertical distance of all locations where testing, observations of conditions, or other similar activities are undertaken by the Owner, such that the Owner can establish the location and elevations at those locations.
- .8 Immediately notify the Engineer if any discrepancies in the primary survey reference points are found.

1.3 GLOBAL POSITIONING SYSTEMS (GPS)

- .1 If GPS controlled excavation and trimming equipment is utilized in conjunction with GPS final grade checking, the Owner may waive the requirement for final grade stakes if the accuracy and consistency of the final grade check can be demonstrated.
- .2 If the final grade stake requirement is waived provide a surface grade sheet in electronic and hard copy of the electronic survey data in a format acceptable to the Owner.
- .3 The surface grade sheet to include the following minimum information.
 - .1 Station.
 - .2 Offset left or right of the centerline.
 - .3 Design elevation at the grade line break point.
 - .4 Actual elevation at the grade line break point.
 - .5 Deviation of the actual elevation from the design elevation.
 - .6 Indication if deviation is within specified tolerances.

1.4 OWNER'S SURVEY REQUIREMENTS

- .1 The Owner may carry out surveys, as the Owner deems necessary, to check the accuracy of the Contractor's layout and stakes.
- .2 The Owner will carry out surveys for the purpose of measuring the Work for payment.

1.5 SUBMITTALS

- .1 Provide the following submittals.
- .2 The name and address of the Contractor's surveyor to the Owner prior to commencing the Work at the Site.
- .3 When requested, submit a copy of reduced notes for surveys or portions of surveys to the Owner.
- .4 A certificate signed by the Contractor's surveyor confirming that the lines, grades, elevations, and dimensions of the completed Work are in conformance or not in conformance with the Contract Documents. Provide details of all non-conformances.
- .5 Electronic survey data files in a format acceptable to the Owner.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL

- .1 Perform final cleaning operations prior to the request for inspection for Total Performance.
- .2 Remove surplus products, tools, construction machinery, and equipment not required for the performance of the remaining Work prior to the request for inspection for Substantial Performance.
- .3 Remove waste products and debris resulting from the Work of the Contractor, and leave the Work clean and suitable for use by the Owner.
- .4 Repair, patch, and touch-up marred surfaces to match adjacent finishes.
- .5 Leave all surfaces in a neat, levelled condition.
- .6 Excavate and dispose of contaminated soils from equipment service and maintenance areas.
- .7 Excavate and dispose of excess soils including impervious, random, granular, and riprap materials.
- .8 Clean up and dispose of all foreign matter including wire, posts, logs, branches, roots, rocks, and construction debris.

2. PRODUCTS – NOT USED**3. EXECUTION – NOT USED****END OF SECTION**

1. GENERAL

1.1 SUMMARY OF PROCESS

- .1 A Contract acceptance process will be used to facilitate the Owner's acceptance of the Work. The process can be summarized as follows:
 - .1 Substantial Performance of the Work:
 - .1 Fulfilment of prerequisites to Substantial Performance.
 - .2 Inspection for Substantial Performance.
 - .3 Issuance of a Certificate of Substantial Performance.
 - .2 Total Performance of the Work:
 - .1 Fulfilment of prerequisites to Total Performance.
 - .2 Inspection for Total Performance.
 - .3 Issuance of a Certificate of Total Performance.
 - .3 Warranty Performance of the Work:
 - .1 Fulfilment of prerequisites to Warranty Performance.
 - .2 Inspection for Warranty Performance.
 - .3 Issuance of Certificate of Warranty Performance.

1.2 SUBSTANTIAL PERFORMANCE OF PART OF THE PERMANENT WORK

- .1 When utilization of part of the Permanent Work is required and Substantial Performance of part of the Permanent Work is a condition of such utilization, the applicable requirements specified in this section will apply to the part of the Permanent Work to be utilized.

1.3 PREREQUISITES TO SUBSTANTIAL PERFORMANCE

- .1 Prior to requesting the Owner's inspection for Substantial Performance carry out the following:
 - .1 Perform Initial Commissioning.
 - .2 Obtain and submit evidence of compliance with Regulatory Requirements.

- .3 Remove from the Site temporary facilities along with construction tools, equipment, mock-ups, and similar items not required for the performance of the remaining work.
 - .4 Correct all Contract Deficiencies that may affect operation of the canal and structures.
 - .5 Complete the Work and have it ready for the purpose intended except for the parts of the Permanent Work specified in Articles 1.3.2 and 1.6.
 - .6 Review the Contract Documents and inspect the Work to confirm that prerequisites to Substantial Performance have been fulfilled and that the Work is ready for inspection for Substantial Performance.
 - .7 Submit product warranties and extended warranties when specified in the Contract Documents.
 - .8 Make final change-over of locks and transmit keys to the Owner.
 - .9 Complete installation of architectural finish items, including all mechanical and electrical covers and trims.
- .2 Complete all work items such that the water treatment plant can be used for the purpose intended. Work that does not have to be completed to obtain Substantial Performance follows:
- .1 Final cleanup
 - .2 Record drawings

1.4 INSPECTION FOR SUBSTANTIAL PERFORMANCE

- .1 Submit a written request to the Owner for inspection for Substantial Performance, certifying that prerequisites have been fulfilled and specifying known exceptions in the form of a list of items to be completed, corrected, or submitted.
- .2 The Owner will, within a reasonable time after receipt of the Contractor's request:
 - .1 proceed with the inspection; or
 - .2 advise the Contractor that prerequisites are not adequately fulfilled.
- .3 Results of the Owner's inspection for Substantial Performance will form the Substantial Performance Contract Deficiency List (SPC Deficiency List).

1.5 SUBSTANTIAL PERFORMANCE OF THE WORK

- .1 Following inspection, the Owner will:

- .1 issue a Certificate of Substantial Performance of the Work stating the effective date of Substantial Performance, with a copy of the SPC Deficiency List attached; or
 - .2 advise the Contractor that prerequisites to Substantial Performance are not fulfilled and repeat the inspection for Substantial Performance as necessary.
- .2 Upon issuance of a Certificate of Substantial Performance of the Work, the Owner will assume responsibility for care, custody, and control of the Work, including responsibility for the following:
 - .1 Facility operation, including all systems and equipment.
 - .2 Maintenance.
 - .3 Security.
 - .4 Property insurance.
 - .5 Utility costs.

1.6 PREREQUISITES TO TOTAL PERFORMANCE

- .1 Prior to requesting the Owner's inspection for Total Performance carry out the following:
 - .1 Perform the entire Work, including the correction of all Contract Deficiencies, including items listed in Article 1.3.2 and except those items arising from the warranty provisions of the Contract Documents.
 - .2 Review the Contract Documents and inspect the Work to confirm that prerequisites to Total Performance have been met and that the Work is ready for inspection for Total Performance.

1.7 INSPECTION FOR TOTAL PERFORMANCE

- .1 Submit a written request to the Owner for inspection for Total Performance, including a copy of the Owner's most recent SPC Deficiency List, and certify that each Contract Deficiency has been corrected or otherwise resolved in a manner agreed to between the Owner and the Contractor. List known exceptions, if any, in the request.
- .2 The Owner will, within a reasonable time after receipt of the Contractor's request:
 - .1 proceed with the inspection; or
 - .2 advise the Contractor that prerequisites are not adequately fulfilled.

1.8 TOTAL PERFORMANCE OF THE WORK

- .1 Following the inspection, the Owner will:

- .1 issue a Certificate of Total Performance of the Work, stating the effective date of Total Performance; or
- .2 advise the Contractor of Contract Deficiencies that must be corrected prior to issuance of a Certificate of Total Performance of the Work.

1.9 PREREQUISITES TO WARRANTY PERFORMANCE

- .1 The prerequisites to Warranty Performance are:
 - .1 Total Performance of the Work;
 - .2 expiry of the warranty period; and
 - .3 correction of items arising from the warranty period required by the Contract Documents.

1.10 INSPECTION FOR WARRANTY PERFORMANCE

- .1 Just prior to the end of the warranty period, the Owner will conduct an inspection for Warranty Performance.

1.11 WARRANTY PERFORMANCE OF THE WORK

- .1 Following the inspection, the Owner will:
 - .1 issue a Certificate of Warranty Performance of the Work; or
 - .2 advise the Contractor of items that must be corrected prior to issuance of the Certificate of Warranty Performance of the Work.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL

1.1 DESIGNATION OF CONTRACT RECORD DOCUMENTS

- .1 At the commencement of the Work, the Owner will provide the following documents to be designated and retained as Contract Record Documents:
 - .1 One copy of the Specifications.
 - .2 Two complete sets of the Drawings.
 - .3 One set of all addenda issued.
- .2 Maintain one record copy of the following:
 - .1 Change Orders and other modifications to the Contract.
 - .2 Reviewed Shop Drawings, Product Data, and Samples.
 - .3 Field-test records.
 - .4 Inspection certificates.
 - .5 Manufacturers' certificates.
 - .6 Final survey data.
 - .7 Environmental Construction Operations Plan

1.2 MAINTENANCE OF CONTRACT RECORD DOCUMENTS

- .1 Store Contract Record Documents in the Contractor's Site office apart from documents used for construction. Provide files, racks, and secure storage.
- .2 Label each document "CONTRACT RECORD" in large, neatly printed letters.
- .3 Maintain Contract Record Documents in a clean, dry, and legible condition. Do not use these documents for construction purposes.
- .4 Keep Contract Record Documents available for inspection by the Owner. Revise the content of the documents as required prior to final submittal.
- .5 Maintain Contract Record Documents as work progresses. Record information for each area of work within 14 days after completion.

1.3 RECORDING INFORMATION ON CONTRACT RECORD DOCUMENTS

- .1 Record information on the Contract Record Documents provided by the Owner.
- .2 Use coloured erasable pencils to record information.
- .3 Use a different colour to record information pertaining to each major system.
- .4 Record changes and variations from the Drawings concurrently with construction progress. Do not cover any work until the required information is recorded.
- .5 Legibly mark Contract Record Drawings to record actual construction, including the following:
 - .1 Measured dimensions, depths, elevations, and horizontal co-ordinates of foundation excavations and fill surfaces, including the interfaces of fill zones.
 - .2 Measured dimensions, elevations, and horizontal co-ordinates of structure components and foundations.
 - .3 Measured depths, elevations, and horizontal co-ordinates of underground utilities and appurtenances. Reference locations to permanent surface improvements.
 - .4 Measured depths, elevations, and horizontal co-ordinates of internal utilities and appurtenances covered in construction. Reference to visible and accessible features of construction.
 - .5 Measured depths, elevations, and horizontal co-ordinates of instrumentation installed in foundations and structures.
 - .6 Field changes of dimensions and details.
 - .7 Changes to equipment layout and services.
 - .8 Details not on the original Drawings.
 - .9 References to related Shop Drawings and modifications.
- .6 Legibly mark the Specifications to record actual construction including the following:
 - .1 Manufacturer trade name and catalogue number of each product actually installed, particularly optional and substitute items.
 - 2. Changes made by addenda and Change Orders.
- .7 Maintain other documents including manufacturer's certifications, inspection certifications, field test records required by individual Specification sections.

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1.4 SUBMITTALS

- .1 Provide the following submittals.
- .2 Prepare Contract Record Drawings at least monthly throughout the course of the Work as the information becomes available or the information is received. The Owner's representative will check the Contract Record Drawings and confirm the accuracy of the information by field notes, surveys, photographs, or other field observation methods and return the Contract Record Drawings to the Contractor after review for ongoing revisions.
- .3 Completed Contract Record Documents before or with the request for inspection for Total Performance. The owner reserves the right to withhold monies until record documents are provided.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

7603-002-00

1. GENERAL

1.1 DESCRIPTION OF TYPES OF OPERATION AND MAINTENANCE DATA

- .1 The following documents are designated as Operation and Maintenance Data.
- .2 For systems designed by the Contractor, Contractor Designed System Data includes the following:
 - .1 System Design and Performance Criteria.
 - .2 System and Controls Descriptions.
 - .3 System and Controls Schematics.
 - .4 Operating Instructions.
 - .5 Equipment Data.
 - .6 Other data as required by the Owner.
- .3 Installation Instructions includes the manufacturer's printed instructions describing the recommended installation procedures, and photographs, video footage, and computer software.
- .4 Operating Instructions includes the manufacturer's printed instructions describing proper operation, and photographs, video footage, and computer software.
- .5 Equipment Identification includes the nameplate information for each piece of equipment, in a form, and with content acceptable to the Owner.
- .6 Maintenance Instructions includes the manufacturer's printed instructions describing the manufacturer's recommended maintenance and photographs, video footage, and computer software.
- .7 Spare Parts Lists includes parts lists and the manufacturer's recommended maintenance products and spare parts.
- .8 Suppliers and Contractors List includes a list of Contractor, Subcontractors, and Suppliers who supplied and installed equipment, systems, materials, or finishes, organized by the Division of Specifications and system, and company names, addresses, and telephone numbers.
- .9 Tag Directory includes a directory identifying tag number and equipment description and location.
- .10 Drawings List includes a list of Drawings.
- .11 Shop Drawings includes the final reviewed Shop Drawings.

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- .12 Product Data includes the manufacturer's product data for equipment, systems, materials, and finishes, and photographs, video footage, and computer software.
- .13 Material Safety Data Sheets (MSDS) includes the MSDS for all relevant products.
- .14 Certifications includes the following:
 - .1 Copies of inspection reports prepared by authorities having jurisdiction.
 - .2 Certified copies of test reports prepared by independent testing agencies.
 - .3 Any other certificates required by the Contract Documents.
- .15 Warranties and Bonds include the Owner's copy of manufacturer's warranties, maintenance bonds, and service contracts.
- .16 Reports includes the following:
 - .1 Documentation certifying the performance of tests required by the Contract Documents and the results of those tests.
 - .2 Documentation of other material, equipment, or system related information required by the Contract Documents.

1.2 OPERATION AND MAINTENANCE MANUAL BY THE CONTRACTOR

- .1 Prepare the operation and maintenance manual as follows:
- .2 General organization of each volume:
 - .1 Include the following in each volume:
 - .1 Title page.
 - .2 Table of contents. Identify volume number where listed information is located.
 - .3 Ten percent free space for additional data.
 - .2 Present textual information, schematics and data on 21.5 X 28 cm, 75 g/m2, white bond paper.
- .3 Manual contents Organization
 - .1 For each major equipment, system, materials or finishes area, organize operation and maintenance data as follows:
 - .1 Operation Division: include the following, as applicable:
 - .1 System Design Criteria.

- .2 System and Controls Descriptions.
 - .3 System and Controls Schematics.
 - .4 Operating Instructions.
 - .2 Maintenance Division: include the following, as applicable:
 - .1 Maintenance Tasks and Schedules.
 - .2 Spare Parts.
 - .3 Suppliers and Contractors.
 - .4 Tags and Directories.
 - .3 Contract Document Division: include the following, as applicable:
 - .1 Drawings List.
 - .2 Shop Drawings and Product Data.
 - .3 Certifications.
 - .4 Warranties and Bonds.
 - .5 Maintenance Brochures.
 - .6 Reports.
- .4 Document Binding Methods
 - .1 Standard 21.5 X 28 cm sheets: punch sheets to fit binder.
 - .2 Sheets up to 28 X 41.5 cm: punched and neatly folded to allow use without removing from binder.
 - .3 Drawings larger than 28 X 41.5 cm: insert drawings in sturdy vinyl envelopes with reinforced binding holes, open on one side and overall folded size not exceeding 21.5 X 28 cm. Do not punch holes in drawings.
- .5 Binders
 - .1 Commercial quality, fabric coated, hard covers attached to spine with metal piano hinges, three post, designed to accommodate 21.5 X 28 cm paper. Maximum 100 mm thick.
 - .2 Silk-screen project title and identification, in gold, on front cover and spine of binder. All binders to be forest green with gold lettering.

- .3 Covers to read as follows:

Operation and Maintenance
Manual

English River Property Management

Wastewater Treatment Plant Facility

2022

Prime Consultant: MPE Engineering Ltd.

General Contractor:

Mechanical Contractor:

Electrical Contractor:

The Spine to read as follows:

Operation and Maintenance
Manual

English River Property Management

Wastewater Treatment Facility

2022

- .4 Divider tabs:

- .1 Heavy-weight coloured paper, mylar laminated with tab number and title printed on tab as follows.
- .2 Main divisions: white tabs, labelled with division name, 2 bank tab length.
- .3 Sections of a main division: colour coded tabs, labelled with section name, 4 bank tab length.
- .4 Subsections: same colour tabs as the section, printed label, 8 bank tab length.
- .5 Co-ordinate tab colour codes and labelling format with the Owner.

1.3 **CONTRACTOR PREPARED ELECTRONIC OPERATION AND MAINTENANCE MANUAL**

- .1 General Organization:

- .1 Include the following in each volume:

- .1 Title page.
- .2 Table of contents. Identify volume number where listed information is located.
- .2 Present textual information, schematics and data in single PDF file.
- .2 Manual Contents Organization:
 - .1 For each major equipment, system, materials or finishes area, organize operation and maintenance data as follows:
 - .1 Summary page:
 - .1 Includes equipment name and tag number.
 - .2 Operation Division: include the following, as applicable:
 - .1 System Design Criteria.
 - .2 System and Controls Descriptions.
 - .3 System and Controls Schematics.
 - .4 Operating Instructions.
 - .3 Maintenance Division: include the following, as applicable:
 - .1 Maintenance Tasks and Schedules.
 - .2 Spare Parts.
 - .3 Suppliers and Contractors.
 - .4 Tags and Directories.
 - .4 Contract Document Division: include the following, as applicable:
 - .1 Drawings List.
 - .2 Shop Drawings and Product Data.
 - .3 Certifications.
 - .4 Warranties and Bonds.
 - .5 Maintenance Brochures.
 - .6 Reports.

- .2 Title page to read as follows:

Operation and Maintenance
Manual

English River Property Management

Wastewater Treatment Facility

2022

Prime Consultant: MPE Engineering Ltd.

General Contractor:

Electrical Contractor:

- .3 Organization of Electronic Data:

- .1 Equipment operation and installation manuals, dimensional drawings, specifications, and exploded diagrams are to be provided in PDF format. Most equipment suppliers provided this information in PDF format. If equipment information is not provided in PDF format, scanning original copies of equipment data is acceptable. The PDF document should be formatted so that document can be printed to 8 1/2" x 11" sheets of paper.
- .2 Images shall be scanned at a resolution of 300 dpi or greater. Word searches of the PDF must operate successfully.
- .3 Create bookmarks in the navigation frame for each entry in the Table of Contents. Include all tag numbers in bookmark.
- .4 Thumbnails must be generated for each PDF file.
- .5 Set bookmark to equipment and/or division section summary page.
- .6 File Storage:
 - .1 PDF files to be stored on DVD's
 - .2 Discs and jewel cases to be labeled to read the same as the title page. Incorporate Municipality's, Engineer's, and Contractor's logo onto labels.

1.4 SUBMITTALS

- .1 Provide the following submittals:
- .1 One draft copy of the operation and maintenance manual prior to requesting inspection for Substantial Performance.
 - .2 Two hard copies and one digital copy of the completed operation and maintenance manual prior to requesting inspection for Total Performance.

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- .2 The Owner reserves the right to withhold any amount of payment up to a maximum of \$5,000 until the Contractor provides satisfactory copies of the O&M manuals.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

7603-002-00

1. GENERAL

1.1 SOURCE OF SUPPLY

- .1 Provide spare parts manufactured by original equipment manufacturer.
- .2 Provide maintenance materials identical to those installed.

1.2. DELIVERY, STORAGE, AND HANDLING

- .1 Deliver required items to the Place of the Work and store in temporary locations determined by Contractor or permanent locations designated by Owner.
- .2 Deliver and store items in original factory packaging or other securely packaged form.
- .3 Identify, on carton or package, name of item, colour or part number, as applicable. Identify equipment, system, area, room no., etc. for which each item is intended.
- .4 Maintain an inventory list of all items delivered. For each item, record description of item, quantity, and location where stored.
- .5 Stored items shall remain in Contractor's care, custody, and control until the completion of the Work. Protect stored items against theft or damage.
- .6 Handle items as necessary, until stored in permanent locations designated by Engineer.

1.3 ACCEPTANCE

- .1 Prior to requesting Owner's final inspection, do the following:
 - .1 Review Contract Documents and compare with inventory list to verify that all required items have been delivered.
 - .2 Verify that items listed on inventory list are in there designated storage locations.
 - .3 Inspect items to verify that they meet specified requirements and are in serviceable condition.
 - .4 Arrange for delivery of any missing items.
 - .5 Arrange for replacement of items not meeting specified requirements or not in serviceable condition.
 - .6 Provide Owner with copy of inventory list indicating status of all required items.
- .2 Review inventory list with Engineer during final inspection

2. PRODUCTS – NOT USED

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3. EXECUTION – NOT USED

END OF SECTION

7603-002-00

1. GENERAL

1.1 SECTION INCLUDES:

- .1 Requirements for placing Work in a state of readiness for acceptance by Owner.
- .2 Section supplements, but does not supersede, specific requirements of other sections.

1.2 INTENT

The Contractor is responsible for all phases of commissioning. The Owner's representative will supply a commissioning manager that will assist the Contractor to fully commission all aspects of the facility. The Commissioning Manager will assist in coordination of full systems commissioning including scheduling, direction of commissioning activities, and informing the Contractor when the applicable equipment manufacturer's representatives are required on site. The Contractor shall supply qualified personnel to assist the Commissioning Manager through all phases of commissioning. The Contractor shall bear the cost of equipment manufacturers technical representatives on site representation. The Commissioning Manager will be the sole judge of the competence and qualifications required of the equipment manufactures technical representative.

2. SCHEDULE

- .1 Contractor to allow sufficient time for total systems commissioning and include in the overall project schedule.
- .2 Contractor to submit a Commissioning Schedule in "Draft" form, to the Owner's representative at the commencement of the Project. Commissioning Schedule is to be submitted as a supplement to overall Construction Schedule. The Commissioning Manager will review and comment on the Commissioning Schedule.

3. DEFINITIONS AND PROCEDURES

- .1 Prestart-up: consists of the non-operating functions required to bring Work to a state of readiness for placing systems into service. Related testing includes but is not limited to hydrostatic and pressure testing, disinfection and completion of Owner supplied installation checklists, labeling, wiring, loop wiring and megger checks on equipment as described in the contract document.
 - .1 Fill out equipment installation checkout lists for all process mechanical, building mechanical, instrumentation and controls and electrical equipment. Group listing into logical systems or sub-systems for orderly progression of activities during start-up.
 - .1 Equipment / Instrumentation installation checklists will be provided by the Commissioning Manager at the Project Start-up Meeting.
 - .2 To extent practical, remove all scaffolding, debris, planks tools and other construction related material.

- .3 Remove all sand, silt, dirt and debris from tanks, channels, chambers, instrumentation and control panels and electrical panels and vacuum clean.
 - .4 Clean all surfaces of tanks and conduits, including walls, roofs, floors and columns and as specified in individual Sections.
 - .5 Clean interior of all pipes and fluid-carrying equipment, including pumps and inspect with Engineer present.
 - .6 Conduct leakage and pressure tests in accordance with individual Sections.
 - .7 Conduct disinfection procedures in accordance with requirements of individual Sections.
 - .8 Submit all installation, programming and maintenance manuals for applicable equipment prior to Start-up as deemed necessary by the Owners Commissioning manager. Ensure that this documentation is included in the O&M manuals as laid out in section 01790.
- .2 Start-up: Includes but is not limited to programming, calibration or balancing of instruments and equipment, filling out Start-up instrument and equipment setup sheets and confirming operation of control systems and protective devices and performance testing prior to placing equipment in service.
- .1 The Manufacturers technical representatives, in accordance with the requirements of individual Sections, shall be on site for full duration of Start-up of applicable equipment in a system. Supply at this time all documentation relating to testing of equipment and supplier's certification of satisfactory installation.
 - .2 The Commissioning Manager shall assist the Contractor in programming and setting up the instrumentation in Section 13312 with exceptions as directed in Section 13312.
 - .3 The Commissioning Manager shall assist the Contractor in filling out Start-up instrument and equipment setup sheets and confirming operation of control systems and protective devices prior to placing equipment in service. Equipment start-up sheets to be included in the O&M manual.
- .3 System Start-up:
- .1 Includes but is not limited to placing the system or systems into operation, re-confirming all equipment test results, performing any tests not yet carried out which may be deemed necessary by the Owners Representative to demonstrate satisfactory performance of equipment.
 - .2 Start-up of systems shall take place in an orderly manner. Coordination of start-up shall take place so that adequate staff is available and that conflicts do not occur due to multiple start-ups at the same time.

- .4 Commissioning:
 - .1 Commissioning includes but is not limited to all the procedures and events included under Prestart-up, Start-up, System Start-up and Operator training of systems.
 - .2 Commissioning is deemed complete when all systems have been operating continuously without fault and all process, mechanical and electrical equipment is free of vibration, overloading or overheating, is functioning in accordance with specified rates, methods and performance and all documentation has been completed submitted and reviewed to the satisfaction of the Commissioning Manager.
 - .3 The period for continuous operation for completion of commissioning shall be 80 hours, during which time the system shall operate without fault or failure as described above. Provide competent staff to oversee the operation and arrange for manufactures' service personnel and subcontractors' personnel, if so required, to attend to any problems that arise. Failure of any part of the Works during this period will require restart of the 80 hour period following rectification of the fault or failure.
 - .4 Provide sufficient qualified manpower for duration of the entire commissioning period. Make necessary adjustments during commissioning to enable the Works to be put into continuous operation.
- .5 Operator Training:
 - .1 Special training of facility staff to take place following successful start-up of all systems, during commissioning period. Coordinate visits of equipment suppliers' supervisors and schedule mutually agreeable times for special training periods.
- .6 System:
 - .1 A "system" is defined as an integral operating entity or loop in a process.
- .7 Manufacturers Technical Representative:
 - .1 The equipment manufacturer's technical representative shall be familiar with the equipment supplied and shall come prepared with both knowledge and equipment to perform and interpret the test, inspections and procedures recommended by the manufacturer for the starting of equipment that has not previously been run.
 - .2 The equipment manufacturer's technical representative shall, immediately after completion of the inspection, convey to the Engineer in writing, confirmation of the tests and inspections carried out and the result of this examination of the work.
 - .3 If the inspection reveals defects in the Work correct as soon as possible and repeat the entire inspection procedure. Repeat until the Work passes the

inspection.

- .4 Document the results of the inspection by the equipment manufacturer's representative.
- .5 Ensure the installation meets all manufacturer's requirements for durable and trouble-free operation.

4. SEQUENCE OF EVENTS

.1 Installation and Pre-Operational Checks

- .1 Ensure equipment is installed in accordance with the manufacturer's instructions. Allow for sufficient days on-site by equipment supplier's qualified technician to instruct installer and inspect installation.
- .2 Receive instruction from manufacturers in the methods and precautions to be followed in the installation of the equipment.

.2 Prestart-up

- .1 On completion of construction of a system, test and otherwise check the system as defined in definitions and as directed by commissioning manager and be satisfied that it is ready for pre start-up. Note all deficiencies brought to light by Prestart-up activities and rectify before moving to Start-up activities.
- .2 Cleaning, leakage testing and disinfection of all systems is required prior to Start-up activities.

.3 Start-up

- .1 On completion of Prestart-up, the Commissioning Manager in conjunction with the Contractor shall Start-up and otherwise check the equipment and instrumentation in the system as defined in definitions. Note all deficiencies brought to light by Start-up activities and rectify before proceeding to System Startup and placing into operation.
- .2 Correct any deficiencies uncovered during Start-up before proceeding to System Start-up activities. Retesting shall be conducted, when required, as determined by the Commissioning Manager.

.4 System Start-up

- .1 On satisfactory completion of Start-up of the devices in a system and after the documentation has been completed, submitted and reviewed and after deficiencies have been rectified to the satisfaction of the Owners commissioning manager the system shall be deemed ready to System Start-up.
- .2 Notify the Operations staff in writing 48 hours prior to a System Start-up.

- .3 The following constraints during System Start-up will be taken into account:
 - .1 Cleaning and disinfection of all systems is required prior to System Start-ups.
 - .2 System Start-ups to be done in an orderly manner following a written procedure authored by the Commissioning Manager so that all the various systems of the Works can be placed into simultaneous continuous operation.
 - .3 A complete simulated System Start-up or parts of the system may be required to reconfirm the equipment prestart test results, particularly in the case of, but not limited to, chemical or hazardous materials and shall be determined by the Owners Commissioning manager. (E.g. Filling a chemical tank with water to confirm the accuracy and or settings of a level transmitter prior to filling with chemical.)
 - .4 In the event that further deficiencies arise during System Start-up immediately rectify and if of a sufficiently serious nature stop the Start-up of the system till such time as deficiencies are rectified.
 - .5 Place the system or systems and place into operation as defined in Start-up and commissioning.

5. RESPONSIBILITY

- .1 Be responsible for overall commissioning and continuous operation as defined in definitions.
- .2 Coordinate equipment suppliers' representatives and all sub-trades personnel for start-up and commissioning as directed by Owner's Commissioning Manager.
- .3 Arrange for the services of the equipment manufacturer's technical representative, when equipment installation has been completed as directed by Owner's Commissioning Manager.
- .4 Equipment manufacturer's technical representative to inspect installation to ensure that equipment has been installed in accordance with manufacturer's requirements. Make adjustments in accordance with instructions of equipment manufacturer's technical representative.
- .5 Advise Engineer in writing that installation of equipment has been checked, installed correctly and is in working order following satisfactory System Start-up.
- .6 Cost of equipment manufacturer's representative shall be borne by Contractor. Do not designate a sub trade as a representative during construction, Prestart-up, start-up, System Start-up and continuous operation. In the event that the Work is phased and the equipment manufacturer's representative is required to additional trips to site the

additional costs shall be borne by the Contractor.

- .7 Owners Commissioning manager will request that equipment be operated to demonstrate that it will perform as specified. Commissioning manager will note deficiencies. Correct deficiencies immediately. Advise Owners Commissioning manager in writing when deficiencies have been corrected.
- .8 If deficiencies are of a sufficiently serious nature as determined by the Commissioning Manager that manufacturers' representatives are required to make additional visits, additional costs shall be borne by Contractor.
- .9 If it is necessary to suspend start-up, or commissioning, or continuous operation due to deficiencies in any system, the full cost of interruption, call back and resumption of start-up, or commissioning, or continuous operation shall be paid by Contractor.
- .10 Commission and operate the Works during continuous operating period. Operation personnel may observe and assist during commissioning and continuous operating period.
- .11 The lack of availability of equipment manufacturers representatives shall not result in an extension to the contract.

6. SYSTEMS DEMONSTRATION

- .1 Special training of County staff shall take place following successful System Start-up of all systems, during the commissioning period. Coordinate visits of equipment suppliers' supervisors with Operations Staff and schedule mutually agreeable times for special training periods.
- .2 Demonstrate operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times.
- .3 Owner will provide list of personnel to receive instructions, and will coordinate their attendance at agreed upon times.
- .4 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.
- .5 Review contents of manual in detail to explain all aspects of operation and maintenance.
- .6 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent.
- .7 The individuals providing training on equipment must be a manufacture's certified technician with competent instructional skills and fully familiar with the detailed operation and maintenance of the provided equipment. The Owner will be the sole judge of the competence of the instructor and quality of instruction. The Owner reserves the right to withhold any amount of payment up to a maximum of \$15,000 until the Contractor provides training to the satisfaction of the Owner.
- .8 Training to cover the following items:

- .1 Overview of equipment;
- .2 Review of Operations and Maintenance Manual documentation for the equipment;
- .3 Instruction and demonstration of operation. Includes start up, shut down, all possible equipment faults and possible rectification.
- .4 Instruction and demonstration of maintenance to include daily, weekly, monthly, quarterly and annual preventative maintenance checks/actions as recommended by the manufacturer as well as trouble shooting summarized clearly on trouble shooting sheets for the specific model of each major piece of equipment.
- .9 All instructional training, supplemented by training and manual handouts, must be in sufficient detail to cover all Owner responsible operations and maintenance requirements to maintain manufacturers' warranties in tack. Training and documentation must highlight specific requirements that if completed or not completed may or would, void or jeopardize the equipment warranty.
- .10 Refer to specific equipment section for additional training requirements.

END OF SECTION

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1. GENERAL

- .1 Not Applicable.

1.1 PROTECTION

- .1 Protect trees, shrubs and other vegetation to remain in place, against unnecessary cutting, breaking and any other damage.
- .2 Protect from damage fences, roadways and other existing site improvements that are to remain.
- .3 Protect bench marks and reference points from damage.

2. PRODUCTS

- .1 Not Applicable.

3. EXECUTION

3.1 GENERAL

- .1 Remove all concrete, logs, trees, brush, stumps, roots and all objectionable material above the ground or on the ground surface.
- .2 Remove all roots and other deleterious materials to 0.3 m below the ground surface.
- .3 Temporarily stockpile material within the site until conditions are suitable for disposal.

3.2 DISPOSAL

- .1 Burn combustible materials on site when permitted. Obtain permits and authorization in accordance with the Regulatory Requirements prior to burning.
- .2 Provide continuous supervision during burning operation and conduct burning operations in such a manner to protect surrounding vegetation and property from damage.
- .3 When burning is not permitted by Regulatory Requirements, excavate, load, transport and dispose of all materials to the nearest waste disposal site as designated in the Contract Documents or to the nearest qualified sanitary landfill site.
- .4 Bury burned debris and non-combustible material in designated waste areas with a minimum cover of 1 m of waste fill. Finish to a neat, leveled appearance, conforming to surrounding landscape.

END OF SECTION

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1. GENERAL

- .1 Not Applicable.

1.1 REGULATORY REQUIREMENTS

- .1 Comply with the conditions of the permits for the Project obtained by the Owner.
- .2 Make arrangements with the Owner, landowners, or other agencies that may be affected by disposal of water, snow, or ice. Obtain any permits required in addition to those obtained by the Owner.

1.2 SITE CONDITIONS

- .1 Project area is immediately south of the City of Saskatoon.
- .2 The Site is located where groundwater is present and seepage into excavations and areas of fill placement may occur during construction.

2. PRODUCTS

2.1 EQUIPMENT AND MATERIALS

- .1 Provide all pumps, hoses and related equipment and power sources required for care of water.
- .2 Maintain pumps in good operating condition at all times. Have at the Site at all times, at least one standby pump for each category of pump required for care of water.
- .3 Install a replacement pump or pumps of equal capacity before removing a pump or pumps for maintenance.

2.2 DESIGN OF CARE OF WATER PROVISIONS

- .1 Include provisions for handling groundwater, rainstorm runoff, snow, snowmelt, and ice that may enter the Work areas in the design of the care of water measures.
- .2 Design dewatering systems that are capable of lowering and maintaining the groundwater level to permit construction of the Work to be conducted in the dry, and on a stable foundation, with no loss of foundation materials or materials from excavated surfaces.
- .3 Design protective works, including enclosures, insulation, and heating systems, to ensure that dewatering measures operate continuously and do not become frozen during cold weather.

2.3 SUBMITTALS

- .1 Provide the following submittals.

- .2 A care of water plan, including Site specific drawings, outlining the care of water provisions designed as specified in clause 1.3 at least 14 days prior to commencing Work at the Jobsite.
- .3 A copy of each permit obtained (in addition to those obtained by the Engineer) upon the Engineer's request.

3. EXECUTION

3.1 GENERAL

- .1 Design, construct and maintain Temporary Work, construct related Permanent Work, as required for care of water, including all necessary cofferdams, channels, flumes, drains, sandpoints, wells and sumps and other temporary diversion and protective works and furnish all materials required therefor. Furnish, install, maintain and operate all necessary pumping and other equipment, for dewatering the various parts of the work and for maintaining the foundation and other parts of the work free of water, ice and snow from whatever source.
- .2 Maintain all sumps, trenches and discharge lines to ensure proper containment and free flow of water to and from the pumps and other diversion and protective works at all times.
- .3 Obtain permits, in addition to those obtained by the Owner.
- .4 Repair damage to any part of the work caused by water or failure of protective works at no extra cost to the owner.
- .5 Be responsible for additional excavation and subsequent backfill made necessary by water, snow, or ice.
- .6 Ensure procedures for "Care of Water" do not cause pollution in the area. Locate and control discharges of water to avoid causing damage to property, pollution of water courses, nuisance on roads, or injury to the public or wildlife.
- .7 Remove or level all cofferdams, drainage ditches or other Temporary Work after having served its purpose so as not to interfere in any way with the operation of existing drainage systems.
- .8 Make provisions for handling residual water, storm runoff and snowmelt that may enter the excavations from time to time.
- .9 Make arrangements with the Minister, landowners and agencies which may be affected by disposal of water snow and ice.

3.2 ENVIRONMENTAL PROTECTION

- .1 Do not use care of water measures that cause pollution.
- .2 Provide and maintain sedimentation ponds to reduce the level of suspended solids to within acceptable limits. Dispose of sediments in waste disposal areas.

- .3 Do not cause damage to property or nuisance on roads, or injury to the public or to wildlife due to discharge of water from the care of water measures.
- .4 During dewatering or other care of water operations, do not allow water to enter or return to a watercourse unless the water entering or returning is of equal or better quality than the water in the watercourse.
- .5 Test water quality in the watercourse to establish its quality within 21 days after commencement of the Contract. Carry out frequent water quality testing during dewatering or other care of water operations to compare the water quality. Take necessary measures to modify the water to equal or better quality prior to allowing it to enter or return to the watercourse.
- .6 Provide and maintain sediment ponds or other means to modify the water quality prior to allowing it to enter or return into the watercourse or canal. Dispose of sediments in waste disposal areas.

END OF SECTION

1. GENERAL

- .1 This section applies to stripping requirements for pipeline easements and right of ways, borrow areas, access roads, material haulage roads and stockpile areas within the Site.

1.1 DEFINITIONS

- .1 For the purpose of construction in this Contract, the following definitions apply:
- .1 “Topsoil” is defined as the uppermost part of the soil, ordinarily moved in tillage, or its equivalent in uncultivated soils, and normally ranging in depth from 50 mm to 450 mm.
- .2 “Subsoil” is defined as material that lies immediately beneath the Topsoil and extending to root depth. Subsoil may be up to 1.5 m in depth.
- .3 “Overburden” is defined as soil material that lies between the subsoil and the material that is designated to be utilized for construction.
- .4 “Stripping” is defined as the excavation of Topsoil, Subsoil, and Overburden, including materials in frozen condition.

2. PRODUCTS

- .1 Not Applicable.

3. EXECUTION

3.1 PROTECTION OF EXISTING FACILITIES

- .1 Locate utility lines, fencing, survey reference points, instrumentation, culverts, and all other existing facilities before commencement of Work. Protect these items from damage.

3.2 EXCAVATION

- .1 Do not strip any area without prior approval of the Engineer.
- .2 Stay on designated haul roads and do not disturb grassed or natural areas not part of the Work. Do not drive on undisturbed areas except for the performance of stripping operation.
- .3 Strip and stockpile materials separately and prevent contamination.
- .4 Strip and stockpile materials from temporary construction access roads, borrow areas and waste fill areas required for performance of the Work.
- .5 Conduct the Stripping operation far enough in advance of excavation to ensure that undesirable material does not become mixed with the Topsoil.
- .6 Suspend Stripping operations during rain or wet ground conditions.

- .7 Suspend Stripping operations during high winds greater than 80 km/hr, which may result in contamination or loss of Topsoil.
- .8 Provide proper drainage of surface water from stripped area to prevent ponding and infiltration in areas where fill is to be placed.
- .9 Use equipment with precise depth control such as a grader when stripping shallow depth Topsoil.
- .10 Excavate all initial frozen material. Subsequent frost removal will not be paid.

3.3 STOCKPILES

- .1 Unless otherwise designated in the Contract Documents, stockpile stripped material adjacent to borrow areas, waste areas or along the pipeline easement. Choose stockpile locations such that they will not interfere with future construction activities.
- .2 Stockpile Topsoil separately from other materials.
- .3 Maintain a minimum separation of 1 m between stockpiles.
- .4 Stockpile frozen material stripped from borrow areas separately from other materials.
- .5 Adopt measures to prevent drifting of topsoil.
- .6 Keep drainage courses clear of stockpiled material.
- .7 Stockpile material at slopes lower than 2H:1V.

3.4 DISPOSAL OF STRIPPING MATERIAL

- .1 Rehandle and place all stockpiled stripping Topsoil material uniformly on all areas disturbed during construction.
- .2 Rehandle and place all stockpiled stripping material from borrow areas in completed borrow areas. Place, spread and compact Overburden and then Subsoil material on borrow area subgrade prior to the placement of Topsoil.
- .3 Place Topsoil as specified in Section 02201.

END OF SECTION

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1. GENERAL

- .1 Not Applicable.

2. PRODUCTS

2.1 MATERIALS

- .1 Use Topsoil materials stripped from site.

3. EXECUTION

3.1 PROTECTION OF EXISTING FACILITIES

- .1 Locate utility lines, fencing, survey reference points, instrumentation, culverts, and all other items before commencement of Work. Protect these items from damage.

3.2 PREPARATION OF SUBGRADE

- .1 Remove debris, roots and other deleterious materials and haul to designated disposal areas.
- .2 Grade areas to be reclaimed to eliminate uneven areas. Grade to ensure proper drainage.
- .3 Scarify all areas to be reclaimed to a minimum depth of 300 mm. Scarify entire subgrade area once in the longitudinal direction and once in the perpendicular direction. Disc area when large clay lumps are prevalent.

3.3 TOPSOIL PLACEMENT

- .1 Excavate, load and haul topsoil from stockpiles and place in waste areas, drainage ditches, fill areas, and road embankments.
- .2 Place Subsoil and Topsoil in dry weather on dry unfrozen subgrade.
- .3 Distribute material to uniform thickness over the entire area. Disc material and remove all rocks larger than 75 mm.
- .4 Manually spread Topsoil around structures, fences or other obstructions.
- .5 Grade to ensure positive drainage on slopes and away from structures.
- .6 Leave surface smooth, uniform and compact to 90% Standard Proctor Density to prevent settlement when watered. Obtain minimum depth of topsoil after compaction of 100 mm.

END OF SECTION

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1. GENERAL

1.1 RELATED SECTIONS

- .1 Read this Section in conjunction with requirements for testing specified in General Conditions Section 00725.

1.2 TESTING

- .1 Contractor is responsible for performance testing in performance of the Work.
- .2 The Owner will perform quality assurance testing according to the testing standards listed in Reference Documents as selected by the Owner.
- .3 Provide samples requested by Owner for testing.

2. PRODUCTS

- .1 Not Applicable.

3. EXECUTION

3.1 FILL MATERIAL TESTING

- .1 Fill materials may be tested, before and after placement, for conformance with specified requirements and to confirm suitability for intended uses.
- .2 Acceptance of fill material will be made only after the material has been dumped, spread and compacted in place. Owner may reject fill material in the borrow areas, in the stockpiles, in the transporting vehicle or in place. Cooperate with the Owner to ensure only acceptance fill material will be placed in the Work.

3.2 COMPACTION AND MOISTURE CONTENT TESTING

- .1 Compaction and moisture content testing will be performed during fill material placement operations to ensure that specified requirements are met.
- .2 The frequency of compaction and moisture content testing will be determined by the Owner.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Read this section in conjunction with other sections for location of excavation specified herein.

1.2 DEFINITIONS

- .1 “Common Excavation” is defined as all excavation within the project work area.
- .2 “Borrow Excavation” is defined as all imported excavation from designated borrow areas excluding stripping and excavation of frozen material.
- .3 “Waste Excavation” is defined as all exported excavation from the project area to the designated waste areas that is not required for the completion of the project work excluding stripping.

2. PRODUCTS

- .1 Not applicable.

3. EXECUTION

3.1 PREPARATION

- .1 Notify Owner at least 2 days prior to beginning excavating operations.
- .2 Prior to commencing excavation:
 - .1 Contact all appropriate utility companies and establish exact location and current status of all utilities, voltage of underground and overhead power lines and pressure of natural gas lines.
 - .2 Notify Owner if any utility lines have been omitted from or incorrectly indicated in the Contract Documents.

3.2 PROTECTION OF EXISTING FACILITIES

- .1 Locate utility lines, fencing, survey reference points, instrumentation, culverts, and all other existing facilities before commencement of Work. Protect these items from damage.

3.3 UNAUTHORIZED EXCAVATION

- .1 Unauthorized excavation is any excavation beyond lines, elevations and dimensions indicated in specifications and in the Contract Documents without specific authorization by the Owner.

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- .2 Fill unauthorized excavation to lines, elevations and dimensions indicated, as directed by the Owner.
- .3 Unauthorized excavation and remedial work will be at Contractor's expense.

3.4 EXCAVATION LINES

- .1 Excavate to the lines and grades indicated in the Contract Documents or as determined by the Owner.
- .2 The Owner will determine if unsuitable bearing materials are encountered at indicated foundation elevations. Carry excavation deeper to remove unsuitable bearing materials and replace excavated material with suitable materials.
- .3 The Owner will determine if bearing conditions are fulfilled at elevations above those indicated in the Contract Documents. Adjust excavation elevations to accommodate raised foundation level.

3.5 SHORING AND BRACING

- .1 If required to provide safe working conditions and to prevent cave-ins and loose soil from falling into excavations, protect excavations by temporary shoring, bracing, or other suitable methods.
- .2 Where the excavation is made to accommodate structures, sufficient material shall be removed to allow for the proper placing and bracing of forms.
- .3 No extra payment will be made for supplying, placing, maintaining and removing sheeting, bracing, shoring, or other means of temporary support.

3.6 EXCAVATION

- .1 Strip Topsoil (and Subsoil where required) in accordance with Section 02200 and stockpile in the area designated on the Drawings.
- .2 Dispose of unsuitable organic soils and other unsuitable, native or uncontaminated material in the waste area designated by the Owner.
- .3 Remove and dispose of all water, snow and surface ice prior to excavation.
- .4 Schedule and coordinate the work such that excavations are trimmed to grade prior to becoming frozen.
- .5 Excavate to the required lines, grades and elevations.
- .6 Prevent loss of soil and sloughing of slopes if springs or seepage are encountered within excavation.

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- .7 Remove boulders, loose bedrock, soil blocks and other fragments that may slide or roll into excavated areas, which, in the opinion of the Owner or the Contractor, are unsafe or appear to endanger persons, work or property. The fact that such removal may enlarge an excavation beyond the required excavation lines shall not relieve the Contractor from the necessity of doing such scaling and removal.

3.7 COBBLES AND BOULDERS

- .1 Cobbles and boulders too large to be left in fill materials must be removed from the fill prior to compaction. In some cases the cobbles and boulders can be too large to be reasonably moved by hand and must be removed by machinery. When cobbles and boulders are removed by machinery, reasonable care, satisfactory to the Owner, must be taken to limit the quantity of suitable fill removed with the cobble or boulder.
- .2 The Contractor is encouraged to make appropriate use of cobbles and boulders materials where suitable and acceptable to the Owner. Stockpile excess cobbles and boulders at locations within the Site limits designated by the Owner.
- .3 No separate payment will be made for removal, handling, transporting and/or disposing of cobbles and boulders.

3.8 DISPOSAL OF EXCAVATED MATERIAL

- .1 General
 - .1 Obtain prior approval by Owner for stockpile areas. Strip topsoil from stockpile areas except do not strip topsoil stockpile areas.
 - .2 If stockpiling is required, stockpile materials meeting the classifications of different zones in separate stockpiles.
 - .3 Prepare stockpile sites and construct stockpiles taking every precaution necessary to prevent segregation of particle sizes and contamination with other materials.
 - .4 Finish the surfaces in stockpiles to safe, stable lines and slopes 3H:1V or flatter or as directed by the Owner and leave the surfaces in a neat and workmanlike manner.
 - .5 Maintain stockpiles in a condition acceptable to Owner.
 - .6 Do not block drainage courses with stockpiled material.
 - .7 Space all stockpiles at least three metres from adjacent material stockpiles with a different classification.
 - .8 Remove all stockpiled materials from stockpiles and incorporate into the Work of the Contract.
- .2 Suitable Materials
 - .1 See Section 02250 for definitions of suitable materials.

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- .2 Load, haul and place, suitable materials from common and borrow excavations where placement of compacted and tamped fills are designated.
- .3 Spread and compact materials as specified in Section 02250.
- .3 Unsuitable Materials
 - .1 See Sections 02250 for definitions of unsuitable materials.
 - .2 Load, haul and place unsuitable materials from excavations in waste fills and designate waste areas.
 - .3 Load, haul and place unsuitable materials from borrow excavations in borrow areas, after the removal of all suitable materials.
 - .4 Spread and compact as specified in Section 02250.
 - .5 Dispose of all waste materials as directed by engineer.

3.9 TOLERANCE

- .1 Excavate all surfaces to within ± 20 mm of the lines, grades and elevations shown in the Contract Documents.

END OF SECTION

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1. GENERAL

1.1 TYPES OF FILL

- .1 Compacted Impervious Fill.
- .2 Compacted Fill.
- .3 Tamped Impervious Fill.
- .4 Waste Fill.

1.2 DEFINITIONS

- .1 “Suitable Material” is defined as material obtained from canal or borrow excavations, free of organic, wet or frozen materials, that is suitable for compacted embankment construction.
- .2 “Unsuitable Material” is defined as organic, wet or frozen material from canal or borrow excavations that is not suitable for compacted embankment construction.
- .3 “Compacted Fill” is defined as suitable material obtained from common excavations, free of organic, wet or frozen materials, and placed on canal embankments.
- .4 “Waste Fill” is defined as organic, wet or frozen material from excavations, that is not suitable for construction, and placed in waste fill locations.

2. PRODUCTS

2.1 FILL MATERIALS

- .1 Compacted and tamped impervious fill material is fine grained materials having a minimum of 50% passing the 0.075 mm sieve size and classified as a low to medium plastic clay based on the unified classification system as modified by PFRA.
- .2 Remove tree roots, sod or other organic materials.
- .3 Do not use frozen material in the fill.
- .4 Remove cobbles and rock fragments having maximum dimensions greater than 75 mm.

3. EXECUTION

3.1 GENERAL

- .1 Drain, clean and maintain fill foundations free from debris, snow, ice, water, frozen ground, topsoil or any loose objectionable material. Do not proceed with fill placement until the Engineer has inspected and approved foundation areas designated for fill placement.

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- .2 Scarify the foundation to obtain a suitable bond with the earth fill immediately prior to placing the first layer of earth fill.
- .3 Construct earth fill to the lines, grades and elevations shown in the Contract Documents.
- .4 Suspend all earthwork operations at any time when satisfactory work cannot be conducted on account of rain, floods, cold weather or other unsatisfactory conditions.

3.2 DENSITY CONTROL

- .1 Compact all fill material, except waste fill, to a dry density equal to or greater than 98% of the maximum dry density obtained in the Standard Proctor Compaction Test performed in accordance with ASTM D698.
- .2 Tamp fill material to 98% of the maximum dry density obtained in the Standard Proctor Compaction Test performed in accordance with ASTM D698. Tamped fill areas around all building structure.
- .3 Compact waste fill material to 95% of Standard proctor Maximum Dry Density Test performed in accordance with ASTM D698. All waste fill to be located as directed by Engineer.

3.3 MOISTURE CONTROL

- .1 Maintain moisture content for compacted fill materials within -1% to 2% of optimum moisture content as determined by ASTM D698 test procedures.
- .2 Maintain moisture content for tamped fill materials within -1% to 2% of optimum moisture content as determined by ASTM D698 test procedures.
- .3 When the moisture content in the fill material is lower than that specified for placement, water shall be added and mixed with the material to achieve uniform moisture content in the material to conform to the requirements.
- .4 When the moisture content in the fill material is higher than that specified for placement, the material shall be dried by scarifying, disking and harrowing to achieve uniform moisture content in the material that conforms to the requirements.
- .5 Moisture content control on waste fill will not be required.

3.4 PLACEMENT AND COMPACTION

- .1 Drain and clean all earth foundations of loose thawed, frozen, soft, or other deleterious material including ice, snow and organic materials and Topsoil.
- .2 Work the surface to obtain a suitable bond with the earth fill immediately prior to placing the first layer.
- .3 When the surface of the prepared foundations or the compacted fill material is too dry or too smooth to bond properly with the layer of fill material to be placed thereon, moisten the

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surface and work with a disc, scarifier, or other equipment, to provide a satisfactory bonding surface before the succeeding layer of fill material is placed.

- .4 When the surface of the prepared foundations or the compacted fill material is too wet for proper compaction, remove it and allow it to dry, or work it with a harrow, disc or other equipment to reduce the moisture content to the required amount; then compact the fill material before the succeeding layer of fill material is placed thereon.
- .5 Maintain slopes at less than 1 V:1H for earth foundations on which fill is to be placed.
- .6 Place compacted fill material in continuous horizontal layers not exceeding 150 mm in thickness when compacted. Spread, blend, disc, blade, smooth and compact each lift to provide a homogeneous fill without stratification. Commence placement of fill at the lowest elevation of foundation. Use sheep's foot type compaction equipment.
- .7 Place waste fill materials in continuous horizontal lifts not exceeding 300 mm in thickness such that there will be no voids or bridging of material. Spread and compact each lift by complete coverage of tracked equipment. Blade the compacted waste fill embankment to a smooth, uniform, free-draining shape.
- .8 Join new fill to existing slopes by terracing or excavating into slopes to remove all dried and loose material.
- .9 Schedule fill placement operations such that the foundation areas or previously compacted earth fill does not freeze and that compacted earth fill is not placed on frozen subgrade. Remove and replace any such frozen layers of compacted earth fill at no cost to the Owner.
- .10 Scarify each lift of impervious fill to a minimum depth of 70 mm following compaction, using a disc or other Minister approved equipment to ensure complete bond between that lift and the overlying lift.
- .11 Reroute construction traffic or increase fill thickness over soft foundations in areas where fill surface starts rutting. If rutting has occurred, scarify, regrade and moisture condition impervious fill surface prior to placement of overlying fill.
- .12 Re-compact or remove any portion of the fill which has suffered a reduction in density due to frost, rain or any other reason before placing succeeding layers. Protect compacted fill material and foundations prepared for the fill from freezing.
- .13 Remove any non-conforming materials, which accumulate on the surface of any layer or prepared foundation before any material is placed for the succeeding layer.

3.5 COMPACTION EQUIPMENT

- .1 Supply necessary compaction equipment capable of meeting the specified compaction requirements.
- .2 Hauling equipment is not acceptable for compaction.
- .3 The Owner's Representative reserves the right to order the discontinuation of any

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compaction equipment that does not produce the specified compaction requirements or causes excessive breakage around structures.

3.6 TOLERANCE

- .1 Make changes in grade natural. Blend slopes into level areas.
- .2 Compact all surfaces to within ± 40 mm from the lines, grades and elevations shown in the Contract Documents.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use, and placement of Granular Materials specified herein.
- .2 This Section is intended to be used as a reference Section; it is not a "section of work". All materials specified in Part 2, Products, may not necessarily be required.

2. PRODUCTS

2.1 MATERIAL QUALITY

- .1 "Gravel" in general means a mixture of natural gravel, crushed gravel or crushed stone, and natural or crushed sand, meeting the gradation limits specified below for each type.
- .2 Use only clean, sound, hard, durable particles, free from silt, clay, soft shale, flaky particles, topsoil, organic matter and other detrimental material.
- .3 Ensure granular materials are not gap graded and have a smooth gradation curve with no excess or deficiency of any particular grain size within the required range.
- .4 Where blending is required, thoroughly mix the granular materials in such a manner that a homogeneous material of the specified gradation is achieved prior to placing of the material into the work or stockpiles.
- .5 "Crushed Gravel" means angular shaped particles of crushed gravel or stone, washed, meeting the gradation limits specified. Ensure minimum of 50% by weight, of material retained on 5 mm sieve has at least one face resulting from fracture.
- .6 Riprap and bedding materials means clean, sound, hard durable rock particles, free from silt, clay, flaky particles, organic matter and foreign substances. Ensure the ratio of maximum dimension to minimum dimension of individual stones does not exceed 3.0.

2.2 GRANULAR MATERIALS

- .1 Granular materials to meet gradation limits specified below for each type:

Granular Material Type	Sieve Size	% Passing By Weight
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Zone 1 – A well graded sand, typically used as a fine filter beneath structure concrete slabs and small embankment toe drains:	10 mm	100
	2 mm	65 – 95
	1 mm	35 – 80
	0.2 mm	5 – 25
	0.07 mm	0 – 5
Zone 2 – A well graded gravel typically used as a course filter in conjunction with Zone 1 fine filter:	40 mm	100
	20 mm	45 – 90
	5 mm	10 – 40
	2 mm	0 – 10
Zone 3 – A combined coarse – fine filter material typically used as a bedding material for concrete slabs, pipe and similar structures:	40 mm	100
	20 mm	50 – 95
	5 mm	25 – 65
	0.5 mm	5 – 25
	0.075mm	0 - 10
Zone 4 – A well graded gravel material typically used as a bedding material:	20 mm	100
	10 mm	20 – 60
	5 mm	5 – 30
	2 mm	2 – 10
Zone 5 – A well graded sand and gravel material typically used as bedding under riprap or as a granular backfill:	150 mm	100
	100 mm	70 – 100
	40 mm	35 – 80
	5 mm	10 – 35
	2 mm	0 – 10
Zone 6 – Road Surfacing Gravel – A well graded material typically used as a bedding material. Percent fracture by weight (2 faces) shall be 50% or greater.	25 mm	100
	20 mm	85 – 100
	10 mm	35 – 75
	5 mm	15 – 55
	1.25 mm	0 – 30
	0.075 mm	0 – 12
Zone 7 – Wash Rock – typically used when specified as bedding material in extremely wet or unstable conditions:	20 mm	100
	10 mm	35 – 95
	5 mm	5 – 25
	2 mm	0 – 10
Zone 8 – Armour Gravel – A processed gravel typically used as a bank armouring material:	200 mm	100
	100 mm	60 – 85
	30 mm	20 – 45
	10 mm	0 – 15
	5 mm	0 – 5
Zone 9 – Bedding and Haunching Material – A well graded angular gravel material (Percent fractures by weight shall be 50% or greater):	20 mm	100
	10 mm	20 – 60
	5 mm	5 – 30
	2 mm	2 – 10

.2 Granular materials to meet gradation limits specified below for each type:

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Base Aggregate and Base Mix			
Sieve Designation	Percent By Weight Passing		
	Type 31	Type 33	Type 35
31.5 mm	100.0		
18.0 mm	75.0-90.0	100.0	100.0
12.5 mm	65.0-83.0	75.0-100.0	81.0-100.0
5.0 mm	40.0-69.0	50.0-75.0	50.0-85.0
2.0 mm	26.0-47.0	32.0-52.0	32.0-65.0
900 um	17.0-32.0	20.0-35.0	20.0-43.0
400 um	12.0-22.0	15.0-25.0	15.0-30.0
160 um	7.0-14.0	8.0-15.0	8.0-18.0
71 um	6.0-11.0	6.0-11.0	7.0-12.0
Plasticity Index	0-7.0	0-6.0	0-5.0
Fractured Face %	50.0 Minimum		
Lightweight Pieces%	5.0 Maximum		
All other Deleterious Material %	2.0 Maximum		

Sub-Base Course			
Sieve Designation	Percent By Weight Passing		
	Type 6	Type 8	Type 10
50.0 mm	100.0	100.0	100.0
2.0 mm	0-80.0	0-90.0	
400 um	0-45.0	0-60.0	
160 um	0-20.0	0-25.0	
71 um	0-6.0	0-15.0	0-20.0
Plasticity Index	0-6.0		

Sand Base Course	
Sieve Designation	Percent By Weight Passing
	Type 40
37.5 mm	100.0
5.0 mm	82.0-100.0
71 um	15.0-22.0
Plasticity Index	0-2.0

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Traffic Gravel								
Sieve Designation	Percent By Weight Passing							
	Type 101	Type 102	Type 103	Type 104	Type 105	Type 106	Type 108	Type 109
75.0 mm	100							
50.0 mm	55-85	100						
40.0 mm		63-92						
31.5 mm			100	101				
22.0 mm			63-92	63-93	100	101	103	
18.0 mm					63-92	63-93	63-95	100.0
5.0 mm	0-40	0-40	0-40	0-40	0-40	0-60		45-80
2.0 mm	0-25	0-25	0-25	0-25	0-25	0-45	20-45	25-60
400 um							0-20	0-30
Fractured Face %	50.0 Minimum							

2.3 RIPRAP

- .1 All Riprap shall consist of hard, dense, durable rock or field stones. Riprap shall be well graded and placed in a manner that ensures the uniform distribution of larger stones with the smaller stones serving to fill the intermediate spaces. Riprap shall always be placed on a granular bedding gravel. Riprap shall meet the following size gradations:

Class A

- 100% smaller than 35 cm or 70 kg;
- at least 20% larger than 25 cm or 25 kg;
- at least 50% larger than 20 cm or 10 kg;
- at least 80% larger than 15 cm or 5 kg.

Class B

- 100% smaller than 45 cm or 130 kg;
- at least 20% larger than 35 cm or 70 kg;
- at least 50% larger than 30 cm or 40 kg;
- at least 80% larger than 20 cm or 10 kg.

3. EXECUTION

3.1 GENERAL

- .1 Drain, clean and maintain foundation and subgrades free from debris, snow, ice, water, topsoil or any loose objectionable material. Do not proceed with granular material, riprap, gravel armour protection or road gravel placement until the Owner has inspected and approved the foundations and subgrade areas.
- .2 Place granular materials, riprap, gravel armour protection and road gravel to the lines, grades and elevations specified in the Contract Documents.
- .3 Suspend all granular material, riprap, gravel armour protection and road gravel placement at any time when satisfactory work cannot be conducted due to rain, floods, snow or other unsatisfactory conditions.

- .4 Select temporary stockpile sites that minimize potential for contamination with underlying soils.
- .5 Stockpile material in a manner that minimizes segregation.

3.2 PLACEMENT

.1 Granular Bedding Or Granular Backfill Materials

- .1 Place course filter, fine filter and pitrun gravel material, in layers not exceeding 150 mm in thickness when compacted, to the lines, grades and elevations shown in the Contract Documents. Compact to a minimum density of 95% Standard Proctor Density. Compact each layer before placing the succeeding layer. Maintain moisture content at approximately 80% of maximum.
- .2 If any granular bedding material is too dry to allow adequate compaction, apply water into the material until uniform distribution of moisture is obtained. Control water application accurately in amounts so that free water will not appear on surface during or subsequent to rolling or tamping.
- .3 If the material is too wet, dry and spread material in thin lifts on subgrade and permit to dry until the moisture content is reduced to the specified moisture content.
- .4 Provide tamping with hand operated mechanical tampers such as vibratory plate tampers, jumping jacks or walk-along double drum rollers. Do not use large compaction equipment in tamped backfill zones.

.2 Riprap

- .1 Place riprap in such a manner to ensure that the completed riprap is stable, without tendency to slide, and such that there are no large unfilled spaces within the riprap. Use small rocks to fill the voids between the larger rocks. Do not drop riprap more than 1.5 m. Do not end dump materials on slope and push into place.
- .2 Do not move any equipment over the riprap that is already in place.

.3 Gravel Armour Slope Protection

- .1 Place gravel armour slope protection so that the finished lines of armour are smooth, regular and uniform.
- .2 Place 200 mm minimum thickness of armour, measured perpendicular to the slope, on unlined sections.
- .3 Place 300 mm minimum thickness of armour, measured perpendicular to the slope, on lined sections.

- .4 Place gravel armour slope protection on PVC membrane liner by means of overhead equipment such as clamshells, draglines, backhoes and gradalls, or other mechanical means that will not result in direct or indirect equipment loading on the liner. Do not drop armour more than 1 m. Do not end dump armour on slopes and push into place.
- .5 Do not place gravel armour slope protection on subgrade or PVC membrane liner covered with snow or ice. Remove snow or ice prior to placement of armour at no extra cost to the Owner.
- .6 Do not place contaminated material. Obtain even distribution of various sizes of particles throughout the mass by selective loading at the pit or stockpiles by controlled dumping of successive loads during placement of by any other methods of placement that will avoid segregation of materials.
- .7 Commence placement of armour on the side slopes at the bottom and proceed up the slope. Do not blade the armour material over the banks.

3.3 TOLERANCES

- .1 Gravel Armour Placement
 - .1 Place gravel armour on earth subgrade to a minimum thickness of 150 mm at any location and an average thickness of 200 mm, and 210 mm over 1 km.
 - .2 Place gravel armour on plastic membrane lined slopes and bottom to a minimum thickness of 290 mm. Ensure the average thickness is between 300 mm and 315 mm.
 - .3 Place gravel to the top of the bank, where designated in the Contract Documents. Where gravel armour is designated to be placed at a level below the top of the bank, place armour to a maximum of 50 mm above the design elevations shown in the Contract Documents.
- .2 Riprap And Bedding Gravel Placement
 - .1 Place riprap and bedding gravel to the thickness and grades shown on the Contract Documents to a thickness not to exceed 120% of the specified thickness and height.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location and requirement of Subgrade Preparation specified herein.

1.2 DETAILED DRAWINGS

- .1 Not Used.

2. PRODUCTS

- .1 Not Applicable.

3. EXECUTION

3.1 SUBGRADE PREPARATION

- .1 Subgrade preparation shall include the scarifying, shaping and compacting to 98% Standard Proctor Density below 300 mm from top of subgrade and to 98% Standard Proctor Density for the top 300 mm, $\pm 2\%$ of optimum moisture content.
- .2 Remove and dispose of unsuitable materials as authorized by the Engineer. Replace with an approved suitable material and compact as specified herein.
- .3 The Contractor shall maintain the subgrade to the specified section, grades and condition required for filter fabric and/or sub-base material placement. The Contractor shall be responsible for providing interim drainage to prevent damage to the work or the causing of unstable conditions due to high moisture contents. No separate payment will be made for these items.
- .4 The subgrade shall pass density and proof rolling requirements prior to the placement of filter fabric and/or granular materials.

3.2 TOLERANCES

- .1 Shape and compact subgrade to the required cross-section and grade to within ± 10 mm of design elevations but not uniformly high or low, and maintain surface drainage as required to protect the work.

END OF SECTION

7603-002-00

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use, and placement of Sub-Base Granular Materials specified herein.

1.2 DETAILED DRAWINGS

- .1 Not Used

2. PRODUCTS

2.1 GRANULAR SUB-BASE MATERIAL

- .1 Granular sub-base material shall consist of sound, hard, durable, well graded pit-run or crushed gravel or sand as specified.
- .2 Granular sub-base material shall not contain clay, loam, roots, plants or other deleterious materials. The materials shall be well graded from course to fine within the gradation limits specified, and shall not be subject to extreme variation between the lower and upper limits of the gradation envelope specified.

2.2 GRADATION

- .1 Gradation to be within the following limits when tested to ASTM C-136-82 and ASTM C117-80, and giving a smooth curve without sharp breaks when plotted on a semi-log grading chart.
- .2 Sub-Base Granular Material – Ministry of Highways

Sub-Base Course			
Sieve Designation	Percent By Weight Passing		
	Type 6	Type 8	Type 10
50.0 mm	100.0	100.0	100.0
2.0 mm	0-80.0	0-90.0	
400 um	0-45.0	0-60.0	
160 um	0-20.0	0-25.0	
75 um	0-6.0	0-15.0	0-20.0
Plasticity Index	0-6.0		

Crushed Particles (2 faces, plus 5 000 sieve fraction) shall be 60 % or greater.

3. EXECUTION

3.1 PLACEMENT OF SUB-BASE MATERIALS

- .1 Process, handle and transport aggregates to avoid segregation, contamination and degradation.
- .2 Do not place granular materials on snow, ice or frozen surfaces.
- .3 Place the sub-base material in uniform layers not exceeding 150 mm compacted depth. Shape each layer to a smooth contour and compact to specified density before placing the next layer. Areas that become segregated during spreading shall be removed and replaced as required at the expense of the Contractor. Compact the final lift of the sub-base material to proper grade and cross-section.
- .4 The Contractor shall maintain the sub-base material to the specified section, grade and condition required for the placement of other materials or as required by the Engineer. The Contractor shall be responsible for providing interim drainage to prevent damages to the work or the causing of unstable conditions due to high moisture contents.
- .5 Do not place the base material until the sub-base material has been inspected, surveyed, proof rolled, tested and approved by the Engineer.

3.2 COMPACTION OF SUB-BASE MATERIALS

- .1 Granular sub-base materials shall be compacted by rolling with a pneumatic tired roller, vibratory roller or other approved equipment.
- .2 During compaction, water shall be added by an applicator in such quantities that the moisture content will be maintained at the optimum level as determined by Standard Proctor test. If the moisture content exceeds the optimum moisture content, the material shall be aerated by mechanical means or work shall cease temporarily until the material has dried sufficiently to reach the optimum moisture content.
- .3 Compact sub-base material to 100% of Standard Proctor Density, $\pm 2\%$ of optimum moisture content.

3.3 TOLERANCES

- .1 The final surface shall be even and uniformly shaped and compacted within a tolerance of ± 20 mm of established grade but not uniformly low or high.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use, and placement of Base Granular Materials specified herein.

1.2 DETAILED DRAWINGS

- .1 Not Used.

2. PRODUCTS

2.1 GRANULAR BASE MATERIAL

- .1 Granular base material shall consist of sound, hard, durable, well graded crushed gravel, sand, and fine soil particles as specified.
- .2 Granular base material shall not contain clay, loam, roots, plants or other deleterious materials. The materials shall be well graded from course to fine within the gradation limits specified, and shall not be subject to extreme variation between the lower and upper limits of the gradation envelope specified.

2.2 GRADATION

- .1 Gradation to be within the following limits when tested to ASTM C-136-82 and ASTM C117-80, and giving a smooth curve without sharp breaks when plotted on a semi-log grading chart.
- .2 Base Granular Material – Ministry of Highways

Base Aggregate and Base Mix			
Sieve Designation	Percent By Weight Passing		
	Type 31	Type 33	Type 35
31.5 mm	100.0		
18.0 mm	75.0-90.0	100.0	100.0
12.5 mm	65.0-83.0	75.0-100.0	81.0-100.0
5.0 mm	40.0-69.0	50.0-75.0	50.0-85.0
2.0 mm	26.0-47.0	32.0-52.0	32.0-65.0
900 um	17.0-32.0	20.0-35.0	20.0-43.0
400 um	12.0-22.0	15.0-25.0	15.0-30.0
160 um	7.0-14.0	8.0-15.0	8.0-18.0
75 um	6.0-11.0	6.0-11.0	7.0-12.0
Plasticity Index	0-7.0	0-6.0	0-5.0
Fractured Face %	50.0 Minimum		
Lightweight Pieces%	5.0 Maximum		
All other Deleterious Material %	2.0 Maximum		

The percent fractures by weight (2 faces) shall be 60 % or greater.

3. EXECUTION

3.1 PLACEMENT OF BASE MATERIAL

- .1 Process, handle and transport aggregates to avoid segregation, contamination and degradation.
- .2 Do not place granular materials on snow, ice or frozen surfaces.
- .3 Do not place the base material until the sub-base material has been inspected, surveyed, proof rolled, tested and approved by the Engineer.
- .4 Place the base material uniformly on the approved sub-base material to compacted depths specified. Do not place the base materials in layers exceeding 150 mm compacted depth. Shape each layer to a smooth contour and compact to the specified density before placing the next layer. Areas that become segregated during spreading shall be removed and replaced as required at the expense of the Contractor. Compact the final layer of the base material to proper grade and cross-section.
- .5 The Contractor shall maintain the base material to the specified section, grade and condition required for the placement of other materials or as required by the Engineer. The Contractor shall be responsible for providing interim drainage to prevent damages to the work or the causing of unstable conditions due to high moisture contents.

3.2 COMPACTION OF BASE MATERIAL

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- .1 Granular base materials shall be compacted by rolling with a pneumatic tired roller, vibratory roller or other approved equipment.
- .2 During compaction, water shall be added by an applicator in such quantities that the moisture content will be maintained at the optimum level as determined by Standard Proctor test. If the moisture content exceeds the optimum moisture content, the material shall be aerated by mechanical means or work shall cease temporarily until the material has dried sufficiently to reach the optimum moisture content.
- .3 Compact base material to 100% of Standard Proctor Density, $\pm 2\%$ of optimum moisture content.

3.3 TOLERANCES

- .1 The final surface shall be even and uniformly shaped and compacted within a tolerance of $\pm 10\text{mm}$ of established grade but not uniformly low or high.

END OF SECTION

1. GENERAL**1.1 INTENT**

- .1 Read this Section in conjunction with other Sections for Proof Rolling requirements specified herein.
- .2 This Section is intended to be used as a reference Section. The Contractor shall provide the proof rolling equipment and perform the Proof Rolling as required. Proof Rolling work shall be considered as incidental to the Contract.

2. PRODUCTS**2.1 PROOF ROLLING EQUIPMENT**

- .1 Proof rolling shall be performed using a heavily loaded tandem truck with a vehicle weight of at least 10 tonnes (22,000 lbs.) per axle and a minimum tire pressure of 550 kPa (80 psi).

3. EXECUTION**3.1 SUBGRADE PROOF ROLLING**

- .1 Subgrade proof rolling shall be performed on a daily basis prior to the placement of geotextile fabric or sub-base granular material and immediately after the subgrade material has been shaped, graded and compacted to the specified density and moisture content. The loaded vehicle shall be driven slowly (walking pace) in a systematic pattern so that each successive pass is next to or partially overlaps the previous pass. Where the area to be tested is large enough successive passes shall be conducted at right angles across the previous passes. While the test is being performed, the Engineer shall observe the surface for deflections, cracking or rutting.
- .2 Once the subgrade proof roll is complete and deficient areas have been sub cut and repaired, the contractor is now responsible for the condition of the road. Any further road failures in the future due to weather or any other conditions shall be the responsibility of the Contractor to repair at his cost.

3.2 SUB-BASE PROOF ROLLING

- .1 Sub-base proof rolling shall be performed on a daily basis prior to the placement of base granular material and immediately after the sub-base granular material has been placed, shaped, graded and compacted to the specified density and moisture content. The loaded vehicle shall be driven slowly (walking pace) in a systematic pattern so that each successive pass is next to or partially overlaps the previous pass. Where the area to be tested is large enough successive passes shall be conducted at right angles across the previous passes. While the test is being performed, the Owners Representative shall observe the surface for deflections, cracking or rutting.

3.3 BASE PROOF ROLLING

- .1 The base proof rolling shall be performed immediately prior to the placement of asphalt and after the base material has been placed, shaped, graded and compacted to the specified density and moisture content. The loaded vehicle shall be driven slowly (walking pace) in a systematic pattern so that each successive pass is next to or partially overlaps the previous pass. Where the area to be tested is large enough successive passes shall be conducted at right angles across the previous passes. While the test is being performed, the Owners Representative shall observe the surface for deflections, cracking or rutting.

3.4 TOLERANCES

- .1 Where an area of subgrade material deflects, then rebounds more than 10 mm, the area will be deemed as failing the proof roll test. The failed areas identified by the Owners Representative shall be repaired to a passing condition and re-tested by proof roll method again.
- .2 Where an area of sub-base granular material deflects, then rebounds more than 10 mm, the area will be deemed as failing the proof roll test. The failed areas identified by the Owners Representative shall be repaired to a passing condition and re-tested by proof roll method again at no cost to the Owner.
- .3 Where an area of base granular material deflects, then rebounds more than 5 mm, the area will be deemed as failing the proof roll test. The failed areas identified by the Owners Representative shall be repaired to a passing condition and re-tested by proof roll method again at no cost to the Owner.

END OF SECTION

1. GENERAL**1.1 INTENT**

- .1 Read this Section in conjunction with other sections for location, use and placement of building and structure excavation specified herein.

1.2 SECTION INCLUDES

- .1 This Section includes requirements for excavating for buildings and structures inside perimeter of each building or structure, and within a nominal distance outside perimeter of each building or structure, as required for foundation and other substructure construction.

2. PRODUCTS

- .1 Not applicable.

3. EXECUTION**3.1 EXCAVATION**

- .1 Excavate to elevations and dimensions indicated on Drawings within a tolerance of ± 25 mm, and extending a sufficient distance from footings and foundation walls to permit placing and removal of concrete formwork, installation of services, other required construction, and for inspection.
- .2 In excavating for matt foundation slabs, footings and foundations, take care not to disturb bottom of excavation. A qualified geotechnical engineer should be retained to inspect the exposed bearing surface at the time of excavation, before footings are placed. Upon positive inspection, a 50 mm thick concrete mudslab should be placed immediately. The mudslab is considered essential, and should be placed within 24 hours of excavating to design bearing surface elevation. Delays in mudslab placement may be grounds for rejection of the bearing surface if it becomes disturbed.
- .3 Protect bottom of excavations and soil around and beneath footings from frost.

END OF SECTION

1. GENERAL**1.1 INTENT**

- .1 Read this Section in conjunction with other sections for the location, use and placement of building and structure backfilling specified herein.

1.2 SECTION INCLUDES

- .1 This Section includes requirements for:
 - .1 Backfilling, filling, and compaction inside perimeter of each building or structure and outside perimeter of each building or structure, adjacent to foundations.
 - .2 Granular base construction, above subgrade, for floor slabs supported on grade, within perimeter of building or structure.

2. PRODUCTS**2.1 MATERIALS**

- .1 Refer to Section 02250 for material product specifications.

3. EXECUTION**3.1 PLACEMENT AND COMPACTION OF FILL MATERIALS**

- .1 Backfill excavations and fill to required subgrade elevations using fill materials specified in Backfilling and Filling Schedule.
- .2 Place fill materials in layers not exceeding loose thickness specified in Backfilling and Filling Schedule.
- .3 Compact each layer of fill to the minimum percentages of Standard Proctor Density and within moisture content range specified in Backfilling and Filling Schedule.
- .4 Ensure that adequate permanent or temporary horizontal bracing is in place prior to backfilling against walls.
- .5 Take care to prevent damage to or displacement of waterproofing, insulation, weeping tile installation, pipe, conduit and other work.

3.2 GRANULAR BASE CONSTRUCTION UNDER SLABS

- .1 Directly under floor slabs supported on grade, provide a minimum of 150 mm compacted layer of 20 mm crushed gravel. Base raft slab to be placed directly on the 50mm mud slab, as shown.

3.3 BACKFILLING AND FILLING SCHEDULE

Location	Fill Material	Max. Lift Thickness	Minimum Compaction	Moisture Content
Under exterior slabs-on-grade	Suitable Native Material	150 mm	98 %	Within $\pm 2\%$ of optimum moisture content
Against exterior side of foundations and under landscaped areas	Suitable Native Material	150 mm	95 %	Within $\pm 2\%$ of optimum moisture content
Against exterior side of foundations and under graveled, concrete or paved areas	Suitable Native Material	150 mm	98%	Within $\pm 2\%$ of optimum moisture content
Landscaped areas	Suitable Native Material	150 mm	95%	Within $\pm 2\%$ of optimum moisture content

END OF SECTION

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1. GENERAL

1.1 DETAIL DRAWINGS

- .1 Refer to Contract Drawings.

1.2 SECTION INCLUDES

- .1 This Section includes requirements for excavating, backfilling, and compacting trenches required for installation of underground services, occurring within and outside perimeter of buildings or structures and within and outside Town limits. Underground services may include pipes, ducts, ductbanks, conduits, cable and wire.

1.3 COORDINATION

- .1 Coordinate work specified in this Section with other related work specified in other Sections.

2. PRODUCTS

2.1 FILL MATERIALS

- .1 Refer to Section 02265 for Granular Material product specifications.

3. EXECUTION

3.1 EXCAVATION

- .1 Excavate trenches to the lines, grades and elevations shown on the Contract Documents. For pipe trenches, comply with Pipe Trench Width Schedule.
- .2 Grade and shape pipe trench to give uniform and even bearing for each length of pipe. Dig bell holes at each joint as required.

3.2 PLACEMENT AND COMPACTION OF FILL MATERIAL

- .1 Backfill trenches using fill materials as specified in Backfilling Schedule.
- .2 Place fill materials in layers not exceeding loose thickness specified in Backfilling Schedule.
- .3 Uniformly compact each layer of fill to minimum percentages of Standard Proctor Density specified in Backfilling Schedule.

3.3 UTILITY CROSSINGS

- .1 Install crossings to the lines, grades and elevations shown on the Contract Documents.
- .2 Comply with requirements of crossing permit issued by utility company.

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3.4 PIPE TRENCH WIDTH

- .1 Except as otherwise specified, minimum and maximum trench widths, up to a point 300 mm above top of pipe, shall be as specified in Pipe Trench Width Schedule.
- .2 Maximum trench widths indicated in Pipe Trench Width Schedule exclude an allowance for shoring.
- .3 Trench width at any point shall not be less than trench width at any depth below such point.

3.5 PIPE TRENCH WIDTH SCHEDULE

No. of Pipes	Minimum Trench Width	Maximum Trench Width
Single pipe, 850 mm diameter or less	300 mm greater than external pipe diameter	450 mm greater than external pipe diameter or 750 mm total trench width, whichever is greater
Single pipe, greater than 850 mm diameter	300 mm greater than external pipe diameter	600 mm greater than external pipe diameter
Multiple pipes, side by side	300 mm greater than horizontal dimension across outer edges of pipes	600 mm greater than horizontal dimension across outer edges of pipes

3.6 BACKFILLING AND FILLING SCHEDULE

Location	Fill Material	Max. Lift Thickness	Minimum Compaction	Moisture Content
Pipe Zone (To 300mm above Pipe) Type 1	Zone 4 Material	150 mm	95 %	-1 % to +2%
Intermediate Pipe Zone Type 1	Suitable Native Material	300 mm	95 %	-1 % to +2%
Final Pipe Zone (1000mm below Subgrade) Type 1	Suitable Site Material	150 mm	98 %	-1 % to +2%

All pipe shall be installed with Type 2 backfill with the exception of waste fill and landscaped areas.

3.7 BACKFILLING SCHEDULE - STAINLESS STEEL PIPE

Location	Fill Material	Max. Lift Thickness	Minimum Compaction	Moisture Content
Pipe Zone - pipe bedding	Zone 4 Granular Material	150 mm	95 %	±2%
Pipe Zone – haunching	Zone 1 Graded Sand	150 mm	100 %	±2%
Pipe Zone – initial backfill	Zone 1 Graded Sand	150 mm	100 %	±2%
Intermediate Zone	Suitable Native Material	300 mm	95 %	±2%
Final Zone – to 1.0m below subgrade	Suitable Site Material	300 mm	98 %	±2%

All structures such as valves, fittings, hydrants, precast structures, and air release valves shall be backfilled according to Section 02318 item 3.3.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Read this section in conjunction with other sections for Directional Drilling requirements specified herein.

1.2 COORDINATION

- .1 The Owner has made application for the proposed work to the appropriate regulatory authorities. Work related to this Section shall not be performed until the necessary Approvals have been obtained.

2. PRODUCTS

2.1 MATERIALS

- .1 PW-25-H2
PW-50-H2
TE-150-H2
OF-150-H2
- .2 Minimum pipe thickness for all Directional Drilling of HDPE pipe shall be DR 11. All associated costs shall be including in the respective bid item.

3. EXECUTION

3.1 GENERAL

- .1 Do not proceed with any directional drilling until approval from specific utility has been obtained by Owner.
- .2 Follow the recommendations for planning and execution of horizontal directional drilling in ASTM F1962, latest edition.
- .3 Adhere to all requirements of the specific utility crossing agreement.
- .4 Follow accepted procedures and practices outlined in the HDD Consortium's "Horizontal Directional Drilling Good Practices Guidelines", May 2001 as available from North American Society for Trenchless Technology, 1655 N. Ft. Meyer Dr., Suite 700, Arlington, Virginia, USA 22209, telephone (703) 351-5252, or on their web site at www.nastt.org.
- .5 Abide by all stipulations and conditions included in the Approvals of any regulatory authorities including, but not limited to the Saskatchewan Ministry of Environment.

3.2 PLANNING

- .1 Prepare directional drilling plan, outlining specific procedures and techniques that will be implemented during construction, as well as a schedule for drilling activities. Provide these plans to the Engineer at least 14 days prior to beginning any work on directional drilling. Modify as required by the Engineer.
- .2 Prepare contingency plans for fuel and hazardous waste spills, frac-outs, storm runoff, and floods. Provide these plans to the Engineer at least 7 days prior to beginning any work on directional drilling. Modify as required by the Engineer.

3.3 CONSTRUCTION

- .1 Construct utility crossing without closing traffic at any time.
- .2 Advance the pilot bore along the alignment and to the grade shown on the Drawings, taking into account the diameter of the final bore and the diameter of the carrier pipe. Do not disturb roadway.
- .3 Maintain control of all drilling fluids at all times. Dispose of in designated locations.
- .4 Do not operate cleated equipment on paved surfaces.
- .5 Backfill all access pits from bottom of excavation to pipe invert with zone 7 gravel and compact to 95% of Standard Proctor Maximum Dry Density. Backfill remaining trench in accordance with typical pipeline bedding and backfill detail specified at that location.
- .6 Restore all disturbed areas to pre-construction conditions.

3.4 RECORD INFORMATION

- .1 Provide all technical documentation and an “as-drilled” map for each bore.

END OF SECTION

1. GENERAL

1.1 GENERAL REQUIREMENTS

- .1 The General Conditions of the Contract and all Sections of Division 00 and 01, shall form an integral part of the requirements of this Section.
- .2 All addenda or corrections issued during the time of the bidding process shall also become part of the contract documents, and shall be covered in the Trade Contractor's bid.
- .3 Cooperate and coordinate with the requirements of other Trade Contractors specified in other sections.

1.2 GENERAL REQUIREMENTS

- .1 Geotechnical Evaluation: Appendix A – Geotechnical Investigation
- .2 Cast-in-Place Concrete: Section 03300

1.3 WORK INCLUDED

- .1 Design of piles in accordance with loads and locations shown on the drawing, and design recommendations for cast-in-place piles indicated in the Geotechnical Report. In addition to the recommendations in the Geotechnical Report, it is the pile designers responsibility to account for depth of fill to be placed at the pile locations in capacity calculations. No skin friction or end bearing of the fill should be included in the pile capacity. Downdrag of the fill may be considered if the pile designer considers it necessary. Pile designer shall coordinate with the Prime Contractor to insure the pile design is applicable with the overall construction plan. Design of piles is to be performed by a firm holding a valid Permit to Practice Engineering in the Province of Saskatchewan employing a suitably qualified Professional Engineer registered to practice in the Province of Saskatchewan.
- .2 Submit two copies of pile shop drawings bearing the Permit to Practice of the firm and the Seal of the responsible Professional Engineer, with signatures, to the Project Manager.
- .3 Supervision of pile installation by qualified personnel under the direct supervision of a Professional Engineer registered to practice in the Province of Saskatchewan, and the provision of a Piling Quality Control Certificate (Section 02446A).
- .4 Installation of piles.
- .5 Corrective measures for piles or pile excavations found to be unacceptable by the Consultant.
- .6 Coordination of installation of dowels.
- .7 Submission of field records.

1.4 INSPECTION AND TESTING BY THE OWNER

- .1 The Owner will appoint and pay for services of an independent geotechnical engineering firm for periodic inspection of piling. This inspection is not intended to replace or limit, in any way, Contractor's quality control procedures.
- .2 The Owner will appoint and pay for services of an independent testing firm for testing of concrete as specified in Section 03300.
- .3 Notify the Consultant at least 48 hours prior to commencement of piling work.
- .4 Do not place concrete and reinforcing steel until pile shaft and base are inspected and approved for concrete placement by the Geotechnical Consultant.

1.5 CERTIFICATION OF QUALITY CONTROL BY CONTRACTOR

- .1 Implement such quality control procedures as may be required to permit the Piling Quality Control Certificate, Document 02466A, appended to this Section, to be completed and submitted.
- .2 Submit Piling Quality Control Certificate promptly upon completion of work of this Section.
- .3 Certificate shall not be signed by an engineer performing inspection on the Consultant's behalf pursuant to article 1.3.1 above.

1.6 ACCEPTABILITY

- .1 The article, "Acceptability" in Section 03300 - Cast-in-Place Concrete, shall apply to piles.

1.7 SHOP DRAWINGS

- .1 Submit detailed shop drawings for review.
- .2 Clearly detail and schedule piling work, identify pile lengths, diameters, design loads, reinforcement, drilling and concrete placement techniques, sequence and related scheduling.

1.8 FIELD RECORDS

- .1 Maintain accurate records of each pile placed. Records are to include the following:
 - .1 Pile Sizes, lengths, and location of piles.
 - .2 Final bearing and cut-off elevation.
 - .3 Condition of base material.
 - .4 Date and time concrete placed and concrete test results.

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- .5 Reinforcing details.
- .6 Shaft and bell diameters if applicable.
- .7 Submit 3 copies of field records to the Engineer.

2. PRODUCTS

2.1 MATERIALS

- .1 Concrete: as specified in Section 03300
- .2 Reinforcement: steel, as specified in Section 03300.
- .3 Bond Breaker: material, such as rigid fibrous glass insulation, that is sufficiently strong to withstand backfilling of soil against it, but much weaker than the backfilled soil.

3. EXECUTION

3.1 PILE INSTALLATION

- .1 The requirements of Section 03300 for concrete and reinforcement placement shall apply except that a free fall of concrete may be the length of the pile.
- .2 Use a suitable method of holding the reinforcement in proper position during concrete placement.
- .3 Clean all concrete from projecting reinforcing steel and dowels.

3.2 TOLERANCES

- .1 Locate centreline of piles within the following tolerances:
 - .1 Maximum Variation of Location:
 - .1 For pile diameters of 600 mm or less: 75 mm.
 - .2 For pile diameters over 600 mm: 100mm.
 - .2 Shafts Out of Plumb: maximum 1.5% of length or 12.5% of shaft diameter, whichever is less.
- .2 Concrete Cut-off Elevation: plus 25 mm to minus 75 mm.
- .3 If tolerances are exceeded and result in excessive eccentricity, propose corrective construction to compensate. Submit proposal for review and approval by the Consultant prior to proceeding.

END OF SECTION

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PROJECT NAME:

I, _____, hereby certify that:

1. I am registered to practice as an engineer in Saskatchewan,
2. I am experienced in the fields of building foundations and soil mechanics,
3. Qualified personnel under my direct supervision have installed the piling work for this project, and
4. based on the observations of the qualified personnel under my direct supervision at the site and all knowledge gained during the installation of piles on this project, I am satisfied that all piles have been constructed in accordance with the Contract Documents and reviewed pile design, with only those deviations, if any, noted below or on an attachment to this Certificate.

Signature

Date

Seal

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1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other sections for location use and placement of HDPE Pipe and Fittings.

2. PRODUCTS

2.1 LINE CODE CLASSIFICATION

- .1 Use the following code classification to determine pipe type and pressure rating from the drawings:

PW -50-H2	DR 11	Open Trench or Directional Drill
TE-150-H2	DR 11	Open Trench or Directional Drill
OF -150-H2	DR 11	Open Trench or Directional Drill
PW-25-H2	DR 11	Open Trench or Directional Drill

2.2 MATERIAL

- .1 The pipe shall be made from polyethylene resin compound qualified as Type III, Category 5, Class C, Grade P34 in ASTM D1248-84. This material shall have a long term hydrostatic strength of 1600 psi, when tested and analyzed by ASTM D2837.
- .2 The raw material shall contain a minimum of 2% carbon black, well dispersed.
- .3 The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification from the same raw material supplier.
- .4 Compliance with the requirements of this paragraph shall be certified in writing by the pipe supplier upon request.
- .5 The cell classification shall be PE 345434C for PE 3408 materials per ASTM D3350.

2.3 PIPE

- .1 Ensure pipe is cylindrical and straight, with ends cut square to the longitudinal axis and having a smooth finish free from imperfections such as grooves or ripples.
- .2 Provide pipe and fittings in outside diameter based iron pipe sizes up to 75 mm diameter certified to CSA B 137.1 and AWWA 901 latest revisions and meeting ASTM material specification PE 3408 for hydrostatic design stress of 800 psi.
- .3 Provide pipe and fittings in outside diameter based iron pipe sizes 100 mm diameter and larger certified to CSA B 137.1 and AWWA 906 latest revisions and meeting ASTM material specification PE 3408 for hydrostatic design stress of 800 psi.

- .4 The following shall be continuously indent printed on the pipe, or spaced at intervals not exceeding 1.5 m.
 - .1 Name and/or trademark of the pipe.
 - .2 Nominal pipe size.
 - .3 Pressure rating and/or DR number.
 - .4 The letters “PE” followed by the polyethylene type and category, as specified by ASTM D-1248, followed by the hydrostatic design basis.
 - .5 Manufactured standard design basis.
 - .6 A production code from which the date and place of manufacture can be determined.

2.4 FITTINGS

- .1 Polyethylene fittings shall be made from material meeting the same requirements as the pipe.
- .2 Where applicable, fittings shall meet the requirements of AWWA C906.
- .3 Molded fittings shall be manufactured in accordance with either ASTM D2683 (socket fused) or ASTM D3261 (butt fused) and shall be so marked.
- .4 Mitred fusion and mitred flanged fittings shall be FRP reinforced.
- .5 Molded fittings shall be constructed of polyethylene pipe with a wall thickness 25% greater than the system design. If molded fittings are to be butt fused, each end of the fitting shall be the same thickness as the pipe to which the fitting is to be fused.
- .6 Mechanical Fittings used with polyethylene pipe shall be specifically designed for, or tested and found to be acceptable for use with, polyethylene pipe. Mechanical Fittings designed for other materials shall not be used unless authorized by the Mechanical Fitting Manufacturer. Special precautions may exist with certain mechanical fittings or additional components may be required. Consult the manufacturer of the fitting prior to its use.

3. EXECUTION

3.1 PIPE INSTALLATION

- .1 Installation and handling of pipe shall be according to the manufacturer's recommendations and applicable AWWA Specification for the type of pipe selected or as specified herein.
- .2 Install pipe to the lines, grades and elevations shown on the Contract Documents. Pipe bedding as specified. Lay the pipes on the prepared bed, true to line and grade, with pipe

invert smooth and free of sag or high points. Ensure barrel of each pipe is in contact with shaped bed throughout the full length of pipe.

- .3 Lower pipe into the trench by hand or by mechanical equipment. Lift pipe by means of slings and lower into the trench. By no means shall the pipe be lifted with equipment that gouges or scars the pipe or be allowed to be pulled over the ground. Do not roll pipe into the trench. If the Contractor elects to use a narrow trench, the method of lowering the pipe into the trench shall be such that no rocks or lumps of earth fall into the trench beneath the pipe. Lumps of earth and rock greater than 25 mm will not be permitted beneath the pipe and must be removed prior to pipe placement.
- .4 The assembly of thermally butt-fused or electro-fused HDPE pipe shall be performed as recommended by the pipe manufacturer and applicable AWWA Specification for the type of pipe selected.
- .5 Employ the services of a certified HDPE fusing technician to perform all butt-fusion and electro-fusion.
- .6 Handle pipe in a manner to prevent damage to the pipe walls. Pipe strung along the trench shall, if necessary, be supported on timber skids sufficiently protected to prevent injury. Securely close the open end of pipe at the end of each day's work to prevent the entrance of small animals, or the introduction of foreign matter of any nature, and do not reopen until work is resumed. Exercise care in joining sections of the pipe, in order to minimize any possibility of foreign matter whatsoever being inside the pipeline after the completion. Any obstructions remaining in the line after the completion thereof are to be removed.
- .7 When installing the pipe bedding/haunching material ensure that the pipe is adequately secured to prevent the pipe from lifting or moving laterally while the pipe bedding/haunching material is being placed and compacted around the pipe.
- .8 For special fittings and tie-ins, cut the pipe to the length required as recommended by the pipe manufacturer without damaging the pipe or its coating. The end shall be cut smooth at right angles to the axis of the pipe.
- .9 Do not install pipe on frozen bedding.
- .10 HDPE pipe and fittings shall have Type 2 backfill as per Section 02319 – Trench Excavating and Backfilling; sub-section 3.7 Backfilling Schedule.

3.2 TOLERANCE

- .1 Maintain constructed grade for manhole connection to within ± 20 mm from the lines, grades and elevations shown in the Contract Documents.
- .2 Maintain constructed grade to within ± 50 mm from the lines, grades and elevations shown in the Contract Documents. Where departures from grade occurs the pipe shall be reinstalled to within grade tolerances.

3.3 TESTING AND INSPECTIONS

- .1 Before application for Substantial Completion all main pipe shall be inspected by means of video camera for grade tolerances. The Contractor shall provide two color copies of the video inspection and the written Final Report to the Owner. Video inspection report shall follow the manhole and/or vault numbering and stationing as per the Contract Documents.
- .2 If the video inspection reveals any ovality (out of round) in the pipe sanitary sewer trunk and main pipe, the Contractor shall perform a deflection test to ensure those sections of pipe have not deflected in excess of 7.5%. The flexible pipe deflection test shall be performed by successfully pulling a mandrel, not less than 92.5% of the base internal diameter (as defined by the CSA or ASTM standard to which the pipe is manufactured), through the pipe. All deflection testing shall be performed in conjunction with the video inspections.
- .3 Contractor shall inform the Engineer 48 hours before all testing and inspections are to begin.
- .4 The Engineer will request random samples of fused joints for testing. The sample will be requested following the completion of the fusion process, but before the next fuse is begun.
- .5 The Contractor will do all work necessary to provide the requested joint and re-fuse the two pieces of pipe. No extra payment will be made for this work.
- .6 The number of fused joints requested for testing will not exceed an average of one joint per 400 metres of HDPE pipe installed.
- .7 All pipe and fittings shall be pressure tested.
- .8 All pipe and fittings on a potable water system shall be flushed and disinfected including bacteriological testing.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other sections for location use and placement of Sanitary Sewer Pipe and Fittings.

2. PRODUCTS

2.1 LINE CODE CLASSIFICATION

- .1 Use the following code classification to determine pipe diameter, type and rating from the drawings:

SS-200-B8	200 mm diameter, SDR 35, ANSI 150, PVC pipe
SS-375-B8	375 mm diameter, SDR 35, ANSI 150, PVC pipe

2.2 GENERAL

- .1 All pipe to have ends sealed by manufacturer prior to shipping.
- .2 Rubber gasket joints are required for all pipe; See part 2.3 PIPE for details.
- .3 All cement used in the manufacture of concrete pipe to be Type 50. Sulfate Resistant, Portland Cement, CSA certified as meeting CAN/CSA-A5-M89.
- .4 All pipe are to be cylindrical and straight, with ends cut square to the longitudinal axis and having a smooth finish free from imperfections such as grooves or ripples.

2.3 PIPE

- .1 “Smooth Wall” Polyvinyl Chloride (PVC) Pipe
 - .1 For pipe sizes 200mm to 375mm in diameter all pipe to be PVC gravity sewer pipe to latest revision ASTM D3034-83, SDR 35, CSA certified as meeting the latest revision CAN/CSA B182.2-M1983, integral locked-in gasket bell and spigot system.
 - .2 For pipe sizes 450mm to 900mm in diameter all pipe to be PVC gravity sewer pipe to latest revision ASTM F679, SDR 35, CSA certified as meeting the latest revision CAN/CSA B182.2-M1983, integral locked-in gasket bell and spigot system.
- .2 PVC Series Pipe
 - .1 PVC Series pipe shall be bell and gasket joint type certified for CSA Standard B137.0 and B137.3 rigid Poly (Vinyl Chloride) for pressure applications.

3 EXECUTION

3.1 PIPE INSTALLATION

- .1 Installation and handling of pipe shall be according to the manufacturer's recommendations and applicable AWWA Specification for the type of pipe selected or as specified herein.
- .2 Install pipe to the lines, grades and elevations shown on the Contract Documents. Pipe bedding as specified. Lay the pipes on the prepared bed, true to line and grade, with pipe invert smooth and free of sag or high points. Ensure barrel of each pipe is in contact with shaped bed throughout the full length of pipe. Commence laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.
- .3 For ties to existing mains requiring interruption of the sewer service, advise the Engineer 48 hours in advance of the proposed interruption for approval. Upon approval notify the occupants, residents and businesses at least 24 hours in advance by way of a written notice and verbal advisory. Submit a copy of the notice to the Engineer for approval prior to distribution. Minimize the period of time of the interruption and schedule the interruption for a non-peak demand time.
- .4 Lower pipe into the trench by hand or by mechanical equipment. Lift pipe by means of slings and lower into the trench. By no means shall the pipe be lifted with equipment that gouges or scars the pipe or be allowed to be pulled over the ground. Do not roll pipe into the trench. If the Contractor elects to use a narrow trench, the method of lowering the pipe into the trench shall be such that no rocks or lumps of earth fall into the trench beneath the pipe. Lumps of earth and rock greater than 25mm will not be permitted beneath the pipe and must be removed prior to pipe placement.
- .5 The assembly of the gasket joint shall be performed as recommended by the pipe manufacturer and applicable AWWA Specification for the type of pipe selected. In all cases, clean the gasket, the bell or coupling interior, especially the groove area, and the spigot area with a rag, brush or paper towel to remove any dirt or foreign material before the assembling. Inspect the gasket; pipe spigot, bevel, gasket groove and sealing surface for damage or deformation. Lubricants shall be applied as specified by the pipe manufacturer.
- .6 Good alignment of the pipe is essential for easy assembly. Align the spigot to the bell and insert the spigot into the bell until it contacts the gasket uniformly. Firm and steady pressure shall be applied either by hand or by bar and block assembly until the spigot easily slips through the gasket. Do not swing or stab the joint or suspend the pipe and swing it into the bell or use excavating equipment to force pipe sections together. Complete each joint before laying next length of pipe.
- .7 Handle pipe in a manner to prevent damage to the pipe walls. Pipe strung along the trench shall, if necessary, be supported on timber skids sufficiently protected to prevent injury. Securely close the open end of pipe at the end of each day's work to prevent the entrance of small animals, or the introduction of foreign matter of any nature, and do not reopen until work is resumed. Exercise care in joining sections of the pipe, in order to minimize any possibility of foreign matter whatsoever being inside the pipeline after the completion. Any obstructions remaining in the line after the completion thereof are to be removed.

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- .8 For concrete sewer pipe, mortar the joints in the interior of 900mm diameter and larger pipe. On the exterior of the pipe use mortar to caulk the joints and allow at least one hour set time before backfilling. Smooth finish the surface of all joints.
- .9 When installing the pipe bedding/haunching material ensure that the pipe is adequately secure to prevent the pipe from lifting or moving laterally while the pipe bedding/haunching material is being placed and compacted around the pipe.
- .10 For special fittings and tie-ins, cut the pipe to the length required as recommended by the pipe manufacturer without damaging the pipe or its coating. The end shall be cut smooth at right angles to the axis of the pipe.
- .11 Flush all new sanitary sewer lines. Prevent any large debris from entering the existing system by using a screen at the downstream tie to the existing system.
- .12 Do not install pipe on frozen bedding.
- .13 Sanitary pipe and fitting shall have backfill as per Section 02319 – Trench Excavating and Backfilling; Backfilling Schedule.

3.2 TOLERANCE

- .1 Maintain constructed grade to within ± 10 mm from the lines, grades and elevations shown in the Contract Documents. Where departures from grade occurs, pipe shall be removed to the last joint where the pipe is within allowable tolerance and pipe shall be reinstalled to grade.
- .2 The Contractor shall repair all deficiencies found during testing and inspections. In general deficiencies include: improper joints; cracked, sheared, out of round or unduly deflected pipe; sags or rises which pond water in excess of 15mm; protruding service connections; and visible leaks.
- .3 Construct sanitary sewer as watertight as possible using rubber gaskets to the pipe manufacturer's specifications. Infiltration of groundwater into the entire system shall not exceed 4.6 litres per day per mm of pipe diameter per km (50 Imperial gallons per day per inch of pipe diameter per mile) of sewer, and the leakage into any section between adjacent manholes shall not exceed three times that amount. After the installation and backfilling of sewer pipe, services and manholes is completed, the Engineer shall have the right to require the Contractor to measure the leakage of groundwater. Should this leakage exceed the amount specified, the Contractor shall at his own expense repair the sewer by replacing or otherwise, until the leakage does not exceed the amount specified.

3.3 TESTING AND INSPECTIONS

- .1 All pipe and fittings on a pressurized system shall be pressure tested.
- .2 Before application for Substantial Completion all sanitary trunk and main pipe shall be inspected by means of video camera for leaks and other deficiencies as noted under 3.2 Tolerance. Contractor shall provide two color copies of the video inspection and the written Final Report to the Owner. The video inspection and reports shall be coded as per the Owners "Sewer Defect Classification Manual". The Final report shall be in

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spreadsheet format. Video inspection report shall follow the manhole and/or vault numbering and stationing as per the Contract Documents.

- .3 If the video inspection reveals any ovality (out of round) in the flexible pipe sanitary sewer trunk and main pipe, the Contractor shall perform a deflection test to ensure those sections of pipe have not deflected in excess of 7.5%. The flexible pipe deflection test shall be performed by successfully pulling a mandrel, not less than 92.5% of the base internal diameter (as defined by the CSA or ASTM standard to which the pipe is manufactured), through the pipe.
- .4 Contractor shall perform the deflection testing in conjunction with the video inspections.
- .5 Contractor shall inform the Engineer 48 hours before all testing and inspections are to begin.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Read this section in conjunction with other sections for location, use and placement of valves and valve boxes specified herein. Valves to be suitable for buried service.

1.2 DETAILED DRAWINGS

- .1 Refer to Contract Drawings.

2. PRODUCTS

2.1 VALVES

- .1 Resilient Wedge Gate Valves (GAV 8100, GAV 8104):
 - .1 100mm diameter valves are not permitted.
 - .2 Valves sized 150 to 300mm diameter shall be resilient wedge gate valves, conforming to latest revision AWWA C509-87, c/w fully rubber encapsulated solid wedge, non-rising stem, suitable for direct bury.
 - .3 Valves to open counter clockwise. (Turn left to open).
 - .4 Valve body to be constructed of cast iron, in accordance with ASTM A126, Class "B". All nuts, bolts, and washers shall be stainless steel.
 - .5 Interior and exterior of valve to be epoxy coated, as per latest revision AWWA C550-81.
 - .6 Bronze valve stem to be operated by a 50 x 50 mm square operating nut. The valve stem (stuffing box) shall contain a double "O" ring seal.
 - .7 Valve ends to be push-on "Tyton Joint" conforming to latest revision of AWWA C111 85 / ANSI A21.11-85.
 - .8 Approved Products:
 - Mueller A-2360 Resilient Wedge Gate Valve
 - Clow F-6112 Resilient Wedge Gate Valve
 - Bibby-Ste-Croix Resilient Wedge Gate Valve
 - American AVK Co. Resilient Wedge Gate Valve

2.2 CAST IRON VALVE BOXES

- .1 To be completely bituminous coated sliding type, adjustable over a minimum of 450 mm. Bottom casing to be large round type with minimum inside diameter of 240 mm. All castings shall clearly have the manufacturer's identification cast on them.
- .2 Depth of bury to be 1.83m (6') to 2.44m (8').

- .1 Valve operating extension spindle to be 25 x 25-mm square. Spindle length shall be such that the operating nut will not be more than 300 mm below the cover when set on the valve-operating nut.
- .2 Bottom of spindle to fit 50 x 50 mm square valve operating nut and shall be riveted to spindle.
- .3 Top of spindle shall have removable 50 x 50-mm square operating nut c/w stonecatcher flange.
- .4 Top casing to fit over 133 mm (5.25") inside diameter bottom casing.
- .5 Lid to be 11.35-kg (25-lbs.) minimum, marked "WATER".
- .6 Approved Products:
 - Norwood "Type A"
 - Trojan Industries "Type A"
 - Sovereign Castings Ltd. "Type A"

2.3 CORPORATION STOPS, CURB STOPS AND CURB STANDS

- .1 Corporation (Main) Stops:
 - .1 Corporation stops to be brass ball valve construction with or without Teflon coating. Body to be red brass to latest revision ASTM B62, compression type outlet fitting and inlet having AWWA thread conforming to latest revision AWWA C800. Valves to be full round port, reduced port not permitted. All brass fittings and valves will be certified by a NSF or ANSI accredited test lab per ANSI/NSF Standard 61, Section 8. Proof of certification is required.
 - .2 Approved Products:
 - Mueller B-25008 c/w "110 Compression" outlet for sizes 20, 25, 38, and 50 mm diameter.
 - Ford FB-1000 "Ballcorp" c/w "Pack Joint" outlet for sizes 20, 25, 38, and 50 mm diameter.
 - Emco/Cambridge Brass c/w "Successor" outlet for sizes 20, 25, 38, and 50 mm diameter.
 - A.Y. McDonald Mfg. "T" Compression outlet for sizes 20, 25, 38, and 50 mm diameter.
- .2 Curb Stops:
 - .1 Curb Stops to be of brass construction. Balls to be Teflon coated brass or industrial chrome plated stainless steel c/w Teflon seats. Body to be red brass without drain. Inlets and outlets to compression type fittings suitable for the specified pipe. Valves to be full port, reduced port not permitted. All brass fittings and valves will be certified by a NSF or ANSI accredited test lab per ANSI/NSF Standard 61, Section 8. Proof of certification is required.
 - .2 Approved Products:

- Cambridge Brass c/w Successor outlet for sizes 20, 25, 38 and 50 mm diameter.
- A.Y. McDonald Mfg. "Q" Compression outlet for sizes 20, 25, 38 and 50mm diameter.
- Ford B44 c/w "pack joint" outlet for sizes 20, 25, 38 and 50mm diameter.

.3 Curb Stands (Service Boxes):

- .1 Depth of bury to be 2.7 m (9') to 3.3 m (11'). A minimum of 3.15 m is recommended under roadways or in areas where soil is predominately gravel.
- .2 Curb stand sliders (top box) will be 31.75 mm (1 1/4") O.D., galvanized Standard Schedule 40, wrought iron pipe conforming to latest revision AWWA C800. Distance from top of cap to bottom of slider to be 610 mm minimum, 1,000 mm maximum.
- .3 Casing will be 25 mm O.D. (1"), galvanized Standard Schedule 40, wrought iron pipe conforming to latest revision AWWA C800 for 20 and 25 mm valves. For 40 mm and 50 mm valves increase casing to 33.4 mm O.D. with 3.38 mm wall thickness.
- .4 Cap to be cast-iron, ribbed, marked "WATER" c/w 32mm pentagonal head brass plug. The exterior of the cap is to be bituminous coated.
- .5 Bottom box to be 90 mm (3.5") I.D. for 20 and 25 mm valves and 150 mm (6") I.D. for 40 and 50 mm valves, cast or ductile iron. The exterior and interior of the bottom box will be factory coated epoxy "Type A" conforming to latest revision AWWA C213.
- .6 The operating rod will be 12.70 mm (1/2") minimum, 15.9 mm (5/8") maximum, supplied as a single unit comprised of a solid AISI Type 304 stainless steel pinned to a manganese bronze clevis with a brass rivet.
- .7 The operating rod will be manufactured with a "W" centering bend (standard pigtail) to fit a standard 25 mm I.D. galvanized casing pipe. Bottom 25 mm of rod to be forged square (cold forged) complete with 3.5 mm brass or stainless steel rivet to clevis.
- .8 The manufacturer's name will be embossed onto the clevis, and cast into the bottom boot to the satisfaction of the Owner's Representative.
- .9 The manufacturer will supply and insert the brass cotter pin into the clevis and apply sufficient bending to prevent the cotter pin from falling out of the clevis during shipping and storage of the rod.
- .10 Approved Products:
 - Western Water and Sewer
 - Trojan

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- .4 Curb Stands Stainless Steel Inserts:
 - .1 Use stainless steel inserts when connecting PEX pipe, PE Municipal tubing or Q-line tubing to curb stops and curb stop valves.
 - .2 Approved Products
 - Ford.
 - Mueller.
 - A.Y McDonald.
 - Or approved equal.

3. EXECUTION

3.1 VALVE INSTALLATION

- .1 Set and joint all valves in accordance with the manufacturer's recommendations and applicable AWWA Specifications.
- .2 Ensure that the stuffing glands are properly packed with a high-grade packing and tighten gland bolts prior to installation.
- .3 Set the valve accurately in position and place the valve box carefully over the bonnet with the valve casing perpendicular to the axis of the pipe, and adjust the top box to the grades specified.
- .4 Securely set the extension rods on the valve nut. Anchor valves as per Detail Drawings. Install wooden markers as per Detail Drawings.
- .5 Backfill for valves and valve boxes shall be consistent with the connecting pipe backfill.
- .6 Provide sacrificial anodes on all valves

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other sections for location, use and placement of Couplings specified herein.

2. PRODUCTS

2.1 COUPLINGS

- .1 Stainless Steel Couplings:
- .1 Designed for joining plain end pipes of equal outside diameter. To be flexible, all stainless steel construction. All welded stainless steel to be "passivated" after welding to eliminate sensitizing of the stainless steel.
 - .2 Shell, Sidebars, Nuts, and Bolts to be Type 304 fully passivated stainless steel. Gasket to be continuous ringed S.B.R. rubber conforming to latest revision AWWA C-111 / ANSI A21.11.
 - .3 Approved Products:
 - Robar 1606 Style 2 - for sizes 100 mm to 350 mm (4" - 14").
 - Robar 1606 Style 3 - for sizes 400 mm to 600 mm (16" - 24").
- .2 Epoxy Coated Couplings:
- .1 To be cathodically fitted and protected by cap type anodes. Anodes to be 300-gram zinc alloy caps meeting latest revision ASTM B418-80, Type 1, threaded onto the coupling bolts. Electrical continuity between bolts and end plates to be achieved by removing the epoxy coating from the end plates, under the nut bearing area.
 - .2 Epoxy Coated couplings are supplied in the three following configurations:
 - Standard Couplings: designed for joining plain end pipes of equal outside diameter.
 - Transition Couplings: designed for connecting pipes of the same nominal size, which have great differences in outside diameter. Transition to be made by "stepped-down" centre ring, c/w special end plate.
 - Reducing Couplings: designed for connecting pipes of different nominal sizes. Reduction to be made by "stepped-down" centre ring, c/w special end plate.
 - .3 Centre ring to be cast ductile iron to latest revision ASTM A536, factory coated with corrosion protective epoxy. Coating thickness to be 0.30-mm (12 mils) minimum, 0.50-mm (20 mils) maximum.
 - .4 End plates to be heat-treated cast ductile iron to latest revision ASTM A536, factory coated with corrosion protective epoxy. Coating thickness to be 0.30-mm (12 mils) minimum, 0.50-mm (20 mils) maximum. End plates shall be provided

with one 6-mm (1/4") SAE J429 Grade 5, NC cadmium plated setscrew to provide electrical conductivity between the end plates and the sleeves.

- .5 Gasket to be S.B.R. rubber conforming to latest revision AWWA C-111 / ANSI A21.11-85.
- .6 Bolts to be 15.875-mm (5/8") NC trackhead, c/w heavy-duty hex nuts. Material to be low alloy steel conforming to latest revision AWWA C-111 / ANSI A21.11-85. All bolts (except threaded area) to be factory coated with corrosion protective epoxy. Coating thickness to be 0.30-mm (12 mils) minimum, 0.50-mm (20 mils) maximum.
- .7 Coupling components to be marked as follows:
 - Centre Ring: Nominal size and manufacturers' name.
 - End-Plate: O.D. range and manufacturers' name.
 - Gaskets: O.D. range and manufacturers' name.
- .8 Approved Coupling Products:
 - Robar 1529
 - Romac 501
 - Hymax 2000 Series.
- .9 Approved Anode Products:
 - "Protecto-Caps" 300 P60W

2.2 TAPPING SLEEVES

- .1 Shall be split body type designed to allow tightening of the sleeve bolts from the opposite side of the flange outlet.
- .2 To be constructed of stainless steel or corrosion protected mild steel material. Corrosion protected sleeves shall be epoxy coated and lined. All welded stainless steel to be "passivated" after welding to eliminate sensitizing of the stainless steel.
- .3 Sleeves to include a 6.35 mm (3/4") NPT test plug for pressure testing of sleeve and installed tapping valve.
- .4 Sleeves to have permanent identification marking to identify the manufacturer's name, nominal size, and O.D. range. All sleeves to be packaged and delivered as a complete unit (i.e. sleeves, gaskets, nuts, and bolts).
- .5 Sleeves to have Class D flanges conforming to the latest revision of AWWA C207-86, 150 lb. drilling. Flanges to be fixed, not floating.
- .6 Flange materials for stainless steel tapping sleeves to be stainless steel. Flange materials for epoxy coated tapping sleeves to be cast ductile iron.
- .7 Gasket materials as follows:

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Flange- Virgin SBR compounded for water service use.

Ring Seal - Buna N, or virgin SBR compounded for water service use.

Liner - 3.18 mm (1/8") Neoprene, or virgin SBR compounded for water service use.

- .8 Bolts to be 19mm (3/4") NC stainless steel c/w heavy hex nuts and washers, lubricated to prevent galling.

- .9 Approved Products:

Stainless Steel

- Robar 6606
- Romac "SST"
- Ford FTSS

Epoxy Coated Mild Steel

- Robar 6506, 6906
- Rockwell 622
- Romac FTS 420

2.3 RESTRAINERS

- .1 Restrain PVC pipe back to nearest fitting. Use cast iron fittings when restrainer required.
- .2 Approved Products: Robar 4400 Restrainer.

3. EXECUTION

- .1 Install all couplings, tapping sleeves and restrainers as per manufacturer recommendations.
- .2 Couplings, tapping sleeves and restrainers shall have Type 2 backfill as per Section 02319 – Trench Excavating and Backfilling; sub-section 3.7 Backfilling Schedule.

END OF SECTION

7603-002-00

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other sections for location use and placement of cathodic protection.

2. PRODUCTS

2.1 CORROSION PROTECTIVE TAPES AND WRAPS

- .1 Field installed corrosion protective coatings to be two part paste & tape systems.

- .2 Approved Products:

- Polyken 900 system
- No. 930 Joint Wrap Tape
- No. 931 Filler Tape
- Denso of Canada Ltd.
- Denso Paste
- Denso Tape
- Corexco Inc.
- Petro Primer Paste
- Petro 40 Tape
- Petro Overwrap Tape
- Polyguard Products Inc.
- Polyguard 600 Primer
- Polyguard 600 Series Coating Tape
- Polyguard 606 Filler System
- The Trenton Corporation
- Trenton Tec-Tape Primer
- Trenton Tec-Tape Wrapper
- Trenton Glas-Wrap
- Trenton Fill-Putty

2.2 CATHODIC PROTECTION

- .1 General:

- .1 Prior to backfilling, arrange for the Engineer to witness the installation of the sacrificial anode, wires, cadwelding, etc., and the necessary continuity check. Location of Anode packs to be determined by the Engineer.

- .2 Steel Pipe And Valves:

- .1 Sacrificial Anodes:

- .1 Sacrificial zinc anodes shall be supplied and installed by the Contractor on each buried steel pipe and adapter. Zinc anodes to be supplied and installed by the Contractor shall consist of an alloy of the following chemical composition:

Al	0.005% maximum
Cd	0.003%
Fe	0.0014% maximum
Zinc	Remainder

- .2 The anode lead wires shall be 3 metres (10-feet) in length and shall consist of #13 solid copper wire with Type TW insulation. The lead wire shall be connected to the core with silver solder. The entire connection shall be insulated by filling the recess with an electrical potting compound.

- .3 The anode shall be packaged in a permeable cloth bag containing a backfill mixture of the following composition:

Ground Hydrated Gypsum	75%
Powdered Wyoming Bentonite	20%
Anhydrous Sodium Sulphate	5%

- .4 Backfill shall have a grain size so that 100% is capable of passing through a 20 mesh screen and 50% will be retained by a 100 mesh screen. The mixture shall be firmly packaged around the magnesium within the cloth bag by means of adequate vibration.

- .2 Location:

- .1 At underground inlet pipe at building (4.6kg)
- .2 At all buried service valves (4.6kg)
- .3 At all couplers (4.6kg)
- .4 At all Fire Hydrants (5.4kg)

3. EXECUTION

3.1 INSTALLATION OF SACRIFICIAL ANODES

- .1 Remove the plastic bag from the anodes, leaving the cloth bag intact.
- .2 Place the anodes a minimum distance of 915 mm (3-feet) from the main in a horizontal position at approximately the same elevation and parallel to the main.
- .3 Ensure that soil is packed uniformly around the anodes to eliminate voids or air pockets adjacent to the anodes.
- .4 Pour a minimum of 9 litres (2-gallons) of water on each anode to initiate the anodes operation.
- .5 Zinc anodes shall be cadwelded onto each length of buried steel pipe and each metal adapter.

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3.2 CADWELDING

- .1 Remove a small portion of coating on the pipe or fitting if a coating exists.
- .2 Thoroughly clean area to be cadwelded and file metal until a shiny, roughened surface is obtained approximately 75 mm (3-inches) square.
- .3 Crimp a copper sleeve onto the bared end of the wire to be cadwelded.
- .4 Use a cadweld mold M108 or equal and powder CA-15 or equal.
- .5 Knock any slag off of the completed cadweld and file smooth any sharp edges.
- .6 Thoroughly coat the cadweld and any area adjacent that has had the coating removed with a moulded plastic patch.

END OF SECTION

7603-002-00

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for the location, use, and placement of "Water Service Connections" specified herein.
- .2 This Section may also be used as a reference section. All materials specified in Part 2, Products, may not necessarily be required.

2. PRODUCTS

2.1 GENERAL

- .1 For service connection sizes 20 mm to 50 mm diameter, pipe to be HDPE DR 11
- .2 Valves and Valve Boxes for service connection sizes 100 mm to 300 mm diameter to be as specified in Section 02515 – Valves and Valve Boxes.

2.2 COUPLINGS

- .1 Water Service Tubing Couplings:
 - .1 Compression type suitable for 1 MPa working pressure. Couplings to be supplied without internal pipe stop.
 - .2 Approved Products:
 - Ford "Pack Joint" couplings
 - Ford "Grip Joint" couplings
 - Mueller "Oriseal" couplings
 - Emco/Cambridge Brass "Successor" couplings
 - A.Y. McDonald Mfg. "T" Compression couplings for sizes 20 & 25 mm diameter.
- .2 Universal Transition Couplings:
 - .1 To be used to join any type of water service connection pipe in sizes 20 mm to 50 mm.
 - .2 Approved Products:
 - PHILMAC Universal Transition Standard Couplings
 - PHILMAC Universal Transition Reducing Couplings
 - PHILMAC Universal Transition Elbow, Tees and Adaptors

2.4 CORPORATION STOPS, CURB STOPS AND CURB STANDS

- .1 Corporation (Main) Stops:

- .1 Corporation stops to be brass ball valve construction with or without Teflon coating. Body to be red brass to latest revision ASTM B62, compression type outlet fitting and inlet having AWWA thread conforming to latest revision AWWA C800. Valves to be full round port, reduced port not permitted. All brass fittings and valves will be certified by a NSF or ANSI accredited test lab per ANSI/NSF Standard 61, Section 8. Proof of certification is required.
- .2 Approved Products:
 - Mueller B-25008 c/w "110 Compression" outlet for sizes 20, 25, 38, and 50 mm diameter.
 - Ford FB-1000 "Ballcorp" c/w "Pack Joint" outlet for sizes 20, 25, 38, and 50 mm diameter.
 - Emco/Cambridge Brass c/w "Successor" outlet for sizes 20, 25, 38, and 50 mm diameter.
 - A.Y. McDonald Mfg. "T" Compression outlet for sizes 20, 25, 38, and 50 mm diameter.
- .2 Curb Stops:
 - .1 Curb Stops to be of brass construction. Balls to be Teflon coated brass or industrial chrome plated stainless steel c/w Teflon seats. Body to be red brass without drain. Inlets and outlets to compression type fittings suitable for the specified pipe. Valves to be full port, reduced port not permitted. All brass fittings and valves will be certified by a NSF or ANSI accredited test lab per ANSI/NSF Standard 61, Section 8. Proof of certification is required.
 - .2 Approved Products:
 - Cambridge Brass c/w Successor outlet for sizes 20, 25, 38 and 50 mm diameter.
 - A.Y. McDonald Mfg. "Q" Compression outlet for sizes 20, 25, 38 and 50mm diameter.
 - Ford B44 c/w "pack joint" outlet for sizes 20, 25, 38 and 50mm diameter.
- .3 Curb Stands (Service Boxes):
 - .1 Depth of bury to be 2.7 m (9') to 3.3 m (11'). A minimum of 3.15 m is recommended under roadways or in areas where soil is predominately gravel.
 - .2 Curb stand sliders (top box) will be 31.75 mm (1 1/4") O.D., galvanized Standard Schedule 40, wrought iron pipe conforming to latest revision AWWA C800. Distance from top of cap to bottom of slider to be 610 mm minimum, 1,000 mm maximum.
 - .3 Casing will be 25 mm O.D. (1"), galvanized Standard Schedule 40, wrought iron pipe conforming to latest revision AWWA C800 for 20 and 25 mm valves. For 40 mm and 50 mm valves increase casing to 33.4 mm O.D. with 3.38 mm wall thickness.
 - .4 Cap to be cast-iron, ribbed, marked "WATER" c/w 32mm pentagonal head brass plug. The exterior of the cap is to be bituminous coated.

- .5 Bottom box to be 90 mm (3.5") I.D. for 20 and 25 mm valves and 150 mm (6") I.D. for 40 and 50 mm valves, cast or ductile iron. The exterior and interior of the bottom box will be factory coated epoxy "Type A" conforming to latest revision AWWA C213.
- .6 The operating rod will be 12.70 mm (1/2") minimum, 15.9 mm (5/8") maximum, supplied as a single unit comprised of a solid AISI Type 304 stainless steel pinned to a manganese bronze clevis with a brass rivet.
- .7 The operating rod will be manufactured with a "W" centering bend (standard pigtail) to fit a standard 25 mm I.D. galvanized casing pipe. Bottom 25 mm of rod to be forged square (cold forged) complete with 3.5 mm brass or stainless steel rivet to clevis.
- .8 The manufacturer's name will be embossed onto the clevis, and cast into the bottom boot to the satisfaction of the Owner's Representative.
- .9 The manufacturer will supply and insert the brass cotter pin into the clevis and apply sufficient bending to prevent the cotter pin from falling out of the clevis during shipping and storage of the rod.
- .10 Approved Products:
 - Western Water and Sewer
 - Trojan
- .4 Curb Stands Stainless Steel Inserts:
 - .1 Use stainless steel inserts when connecting PEX pipe, PE Municipal tubing or Q-line tubing to curb stops and curb stop valves.
 - .2 Approved Products
 - Ford.
 - Mueller.
 - A.Y McDonald.
 - Or approved equal.

2.5 SERVICE SADDLES

- .1 Service Saddles – "Boss" Clamps:
 - .1 Stainless steel "Boss" repair clamps are to be used in service saddle applications.
 - .2 "Boss" repair clamps are to be fabricated, flexible, all T304 stainless steel construction, fully passivated, with double bolt closure (fasteners) minimum. Body to be minimum 300 mm (12") long.
 - .3 Outlet to be 20 mm to 50 mm AWWA Taper thread for standard service connections. For use on chlorination points only, outlet to be 20 mm to 50-mm IP thread.

- .4 Fasteners to be 15.88 mm (5/8") NC thread T304 stainless steel. Hex nuts and washers to be T304 stainless steel, lubricated to prevent galling.
- .5 Gasket to be continuous ring, waffle pattern S.B.R. rubber conforming to latest revisions of ASTM D2000 and AWWA C-111 / ANSI A21.11.
- .6 "Boss" service clamps are to be used on all service connections or manual air relief valves tapped into PVC series rated pipe.
- .7 Approved Products:
 - Robar 5616 Triple Bolt for main sizes 75mm to 300mm
 - Robar 5626 Triple Bolt for main sizes 75mm to 350mm
 - Canada Pipeline CR2/CRB2 for main sizes 100mm to 300mm
 - Robar 5636 for main sizes 250mm to 600mm
 - Canada Pipeline CR3/CRB3 for main sizes 300mm to 900mm
 - TPS EZ MAX 4000 for main sizes 75mm to 300mm

3. EXECUTION

3.1 GENERAL

- .1 Drill and direct tap water mains under normal pressure by means of a tapping machine and thread in corporation main stop with tapping machine. Use only when tapping PVC C900 or C905 pipe. Do not direct tap PVC series pipe. Single and multiple tap service connections will be tapped in the top half of the pipe at the 10:00 o'clock and 2:00 o'clock positions. Adjacent service taps are not to be any closer than 600 mm between services and no closer than 600 mm to a pipe or fitting joint.
- .2 Use a service saddle on all dry tap installation and for all 25 mm and larger services.
- .3 Form a gooseneck with service pipe to the right of the corporation stop, as viewed from the property line to the main, formed so that no flattening of the service occurs.
- .4 Locate corporation curb stop on property line for street servicing or 300 mm outside property line for land servicing or as specified on the applicable drawings.
- .5 Set service boxes plumb over the centre of the corporation curb stop and set the top of service box to proper elevation.
- .6 In areas of clay soil, water service will be a minimum of 2.7 m below the final grade or as specified. In areas where the soil is predominantly gravel, water services will be 3.3 m below final grade or as specified. Where minimum cover on the service cannot be achieved, the service will be installed with an insulating frost shield unless otherwise directed by Owner's Representative.
- .7 Support and centre curb stop on an approved; fiberglass, concrete, or treated wooden block 50 mm x 150 mm x 200 mm.

- .8 Test water service under the operating pressure for a period of one hour. The entire test will be inspected by the Owner's Representative and approved before backfilling.
- .9 Backfill for water service will be consistent with the connecting water main Work.

1. GENERAL

1.1 INTENT

- .1 This Section is intended to be used as a reference Section; it is not a "section of work". All materials specified in Part 2, Products, may not necessarily be required.

2. PRODUCTS

- .1 Not Applicable.

3.0 EXECUTION

- .1 Subject the newly laid pipe to hydrostatic tests after backfilling.
- .2 Provide all labour, equipment and materials required to perform the hydrostatic and leakage tests
- .3 The Contractor shall be responsible for the supply of all water, materials, equipment and fittings required for pipe pressure testing.
- .4 Submit written hydrostatic testing plan to the Owner's Representative at least 48 hours prior to starting the tests. Tests are to be performed in the presence of the Owner's Representative.
- .5 Do not conduct tests until at least 5 days after placing concrete or 2 days if high early strength concrete is used for thrust blocks.
- .6 Open all valves necessary to test section of pipe.
- .7 Test pipeline in sections not to exceed 500 m in length unless otherwise authorized by Owner's Representative.
- .8 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. To compensate for initial pipe stretch and to expel all entrapped air, the pipe shall be pressurized until pressure is maintained before the test period is started
- .9 Fill concrete pipe at least 24 hours before testing to allow water absorption by pipe material.
- .10 Thoroughly examine exposed parts and correct for leakage as necessary.
- .11 For PVC pipes, apply hydrostatic test pressure of 1035 kPa or 1.5 times the normal operating pressure, whichever is greater, based on elevation of lowest point in the main and corrected to elevation of test gauge, for a period of 2 hours. Test pressure not to exceed the pressure rating of the pipe or fittings.

- .12 Define leakage as amount of water supplied in order to maintain test pressure for 2 hour for jointed pipes and 4 hours for polyethylene pipe.
- .13 After the test period, a measured amount of "make-up" water shall be added to return the pipe to the test pressure. The amount of "make-up" water shall not exceed the allowance given in the following table.
- .14 For PVC pipes, do not exceed allowable leakage as defined in AWWA C605 using the following formula for ductile iron pipe and the valves.

$$Q = \frac{L * D * (P^{0.5})}{795,000} \text{ where } Q = (\text{maximum allowable leakage in litres per hour})$$

L = length of pipe section being tested (m)
D = nominal pipe diameter (mm)
P = test pressure (kPa)

Note: 1.0 PSI = 6.89 kPa

- .15 Steel pipelines shall be pressure and leakage tested in accordance with AWWA M11 and the manufacturers recommendations, unless otherwise specified.
- .16 For fused polyethylene pipe the hydrostatic test consists of two steps: the initial expansion phase and the test period. The main shall initially be pressured up to 1.5 times the Standard Pressure Rating of the Pipe with pressure measured at the lowest elevation in the section being tested. Water shall be added each hour during this period to maintain the pressure, thereby compensating for the expansion of the pipe. The initial expansion period shall be no less than 3 hours. At the end of the three hour initial period, there should be a noticeable drop in the amount of make-up water required. Following the expansion period, a 1 to 3 hour test period will commence. The pipe shall be pressured up to the test pressure and at the end of the test period, the volume of make-up water measured. The amount of make-up water should not exceed the volume in the following table:

**Table No. 2 Maximum Make-up Water Allowance for Expansion
Under Test Pressure at 73.4°F (23.0°C) per 100 ft (30.5 metres) of pipe**

Nominal Pipe Size		Allowable Makeup Volume (1hr test)		Allowable Makeup Volume (2 hr test)		Allowable Makeup Volume (3 hr test)	
(in)	(mm)	(u.s. gal)	(litres)	(u.s. gal)	(litres)	(u.s. gal)	(litres)
3	75	0.10	0.38	0.15	0.57	0.25	0.95
4	100	0.13	0.49	0.25	0.95	0.40	1.5
6	150	0.30	1.1	0.60	2.3	0.90	3.4
8	200	0.50	1.9	1.0	3.8	1.5	5.7
10	250	0.70	2.7	1.3	4.9	2.1	8.0
11	280	1.0	3.8	2.0	7.6	3.0	11.4
12	300	1.1	4.2	2.3	8.7	3.4	12.9
14	350	1.4	5.3	2.7	10.2	4.2	15.9
16	400	1.7	6.4	3.3	12.5	5.0	18.9
18	450	2.2	8.3	4.3	16.3	6.5	24.6
20	500	2.7	10.2	5.5	20.8	8.0	30.3

For test temperatures other than 23 degrees C., the following correction factor should be multiplied by the expansion allowance volume:

Temperature	Correction Factor
23	1.00
21	0.87
20	0.75
18	0.66
16	0.58
10	0.42
5	0.30
0	0.22

Test temperature is the average between the ambient air temperature and the test temperature of the water introduced into the main.

For PVC Pipe:

Nominal Pipe Size (mm)	Allowable Leakage for 2 hour test (litres per km of pipe)
150	12
200	16
250	21
300	25
375	29
400	33
450	37
500	41
600	49
750	62
900	74

- .17 For polyethylene pipe, under no circumstances should the total time at 1.5 times the pressure rating exceed eight (8) hours. If the test is not completed within the time period for whatever reason, the test section should be permitted to "relax" for an additional eight hour period prior to starting the next test sequence.
- .18 After testing, locate and repair defects if leakage is greater than amount specified.
- .19 Remove joints, fittings and appurtenances found defective and replace with new sound material and make watertight.
- .20 Repeat hydrostatic test until all defects have been corrected.
- .21 Repeat test until leakage is within specified allowance for full length of watermain.

1. GENERAL

1.1 INTENT

- .1 This section is intended to be used as a reference section; it is not a "section of work". All materials specified in Part 2, Products, may not necessarily be required.

1.2 DETAILED DRAWINGS

- .1 Not applicable.

2. PRODUCTS

- .1 The form of chlorine that may be used in the disinfection operation is sodium hypochlorite solution. The sodium hypochlorite shall conform to ANSI/AWWA B300.

3. EXECUTION

3.1 GENERAL

- .1 Scope: This standard presents mandatory procedures for the flushing and disinfection of new and repaired potable water mains. All new water mains shall be flushed and disinfected before they are placed in service. All water mains taken out of service for inspection, repair or other activities that might lead to contamination of water shall be disinfected before they are returned to service.
- .2 Purpose: The purpose of this section is to define the minimum requirements for the disinfection of water mains, including the preparation of water mains, application of chlorine, and sampling and testing for the presence of coliform bacteria.
- .3 The Owner's Representative shall witness flushing and disinfecting operations. The Contractor is responsible for notifying the Owners Representative at least four days in advance of commencing the disinfecting process. The Contractor is responsible for making the necessary arrangements for the supply of water for the flushing operation.
- .4 Thoroughly flush each completed section of main and services over 50 millimetre (2-inches) to remove all foreign matter. Inject the main with a chlorine solution (i.e. calcium hypochlorite) at a dosage of at least 50 mg/L. The point of application shall be at or near the beginning of the pipe extension and the discharge point at or near the end of the line being treated.
- .5 Inject the chlorine solution while the line is being slowly charged to ensure an even distribution. When the main has been fully charged, valve the main off and let stand for 24 hours. During the detention period, operate all valves and hydrants on the line to ensure that all parts have contacted the chlorine solution. The water in the main shall have a chlorine concentration of 10 mg/l at the end of the 24-hour period. Thoroughly flush the mains to expel all heavily treated water. Take and test water samples from the line both chemically and bacteriologically. Provide results to Owners Representative for review.

- .6 Do not put a new main into service until a certificate stating that the water is free from contamination has been issued by a recognized laboratory.
- .7 Disinfecting, flushing and obtaining water samples from the mains must be carried out in the presence of the Owners Representative.
- .8 Ensure that water from the mains in the area will not be used for drinking or other domestic purposes until the mains have been disinfected, samples taken and these samples certified as being free from contamination.
- .9 All necessary water for flushing and disinfection will be supplied by the Owner.
- .10 Install any necessary chlorination points along the pipeline route in order to properly inject the disinfectant. Connections to be main to be completed at no cost to the Owner. The connections made shall be appropriately marked and abandoned to the satisfaction of the Owners Representative.
- .11 Ensure that all water flushed from the main is safe to be discharged into the disposal point. Abide by all local and Provincial regulations relative to the discharge of super-chlorinated water.
- .12 The addition of an additive to the discharge water may be required in order to neutralize the super chlorinated water prior to disposal. Contractor is responsible for all costs related to this work.

3.2 DISINFECTION AND FLUSHING

- .1 The basic disinfection procedure consists of:
 - .1 inspecting all materials to be used to ensure the integrity of the materials;
 - .2 preventing contaminating materials from entering the water main during storage, construction, or repair and noting potential contamination at the construction site;
 - .3 removing, by flushing or other means, those materials that may have entered the water main;
 - .4 chlorinating any residual contamination that may remain, and flushing the chlorinated water from the main;
 - .5 protecting the existing distribution system for backflow caused by hydrostatic pressure test and disinfection procedures;
 - .6 documenting that an adequate level of chlorine contacted each pipe to provide disinfection;
 - .7 determining the bacteriological quality by laboratory test after disinfection;
 - .8 final connection of the approved new water main to the active distribution system.

.2 Preventive and Corrective Measures During Construction:

.1 General:

- .1 Heavy particulates generally contain bacteria and prevent even very high chlorine concentrations from contacting and killing these organisms. Therefore, the procedures of this section must be observed to assure that a water main and its appurtenances have been thoroughly cleaned for the final disinfection by chlorination. Also, any connection of a new water main to the active distribution system prior to the receipt of satisfactory bacteriological samples may constitute a cross-connection. Therefore, the new main must be isolated until bacteriological test described in Section 4.2 of this standard are satisfactorily completed.

.2 Keeping Pipe Clean and Dry:

- .1 The interiors of pipes, fittings, and valves shall be protected from contamination. Pipe delivered for construction shall be strung to minimize the entrance of foreign material. All openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. Rodent-proof plugs may be used when watertight plugs are not practicable and when thorough cleaning will be performed by flushing or other means.

.3 Delays:

- .1 Delay in placement of delivered pipe invites contamination. The more closely the rate of delivery is correlated to the rate of pipe laying, the lower the risk of contamination.

.4 Joints:

- .1 Joints of all pipes in the trench shall be completed before work is stopped. If water accumulates in the trench, the plugs shall remain in place until the trench is free of water.

.5 Packing Materials:

- .1 Yarning or packing material shall consist of molded or tubular rubber rings, rope of treated paper, or other approved materials. Materials such as jute or hemp shall not be used. Packing material shall be handled in a manner that avoids contamination. If asbestos rope is used, asbestos shall be prevented from entering into the water-carrying portion of the pipe.

.6 Sealing Materials:

- .1 No contaminated material or any material capable of supporting prolific growth or microorganisms shall be used for sealing joints. Sealing

material or gaskets shall be handled in a manner that avoids contamination. The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water and shall not contribute odors. It shall be delivered to the job in closed containers and shall be kept clean and applied with dedicated, clean applicator brushes.

.7 Cleaning and Swabbing:

- .1 If dirt enters the pipe, it shall be removed and the interior pipe surface swabbed with a 1 to 5% hypochlorite disinfecting solution. If, in the opinion of the Owners Representative, the dirt remaining in the pipe will not be removed using the flushing operation, then the interior of the pipe shall be cleaned using mechanical means, such as a hydraulically propelled foam pig (or other suitable device acceptable to the Owners Representative) in conjunction with the application of a 1% hypochlorite disinfecting solution. The cleaning method used shall not force mud or debris into the interior pipe-joint spaces and shall be acceptable to the Owners Representative.

.8 Wet-trench construction:

- .1 If it is not possible to keep the pipe and fittings dry during installation, the water that may enter the pipe-joint spaces shall contain an available chlorine concentration of approximately 25 mg/L. This may be accomplished by adding calcium hypochlorite granules or tablets to each length of pipe before it is lowered into a wet trench or by treating the trench water with hypochlorite tables.

.9 Flooding by storm or accident during construction:

- .1 If the main is flooded during construction, the Owners Representative may require the following procedure be followed. The decision will be based on site specific conditions.

The main shall be cleared of the floodwater by draining and flushing with potable water until the main is clean. The section exposed to the floodwater shall then be filled with a chlorinated potable water that, at the end of a 24-h holding period, will have a free chlorine residual of not less than 25 mg/L. The chlorinated water may then be drained or flushed from the main. After construction is completed, the main shall be disinfected using the continuous-feed or slug method.

.10 Backflow Protection:

- .1 When specified by the Owners Representative, the new water main shall be kept isolated from the active distribution system using a physical separation until satisfactory bacteriological testing has been completed and the disinfectant water flushed out. Water required to fill the new main for hydrostatic pressure testing, disinfection, and flushing shall be supplied through a temporary connection between the distribution system and the new main. The temporary connection shall include an

appropriate cross-connection control device consistent with the degree of hazard (a double check valve assembly or a reduced pressure zone assembly).

In **most** cases a closed gate valve will be considered to be sufficient isolation.

It will be necessary to re-establish the temporary connection after completion of the hydrostatic pressure test to flush out the disinfectant water prior to final connection of the new main to the distribution system.

.3 Pre Flushing:

- .1 The source water used for disinfection and pressure testing shall be flushed prior to its use to ensure that contaminants or debris are not introduced into the new pipe. Adequate drainage must be provided during flushing. Drainage shall not take place away from the construction area.
- .2 The Contractor shall provide temporary pumping to boost pressures as required and achieve the required velocity of 0.76 m/s through the entire pipe system.

.4 Final Flushing:

.1 Clearing the main of heavily chlorinated water:

- .1 After the applicable retention period, heavily chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe lining or to prevent corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main fittings, valves, and branches until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the distribution system or that is acceptable for domestic use.

.2 Disposing of Heavily Chlorinated Water:

- .1 Under no condition is heavily chlorinated water to be discharged to the Storm Sewer system. Heavily chlorinated water may be discharged to the Sanitary Sewer system with permission from the Owner.

Where discharge to the Sanitary Sewer System is impractical, chlorinated water shall be treated with an approved de-chlorinating agent and monitored to ensure that chlorine levels do not adversely affect the environment.

.5 Procedures When Cutting Into or Repairing Existing Mains

The following procedures apply primarily when existing mains are wholly or partially dewatered. After the appropriate procedures have been completed, the existing main may

be returned to service prior to the completion of bacteriological testing in order to minimize the time customers are without water.

.1 Trench Treatment:

When an existing main is opened, either by accident or by design, the excavation will likely be wet and may be badly contaminated from nearby sewers. Liberal quantities of hypochlorite applied to open trench areas will lessen the danger from this pollution. Tablets have the advantage in this situation, because they dissolve slowly and continue to release hypochlorite as water is pumped from the excavation.

.2 Swabbing with Hypochlorite Solution:

The interior of all pipe and fittings (particularly couplings and sleeves) used in making the repair shall be swabbed or sprayed with a 1% hypochlorite solution before they are installed.

.3 Flushing:

Thorough flushing is the most practical means of removing contamination introduced during repairs. If valve and hydrant locations permit, flushing toward the work location from both directions is recommended. Flushing shall be started as soon as the repairs are completed and shall be continued until discolored water is eliminated.

.4 Slug Chlorination:

Where practical, in addition to the procedures previously described, the section of the main in which the break is located shall be isolated, all service connections shut off, and the section flushed and chlorinated. The dose may be increased to as much as 300 mg/L and the CT reduced to as little as 15 min. After chlorination, flushing shall be resumed and continued until discoloured water is eliminated and the chlorine concentration in the water exiting the main is no higher than the prevailing water in the distribution system or that which is acceptable for domestic use.

.5 Bacteriological Samples:

Bacteriological samples shall be taken after repairs are completed to provide a record for determining the procedure's effectiveness. If the direction of flow is unknown, then samples shall be taken on each side of the main break. If positive bacteriological samples are recorded then the situation shall be evaluated by the Owners Representative who can determine corrective action.

.6 Special Procedure for Caulked Tapping Sleeves

Before a tapping sleeve is installed, the exterior of the main to be tapped shall be thoroughly cleaned and the interior surface of the sleeve shall be lightly dusted with calcium hypochlorite powder.

Tapping sleeves are used to avoid shutting down the main. After the tap is made, it is impossible to disinfect the annulus without shutting down the main and removing the sleeve. The space between the tapping sleeve and the tapped pipe is approximately 13 mm, so that as little as 1000 mg/m² of calcium hypochlorite powder will provide a chlorine concentration of more than 50 mg/L.

3.3 VERIFICATION

.1 Bacteriological Tests:

.1 Standard Conditions:

After final flushing, and before the new water main is connected to the distribution system, two consecutive sets of acceptable samples taken at least 24h apart, shall be collected from the new main. (NOTE: The pipe, the water loaded into the pipe, and any debris all exert a chlorine demand that can interfere with disinfection).

At least one set of samples shall be collected from every 350 m of the new water main, plus one set from the end of the line and at least one set from each branch. All samples shall be tested for bacteriological quality in accordance with Standard Methods of the Examination of Water and Wastewater, and shall show the absence of coliform organisms.

Testing for chlorine residual and turbidity shall also be conducted.

A standard heterotrophic plate count MAY be required at the option of the Owners Representative, because new material does not typically contain coliforms but does typically contain HPC bacteria.

.2 Special Conditions:

If trench water has entered the new main during construction or if, in the opinion of the Owners Representative, excessive quantities of dirt or debris have entered the new main, bacteriological samples shall be taken at intervals of approximately 60m and the location shall be identified. Samples shall be taken of water that has stood in the new main for at least 16 hours after final flushing has been completed.

.3 Sampling Procedure:

Samples for bacteriological analysis shall be collected in sterile bottles treated with sodium thiosulfate as required by Standard Methods for the Examination of Water and Wastewater. No hose or fire hydrant shall be used in the collection of samples. (NOTE: For pipe repairs, if no other sampling port is available, well flushed fire hydrants may be used with the understanding that they do not represent optimum sampling conditions). The sampling pipe must be dedicated and clean, and disinfected and flushed prior to sampling. A corporation cock may be installed in the main with a copper-tube gooseneck assembly.

.4 Record of Compliance:

The record of compliance shall be the bacteriological test results certifying that the water sampled from the new water main is free of coliform bacteria contamination.

.2 Re-Disinfection

If the initial disinfection fails to produce satisfactory bacteriological results or if other water quality is affected the new main may be re-flushed and shall be re-sampled. If check samples also fail to produce acceptable results, the main shall be re-chlorinated by the continuous-feed or slug method until satisfactory results are obtained. (NOTE: High velocities in the existing system, resulting from flushing the new main, may disturb sediment that has accumulated in the existing mains. When check samples are taken, it is advisable to sample water entering the new main to determine the source of turbidity).

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 This Section is intended to be used as a reference Section; it is not a "section of work". All materials specified in Part 2, Products, may not necessarily be required.

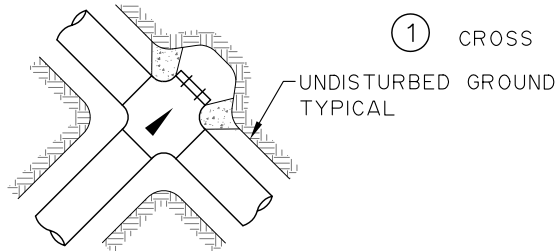
2. PRODUCTS

- .1 Supply concrete in accordance with Section 3300 Cast-in place Concrete
- .2 6 mil polyethylene to be placed between all fittings, valve, and pipe and the concrete,

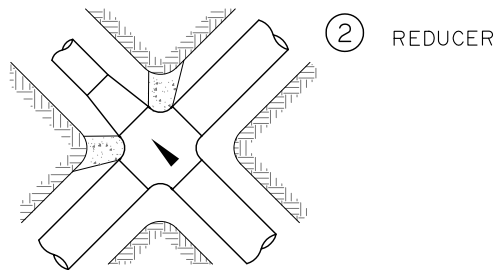
3. EXECUTION

- .1 All bends, fittings, valves and all points where there is thrust shall be anchored to prevent movement by providing suitable thrust blocking, as shown on the attached detail drawings
- .2 Thrust-blocking material shall be purchased from a reputable concrete supplier and will not be manufactured on site.
- .3 Thrust blocking shall be placed between solid ground and the fitting to be anchored; the area of bearing between the pipe and the ground in each instance shall be that shown on the Detail Drawings. The blocking shall be so placed that the pipe and fitting joints will be accessible for repair.
- .4 Place concrete thrust blocks between valves, tees, plugs, caps, bends, changes in pipe diameter, reducers, hydrants, and fittings and undisturbed ground as indicated or as directed by the Engineer.
- .5 Bearing areas shall be inspected by the Engineer prior to placing concrete.
- .6 Keep joints and couplings free from concrete.
- .7 Do not backfill over concrete for a minimum of 24 hours after concrete is placed.

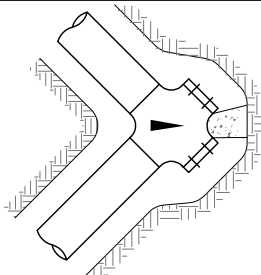
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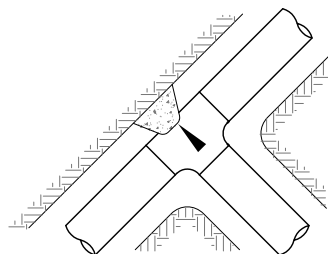
① CROSS



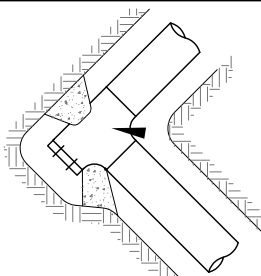
② REDUCER



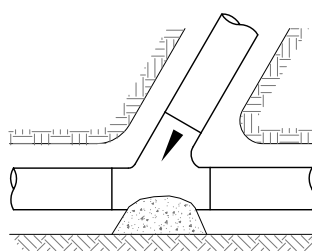
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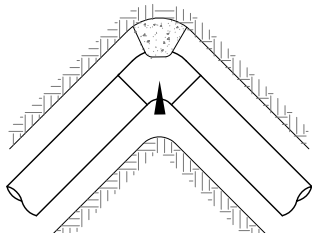
④ TEE



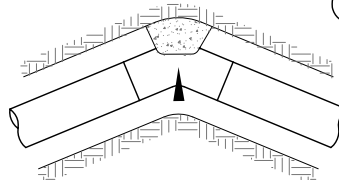
⑤ TEE



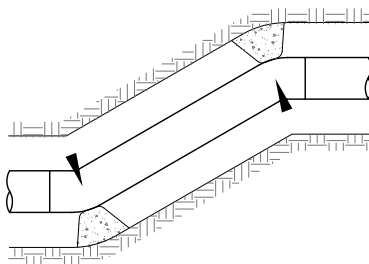
⑥ WYE



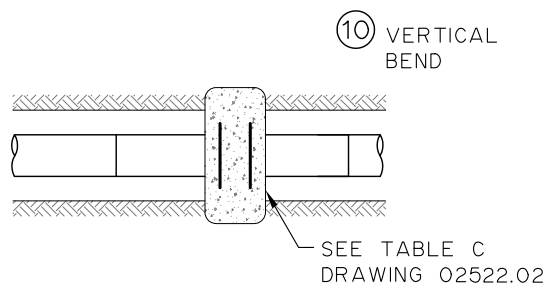
⑦ 90° BEND



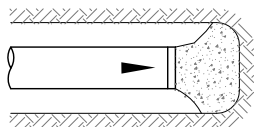
⑧ 45° BEND
22.5° BEND
11.25° BEND



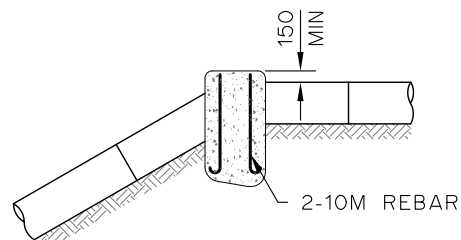
⑨ OFFSET BEND



⑩ VERTICAL BEND



⑪ CAP



STANDARD DRAWING

THRUST BLOCK LOCATIONS

TABLE 'A'						
THRUST BLOCK FACE AREA IN SQ METRES AT FITTING FOR CL 150 PIPE @ 1000 kPa AND SOIL BEARING CAPACITY OF 100 kPa						
PIPE SIZE IMPERIAL	PIPE SIZE METRIC	DEAD ENDS OR TEE	90° BEND	45° BEND	22.5° BEND	11.25° BEND
4"	100	0.12	0.17	0.10	0.10	0.10
6"	150	0.25	0.35	0.19	0.10	0.10
8"	200	0.43	0.60	0.33	0.17	0.10
10"	250	0.70	0.99	0.54	0.27	0.14
12"	300	1.00	1.40	0.75	0.39	0.19
14"	350	1.35	1.90	1.03	0.52	0.26
16"	400	1.75	2.47	1.34	0.68	0.34
18"	450	2.24	3.15	1.72	0.87	0.44
20"	500	2.77	3.90	2.12	1.07	0.54
24"	600	4.00	5.64	3.07	1.55	0.78
30"	750	6.26	8.83	4.81	2.44	1.22
36"	900	9.03	12.70	7.58	3.51	1.76

TABLE 'B'	
SOIL TYPE	SAFE BEARING LOAD kPa
SOFT CLAY, LOOSE SAND	50
MEDIUM SOFT CLAY, DENSE SAND	100
DENSE CLAY TILL AND GRAVEL	150
HARD SHALE	500

TABLE 'C'							
DEAD WEIGHT REQUIREMENTS FOR VERTICAL BENDS CUBIC METRES OF CONCRETE (m ³)							
TYPE OF BEND	SIZE (mm)						
	100	150	200	250	300	350	400
90° BEND	0.75	1.50	2.75	4.25	6.00	8.50	11.0
45° BEND	0.50	1.00	1.50	2.25	3.50	4.75	6.00
22.5° BEND	0.25	0.50	0.75	1.25	1.50	2.25	3.00
11.25° BEND	0.25	0.25	0.50	0.75	1.00	1.25	1.50



STANDARD DRAWING

THRUST BLOCK DATA

SCALE: NTS

DATE: MARCH 2006

DRAWING: 02522.02

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1. GENERAL

1.1 INTENT

- .1 Read this section in conjunction with other sections for location and use of swabbing specified herein.

2. PRODUCTS

- .1 Submit product information and shop drawings of proposed products for approval well in advance of swabbing operations.

3. EXECUTION

- .1 Disassemble Hydrant at launch site and receiving site, or temporarily modify piping as required in order to facilitate launching and retrieval of the swabs.
- .2 Insert swab and connect pumping equipment to the launch point. Force the swab through the system with water pressure until it emerges from the receiving point.
- .3 Monitor pressure carefully. Do not exceed safe operating pressure for the water line.
- .4 Protect against erosion at the site of the receiving point. Submit plan to Owner's Representative well in advance of swabbing operations.
- .5 Dispose of waste at an approved landfill location.
- .6 Reassemble hydrants, and/or remove piping modifications as required after completion of swabbing. All disassembly and reassembly of hydrants is to be done by qualified personnel only and under supervision of the Owner's Representative. All reassembly must be in accordance with the hydrant manufacturer's specifications.
- .7 Once swabbing of the work has been completed, flush and disinfect, in accordance with Section 02521.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other sections for location use and placement of Precast Concrete Manholes specified herein.

1.2 DETAILED DRAWINGS

- .1 Provide shop drawings for each manhole and vault prior to fabrication as per Section 01340.

2. PRODUCTS

2.1 GENERAL

- .1 Concrete:
 - .1 Construct all manholes as shown in the Contract Document plans, standard drawings and detailed drawings.
 - .2 All cement for cast-in place or precast concrete to be Type HS. Sulfated Resistant, Portland Cement, CSA certified as meeting CAN/CSA-A5-M89.
 - .3 All concrete for cast-in-place or precast to meet CAN/CSA-A23.1-M90 "Concrete Materials and Methods of Concrete Construction".
 - .4 Concrete: minimum compressive strength of 25 MPa at 28 days.
 - .5 Slump: maximum 90 mm.
 - .6 Air content: 5 to 8 percent.
 - .7 Reinforcing steel: 400 MPa minimum yield strength.
- .2 Metal Castings:
 - .1 Castings to be grey iron to latest revision ASTM A48, minimum strength class 30B. Castings shall be true to pattern, and free of cracks, gas holes, flaws and excessive shrinkage.
 - .2 Castings to be sand blasted or cleaned and ground to eliminate surface imperfections. Surface castings to be free of burnt sand, and shall be cast reasonably smooth. Runners, risers, fins, and all other cast pieces shall be removed.

2.2 PRECAST MANHOLES

- .1 Precast reinforced manhole sections; precast monolithic base and precast slab top to meet the latest revision of ASTM C478M. Barrels to be 1220mm minimum inside diameter (I.D.) c/w safety lift rings and matching female and male joints in precast manhole sections. Dimensions as per standard drawing S-02.
- .2 All manholes to have flat slab tops with opening offset for vertical ladder installation.
- .3 Shop drawing of precast monolithic bases to be submitted to Engineer for review and approval prior to installation.
- .4 Adjusting rings (collars) to latest revision ASTM C478M. Only 100mm, 200mm and 200mm thick collars permitted. A maximum of two adjusting rings (collars) are permitted in any one manhole.
- .5 All manholes to have two (2) rows of concrete brick minimum and three (3) rows maximum installed where applicable. Concrete brick to CAN/CSA3-A165 Series M85. Cement type 50, Sulphate Resistant. Brick to be approximately 50mm x 100mm.
- .6 Manholes to be complete with ladder rungs 400mm "on center" vertically. For manholes with pipe greater than 450mm in diameter, rungs to be at 90 degrees to channel. For manholes with pipe less than 450mm in diameter, rungs to be in line with channel.
- .7 All joints to be made watertight using flexible butyl resin sealant or approved equal.
- .8 All mortar to use aggregated meeting the latest revision CSA A82.56, cement CSA certified as meeting CAN/CSA3-A8-M83, Type 50, Sulphate Resistant.

2.3 LADDER RUNGS

- .1 All ladder rungs to be drop step type, to latest revision ASTM C478M. Rungs to be minimum 250mm wide. Rung material to be:
 - .1 Coated Aluminum Rungs: to be 20mm (3/4") O.D. aluminum tubing coated with low density polyethylene, 3mm (1/8") thickness. Coating to have integral slip resistant pattern.
 - .2 Aluminum Rungs: to be 20mm (3/4") O.D. aluminum tubing. Tubing to have integral slip resistant pattern.
- .2 All rungs to be fastened to concrete with low density polyethylene anchor sleeves.

2.4 MANHOLE FRAMES AND COVERS

- .1 Manhole frames and covers to dimensions shown of Standard Drawing 02645.2. A frame with cover shall constitute one unit.
- .2 Manhole covers shall bear evenly on the frames.

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- .3 Manhole frames and covers to have a minimum weight of 158.9 kg. (350lbs) per set. Cover to be cast without perforation, complete with two 25mm diameter lifting holes. Covers to be marked **“Sanitary Sewer” or “Storm Sewer”**, as required.

2.5 WATERTIGHT MANHOLE INSERTS – N/A

- .1 Watertight manhole inserts to be comprised of insert body, gasket, gas relief valve, and handle. Insert components to be manufactured from materials resistant to corrosion caused by hydrogen sulfide and dilute sulfuric acid contaminated atmospheres.
- .2 Insert body to be 304 stainless steel with a minimum thickness of 0.80mm. Depth of insert to be 140mm to accommodate manhole lids. Inserts to have a “straightside” design to allow a loose fit into ring for easy removal. Manufacturer to provide load test verification indicated a load test failure resistance in excess of 5.34 kN (1200lbf).
- .3 Insert gasket to be EPDM rubber, envelope style design, ribbed on one side to insure a positive seal. Gasket to be factory installed by Manufacturer.
- .4 Gas relief valve shall be designed to open at a pressure of 3.48 to 10.34 kPa (0.5 to 1.5 psi) and have a water leak down rate no greater than 18.93 litres per 24 hours (5 USgpm per 24 hours). The valve shall be manufactured from Nitrile, and installed in the insert by means of a hole tapped in the insert by manufacturer, and secured to prevent being knocked out by lid rotation.
- .5 The handle shall be of 25mm wide nylon web strapping fastened to the insert body with two #6 high grade stainless steel rivets and washers. The handle is to be installed on the insert in such a way that it does not interfere with the installation of the manhole lid. The handle shall be able to withstand a 2.22kN (500lbf) pulling force before it fails or separates from the insert body.
- .6 Approved Products:
 - “Rainstopper” manufactured by Southwestern Packing & Seals Inc. of Shreveport, Louisiana.

3. EXECUTION

3.1 MANHOLE INSTALLATION

- .1 Excavate for installation of manholes to the required depths and lateral dimensions to allow for the safe and accurate installation of the structure. Comply with all safety requirements.
- .2 The excavation for the manhole shall be free of any standing water.
- .3 Remove any unstable subgrade and replace with compacted native material or compacted granular material to bridge the unstable subgrade condition.
- .4 Place manhole base on undisturbed stable ground or 150mm minimum of compacted well graded granular material (98% Standard Proctor Density) or a 25mm skin coat of lean concrete.

- .5 For cast-in-place manhole slab or base, place specified reinforcing steel and miscellaneous metals on undisturbed stable ground, compacted granular material or lean concrete.
- .6 Where a new manhole is to be installed on an existing run of pipe, ensure that the existing pipe is fully supported during the installation and carefully remove that portion of the existing pipe to dimensions required. Make joints watertight.
- .7 Place stub outlets and bulkheads at elevations and in positions shown in the Contract Documents. Bench the manholes to provide a smooth U-shaped channel. Side height of channel to be 0.50 times diameter of sewer. Slope the floor towards the channel. Curves in channel shall be made smoothly. Slope the invert of the channel to establish the sewer grade.
- .8 For precast barrels, set the bottom section in a bed of cement mortar and bond to concrete slab or base. Make each joint watertight with an approved bituminous compound. Clean all surplus mortar and joint compounds from interior surface of manhole as work progresses. Do not flush debris into sewer. Plug all lifting holes with cement mortar or epoxy resin cement to make a watertight seal.
- .9 Install precast manhole sections, base, slab top and cover plumb, level and in accordance with the lines, grades and elevations shown in the Contract Documents. Ensure the ladder rungs are aligned in a straight vertical line. The hole in the slab top shall be aligned with the ladder rungs
- .10 Where deemed expedient and appropriate to maintain service around existing pipes and when systems constructed under this project are ready to be put in operation, complete the installation with the appropriate break-outs, removals, redirection of flows, blocking unused pipes or other necessary work.
- .11 After installation of the manholes, backfill the excavated area around the manholes with compacted backfill to the lines, grades and elevations shown in the Contract Documents. Exercise care to ensure that the backfill is brought up evenly around the manholes. Compact backfill in accordance with have Type 2 backfill as per Section 02319 – Trench Excavating and Backfilling; sub-section 3.7 Backfilling Schedule.
- .12 Do not displace the alignment of manhole sections during backfill operation.
- .13 Clean all manholes of debris preventing any large debris from entering the new or existing system.
- .14 Any manhole that requires the contractor to add additional inverts must have the concrete saw cut.

3.2 TOLERANCE

- .1 Maintain constructed grade to within + or – 10mm from the lines, grades and elevations shown in the Contract Documents.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for “Video Inspections” requirements specified herein.
- .2 This Section includes video inspections of pipes that are under or adjacent to the work of the Contract and which may not be included as items of Work.

1.2 QUALIFICATIONS

- .1 The Contractor will retain the services of a qualified video inspection contractor who is a member in good standing with the National Association of Sewer Service Companies (NASSCO). The closed-circuit television (CCTV) operator will have the following training:
 - Pipeline Assessment and Certification Program (PACP) – main line inspections.
 - Manhole Assessment and Certification Program (MACP) – manhole inspections.
 - Lateral Assessment and Certification Program (LACP) – service line inspections

1.3 VIDEO INSPECTION REPORT AND DVD SUBMITTALS

- .1 Provide the Owners Representative with two (2) copies of all video inspection reports and corresponding DVDs for each video inspection.
- .2 Label all manholes in the video inspection reports and DVDs in accordance with the labelling shown on the contract drawings.
- .3 Ensure all disk numbers, individual video inspection names and video reference numbers correspond to the video inspection DVDs and reports.
- .4 Ensure the length of pipe measurement on the video inspections starts at 0.0 m from the inside edge of the manhole.
- .5 Video Inspection DVD Requirements
 - .1 All DVD disks will be compatible with standard NTSC DVD players.
 - .2 All videos will be colour with a clean, in-focus picture of the entire periphery of the pipe.
 - .3 DVD disks will have permanent labels that display the following information:
 - Project name.
 - Date report was completed.
 - List of individual video inspections included in disks including video reference numbers.
 - .4 At the start of each individual video inspection run, the following information will be clearly displayed on the video:

- Project name.
 - Date and time of survey.
 - Road name and location (House address for service inspection videos).
 - Upstream and downstream manhole information.
 - Direction of flow.
 - Pipeline operating state (in operation or out of operation).
 - Flow control used or not.
 - Approximate length of pipe in meters.
 - Size and type of pipe.
 - Video reference number.
- .5 The following information will be displayed on the individual video inspections at all times:
- Upstream and Downstream manhole information (House address for service inspection videos).
 - The camera's reading position in the pipeline. The distances will be displayed in tenth of a meter increments.
 - Video reference number.
- .6 Video Inspection Report Requirements
- .1 Report summary page including:
- Project name.
 - List of individual reports including disks reference numbers and individual video inspection reference numbers.
- .2 Sewer inspection code legend page including all codes used in the individual video inspection reports.
- .3 Individual video inspection reports will include:
- Project name.
 - Date and time video inspection was completed.
 - Upstream and downstream manhole information.
 - Direction of flow.
 - Flow control used or not.
 - Approximate length of pipe (in meters).
 - Size and type of pipe.
 - Video reference number.
 - List of service connections, pipe material changes, rolled gaskets, sags and pipe defects including the camera's reading position in the pipeline, sewer inspection code, description, and reference to photos.
 - Colour photographs of all connections and pipe defects.

2. PRODUCTS

- .1 Not applicable.

3. EXECUTION

3.1 GENERAL

- .1 Control all flows necessary to complete the work, including any required pipe plugging and bypass pumping work.
- .2 Notify Owners Representative at least 48 hours prior to any video inspections.

3.2 FLUSHING, CLEANING AND REAMING

- .1 Flush and clean as required, to undertake video inspections of the pipe.
- .2 Perform reaming to remove obstructions that cannot be removed by the flushing or cleaning process, such as protruding laterals, calcified joints, root penetration, or heavy grease deposits. Record the reaming operations so any pipe damages can be assessed.
- .3 Any damages to the pipe resulting from reaming operations will be repaired by the Contractor at no cost to the Owner.
- .4 Re-flush and re-clean the mains as necessary to remove any debris remaining from flushing, cleaning and reaming operations.
- .5 Remove and dispose of all waste materials resulting from the flushing, reaming and cleaning work. A filtering device will be utilized to prevent waste materials from entering sewers outside of the work area.
- .6 Should the video inspection show unsatisfactory flushing, cleaning and/or reaming, the pipe will be re-flushed, re-cleaned, re-reamed and re-inspected to the satisfaction of the Owner's Representative.

3.3 VIDEO INSPECTIONS

- .1 Video inspect the main with no active flows entering it.
- .2 Video inspections with sags ponding in excess of 20% of the pipe capacity will require re-inspection in conjunction with cleaning operations to achieve a clear video inspection of the pipe condition. Other measures may be employed to achieve a clear video inspection of the sag pipe sections.
- .3 Video inspections will be completed from upstream to downstream where possible.
- .4 The video camera will stop and observe at the best of the cameras ability all connections and defects in correspondence with the video inspection report. Photographs will be taken at all these locations.

- .5 If a blockage or obstruction is encountered its location will be recorded and the remaining section of pipe will be video inspected from the other end to confirm the obstruction location.

3.4 PRE-CONSTRUCTION VIDEO INSPECTIONS

- .1 The Owner recognizes that there may be some conditions which may affect the quality and/or ability to complete the video inspection, such as broken pipe, sags or major blockages that prevent the flushing, cleaning and video inspection work from being completed. Should such conditions arise, immediately contact the Owner's Representative for direction.
- .2 Existing main repair work not caused by video inspection operations will be considered extra work and will be paid for by the Owner.

3.5 POST-CONSTRUCTION VIDEO INSPECTIONS

- .1 The pre-construction and post-construction video inspections of the existing pipe will be compared to determine if any deficiencies are present due to construction activities.
- .2 The Contractor is responsible to repair and re-inspect any pipe deficiencies resulting from construction activities identified by the post-construction video inspections.

END SECTION

1. GENERAL**1.1 INTENT**

- .1 Read this section in conjunction with other sections for location and use of appurtenance adjustment specified herein.

2. PRODUCT**2.1 MANHOLES, FRAMES AND COVERS**

- .1 Refer to Section 02645 – Precast Concrete Manholes.

2.2 VALVES AND VALVE BOXES

- .1 Refer to Section 02515 – Valve and Valve Boxes.

3. EXECUTION**3.1 GENERAL**

- .1 Bring all manholes, catch basins, water valve boxes and other appurtenances to the finished grade of the road, parking lot, median strip or landscaped areas. Complete this work prior to placement of the concrete structures, sod, seed or final lift of asphalt.
- .2 Repair or replace water valves, catch basins, manholes and other appurtenances damaged as a result of construction at no cost to the Owner. No tolerance will be allowed in the shape of the finished surface in the vicinity of any utility appurtenance.
- .3 Raise or lower manhole frames and covers to grade by the addition and/or deletion of manhole components including frames, frame riser rings, manhole barrels and collars, as required. The completed manhole adjustment work shall be in accordance with the precast concrete manhole standards. All work shall be inspected and approved by the Owners representative before it will be considered complete.
- .4 Raise or lower catch basin frames and grates to grade by the addition, deletion and/or modification of catch basin components including frames, collars, slab tops and barrel, as required. The completed catch basin adjustment work shall be in accordance with the precast concrete catch basin standards. All work shall be inspected and approved by the Owners representative before it will be considered complete.
- .5 Raise or lower water valve boxes to grade by the addition, deletion and/or modification of water valve components including top box, top box riser, casing and extension spindle, as required. The completed water valve box adjustment work shall be in accordance with the valve and valve box standards. All work shall be inspected and approved by the Owners representative before it will be considered complete.
- .6 Do not proceed with paving final surface lift until all necessary manhole, catch basin, valve and other appurtenance adjustments have been completed.

- .7 Raise or lower manholes and catch basins using frames, riser rings and collars to a maximum of 300mm.
- .8 Ramp asphalt or gravel at 40:1 slope to all projecting manholes, catch basins, valves and other appurtenances as required.
- .9 Where the top/final lift of asphalt is not placed in the same year as base lift, set manhole frames and covers; catch basin frames and grates; valve boxes; and other surface appurtenances to interim asphalt grade or graveled surface grade.

3.2 TOLERANCES

- .1 The final manhole, catch basin, water valve box and other appurtenances shall be within a tolerance of ± 10 mm of finish grade or as approved by the Owners representative.

END OF SECTION

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1. GENERAL

1.1 DETAIL DRAWINGS

- .1 Refer to detail drawings in Contract Drawings.

2. PRODUCTS

2.1 STANDARDS

- .1 Steel Pipe to ASTM A53.
- .2 Chain Link Fabric to CAN2-138.1.
- .3 Fence, Chain Link, Frame Work, Zinc-Coated Steel to CAN2-138.2.
- .4 Fence, Chain Link Installation to CAN2-138.3.

2.2 MATERIALS

- .1 Pipe: Steel butt weld, Schedule 40, hot dip galvanized to 550 g/m² coating.
- .2 Mesh Wire: Galvanized steel wire hot-dipped galvanized to 490 g/m².
- .3 Barbed Wire: Double-strand, galvanized coated wire, 2.51 mm diameter (12 1/2 gauge), four point barbs with a zinc coating of not less than 245 g/m² of uncoated wire surface.
- .4 Concrete: Sulphate resistant Portland cement, 20 MPa @ 28 days, 50 mm to 80 mm slump, 20 mm aggregate, 6% air entrainment.

2.3 COMPONENTS

- .1 Line Posts: 48 mm O.D., 4.05 kg/m.
- .2 Corner, Terminal and Straining posts: 73 mm O.D., 8.62 kg/m.
- .3 Gate Posts: 73 mm O.D., 8.62 kg/m.
- .4 Top and Brace Rail: 33 mm O.D., 2.51 kg/m.
- .5 Gate Frame: 42 mm O.D., 3.38 kg/m. Gate leaves to have horizontal and vertical intermediate brace on gate leaves 3.0 m wide and over.
- .6 Post Caps: Cast aluminum, sized to post diameter, set screw retained.
- .7 Extension Arms: Cast aluminum to accommodate 3 strands of barbed wire, sloped 45°, top strand 300 mm from fence fabric.
- .8 Line Post Eye tops: Cast aluminum.
- .9 Rail Ends: Cast aluminum.

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- .10 Fittings: Sleeves, bands, clips, tension bars, fasteners and fittings galvanized steel.
- .11 Fabric: 50 mm diamond mesh, interwoven 3.5 mm wire, top selvage twisted tight, bottom selvage knuckle end closed.
- .12 Bottom tension Wire: 3.0 mm steel single strand hot-dipped galvanized to 490 g/m².
- .13 Barbed Wire: 2.5 mm wire, three strands, four point barbs at 150 mm on centre, zinc coated steel.
- .14 Single Gate Hardware: 2 piece latch and latch catch. Gate hinge 180° male and female hardware for padlock.

2.4 CANTILEVER SLIDING GATE COMPONENTS

- .1 Cantilever sliding gate as shown in detail or approved equal, c/w free-operating roller Assembly.
- .2 Terminal and receiving posts: 4 1/2" (110mm) SS40 or approved equal.

3. EXECUTION

3.1 INSTALLATION

- .1 Install to alignment specified, line posts, corner posts, gate posts and top rails to provide rigid structure for 1.8 m high fabric and gates.
- .2 Maximum spacing of posts: 3.0 m on centre.
- .3 Install line and corner posts plumb.
- .4 Set posts in cylindrical cast-in-place concrete footings sized as follows:

Location	Depth	Diameter
Fence height up to 1.2 m:		
Line posts	900 mm	250 mm
Gate and corner posts	1000 mm	300 mm
Fence height from 1.2 to 1.8 m:		
Line posts	1000 mm	250 mm
Gate and corner posts	1200 mm	300 mm

- .5 Set posts to within 150 mm from bottom of concrete footing.

- .6 Set top of concrete footing 50 mm above finished grade. Slope top of footing to ensure water runs off.
- .7 Position bottom of fabric 50 mm above finished grade with tension wire stretched taut between posts.
- .8 Align top of posts to ensure that top rail varies gradually with changes in ground elevations.
- .9 Pass top rail through line post tops to form continuous bracing. Install 150 mm long couplings mid-span at pipe ends.
- .10 Brace each gate and corner post back to adjacent line post with horizontal centre brace rail. Install brace rail, one bay from corner and gate posts.
- .11 Install 10 mm steel truss rod and truss tightener diagonally from top of gate post back to adjacent line post.
- .12 Fasten fabric to top rail, line posts, braces and bottom tension wire with 3.5 mm wire ties at maximum 500 mm on centre.
- .13 Attach fabric to corner and gate posts with tension bars and tension bar clips. Stretch fabric between posts at intervals of 30.0 m maximum.
- .14 Install straining post at 90 m approximately.
- .15 Install 3 strands of barbed wire on arms, tensioned and secured. Slope extension arms for barb wire inward.
- .16 Install gates of sizes shown in the Contract documents using fabric [and vertical extension arms] to match fence. Install 3 hinges per leaf and hardware specified.
- .17 Provide concrete centre rest and drop bolt retainers at centre of double gate openings.
- .18 Install sway brace units on gate posts where gate leaves are 4.9 m and over in width.

3.2 CANTILEVER SLIDING GATE INSTALLATION

- .1 Install to alignment specified, line posts, corner posts, gate posts and top rails to provide rigid structure for wire mesh fabric and gates.
- .2 Install according to Manufacturer's recommendation, unless approved otherwise by owners representative.
- .3 Contractor shall provide shop drawings for Cantilever Sliding Gate for review prior to installation.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Read this section in conjunction with other sections for location, use and placement of chain link cantilever gate and operator specified herein.

1.2 DETAILED DRAWINGS

- .1 Refer to detailed drawings in Contract Drawings.

1.3 STANDARDS

- .1 Steel Pipe to ASTM A53-96.
- .2 Chain Link Fabric to CAN2-138.1-96.
- .3 Fence, Chain Link, Frame Work, Zinc-Coated Steel to CAN2-138.2-96.
- .4 Fence, Chain Link Installation to CAN2-138.3-96.

1.4 REFERENCES

- .1 National Electrical Manufacturers Association (NEMA): NEMA ICS 6 - Industrial Control and Systems: Enclosures.
- .2 Underwriters Laboratories (UL): UL 325 - Standard for Safety for Door, Drapery, Gate, Louver, and Window Operators and Systems.
- .3 Underwriters Laboratories (UL): UL 991 - Standard for Tests for Safety-Related Controls Employing Solid-State Devices.
- .4 International Organization for Standardization: ISO 9001 - Quality Management Systems.

1.5 SUBMITTALS

- .1 Submit under provisions of Section 01300.
- .2 Product Data: Equipment list, system description, electrical wiring diagrams for installation, and manufacturer's data sheets on each product to be used, including:
 - .1 Preparation instructions and recommendations.
 - .2 Storage and handling requirements and recommendations.
 - .3 Installation methods.
- .3 Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, edge conditions, and accessories.

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- .1 Operation, installation, and maintenance manuals including wiring diagrams.
- .2 Risers, layouts, and special wiring diagrams showing any changes to standard drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store, and handle materials and products in strict compliance with manufacturer's instructions and industry standards.
- .2 Store products indoors in manufacturer's original containers and packaging, with labels clearly identifying product name and manufacturer. Protect from damage.

1.7 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: ISO 9001 Certified Manufacturer.
- .2 Installer Qualifications: Installation performed by factory authorized contractor specifically trained in gate operation systems of the type found within this section.
 - .1 Provide documentation of maintenance and repair service availability for emergency conditions.
 - .2 Provide quarterly maintenance for one year following Substantial Completion of the Project.

1.8 WARRANTY

- .1 Manufacturer's Standard Limited Warranty:
 - .1 Warranty Period: 2 years.

2. PRODUCTS

2.1 COMPONENTS

- .1 Cantilever gate as shown in detail or approved equal, c/w free-operating roller assembly.
- .2 Terminal and Receiving posts: 4½" (110mm) SS40 or approved equal

2.2 MANUFACTURERS

- .1 Acceptable Manufacturer: LiftMaster
- .2 Requests for substitutions will be considered in accordance with Division 1 in specifications.
- .3 LiftMaster SL595103U complete with all mounting and operation hardware or approved equal.

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- .4 Operating Voltage: 1 HP 208VAC 3 PHASE
- .5 LiftMaster UL 325 Radio Receiver and 10 single button remote fobs or approved equal.
- .6 Pedestal complete with hardwired keypad.
- .7 Gate operator to accept dry contact open command and dry contact close command from Plant PLC. PLC initiated open and close commands shall not override vehicle detection loops and other safety interlocks.
- .8 Interrupt and Exit Loops
 - .1 2 -- PVC vehicle detection loops with detectors.
 - .2 Provide twisted pair cabling as recommended by product manufacturer for entrance and exit interrupt safety loops.
- .9 Operation
 - .1 Entrance to access road shall be granted by means of keypad entry, wireless remote control, or Plant PLC dry contact.
 - .2 Egress from water plant access road shall be granted by means of wireless remote control, Plant PLC dry contact or in-ground interrupt sensing loop that detects when a vehicle is at the gate ready to exit. Contractor to provide additional loop and controller accessories as required.

3. EXECUTION

3.1 INSTALLATION

- .1 Install to alignment specified, line posts, corner posts, gate posts and top rails to provide rigid structure for wire mesh fabric and gates.
- .2 Install according to Manufacturer's recommendation, unless approved otherwise by owners representative.
- .3 Contractor shall provide shop drawings for Cantilever Gate for review prior to installation.
- .4 Contractor shall provide a set of operating manuals for all components unless otherwise stated by owners representative.

END OF SECTION

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1. GENERAL

1.1 DELIVERY STORAGE AND HANDLING

- .1 Provide seed in standard containers clearly labeled with the following information:
 - .1 Supplier's name and address
 - .2 Lot Number
 - .3 Net Mass
 - .4 Names and percentages of individual seed species
- .2 Protect seed from moisture, mould and damage while in transit and storage.
- .3 Provide fertilizer in standard containers clearly labeled with the following information:
 - .1 Supplier's name and address
 - .2 Specified Composition
 - .3 Net Mass

2. PRODUCTS

2.1 MATERIALS

- .1 Provide seed mixture to the following composition:
 - 25% Northern Wheatgrass
 - 25% Green Needlegrass
 - 15% Junegrass
 - 10% Slender Wheatgrass
 - 10% Bluegrama
 - 10% Needle and Threadgrass
 - 5% Sheeps Fescue
- .2 Apply seed mixture to meet the following application rates:

For rural areas:

 - .1 Drilled application rate 22.5 kg/ha.
 - .2 Broadcast application rate 34 kg/ha.
- .3 Provide seed and seed mixture that are free of all prohibited noxious weed seeds.

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- .4 Provide Canada No. 1 Grade seed in accordance with the Government of Canada Seeds Act and Seeds Regulations. Do not provide seeds which are wet, mouldy, or otherwise damaged.
- .5 Provide fertilizer in accordance with Government of Canada Fertilizer Act and Fertilizers Regulations. Fertilizer is to be compatible with the seed mixture and the soil conditions.

3. EXECUTION

3.1 GENERAL

- .1 Prepare topsoil surface for seeding as specified in Section 02201.
- .2 Apply materials during calm weather and on ground free of frost and standing water.
- .3 Measure the quantities of materials by weight.

3.2 APPLICATION OF SEEDS

- .1 Perform seeding operations at such a time of the year when climatic conditions are suitable for establishing grass stands.
- .2 Fine grade and loosen the surface to plow depth to obtain a proper seed bed without undue loss from high winds or ordinary rainfall.
- .3 Where the work adjoins existing vegetation, blend the application at least 300 mm into adjacent vegetated areas.
- .4 Protect seeded areas against damage.
- .5 Sow seed mixture by drilling with disk or shoe-type grass drill.
- .6 Apply seed uniformly at the rate specified.
- .7 Regulate the drill so that the seed is properly placed in the soil to a depth of 20 to 32 mm.
- .8 Apply fertilizer uniformly at the rate of 78.5 Kg per hectare using a fertilizer attachment.

3.3 MAINTENANCE

- .1 Re-apply seed to all areas that do not show a uniform stand of grass. Perform such reapplication to allow for establishment prior to Substantial Performance of the Work. A uniform stand of grass will be considered growth that shows no bare spots greater than 0.25 square metres in size and provides a minimum of eighty percent ground cover.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Read this section in conjunction with other sections for location, use and placement of restoration of sitework specified herein.

1.2 DETAILED DRAWINGS

- .1 Not applicable.

2. PRODUCTS

- .1 Not Applicable.

3. EXECUTION

3.1 RESTORATION - GENERAL

- .1 Restore all existing areas and sitework damaged or disturbed due to earthwork or other work of this Contract, back to their original condition or better.

3.2 LANDSCAPE WORK

- .1 Protect the integrity of the existing landscape features by implementing construction procedures that will minimize damages.
- .2 Restore all landscape features damaged or disturbed by the work, back to their original condition or better. All costs associated with this work shall be borne by the Contractor.
- .3 Maintain all trees within the work site.
- .4 Minimize damage to trees, plants and shrubs during the course of construction.
- .5 Attend to damaged trees, plants or shrubs by qualified personnel.
- .6 All grassed areas stripped shall be restored with topsoil and dryland seed mixture.
- .7 Topsoil and sod reconstruction limits will be laid out by the Owners Representative when rough grading has been completed.
- .8 All landscape work shall be completed to the satisfaction to the Owner.

3.3 CONCRETE STRUCTURE WORK

- .1 Protect the integrity of existing concrete structures. This includes utilizing suitably sized equipment and implementing construction procedures that will minimize concrete damage.

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- .2 Replace any concrete structures damaged or disturbed, outside of the construction limits. All costs associated with this work shall be borne by the Contractor.

3.4 ASPHALT WORK

- .1 Protect the integrity of existing road, lane and driveway structures. This includes utilizing suitably sized equipment and implementing construction procedures that will minimize pavement damage.
- .2 Replace any asphalt pavement damaged or disturbed, outside of the construction limits. All costs associated with this work shall be borne by the Contractor.

3.5 GRAVEL WORK

- .1 Restore any gravel damaged or disturbed outside of the construction limits, back to their original condition or better. All costs associated with this work shall be borne by the Contractor.

END OF SECTION

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1. GENERAL

1.1 RELATED SECTIONS

- .1 Hydrostatic and Pressure Testing Section 15190.

1.2 WORK INSTALLED BUT SUPPLIED UNDER OTHER SECTIONS

- .1 Install following materials specified to be supplied under other Sections of these project specifications:
 - .1 Fabricated components, anchor bolts, bearing plates, sleeves and other inserts to be built into concrete.

1.3 QUALITY ASSURANCE

- .1 Cast-in-place concrete to conform to CSA-A23.1.
- .2 Testing shall conform to CSA-A23.2.
- .3 These standards shall be available in Contractor's site office for use of Contractor and Engineer.

1.4 REFERENCE DOCUMENTS

- .1 Perform cast-in-place concrete work in accordance with the following standards except where specified otherwise.
- .2 ASTM C109/C109M – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars Using 2-in. or 50-mm Cube Specimens.
- .3 ASTM C295 – Standard Guide for Petrographic Examination of Aggregates for Concrete.
- .4 ASTM C309 – Standard Specification for Liquid Membrane –Forming Compounds for Curing Concrete.
- .5 ASTM C330 – Standard Specification for Lightweight Aggregates for Structural Concrete.
- .6 CAN/CGSB-51.34-M Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .7 CAN/CSA-A3000 – Cementitious Materials Compendium (Consists of A5-98, A8-98, A23.5-98, A362-98, A363-98, A456.1-98, A456.2-98, A456.3-98).
- .8 CAN/CSA-A23.1 – Concrete Materials and Methods of Concrete Construction.
- .9 CAN/CSA-A23.2 – Methods of Test for Concrete.
- .10 CAN/CSA-A23.3 – Design of Concrete Structures.

- .11 ASTM A185/A185M Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- .12 ASTM A496/A496M Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
- .13 ASTM A497/A487M Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
- .14 CAN/CSA G30.18- M Billet Steel Bars for Concrete Reinforcement.
- .15 CAN/CSA-S269.1, Falsework for Construction Purposes.
- .16 CAN/CSA-S269.3, Concrete Formwork.
- .17 CAN/CSA W186-M Welding of Reinforcing Bars in Concrete Construction.
- .18 American Concrete Institute (ACI) Detailing Manual - SP-66, ACI 315.
- .19 Concrete Reinforcing Steel Institute (CRSI) – Reinforcing Steel Manual of Standard Practice.

1.5 INSPECTION AND TESTING

- .1 Concrete work may be tested to CAN/CSA A23.2 or as specified herein by a testing firm retained by the Owner.
- .2 Submit the following:
 - .1 Proposed concrete mix design.
 - .2 Results of petrographic examination of aggregates conforming to ASTM C295 representative of aggregates to be supplied for project, when requested by Engineer.
 - .3 Samples of fine and coarse aggregate, when requested by Engineer.
- .3 Provide casual labour for the purpose of obtaining and handling sample materials.
- .4 Advise testing firm in advance of concrete placement.
- .5 Provide and maintain facilities at the site for storage of concrete test cylinders for the first 24 hours.
- .6 Provide copies of mill test reports of cement and reinforcing steel as required.
- .7 Secure sufficient cylinders for testing to ensure concrete quality control.
- .8 Provide at least one ASTM cube test on grout used under base plates and machinery.
- .9 Conduct core tests when required.

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- .10 Obtain Consultant's approval of reinforcing before placement of concrete commences. Refer to Section 3 for notification requirements.
- .11 The testing firm may perform the following tests:
 - .1 Take three test cylinders from each 60 m³ of concrete, or fraction thereof, of each type of concrete placed in any one day.
 - .2 Take samples of concrete mix close to the point of final deposit in the form. Contractor is required to provide suitable access to the Work for obtaining samples.
 - .3 Moist cure and test one cylinder in 7 days and moist cure and test the remaining two cylinders in 28 days.
 - .4 Take one additional test cylinder when the temperature is likely to fall below 0°C within 48 hours after placing and no provisions have been made to heat the concrete to greater than 10°C. Cure the additional test cylinder on the job-site under same conditions as concrete it represents and test in 7 days.
 - .5 Make at least one slump test and one entrained air test for each set of test cylinders taken.
 - .6 Monitor Temperature of concrete.
 - .7 Results of field tests will be reported immediately to the Contractor by the field representative of the testing firm. These results do not imply approval or disapproval of the work, but are for the Contractor's information. The Engineer will determine acceptability of the work.
 - .8 Results of concrete tests will be forwarded to the Engineer and to the Contractor. Included with the results will be the following information: Name of Project, Date of Sampling, Name of Supplier, Delivery Truck Number, Identification of Sampling and Testing Technician and exact location in the structure of the concrete sampled.
 - .9 Testing firm personnel are not authorized to revoke, relax, enlarge or release any requirements of the specification, nor to accept or reject any portion of the work.

1.6 SHOP DRAWINGS

- .1 Submit Shop Drawings, including placing drawings for reinforcing steel and welded steel wire fabric in accordance with Division 1.
- .2 Identify support and placing details of reinforcing conforming to ACI 315 and CRSI.

1.7 ACCEPTABILITY

- .1 Failure to comply with the requirements which control strength and durability will result in the structure being considered potentially deficient.
- .2 A structure will be considered potentially deficient when:

- .1 Concrete is not as specified in Concrete Mix Schedule in this Section.
- .2 Reinforcing steel size, quantity, position, quality or arrangement are not as specified or detailed.
- .3 Improper curing methods or materials are used.
- .4 Inadequate protection of concrete is provided from extremes of temperature during early stages of hardening and strength development.
- .5 Mechanical injury occurs from fire, construction overload or premature removal of forms.
- .6 Poor workmanship is evident.
- .7 Placed concrete differs from the required dimensions.
- .8 The Engineer has not reviewed formwork and reinforcement before concrete placement.
- .3 Strength evaluation tests and analysis.
 - .1 The Engineer may order an independent testing firm to obtain cores, x-rays, or similar non-destructive tests.
 - .2 The Engineer may order a load test and/or analysis as defined by CSA-A23.3 Section 20, if the non-destructive tests are impractical or inconclusive.
 - .3 The Contractor shall reinforce by additional construction or replace, as directed by the Engineer at own expense, concrete judged inadequate by structural analysis or by results of load tests.
 - .4 The Contractor shall pay the cost of testing and/or analysis which is required to demonstrate the adequacy of the structure, which does not meet the requirements for strength, or which has been placed before formwork and reinforcing have been inspected and approved by the Engineer.
 - .5 The Engineer may order additional testing at any time even though the required tests indicate that the strength requirements have been met. In this instance the Engineer will pay for those tests that meet the specified requirements and the Contractor shall pay for those that do not.
- .4 Concrete not conforming to the lines, detail, strength and grade specified herein or as shown on drawings shall be modified or replaced at the Contractor's expense, to the satisfaction of the Engineer.

2. PRODUCTS

2.1 CONCRETE MATERIALS

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- .1 Portland Cement: to CAN/CSA-A3000.
- .2 Aggregates: to CAN/CSA-A23.1 and as follows:
 - .1 Ironstone content of aggregates in exposed interior or exterior concrete subject to intermittent or continuous wetting not to exceed the following, when tested to ASTM C295:
 - .1 Coarse Aggregate: maximum 1% by mass.
 - .2 Fine Aggregate Retained on 2.5 mm Sieve: maximum 1.5% by mass.
- .3 Water: potable, to CAN/CSA-A23.1.
- .4 Lightweight Aggregates For Structural Lightweight Concrete: to ASTM C330.
- .5 Air Entraining Admixtures: to CAN/CSA-A23.1.
- .6 Chemical Admixtures: to CAN/CSA-A23.1 and as approved by the Engineer. Calcium chloride will not be permitted.
- .7 Supplementary Cementing Materials: to CAN/CSA-A3000.

2.2 CONCRETE ACCESSORIES

- .1 Liquid Membrane Forming Curing Compound: to CAN/CSA-A23.1.
- .2 Grout: Non-shrink premixed types with a minimum of 30 MPa compressive strength at 24 hours or as specified in Drawings.
- .3 Bonding Agent: High polymer resin emulsion mixed with cement mortar or grout to form a water resistant adhesive bond.
- .4 Control Joint Sealant: NSF Approved only.
 - .1 Sikaflex 2C SL (Horizontal), Sikaflex 2C NS EZ Mix (Vertical).
- .5 Waterstops: See drawings for location of waterstop:
 - .1 Voclay WATERSTOP-RX complete with WB-ADHESIVE.
- .6 Dampproof Membrane: 150 micrometre polyethylene film to CAN/CGSB-51.34.
- .7 Bituminous Dampproofing: to Section 07111 Bituminous Dampproofing.
- .8 Cementitious Crystalline Waterproofing: to Section 07125.

2.3 REINFORCING MATERIALS

- .1 Reinforcing Steel: to CSA G30.18 400 MPa yield grade deformed billet steel bars except for beam stirrups and column ties use only 300 MPa yield grade or 400 MPa yield grade to CSA G30.18.

- .2 Reinforcing Steel: to CSA G30.18, 400 MPa yield grade special low alloy deformed billet steel for welding and/or bending.
- .3 Welded Steel Wire Fabric: to ASTM A185/A185M.
- .4 Chairs, Bolsters, Bar Supports, Spacers: to CSA A23.1, adequate for strength and support of reinforcing. Non-corrosive and non-staining where specified.

2.4 FORMWORK MATERIALS

- .1 Formwork: design to CAN/CSA A23.1, CAN/CSA S269.1, ACI 347, and all applicable construction safety regulations for the place of work. Formwork to be free of bends, dents and residual concrete, well matched, tight fitting and adequately stiffened to support concrete weight without deflection detrimental to appearance of finished concrete surfaces.
- .2 Form Ties:
 - .1 Concrete without special architectural features: use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface. Ties to have a minimum 25mm break back from concrete surface. Ties to be water seal type. Non-corrosive and non-staining at surfaces where concrete will be exposed.
- .3 Form Release Agent: non-staining and non-volatile type. Form release products used on treated water reservoir structures must be approved for potable water contact.
- .4 Void Forms: low density bead board; structurally sufficient to support weight of wet concrete mix until initial set; thickness noted on Drawings.
- .5 Falsework materials: to CAN/CSA-S269.1.

2.5 MIX

- .1 Supply concrete mix proportioned to produce concrete specified in Concrete Mix Schedule.
- .2 For requirements not specified in Schedule, conform to CAN/CSA A23.1.
- .3 Use of admixtures, other than air-entraining admixtures, are not permitted without prior approval of the Engineer.

2.6 FABRICATION OF CONCRETE REINFORCEMENT

- .1 Fabricate reinforcing steel in accordance with CAN/CSA A23.1, ACI 315 and the (CRSI) Reinforcing Steel Manual of Standard Practice.
- .2 Obtain Engineer's approval for locations of reinforcing splices other than those shown on placing drawings.
- .3 Upon approval of Engineer, weld reinforcing steel in accordance with CSA W186.

- .4 For Hooks, Bends, Laps and Similar Details conform to ACI Detailing Manual SP-66.
- .5 Dowel columns and walls into foundations using same reinforcing as in column and wall unless noted otherwise in the Contract Documents.
- .6 Provide horizontal "L" shaped corner bars of same cross section and spacing as horizontal bars or welded wire fabric around wall and grade beam corners.
- .7 Provide 10M stirrup support bars in hooks or corners of beam stirrups unless noted otherwise in the Contract Documents.
- .8 Cover electrical conduit, ductwork or piping buried in slabs with 600 mm wide strip of 102 x 102 x MW13.3 x MW13.3 welded wire fabric. When principal slab reinforcement is placed above conduit then place 600 mm strip under conduit. Position of reinforcing steel takes precedence over conduit, ductwork or piping.

3. EXECUTION

3.1 PREPARATION

- .1 Obtain Engineer's approval before placing concrete. Provide Engineer and testing agency 2 working days' notice prior to placing concrete.
- .2 Coordinate placement of waterstops, inserts and joint devices with erection of concrete formwork and formwork accessories.
- .3 Pumping of concrete is permitted only after approval of equipment, mix, and additives.
- .4 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .5 Prior to placing concrete obtain Engineer's review of method for protection of concrete during placing and curing in adverse weather and in conformance with CAN/CSA-A23.1.
- .6 If the Engineer finds any portion of the preparation is not in conformance with the Contract Documents and/or good workmanship, the Contractor shall rectify the deficiency and no concreting shall be done until the deficiency is rectified.

3.2 FORMWORK

- .1 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.
- .2 Apply form release agent in accordance with manufacturer's recommendations, prior to placing reinforcing steel, anchoring devices and embedded parts.
- .3 Do not apply form release agent where concrete surfaces are to receive special finishes which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces moist prior to placing concrete.

- .4 Fabricate and erect falsework in accordance with CSA-S269.1.
- .5 Do not place shores and mud sills (if required) on frozen ground.
- .6 Provide site drainage to prevent washout of soil supporting shores and mudsills.
- .7 Align form joints and make watertight. Keep form joints to a minimum.
- .8 Use 25 mm chamfer strips on external corners and 25 mm fillets at interior corners of concrete members, unless specified otherwise.
- .9 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .10 Build in anchors, sleeves, and other inserts required to accommodate work specified in other sections. Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including paint.
- .11 Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings in bottom of forms to allow flushing water to drain.
- .12 Close temporary ports or openings with tight fitting panels, flush with inside face of forms, neatly fitted so no leakage occurs and to provide uniform surface on exposed concrete.

3.3 INSERTS, EMBEDDED ITEMS, AND OPENINGS

- .1 Provide formed openings where required for pipes, conduits, sleeves or other work to be embedded in and passing through concrete members. Obtain Engineer's approval before framing openings not shown on drawings.
- .2 No sleeves, ducts, pipes or other openings shall pass through joists, beams, column capitals or columns, except where indicated on Structural Drawings or approved by the Engineer.
- .3 Do not cut, bend, eliminate or displace reinforcement to accommodate sleeves, ducts, pipes and embedded items. If these cannot be located as specified, obtain approval of modifications from the Engineer before placing of concrete.

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- .4 Check locations and sizes of sleeves and openings shown on drawings. Accurately locate and set in place items which are to be cast directly into concrete. Coordinate installation of concrete accessories.
- .5 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
- .6 Conduit and pipe embedded in concrete shall:
 - .1 Not displace more than 4% of the cross sectional area of a column, including the area of concrete displaced by the bending of the conduit, or the exit path of the conduit out of the column.
 - .2 Not exceed one-third of the solid portion of the slab thickness.
 - .3 Not be spaced closer than three diameters on centre.
 - .4 Have a minimum concrete cover of 25 mm.

3.4 ANCHOR BOLTS AND BASE PLATES

- .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete. "Wet placement" of anchor bolts is not acceptable.
- .2 Grout under base plates and machinery using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.

3.5 WATERSTOPS

- .1 Install waterstops to provide continuous water seal. Do not distort or pierce waterstop in any way to hamper performance.
- .2 Do not displace reinforcement or inserts when installing waterstops.
- .3 Install waterstops to manufacturer's requirements.
- .4 Bridge construction joints with waterstops in walls against earth and where indicated in the Contract Documents.

3.6 FORM REMOVAL

- .1 Contractor to provide proposed form removal schedule.

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- .2 Leave formwork in place for following minimum periods of time after placing concrete or as otherwise directed by the Engineer for specific locations.
 - .1 Seven days for walls, sides of beams, and columns, **or** three days if a strength test indicates that 60% of the 28 day compressive design strength is achieved.
 - .2 Fourteen days for beam soffits, slabs, decks and other structural members, or seven days when replaced immediately with adequate shoring to standard specified for falsework **and** a seven day strength test indicates that 70% of the 28 day compressive design strength is achieved.
 - .3 Two days for footings and abutments.
 - .4 Where forms are providing curing protection, they shall be left in place a minimum of seven days.
- .3 Remove falsework progressively, in accordance with CSA 269.1 and ensure that no shock loads or unbalanced loads are imposed on the structure.
- .4 Loosen forms carefully. Do not wedge pry bars, hammers or tools against finish concrete surfaces scheduled for exposure to view.
- .5 Do not place load upon or against new concrete until authorized by the Engineer.
- .6 Submit backfilling schedule to the Engineer. Backfilling against the structure should not start until the following time and must be authorized by the Engineer.

Foundation walls retaining
earth on one side (provided that main
floor slab is in place)

The greater of 7 days or when
70% of 28-day design strength is reached

3.7 **RESHORING**

- .1 Prepare a schedule of reshoring and submit to Engineer for review.
- .2 Reshore structural members where required due to design requirements or construction conditions. Remove load supporting forms only when concrete has attained 80 percent of required 28-day strength and reshore.
- .3 Install reshoring as required to permit progressive construction.
- .4 If a concrete floor is supporting shoring for the floor above, forms for the bottom floor shall be left in place not less than 28 days.

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3.8 PLACING REINFORCING STEEL

- .1 Place reinforcing steel as indicated on reviewed shop drawings and in accordance with CAN/CSA A23.1.
- .2 Prior to placing concrete, obtain Engineers approval of reinforcing and placement.
- .3 Ensure cover to reinforcement is maintained during concrete pour.
- .4 Do not field bend or field weld reinforcement, except where indicated in the Contract Documents or as authorized by the Engineer.
- .5 Remove all loose scale, loose rust and other deleterious matter from surfaces of reinforcing.
- .6 Place reinforcement within a tolerance of + or - 6 mm for slab steel and to within + or - 12 mm for other steel. Locate bends and end of bars within 50 mm of specified location.
- .7 Place reinforcing steel to provide concrete cover to the most stringent requirements of either the minimum requirements of CAN/CSA A23.1, as indicated elsewhere in the Contract Documents, or as follows:

Item	Cover (mm)
Beam Stirrups	40
Supported Slabs and Joists	25
Column Ties	40
Interior Walls not exposed to weather or backfill	25
Walls Exposed to weather or backfill	50
Footings and concrete formed against earth	75
Slabs on Fill	50

- .8 Where a structural concrete member is required to have a fire resistance rating, provide minimum concrete cover to reinforcing steel in accordance with Appendix B of the National Building Code, except where indicated otherwise in the Contract Documents.
- .9 Provide 10M "U" spacers at 3 m on centre horizontally and 1.5 m on centre vertically to hold wall reinforcing mats in position.
- .10 Provide non-corrosive and non-staining reinforcing steel supports at surfaces where concrete will be exposed.
- .11 Support welded wire mesh and reinforcing steel in slabs on grade, using concrete bricks or high chairs located at maximum 1 m on centre each way.
- .12 Placing reinforcing on or in layers of fresh concrete as the work progresses is not permitted.

3.9 PLACING CONCRETE

- .1 Perform concrete work in accordance with CAN/CSA-A23.1.
- .2 Place concrete as a continuous operation stopping only at construction joints indicated on the drawings or as follows:
 - .1 At center of span of suspended slabs, beams and joists;
 - .2 In walls and columns immediately above or below floor construction;
 - .3 At center of steel beam that supports concrete slab.
- .3 Construction joints at center of span of suspended slabs beams and joists shall be adequately doweled and keyed.
- .4 Place floor slabs on grade as one continuous pour between construction joints indicated on drawings. Control joints for each pour shall be formed by sawing a continuous 25 mm deep slot at 6 m centers each way unless otherwise indicated on drawings. Sawing shall be done as soon as the concrete has sufficiently hardened to prevent raveling of the edges but in no case later than 24 hours after the concrete slab has been placed.
- .5 Isolate slabs on grade from vertical concrete using pre-moulded joint fillers extending from bottom of slab to within 12 mm of slab surface unless otherwise indicated.
- .6 Use winter concreting methods in accordance with CAN/CSA A23.1 when the mean daily temperature falls below 5°C.
- .7 Use procedures noted in CAN/CSA-A23.1 to remove excess bleed water. Ensure surfaces are not damaged.
- .8 Vibrate concrete using the appropriate size equipment as placing proceeds in strict accordance with Clause 19.5 of CAN/CSA-A23.1. Check frequency and amplitude of vibrations prior to use. Provide additional standby vibrators in the event of equipment failure.
- .9 Do not place concrete if carbon monoxide producing equipment has been in operation in the building during the 12 hours preceding the pour. This equipment shall not be used during placing, or for 24 hours after placing. During placing and curing concrete, surfaces shall be protected by formwork or by an impermeable membrane from direct exposure to carbon monoxide, combustion gases or drying from heaters.
- .10 Honeycomb or embedded debris in concrete is not acceptable. Honeycombed areas discovered after the removal of the forms shall not be repaired until inspected by the Engineer. Where honeycombing has occurred, the corrective method of treatment shall be carried out as directed by the Engineer.
- .11 Remove and replace concrete deemed to be defective by the Engineer.

- .12 Revise, re-seat and correct improperly positioned reinforcing, immediately before placing concrete.
- .13 Maintain accurate records of poured concrete items to indicate date, location of pour, quality of concrete, ambient air temperature and test samples taken.
- .14 Clean previously placed concrete with steel brush. Use acid if necessary and permitted by bonding agent manufacturer. Mix and brush on bonding agent in accordance with manufacturer's instructions.

3.10 FINISHING FORMED SURFACES

- .1 Rough Form Finish Concrete Surfaces not Exposed to View: in accordance with CAN/CSA A23.1. Place concrete against forms reasonably true and plane. Cut off form ties a minimum of 10 mm below concrete surface. Patch tie holes and defects. Remove fins exceeding 5 mm.
- .2 Smooth Form Finish Concrete Surfaces Exposed to View: in accordance with CAN/CSA A23.1. Place concrete against plywood, steel or tempered hardboard. Patch tie holes and defects. Remove fins.
- .3 Rubbed Finish Surfaces Exposed to View:
 - .1 Smooth-rubbed Finish: Smooth-rubbed finishes shall be produced on newly hardened concrete surfaces no later than 6 h following form removal. Surfaces shall be thoroughly wetted and rubbed with carborundum brick or another abrasive until uniform colour and texture are produced. No finishing mortar shall be used other than that produced from the concrete by the rubbing process.
 - .2 Sand-rubbed Finish: Sand-rubbed finishes shall be produced on newly hardened concrete surfaces no later than 6 h following form removal. Surfaces shall be thoroughly wetted and rubbed with a wood float in a circular motion, with fine sand rubbed into the surface until the resulting finish is even and uniform in colour and texture.
 - .3 Sack-rubbed Finish: The sack-rubbed finish shall be undertaken as soon as the surfaces are accessible. The concrete surfaces shall be thoroughly saturated with water and maintained wet for at least 1 h before finishing operations are begun. All free water on the surface shall be removed prior to the application of the finishing mortar. The mortar shall consist of one part (by volume) of cement to two parts (by volume) of clean sand passing a 630 µm sieve and enough water so that the mixed mortar shall have a consistency of thick paint. The mortar shall be preshrunk by mixing at least 1 h before it is used and then remixing without the addition of water prior to its use. The sand and cement shall be the same materials as those used in the concrete. The mortar shall be rubbed thoroughly over sections of the prepared concrete surfaces with clean burlap pads or other suitable materials so that all surface voids are filled. While the application mortar is still plastic, the surfaces shall be rubbed with the sack pads, using a mixture of mortar of the same proportions as previously specified, except that no mixing water shall be used. The final rubbing shall be performed in such a manner that the filled voids are left flush with the surface of the surrounding concrete. The finished surface shall be cured continuously in accordance with

Clause 3.13.

- .4 On all surfaces, cavities produced by form ties, air bubbles, all other holes, broken edges or corners and all other defects shall be repaired. The resulting surfaces shall be true and uniform.

3.11 FINISHING FLATWORK

- .1 Surfaces to be level to within 3mm in 3.0m with a maximum total variance of +/- 6mm.
- .2 Interior floor slabs to be left exposed or to receive carpet, sheet vinyl or other covering requiring a smooth surface: initial finishing operations followed by mechanical floating and steel trowelling as specified in CSA A23.1, to produce hard, smooth, dense trowelled surface free from blemishes. Finish tolerance classification: flat.
- .3 Equipment pads: smooth trowelled surface.

3.12 TREATMENT OF SLAB OR FLOOR SURFACES

- .1 N/A.

3.13 CURING AND PROTECTION

- .1 Initial Curing: Keep concrete surface continuously moist until concrete temperature has dropped several degrees.
- .2 Final Curing: Immediately following initial curing and before the concrete has dried, cure for an additional seven days. During that time, ensure that the temperature of the air in contact with the concrete is above 10°C.
- .3 Acceptable Curing Methods:
 - .1 Ponding or continuous sprinkling.
 - .2 Absorptive mat or fabric kept continuously wet.
 - .3 Damp sand, earth, or similar moist material.
 - .4 Continuous steam vapour mist bath not exceeding 66°C.
 - .5 Curing compound approved by Engineer. Product to be ANSI/NSF-61 certified.
 - .6 Forms in contact with the concrete surface and left in place for 7 days.
- .4 Do not use curing compounds on concrete surfaces to receive topping or other type of bonded finish unless approved by the Engineer.
- .5 Protect freshly placed and consolidated concrete against damage or defacement from adverse weather conditions.

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- .6 Exposed Concrete Walking Surfaces not to receive an Integral Hardener: Coat with curing compound of type that provides permanent seal.
- .7 Provide appropriate cold weather protection as specified in CAN/CSA A23.1.

3.14 COLD AND HOT WEATHER CONCRETING

- .1 Conform to the requirements of CSA A23.1.
- .2 Protect slabs being finished during drying conditions above 25° C, and/or during high winds with moisture retention film.

3.15 DAMPPROOF MEMBRANE

- .1 Place dampproof membrane on prepared sub-grade under slabs on grade. Lap each sheet minimum 150 mm. Seal laps and penetrations using materials recommended by membrane manufacturer.

3.16 GROUT

- .1 Mix grout to flowable consistency and apply in accordance with manufacturer's instructions.

3.17 EQUIPMENT PADS

- .1 Provide concrete pads for equipment where indicated on drawings. Adjust dimensions of pads to reviewed shop drawings.
- .2 Insert bolts and sleeves and pack with non-shrink grout, in accordance with setting details and templates.
- .3 Steel trowel surfaces smooth. Chamfer exposed edges.
- .4 Formed sides are to receive sack rub finish as per section 3.10.3.3.

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3.18 CONCRETE MIX SCHEDULE

Component	Type*	Min. Comp. Strength @ 28 Days (MPa)	Max. Water/ Cement Ratio	Air Content Range (%)	Slump Range** (mm)	Nominal Aggregate Size (mm)
Lower Floor Slab	HS	32	0.45	Max. 4	50-80	20-5
Reservoir Walls and Columns	HS	32	0.45	4-7	50-80	20-5
Interior Top floor Slab and Beams	HS	32	0.45	Max. 4	50-80	20-5
Interior Curbs, Interior Pads & Thrust Blocks	GU	32	0.45	Max.4	50-80	20-5
Exterior Slab	HS	32	0.45	5-8	50-80	20-5
Masonry Core Fill	GU	20	0.60	Max. 4	Max. 150	6

* Type HS formerly called Type 50. Type GU formerly called Type 10.

** Subject to Engineer's prior written approval, maximum slump may be increased beyond specified range by the use of chemical admixtures, except for zero slump mixes.

END OF SECTION

1 GENERAL

1.1 RELATED WORK SPECIFIED IN OTHER SECTIONS

- .1 Cast-in-place concrete: Section 03300.
- .2 Clarifier Waterproofing: Section 07150.
- .3 Disinfection, Hydrostatic and Pressure Testing: Section 15190.

1.2 REFERENCE DOCUMENTS

- .1 CAN/CSA-A23.1-00, Concrete Materials and Methods of Concrete Construction.

1.3 PRODUCT DATA

- .1 Submit product data for each product in accordance with Division 01.
- .2 Include application instructions and surface preparation for product.
- .3 Submit WHMIS MSDS – Material Safety Data Sheets for each product. Indicate VOC levels.
- .4 Submit data indicating product NSF-61 certification.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver materials to site in containers sealed and labeled by manufacturers.
- .2 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding storage, handling and disposal of hazardous materials.

1.5 ENVIRONMENTAL REQUIREMENTS

- .1 Provide temporary lighting, as required, to provide a minimum of 1200 watt light source, placed 2.5 meters above floor surface, for each 40 m² of floor or wall.
- .2 Maintain ambient temperature of 10°C minimum from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period. Follow manufacturers' requirements if more stringent.
- .3 Ensure substrate is within moisture limits prescribed by product manufacturers' limit.
- .4 Ventilate enclosed spaces as required during product application and for 48 hours after application.

1.6 COORDINATION

- .1 Coordinate the work of this section with the work of Section 03300 to ensure proper application.

1.7 WARRANTY

- .1 The product manufacturer shall issue a written and signed document in the name of the Owner, certifying the product meets all the physical characteristics published by the manufacturer and will remain leak-proof for a period of two (2) years from the date of final completion of the Work.
- .2 The applicator contractor shall issue a written and signed document in the name of the Owner by way of a maintenance bond certifying the work shall remain in place and free from any workmanship defects for a period of two (2) years starting from the date of final completion of work.

2 PRODUCTS

2.1 MATERIALS

- .1 Concrete materials and reinforcement: Specified in accordance with Section 03300.
- .2 Tank Liner: Epoxy or Elastomeric liner.
- .3 Colour: Manufacturers standard colour.

2.2 APPROVED PRODUCT:

- .1 Sikagard75 EpoCem underlying Sikagard 62 Epoxy coating
- .2 Approved Alternative
 - .1 Sikagard EWL complete with Sikagard EWL Bonding Agent or approved equal.
 - .1 Sikagard EWL on all horizontal surfaces
 - .2 Sikagard EWL Trowel Grade on all vertical surfaces
 - .2 Carboline501 & Carboline Polibrid671 underlying Carboline Polibrid 705
 - .3 Tnemec Elasto-Shield Series 400 c/w manufactures recommended primer.

3 EXECUTION

3.1 VERIFICATION OF CONDITIONS

- .1 Verify that slabs and surfaces are ready to receive work in accordance to manufacturer's specification.

3.2 SURFACE PREPARATION

- .1 Sandblast all surfaces to receive liner. Surface to be further prepared as per product manufacturers instruction.

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3.3 APPLICATION

- .1 Product must be applied by manufacturers certified applicator, according to manufacturer's specifications.

3.4 PRIMER

- .1 Apply Sikagard75 EpoCem @ 2mm thick on floor and walls of tank.
- .2 Approved Alternative
 - .1 Apply Sikagard EWL Bonding Agent at 7.4 m²/L on floor and walls of tank.

3.5 EPOXY COATING

- .1 Apply Sikagard62 in 2 lifts on walls @ 5-7 mils per coat, and 2 coats @ 7-11 mils on the floor.
- .2 Approved Alternative
 - .1 Apply Sikagard EWL in two (2) lifts on floor at 1.2 m²/L (30 mm per lift), and Sikagard EWL Trowel Grade in two (2) lifts on walls at 1.2 m²/L (30 mm per lift)
- .3 Use measured areas to ensure accurate quantity is applied.
- .4 The finished surface must be free from defects detrimental to appearance or performance of the product.
- .5 Provide adequate temporary protection until flooring is fully cured in accordance to manufacturer's recommendation.

3.6 TANK LINER SCHEDULE

Product	Location	Colour
Sikagard 62	MBR Tanks	Grey
Sikagard 75 EpoCem (primer)	MBR Tanks	Dark Grey
Approved Alternative:		
Sikagard EWL	MBR Tanks Floor	Glossy Black
Sikagard EWL Trowel Grade	MBR Tanks Walls	Glossy Black

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Supply and install precast concrete structure.
- .2 Approved Manufacturers
 - .1 Precon
 - .2 Alternates
 - .1 As approved by Engineer
 - .3 Station Main, PO Box 128, Lethbridge Alberta, T1J 3Y3
- .3 Approved Products
 - .1 Vault Structure Model VS 2530 Alternate

1.2 RELATED SECTIONS

- .1 Section 01340 - Shop Drawings, Product Data and Samples.
- .2 Section 02999 - Slide Gates
- .3 Section 05141 - Structural Aluminum

2. PRODUCTS

2.1 PRECAST CONCRETE STRUCTURES

- .1 Supply precast concrete structures for turnouts and manholes.
- .2 Submit the structural design of the precast concrete structures, including connections, to the Owner for review. The structural design must be stamped by a Professional Engineering registered in the Province of Alberta.
- .3 Provide the precast concrete structure design that is in accordance with CSA Standards CAN3-A23.1-A23.4.
- .4 Provide structural steel and miscellaneous metal design related to the precast concrete structure that is in accordance with CSA Standard CAN3-S16.1
- .5 Design the precast structure to resist all soil loads, live loads and hydrostatic pressures with a minimum factor of safety FS=1.5.

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- .6 Base the precast concrete structure design on the following unfactored load parameters:
 - .1 Unit weight of backfill material = 21 Kn/m^3
 - .2 Active soil pressure coefficient $K_a = 0.5$
 - .3 Design water table = Top of structure headwall elevation
- .7 Provide the precast concrete structures with solid walls with a minimum thickness of 150 mm.
- .8 The minimum clear concrete cover to steel reinforcement is 30 mm.
- .9 Design the precast structure to a minimum of the dimensions shown on the Drawings.
- .10 Construct the precast structure to allow for and incorporate all equipment and embedded parts.
- .11 Use Portland Type 50 sulphate resistant cement conforming to the current requirements of CSA Standard A5.
- .12 Use concrete reinforcing steel and accessories conforming to CSA Standard CAN3-A23.1.
- .13 Use air entraining admixture conforming to CSA A266.1.
- .14 Maintain responsibility for the safe storage of materials furnished by the precaster and intended for the Work until it has been incorporated into the Work.
- .15 All material found during the progress of the Work to have cracks, flaws or other defects, or to be of doubtful quality, will be rejected. Promptly remove all rejected materials from the site of the Work and replace with specified material.
- .16 Ladders:
 - .1 Install one ladder at each access hatch location as shown on drawings.
 - .2 Ladder to conform to PIP Standard STF05501
 - .3 All components to be Aluminum Alloy 6061
 - .4 Specified Equipment: L8501
 - .1 Manufacturer: MSU Mississauga Ltd. or approved equivalent
 - .2 Model: MSU Model 1105 (406mm)
 - .3 Access Handle: MSU Model 3105 for use on 406 mm ladder

- .17 Access Hatches:
 - .1 Install hatches where indicated on structural and mechanical drawings.
 - .2 Applicable Equipment:
 - .1 Location:
 - .1 As shown on Contract Drawings
 - .3 Specified Equipment: AH 8501
 - .1 Manufacturer: MSU Mississauga Ltd. or approved equivalent.
 - .2 Model: M4
 - .3 Opening Size: 900 mm x 900 mm
 - .4 Finish: Factory Finish
 - .5 Body: Aluminum: to ASTM B 221M or B 209M, Alloy 6351-T6.
 - .6 Tread Plate: Aluminum: to ASTM B 221M or B 209M, Alloy 6061-T6.
 - .7 Misc:
 - .1 Fasteners, gas spring, and hold open arm in 316 stainless steel; hinges and slam lock in 304 stainless steel.
 - .2 All aluminum surfaces in contact with concrete to receive two coats of bituminous paint.
 - .8 ABS Drain: N/A
 - .9 Accessories:
 - .1 Padlock: Complete with master padlock and key
 - .2 Compression Latch c/w Neoprene seal
 - .4 Specified Equipment: AH 8502
 - .1 Manufacturer: MSU Mississauga Ltd. or approved equivalent.
 - .2 Model: MD2
 - .3 Opening Size: 1800 mm x 1200 mm
 - .4 Finish: Factory Finish
 - .5 Body: Aluminum: to ASTM B 221M or B 209M, Alloy 6351-T6.
 - .6 Tread Plate: Aluminum: to ASTM B 221M or B 209M, Alloy 6061-T6.
 - .7 Misc:
 - .1 Fasteners, gas spring, and hold open arm in 316 stainless steel; hinges and slam lock in 304 stainless steel.
 - .2 All aluminum surfaces in contact with concrete to receive two coats of bituminous paint.
 - .8 ABS Drain: N/A
 - .9 Accessories:
 - .1 Padlock: Complete with master padlock and key
 - .2 Compression Latch c/w Neoprene seal

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2.2 CONCRETE MIX

- .1 Use the following concrete mix parameters for precast concrete structures:

<u>Unit</u>	<u>Measurement</u>
Water/cement ratio	maximum 0.45
Min. compressive strength @ 7 days	21 MPa
Min. compressive strength @ 28 days	30 MPa
Aggregate size – maximum	20 mm
Minimum cement content	340 kg/m ³
Slump at discharge	80 mm ±10 mm
Air content	5% to 8%

- .2 Provide certification that the plant, equipment, and all materials to be used in concrete comply with the requirements of CAN3-A23.1.
- .3 Provide certification that the mix proportions selected will produce concrete of specified quality and yield, and that the strength will comply with CAN3-A23.1.
- .4 Obtain the Owner's written approval prior to using chemical admixtures other than those specified.
- .5 Do not use calcium chloride.
- .6 Submit a concrete mix design to the Owner for review a minimum of 7 days prior to the start of precasting.

3. EXECUTION

3.1 GENERAL

- .1 Structural aluminum work: in accordance with CAN/CSA-S157.
- .2 Welding: in accordance with CSA W59.2.
- .3 Companies to be certified under Division 1 or 2.1 of CSA W47.2 for fusion welding of aluminum and/or CSA W55.3 for resistance welding of structural components.
- .4 Paint aluminum surfaces in contact with concrete with two (2) coats of alkali resistant bituminous paint.

3.2 FABRICATION AND PRECAST POURING

- .1 Fabricate and place concrete reinforcement in accordance with CSA Standard CAN3-A23.1.
- .2 Provide precast concrete work in accordance with CSA Standards CAN3-A23.1, CAN3-A23.2, CAN3-A23.3 and CAN3-A23.4, except where specified otherwise.

- .3 Submit a pour schedule to the Owner 7 days prior to placing concrete.
- .4 Test each concrete placement of precast structure components using an independent testing laboratory. Make test cylinders in the presence of the Owner in accordance with CSA A23.2. Forward test results to the Owner. Perform testing at no extra cost to the Owner.
- .5 All precast concrete components must obtain a minimum compressive strength of 21 MPa prior to removal and transportation from the casting form bed.
- .6 Cure all precast concrete components at a temperature of 5°C or greater until minimum 7-day design strengths are obtained.
- .7 Safely and carefully handle precast concrete panels at all times, utilizing the lifting devices and holes provided. Transport large panels and manipulate in a vertical position. Replace any materials damaged or lost in hauling, handling and storage at the Contractor's expense.

3.3 STRUCTURE EXCAVATION

- .1 Carry out structure excavation to the lines and grades.
- .2 Provide excavations of sufficient width to accommodate the assembly of the structure and to allow for satisfactory compaction on both sides.
- .3 Be responsible to provide the actual slopes and protection required for stability of the excavations, in accordance with the Occupational Health and Safety Act.
- .4 Use suitable excavated materials. Place surplus material in waste areas or as otherwise directed by the Owner.

3.4 INSTALLATION

- .1 Transport, unload and assemble the precast concrete structure in accordance with the manufacturer's instructions and as shown on the Drawings.
- .2 Accurately install precast concrete units to the lines and grades. Install units within ± 25 mm of the line and grades shown on the Drawings.
- .3 Provide a watertight joint. Apply a 25 mm diameter bead of Kent Seal between all connecting panels or components. Seal any bolt holes not used with non-shrink concrete grout or Kent Seal.
- .4 Provide an assembled structure that is truly vertical and square prior to and after backfilling.

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3.5 STRUCTURE BACKFILL

- .1 Backfill and compact the structure with suitable impervious material as specified in Section 02250 Compacted Earth Fill. Place granular materials and riprap as specified in Section 02265.

END OF SECTION

1. GENERAL**1.1 RELATED SECTIONS**

- | | | |
|----|---|----------------|
| .1 | Reinforcement in grout or concrete filled masonry cavities: | Section 03300. |
| .2 | Painting and Finishing General Requirements | Section 09901. |
| .3 | Joint Sealants | Section 07920. |

1.2 REFERENCE DOCUMENTS

- | | |
|----|---|
| .1 | Materials and installation shall meet or exceed: |
| .1 | CSA A371, Masonry Construction for Buildings. |
| .2 | CSA A165 Series-04, CSA Standards on Concrete Masonry Units |
| .3 | CSA A179-04, Mortar and Grout for Unit Masonry |

1.3 SAMPLES

- | | |
|----|--|
| .1 | Comply with requirements of Division 1. |
| .2 | Provide 5 concrete masonry units showing range of colour and texture possible within colour specified. |
| .3 | Obtain approval from Owner before ordering. |

1.4 TEST REPORTS

- | | |
|----|---|
| .1 | Comply with requirements of Division 1. |
| .2 | Submit copies of test reports by an independent testing agency, accredited for this type of testing by the Standards Council of Canada, demonstrating that: |
| .1 | Concrete masonry complies with CSA A165 Series and specified requirements. |

1.5 MOCK-UP

- | | |
|----|-----|
| .1 | N/A |
|----|-----|

1.6 TESTING AND INSPECTION BY OWNER

- | | |
|----|---|
| .1 | Owner will appoint and pay for services of a testing agency to perform site quality control testing and inspection. |
|----|---|

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- .2 Concrete masonry units delivered to the site will be sampled and tested in accordance with CSA A165 Series. Following tests will be performed to verify compliance with specified requirements:

Test	Test Method
Compressive strength	ASTM C140
Linear shrinkage	ASTM C426
Moisture content	ASTM C426

- .3 Sand and cement materials will be inspected and tested to verify compliance with specified requirements.

- .4 Mortar will be tested to verify that compressive strength complies with specified requirements. Method of testing will be in accordance with CSA A179, for job-mixed mortars.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver masonry units on pallets, suitably protected from road grime and moisture absorption due to exposure to rain or melting snow.
- .2 Unload and store on dry, level areas.
- .3 Remove plastic wrappings from concrete masonry units and cover with waterproof coverings which will provide protection from the elements but allow for air circulation.
- .4 Protect masonry materials from damage during all phases of delivery, storage and handling.

1.8 COORDINATION

- .1 Coordinate lines, levels and coursing with work of other Sections.
- .2 Obtain built-in items prior to start of this work.

2. PRODUCTS

2.1 CLAY BRICK MASONRY UNITS

- .1 Not applicable.

2.2 CONCRETE MASONRY UNITS

- .1 Concrete Block Masonry Units: to CSA A165.1 and as follows:

- .1 Classification: H/15/D/M.
- .2 Method of Curing: Autoclave or low pressure steam curing is acceptable, provided that masonry units comply with linear shrinkage and moisture content requirements of CSA A165.1 for type M units at time of delivery to site. Notwithstanding the foregoing, age all units before delivery to site, as follows:
 - .1 Autoclaved units: minimum 7 days.
 - .2 Low pressure steam cured units: minimum 28 days.
- .3 Sizes:
 - .1 200 x 200 x 400.
- .4 Special Shapes:
 - .1 Bond beam, lintel beam, corner and other shapes as required or indicated on drawings. Provide external corner units as a single unit, with required architectural face appearance on one side and one end.
 - .2 Exposed corners including door and window openings to be bullnose corners.
- .5 Face Textures, Finishes and Colours: Following types, as indicated on drawings:
 - .1 Smooth face, standard colour

2.3 HORIZONTAL JOINT REINFORCEMENT

- .1 Reinforcement which will also function as masonry connectors:
 - .1 Conventional Continuous Welded Ties/Reinforcing: to CSA A370, in ladder or truss configuration.
- .2 Reinforcement:
 - .1 Steel Wire: to ASTM A82, hot dip galvanized.
 - .2 Continuous Welded Double Wire Welded Ladder or Truss Type: to CSA A370.
 - .3 Single Wire Type: 3.66 mm diameter.
- .3 For continuous welded ladder or truss type, provide:
 - .1 widths to suit wall widths, and
 - .2 prefabricated tee-shaped and 90° corner configurations for use at wall intersections and corners.

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2.4 MASONRY CONNECTORS

- .1 Select any suitable conventional or non-conventional type as defined by CSA A370-04, and as follows:
 - .1 Corrosion Protection: level II.
 - .2 Maximum unsupported length of connectors in cavity shall not exceed that permitted by CSA A370-04 or recommended by connector manufacturer, whichever is the smaller dimension.

2.5 FASTENERS FOR MASONRY CONNECTORS

- .1 N/A

2.6 ACCESSORIES

- .1 Control Joint Fillers: Preformed rubber, neoprene or polyvinylchloride, size and profile to suit intended application.
- .2 Cavity Weeps/Vents: Preformed plastic or galvanized steel.

2.7 ANCHOR BOLTS

- .1 Hollow Core Block – Use Hilti Hit HY 70 or approved equal
- .2 Grout Filled Block – Use Hilti Hit HY 200 or approved equal

2.8 MORTAR AND GROUT

- .1 Mortar: to CSA A179, property specifications, and as follows:

Location	Mortar Type	Maximum Compressive Strength*	Colour
All locations	S	15 MPa	to match masonry block colour specified.

*Average of six 50 mm cubes, job prepared, tested @ 28 days.

- .3 Masonry cement is not permitted.
- .4 Grout: to CSA A179.

2.9 FLASHINGS

- .1 Butyl Rubber Base Flashing: minimum 1.2 mm thick butyl sheet rubber strips.
- .2 Sheet Steel Base Flashing: minimum 0.60 mm thick, to ASTM A653M-08, formed as detailed, galvanized with Z275 zinc coating.

3. EXECUTION

3.1 EXAMINATION

- .1 Examine work of other Sections upon which work of this Section is dependent. Should discrepancies be found which affect the proper performance of the work of this section, do not commence work until such discrepancies have been resolved.

3.2 COLD WEATHER REQUIREMENTS

- .1 For masonry work which will be done below 5°C, measure temperatures of masonry material prior to use; maintain temperatures as close as possible for mortar batches; ensure mortar temperature on mortar boards does not exceed 50°C; use dry masonry units; lay masonry on unfrozen surfaces free from snow and ice; use windbreaks when laying masonry not protected by enclosures; provide a high-low registering thermometer where directed on site.
- .2 When mean air temperature will, over a 24 hour period, go below 5°C but not below 0°C, conduct masonry work as for normal temperatures except heat water and sand to produce mortar temperatures between 5°C and 50°C. Protect entire constructed masonry by enclosing within weatherproof membrane for 48 hours.
- .3 When mean air temperature will, over a 24 hour period, go below 0°C but not below -4°C, conduct masonry work as for normal temperatures except heat water and sand to produce mortar temperatures between 5°C and 50°C and maintain temperature of mortar boards above 0°C. Protect entire constructed masonry by enclosing within weatherproof membrane for 48 hours.
- .4 When mean air temperature is below -4°C, conduct laying of masonry in enclosures heated to maintain air temperature above 0°C. Conduct masonry work as for normal temperatures except heat water and sand to produce mortar temperatures between 5°C and 50°C and heat units if necessary so that temperature of units at time of laying is minimum -7°C. Maintain enclosure in position for 48 hours and maintain air temperature within enclosure at minimum 0°C.

3.3 MIXING MORTAR

- .1 Mix mortar in accordance with CSA A179, using maximum amount of water consistent with workability.
- .2 Provide gauging equipment and ensure that shovel count is accurate.

- .3 Use mechanical mixer of one sack minimum capacity for large batches, mechanically mixing for not less than 3 minutes and not more than 5 minutes. Hand mixing may be used for small batches.
- .4 Re-temper mortar to replace water lost by evaporation.
- .5 Use and place mortar in final position within 2 hours after mixing.
- .6 For coloured mortar, mix coloured pigment with 10% to 15% dry cement by weight. Do not use same mixer for regular and coloured mortar.

3.4 PLACING OF MASONRY, GENERALLY

- .1 Meet or exceed requirements of CSA A371.
- .2 Where mortar has started to harden at units requiring repositioning, remove and replace with fresh mortar.
- .3 Construct cavity walls using techniques that will minimize mortar dropping in cavity space. This may require the use of batten boards to catch mortar droppings. No mortar shall bridge cavity space or plug cavity vents at bottom of cavity.

3.5 PLACING CLAY BRICK MASONRY UNITS

- .1 Not applicable.

3.6 PLACING CONCRETE MASONRY UNITS

- .1 Do not wet concrete masonry units prior to installation. Cut with dry blade saws.
- .2 Place units in face shell mortar bedding for running bond.
- .3 Remove excess mortar from cores intended for grouting. Puddle or vibrate grout to completely fill cores.

3.7 BONDS AND PATTERNS

- .1 Except where otherwise indicated on drawings, lay up all masonry in running bond

3.8 JOINTING

- .1 Tool mortar joints to a dense, smooth surface, after thumbprint hard.

- .2 Except where otherwise indicated on drawings, provide following joint types at specified locations:

Location	Joint Type
----------	------------

Exposed:

Exterior concrete masonry	Weather
Interior concrete masonry	Concave

Concealed:

Cavity walls	Flush
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3.9 INSTALLATION OF REINFORCEMENT

- .1 Install reinforcement in accordance with CSA 371 and as indicated on drawings.
- .2 Place horizontal joint reinforcement in accordance with CSA 371, and as follows:
- .1 Place in first and second mortar joints above and below openings. Extend reinforcement minimum 600 mm past openings.
- .2 Place in first and second mortar joints below tops of walls.
- .3 Stop horizontal reinforcement on each side of control joints.

3.10 INSTALLATION OF MASONRY CONNECTORS

- .1 Install masonry connectors in accordance with CSA A370-04.
- .2 Comply with fastener manufacturer's recommendations for edge distance in applicable substrates. Do not fasten into mortar joints of masonry backup.
- .3 Install top row of masonry connectors not more than one-half of typical tie spacing below top of veneer panels.
- .4 Ensure that connectors installed over or through sheathing are adequately fastened to studs or other structural framing.

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3.11 INSTALLATION OF FLASHING

- .1 Install flashing under exterior masonry walls and as indicated on drawings.
- .2 Extend flashings through brick veneer, turn up minimum 200 mm on back-up substrate.
- .3 Secure butyl rubber flashing to back-up substrate with adhesive [as detailed on drawings].
- .4 Lap joints 150 mm and seal with adhesive.

3.12 INSTALLATION OF ACCESSORIES

- .1 Control Joints: install continuous control joint fillers as indicated on drawings.
- .2 Cavity Vents:
 - .1 Install vents in vertical joints immediately over flashing and near tops of walls, in exterior wythes of cavity wall construction at 600 mm o.c. horizontally.
 - .2 Do not install vent tubes in control or expansion joints.

3.13 INSTALLATION OF ANCHOR BOLTS

- .1 Install as per manufacturers recommendation.

3.14 BUILT-IN WORK

- .1 Build-in all door and window frames, steel lintels, anchors and bolts, and any other items to be built into masonry.

3.15 CUTTING AND FITTING

- .1 Fit and cut chases for piping, conduits, ducts, and sleeves. Install grounds, blocking, inserts, etc., as required.
- .2 Do all cutting, fitting, drilling, patching and making good for other trades.
- .3 Obtain the Owner's Representative's approval before cutting any part which may impair appearance or strength of the work.

3.16 CLEANING

- .1 Clean off all excess mortar and smears.
- .2 Clean and wash masonry surfaces with masonry manufacturer's approved solution using only fibre brushes. Clean a trial area and obtain Owner's approval before proceeding.

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- .3 Promptly remove from job site all mortar droppings, broken units, and debris resulting from work of this Section.
- .4 Surfaces to be painted are to be prepared as indicated in Section 09901 - 3.5.10.

END OF SECTION

1. GENERAL**1.1 RELATED WORK SPECIFIED IN OTHER SECTIONS**

- .1 Grout under column base plates: Section 03300
- .2 Installation of anchor bolts for column base plates: Section 03300
- .3 Interior Painting and Finishing Schedule: Section 09904

1.2 DESIGN CRITERIA

- .1 Design connections and other work not detailed on drawings, but necessary for completion of the Work, in accordance with requirements of National Building Code, CAN/CSA-S16.1 and CSA S136.

1.3 SUBMITTALS

- .1 Comply with requirements of Division 1.
- .2 Submit shop drawings and product data prior to commencement of fabrication.
- .3 Shop Drawings shall include shop details and erection diagrams and shall indicate framing and grid lines, bearing and anchorage details, framed openings, accessories, schedule of materials, camber and loadings, fasteners, method of torquing bolts, and welds using American Welding Society basic weld symbols.
- .4 Shop drawings for work designed by fabricator shall bear the stamp and signature of a Professional Engineer registered in the Province of Saskatchewan.
- .5 Submit shop paint primer manufacturer's product data.

1.4 FABRICATOR AND ERECTOR QUALIFICATIONS

- .1 Welding shall be undertaken only by a company approved by the Canadian Welding Bureau to the requirements of CSA W47.1, Certification of Companies for Fusion Welding of Steel.

1.5 REFERENCE DOCUMENTS

- .1 Comply with applicable requirements of CAN/CSA-S16.1 and CAN/CSA-S136.
- .2 Do welding in accordance with CSA W59.

1.6 TESTING AND INSPECTION

- .1 Engineer may appoint and pay for services of testing agency to perform testing and inspection of work of this Section.
- .2 Notify Engineer prior to commencement of fabrication work so that testing and inspection may be properly scheduled.

- .3 When defects are revealed, Engineer may request additional testing and inspection at Contractor's expense.

1.7 COORDINATION

- .1 Where structural steel is scheduled to be finish painted, ensure that shop paint primer is compatible with painting coats specified in Section 09901.

2. PRODUCTS

2.1 MATERIALS

- .1 Steel: Structural quality, to CAN/CSA-G40.20.
- .2 Rolled Structural Steel Sections: to CAN/CSA-G40.21, grade 300 MPa.
- .3 Hollow Structural Steel Sections: to CAN/CSA-G40.21, grade 350 MPa.
- .4 Bolts: to ASTM A668M or ASTM A490M.
- .5 Expansion Joint Plates: 6 mm thick dry lubricated brass cut to the shapes required to give full coverage of the bearing surfaces.
- .6 Shear Stud Connectors: to ASTM A108.
- .7 Shop Paint Primer: to CISC/CPMA 2-75 or CAN/CGSB-1.105.
- .8 Fixed Ladder and Cages: to Process Industry Practices Standard STF05501.

2.2 FABRICATION

- .1 Fabricate structural steel in accordance with CAN/CSA-S16.1 and CSA-S136.
- .2 Camber steel members as indicated on drawings.
- .3 Shop weld shear stud connectors with automatic stud welding equipment. Thoroughly clean surface to which studs are to be welded. Ensure stud stem is perpendicular to surface to which it is attached.

2.3 SURFACE PREPARATION AND SHOP PRIMING

- .1 Where structural steel is scheduled to be finish painted, prepare surfaces in accordance with SSPC-SP6 - Commercial Blast Cleaning.
- .2 Apply shop paint primer in accordance with CAN/CSA-S16.1 to a dry film thickness of 50 to 75 micrometers.

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3. EXECUTION

3.1 ERECTION

- .1 Erect structural steel in accordance with CAN/CSA-S16.1 and CSA-S136.
- .2 Obtain Engineer's approval prior to field cutting or altering of members.
- .3 Field touch up shop paint primer at bolts, welds and burned or scratched surfaces. Use same primer as applied in shop.

3.2 GALVANIZING

- .1 Galvanize according to CSA G-164 and to a minimum coating of 0.61 kilogram per square metre.
- .2 Apply zinc rich paint where the galvanized coating has been damaged.

END OF SECTION

1. GENERAL

1.1 RELATED SECTIONS

- .1 Not Applicable

1.2 REFERENCES

- .1 Canadian Standards Association (CSA):
 - .1 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .2 CAN/CSA-S157, Strength Design in Aluminum.
 - .3 CSA W47.2, Certification of Companies for Fusion Welding of Aluminum.
 - .4 CSA W59.2, Welded Aluminum Construction.
 - .5 CSA W55.3 - Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings
- .2 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-1.108, Bituminous Solvent Type Paint.
- .3 American Society for Testing and Materials (ASTM):
 - .1 ASTM A 307, Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - .2 ASTM A668M Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use.
 - .3 ASTM A 490, Specification for Heat Treated, Steel Structural Bolts, 150 ksi (1035 Mpa) Tensile Strength.
 - .4 ASTM A 490M, Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3 for Structural Steel Joints Metric.
 - .5 ASTM B 209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate Metric.
 - .6 ASTM B 210M, Specification for Aluminum-Alloy Drawn Seamless Tubes Metric.
 - .7 ASTM B 211M, Specification for Aluminum and Aluminum-Alloy Bar, Rod and Wire Metric.
 - .8 ASTM B 316M Standard Specification for Aluminum and Aluminum-Alloy Rivet and Cold-Heading Wire and Rods Metric

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- .4 Aluminum Association, Inc. (AA):
 - .1 Designation System for Aluminum Finishes.
- .5 American Welding Society (AWS):
 - .1 AWS A5.10, Specification for Bare Aluminum and Aluminum-Alloy Welding Electrodes and Rods.

1.3 SHOP DRAWINGS

- .1 Shop Drawings:
 - .1 Submit shop drawings including fabrication and erection documents consisting of connection and design details, shop details, erection diagrams, erection procedures and material lists in accordance with Section 01330 – Submittals.
 - .2 Indicate cuts, copes, connections, holes, threaded fasteners, rivets, welds and other items. Indicate welds using welding symbols as shown in Appendix A of CSA W59.2.
 - .3 Submit description of methods, sequence of erection and type of equipment to be used in erecting structural aluminum.

1.4 SAMPLES

- .1 Not Applicable.

1.5 QUALITY ASSURANCE

- .1 Submit one copy of mill test reports showing chemical and physical properties and other details of aluminum to be incorporated into work, at least 4 weeks prior to fabrication of structural aluminum. Mill test reports shall be certified by metallurgists qualified to practice in the Province of Saskatchewan, Canada.

2. PRODUCTS

2.1 MATERIALS

- .1 Aluminum bar, rod, and wire: to ASTM B 211M.
- .2 Aluminum and Aluminum-Alloy Extruded Bar, Rods, Wire, Shapes, and Tubes: to ASTM B 221M.
- .3 Aluminum sheet or plate: to ASTM B 209M.
- .4 Aluminum drawn tubes: to ASTM B 210M.
- .5 Aluminum bolts and rivets: to ASTM B 316M

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- .6 Aluminum welding wire: to AWS A5.10.
- .7 Stainless steel bolts: to AISI Steel Products Manual No. 13.
- .8 Steel bolts: to ASTM A 668M.
- .9 Bituminous paint: to CAN/CGSB-1.108, type 1, 2, without thinner.
- .10 Galvanizing hot dip galvanize steel bolts to CAN/CSA-G164, minimum zinc coating of 600g/m².
- .11 Grating:
 - .1 Fishlow Aluminum Grating – Type 30-102M or approved equivalent.
 - .2 Bearing Bars: 6063T6
 - .3 Cross Bars: 6063T5
 - .4 Maximum allowable fibre stress: 82.82 MPa
 - .5 Fasteners to be Type A fixing clip c/w stainless steel screw, nut, and washer unless noted otherwise on drawings.
 - .6 Grating bearing bar size as shown on Drawings.
- .12 Ladders: L 1100, L 2100, L 2200, L 2300, L3100, L8100, L8200
 - .1 Install ladder at locations indicated on Drawings.
 - .2 Ladders to come complete with all necessary attachment brackets and accessories.
 - .3 Ladder to conform to CAN3-S157 -M83, CSA W59.2 -M191, CSA W47.2-M1987
 - .4 All components to be Aluminum Alloy 6061
 - .5 Specified Equipment:
 - .1 Manufacturer: MSU Mississauga Ltd. or approved equivalent
 - .2 Model: MSU Model 1105 (406mm)
 - .3 Access Handle: MSU Model 3105 for use on 406 mm ladder
- .13 Access Hatches:
 - .1 Install hatches where indicated on structural and mechanical drawings.
 - .2 Applicable Equipment: AH 1100, AH 1200, AH 2100, AH 2200, AH 2300, AH 3100, AH 4100, AH 8100, AH 8200

- .1 Location: As shown on drawings
- .2 Specified Equipment: AH 1100, AH 3100, AH 8100, AH 8200
 - .1 Manufacturer: MSU Mississauga Ltd. or approved equivalent.
 - .2 Model: CK-GT
 - .3 Opening Size:
 - .1 750 mm x 900 mm: AH 3100, AH 8200
 - .2 800 mm X 1200 mm: AH 1100, AH 8100
 - .4 Finish: Factory Finish
 - .5 Body: Aluminum: to ASTM B 221M or B 209M, Alloy 6351-T6 c/w Neoprene seal.
 - .6 Tread Plate: Aluminum: to ASTM B 221M or B 209M, Alloy 6061-T6.
 - .7 Miscellaneous:
 - 1. Fasteners and hold open arm in 316 stainless steel; hinges in 316 stainless steel.
 - 2. All aluminum surfaces in contact with concrete to receive two coats of bituminous paint
 - .8 Padlock: N/A
 - .9 Accessories:
 - .1 Gas Spring Assist Cylinder: 316 stainless steel c/w Aluminum mounting brackets
 - .2 Compression Latch c/w Neoprene seal
 - .3 Hatch to be completely air tight
- .3 Specified Equipment: AH 1200, AH 2100, AH 2200, AH 2300, AH 4100
 - .1 Manufacturer: MSU Mississauga Ltd. or approved equivalent.
 - .2 Model:
 - ..1 CKD: AH 4100
 - .2 CKP: AH 1200, AH 2100, AH 2200, AH 2300
 - .3 Opening Size:
 - .1 1400 mm x 1800 mm: AH 4100
 - .2 900 mm X 1450 mm: AH 1200, AH 2100, AH 2200, AH 2300
 - .4 Finish: Factory Finish
 - .5 Body: Aluminum: to CSA HA.5-M1980, Alloy 6351-T6 c/w Neoprene seal.
 - .6 Tread Plate: Aluminum: to CSA HA.5-M1980, Alloy 6061-T6.
 - .7 Miscellaneous:
 - 1. Fasteners and hold open arm in 316 stainless steel; hinges in 304 stainless steel.
 - 2. All aluminum surfaces in contact with concrete to receive two coats of bituminous paint
 - .8 Padlock: N/A
 - .9 Accessories:
 - .1 Gas Spring Assist Cylinder: 316 stainless steel c/w Aluminum mounting brackets

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- .2 Compression Latch c/w Neoprene seal
- .3 Hatch to be completely air tight

2.2 FABRICATION

- .1 Fabricate in accordance with CAN/CSA-S157 and in accordance with shop drawings.

2.3 FINISHES

- .1 Plain mill finish, unless otherwise indicated.

3. EXECUTION

3.1 GENERAL

- .1 Structural aluminum work: in accordance with CAN/CSA-S157.
- .2 Welding: in accordance with CSA W59.2.
- .3 Companies to be certified under Division 1 or 2.1 of CSA W47.2 for fusion welding of aluminum and/or CSA W55.3 for resistance welding of structural components.
- .4 Paint aluminum surfaces in contact with concrete with two (2) coats of alkali resistant bituminous paint.

3.2 ERECTION

- .1 Erect structural aluminum as indicated and in accordance with CAN/CSA-S157 and approved erection drawings.
- .2 Field cutting or altering structural members: to approval of the Engineer.

3.3 FIELD QUALITY CONTROL

- .1 Inspection and testing of materials and workmanship may be carried out by testing laboratory designated by Engineer.
- .2 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Engineer.

END OF SECTION

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1. GENERAL

- .1 Not Applicable.

2. PRODUCTS

- .1 Unless noted otherwise, all bolts and nuts to be cadmium plated. Bolt heads and nuts to be heavy hex conforming to ASTM A307.
- .2 Stainless steel bolts are to be used with structural aluminum. See Section 05141.
- .3 All steel, plates, bars etc. conforming to CSA - G40.20.

3. EXECUTION

3.1 CATHODIC PROTECTION

- .1 Install cathodic protection as shown in the Contract Documents.
- .2 Cathodic protection is to be achieved by using prepackaged anodes connected to the valve, fitting or steel pipe in a convenient place.
- .3 Install 1 kilogram of high purity ASTM Type II zinc anode for every 4 square metres of soil exposed coated surface.

3.2 GALVANIZING

- .1 Galvanize according to CSA G-164 and to a minimum coating of 0.61 kilogram per square metre.
- .2 Apply zinc rich paint where the galvanized coating has been damaged.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 This section of the specification refers to the supply and installation of a prefabricated building to CSSBI 30 M-95 Standard for Steel Building Systems.
- .2 Building Supplier to co-ordinate scope of supply with regards to man doors, anchor bolts, etc with General Contractor.
- .3 Building Supplier to co-ordinate location and size of Mechanical and Electrical penetrations with General Contractor.
- .4 Building Supplier to provide building structure to the physical dimensions as shown on the Tender Drawings.
- .5 Building drawings to be stamped by a Professional Engineer registered in the Province of Saskatchewan.

1.2 RELATED WORK

- .1 Hollow Metal Frames Section 08110
- .2 Hollow Metal Doors Section 08115
- .3 Insulated Overhead Coiling Doors Section 08330
- .4 Hardware Section 08700

1.3 REFERENCE STANDARDS

- .1 American Society for Testing and Materials (ASTM).
 - .1 ASTM A653/653M, Steel Sheet, Zinc coated (Galvanized) or Zinc-Iron Alloy. Coated (Galvannealed) by the Hot-Dip Process, Structural (Physical) Quality.
 - .2 ASTM A792/792M, Steel Sheet, Aluminum-Zinc Alloy-Coated by the Hot-Dip Process. General Requirements.
- .2 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI 30M-95, Standard for Steel Building Systems.
 - .2 CSSBI Bulletin No. B15-93, Snow, Wind and Earthquake Load Design Criteria for Steel Building Systems.
 - .3 CSSBI Sheet Steel Facts #3, Care, Maintenance of Prefinished Sheet Steel Building Products, April 1994.

- .3 Canadian Standards Association (CSA)
 - .1 CSA S16, latest edition, Limit States Design of Steel Structures.
 - .2 CSA S136-01, Cold Formed Steel Structural Members.
 - .3 CSA A660-M, Certification of manufacturers of Steel Building Systems.
 - .4 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel Structures.
 - .5 W59-03, Welded Steel Construction (Metal Arc Welding).

1.4 SYSTEM DESCRIPTION

- .1 Water Treatment Plant:
 - .1 Type: Pre-Engineered Rigid Frame Steel Building
 - .2 Wall System:
 - .1 Maximum Overall Thermal Transmittance = 0.21 W/(m²-K)
(minimum RSI value of 4.8)
 - .3 Roof System:
 - .1 Maximum Overall Thermal Transmittance = 0.162 W/(m²-K)
(minimum RSI value of 6.2)

1.5 DESIGN CRITERIA

- .1 Design roof, walls, connections, and other work not detailed on tender drawings, but necessary for completion of the Work, in accordance with requirements of the National Building Code, National Energy Code, CAN/CSA-S16.1 and CSA S136, latest editions.
- .2 All cold formed steel members shall conform to the latest editions of CSA/CAN S136.
- .3 All structural steel members shall conform to the latest edition of CSA/CAN S16. HSS and "I" shapes shall meet the requirements of G40.21-350W (350W). All other rolled shapes shall meet the requirements of G40.21-300W (300W).
- .4 All welding shall conform to the latest editions of CSA W59 and CSA W47.1.
- .5 Maximum deflection:
 - .1 Roof cladding under full design load: 1/180 of clear span.
 - .2 Wall cladding under specified wind effects: 1/180 of clear span.
- .6 Thermal resistance: Building to meet the National Energy Code's requirement for a building located in Zone 7A and as per Section 1.4.
- .7 Design building walls and roof to allow for thermal movement of component materials caused by ambient temperature range of 55 °C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

- .8 Ensure total absence of condensation on interior surfaces under following minimum condition:
Interior: +22°C, 30% relative humidity (RH), still air.
Exterior: - 23°C, 25 km/h wind.
- .9 Building shall be weather tight. All wall penetrations to be framed c/w flute closures and sealed. Roof penetrations to be fully sealed to prevent any leakage.
- .10 Design building enclosure elements to accommodate, by means of expansion joints, any movement in element itself and between element and building structure caused by structural movements without permanent distortion, damage to infills, racking of joints, breakage of seals, water penetration or glass breakage.
- .11 Provide all gutters, drip flashing, and downspouts as indicated on Contract Drawings.

1.6 QUALITY ASSURANCE

- .1 Submit documentation that steel building systems manufacturer is certified to CSA A660-M, and that the erector is qualified to erect system.

1.7 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01340 and bearing stamp and signature of a professional engineer registered in the Province of Saskatchewan.
- .2 Submit the following documents in accordance with CSSBI 30M-95:
 - .1 Erection drawings, foundation loads and anchor bolt setting plans, connection and assembly details.
- .3 Indicate plans and grid lines, structural members and connection details, bearing and anchorage details, framed openings, accessories, schedule of welds, sealant locations and details.
- .4 Indicate shop and erection details including cuts, copes, connections, holes, treaded fasteners, rivets and welds. Indicate welds by CSA welding symbols.
- .5 Indicate on shop drawings related provisions required for mechanical, electrical, and other work.
- .6 Indicate on shop drawing the Overall Thermal Transmittance of the wall and roof system.

1.8 CERTIFICATION

- .1 Submit following documents in accordance with CSSBI 30M-95
 - .1 Certification that building is in accordance with contract requirements.
 - .2 A structural analysis certification of building system.
 - .3 Standard CSSBI Certificate of Design and Manufacturing Conformance bearing the stamp and signature of a professional engineer registered in the Province of Saskatchewan.

1.9 PROTECTION

- .1 Protect prefinished steel sheet during fabrication, transportation, site storage and installation in accordance with CSSBI Sheet Steel Facts #3.
- .2 Handle and protect galvanized and galvalume materials from damage to coating. During storage, space surfaces of materials to permit free circulation of air.

2. PRODUCTS

2.1 MATERIALS

- .1 Structural steel:
 - .1 Steel: Structural quality, to CAN/CSA-G40.20-M92.
 - .2 Rolled Structural Steel Sections: to CAN/CSA-G40.21-M92, grade 300 MPa.
 - .3 Hollow Structural Steel Sections: to CAN/CSA-G40.21-M92, grade 350 MPa.
- .2 Interior liner: 26 Gauge, standard steel sheet, low mesa profile, factory prefinished. Colour: White from stock colours.
- .3 Exterior Sheet: 22 Gauge, 4 in. panel ribs, steel sheet to ASTM A445 or ASTM 446 Grade G90, factory prefinished. Colour: to be selected by owner from stock colours.
- .4 Bolts: to ASTM A325 or ASTM A490 complete with nuts and washers.
- .5 Welding materials: to CSA W59.
- .6 Shop Paint Primer: to CISC/CPMA 2-75 or CAN/CGSB-1.105-M91.
- .7 Thermal break and sealing tape: as recommended by steel building systems manufacturer.
- .8 Sealant tape: 100% solids, polyisobutylene and butyl composition, Guertin Bros. GT1085 or approved substitution.

- .9 Sealants: as recommended by both sealant and steel building systems manufacturers for intended uses. Ensure compatibility of sealants and primers proposed for use with materials they are to contact, including adhesive suitability, and freedom from staining and corrosiveness.
- .10 Steel Sheet Accessories: brake or bend to shape of material and finish to match wall cladding, comprising cap flashings, drip flashings, internal corner flashings, copings and closures for head, jamb, sill, and corners.
- .11 Accessories to roof cladding. brake or bend to shape, of material and finish to match roof cladding or wall cladding where applicable, comprising cap flashings drip flashings coping and closures for corners.
- .12 Polyethylene Film: to CAN/CGSB-51.34-M86, 150 micrometre thick.

2.2 FABRICATION

- .1 Fabricate structural members in accordance with shop drawings and to CSA S16-01. Tolerance not to exceed those specified in CSSBI 30M-95.
- .2 Fabricator shall be certified to the requirements of the Canadian Welding Bureau, Div. 1 or Div. 2.1
- .3 Provide holes for attachment of other work, as indicated.
- .4 Reinforce openings to maintain design strength.

2.3 SHOP PAINTING

- .1 Where structural steel is scheduled to be finish painted, prepare surfaces in accordance with SSPC-SP6 - Commercial Blast Cleaning except where members are zinc or aluminum-zinc alloy coated, or are to be encased in concrete.
- .2 Where structural steel is scheduled to be finish painted, ensure that shop paint primer is compatible with painting coats.
- .3 Apply shop paint primer in accordance with CAN/CSA-S16.1 to a dry film thickness of 50 to 75 micrometers.

2.4 WALL SYSTEM COMPONENTS

- .1 Exterior sheet-wall: factory preformed steel sheet, pre-finished from manufacturer's standard profiles. Include closures, gaskets, caulking, flashing and fasteners to effect weather-tight installation. Cut ends of heels square and clean.
- .2 Exterior corners-wall: of material to match finish and profile of adjacent cladding material, shop cut and brake formed to correct angle.
- .3 Accessories to exterior wall cladding, brake or bend to shape of material and finish to match wall cladding, comprising cap flashings, drip flashings, internal corner flashings, copings and closures for head, jamb, sill, and corners.

2.5 ROOF SYSTEM COMPONENTS

- .1 Exterior sheet-roof: factory preformed steel sheet minimum 0.77 mm base metal thickness, aluminum- zinc alloy coated complete with clear acrylic coating from manufacturer's standard profiles. Include closures, gaskets, caulking, flashing and fasteners to effect weather tight installation. Cut ends of sheets square and clean.
- .2 Accessories to roof cladding. brake or bend to shape, of material and finish to match roof cladding or wall cladding where applicable, comprising cap flashings drip flashings coping and closures for corners.
- .3 Interior sheet-ceiling: factory preformed prefinished steel sheet minimum 0.77 mm base metal thickness, aluminum-zinc alloy coated complete with clear acrylic coating of manufacturer's standard profile, with male and female side lap. Install sealant material in female lap, where liner sheet is to be used as a vapour barrier. Cut ends of sheets square and clean.
- .4 Diagonal web members: factory preformed steel sheet, minimum 1.23 mm base thickness, zinc coated shop cut and formed to profile indicated from manufacturer's standard.
- .5 Gussets, lateral spacers: factory preformed steel sheet, minimum 1.23 mm base metal thickness, zinc coated shop cut and formed to profile indicated from manufacturer's standard.

3. EXECUTION

3.1 INSTALLATION

- .1 Confirm acceptability of wall sheathing of soundness, measurement and flatness.
- .2 Install to CAN/CGSB-93.5-92 and as specified herein.
- .3 Install building paper horizontally by nailing lapping edges 75 mm, one layer.
- .4 Install sheet polyethylene to form a continuous vapour retarder on warm side of building envelope.
- .5 Use sheets of largest practical size to minimize joints. Join sheets over solid, continuous backing, lapping sheets minimum 150 mm.
- .6 Mechanically fasten or adhere polyethylene sheet to substrates.
- .7 Repair punctures and tears with sealing tape. Where punctures and tears are extensive replace entire damaged section, overlapping perimeter framing on all sides.

- .8 Seal sheet polyethylene to air/vapour hats installed over electrical boxes and other semi-recessed devices, using sealing tape or 15 mm diameter bead of polyurethane sealant.
- .9 Seal penetrations through air/vapour hats using polyurethane sealant. Ensure sealant extrudes to both sides of penetrations.
- .10 Install flashings, starter strips, inside corners, edgings, and soffits (if required).
- .11 Install cladding to manufacturer/fabricators written instructions.
- .12 Install exterior corners, fillers and closure strips with carefully formed and profiled work. Install with concealed fasteners.
- .13 Maintain joints in exterior sheets, true to line, tight fitting.
- .14 Caulk joints, seams and junctions with dissimilar materials, with specified sealant. Refer to Section 07920 for caulking technique and workmanship.
- .15 Provide all components including drip and cap flashings, screws and fasteners as required to complete installation.
- .16 Install insulation materials in accordance with manufacturer's recommendations.
- .17 Install insulation to maintain continuity of thermal protection of building elements and spaces.
- .18 Fit insulation tightly around openings and protrusions in plane of insulation.
- .19 Install batts between framing members, structural components and other items snug and tight.
- .20 Cut and trim batts neatly to fit spaces. Use batts free from ripped or damaged back and edges.
- .21 Do not compress insulation to fit into spaces.

3.2 ERECTION

- .1 Erect structural frame in accordance with shop drawings and to CSA S16-01, Erection tolerances not to exceed those specified in CSSBI 30M-95.
- .2 Prepare galvanized structural steel surfaces for field welding by removing zinc before welding. After welding, chip away flux and prime with spot primer.
- .3 Obtain written permission of Engineer prior to field cutting or altering of structural members.
- .4 Touch up with shop primer, bolts, rivets, welds and burned or scratched surfaces where exposed at completion of erection.

3.3 WALL PANELS

- .1 Install wall panel assemblies ensuring a completed weather-tight installation.

3.4 ROOF ASSEMBLY

- .1 Secure sheets to wall panels and roof assemblies.
- .2 Secure side laps.
- .3 Continually seal side and end laps.
- .4 Install roof assemblies ensuring a completed installation.
- .5 Install ceiling panels ensuring a continuous vapour barrier by pre-caulking joints.
- .6 Install all necessary closures, gaskets, caulking sealants and flashings.

3.5 THERMAL INSULATION

- .1 Install insulation and vapour retarder to maintain continuity of thermal and moisture protection to building elements and spaces.
- .2 Fit insulation closely around and behind electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- .3 For roof system, apply insulation in ceiling to form continuous thermal barrier in conjunction with vapour barrier formed by ceiling panels.
- .4 For roof system, ensure continuous vapour barrier seal by pre-caulking joints of ceiling panel.

3.6 CONCRETE FLOOR

- .1 Refer to Drawings for concrete specifications.
- .2 Refer to Sections 09671 Epoxy Flooring.

END OF SECTION

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1. GENERAL

1.1 RELATED SECTIONS

- .1 Site Painting and Finishing - General Requirements: Section 09901.
- .2 Glass and Glazing General Requirements: Section 08801.
- .3 Glazing: Section 08810.

1.2 REFERENCE DOCUMENTS

- .1 Materials and workmanship shall meet or exceed "Quality Standards for Architectural Woodwork" of the Architectural Woodwork Manufacturer's Association of Canada (AWMAC) , hereinafter referred to as AWMAC's Standard.
- .2 Provide copy of AWMAC Standard at factory, readily accessible for duration of work.

1.3 SHOP DRAWINGS

- .1 Comply with requirements of Division 1.
- .2 Include plans, elevations, sections and details. Indicate materials, factory finishes, thicknesses, and hardware.
- .3 Indicate construction details, locations of built-in items, connections, attachments, anchorage and location of exposed fastenings, as applicable.

1.4 PRODUCT DATA

- .1 Comply with requirements of Division 1.
- .2 Submit manufacturer's product literature for items not manufactured by architectural woodwork manufacturer, when requested.

1.5 SAMPLES

- .1 Comply with requirements of Division 1.
- .2 Submit samples of plastic laminate for selection of colour.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Comply with AWMAC Standard.

1.7 COORDINATION

- .1 For items to be site finished, coordinate with work of Section 09901 to ensure that back-priming of surfaces concealed after installation is performed prior to installation.
- .2 Coordinate installation of all electrical and plumbing items during fabrication of the

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woodwork as required.

2. PRODUCTS

2.1 LUMBER, GENERAL

- .1 Materials and Moisture Content: to AWMAC Standard, except where otherwise specified.

2.2 PANEL PRODUCTS, GENERAL

- .1 Materials and Moisture Content: to AWMAC Standard, except where otherwise specified.
- .2 Canadian Softwood Plywood: to applicable CSA standards referenced in AWMAC's Standard, G2S.
- .3 Particleboard and Medium Density Fibreboard (MDF): Meeting requirements of AWMAC's Standards.
- .4 Plastic Laminate: to NEMA LD-3 Grade required by AWMAC's Standards for its use.
 - .1 Provide high pressure chemical resistant laminate for counter and backsplash surface in Laboratory Room
- .5 Edgeband
 - .1 For Plastic Laminate Casework: PVC or ABS
- .6 Adhesives: Type I

2.3 ACCESSORIES

- .1 Silicone Sealant: to CAN/CGSB-19.13-M87, Shore A Hardness 15 – 25, colour to match adjacent surfaces.
- .2 Other Accessories: to AWMAC Standards.

2.4 CASEWORK HARDWARE

- .1 Where products are specified by proprietary names, other unnamed products may be substituted in accordance with the requirements of Division 01.
- .2 Fasteners:
 - .1 Draw Bolt Fasteners: Mitre butt joint fastener, adjustable and requiring no special tools for installation, galvanized.
 - .2 Non-exposed Fasteners: Fabricators choice consistent with quality level specified.
- .3 Hinges: to ANSI-A156.9, B01612 – concealed hinge, self closing, 120 to 125 degree of opening, full overlay type for screw attachment complete with mounting plates.

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- .1 Acceptable products:
 - 1 Model 71T558 by Blum.
 - .2 Model HD1311-552 by Mepla.
 - .3 Model A00P94 by Salice.
 - .4 Model 9956 by Hettich.

- .4 Door and Drawer Pulls: back mount, 100 mm wire D pulls, brushed chrome finish.
 - .1 Acceptable Products:
 - .1 CBH 220-101
 - .2 Häfele America Co. 115.61.601
 - .3 Hettich Canada LP Columbus 41, 1170 122 40/320
 - .4 Richelieu, Collection BP33205170
 - .5 Stanley 4484 x 101

- .5 Drawer Slides For Drawers Up To 150 mm Deep but less than 406 mm wide: to ANSI-A156.9, B85051, side mount, steel construction, $\frac{3}{4}$ extension, ball bearing operation, rail disconnect system, bright zinc finish, length as required.
 - .1 Acceptable Products:
 - .1 Model 2037 by Accuride.
 - .2 Model 8150 by Knappe & Vogt.
 - .3 Model LP KA3434 by Hettich.

- .6 Drawer Slides for drawers deeper than 150 mm but less than 406 mm wide: to ANSI-A156.9, B85051, side mount, steel construction, full extension, ball bearing operation, bright zinc finish, length as required.
 - .1 Acceptable Products:
 - .1 Model 3834 by Accuride.
 - .2 Model 8400 by Knappe and Vogt.
 - .3 Model LP KA 5632 by Hettich.

- .7 Stainless Steel Pins: Steel pin shelf supports:
 - .1 Acceptable Products:
 - .1 Richelieu 2291180

2.5 CASEWORK, PLASTIC LAMINATE FINISH

- .1 AWMAC Quality Grade: Custom.
- .2 Construction: to AWMAC's Standard for flush overlay, except as otherwise detailed on drawings.

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- .3 Exposed and Semi-exposed Parts:
 - .1 Core: hardwood species, shop sanded exterior grade veneer core plywood, G2S, or industrial grade particleboard. Use only particle board core for doors and drawer fronts.
- .4 Exposed Surfaces: High Pressure Decorative Laminate (HPDL), colour, finish and pattern direction meeting requirements of AWMAC's Standards (NAAWS) for Grade specified
- .5 Exposed interior surfaces: HPDL matching exposed surfaces
- .6 Semi-exposed surfaces: LPDL (melamine)
- .7 Laminate Finish and Surface: matte finish, smooth surface.
- .8 Edge Banding: PVC or ABS
 - .1 Edgeband at doors, drawer fronts and false fronts: 3mm thick.
- .9 Drawers:
 - .1 Sides: Particle board with melamine surfaces.
 - .2 Bottoms: MDF with melamine surfaces
 - .3 Joinery: Meeting requirements of AWMAC's Standards (NAAWS) for Grade specified.

2.6 PLASTIC LAMINATE COUNTERTOPS AND SPLASHBACKS, POST-FORMED TYPE

- .1 General: to AWMAC's Standard, with integral backsplash 100mm high.
- .2 Laminate: HPDL. Postforming and laboratory grade and laminate backer grade.
 - .1 Laminate Finish: matte finish, smooth surface.
 - .2 Laminate Colour and Pattern: As scheduled. A maximum of two colours/patterns may be selected.
- .3 Core material: particleboard. Minimum 2-16mm thick.
- .4 Back splashes: butt joint, 100mm high.
- .5 Front edges: waterfall edge.

2.7 TRIM, CLEAR FINISH

- .1 Not applicable

2.8 FACTORY FINISHING

- .1 Grade: AWMAC's Standards (NAAWS). Match grade of product to be finished.
- .2 AWMAC's Standards (NAAWS) finish system: Not applicable.

3. EXECUTION

3.1 VERIFICATION OF CONDITIONS

- .1 Verify job site conditions in accordance with AWMAC Standard.
- .2 Verify humidity and temperature conditions are stable and as recommended in AWMAC Standard.

3.2 INSTALLATION

- .1 Install items in accordance with AWMAC Standard.
- .2 Position items accurately, secure and rigid.
- .3 Scribe and cut as required to neatly fit to abutting walls and recesses and to projecting, intersecting or penetrating objects.
- .4 Use draw bolts in countertops and casework joints.
- .5 Apply smallest practicable bead of silicone sealant at junction of splashbacks and adjacent wall finish.

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3.3 ARCHITECTURAL WOODWORK SCHEDULE

Location/Components	Finish	Colour
Lab/Control Room, Washroom		
Casework, Plastic Laminate Finish		
Exposed Surfaces	Matte & Smooth	Selected by Owner
Exposed Interior Surfaces	Matte & Smooth	Match Exposed Surfaces
Semi-exposed Surfaces	Melamine	White
Countertops and Backsplashes, Chemical Resistant Plastic Laminate Finish, Post-Formed Type.	Matte & Smooth	Selected by Owner

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 This section specifies requirements for waterproofing by surface treatment or admix using crystalline materials applied to the inside of water retaining concrete structures.

1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS

- .1 Cast-in-Place Concrete Section 03300.
- .2 Disinfection, Hydrostatic and Pressure Testing Section 15190

1.3 PRODUCT OPTIONS AND SUBSTITUTIONS

- .1 Refer to Division 01 for requirements pertaining to product options and substitutions.

1.4 INSPECTION/TESTING

- .1 Independent inspection and testing services may be employed on behalf of the Owner. Provide necessary facilities and cooperate with inspection firm engaged by the Owner's Representative and paid for by the Owner.
- .2 Rejected test areas shall be cleaned such that they are free of applied finish and materials and made acceptable for new application.

1.5 DELIVERY/STORAGE

- .1 Deliver materials in manufacturer's original, unopened and undamaged containers with labels and seals intact.
- .2 Store waterproofing materials in dry, enclosed location, at temperature and humidity conditions recommended by manufacturer.
- .3 Materials which are damaged, deteriorated, or contaminated in transit or storage will not be accepted for incorporation into the Work and shall be removed and replaced at the Contractor's expense.

1.6 WARRANTY

- .1 Provide a written guarantee, signed and issued in the name of the Owner stating that the waterproofing work of this Section is guaranteed against moisture infiltration and exfiltration for a period of three years from the date of Substantial Completion and that any defects will be repaired or replaced at the expense of the Contractor.
- .2 Provide manufacturer's standard warranty document authorized by manufacturer's representative for 10 year material warranty from date of Substantial Completion.

1.7 QUALITY ASSURANCE

- .1 Application of all waterproofing chemicals, admixtures, and products shall be by an experienced installer familiar with the requirements of this work. Waterproofing contractor to be approved and certified as a qualified installer by the manufacturer.
- .2 Comply with the manufacturer's instructions.
- .3 Apply materials to properly remediated and prepared surfaces.
- .4 Provide descriptive product literature, performance test data, certification information, and instructions for use as required by the Owner's Representative prior to commencing work.
- .5 Prior to installation, waterproofing installer, Contractor, manufacturer's representative, and Owner's Representative to meet to verify installation methods and warranty requirements.

2. PRODUCTS

2.1 MATERIALS

- .1 Approved reservoir waterproofing products:
 - .1 Concrete Waterproofing Coating System consisting of Xypex Concentrate Slurry Coat and Dry-Pac and Xypex Modified cementitious waterproofing coating surface treatment.
 - .2 Concrete Additive Xypex Admix C-500.
- .2 Approved construction joint and crack repair products:
 - .1 Xypex Concentrate Slurry Coat and Dry-Pac, cementitious waterproofing coating for crack, joint repair. Use Xypex Megamix where recommended by the manufacturer
- .3 Grouting mortar for cold joints or cracks to be compatible with the cementitious crystal producing chemicals and contain no chlorides or artificial accelerators. Grouting material to be non-shrink, non-toxic, fast setting (initial 25 minutes) and contain the crystal growing chemicals.
- .4 Patching, crack repair, pre-filling of surface irregularities, and leveling material as recommended by product manufacturer.
- .5 All waterproofing to be potable grade certified to comply with ANSI / NSF Standard 61.

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3. EXECUTION

3.1 GENERAL APPLICATION

- .1 All surfaces in contact with potable water to receive waterproofing admix or coating system or a combination of both as specified above and below.

3.2 CONCRETE WATERPROOFING COATING SYSTEM

.1 Surface Preparation

- .1 Prior to surface treatment, repair all defects including cracks, honeycombs, rock pockets and general surface defects as per product manufacturer's requirements.
- .2 Prior to waterproofing cracks and joint leaks, prepare a chase along the entire length of the crack or joint as per product manufacturer's requirements.
- .3 Examine all concrete surfaces which are to receive waterproofing and ensure surfaces are free from loose particles, grease, oil and other foreign matter detrimental to proper application and curing of waterproofing materials.
- .4 Surfaces that are unacceptable to receive the work of this section are to be repaired as recommended by the manufacturer of the cementitious waterproofing system.
- .5 Do not install waterproofing until satisfactory surface preparation has been achieved. Commencement of waterproofing application will imply unconditional acceptance of surfaces to receive the work of this section.

.2 Application

- .1 After repairs, surface preparation, treatment of construction joints have been completed in accordance with manufacturer's product data and as specified herein, apply Xypex treatment uniformly to concrete surfaces with semi-stiff bristle brush or broom, or suitable spray equipment. Application rates and locations shall be as indicated in the drawings and in accordance with manufacturer's product data.
- .2 Concrete surfaces to receive waterproofing treatment to be brought to a saturated-surface-dry (SSD) condition as per the manufacturer's requirements. Remove any excess standing water prior to application.
- .3 Apply waterproofing, crack sealing, and surface treatment slurry coating with techniques, application rates and mix proportions in accordance with manufacturer's recommendations.
- .4 Temperature, humidity and ventilation levels shall be as required by manufacturer during product application and curing. If project conditions are outside these limits, rectify conditions.

.3 Curing

- .1 Cure waterproof coating in accordance with manufacturers recommendations and specifications.

3.3 CONCRETE WATERPROOFING ADDITIVE

.1 Application

- .1 The admix must be added to the concrete mix at the time of batching in dosage rates as recommended by the manufacturer.
- .2 Procedures for mixing will vary according to type of batch plant operation and equipment. Follow manufacturers' recommendations for type of batch plant operation.
- .3 All riglets and construction joints where identified on the drawings and all defects including cracks, honeycombs, rock pockets and general surface defects are to be repaired as per product manufacturer's requirements and as specified herein.

.2 Curing

- .1 Cure waterproofing admix in accordance with manufacturers recommendations and specifications.

3.4 CONSTRUCTION JOINT AND CRACK REPAIR

- .1 All riglets and construction joints to be waterproofed as outlined in this section regardless of reservoir waterproofing method chosen.
- .2 Where PVC or Volclay waterstops are shown on the drawings application of Xypex Concentrate slurry coat is not required between pours and cold joints unless otherwise noted.
- .3 Surface preparation
 - .1 Prior to waterproofing cracks and joint leaks, prepare a chase along the entire length of the crack or joint as per product manufacturer's requirements.
 - .2 Examine all concrete surfaces which are to receive waterproofing and ensure surfaces are free from loose particles, grease, oil and other foreign matter detrimental to proper application and curing of waterproofing materials.
 - .3 Surfaces that are unacceptable to receive the work of this section are to be repaired as recommended by the manufacturer of the cementitious waterproofing system.

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- .4 Do not install waterproofing until satisfactory surface preparation has been achieved. Commencement of waterproofing application will imply unconditional acceptance of surfaces to receive the work of this section.
- .4 Application of Joint and crack repair products
 - .1 Concrete surfaces to receive waterproofing treatment to be brought to a saturated-surface-dry (SSD) condition as per the manufacturer's requirements. Remove any excess standing water prior to application.
 - .2 Apply joint and crack repair products with techniques, application rates and mix proportions in accordance with manufacturer's recommendations.
 - .3 Temperature, humidity and ventilation levels shall be as required by manufacturer during product application and curing. Rectify if project conditions are outside these limits.
- .5 Curing
 - .1 Cure waterproofing admix in accordance with manufacturers' recommendations and specifications.

END OF SECTION

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1. GENERAL

1.1 RELATED SECTIONS

- .1 Cast-In-Place Concrete. Section 03300

1.2 SITE MOCK-UP

- .1 Apply dampproofing to minimum 3 m x 3 m area, for approval. Locate mock-up where directed by Engineer.
- .2 Materials and/or installation methods will be rejected if bond coverage or failure occurs.
- .3 Clean rejected test areas free of applied finish, acceptable for new application.

2. PRODUCTS

2.1 MATERIALS

- .1 Dampproofing material: to one of more of the following:
 - .1 CAN/CGSB-37.1-M89, Chemical Emulsified Type, Emulsified Asphalt for Dampproofing.
 - .2 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coating.
 - .3 CGSB 37-GP-6Ma, Asphalt, Cutback, Unfilled, for Dampproofing.
 - .4 CAN/CGSB-37.16-M89, Filled, Cutback Asphalt for Dampproofing and Waterproofing.
- .2 Water: potable.
- .3 Joint Sealing Compound: rubber-asphalt, to CAN/CGSB-37.29-M89.

3. EXECUTION

3.1 PROTECTION

- .1 Protect adjoining surfaces from soiling during application.

3.2 APPLICATION

- .1 Apply dampproofing to provide a continuous, uniform coating to entire exterior faces of foundation walls from 50 mm below finish grade level to and including tops of foundation wall footings.

- .2 Apply dampproofing materials in accordance with one of the following, as applicable:
 - .1 CAN/CGSB-37.3-M89, Application of Emulsified Asphalts for Dampproofing and Waterproofing and for Roof Coatings.
 - .2 CGSB 37-GP-12Ma, Application of Unfilled Cutback Asphalt for Dampproofing.
 - .3 CGSB 37-GP-36M, Application of Filled Cutback Asphalts for Dampproofing and Waterproofing.
- .3 Use cutback asphalt materials at temperatures below 5°C.
- .4 Use either cutback or emulsified asphalt materials, at Contractor's option, when surfaces and ambient air will be minimum 5°C for 72 hours before application, during application and for curing period.
- .5 Seal holes around pipes and other services passing through dampproofed surfaces by using joint sealing compound applied in accordance with manufacturer's directions.

END OF SECTION

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1. GENERAL

1.1 RELATED SECTIONS

- .1 Rigid board insulation in exterior insulation and finish systems: Section 03300.

1.2 STORAGE

- .1 Store to protect materials from wind, moisture, sunlight and accidental ignition.

1.3 ENVIRONMENTAL CONDITIONS

- .1 Install insulation during dry weather conditions.

1.4 SEQUENCING AND SCHEDULING

- .1 Schedule application of insulation to follow immediately after installation of sheet membrane air and vapour seal and to proceed concurrently with it, where applicable.

2. PRODUCTS

2.1 INSULATION

- .1 Polystyrene, Type 3: to CAN/CGSB-51.20-M87, Type 3, except thermal resistance shall meet requirements for Polystyrene, Type 4.
- .2 Polystyrene, Type 4: to CAN/CGSB-51.20-M87, Type 4.
- .3 High-Density Polystyrene: same as Polystyrene, Type 4, except compressive strength shall be minimum 275 kPa.
- .4 Fibrous Glass: to CAN/CGSB-51.10-92, rigid, and as follows:
- .1 Thermal Resistance: minimum $0.73 \text{ m}^2\text{C/W}$ per 25.4 mm thickness.
- .2 Minimum Density: 45 kg/m^3 .

2.2 BOARD DIMENSIONS AND SHAPE

- .1 Minimum Width: 400 mm.
- .2 Minimum Length: 1200 mm.
- .3 Thickness: as indicated in Insulation Schedule.

2.3 FASTENERS

- .1 Fasteners shall be specifically designed to anchor insulation by frictional resistance within structurally adequate substrates. They shall be inserted into and compressed against surrounding substrates, either by being driven or screwed, and shall be one of the following types:
 - .1 Plastic: with integral shank and head of minimum 45 mm diameter to distribute stresses, of high density polyethylene to ASTM D1248-84 or high density polypropylene to ASTM D4101-95b.
 - .2 Carbon Steel or Stainless Steel: of nail, screw or expansion type, with separate hot-dip galvanized sheet steel or high density polyethylene or polypropylene stress distribution plates of minimum 50 mm diameter or width.
- .2 Performance requirements for installed insulation fasteners:
 - .1 Pullout Resistance: minimum 200 N, perpendicular to applicable substrates and within temperature range of -30°C to +40°C.
 - .2 Corrosion Resistance: carbon steel components shall show not more than 15% of the surface rusted, and coatings shall not blister, peel or crack, when tested to Corrosion Test Procedure of Factory Mutual Research Approval Standard, Class I Roof Covers (4470).

3. EXECUTION

3.1 INSTALLATION OF INSULATION

- .1 Install insulation boards horizontally. Offset vertical joints minimum 300 mm.
- .2 Install tightly against dry substrate. Provide continuity of thermal protection to building elements and spaces.
- .3 Cut and trim insulation neatly to fit around corners and penetrations. Take care to prevent cutting sheet membrane air and vapour seal.
- .4 Butt joints tightly. Deform board edges as required to maintain tight butt joints at insulation fasteners and other penetrations located at board joints.

3.2 INSTALLATION OF FASTENERS

- .1 Secure partially above grade insulation boards with fasteners, anchored to substrates capable of providing specified fastener pull-out performance. Do not anchor to gypsum sheathing.
- .2 Install fasteners following fastener manufacturer's recommendations for type of substrate, drill bits, edge distance, installation methods, and ambient and substrate temperature conditions.

3.3 INSULATION SCHEDULE

Location	Type	Thickness(mm)
Above grade:	Polystyrene, Type 3 Polystyrene, Type 4	As per Contract Drawings
Vertical and Horizontal Below grade:	Polystyrene, Type 4	As per Contract Drawings

Note: Where more than one insulation type is specified for a single location, provide any one of the types specified for that location.

END OF SECTION

1. GENERAL**1.1 INTENT**

- .1 Provide firestopping to meet or exceed requirements of the Alberta Building Code as specified in this Section.

1.2 REFERENCE DOCUMENTS

- .1 Alberta Building Code, current edition.
- .2 Underwriter's Laboratories of Canada ULC S115-95 - Standard Method of Fire Tests of Firestop Systems.
- .3 Underwriter's Laboratories of Canada (ULC), "List of Equipment and Materials, Volume II", current edition.
- .4 Warnock Hersey (WH) Certification Listings, current edition.

1.3 PERFORMANCE REQUIREMENTS

- .1 Firestopping shall provide a rating as specified in Firestopping Schedule at end of this Section, when tested to ULC S115-95, for a rating period applicable to the fire separation.
- .2 Firestopping of electrical and communications cables shall be easily re-enterable and re-sealable with negligible risk of damage to cables, and shall not require de-rating of electrical cables.

1.4 PRODUCT DATA

- .1 Comply with requirements of Division 1.
- .2 Submit manufacturer's product data for materials and systems. Include manufacturer's printed instructions for installation.
- .3 Data shall indicate conformance with requirements of this Section, including ULC or Warnock Hersey system number.

1.5 COORDINATION AND SEQUENCING

- .1 Coordinate construction of fire separations and penetrations through fire separations with work of this Section.
- .2 Ensure penetrations have been completed prior to installing firestopping.
- .3 Install firestopping prior to insulation of piping, unless insulation is part of a tested firestop system meeting requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver materials in original, unopened packaging bearing manufacturer's seals and labels intact.
- .2 Store materials off ground, under cover and away from moisture.

2. PRODUCTS**2.1 SYSTEMS AND MATERIALS**

- .1 Firestopping systems: as listed under ULC Guide 40 U19 - "Firestop Systems" or as listed in WH Listings under "Through-Penetration Firestopping Systems".
- .2 Firestopping materials, whether used in a tested system or not, shall be:
 - .1 listed under ULC Guide No.40 or under WH Listings,
 - .2 labelled with applicable ULC or WH label, and
 - .3 compatible with applicable substrates and openings.
- .3 Provided that all other specified requirements can be met, use any of the following products, either singly or in combination:
 - .1 Elastomeric sealant.
 - .2 Elastomeric coating.
 - .3 Mineral fibre.
 - .4 Mortar.
 - .5 Intumescent putty.
 - .6 Poured-in-place silicone foam.
 - .7 Preformed silicone foam.
 - .8 Multi-cable transit system.
 - .9 Any other product which meets all other specified requirements.
- .4 Primer: as recommended by firestopping manufacturer for applicable substrate.

3. EXECUTION**3.1 VERIFICATION OF CONDITIONS**

- .1 Examine condition of voids to be filled to ensure suitability for firestop systems.
- .2 Verify installation of service penetrations and adjacent construction has been completed.

3.2 PREPARATION

- .1 Prepare substrates and surfaces to a clean, dry, and frost free condition, ready to receive firestopping.
- .2 Prime substrates and surfaces to manufacturer's recommendations.

3.3 INSTALLATION

- .1 Provide tested firestopping systems meeting specified performance requirements wherever the continuity of a fire separation is interrupted by mechanical, electrical or other service penetrations, or by any other openings, gaps or discontinuities.
- .2 Install tested firestopping systems in accordance with manufacturer's recommendations and in strict conformance with tested systems.
- .3 Where applicable, neatly tool or trowel firestopping surfaces remaining exposed and make flush with surrounding exposed surfaces.

END OF SECTION

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1. GENERAL

1.1 RELATED SECTIONS

- .1 Installation of caulking for metal flashing and trim: Section 07620.

1.2 QUALITY ASSURANCE

- .1 Not applicable.

1.3 SAMPLES

- .1 Not applicable.

1.4 DELIVERY/STORAGE

- .1 Receive and store materials as recommended by materials manufacturer.
.2 Maintain containers and labels in undamaged condition.

1.5 EXISTING CONDITIONS

- .1 Examine substrate materials, joint voids and note temperature/humidity conditions. Report unacceptable conditions to the Owner.
.2 Commencement of work implies acceptance of conditions.

2. PRODUCTS

2.1 MATERIALS

- .1 Joint Cleaner: Non-corrosive solvent recommended by sealant manufacturer for applicable substrate material.
.2 Primer: Non-staining type recommended by sealant manufacturer.
.3 Joint Back-Up: Round closed cell foam, extruded polyethylene, Shore A hardness of 20, tensile strength 140 to 200 kPa, oversized 30-50%, compatible with sealant and primer, non-adhering to sealant.
.4 Bond breaker: Pressure sensitive polyethylene tape, not bondable to sealant.
.5 External Wall and Metal Roof Sealant:
.1 Polysulphide base, one (1) component, to CAN/CGSB-19.13-M87, Shore A hardness 15-25.
.2 Silicone base, one (1) component to CAN/CGSB-19.13-M87, Shore A hardness 15-25.

- .3 Polyurethane base, one (1) component, to CAN/CGSB-19.13-M87 type 1 & 2, Shore A hardness 20-35.
- .4 Polyurethane base, multi-component, to CAN/CGSB-19.24-M90 type 2, Shore A hardness 20-35.
- .6 Interior of External Wall Sealant:
 - .1 Silicone base, one (1) component to CAN/CGSB-19.13-M87, Shore A hardness 15-25.
- .7 Hollow Metal Door Frame to Wall Sealant:
 - .1 Acrylic Base, one (1) component to CGSB 19-GP-5M solvent cure.
- .8 Exterior Joints in Block Wall and Block Veneer.
 - .1 SikaFlex 1A or approved alternate.

3. EXECUTION

3.1 EXECUTION

- .1 Remove dust, paint, loose mortar and all foreign matter; dry joint surfaces.
- .2 Remove rust, mill scale and coatings from ferrous metals by wire brush, grinding or sandblasting.
- .3 Remove oil, grease and other coatings from non-ferrous metals with appropriate solvent.
- .4 Prepare concrete and masonry surfaces as recommended by sealant manufacturer.
- .5 Examine joint dimensions and size materials to achieve joint depth which is half the width of the joint with minimum width and depth of 5 mm, maximum width 25 mm.
- .6 Install joint back-up to achieve correct joint depth.
- .7 To prevent staining, mask adjacent surfaces with tape prior to priming.
- .8 Apply bond breaker tape in accordance with manufacturer's directions.
- .9 Prime sides of joints to manufacturer's directions immediately prior to caulking.

3.2 APPLICATION

- .1 Apply sealant in accordance with manufacturer's directions, using a gun with proper size nozzle, to leave a weathertight, airtight installation. Use sufficient pressure to fill voids and joints solid. Superficial pointing with skin bead is not acceptable.
- .2 Form surface of sealant smooth, free from ridges, wrinkles, sags, air pockets, embedded

impurities. Neatly tool surface to a slight concave joint.

- .3 In masonry cavity construction, vent caulked joints from cavity to 3 mm beyond external face of wall by inserting 3 mm diameter plastic tubing at bottom of each joint and maximum of 1500 mm O.C. vertically.
- .4 Clean adjacent surfaces immediately and leave work neat and clean. Remove excess sealant and droppings, using recommended cleaners as work progresses. Remove masking tape after tooling of joints.

END OF SECTION

1. GENERAL

1.1 RELATED SECTIONS

- | | | |
|----|------------------------------------|----------------|
| .1 | Perimeter sealant to frames: | Section 07920. |
| .2 | Metal doors & panels: | Section 08115. |
| .3 | Supply of door hardware templates: | Section 08700. |
| .4 | Painting: | Section 09901. |

1.2 QUALITY ASSURANCE

- | | |
|----|---|
| .1 | Manufacture fire door and frame components and assemblies to ULC/ULI/WARNOCK HERSHEY/FACTORY MUTUAL requirements. |
| .2 | Hollow Metal Trades Association - Canadian Manufacturing Standards for Metal Doors and Frames. |

1.3 SAMPLES

- | | |
|----|---|
| .1 | Submit one 300 mm x 300 mm "L" section of frame showing corner detail and reinforcement for butts, and glazing stops. |
|----|---|

1.4 SHOP DRAWINGS

- | | |
|----|---|
| .1 | Clearly indicate each type of frame, material, material thicknesses, mortises, reinforcements, anchors, finish, and special features. |
| .2 | Reference frames to door schedule. Indicate door numbers and construction where applicable. |

2. PRODUCTS

2.1 MATERIALS

- | | |
|----|--|
| .1 | Frames: 1.2 mm for interior locations, 1.6 mm for exterior doors, commercial quality steel cold rolled to ASTM A526-80; zinc coated to ASTM A525M-80, Z275 coating designation for exterior frames, ZF075 for interior frames; |
| .2 | Accessories: Glazing stops, floor anchors, channel spreaders, 1.6 mm tee anchors, 1.2 mm wall stud anchors, zinc coated to ASTM A525M-80, coating designation ZF075. Corrugate tee anchors for masonry bond. |

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- .3 Guard Boxes: 0.50 mm steel, ZF075 coating designation zinc finish to ASTM A525M-80.
- .4 Door Bumpers: black neoprene.
- .5 Reinforcement for Hardware: carbon steel, prime painted, to the following thicknesses:

Hinge & Pivot reinforcements	30 mm x 250 mm x 3.5 mm
Strike reinforcements	1.6 mm
Flush Bolt reinforcements	1.6 mm
Closer reinforcements	2.5 mm
Surface hardware reinforcements	2.5 mm
- .6 Door Jamb Reinforcement: 100 mm x 40 mm structural steel channel to CAN3-G40.21-M81.
- .7 Primer: to CGSB 1-GP-178M, for touch-up.

2.2 FABRICATION

- .1 Fabricate frames in accordance with details and approved shop drawings, to Underwriters requirements and provide Underwriters labels.
- .2 Mortise, reinforce, drill and tap frames and reinforcements to receive hardware using templates provided. Locate mortising to National Builders Hardware Association Standards.
- .3 Install 2 double stud bumpers on strike jamb of frame for each single door and 2 bumpers at head of double door frames.
- .4 Protect strike, hinge and overhead concealed door closer reinforcement completely by guard boxes welded to frame.
- .5 Weld in 50 mm channel spreaders to frame; ensure proper frame alignment.
- .6 Where frames terminate at finished floor, provide floor plates for anchorage to structural slab.
- .7 Cut mitres accurately and weld on inside of frame profile.
- .8 Grind welded corners to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.
- .9 Fill surface depressions and butted joints with metallic paste filler and sand to a uniform smooth finish.
- .10 Touch-up frames by priming areas where galvanizing is damaged.
- .11 Reinforce head of frames wider than 1200 mm with 2.5 mm formed steel channel welded in place, flush with top of frame.

- .12 Provide 3 jamb anchors per jamb for frames up to 2130 mm high and 1 additional for each 600 mm over 2130 mm high.
- .13 Minimum depth of stop: 15 mm. miter joints, channel shape 15 mm wide with counter screws.
- .14 Cut-off hospital stops at 45 deg. to height same as adjacent base finish; weld, fill, grind smooth and apply primer finish.
- .15 Reinforce head section at junction with removable mullion.
- .16 Reinforce both jambs where door openings occur in screens. Install reinforcing continuous structure to structure.

3. EXECUTION

3.1 INSTALLATION

- .1 Set frames in plumb and square at correct elevation. Limit of acceptable frame distortion - 2 mm out of plumb measured on face of frame, maximum twist corner to corner of 3 mm.
- .2 Secure anchorages and connections to adjacent construction. Anchor door jamb reinforcement securely to structure.
- .3 Brace frames solidly to maintain in position while being built-in. Erect knocked down frames in accordance with fabricators instructions.
- .4 Install a temporary horizontal wood spreader at mid-height of door opening to maintain frame width until building work completed.
- .5 For frames over 1200 mm in width, provide vertical support at the centre of head.
- .6 Remove temporary spreaders only after completion of adjacent work.
- .7 Co-ordinate grouting of all frames solid to adjacent construction.
- .8 Provide formed metal drip section full width of frame opening for exterior doors.

END OF SECTION

1. GENERAL

1.1 RELATED SECTIONS

- .1 Hollow metal frames: Section 08111.
- .2 Supply of hardware and weatherstripping: Section 08700.

1.2 REFERENCE DOCUMENTS

- .1 Except as otherwise specified, comply with requirements of Canadian Manufacturing Standards for Steel Doors and Frames published by the Canadian Steel Door and Manufacturers' Association.

1.3 FIRE RATED DOORS

- .1 Provide doors produced under label service program of a testing agency acceptable to authorities having jurisdiction.
- .2 Doors shall bear testing agency label indicating following:
 - .1 At standard size openings: fire endurance rating.

1.4 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Division 1.
- .2 Clearly indicate each type of door, material, metal thicknesses, mortises, reinforcements, location of exposed fasteners and special features.
- .3 Reference door types to door schedule. Indicate door numbers where applicable.

2. PRODUCTS

2.1 MATERIALS

- .1 Sheet Steel: to ASTM A653M-96 commercial quality steel, cold rolled, zinc coated to ZF075 coating designation.
- .2 Honeycomb core material: rigid pre-expanded resin impregnated kraft paper having maximum 25 mm hexagonal shaped cells.
- .3 Reinforcement for Hardware: carbon steel, welded in place, prime painted, to the following thicknesses:
 - .1 Hinge, pivot and panic bar reinforcements: 3.5 mm
 - .2 Lock face, flush bolts, concealed bolts: 2.5 mm
 - .3 Concealed or surface closer reinforcements: 2.5 mm

.4 Other surface hardware reinforcements: 2.5 mm

.4 Glazing stops: 1.0 mm steel, primed, miter joints, counter sink for screws.

2.2 FABRICATION

.1 Hollow metal doors shall be of seamless construction with no visible seams or joints on faces at vertical edges.

.2 Steel face sheet thickness:

.1 Interior doors: 1.2 mm.

.2 Exterior doors: 1.6 mm.

.3 Core Construction shall be one of the following:

.1 Internally steel stiffened with continuous vertical steel stiffeners at 150 mm O.C. spot welded to both face sheets; fill voids with glass fibre insulation.

.2 Composite construction consisting of honeycomb core with steel face sheets pressure laminated to core.

.4 Mortise, reinforce, drill and tap doors and reinforcements to receive hardware using templates provided.

.5 Join door faces at intersecting edges with continuous welds, fill and grind smooth. Finish door faces flush without visible joints or distortion.

.6 Close top and bottom edges of door with recessed 1.2 mm steel channel, full width welded.

.7 Touch-up doors by priming areas where zinc coating is damaged.

.8 Provide astragals for pairs of doors in accordance with Underwriters requirements.

.9 Profile edge of doors as follows: Single acting swing doors - Bevel 3 mm in 50 mm
Double acting swing doors - Radius of 54 mm.

3. EXECUTION

3.1 INSTALLATION

.1 Install doors and hardware in accordance with templates and manufacturer's instructions. Maximum permissible warp of 3 mm measured diagonally across door.

.2 Adjust operable parts for correct function.

.3 Apply hardware to Class 'A' fire rated doors prior to delivery.

END OF SECTION

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1. GENERAL

1.1 RELATED SECTIONS

- .1 Not applicable.

1.2 REFERENCES

- .1 ANSI/DASMA 108 - American National Standards Institute Standard Method For Testing Sectional Garage Doors And Rolling Doors: Determination Of Structural Performance Under Uniform Static Air Pressure Difference.
- .2 NFRC 102 - Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems.
- .3 ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Element.
- .4 ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- .5 ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .6 ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- .7 ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- .8 ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- .9 NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- .10 NEMA MG 1 - Motors and Generators.

1.3 DESIGN/PERFORMANCE REQUIREMENTS

- .1 Overhead coiling insulated doors:
 - .1 Wind Loads: Design door assembly to withstand wind/suction load of 20 psf (958 Pa) without damage to door or assembly components in conformance with ASTM E 330.
 - .2 Operation: Design door assembly, including operator, to operate for not less than 20,000 cycles.

- .2 Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.
- .3 Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.4 SUBMITTALS

- .1 Submit under provisions of Division 1.
- .2 Product Data: Manufacturer's data sheets on each product to be used, including:
 - .1 Preparation instructions and recommendations.
 - .2 Storage and handling requirements and recommendations.
 - .3 Details of construction and fabrication.
 - .4 Installation instructions.
- .3 Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.
- .4 Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- .5 Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.
- .6 Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- .7 Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.5 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.
- .2 Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Store products in manufacturer's unopened packaging until ready for installation.
- .2 Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

- .3 Store materials in a dry, warm, ventilated weathertight location.

1.7 PROJECT CONDITIONS

- .1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 COORDINATION

- .1 Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

1.9 WARRANTY

- .1 Warranty: Manufacturer's limited door and operator system, except the counterbalance spring and finish, to be free from defects in materials and workmanship for 3 years or 20,000 cycles, whichever occurs first.
- .2 PowderGuard Finish
 - .1 PowderGuard Premium Applied to curtain, guides, bottom bar, headplates: Manufacturer's limited Premium Finish warranty for 2 years.

2. PRODUCTS

2.1 MANUFACTURERS

- .1 Acceptable Manufacturer:
 - .1 Overhead Door Corp., 11703 160 Street, 1-780-451-0060
 - .2 Alternates as approved by Engineer.

2.2 INSULATED OVERHEAD COILING SERVICE DOORS (102, 104)

- .1 Overhead Coiling Stormtite Insulated Service Doors: Overhead Door Corporation Model 625.
 - .1 Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.
 - .1 Flat profile type F-265i for doors up to 40 feet (12.19 m) wide.
 - .2 Front slat fabricated of:
 - .1 24 gauge galvanized steel.

- .3 Back slat fabricated of:
 - .1 24 gauge galvanized steel.
- .4 Slat cavity filled with CFC-free foamed-in-place, polyurethane insulation.
 - .1 R-Value: 7.7, U-Value: 0.13.
 - .2 Sound Rating: STC-21.
- .2 Performance:
 - .1 Through Curtain Sound Rating: Sound Rating: STC-28 (STC-30+ with HZ noise generator) as per ASTM E 90.
 - .2 Installed System Sound Rating: STC-21 as per ASTM E 90.
 - .3 U-factor: 0.91 NFRC test report, maximum U-factor of no higher than 1.00.
 - .4 Air Infiltration: Meets ASHRAE 90.1 & IECC 2012/2015 C402.4.3 Air leakage <1.00 cfm/ft².
- .3 Slats and Hood Finish:
 - .1 Galvanized Steel: Slats and hood galvanized in accordance with ASTM A 653 and receive rust-inhibitive, roll coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester top coat.
 - .1 Polyester Top Coat. Colour to be Client Specified.
- .4 Weatherseals: Vinyl bottom seal, exterior guide and internal hood seals.
- .5 Bottom Bar: Two galvanized steel angles minimum thickness 1/8 inch (3 mm) bolted back to back to reinforce curtain in the guides.
- .6 Guides: Three structural steel angles.
- .7 Brackets: Galvanized steel to support counterbalance, curtain and hood.
- .8 Finish; Bottom Bar, Guides, Headplate and Brackets:
 - .1 Finish: PowderGuard Premium powder coat color as selected by the Client.
- .9 Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch per foot of span. Counterbalance is adjustable by means of an adjusting tension wheel.
- .10 Hood: Provide with internal hood baffle weatherseal.
 - .1 24 gauge galvanized steel with intermediate supports as required.
- .11 Manual Operation: Chain hoist.

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- .12 Electric Motor Operation: Provide UL listed electric operator, size as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.
 - .1 Sensing Edge Protection:
 - .1 Electric sensing edge.
 - .2 Operator Controls:
 - .1 Push-button operated control stations with open, close, and stop buttons.
 - .2 Controls for interior location.
 - .3 Controls surface mounted.
 - .3 Motor Voltage: 115/230 single phase, 60 Hz.
- .13 Windload Design:
 - .1 Standard windload shall be 20 PSF.
- .14 Locking:
 - .1 Chain keeper locks for chain hoist operation.
 - .2 Interior slide bolt lock for electric operation with interlock switch.
- .15 Wall Mounting Condition:
 - .1 Face-of-wall mounting.

3. EXECUTION

3.1 EXAMINATION

- .1 Verify opening sizes, tolerances and conditions are acceptable.
- .2 Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
- .3 If substrate preparation is the responsibility of another installer, notify Engineer of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- .1 Clean surfaces thoroughly prior to installation.
- .2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

- .3 Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- .4 Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- .5 Coordinate installation of electrical service with Division 16. Complete wiring from disconnect to unit components.
- .6 Coordinate installation of sealants and backing materials at frame perimeter as specified in the contract documents.
- .7 Install perimeter trim and closures.
- .8 Instruct Owner's personnel in proper operating procedures and maintenance schedule.

3.4 ADJUSTING

- .1 Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- .2 Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

- .1 Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.
- .2 Remove labels and visible markings.
- .3 Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

- .1 Protect installed products until completion of project.

3.7 DOOR SCHEDULE

<u>Mark</u>	<u>Width</u>	<u>Height</u>	<u>Location</u>	<u>Operator</u>
102	3050	3050	Blower/Treatment Room	Electric
104	2500	3050	Headworks Room	Manual

END OF SECTION

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1. GENERAL

1.1 SECTION INCLUDES

- .1 This Section specifies aluminum window systems, of the following type, installed in exterior and interior walls:
 - .1 Single fixed units.
- .2 Some components of aluminum window systems are specified in related sections.

1.2 RELATED SECTIONS

- .1 Sealants: Section 07920.
- .2 Glass and Glazing General Requirements: Section 08801.

1.3 REFERENCE DOCUMENTS

- .1 Materials, fabrication, attachments, accessories, assembly and performance shall meet or exceed requirements of CAN/CSA-A440-M90.

1.4 DEFINITIONS

- .1 Single Unit Window: a window consisting of one fixed or one operable lite.

1.5 DESIGN CRITERIA

- .1 Fixed glazing specified in this Section shall be installed from the interior.
- .2 Provide products designed to meet specified performance requirements.
- .3 Design frames to equalize pressure between outside air and:
 - .1 cavities surrounding insulating glass units, and
 - .2 cavities surrounding operable sash.
- .4 Provide drainage from all spaces around insulating glass units, including each horizontal space created by setting blocks.
- .5 Provide baffles or other protection at drainage openings to prevent direct entrance of wind-driven rain.
- .6 Provide frames and sash designed to provide mechanical key for glazing splines and gaskets.
- .7 Provide window anchorage to withstand 1.22 kPa wind load and to distribute wind load along frames to window manufacturer's recommendations.
- .8 Design components to accommodate thermally induced movement.

- .9 Thermal Resistance of System to incorporate a thermal separator within the frame.

1.6 SHOP DRAWINGS

- .1 Comply with requirements of Division 1.
- .2 Submit detailed and complete description of differences between windows tested for conformance to this specification, and windows intended for this project. Include elevations and full scale details to show physical differences.
- .3 Provide elevation views. Indicate components, materials, finishes, and locations of anchorage.
- .4 Clearly indicate, in large scale, the following:
 - .1 Sections details showing all window perimeter conditions.
 - .2 Mullion and muntin details and frame corner connections.
 - .3 Sill flashing terminations, in isometric view, including coordination with wall cladding materials.
 - .4 Frame anchorage details.
 - .5 Details showing sealing techniques within and around perimeter of framing and operable sash.
 - .6 Connection to building sheet membrane air and vapour seal.
 - .7 Required sizes and tolerances of openings.

1.7 TEST REPORTS

- .1 Comply with requirements of Division 1.
- .2 Submit test reports from an independent testing agency acceptable to the Minister, indicating windows to be supplied for project meet specified requirements.
- .3 Include complete description of windows tested.

1.8 OPERATION AND MAINTENANCE DATA

- .1 Comply with requirements of Division 1.
- .2 Submit the following:
 - .1 Window type and location.

- .2 Names of products under each window type, including manufacturer's name and identification of framing components, components of sealed units, weather-stripping, glazing materials, and sealants.
- .3 Submit as-built drawings, using reviewed shop drawings, modified to as-built condition.
- .4 Submit maintenance instructions for glass and aluminum finishes.

2. PRODUCTS

2.1 MATERIALS

- .1 Aluminum: Aluminum Association (AA) alloy 6063-T5 or 6063-T6 for extrusions and AA 1100, anodizing quality, for sheet.
- .2 Steel: to CAN/CSA-G40.21-M92, hot dip galvanized to CAN/CSA-G164-M92.
- .3 Sheet Steel: to ASTM A653M-96, hot dip galvanized to Z275 coating designation.

2.2 SINGLE UNIT FIXED WINDOWS

- .1 Windows shall meet or exceed requirements of CAN/CSA-A440-M90, and the following performance ratings:
 - .1 Air Tightness: Fixed.
 - .2 Water Tightness: B7.
 - .3 Wind Load Resistance: C5.
 - .4 Minimum Temperature Index: 56.
- .2 Units to similar to Kawneer 1600 System or equal.

2.3 GLASS AND GLAZING ACCESSORIES

- .1 Provide glass for aluminum windows as scheduled in Window Schedule at end of this Section, and as specified in Section 08801.
- .2 Provide glazing materials designed to maintain adequate pressure against glass through full design temperature range experienced through warranty period, regardless of installation temperatures.
- .3 Setting Blocks: neoprene, 80 durometer hardness, 100 mm long x 25 mm thick x 6 mm high.
- .4 Spacer Shims: neoprene, 80 durometer hardness, 75 mm long x minimum 6 mm thick. Do not use lead, plastic, or wood shims.

- .5 Glazing Splines and Gaskets: manufacturer's standard dry glazing splines and gaskets profiled for glazing stops and glazing retaining devices. Profiles shall mechanically key into glazing retaining devices. Except where otherwise specified, colour shall match frame colour.

2.4 EXTERIOR SILLS

- .1 Material: extruded aluminum.
- .2 Shape and Size: to suit job conditions.
- .3 Thickness: minimum 3.2 mm thick.
- .4 Accessories: joint covers, jamb drip deflectors, chairs, anchors and anchoring devices.
- .5 Finish: same as adjacent window frame.

2.5 INTERIOR SILLS

- .1 Material: extruded aluminum.
- .2 Type and Size: to suit job conditions.
- .3 Thickness: minimum 1.6 mm.
- .4 Accessories: joint covers and anchoring devices.
- .5 Finish: same as adjacent window frame.

2.6 ACCESSORIES

- .1 Steel Clips, Supports and Reinforcement: minimum 2.0 mm bare sheet thickness, hot-dip galvanized to CAN/CSA-G164-M92. Provide anchors that permit sufficient adjustment for accurate alignment.
- .2 Joint Sealants: as specified in Section 07920.

2.7 FABRICATION

- .1 Fabricate window units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and 3 mm for units with a diagonal measurement over 1800 mm.
- .2 Seal framing joints with butyl-polyisobutylene or silicone sealant.
- .3 Arrange components to prevent abrupt variation in colour.
- .4 Fabricate and form sheet aluminum prior to colour anodizing or painting.

2.8 FLUOROPOLYMER PAINT FINISHES

- .1 Provide fluoropolymer paint finish meeting or exceeding test requirements of American Architectural Manufacturers Association specification AAMA 605.2-92 - Voluntary Specifications for High Performance Organic Coatings on Architectural Extrusions and Panels.
- .2 Factory apply paint finish on exposed aluminum surfaces, by an applicator qualified by paint manufacturer. Prepare surfaces in strict compliance with paint manufacturer's recommendations.
- .3 Provide paint system consisting of 4 coats, as follows:
 - .1 First Coat: primer.
 - .2 Second Coat: barrier coat.
 - .3 Third Coat: colour coat.
 - .4 Fourth Coat: clear protective coat.
 - .5 Total Dry Film Thickness: minimum 40.6 micrometer.
 - .6 Sheen: medium gloss.
 - .7 Colour: match metal siding colour.

3. EXECUTION

3.1 WINDOW INSTALLATION

- .1 Erect and secure window units in prepared openings, plumb and square, free from warp, twist or superimposed loads.
- .2 Secure work accurately to structure and in a manner not restricting thermal movement of materials.
- .3 Provide shims under sill frame at setting block locations, and as recommended by window frame manufacturer.
- .4 Conceal all anchors and fitments. Exposed heads of fasteners not permitted.
- .5 Maintain dimensional tolerances after installation. Maintain alignment with adjacent work.
- .6 Isolate aluminum surfaces from cementitious materials adjacent after installation, using coating of bituminous paint.
- .7 Seal framing joints with butyl-polyisobutylene or silicone sealant.

3.2 SILL INSTALLATION

- .1 Set exterior sills with uniform design drainage slope to exterior, level in length. Extend sills past jambs.

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- .2 Secure sills in place with anchoring devices located at ends and joints and evenly spaced at maximum 600 mm between.
- .3 Provide one piece sill flashing where practicable. Where joints are required, locate to provide equal sill lengths and provide backup flashing at joints as detailed. Do not caulk joints.
- .4 Provide adequate space between butt ends of sill lengths to allow for thermal expansion. For sills over 1200 mm in length, maintain 3 to 5 mm expansion space at each end.

3.3 GLAZING

- .1 Refer to Section 08801 - Glass and Glazing for general requirements for glazing.
- .2 Install glazing splines and gaskets uniformly, with accurately formed corners and bevels. Ensure that proper contact is made with glass and rabbet interfaces.
- .3 Continuously and uniformly compress glazing splines and gaskets 38-50 mm per 1200 mm during installation.

3.4 SEALANT APPLICATION

- .1 Install sealant and related materials in accordance with Section 07920 and as detailed on drawings.

3.5 CLEANING

- .1 Wash down exposed interior metal surfaces using a solution of mild domestic detergent in warm water, applied with soft clean wiping cloths.
- .2 Clean exposed exterior non-metal surfaces as recommended by manufacturer of the material.
- .3 Clean interior and exterior surfaces as soon as adjacent construction which might soil surfaces, is completed.

3.7 WINDOW SCHEDULE

- .1 Refer to drawings for window schedule and location.
- .2 Provide sealed insulating glass units for all exterior aluminum windows as specified in Section 08801.

END OF SECTION

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1. GENERAL

1.1 RELATED SECTIONS

- | | | |
|----|---------------------|---------------|
| .1 | Hollow Metal Frames | Section 08111 |
| .2 | Hollow Metal Doors | Section 08115 |

1.2 PRODUCT DATA

- .1 Comply with requirements of Division 1.
- .2 Hardware Schedule: Submit a detailed hardware schedule indicating the following:
 - .1 Door and frame types, sizes, door swings.
 - .2 Type, style, function, size and finish of each hardware item.
 - .3 Mounting heights, fastenings and other pertinent information.
 - .4 Name and manufacturer of each item.
 - .5 Location of all hardware items cross-referenced to door numbers indicated on floor plans and in door and frame schedule.
 - .6 Explanation of all abbreviations, symbols and codes contained in schedule.
- .3 Keying Schedule: Submit a separate detailed schedule clearly indicating how Owner's instructions on keying requirements have been fulfilled.

1.3 CERTIFICATES

- .1 After completion of all construction work, certify on an approved form, that all items of finish hardware have been adjusted and are working properly and that all hardware on fire rated (labeled) doors conforms to the requirements of (ULC) Underwriters Laboratories of Canada.

1.4 OPERATION AND MAINTENANCE DATA

- .1 Provide the following:
 - .1 One copy of manufacturer's key biting list. Forward by hand, together with keys.
 - .2 Manufacturer's maintenance instructions.
 - .3 Complete parts lists.
 - .4 Manufacturer's installation and operation instructions for all operable hardware.

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1.5 PACKING AND SHIPPING

- .1 Include, with each item of hardware the following:
 - .1 Screws, bolts and fastenings necessary for installation.
 - .2 Installation instructions.
 - .3 Special tools required for installation.
- .2 Deliver finish hardware with all items in individual packages, legibly marked and adequately labeled indicating the part of the work for which it is intended.

1.6 STORAGE AND PROTECTION

- .1 Protect knobs, handles, push plates and pulls with adhesive release paper, of type which is easily removed without marring finish.

1.7 SEQUENCING AND SCHEDULING

- .1 Deliver hardware required for shop application in ample time so as not to impede the progress of the Work.

1.8 SPARE PARTS AND MAINTENANCE MATERIALS

- .1 Provide two sets of wrenches for door closers, lock and latch sets and exit devices.
- .2 Spare Hardware: Not applicable.

1.9 ACCEPTANCE OF KEYS

- .1 For security reasons, forward all keys by hand to the Owner.

2. PRODUCTS

2.1 HARDWARE PRODUCTS

- .1 Refer to Hardware Schedule for product specifications.
- .2 Use one manufacturer's products only for all similar items.

2.2 DOOR HARDWARE

- .1 Hinges: to ANSI/BHMA A156.1, type, size and finish specified in Hardware Schedule. Stanley FBB191 or FBB 199. Stainless steel. Satin finish.
- .2 Lock and latch sets (mortised): Not applicable
- .3 Lock and latch sets (cylindrical locks): to ANSI/BHMA A156.2, cylindrical locks series 4000, grade 1, designed for function and keyed as stated in hardware schedule
 - .1 Lever handles: plain design
 - .2 Normal strikes: box type, lip projection.
 - .3 Cylinders: key into keying system as directed

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- .4 Finish: 626 (Satin Chrome)
- .5 Approved products:
 - .1 Schlage ND Series
- .4 Exit devices: to ANSI/BHMA A156.3. Products shall be to, type 1 rim, grade 1, modern design, satin chrome finish. Equipped with dogging device. Designed for function, rating and option as stated in hardware schedule.
 - .1 Trim Functions:
 - .1 Thumbpiece (TP)
 - .2 Thumbpiece – blank escutcheon (TP-BE): no cylinder
 - .2 Rating: Fire exit hardware (F)
 - .3 Options:
 - .1 Pneumatic Controlled Exit Devices (PN)
 - .4 Approved product: Von Duprin 99 series
- .5 Door closers: to ANSI/BHMA A156.4, size as per recommended door size listed in standard, with back checking action, equipped with hold-open arm of degree noted in Schedule, finished with chromium plating and equipped with arms or brackets when noted in Schedule. LCN 4041 CUSH or approved equal. Finish: 689
- .6 Electric Strikes, suitable for the lock specified in Hardware Schedule. Provide manufacturer's wiring and devices required for complete installation.
 - .1 Finish: 626 (Satin Chrome)
 - .2 Approved manufacturer: Assa Abloy
- .7 Cylinders: types as required to accommodate lockset, exit device or bolt, Key into keying system as directed.
- .8 Dead bolt: Not applicable.
- .9 Push plates: Not applicable.
- .10 Kick plates: 1.27 mm thick brass, beveled edges, width less 40 mm on push side of door and 25 mm on pull side of door than width of door x 300 high. 626 finish
- .11 Pull Units With Plate: Not applicable.
- .12 Door bottom seal: Extruded aluminum clear anodized with rubber insert, black. DraftSeal DS136C-2 or approved equal.
- .13 Thresholds: to ANSI/BHMA A156.21, full width of door opening, extruded aluminum millfinish with vinyl thermal break. DraftSeal DS501TBA or approved equal.
- .14 Weatherstripping: extruded aluminum clear anodized with sponge neoprene insertframe and neoprene insert. DraftSeal DS130 or approved equal.

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- .15 Dome Stop: Not applicable.

2.3 KEYING

- .1 Locks shall be keyed alike
- .2 Locks shall be keyed into existing master key system.
- .3 Form keys from nickel silver.
- .4 Furnish three change keys for each lock except where otherwise required. Furnish all other keys as required to meet keying system requirements.

2.4 KEY CONTROL SYSTEM

- .1 Not applicable.

3. EXECUTION

3.1 INSTALLATION

- .1 Install all hardware items to manufacturer's instructions and recommendations.
- .2 Where hardware items are required to be installed onto or into surfaces that are to be later painted or finished, install hardware completely to ensure proper fit, remove and store until finishing is complete, and then re-install.
- .3 Drill and countersink units which are pre-prepared for anchorage of fasteners. Space fasteners and anchors to manufacturer's recommendations.
- .4 Install hardware to heights and centres as indicated in reviewed hardware schedule.
- .5 Protect doors and frames from damage due to installation of hardware.

3.2 INSTRUCTION

- .1 Instruct user's personnel in:
 - .1 Proper care, cleaning and general maintenance of hardware.

3.3 HARDWARE SCHEDULE

- .1 Contractor to provide the following or Owner approved equal hardwares:

Set #001: Doors: 101, 103, 106, 113

3 Hinges	Stanley FBB 191, 114 x 102 NRP	32D
1 Exit Device	Von Durpin 99-TP-990TP	626
1 Kickplates		630
1 Rim Cylinder	Schlage 20-021 MKxCMK	626
1 Closer	LCN 4041 CUSH	689
1 Threshold	DraftSeal DS501TB x 914	AL

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1 Sweeps	DraftSeal DS136x914	AL
1 Weatherstrip	DraftSeal DS130 1-914/2-2134	AL
1 Electric Strike	Assa Abloy HES 9600	630

Set #002: Doors 107, 111 (45-min rated doors)

3 Hinges	Stanley FBB 191, 114 x 102	32D
1 Exit Device	Von Durpin 99-F-TP-BE-990TP	626
1 Closer	LCN 4041 CUSH	689

Set #003: Doors: 108

3 Hinges	Stanley FBB 191, 114 x 102	32D
1 Exit Device	Von Durpin 99-F-TP-BE-990TP	626
1 Closer	LCN 4041 CUSH	689

Set #004: Doors: 109

3 Hinges	Stanley FBB 191, 114 x 102	32D
1 Lockset	Schlage ND50PD	626
1 Closer	LCN 4041 CUSH	689
1 Electric Strike		

Set #005: Doors: 110

3 Hinges	Stanley FBB 191, 114 x 102	32D
1 Privacy Set	Schlage ND40S	626
1 Closer	LCN 4041 CUSH	689

Set #006: Doors 112 (45-min rated doors)

3 Hinges	Stanley FBB 199, 114 x 102	32D
1 Exit Device	Von Durpin 99-F-TP-BE-990TP	626
1 Closer	LCN 4041 CUSH	689

Set #007: Doors: 105

3 Hinges	Stanley FBB 191, 114 x 102 NRP	32D
1 Exit Device	Von Durpin PN99-TP-990TP	626
1 Kickplates		630
1 Rim Cylinder	Schlage 20-021 MKxCMK	626
1 Closer	LCN 4041 CUSH	689
1 Threshold	DraftSeal DS501TB x 914	AL
1 Sweeps	DraftSeal DS136x914	AL
1 Weatherstrip	DraftSeal DS130 1-914/2-2134	AL
1 Pneumatic Transfer	Von Duprin PNT-1	AL

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 This Section specifies:
 - .1 General requirements common to all glass and glazing work.
 - .2 Glass and glazing products.
- .2 Read this Section in conjunction with other Sections which specify glass installation in specific components.
- .3 This Section is intended to be used as a reference section; it is not a "section of work". Refer to other Sections for application of requirements specified herein.

1.2 RELATED SECTIONS

- .1 Hollow Metal Frames: Section 08111.
- .2 Aluminum Windows: Section 08520.
- .2 Glazing: Section 08810.

1.3 PRODUCT OPTIONS AND SUBSTITUTIONS

- .1 Refer to Division 1 for requirements pertaining to product options and substitutions.

1.4 SUBMITTALS

- .1 Comply with requirements of Division 1.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Suitably protect glass products to prevent damage from weather and breakage. Individually wrap accessory materials to protect them from damage.
- .2 Store glass vertically, off the ground, on "A" frames, braced or blocked to prevent racking, twisting, or sagging.
- .3 Take special care to protect edges of insulating glass units from damage but do not apply tape or other materials to edges.
- .4 Protect glass products from exposure to moisture or condensation prior to installation.

1.6 CERTIFICATIONS

- .1 Insulating glass units shall be certified by the Insulated Glass Manufacturers Alliance (IGMA).

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2. PRODUCTS

2.1 CLEAR FLOAT GLASS

- .1 Product: to CAN/CGSB-12.3-M91, glazing quality.

2.2 WIRED SAFETY GLASS

- .1 Not applicable

2.3 CLEAR TEMPERED SAFETY GLASS

- .1 Product: to CAN/CGSB-12.1-M90 and as follows:
 - .1 Type: 2 - Tempered.
 - .2 Class: B - Float Glass.
 - .3 Category: II - 540 J impact resistance.

2.4 INSULATING GLASS UNITS

- .1 Provide sealed insulating glass units in accordance with CAN/CGSB-12.8-M90, in configurations indicated in Insulating Glass Schedule, and as specified herein.
- .2 Manufacture sealed insulating glass units without edge channels or tape, that is, with bare glass edges.
- .3 Use two stage seal method of manufacture, as follows:
 - .1 Primary Seal: polyisobutylene sealing compound between glass and metal spacer/separator.
 - .2 Secondary Seal: polyurethane, silicone or polysulphide base sealant, filling gap between the two lites of glass at the edge up to the spacer/separator and primary seal.
- .4 Spacer/separator to provide continuous vapour barrier between interior of sealed unit and secondary seal.
- .5 Sealants for Insulating Glass Units:
 - .1 Butyl-polyisobutylene Sealants: one component, polymer base, solvent curing, to CGSB 19-GP-14M, colour to match frame colour.

- .2 Polysulphide Base and Polyurethane Base Sealants: to CAN/CGSB-19.24-M90, multi-component, chemical curing, and as follows:
 - .1 Type: 2 - non-sag.
 - .2 Class: A - glazing.
 - .3 Movement Capability: plus and minus 25%.
 - .4 Colour: to match adjacent surfaces.
- .3 Silicone Base Sealants: to CAN/CGSB-19.13-M87, one component, elastomeric, chemical curing, and as follows:
 - .1 Rheological Properties: Class 2 - non-sag.
 - .2 Substrate Class: G - Glass.
 - .3 Glazing Suitability: Class A - resists ultraviolet through glass.
 - .4 Temperature Class: L - low temperature
 - .5 Movement Class: 40.
 - .6 Colour: to match adjacent surfaces.
- .4 Do not use polyurethane sealants for insulating glass units having laminated glass with a polyvinyl butyrate interlayer.

2.5 GLAZING ACCESSORIES

- .1 Setting Blocks: neoprene, 80 durometer hardness, 100 mm long x 10 mm thick x 6 mm high.
- .2 Spacer Shims: neoprene, 80 durometer hardness, 75 mm long x minimum 6 mm thick. Do not use metal, plastic, or wood shims.
- .3 Glazing Splines and Gaskets: manufacturer's standard dry neoprene glazing splines and gaskets. Provide keyed type for fixed glazing stops and keyed or roll-in type for removable glazing retaining devices. Except where otherwise specified, colour shall match frame colour.
- .4 Glazing Tape: preformed butyl tape, 10 - 15 durometer hardness, with integral neoprene shim, 80 durometer hardness, paper release, colour to match window frames, 3 mm thick x 10 mm wide.

3. EXECUTION

3.1 GLAZING GENERAL REQUIREMENTS

- .1 Clean sealing surfaces at perimeter of glass and sealing surfaces of rabbets and stop beads before applying tapes, splines or gaskets. Use solvents and cleaning agents recommended by manufacturer of sealing materials.
- .2 Install glazing tapes, splines and gaskets uniformly with accurately formed corners and bevels. Ensure that proper contact is made with glass and rabbet interfaces.
- .3 Continuously and uniformly compress length of dry glazing splines and gaskets 38-50 mm per 1200 mm during installation.
- .4 Set glass on setting blocks, spaced as recommended by glass manufacturer. Provide at least one setting block at quarter points from each corner.
- .5 Centre glass in glazing rabbet to maintain required clearances at perimeter on all four sides.
- .6 Use spacers and shims in accordance with glass manufacturer's recommendations.

3.2 CLEANING

- .1 Remove dirt, scum, plaster, paint spatter and other harmful or deleterious matter from glass promptly and completely, before they establish tight adhesion.
- .2 Use clean water or proprietary glass cleaning solutions that will not damage glass surfaces. Avoid using abrasives, steel wool, razor blades, solvents, alkaline or other harsh cleaning agents.

3.3 PROTECTION

- .1 Identify glazed openings immediately following glass installation, using liquid shoe wax in a sponge topped bottle or similar easy-to-remove product.
- .2 Protect glass against scratches, pitting and other surface damage.

3.4 GLASS SCHEDULE

- .1 See Section 08810

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with:
 - .1 Glass and Glazing General Requirements: Section 08801.

1.2 SECTION INCLUDES

- .1 This Section includes requirements for the following:
 - .1 Glazing of hollow metal doors.
 - .2 Glazing of hollow metal frames.

1.3 RELATED SECTIONS

- .1 Hollow Metal Frames: Section 08111.
- .2 Aluminum Windows: Section 08520.

2. PRODUCTS

2.1 GLASS PRODUCTS

- .1 Glass, Glazing and Sealing Compounds, and Glazing Accessories: as specified in Section 08801.

3. EXECUTION

3.1 GLAZING

- .1 Glaze components required to be glazed under the work of this Section in accordance with general requirements for glazing specified in Section 08801 and detailed requirements specified herein.
- .2 Glaze interior and exterior hollow metal doors as follows:
 - .1 Apply butyl tape to fixed stop, back 2 mm from sight line.
 - .2 Remove release tape and press glass into place.
 - .3 Apply butyl tape to removable stop, remove release tape and secure stops in place.
 - .4 Ensure adequate thicknesses of glazing tape to secure glass in place and prevent glass from rattling.

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3.2 GLAZING SCHEDULE

Unit No.	Componant	Glass Type and Surface Treatment	Thickness	Locations
GL-1	Exterior Lite	Tempered Low E	6 mm	WD1
	Airspace	Argon Gas	13 mm	
	Interior Lite	Tempered Low E	6 mm	
GL-3	Interior Lite	Tempered	6mm	WD2 and Door Type B

END OF SECTION

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1. GENERAL

1.1 RELATED WORK SPECIFIED IN OTHER SECTIONS

- .1 Diffuser grilles: Division 15.
- .2 Lighting fixtures: Division 16.

1.2 PRODUCT OPTIONS AND SUBSTITUTIONS

- .1 Refer to Division 1 for requirements pertaining to product options and substitutions.

1.3 SAMPLES

- .1 Submit duplicate samples of each component of acoustical systems for approval. Include accessories and mitered interior and exterior corners of wall mouldings.

2. PRODUCTS

2.1 MATERIAL

- .1 Acoustic Units: LAT type fibre panels conforming to CAN/CGSB-92.1-M89.

Pattern: C
Flame spread classification of: 0 – 25, Class A
Smoke Producing rate of: 0 – 25
Size: 2' x 4' x 5/8" (610 x 1220 x 16 mm) thick beveled edge, white colour

NRC-Noise Reduction Coefficient Range of 0.60 – 0.70
STC-Sound Transmission Class Range of 35 – 39
LRC-Light Reflectance Coefficient of LR-1
- .2 Staples, nails and screws: to CSA B111-1974, non-corrosive finish.
- .3 Suspension System: Non-fire rated exposed tee bar grid including wall moulding.
- .4 Suspension System Components: commercial quality cold rolled steel zinc coated die cut interlocking components main and cross tee of double web with rectangular bulb depth governed by span all components 25 mm exposed face.
- .5 Hangers: 2.6 mm steel wire galvanized.
- .6 Suspension Accessories: Splices, clips, retainers, etc. to complement suspension system components.

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3. EXECUTION

3.1 JOB ENVIRONMENT

- .1 Commence installation after building enclosed and dust generating activities completed.
- .2 Permit wet work to dry prior to commencement of installation.
- .3 Maintain uniform minimum temperature of 15°C and humidity of 20-40% prior to, during and after installation.

3.2 INSTALLATION

- .1 Ensure suspended system is coordinated with location of related components.
- .2 Install acoustic units parallel to building lines. Refer to reflected ceiling plan.
- .3 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding.
- .4 Support suspension system main runners at 1.2 m on centre maximum with hanger wire from building structural system. Completed assembly to support all superimposed loads. Maximum permissible deflection is 1/360 of span.
- .5 Interlock cross member to main runner to provide rigid assembly.
- .6 Install suspension assembly to manufacturers written instructions.
- .7 Install flush edge moulding at junction of acoustic unit ceiling and other materials around entire length of joint. Secure to construction. Butt joints neatly, square and true in alignment.
- .8 Install framed access panels supplied under Divisions 15 and 16.
- .9 Seal vertical air plenum closure and acoustical ceiling where ventilating ceiling occurs. Use vinyl tape and 100 micrometre polyethylene to make positive, continuous seal.
- .10 Electrical fixtures shall be supported by the main runners and cross runners, but in addition to this the acoustical Subcontractor shall supply and install to each and every fixture a 2.6 mm galvanized soft annealed mild steel wire hangers within 150 mm of each corner. Fixtures exceeding 610 mm x 1220 mm shall be supported by other Subcontractors responsible to the General Contractor.
- .11 Runners supporting ceiling fixtures shall remain horizontal across their width within 2 degrees after the fixture loads are imposed.
- .12 Do not install acoustic units until work above suspension system is complete and has been inspected by Engineer.

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3.3 EXPANSION JOINTS

- .1 Supply and install "U" shaped metal trim pieces at each side of expansion joint. Design to accommodate ± 25 mm movement and maintain visual closure. Finish metal components to match adjacent metal trim. Provide backing plates behind butt joints.

3.4 CLEANING

- .1 Keep acoustic installation and all components clean. Remove blemishes immediately.

END OF SECTION

1. GENERAL

1.1 RELATED WORK SPECIFIED IN OTHER SECTIONS

- .1 Cast-In-Place Concrete: Section 03300.
- .2 Painting: Section 09901.

1.2 PRODUCT OPTIONS AND SUBSTITUTIONS

- .1 Refer to Division 1 for requirements pertaining to product options and substitutions.

1.3 QUALIFICATIONS

- .1 The work of this Section shall be applied only by experienced applicators of the specified products.

1.4 SAMPLES

- .1 Submit 300 mm x 300 mm representative sample of flooring in selected colour. Identify sample by project name including material and colour identification.
- .2 Site apply sample installation to minimum 2 m² area, to surface as directed, for approval by the Engineer. Retain approved sample until work is completed and accepted.

1.5 MANUFACTURER'S LITERATURE

- .1 Make available copies of the material literature, clearly indicating conditions of acceptance for surfaces and methods of application on site before, and during, period of application of the work of this Section.

1.6 DELIVERY

- .1 Deliver materials undamaged, in original containers, with manufacturer's labels and seals intact.

1.7 ENVIRONMENTAL CONDITIONS

- .1 For exterior coatings: Comply with coating manufacturer's recommendations. Do not apply under adverse weather conditions which could affect coating performance.
- .2 For interior coatings: Ensure minimum surface temperature 10°C 24 hours before, during and 24 hours after application or until cured; adequate controlled ventilation; bright, uniform lighting; broom clean; reasonably dust free.

1.8 PROTECTION

- .1 Protect adjacent surfaces from damage or overspray resulting from work of this Section. Mask and/or cover adjacent surfaces. Make good any damage at own expense, to the Minister's satisfaction.

- .2 Post "Wet Coatings" and "No Smoking" signs, while work is in progress and curing.

2. PRODUCTS

2.1 EPOXY COATING

- .1 Acceptable Products:
 - .1 Sikafloor 261 – System 2, low odour, glossy, orange peel textured, epoxy flooring coating system or,
 - .2 Stonkote GS4 – gloss finish, orange peel textured, epoxy flooring system.

2.2 COLOURS

- .1 Standard colour – Owner to select from standard colour range.

3. EXECUTION

3.1 EXAMINATION

- .1 Examine all surface conditions to which the work of this Section is to be applied. Report unacceptable surfaces to the Engineer. Commencement of work shall imply acceptance of surfaces and conditions.

3.2 PREPARATION/APPLICATION

- .1 Prepare surfaces and apply as directed in the manufacturer's literature.
- .2 Match finished work to approved samples. Maintain uniform thickness, sheen, colour, texture and free from defects detrimental to appearance of performance.

3.3 CLEANING

- .1 Promptly, as the work proceeds and upon completion, clean up excess materials and rubbish.

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3.4 APPLICATION SCHEDULE

Room No./Name	Material	Finish	Colour
WWTP Main floor and Basement Pump Room including Curbs, housekeeping pads, mechanical pads, and thrust blocks.	Sikafloor 261 CA or Stonkote GS4	Glossy orange peel textured	Select by Owner from standard range

END OF SECTION

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1. GENERAL

1.1 RELATED SECTIONS

- | | | |
|----|--|----------------|
| .1 | Exterior Painting and Finishing Schedule: | Section 09902. |
| .2 | Interior Painting and Finishing Schedule | Section 09904. |
| .3 | Painting of Building Mechanical and Electrical Work: | Section 09906. |
| .4 | Painting of Process Piping and Equipment: | Section 09907. |

1.2 REFERENCES

- | | |
|----|---|
| .1 | The painting and finishing specifications for new, not previously painted or finished, substrates are based on and make reference to the " Architectural Painting Specification Manual", latest edition, including the latest edition of "Approved Products Lists", published by the Master Painters Institute (MPI). |
| .2 | The painting and finishing specifications for previously painted or finished substrates are based on and make reference to the "Maintenance Repainting Manual", latest edition, including the latest edition of "Approved Products Lists", published by the Master Painters Institute (MPI). |

1.3 PRODUCT DATA

- | | |
|----|---|
| .1 | Submit list of all products proposed for use. Include manufacturer's name, product name, product code and MPI number of each product. |
| .2 | Products identified in submitted products list and approved by Owner shall be used in the applications for which they are scheduled and shall not be changed without Owner's consent. |

1.4 SAMPLES

- | | |
|----|--|
| .1 | Prepare and submit colour chip samples for all paint to be used on this project. |
|----|--|

1.5 FIELD SAMPLES

- | | |
|----|-----------------|
| .1 | Not applicable. |
|----|-----------------|

1.6 DELIVERY, STORAGE, AND HANDLING

- | | |
|----|--|
| .1 | Deliver materials in sealed original labeled containers bearing manufacturer's name, type of material, brand name, colour designation, and where applicable, instructions for mixing and reducing. |
| .2 | Store paint and other materials in a single heated and well ventilated area with a minimum ambient temperature of 7°C. |
| .3 | Take precautionary measures to prevent fire hazards or spontaneous combustion. |

1.7 SITE CONDITIONS

- .1 Interior:
 - .1 Temperature: Maintain temperature at minimum 8°C for at least 24 hours before and during application and until coatings have cured.
 - .2 Ventilation: Adequately ventilate areas where coatings are being applied and maintain a reasonably dust free atmosphere.
 - .3 Lighting: Maintain bright and uniform levels of lighting in areas where coatings are being applied.
- .2 Exterior:
 - .1 Temperature: Apply coatings only when temperature is above 10°C.
 - .2 Precipitation: Do not apply coatings during periods of precipitation nor when precipitation is imminent.
 - .3 Wind: Do not apply coatings under high wind conditions resulting in wind blown dust and debris.

1.8 COORDINATION

- .1 Ensure that site applied paints and finishes are compatible with primers or other finishes applied in the shop or factory.
- .2 Notify Owner's Representative of any incompatibilities.

1.9 SEQUENCING AND SCHEDULING

- .1 Co-ordinate with other trades as required.

1.10 MAINTENANCE MATERIALS

- .1 Leave on premises not less than 4 L of unused material of each colour and finish sheen used.
- .2 Tightly seal and clearly label containers.

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2. PRODUCTS

2.1 MATERIALS

- .1 Paint and Other Finishing Materials:
 - .1 Use only "top line quality" products. Refer to schedules Sections for product descriptions and product numbers. Product numbers are from the MPI Approved Product Lists, latest edition.
 - .2 Where a product number is specified in a schedule, use any corresponding MPI approved product from the MPI Approved Product Lists.
 - .3 Where a product number is followed by an asterisk, use any corresponding environmental choice certified product from the MPI Approved Product Lists. Such products are certified for the EcoLogo under Environment Canada's Environmental Choice Program.
 - .4 Paint materials for each coating formula to be products of a single manufacturer.
- .2 Thinners: Odorless paint thinner, pure and clean with no deleterious material.
- .3 Patching compounds: Spackling compound or oil base putty for substrates receiving a paint finish. Oil base putty, coloured to match finish, for substrates receiving a transparent finish.

2.2 MIXING

- .1 Except as otherwise specified, paints shall be ready mixed. Materials in paste or powder form, or to be field-catalyzed, shall be field mixed in accordance with manufacturer's directions. Pigments shall be fully ground and shall maintain a soft paste consistency in vehicle during storage that can and shall be dispersed readily and uniformly by paddle to a complete homogeneous mixture.
- .2 Thinning of materials will be permitted only where specified herein or upon Owner's approval. Do not use solvent for thinning.
- .3 Thoroughly strain all materials prior to each application.

2.3 COLOURS

- .1 Colour Schedule: Colour schedule will be provided by Owner. Do not start work prior to receiving colour schedule.
- .2 Colour Scheme: For bidding purposes, colour scheme will be generally as follows unless noted otherwise:
 - .1 Maximum 2 field colours and 2 accent colours for interior doors and frames.
 - .2 Maximum 2 field colours and 2 accent colours for interior walls.
 - .3 Maximum 2 field colours and 2 accent colours for ceilings.

2.4 GLOSS LEVELS

- .1 Specified gloss levels are based on the MPI standard, which is as follows:
 - .1 Level G1 – Matte or Flat: gloss rating of 0 to 5 units at 60 degrees and sheen rating of a maximum of 10 units at 85 degrees.
 - .2 Level G2 – Velvet: gloss rating of 0 to 10 units at 60 degrees and a sheen rating of 10 to 35 units at 85 degrees.
 - .3 Level G3 – Eggshell: gloss rating of 10 to 25 units at 60 degrees and a sheen rating of 10 to 35 units at 85 degrees.
 - .4 Level G4 – Satin: gloss rating of 20 to 35 units at 60 degrees and a sheen rating of 35 units minimum at 85 degrees.
 - .5 Level G5 – Semi-gloss: gloss rating of 35 to 70 units at 60 degrees.
 - .6 Level G6 – Gloss: gloss rating of 70 to 85 units at 60 degrees.
 - .7 Level G7 – High-gloss: gloss rating of more than 85 units at 60 degrees.
- .2 Gloss levels for individual finishing systems are specified in Sections 09902 and 09904.
- .3 Where gloss level is not specified, confirm required gloss level with Owner prior to proceeding with finish coats.

3. EXECUTION

3.1 GENERAL

- .1 Perform all painting operations in accordance with CAN/CGSB-85.100 except where specified otherwise.
- .2 Perform all painting operations in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.
- .3 Apply all paint materials in accordance with paint manufacturers written application instructions.
- .4 Ensure all dust generating activities have been terminated and dust removed.

3.2 VERIFICATION OF CONDITIONS

- .1 Prior to commencement of painting and finishing work, thoroughly examine all substrates scheduled to receive coatings.

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- .2 Do not apply coatings to substrates whose condition will adversely affect execution, permanence, or quality of work and which cannot be put into an acceptable condition through preparatory work specified herein.
- .3 Verify compatibility of any previously applied coatings with specified coatings.
- .4 Notify Owner's Representative of any incompatibilities.

3.3 PROTECTION OF EXISTING SURFACES

- .1 Provide sufficient quantity of clean drop cloths and take necessary protective measures to prevent spray, splashings, and droppings from fouling adjacent surfaces.
- .2 Remove electrical plates, surface hardware, fittings and fastenings prior to painting and finishing operations. Carefully store and replace these items on completion of work in each area.
- .3 Take special care to keep sprinkler heads and smoke detectors free of paint. Replace those which do receive paint.

3.4 CONDITION OF SUBSTRATES

- .1 Sound, non-dusting, and free of grease, oil, dirt and other matter detrimental to adhesion and appearance of coatings.
- .2 Temperature: Minimum 8°C.
- .3 Moisture Content: Maximum 15% for wood, maximum 12% for other substrates. Test for moisture content using electronic moisture meter.
- .4 Alkalinity: Test cementitious substrates for alkalinity using litmus paper test.

3.5 PREPARATION OF NEW/UNFINISHED SUBSTRATES

- .1 Prepare substrates in accordance with requirements of Chapter 3, Surface Preparation, of the MPI Manual and as specified herein.
- .2 All Substrates: Thoroughly broom, vacuum and wipe clean as required to produce acceptable surface. Sand lightly and dust prior to application of each coat. Use proper type and grade of sandpaper to avoid scratching or gouging of surfaces.
- .3 Wood Generally: Clean soiled surfaces, sand smooth and dust off. Fill nail holes, splits, scratches, small joints and other minor imperfections with patching compound after paint prime coat or first varnish coat has been applied and dried. Apply putty with putty knife, press firmly in place, and finish off flush with surface.
- .4 Wood for Paint Finish: Clean knots, pitch streaks, and sappy sections of residue and seal such areas with shellac before applying prime coat.

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- .5 Wood for Transparent Finish: Clean knots, pitch streaks, and sappy sections of residue and seal with sanding sealer or shellac after applying stain, if stain is required. Sand between coats using minimum #400 grit wet and dry sandpaper.
- .6 Bare Ferrous Metal: Remove rust and scale and wash with solvent.
- .7 Previously Primed Metal: Remove loose shop paint and rust; make good shop coat, feather out edges of touch-up.
- .8 Zinc Coated Metal: Remove surface contaminants and wash with solvent.
- .9 Unit Masonry and Concrete: Fill minor cracks, holes and fissures with cement grout and smooth to a flush surface. Include bonding agent in cement grout mix.
- .10 Gypsum Board and Plaster: Fill minor cracks, holes, and imperfections with tinted patching compound after prime coat has been applied and dried. Allow patching compound to dry, sand smooth and remove dust. Use minimum #150 grit sandpaper.
- .11 Alkaline Surfaces: Wash and neutralize using proper type of solution compatible with paint to be used.

3.6 PREPARATION OF PREVIOUSLY COATED SUBSTRATES

- .1 Thoroughly inspect existing conditions to determine degree of deterioration of each previously coated substrate required to be repainted or refinished. Degrees of deterioration shall be as defined in Chapter 3, Surface Preparation, of the "Maintenance Repainting Specification (MRS) Manual", i.e. sound, slight to moderately deteriorated, or severely deteriorated.
- .2 Prepare substrates using surface preparation procedures, including cleaning and removal systems, specified for the degree of deterioration, in Chapter 3, Surface Preparation, of the MRS Manual.

3.7 APPLICATION OF COATINGS, GENERALLY

- .1 Applied and cured coatings shall be uniform in thickness, sheen, colour, and texture and be free of defects detrimental to appearance and performance. Such defects include brush marks, streaks, runs, laps, heavy stippling, pile up of paints and skipped or missed areas. Edges of paint adjoining other materials shall be clean and sharp with no overlapping.
- .2 Use rollers which will produce the least possible stipple effect; maximum 10 mm pile for smooth substrates. Heavier pile rollers may be permitted for use on rough substrates, subject to Owner's approval.
- .3 Airless spray application shall be followed with back rolling.
- .4 Use a single manufacturer's products for all coats required for each finish system.
- .5 Vary slightly the colour of successive coats to differentiate between coats.
- .6 Each coat shall be dry and hard before succeeding coats are applied with a minimum of 24 hours between coats, except where manufacturer's instructions state otherwise.

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- .7 For open grain woods to receive a clear finish, tint wood filler to match wood. Work filler well into grain and before it sets, wipe off excess to provide a clean surface.

3.8 FINISHING OF NEW/UNFINISHED SUBSTRATES

- .1 Site paint or finish all work and substrates indicated as requiring site painting or finishing in Schedules, Drawings, or Specifications.
- .2 Leave following surfaces unfinished:
 - .1 N/A
- .3 Site apply all prime and finish coats as scheduled, whether or not factory prime coats have been applied.

3.9 FINISHING OF PREVIOUSLY COATED SUBSTRATES

- .1 Repaint or refinish all work and substrates indicated as requiring repainting or refinishing in Schedules, Drawings, or Specifications.

3.10 BACK-PRIMING EXTERIOR WOOD

- .1 Backprime concealed surfaces of all wood components with one or more surfaces exposed to the exterior and one or more surfaces concealed after installation, prior to their installation:
- .2 Use exterior alkyd primer for components scheduled to receive a paint finish.
- .3 Use semi-transparent stain for components scheduled to receive a solid or semi-transparent stain finish.
- .4 Use gloss varnish, reduced 25% with thinner, for components scheduled to receive a varnish finish.

3.11 BACK-PRIMING INTERIOR WOOD

- .1 Backprime following concealed surfaces of interior wood components, prior to their installation:
 - .1 Surfaces in contact with concrete or masonry.
 - .2 Surfaces in contact with any floors or floor finishes.
 - .3 Other surfaces which may be subjected to moisture during normal use or cleaning operations.
- .2 Use white alkyd wood primer for components scheduled to receive a paint finish.
- .3 Use semi-transparent stain for components scheduled to receive a solid or semi-transparent stain finish.

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3.12 FINISHING NEW/UNFINISHED DOORS AND FRAMES

- .1 Finish edges of doors in accordance with specified finish system. For top and bottom edges, final coat may be omitted.
- .2 Apply finishes specified for exterior doors to both door faces.

3.13 FINISHING MISCELLANEOUS SUBSTRATES

- .1 Paint substrates behind surface mounted fixtures, wall mounted heating units and unbacked cabinet work with specified finish systems, including specified number of coats.

3.14 PATCHING OF COMPLETED WORK

- .1 Repair, touch-up, and refinish damaged finishes and finishes unsatisfactory to Owner.
- .2 Refinish entire wall or area where deemed necessary by Owner.

3.15 CLEANING

- .1 Place cotton waste, cloths and other material which may constitute a fire hazard in metal containers and remove from site daily.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with Section 09901 - Painting and Finishing General Requirements.

2. PRODUCTS

- .1 (Not used).

3. EXECUTION

3.1 EXTERIOR PAINTING AND FINISHING SCHEDULE

- .1 The following code numbers, finishing system descriptions, gloss levels, coats and product descriptions are derived from the MPI Architectural Painting Specification Manual and the MPI Approved Products List.

Substrate	Finish System	Product No.
Structural and Misc. Steel, Factory Primed.	EXT 5.1D Alkyd (over alkyd primer), Gloss level G6	
	1st Coat: Alkyd Metal Primer	79
	2nd Coat: Alkyd	8, 9, 94
	3rd Coat: Alkyd	8, 9, 94
Galvanized Metal, Zinc Coated Steel	EXT 5.3B Alkyd, Gloss level G6	
	1st Coat: Cementitious Primer	26
	2nd Coat: Alkyd	8, 9, 94
	3rd Coat: Alkyd	8, 9, 94
Concrete Block	EXT 3.1B, Gloss Level G1(over latex sealer)	
	1st Coat: Latex Block Filler	4*
	2nd Coat: Latex Primer Sealer	50
	3rd Coat: Latex	47, 48, 49, 51
	4th Coat: Latex	47, 48, 49, 51

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with Section 09901 - Painting and Finishing General Requirements.

2. PRODUCTS

- .1 (Not used).

3. EXECUTION

3.1 INTERIOR PAINTING AND FINISHING SCHEDULE

- .1 The following code numbers, finishing system descriptions, gloss levels, coats and product descriptions are derived from the MPI architectural Painting Specification Manual and the MPI approved Products List.

Substrate	Finish System	Product No.
Wood and Plywood	INT 6.4F Lacquer (over stain), Gloss level G1.	
	1st Coat:	Wood Filler 91
	2nd Coat:	Semi-Transparent Stain 90
	3rd Coat:	Lacquer Sanding Sealer 84
	4th Coat:	Clear Lacquer 85, 86, 87
	5th Coat:	Clear Lacquer 85, 86, 87
	INT 6.4B Alkyd (over alkyd sealer), Gloss level G1.	
	1st Coat:	Wood Filler 91
	2nd Coat:	Alkyd Primer Sealer 45
	3rd Coat:	Alkyd 47, 48, 49, 51
	4th Coat:	Alkyd 47, 48, 49, 51
Plaster, Drywall	INT 9.2C Alkyd (over latex sealer)	
	1st Coat:	Latex Primer Sealer 50*
	2nd Coat:	Alkyd 47, 48, 49, 51
	3rd Coat:	Alkyd 47, 48, 49, 51

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Substrate	Finish System	Product No.
Concrete Block	INT 4.2C Alkyd	
	1st Coat: Latex Block Filler	4
	2 nd Coat: Alkyd	47, 48, 49, 51
	3 rd Coat: Alkyd	47, 48, 49, 51
Structural and Misc. Steel, Factory Primed	INT 5.1E Alkyd, Gloss level G5	
	1st Coat: Alkyd Metal Primer	79, 76
	2nd Coat: Alkyd	47, 48, 49, 51
	3rd Coat: Alkyd	47, 48, 49, 51
Galvanized Metal, Zinc Coated Steel	INT 5.3C Alkyd (over cementitious primer), Gloss level G5	
	1st Coat: Cementitious Primer	26
	2nd Coat: Alkyd Finish	47, 48, 49, 51
	3rd Coat: Alkyd	47, 48, 49, 51

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 This Section specifies requirements for site painting and colour coding of mechanical and electrical work only.
- .2 Read this Section in conjunction with Section 09901 - Painting and Finishing General Requirements.

1.2 RELATED SECTIONS

- .1 Mechanical Identification: Division 15.
- .2 Electrical Identification: Division 16.

1.3 REFERENCE DOCUMENTS

- .1 Comply with requirements of latest edition of EPB-501 Water Treatment Plant Piping Recommended Colour Code.
- .2 Obtain copy of EPB-501 Water Treatment Plant Piping Recommended Colour Code document prior to starting work.

1.4 COORDINATION

- .1 Coordinate work specified in this Section with work specified in Division 15 to ensure correct colour coding.
- .2 Coordinate work specified in this Section with work specified in Division 16 to ensure correct colour coding.

2. PRODUCTS

2.1 PAINT

- .1 Refer to finish systems schedules at the end of this Section for product descriptions and product numbers. Product numbers are from the MPI Approved Product Lists.
- .2 Use products suitable for anticipated surface temperatures of substrates while in service.

3. EXECUTION

3.1 PREPARATION OF SUBSTRATES

- .1 Comply with applicable requirements specified in Section 09901.
- .2 Clean and sand between coats using minimum #150 grit sand paper.

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3.2 SUBSTRATES

- .1 Painting and colour coding is required on substrates specified below, at locations and by methods indicated in "Painting and Colour Coding Schedule" in this Section.
- .2 Mechanical Piping: Includes interior and exterior mechanical pipe surfaces, pipe hangers, hanger rods and supports.
- .3 Mechanical Equipment: Includes the following items, whether or not factory coatings have been applied:
 - .1 Interior:
 - .1 Uninsulated valves.
 - .2 Valve Handles.
 - .3 Fans.
 - .4 Integral fan bases.
 - .5 Fan guards.
 - .6 Pumps.
 - .7 Integral pump bases.
 - .8 Electrical bases.
 - .9 Electric motors.
 - .10 Motor guards.
 - .11 Boilers.
 - .12 Hot water storage tanks.
 - .13 Air handling units
 - .14 Plenums.
 - .2 Exterior:
 - .1 Not applicable.
- .4 Mechanical Ductwork: Includes the following:
 - .1 Interior: All exposed ductwork surfaces, including hangers, hanger rods, and supports.
 - .2 Exterior:
 - .1 Not applicable
- .5 Electrical Conduit and Cable: Exposed conduit and cable.
- .6 Other Electrical Work: Includes all other interior and exterior electrical work except:
 - .1 Conduit and cable.
 - .2 Electrical equipment which is required to be prefinished in coded colours in accordance with EPB-501 Water Treatment Plant Piping Recommended Colour Code.

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3.3 LOCATIONS

- .1 Painting and colour coding is required at locations specified below, on substrates and by methods indicated in "Painting and Colour Coding Schedule" in this Section.
- .2 Exposed in Finished Areas: Includes the following rooms:
 - .1 Wastewater Treatment Plant.
- .3 Semi-Concealed Spaces: Includes all non-exposed but accessible spaces behind ceilings, walls and floors, including exposed spaces which may be semi-concealed at some future time.

3.4 METHODS

- .1 Painting and colour coding by methods specified below, are required on substrates and at locations indicated in "Painting and Colour Coding Schedule" in this Section.
- .2 Method 'P1' - Full Colour Coding for Mechanical Piping and Equipment:
 - .1 Primary Colour Coding: Paint substrates in their entirety in required primary colour for each type of service in accordance with EPB-501 Water Treatment Plant Piping Recommended Colour Code. Use applicable 3 coat finish system.
- .3 Method 'P2' - Intermittent Colour Coding for Mechanical Piping:
 - .1 Paint System: Use one coat semi-gloss enamel or machinery enamel, suitable for type of substrate and surface temperature.
 - .2 Primary Colour Coding: Apply paint in required primary colours for each type of service in accordance with EPB-501 Water Treatment Plant Piping Recommended Colour Code in 450 mm long bands all around pipe as follows:
 - .1 At beginning and end of each run.
 - .2 At least once in each 10 m of pipe run.
 - .3 At least once in each room or area through which a pipe passes.
 - .4 On both sides of obscuring equipment, pipe chases, and inaccessible ceiling, wall and floor spaces.
 - .5 Adjacent to each valve in pipe run.
- .4 Method 'P3' - Full Painting in Uncoded Colours:
 - .1 Paint substrates in their entirety. Use applicable 3 coat finish system.
 - .2 Colours shall be the same as wall or ceiling background colours.
- .5 Method 'P4' - No Painting and Colour Coding:
 - .1 Painting and colour coding are not required.

3.5 PAINTING MISCELLANEOUS ITEMS

- .1 Paint concrete machine and equipment bases in coded colours and with 100 mm wide

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diagonal stripes. Do not paint spring isolators.

- .2 Paint steel bollards in coded colours and with 50 mm wide vertical stripes as detailed in EPB-501 Water Treatment Plant Piping Recommended Colour Code.
- .3 Back-prime and paint surfaces and edges of plywood backboards for electrical and telephone equipment with one coat Alkyd Wood Primer, white colour, and two coats Alkyd Porch and Floor Enamel, grey colour, applied before backboards are installed.

3.6 PAINTING AND COLOUR CODING SCHEDULE

Locations	Substrates				
	Mech. Piping	Mech. Equipment	Mech. Ductwork	Elect. Conduit and Cable	Other Elect. Work
Exposed in service areas	P1	P1	P3	P4	P3
Exposed in unfinished areas	P1	n/a	P4	P4	P4
Exposed in finished areas	P1	n/a	P3	P3	P3
Semi-concealed spaces	P1	n/a	P4	P4	P4
Permanently concealed spaces	P4	n/a	P4	P4	P4
Exposed to exterior	P1	P4	P3	P4	P4

Key: P1 - Full Colour Coding for Mechanical Piping and Equipment
P2 - Intermittent Colour Coding for Mechanical Piping
P3 - Full Painting in Uncoded Colours
P4 - No Painting in Coded or Uncoded Colours.

Refer to articles 3.2, 3.3 and 3.4 of this Section for detailed descriptions of substrates, locations and methods.

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3.7 FINISH SYSTEMS SCHEDULE FOR MECHANICAL AND ELECTRICAL WORK

Substrate	Finish System	Product No.
Iron and Steel Piping and Equipment	EXT 5.1D Alkyd, Gloss Level G6 - Gloss	
	1st Coat: Alkyd Anti-corrosive Metal Primer	79
	2nd Coat: Alkyd	9
	3rd Coat: Alkyd	9
Galvanized Metal Piping, Ductwork, Conduit, and Equipment	EXT 5.3B Alkyd, Gloss Level G6 - Gloss	
	1st Coat: Cementitious Primer	26
	2nd Coat: Alkyd	9
	3rd Coat: Alkyd	9
Aluminum Jacketed Piping, Conduit, and Equipment (Exposed aluminum)	EXT 5.4A Alkyd, Gloss Level G6 - Gloss	
	1st Coat: Vinyl Wsh Primer	80
	2nd Coat: Q.D. Primer	95
	3rd Coat: Alkyd	8, 9, 94
	4 th Coat: Alkyd	8, 9, 94
Copper Piping	EXT 5.5A Alkyd, Gloss Level G6 – Gloss	
	1st Coat: Vinyl Wash Primer	80
	2nd Coat: Alkyd	8, 9, 94
	3rd Coat: Alkyd	8, 9, 94
Canvas and Cotton Insulated Piping, Ductwork, and Equipment	INT 10.1B Alkyd, Gloss Level G5 – Semi-gloss	
	1st Coat: Latex Primer Sealer	50
	2nd Coat: Alkyd	47, 48, 49, 51
	3rd Coat: Alkyd	47, 48, 49, 51
Iron and Steel Piping and Equipment	INT 5.1E Alkyd Finish, Gloss Level 5 – Semi-gloss	
	1st Coat: Alkyd Metal Primer	79, 76
	2nd Coat: Alkyd	47
	3rd Coat: Alkyd	47

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Substrate	Finish System	Product No.
Galvanized Metal Piping, Ductwork, Conduit, and Equipment	INT 5.3C Alkyd, Gloss Level G5 – Semi-gloss 1st Coat: Cementitious Primer 2nd Coat: Alkyd 3rd Coat: Alkyd	26 47 47
High Heat Steel, Boilers, Breeching, Furnace Fronts, Piping Flues, Heat Exchangers, etc.	INT 5.2B Heat Resistant Enamel, Aluminum, Maximum 800°F (427°C) See note Aluminum Heat Resistant Enamel Note - No. of coats and application procedures in accordance with manufacturer's recommendations INT 5.2D High Heat Resistant Coating, Maximum 1100°F (593°C) See note High Heat resistant Coating Note - No. of coats and application procedures in accordance with manufacturer's recommendations	2 22
Aluminum Jacketed Piping, Conduit, and Equipment	INT 5.4A Alkyd, Gloss Level G5 – Semi-gloss 1st Coat: Vinyl Wash Primer 2nd Coat: Alkyd 3rd Coat: Alkyd	80 47 47
Copper Piping	INT 5.5A Alkyd, Gloss Level G5 – Semi-gloss 1st Coat: Vinyl Wash Primer 2nd Coat: Alkyd 3rd Coat: Alkyd	80 47 47
Plastic Piping	INT 6.8B Alkyd, Gloss Level G5 – Semi-gloss 1st Coat: Bonding Primer 2nd Coat: Alkyd 3rd Coat: Alkyd	69 47 47

END OF SECTION

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1. GENERAL

1.1 REFERENCES

- .1 CGSB 1-GP-12c-68, Standard Paint Colors.
- .2 CGSB 1-GP-48M-78, Primer, Marine, for Steel.
- .3 CAN/CGSB-1.59-M89, Alkyd, Exterior Gloss Enamel.
- .4 CGSB 1-GP-61Ma-85, Enamel, Alkyd, Marine, Exterior and Interior.
- .5 CAN/CGSB-1.93-92, Aluminum Marine Paint.
- .6 CGSB 1-GP-171M-79, Coating, Inorganic Zinc.
- .7 AWWA C209, Standard for Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections and Fittings for Steel Water Pipelines.
- .8 AWWA C210, Standard for Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.
- .9 AWWA C218, Standard for Coating the Exterior of Above Ground Steel Water Pipelines and Fittings.
- .10 EPB-501 Waterworks Design Standard, Table 3.1 Water Treatment Plant Piping Recommended Colour Code.

1.2 RELATED SECTIONS

- .1 Section 15015 - Mechanical General Requirements:
- .2 Section 15020 - Detailed Piping Specifications
- .3 Coordinate Work with other trades as required.

1.3 SAMPLES

- .1 Submit colour chip samples of all paints to be used on this project. Allow two (2) weeks for Engineer's review.
- .2 Paints that do not appear on qualified products list must be approved by Engineer before use on project. When it is proposed to use non-qualified paint, submit one 2 L sample of paint to Engineer at least 3 weeks prior to commencement of painting for analysis and acceptance. Mark samples with name of project, its location, paint manufacturer's name and address, name of paint, CGSB standard number and manufacturers paint code number.

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1.4 ENVIRONMENTAL REQUIREMENTS

- .1 Do not apply paint finish in areas where dust is being generated.
- .2 Do not apply paint to work at temperatures below 10 degrees Celsius or minimum temperature recommended by manufacturer, whichever is more stringent.
- .3 Do not apply paint if the ambient temperature is not at least 5 degrees Celsius above the dew point or as recommended by manufacturer. Maintain room temperature at least 5 degrees Celsius above dew point during drying of paint.
- .4 Provide temporary heating and ventilation as required for painting and curing.

1.5 COLOUR SCHEDULE

- .1 All piping, valves, and equipment shall be colour coded and the finish colours shall be as shown on the following schedule or as directed by the Engineer.
- .2 Colour Schedule

Process Piping	Symbol	Colour	Glidden Product	Bands	
				No.	Colour
Raw Wastewater	S	Brown	--	--	--
Primary Settled Wastewater Effluent	EF	Brown	--	1	White
Secondary Settled Wastewater Effluent	EF	Gray	--	--	--
Final Effluent	TE	Green	--	--	--
Raw Sludge	WS	Black	--	--	--
Primary Sludge	WS	Black	--	1	White
Secondary Sludge	WS	Black	--	2	White
Digested Sludge	SL	Black	--	3	White
Emulsified Polymer	EP	Pink	--	1	Black
Polymer Solution	POS	Pink	--	1	Black
Alum	ALS	Pink	--	2	Green
Sample Lines	SAM	Colour to match line colour	--	--	--

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Process Piping	Symbol	Colour	Glidden Product	Bands No.	Colour
Potable Water	PW	Blue	Deep Space Blue (Pittsburgh 7060)	--	--
Plant Service Water	PSW	Green	--	--	--
Drains	DR	Brown	Industry Brown	--	--
Overflow	OV	Brown	Industry Brown	--	--
Compressed Air	AS	White	--	--	--
Instrument Air	IA	White	--	--	--
Heating	--	Silver	--	--	--
Fire Protection	--	Red	Safety Red	--	--
Natural Gas, Low Pressure	NGL	Orange	Safety Orange	--	--
Pipe Hangers / Supports	--	Black	--	--	--
Valves	Symbol	Factory Finish			
Valve Body and Bonnet	--	Factory Finish			
Valve Handles	--	Factory Finish			
Equipment	Symbol	Factory Finish			
Pumps	P	Factory Finish			
Electrical Motors	M	Factory Finish			

1.6 HANDLING AND STORAGE OF MATERIALS

- .1 Deliver all materials in unopened original packages or containers of a suitable size for the particular application. Use without alteration of any kind, except where specifically recommended by the manufacturer and with the Engineer's review.
- .2 Prior to storage, the storage area shall be clean, dry and heated to at least 15 degrees Celsius.

2. PRODUCTS

2.1 MATERIALS

- .1 All paint materials shall be first line, first quality products.
- .2 Paint materials for each coating formula to be products of a single manufacturer.
- .3 Approved Manufacturers are: Sherwin Williams, Benjamin Moore, Canadian Pittsburgh Industries, Bapco (Canadian Industries Ltd.) and General Paint or approved equal.
- .4 Paint Schedule (General Pipe and Equipment Exterior):
 - .1 Ungalvanized steel and cast iron pipe, fittings and valves, supports, exterior of steel tanks and non-submerged structural steel:
 - .1 Spot Primer: to CGSB 1-GP-40M.
 - .2 1st Coat: alkyd metal primer to CPCA Product No. 79.
 - .3 2nd Coat: gloss machinery enamel to CPCA Product No. 81.
 - .4 3rd Coat: gloss machinery enamel to CPCA Product No. 81.
 - .2 Ungalvanized steel and cast iron piping, fittings, valves, equipment supports immersed or in contact with water, wet by spray or condensation, or exposed to high humidity:
 - .1 1st Coat: Ameron 68 HS Primer
 - .2 2nd Coat: Amerlock #400.
 - .3 3rd Coat: Amerlock #400.
 - .4 4th Coat: Amerlock #400.
 - .3 Galvanized steel piping, and miscellaneous galvanized metals:
 - .1 The galvanized metals shall be unpassivated (active).
 - .2 1st Coat: zinc chromate primer CGSB 1-GP-132.
 - .3 2nd Coat: Amerlock #400.
 - .4 3rd Coat: Amerlock #400.
 - .5 4th Coat: Amerlock #400.
 - .4 Machinery and Equipment (for units having factory applied finish):
 - .1 Primer: touch up with primer compatible with manufacturer's finish.
 - .2 Finish: Enamel, compatible with primer and factory applied finish, colour as per colour schedule.
 - .5 Machinery and Equipment (for units supplied with prime coat only):
 - .1 1st Coat: touch up prime coat with primer compatible with manufacturer's paint.
 - .2 2nd Coat: enamel (semi-gloss) compatible with factory applied primer.
 - .3 3rd Coat: enamel (gloss) compatible with 2nd coat.
 - .6 PVC pipe and conduit (non-submerged)

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- .1 1st Coat: undercoat/primer product recommended by manufacturer to provide adhesion to plastic.
- .2 2nd Coat: alkyd to CPCA Product No. 47.
- .3 3rd Coat: alkyd to CPCA Product No. 47.

- .7 Copper piping:
 - .1 1st Coat: vinyl wash primer to CPCA Product No. 80.
 - .2 2nd Coat: alkyd enamel to CPCA Product No. 47.
 - .3 3rd Coat: alkyd enamel to CPCA Product No. 47.

- .8 Canvas insulation covering:
 - .1 1st Coat: canvas sealer.
 - .2 2nd Coat: enamel (semi-gloss) to CGSB 1-GP-57M.

3. EXECUTION

3.1 PREPARATION

- .1 New metal surfaces.
 - .1 Clean surfaces of new metal to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with the following:
 - .1 Solvent cleaning: SSPC-SP-1.
 - .2 Power tool cleaning: SSPC-SP-3.

- .2 Metal surfaces to be repainted - General.
 - .1 Clean surfaces by removing loose, cracked, brittle or non-adherent paint, rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with the following:
 - .1 Solvent cleaning: SSPC-SP-1.
 - .2 Power tool cleaning: SSPC-SP-3.
 - .2 Scrape edges of old paint back to sound material where remaining paint is thick and sound, feather exposed edges.

- .3 PVC Pipe.
 - .1 All plastic surfaces to be coated shall be hand sanded with a medium grit sand paper to provide tooth for the coating system.
 - .2 Prior to painting clean pipe with detergent water solutions to remove any dirt or grease and allow to dry.
 - .3 Apply PVC cleaner/primer liberally with brush or soft lint-free cloth. Allow 10 to 15 minutes to dry and then paint immediately.

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- .4 Compressed air to be free of water and oil before reaching nozzle.
- .5 Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes, by blowing with clean dry compressed air, or by vacuum cleaning.
- .6 Touch up shop primer to CGSB 85-GP-10M with primer as specified in applicable section. Touch-up to include cleaning and painting of field connections, welds, rivets, nuts, washers, bolts, and damaged or defective paint and rusted areas.
- .7 Prepare galvanized steel and zinc coated steel surfaces to CGSB 85-GP-16M.
- .8 Prepare copper and copper alloys surfaces to CGSB 85-GP-20M.
- .9 Prepare new steel surfaces exposed normally to dry conditions to CGSB 85-GP-14M.
- .10 Prepare previously painted steel surfaces exposed normally to dry conditions to CGSB 85-GP-15M.
- .11 Prepare steel surfaces exposed to industrial environments to CGSB 85-GP-13M.
- .12 Prepare steel surfaces exposed to water or high humidity levels to CGSB-85-GP-11M
CGSB 85-GP-18M.
- .13 Do not apply paint until prepared surfaces have been accepted by Engineer.
- .14 Prior to commencing paint application the degree of cleanliness of surfaces to be in accordance with SSPC-Vis 1.
- .15 Protection of surfaces.
 - .1 Protect surfaces not to be painted and if damaged, clean and restore such surfaces as directed by Engineer.
 - .2 Apply primer, paint, or pretreatment as soon as possible after surface has been cleaned and before deterioration of surface occurs.
 - .3 Clean surfaces again if rusting occurs after completion of surface preparation.
 - .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats of paint. Remove contaminants from surface and apply paint immediately.
 - .5 Protect cleaned and freshly painted surfaces from dust to approval of Engineer.
- .16 Mixing paint.

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- .1 Do not dilute or thin paint for brush application; use as received from manufacturer.
- .2 Mix ingredients in container before and during use and ensure breaking up of lumps, complete dispersion of settled pigment, and uniform composition.
- .3 Do not mix or keep paint in suspension by means of air bubbling through paint.
- .4 Thin paint for spraying according to manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Engineer.

3.2 APPLICATION

- .1 Apply paint by spraying, brushing, or combination of both. Use sheepskins or daubers only when no other method is practical in places of difficult access.
- .2 Follow manufacturer's recommendations for coverage and film thickness.
- .3 Use dipping or roller coating method of application only when specifically authorized by Engineer in writing.
- .4 Caulk open seams at contact surfaces of built up members with material approved by Engineer, before second undercoat of primer is applied.
- .5 Where surface to be painted is not under cover, do not apply paint when:
 - .1 Air temperature is below 5°C or when temperature is expected to drop to 0°C before paint has dried.
 - .2 Temperature of surface is over 50°C unless paint is specifically formulated for application at high temperatures.
 - .3 Fog or mist occur at site; it is raining or snowing; there is danger of rain or snow; relative humidity is above 85%.
 - .4 Surface to be painted is wet, damp or frosted.
 - .5 Previous coat is not dry.
- .6 Provide cover when paint must be applied in damp or cold weather. Protect, shelter, or heat surface and surrounding air to comply with manufacturer's recommendations for temperature and humidity conditions. Protect until paint is dry or until weather conditions are suitable.
- .7 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.
- .8 Apply each coat of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

- .9 Brush application.
 - .1 Work paint into cracks, crevices and corners and paint surfaces not accessible to brushes by spray, daubers or sheepskins.
 - .2 Brush out runs and sags.
 - .3 Remove runs, sags and brush marks from finished work and repaint.
- .10 Spray application.
 - .1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
 - .2 Provide traps or separators to remove oil and water from compressed air and drain periodically during operations.
 - .3 Keep paint ingredients properly mixed in spray pots or containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
 - .4 Apply paint in uniform layer, with overlapping at edges of spray pattern.
 - .5 Brush out immediately all runs and sags.
 - .6 Use brushes to work paint into cracks, crevices and places that are not adequately painted by spray. In areas not accessible to spray gun, use brushes, daubers or sheepskins.
 - .7 Remove runs, sags and brush marks from finished work and repaint.
- .11 Shop painting.
 - .1 Do shop painting after fabrication and before any damage to surface occurs from weather or other exposure.
 - .2 Spray paint contact surfaces of field assembled, bolted, friction type joints with primer coat only. Do not brush primer after spraying.
 - .3 Do not paint metal surfaces that are to be embedded in concrete.
 - .4 Paint metal surfaces to be in contact with wood with either full paint coats specified or three shop coats of specified primer.
 - .5 Do not paint metal within 50 mm of edge to be welded. Give unprotected steel one coat of boiled linseed oil or other approved primer protective coating after shop fabrication is completed.

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- .6 Remove weld spatter before painting. Remove weld slag and flux by methods as specified in paragraph 3.2.2 and 3.2.3 Metal Surfaces to be Repainted.
- .7 Protect machine finished or similar surfaces that are not to be painted but that do require protection, with coating of rust inhibitive petroleum, molybdenum disulphide, or other coating approved by Engineer.
- .8 Copy previous erection marks and weight marks on areas that have been shop painted.
- .12 Field painting.
 - .1 Paint steel structures as soon as practical after erection.
 - .2 Touch up metal which has been shop coated with same type of paint and to same thickness as shop coat. This touch-up to include cleaning and painting of field connections, welds, rivets, nuts, washers, bolts, and damaged or defective paint and rusted areas.
 - .3 Field paint surfaces (other than joint contact surfaces) which are accessible before erection but which are not to be accessible after erection.
 - .4 Do not apply final coat of paint until concrete work is completed, except as directed by Engineer. If concreting or other operations damage any paint, clean and repaint damaged area. Remove concrete spatter and droppings before paint is applied.
 - .5 Where painting does not meet with requirements of specifications, and when so directed by Engineer remove all defective paint, thoroughly clean affected surfaces and repaint in accordance with these specifications.
- .13 Handling painted metal.
 - .1 Do not handle painted metal until paint has dried, except for necessary handling for painting or stacking for drying.
 - .2 Scrape off and touch up paint which is damaged in handling, with same number of coats and kinds of paint as were previously applied to metal.

3.3 INSPECTION

- .1 The Engineer reserves the right to inspect all coating operations. Inspections will be carried out on a periodic basis to ensure that coating materials, surface preparations and application are in accordance with these specifications.

3.4 POSTING OF SIGNS

- .1 While painting is in progress or drying, "WET PAINT" signs shall be posted in prominent locations.

3.5 PIPE LABELS

.1 Flow Arrows

- .1 Provide and install flow arrows on all piping in between each T and/or elbow in the wastewater treatment plant. Flow arrows to be visible at ground level and to be 50 mm minimum in height and 150 mm minimum in length.

.2 Pipe Labels

- .1 Pipe Labels are to be minimum 50 mm high (50 to 100 mm pipe) or 100 mm high (150 mm and larger pipe). Labels to be placed and noted as directed by Engineer.

END OF SECTION

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1. GENERAL

1.1 SCOPE

- .1 This section of the specifications refers to the supply and installation of secondary spill containment systems.

1.2 RELATED REQUIREMENTS

- .1 Mechanical General Requirements: Section 15015.

1.3 PRODUCT OPTIONS AND SUBSTITUTIONS

- .1 Refer to Division 1 for requirements pertaining to product options and substitutions.

1.4 UNIFORMITY OF EQUIPMENT

- .1 All spill containment systems are to be supplied by one manufacturer throughout to the extent practical. Variations will be permitted only where the major supplier cannot supply a particular piece of equipment as specified.

1.5 SHOP DRAWINGS

- .1 Comply with requirements of Section 15015.
- .2 Submit schedule before ordering.
- .3 Submit shop drawings in accordance with Section 01330 - Submittals.

1.6 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into the manual specified in Section 01790 - Operation and Maintenance Data.
- .2 Include the reviewed tag lists.

1.7 IDENTIFICATION

- .1 Indicators shall bear the following information permanently marked on body:
 - .1 Manufacturer's name or trademark.
 - .2 Serial number.

1.8 TAGGING

- .1 N/A

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2. PRODUCTS

2.1 SECONDARY SPILL CONTAINMENT

- .1 Install secondary containment systems where indicated on process drawings.
- .2 Applicable Equipment:
 - .1 Location:
 - .1 Sludge Thickening Area: one (1) One Drum Platform
 - .2 Overhead Door Area: one (1) Four Drum Platform
 - .2 Specified Equipment:
 - .1 One Drum Platform
 - .1 Manufacturer: Eagle Modular Spill Containment, or approved equivalent.
 - .2 Type: One-Drum Platform
 - .3 Manufacturer Model: 1633D
 - .4 Quantity Required:
 - .5 Body: HDPE
 - .2 Four Drum Platform
 - .1 Manufacturer: Eagle Modular Spill Containment, or approved equivalent.
 - .2 Type: Four-Drum Platform
 - .3 Manufacturer Model: 1635D
 - .4 Quantity Required:
 - .5 Body: HDPE
 - .3 Accessories: Poly Pallet Ramp
 - .1 Manufacturer: Eagle Modular Spill Containment, or approved equivalent.
 - .2 Model: 1689
 - .3 Body: HDPE
 - .4 Approved Supplier:
 - .1 Acklands Grainger; www.acklandsgrainger.com

3. EXECUTION

3.1 INSTALLATION

- .1 Install all equipment in strict accordance with manufacturer's and supplier's instructions.
- .2 Any damage resulting from either failure to observe the installation instructions or as a result of proceeding with the work without complete knowledge of how it is to be done will be the Contractor's responsibility.
- .3 Make equipment installation and connections by skilled tradesmen to the best standard.

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- .4 Carry out work to produce a neat, accurate, secure, functional installation.
- .5 Repair at own expense, any damage done to the installation of materials while carrying out the work.
- .6 Install supports and bases in advance of equipment installation in accordance with manufacturer's instructions.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Supply portable fall arrest to the requirements indicated on the Contract Drawings and in this Specification.
- .2 Approved Manufacturer:
 - .1 Miller
 - .2 Or As Approved by Engineer

1.2 RELATED SECTIONS

- .1 Section 01340 - Shop Drawings, Product Data and Samples
- .2 Section 01790 - Operation and Maintenance Data and Manuals
- .3 Section 15015 - Mechanical General Requirements

1.3 REFERENCE STANDARDS

- .1 ANSI Standards:
 - Applicable Standards
- .2 OH&S Standards:
 - Applicable Standards

1.4 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01340.
- .2 Shop drawings and product data to include the following:
 - .1 Outline and arrangement drawings.
 - .2 Cross-section drawings.
 - .3 Materials of construction.

1.5 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into the manual specified in Section 01790.
- .2 Maintenance data to include the following:
 - .1 Manufacturer's name, type, model year, capacity and serial number.
 - .2 Details of operation, servicing, and maintenance.

- .3 Recommended spare parts list with names and addresses.

1.6 DESIGN CRITERIA

- .1 N/A

1.7 TAGGING

- .1 Provide each piece of equipment with a tag stamped or engraved with the appropriate equipment number, as listed in this Specification.
- .2 Tags to be 20mm high, 75mm long, and 1.5mm thick, plastic Romark "Ultra Suede", 8mm high alphanumeric characters, Helvetica font (01040 cutter), reverse engraved. Characters to be white on coloured background. Background colour to be red.
- .3 The code lettering and number system shall be as shown on the P & I drawings or as directed by the Engineer.
- .4 Affix tags to equipment securely.

1.8 QUALITY ASSURANCE

- .1 Ensure that installations conform with all applicable local, Provincial, and/or Federal codes, standards, and regulations in effect at time of bid.
- .2 Comply with the requirements of the following organizations, at minimum:
 - .1 CSA, Canadian Standards Association.
 - .2 NEC, National Electric Code.
 - .3 NEMA, Standards of National Electrical Manufacturers Association.
 - .4 ANSI, American National Standards Institute.
 - .5 ASTM, American Society for Testing and Materials.
 - .6 AISI, American Iron and Steel Institute.
 - .7 AGMA, American Gear Manufacturer's Association.
 - .8 AISC, American Institute of Steel Construction
 - .9 AWS, American Welding Society.
 - .10 ASME, American Society of Mechanical Engineers
 - .11 NSF, National Sanitation Foundation

1.9 MATERIALS

- .1 All materials to be new, free from defects and conforming to applicable reference standards.
- .2 Where any standard referenced has been superseded prior to bidding, the Contractor shall comply with the current standard.

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2. PRODUCTS

2.1 FALL ARREST (DAV 2100)

- .1 Quantity: One (1)
- .2 Approved Products:
 - .2 Specified Equipment: DAV 2100
 - .1 Provide and install a portable fall arrest complete with floor mount sleeve, manual winch, pulley, cable, and all appurtenances for the safe lifting and lowering of maintenance personnel.
 - .2 Fall Arrest to be portable to be used to provide safe access to the EQ tank.
 - .3 Acceptable Suppliers:
 - .1 Miller DH-3 by Honeywell
 - .2 or approved equivalent
 - .4 Floor Sockets
 - .1 Refer to Section 11217
- .4 Tag#'s: DAV 2100

3. EXECUTION

3.1 MARKING, PACKING, AND PACKAGING

- .1 Equipment shall be marked to identify the product, date (month and year) of manufacture, capacity, and serial number. Equipment shall be shipped with a label containing equipment description, manufacturing order number, part number, serial number, manufacturer, and date.
- .2 The proper caution or warning signs as prescribed by OH&S standard shall be customer determined and supplied.
- .3 All packing, packaging, and marking provisions of ASTM Practice D3892 shall apply to this standard.

3.2 SHIPPING, RECEIVING AND STORAGE

- .1 Various sections of the equipment to be properly match-marked to assist in positioning and assembly at the site.
- .2 The pumps shall be shipped to site assembled to the greatest extent possible to reduce installation and start-up costs.

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- .3 Provide instructions on storage and protection well in advance of shipping. If any special instructions are necessary covering safe storage, give them to the Contractor.
- .4 The Contractor will sign the carrier's bill of lading to indicate receipt of the required number of crates, packages, etc., and will note thereon any apparent shortages of or visible damage to such crates, packages, etc. The supplier shall furnish to the Contractor, lists showing the contents of the said crates, packages, etc., complete with all necessary handling and off-loading instructions. Such lists shall be furnished sufficiently early so that copies will be available at the site when delivery of the said equipment and appurtenances is made. Within seven days after the date of delivery to the site, the Contractor will notify the Supplier in writing of shortages or damage in equipment delivered.
- .5 The Contractor will provide unloading facilities and place the equipment in location or storage. The Contractor will be responsible for off-loading at site, for storing the equipment, appurtenances and materials and for protection against weather loss, damage, or theft. The supplier shall provide full instructions of all precautions to be observed in connection with the handling, storing and protection of the equipment.

3.3

INSTALLATION

- .1 Install all pumping equipment in strict accordance with manufacturer's and supplier's instructions.
- .2 Any damage resulting from either failure to observe the installation instructions or as a result of proceeding with the work without complete knowledge of how it is to be done will be the Contractor's responsibility.
- .3 Make equipment installation and connections by skilled tradesmen to the best standard.
- .4 Carry out work to produce a neat, accurate, secure, functional installation.
- .5 Repair at own expense, any damage done to the installation of materials while carrying out the work.
- .6 Install anchor bolts and concrete bases in advance of equipment installation in accordance with manufacturer's instructions.
- .7 Set sole pumps in place and shim to correct alignment. Grout as required.
- .8 Upon completion of installation, fill, add to, and check equipment requiring lubricating oils, greases and coolants. Types and amounts to be in strict accordance with manufacturer's recommendations.

3.4

EQUIPMENT TESTING PROCEDURE

- .1 Submit a thorough description of the procedures to be employed in testing this equipment. The procedure will be reviewed by the Engineer for suitability and should be submitted 3 weeks prior to any testing.

3.5 FIELD TESTING

- .1 When equipment installation has been completed to the standards indicated by these specifications, arrange for the services of the equipment manufacturer's technical representative.
- .2 The equipment manufacturer's technical representative shall inspect the installation to ensure that the equipment has been installed in accordance with the manufacturer's requirements. If the installation is not in order, correct the deficiencies indicated by the technical representative. Start, run and adjust equipment at this time. The technical representative shall then advise the Engineer in writing that the installation has been checked, has been installed correctly and is in working order.
- .3 Bear all the costs of the equipment manufacturer's technical representative.
- .4 Use only personnel who have taken an active part in the actual installation of the system. Do not designate a subtrade as representative at any time during the construction prior to final inspection.

3.6 EQUIPMENT MANUFACTURER'S REPRESENTATIVE

- .1 The equipment manufacturer's technical representative shall be familiar with the equipment supplied and shall come prepared with both knowledge and equipment to perform and interpret the test, inspections and procedures recommended by the manufacturer for the starting of equipment that has not previously been run.
- .2 The equipment manufacturer's technical representative shall, immediately after completion of the inspection, convey to the Engineer in writing, confirmation of the tests and inspections carried out and the result of this examination of the work.
- .3 If the inspection reveals defects in the work, correct as soon as possible and repeat the entire inspection procedure. Repeat until the work passes the inspection.
- .4 Document the results of the inspection by the equipment manufacturer's representative.
- .5 Ensure the installation meets all manufacturer's requirements for durable and trouble-free operation.

3.7 FIELD INSPECTION

- .1 Final inspection will be made by the Engineer only after the equipment manufacturer's technical representative has advised that equipment installation is in order and the Contractor has advised in writing that the system can be operated.

- .2 The Engineer will request that the equipment be operated to demonstrate that it will perform as specified. The Engineer will note deficiencies, and if possible, the deficiency will be corrected immediately by the Contractor. All deficiencies that cannot be corrected at the time of inspection will be noted by the Engineer who will advise the Contractor of these deficiencies in writing. Correct the deficiencies as soon as possible and advise the Engineer of their correction. Should the deficiencies be of a sufficiently serious nature to require the work to be re-inspected, the cost of the inspection will be borne by the Contractor.

3.8 OPERATOR TRAINING

- .1 Supplier shall provide the services of a skilled technical representative for a minimum period of two (2) hours at the site to instruct plant personnel in the operation and service of the equipment.

END OF SECTION

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1. GENERAL

1.1 REFERENCES

- .1 Refer to current issue of NFPA 10, Portable Fire Extinguishers..

1.2 PRODUCT OPTIONS AND SUBSTITUTIONS

- .1 Refer to Division 1 for requirements pertaining to product options and substitutions.

1.3 SUBMITTALS

- .1 Submit product data sheets.

2. PRODUCTS

2.1 RATING OF HAND HELD FIRE EXTINGUISHERS

- .1 Provide hand held fire extinguishers rated in accordance with CAN/ULC S508-2002 and bearing ULC label.

2.2 HAND HELD FIRE EXTINGUISHERS

- .1 All hand fire extinguishers to be of dry chemical agent suitable for Class A, B and C fires.
- .2 Description: Extra Heavy duty steel cylinder, baked enamel finish, squeeze grip handle with positive on/off valve, hose and nozzle, pressure gauge, stainless steel hose band, mounting brackets or semi-recessed cabinet.
- .3 Capacity: 4.5 kg (10 lb)
- .4 Quantity: 8
- .5 Model: B10M
- .6 Manufacturer: **Badger (Kidde)**

3. EXECUTION

3.1 INSTALLATION

- .1 Install fire extinguishers on wall brackets with top 1.5 m above floor.
- .2 Provide extinguishers where indicated on drawings.
- .3 Where exact location is not indicated, mount in location as directed by the Engineer.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Supply, deliver, store, and install laboratory equipment as indicated on the Contract Drawings and in this Specification. Weatherproof heated storage to be provided by Contractor for equipment. If applicable, delay placing equipment in Laboratory room until all work is completed.
- .2 Approved Suppliers:
 - .1 VWR/Anachemia Science Phone: (800) 932-5000
Fax: (800) 668-6348
 - .2 Cleartech Phone: (800) 387-7503
Fax: (888) 281-8109
 - .3 Hach Canada Phone: (403) 536-9830
Fax: (866) 259-0984
- .3 All items to be provided by one Supplier.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01340.
- .2 Shop drawings and product data to include the following:
 - .1 Provide details, methods of operation, procedures.

1.2 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into separate maintenance manual for laboratory equipment.
- .2 Maintenance data to include the following:
 - .1 Details of equipment giving manufacturer's name, type, model year, capacity and serial number.
 - .2 Details of operation, servicing, and maintenance.
 - .3 Recommended spare parts list with names and addresses.

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2. PRODUCTS

2.1 LABORATORY EQUIPMENT

.1 Spectrophotometer:

- .1 DR3900 Benchtop VIS Spectrophotometer with RFID Technology. No. LPV440.99.00012.

.2 Complete with reagents for following tests:

.1 Ammonia – Nitrogen

- .1 10205 ULR TNTplus 830, one (1) 25/pkg
- .2 10205 HR TNTplus 832, one (1) 25/pkg
- .3 Ammonia Nitrogen Standard Solution, 1mg/L, Part #189149
- .4 Ammonia Nitrogen Standard Solution, 10mg/L, Part #189149

.2 Dissolved Oxygen

- .1 Dissolved Oxygen AccuVac Ampul, One (1) 25pkg, Part #2515025
- .1 Sample cell # 2427606

.3 Phosphorus

- .1 Molybdovanadate Reagenet, #2076032
- .1 Two (2) Sampler Cells, #2495402,
- .2 Phosphate Standard Solution, 10 mg/L, 946mL, #1420416
- .3 Phosphate Standard Solution, 3 mg/L, 946mL, #2059716

.3 Accessories:

- .1 No. LZV565 Replacement Light Source
- .2 No. 2612602 Sample Cells
- .3 LZV849 Light Shield
- .4 No. LZV846 Adapter

.2 Turbidimeter:

- .1 Hach Portable Turbidimeter 2100QIS01

.3 Incubator:

- .1 Fisherbrand IsoTemp Microbiological Incubator for Fecal Coliform
 - .1 Part# 51030513
 - .2 Electrical: 120V/60Hz
 - .3 Approved Equal
- .2 Thermal Scientific's Heratherm Compact Microbiological Incubator for Total Coliform
 - .1 Part#: TMO TSI-50125590-1

- .2 Electrical: 120V/60Hz
 - .3 Approved Equal
- .3 Hach SRI56 Low Temp BOD Incubator
 - .1 Part#: 2636200
 - .2 Electrical: 120V/60Hz
 - .3 Accessories
 - .1 BOD Track II Apparatus, Part# 2952400
 - .2 Clippers
 - .3 Graduated Cyclinder
 - .4 Alternate
 - .1 Fisherbrand IsoTemp BOD Refrigerated Incubator, Part# 3720A
- .4 Digester
 - .1 Hach DRB200, Digital Reactor Block or approved alternate
 - .1 Part#: LTV082.53.40001
 - .2 Electrical: 120V/60Hz
 - .3 Quantity: One (1)
- .5 Lab Oven
 - .1 Hach Part #1428900 or approved alternate
 - .1 Electrical: 120V/60Hz
 - .2 Quantity: One (1)
 - .3 Thermometer Hach #2635700
- .6 Steam Sterilizer Autoclave
 - .1 Tuttnauer Brinkmann EZ9 or approved equal
 - .1 Size: 545x510x365
 - .1 Electrical: 120V/60Hz
- .7 Multi-Parameter Meter
 - .1 Hach HQ40d Portable pH & BOD Meter, Laboratory Kit for Water Quality, with Refill pH Electrode, Luminescent DO Sensor and BOD Bottles, 1 m Cable Product No. 8506200.
 - .2 Complete with reagents for following tests:
 - .1 BOD Nutrient Buffer Pillow, 5 mL (for 3 L of dilution water), Part# 1416066.
 - .2 Six (6) Lithium Hydroxide, Powder Pillows, Part# 1416369
 - .3 One (1) Grease, stopcock, tube
 - .4 pH buffer solutions (pH4, pH7, pH10), pH storage solution, Include one spare each.
 - .5 Disposable Wipes, #2097000
 - .3 Accessories
 - .1 IntelliCAL™ LBOD101 Sensor Cap Replacement Kit #5838000
 - .2 Intellical™ PHC301 Laboratory General Purposes Refillable pH Electrode, 1 m Cable #PHC30101
 - .3 Disposable BOD Bottles, 300 mL, 100/cs, #2943100
 - .4 Eight (8) Battery, AA, 1.5 Vdc, Alkaline, #1938004

- .5 Intellical™ LBOD101 Luminescent/Optical Dissolved Oxygen (LDO) Sensor for BOD Measurements, 1 m cable #LBOD10101
 - .6 Bottle, BOD, Cap, 6/pk, #241906
 - .7 Include probe stand, meter stand, power adapter and UBS/DC adapter for data transfer.
 - .8 Include electrode stirrer stand (115V) c/w probe holder. Include one spare stirrer bar.
- .8 Laboratory Fume Hood
- .1 Labconco No. 303000 or approved alternate
 - .2 Dimensions 762mm (30") x 767mm (30.2") x 1219mm (48")
 - .3 Electrical: 115V/60Hz
 - .4 Quantity: One (1)
- .9 Solid Solid Epoxy Work Surface
- .1 Labconco No. 4882806 or approved alternate
 - .2 Dimensions 762mm (30") x 762mm (30") x 32.8mm (1.25")
 - .3 Quantity: One (1)
 - .4 No Cutouts
- .10 Standard Storage Cabinet
- .1 Labconco No. 9900200 or approved alternate
 - .2 Dimensions 762mm (30") x 559mm (30") x 933mm (36.75")
 - .3 Quantity: One (1)
- .11 SteamScrubber
- .1 Labconco No. 4400331 or approved alternate
 - .2 Dimensions 696mm (27.4") L x 612mm (24.1") W x 866mm (34.2") H
(Contractor to confirm height)
 - .3 Quantity: One (1)
 - .4 Upper and Lower Standard Open Racks: 304 Stainless Steel
 - .5 Viewing Window
 - .6 Purified water pump to bring non-pressurized or pressurized purified water into the tank for up to six pure water rinses.
 - .7 Steam generator that produces hot vapor before the WASH 2 cycle (RINSE ONLY and PLASTIC programs excluded)
 - .8 Electrical: 208V/60HZ/1P
- .12 Distillation Set
- .1 Hach Distillation Apparatus Set, General Purpose
 - .1 Part No. 2265300
 - .2 Quantity: One (1)
- .13 Glassware/Miscellaneous

<u>Quant.</u>	<u>Catalogue #</u>	<u>Description</u>
1 pk/50	2093135	Pipet, Serological, 1.0 mL, Glass
1	53237	Pipet, Serological, 5.0 mL

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1	53238	Pipet, Serological, 10.0 mL, graduated
1	1465100	Pipet filler, safety bulb
1	BBP078	Pipet, adjustable volume, 0.2 – 1.0 mL
1	BBP 065	Pipet, adjustable volume, 1.0 – 5.0 mL
1 pk/100	BBP079	Pipet Tips for 0.2 – 1.0 mL pipets
1	BBP068	Pipet Tips for 1.0 – 5.0 mL pipets
1	2497900	Test Tube Rack, for 13-mm OD vials, 90 holes
1 pk	108041	50 mL PE Beaker
1	2405200	AccuVac Ampul Snapper
1 pk/25	173125	Stoppers
1 pk/12	50076H	250 ml pyrex beaker
1 pk/6	500-82	600 ml pyrex beakers
2 pk/4	500-84	2000 ml pyrex beakers, graduated
1 pk/12	2087079	500 ml PE bottles
1 pk/6	620-11	500 ml PE wash bottles
2 each	68700	Cylinder brush
2 each	69000	Test tube brush
2 each	2103200	Camel hair brush
4 each	50842	100 ml graduated cylinders
2 each	50849	500 ml graduated cylinders
2 each	2117953	1000 ml plastic graduated cylinders
2 each	2088000	Alconox detergent
12 pair	2410104	#9 nitrile gloves
2 each	2927902	Safety goggles
24 box	2097000	Disposable Wipes
2	2635700	Lab thermometers -20°C to 110°C
1 bx/10	VWR026	Red marking pencils
20 L		Deionized Water
2 – 500mL	13449	Hydrochloric Acid
2 - 100mL	245032	Sodium Hydroxide Standard Solution
1		First aid cabinet
2		Rubber aprons
1		Wall mounted drying rack and dish rack

3. EXECUTION

3.1 INSTALLATION

- .1 Install equipment in strict accordance with manufacturer's and supplier's instructions.
- .2 Any damage resulting from either failure to observe the installation instructions or as a result of proceeding with the work without complete knowledge of how it is to be done will be the Contractor's responsibility.
- .3 Make equipment installation and connections by skilled tradesmen to the best standard.

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- .4 Carry out work to produce a neat, accurate, secure, functional installation.
- .5 Contractor to duct fume hood exhaust to nearby damper as per mechanical drawings.
- .6 Repair at own expense, any damage done to the installation of materials while carrying out the work.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Supply, deliver, store, and install Indoor refrigerated sampler for the representative collection of liquid water samples to monitor influent and effluent wastewater.
- .2 Manufacturers:
 - .1 Approved: Teledyne ISCO Inc.
 - .1 Supplier: Avensys Solutions Inc.
 - .2 Alternates:
 - .1 As approved

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01340.
- .2 Shop drawings and product data to include the following:
 - .1 Provide details, methods of operation, procedures.

1.3 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into separate maintenance manual for laboratory equipment.
- .2 Maintenance data to include the following:
 - .1 Details of equipment giving manufacturer's name, type, model year, capacity and serial number.
 - .2 Details of operation, servicing, and maintenance.
 - .3 Recommended spare parts list with names and addresses.

2. PRODUCTS

2.1 REFRIGERATED SAMPLERS (RFS 2900, RFS 5900)

- .1 Location:
 - .1 Treatment Area: RF 2900, RF 5900
- .2 Specified Equipment
 - .1 Manufacturer: Tedelyne ISCO Inc.

- .2 Model: ISCO 5800
 - .1 Quantity: Two (2)
- .3 Refrigerator
 - .1 Body: LLDPE
 - .2 Size of unit: 52x29x33 inch (132x74x84 cm) (HxWxD)
 - .3 Weight: 195 lb. (88.5 kg)
 - .4 Operating Temperature: -20° to +128°F (-29° to +49°C)
 - .5 Power: 120 VAC 60Hz
- .4 Sample Pump:
 - .1 Intake suction tubing
 - .1 Length: 3 to 99 feet (1 to 30 m)
 - .2 Material: PTFE-lined
 - .3 Inside diameter: 3/8 inch (9 mm)
 - .4 Pump tubing life: Typically 1,000,000 pump counts
 - .5 Maximum suction lift: 28 feet (8.5 m)
 - .6 Typical repeatability: ± 5 ml or $\pm 5\%$ of the average volume in a set, whichever is greater, at lifts up to 25 ft
 - .7 Typical accuracy at lifts up to 25 ft: ± 10 ml or $\pm 10\%$ of program
 - .8 Strainer: 32mm dia. Stainless Steel
 - .2 Typical Line Velocity at Head Height
 - .1 3 ft. (0.9 m): 3.0 ft/s (0.9 m/s)
 - .2 10 ft. (3 m): 2.9 ft/s (0.9 m/s)
 - .3 15 ft. (4.6 m): 2.7 ft/s (0.8 m/s)
 - .3 Liquid Presence Detector
- .5 Controller
 - .1 Enclosure rating: NEMA 4X, 6 (IP67)
 - .2 Program memory: Non-volatile ROM
 - .3 Flow meter signal inputs: 5 to 15 volt DC pulse or 25 ms isolated contact closure for Isco flow meters. 4-20 mA input for non-Isco flow meters
 - .4 Digital alarms: 4 programmable outputs; 5V, 100 mA
 - .5 Number of composite samples: Programmable from 1 to 999 samples
- .6 Software
 - .1 Sample frequency: 1 minute to 99 hours 59 minutes, in 1-minute increments 1 to 9,999 flow pulses
 - .2 Sampling modes (flow modes are controlled by external flow meter signal):
 - .1 constant time – constant volume,
 - .2 constant time – variable volume,
 - .3 variable time – constant volume
 - .3 Programmable sample volumes: 10 to 9,990 ml in 1 ml increments
 - .4 Sample retries: If no sample is detected, up to 3 attempts; user selectable
 - .5 Rinse cycles: Automatic rinsing of suction line up to 3 rinses for each sample collection

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- .6 Controller diagnostics: Tests for RAM, ROM, pump, display, and electrical components
- .7 Bottle Configuration: Two (2) 10 L round Glass Bottle
- .8 Accessories
 - .1 Bottle kits
 - .2 Tubing and strainers
 - .3 Cables and interfaces
 - .4 Desktop software
 - .5 AC battery back up
 - .6 Controller cover
 - .7 Input/Output Module

3. EXECUTION

3.1 INSTALLATION

- .1 Install equipment in strict accordance with manufacturer's and supplier's instructions.
- .2 Any damage resulting from either failure to observe the installation instructions or as a result of proceeding with the work without complete knowledge of how it is to be done will be the Contractor's responsibility.
- .3 Make equipment installation and connections by skilled tradesmen to the best standard.
- .4 Carry out work to produce a neat, accurate, secure, functional installation.
- .5 Contractor to duct fume hood exhaust to nearby damper as per mechanical drawings.
- .6 Repair at own expense, any damage done to the installation of materials while carrying out the work.

END OF SECTION

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1. GENERAL

1.1 RELATED SECTIONS

- .1 Not applicable.

1.2 SUBMITTALS

- .1 Submit shop drawings or catalogue illustrations in accordance with Division 1.

2. PRODUCTS

2.1 FIXTURES

- .1 Towel Dispenser: roll and single fold, wall mounted, center pull towel dispenser. Front loading; holds fold and roll towels (max. 6" diameter roll and up to 10" wide), all welded stainless steel brushed construction and finish. Similar to Frost 102 or equal.
- .2 Soap Dispenser: wall mounted, stainless steel construction. Easy refill at top. Keyed lock filler cap. All mounting screws concealed. 40oz. capacity. Soap level indicator. Similar to Frost 708A or equal.
- .3 Toilet Tissue Dispenser: wall mounted, 1.2 mm steel with chrome finish, double roll dispenser. Tension spring and self locking device. Similar to Frost 150 or equal.
- .4 Mirror; wall mounted. Similar to Frost 941.2424 or equal.

2.2 SHOWER AND DRESSING ACCESSORIES

- .1 Towel and Robe Hooks: Stainless steel, three hook strip, flush tamper proof fasteners.

3. EXECUTION

3.1 INSTALLATION

- .1 Install and secure all towel dispensers rigidly in place using the following techniques.
 - .1 For stud walls install steel back plate to stud prior to plaster or drywall finish. Plate to have threaded studs or plugs provided.
 - .2 For hollow masonry units or existing plaster/drywall surfaces use toggle bolts drilled into cell/wall cavity.
 - .3 In solid masonry, marble, stone or concrete use bolt with lead expansion sleeve set into drilled hole.
 - .4 In toilet and shower compartment partitions, use male/female through bolts.
- .2 Use tamper proof headed screws and bolts for fasteners.

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3.2 LOCATION AND QUANTITY

- .1 Locate accessories where indicated on drawings, and as follows. Exact locations to be determined by Owner.
- .2 Toilet tissue dispenser: one in each toilet compartment.
- .3 Towel dispenser: one in washroom, one in Laboratory.
- .4 Soap dispenser: one in each washroom, one in Laboratory.
- .5 Towel and robe hooks: one (three hooks strip) for each shower compartment.
- .6 Mirror: one in each washroom.

END OF SECTION

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1. GENERAL

1.1 INTENT

- 1 Supply, deliver, store, and install aluminum signs as indicated on the Contract Drawings and in this Specification.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01340.
- .2 Shop drawings and product data to include the following:
 - .1 Provide description of product and installation.

2. PRODUCTS

2.1 ALUMINUM SIGNS

- .1 Aluminum, reflective signs. Refer to Contract Drawing for Sign Schedule.
 - .1 Approved Manufacturer: Lab Safety Supply as approved by Engineer
- .2 Exterior "English River Property Management Wastewater Treatment Facility" sign. Letter type: Helvetica medium; cast aluminum, acrylic lacquer faces and edges. Colour selection by Owner. Design and manufacture by Behrends Group.

3.0 EXECUTION

3.1 GENERAL

- .1 Place all signs in areas indicated in Contract Drawings or as directed by Engineer.
- .2 Install signs as per manufacturer's instructions. Provide fasteners if required that are suitable for the substrate or as approved by Engineer.
- .3 Hardware frame with painted plywood backing.
- .4 Mechanical attachment to building wall.

END OF SECTION

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1. GENERAL

1.1 SCOPE

- .1 This section of the specifications refers to the supply of pallet trucks.

1.2 RELATED REQUIREMENTS

- .1 N/A

1.3 PRODUCT OPTIONS AND SUBSTITUTIONS

- .1 Refer to Division 1 for requirements pertaining to product options and substitutions.

1.4 UNIFORMITY OF EQUIPMENT

- .1 All pallet trucks to be supplied by one manufacturer.

1.5 SHOP DRAWINGS

- .1 Comply with requirements of Section 15015.
- .2 Submit pallet truck specifications before ordering.
- .3 Submit shop drawings in accordance with Section 01330 - Submittals.

1.6 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into the manual specified in Section 01790 - Operation and Maintenance Data.

1.7 IDENTIFICATION

- .1 Indicators shall bear the following information permanently marked on body:
 - .1 Manufacturer's name or trademark.
 - .2 Serial number

1.8 TAGGING

- .1 N/A

2. PRODUCTS

2.1 MANUAL PALLET TRUCK

- .1 Supply manual pallet truck and place in UV & Filtration Area

.2 Applicable Equipment:

.1 Location:

.1 N/A

.2 Specified Equipment:

.1 Quantity: One (1)

.2 Manufacturer: Toyota Industrial Equipment or approved equivalent.

.3 Type: Hand Pallet Jack

.4 Model: HPT28U

.5 Fork Length: 48 in

.6 Overall Fork Width: 27 in

.7 Capacity: 5500 lb

3. EXECUTION

3.1 INSTALLATION

.1 N/A

END SECTION

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1. GENERAL

1.1 SCOPE

- .1 This section of the specifications refers to the supply of a refrigerator for the laboratory.

1.2 RELATED REQUIREMENTS

- .1 N/A

1.3 PRODUCT OPTIONS AND SUBSTITUTIONS

- .1 Refer to Division 1 for requirements pertaining to product options and substitutions.

1.4 UNIFORMITY OF EQUIPMENT

- .1 N/A

1.5 SHOP DRAWINGS

- .1 Comply with requirements of Section 15015.
- .2 Submit pallet truck specifications before ordering.
- .3 Submit shop drawings in accordance with Section 01330 - Submittals.

1.6 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into the manual specified in Section 01790 - Operation and Maintenance Data.

1.7 IDENTIFICATION

- .1 Indicators shall bear the following information permanently marked on body:
 - .1 Manufacturer's name or trademark.
 - .2 Serial number

1.8 TAGGING

- .1 N/A

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2. PRODUCTS

2.1 REFRIGERATOR

.1 Applicable Equipment:

.1 Location:

.1 Laboratory

.2 Specified Equipment:

.1 Manufacturer: General Electric

.2 Model No.: # GTS18GSHSS

.3 Supplier: The Home Depot, www.homedepot.com

.4 Type: 17.5 Cu. Ft, top freezer, stainless steel refrigerator

.5 826mm deep x 1712mm height x 711mm width (205lbs)

3. EXECUTION

3.1 INSTALLATION

.1 N/A

END SECTION

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1. GENERAL

1.1 INTENT

- .1 Supply operational submersible effluent pump(s) as indicated on the Contract Drawings and in this Specification.
- .2 Approved Manufacturers:
 - .1 ITT Flygt
 - .2 Or As Approved by Engineer
- .3 Approved Suppliers:
 - .1 Xylem Inc.
Bat 10, 3111 Nilar Avenue
Saskatoon, SK
S7K 6N3
(306) 933-4849
 - .2 Approved Alternates:
 - .1 As approved by Engineer
 - .2 Equipment supplied by approved alternate must be of the same or greater quality than equipment from specified manufacturer.
 - .3 All alternate pumps must conform to the intent of the approved manufacturer including technical specification, type, performance, flanges, materials of construction, motors, seals, etc.
 - .4 The Contractor is responsible for any pipe, valve, and fitting modifications that may occur from using approved alternate pump selection.
 - .5 The Contractor is responsible for any electrical modifications including VFD's, generator sizing, wiring, etc. that may occur from using alternate pump selection.
 - .6 The Contractor is responsible for any additional engineering fees incurred by MPE Engineering Ltd., necessitated as a result of the supply of an alternative pump.
- .4 All pumps to be provided by one manufacturer.

1.2 RELATED SECTIONS

- .1 Section 01340 - Shop Drawings, Product Data and Samples
- .2 Section 01790 - Operation and Maintenance Data and Manuals
- .3 Section 13311 - Instrumentation - Wiring

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- .4 Section 15015 - Mechanical General Requirements
- .5 Section 15020 - Detailed Piping Specifications
- .6 Section 15110 - Valves

1.3 REFERENCE STANDARDS

- .1 ANSI Standards:
 - B-16.5 Pipe Flanges and Flanged Fittings
- .2 OH&S Standards:
 - Applicable Standards

1.4 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01340.
- .2 Shop drawings and product data to include the following:
 - .1 Performance curves, which include differential head, efficiency, water NPSHR, and brake horsepower.
 - .2 Outline and arrangement drawings.
 - .3 Cross-section drawings.
 - .4 Materials of construction.
 - .5 Details of stuffing box or mechanical seal arrangement.

1.5 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into the manual specified in Section 01790.
- .2 Maintenance data to include the following:
 - .1 Manufacturer's name, type, model year, capacity and serial number.
 - .2 Details of operation, servicing, and maintenance.
 - .3 Recommended spare parts list with names and addresses.
 - .4 As-built wiring diagrams.
 - .5 Performance curves.

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1.6 DESIGN CRITERIA

- .1 Unless stated herein or waived in writing by the Engineer, submersible sump pump construction, materials, methods and performance shall conform to AWWA Standard E101-77, latest revision.

1.7 TAGGING

- .1 Provide each piece of equipment with a tag stamped or engraved with the appropriate equipment number, as listed in this Specification.
- .2 Tags to be 20mm high, 75mm long, and 1.5mm thick, plastic Romark "Ultra Suede", 8mm high alphanumeric characters, Helvetica font (01040 cutter), reverse engraved. Characters to be white on coloured background. Background colour to be red.
- .3 The code lettering and number system shall be as shown on the P & I drawings or as directed by the Engineer.
- .4 Affix tags to equipment securely.

1.8 QUALITY ASSURANCE

- .1 Ensure that installations conform with all applicable local, Provincial, and/or Federal codes, standards, and regulations in effect at time of bid.
- .2 Comply with the requirements of the following organizations, at minimum:
 - .1 CSA, Canadian Standards Association.
 - .2 NEC, National Electric Code.
 - .3 NEMA, Standards of National Electrical Manufacturers Association.
 - .4 ANSI, American National Standards Institute.
 - .5 ASTM, American Society for Testing and Materials.
 - .6 AISI, American Iron and Steel Institute.
 - .7 AGMA, American Gear Manufacturer's Association.
 - .8 AISC, American Institute of Steel Construction
 - .9 AWS, American Welding Society.
 - .10 ASME, American Society of Mechanical Engineers
 - .11 NSF, National Sanitation Foundation

1.9 MATERIALS

- .1 All materials to be new, free from defects and conforming to applicable reference standards.
- .2 Where any standard referenced has been superseded prior to bidding, the Contractor shall comply with the current standard.

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2. PRODUCTS

2.1 INFLUENT PUMPS (P 1101, P 1102)

.1 Location:

- .1 Wetwell: P 1101, P1102

.2 Conditions

- .1 Liquid: Wastewater
- .2 Capable of running dry without damage to components.
- .3 Designed for continuous operation, when fully submerged.
- .4 Flow: 8.22 l/sec (127 USgpm)
- .5 TDH: 8.16 m (26.7 ft)
- .6 Installation: P – Semi Permanent, Wet
- .7 Solids Handling: Up to ¾ inch

.3 Approved Products:

.1 Specified Equipment: P 1101, P 1102

- .1 Manufacturer: Flygt or approved equivalent
- .2 Model: NP 3069 Type SH 3
- .3 Efficiency: 47.4%
- .4 Impeller Dia: 106 mm
- .5 Impeller: Hard Iron, semi-open, enclosed, solids handling design with pump out vanes for mechanical seal protection
- .6 Volute: Cast Iron Class 35B
- .7 Pump Shaft: pump and motor shaft are same unit; Type 431 SS
- .8 Wear Rings: Stationary; brass
- .9 Mechanical Seal: tungsten carbide
- .10 Fasteners: Type 304 Stainless Steel
- .11 Bearings: Upper and lower heavy duty ball bearing construction.
- .12 Motor:
 - .1 Three phase; 460 VAC; 60 Hz; 1160 rpm; 2.7 HP; SF 1.15
 - .2 NEMA –B design induction type with squirrel cage rotor
 - .3 Motor housed in air filled, water tight chamber
 - .4 Protection (MINICAS Relay):
 - .1 Thermal Switches in series to monitor temperature
 - .2 Leakage sensor to detect water in stator chamber
 - .5 Power Cable:
 - .1 Severe duty rated; oil and water resistant

- .2 Length to suit
 - .6 Rated for:
 - .1 Zone 1 (Class 1, Division 1)
 - .13 Accessories:
 - .1 Guide rail system and chains for easy removal.
 - .2 Provide all anchor bolts, shims and miscellaneous accessories necessary for installation of the pumping equipment and drivers.
 - .3 Provide the following spare parts, to be delivered to the site and handed over to the Owner at the time of commissioning:
 - i) Sufficient lubricating oils and greases of correct grade and specification for 12 months operation of all equipment requiring such.
 - ii) Any other spares which may be required to comply with the manufacturer's operating and maintenance instructions and recommendations during the course of the first 12 months of operation.
 - .4 Flush Valve (one per pumping system).
- .2 Miscellaneous Items
 - .1 Supply special tools required for servicing in the field.
 - .2 Provide all anchor bolts, shims, guide brackets and miscellaneous accessories necessary for the installation of the pumping equipment.
- .3 Acceptable Suppliers:
 - .1 Flygt ITT
 - .2 or approved equivalent
- .4 Tag#'s: P 1101, P 1102

2.2 EFFLUENT PUMPS (P 8101, P 8102)

- .1 Location:
 - .1 Effluent Chamber: P 8101, P 8102
- .2 Conditions
 - .1 Liquid: Wastewater
 - .2 Capable of running dry without damage to components.
 - .3 Designed for continuous operation, when fully submerged.
 - .4 Solids Handling: Up to $\frac{3}{4}$ inch
 - .5 Flow: 6.79 L/s (108 USgpm)
 - .6 TDH: 12.8m (42.0 ft)

- .7 Installation: P – Semi Permanent, Wet
- .3 Approved Products:
 - .1 Specified Equipment: P 8101, P 8102
 - .1 Manufacturer: Flygt or approved equivalent
 - .2 Model: NT 3069 Type SH 3
 - .3 Efficiency: 54.7%
 - .4 Impeller Dia: 115 mm
 - .5 Impeller: Grey cast iron, semi-open, enclosed, solids handling design with pump out vanes for mechanical seal protection
 - .6 Volute: Cast Iron Class 35B
 - .7 Pump Shaft: pump and motor shaft are same unit; Type 431 SS
 - .8 Wear Rings: Stationary; brass
 - .9 Mechanical Seal: tungsten carbide
 - .10 Fasteners: Type 304 Stainless Steel
 - .11 Bearings: Upper and lower heavy duty ball bearing construction.
 - .12 Motor:
 - .1 Three phase; 460 VAC; 60 Hz; 1160 rpm; 2.7 HP; SF 1.15
 - .2 NEMA –B design induction type with squirrel cage rotor
 - .3 Motor housed in air filled, water tight chamber
 - .4 Protection (MINICAS Relay):
 - .1 Thermal Switches in series to monitor temperature
 - .2 Leakage sensor to detect water in stator chamber
 - .5 Power Cable:
 - .1 Severe duty rated; oil and water resistant
 - .2 Length to suit
 - .13 Accessories:
 - .1 Provide all anchor bolts, shims and miscellaneous accessories necessary for installation of the pumping equipment and drivers.
 - .2 Provide the following spare parts, to be delivered to the site and handed over to the Owner at the time of commissioning:
 - i) Sufficient lubricating oils and greases of correct grade and specification for 12 months operation of all equipment requiring such.
 - ii) Any other spares which may be required to comply with the manufacturer's operating and maintenance instructions and recommendations during the course of the first 12 months of operation.
 - .2 Miscellaneous Items
 - .1 Supply special tools required for servicing in the field.
 - .2 Provide all anchor bolts, shims, guide brackets and miscellaneous accessories necessary for the installation of the pumping equipment.
 - .3 Acceptable Suppliers:

- .1 Flygt ITT
- .2 or approved equivalent
- .4 Tag#'s: P 8101, P 8102

2.4 PORTABLE LIFTING DAVITS (DAV 1100)

- .1 Location:
 - .1 Portable: DAV 1100
- .2 Quantity: One (1)
- .3 Approved Products:
 - .1 Specified Equipment: DAV 1100
 - .1 Provide and install a portable lifting davit complete with manual winch, hammerlock coupling link, pulley, adaptor, cable and all appurtenances for the safe lifting and lowering of the pumping and mixing equipment. Davit to be suitable for lifetime associated pumps and Mixers (P 1101, P 1102, P 8101, P8102, MX 1012, MX 3011).
 - .2 Davits to be portable to be used for removal of all pumps and mixers.
 - .3 Acceptable Suppliers:
 - .1 Flygt ITT P/N 13-50 05 16 (**Contractor to confirm**)
 - .2 or approved equivalent
 - .2 Tag#'s: DAV 1100

2.5 SOCKETS (FS 1100, FS 1200, FS 2100, FS 2200, FS 3100, FS 8100, FS 8200)

- .1 Location:
 - .1 Wetwell: FS 1100, FS 1200
 - .2 TWAS Chamber: FS 3100
 - .3 Aerobic Chamber: FS 2200
 - .4 Anoxic Chamber: FS 2100
 - .5 Effluent Chamber: FS 8100, FS 8200
- .2 Quantity: Six (7)

- .3 Approved Products:
 - .1 Specified Equipment: FS 1100, FS 1200, FS 2100, FS 3100, FS 8100, FS 8200
 - .1 3" Wall mounted socket, complete with cap, is to be supplied and to be installed as per contract drawings.
 - .2 Socket to be suitable for associated lifting davit and fall arrest system (Section 10317).
 - .3 Stainless steel
 - .4 Acceptable Suppliers:
 - .1 Flygt ITT P/N 13-52 01 40 (**Contractor to confirm**)
 - .2 Miller DH-8SS
 - .3 or approved equivalent
- .3 Approved Products:
 - .1 Specified Equipment: FS 2200
 - .1 3" Pre-cast floor socket, complete with cap, is to be supplied and to be installed as per contract drawings. Socket to be suitable for associated pump and davit.
 - .2 Socket to be suitable for associated lifting davit and fall arrest system (Section 10317).
 - .3 Stainless steel
 - .4 Acceptable Suppliers:
 - .1 Flygt ITT P/N 13-52 01 58 or approved equal (**Contractor to confirm**)
 - .2 or approved equivalent
- .4 Tag#'s: FS 1100, FS 1200, FS 2100, FS 2200, FS 3100, FS 8100, FS 8200

3. EXECUTION

3.1 MARKING, PACKING, AND PACKAGING

- .1 Equipment shall be marked to identify the product, date (month and year) of manufacture, capacity, and serial number. Equipment shall be shipped with a label containing equipment description, manufacturing order number, part number, serial number, manufacturer, and date.
- .2 The proper caution or warning signs as prescribed by OH&S standard shall be customer determined and supplied.
- .3 All packing, packaging, and marking provisions of ASTM Practice D3892 shall apply to this standard.

3.2 SHIPPING, RECEIVING AND STORAGE

- .1 Various sections of the equipment to be properly match-marked to assist in positioning and assembly at the site.
- .2 The pumps shall be shipped to site assembled to the greatest extent possible to reduce installation and start-up costs.

- .3 Provide instructions on storage and protection well in advance of shipping. If any special instructions are necessary covering safe storage, give them to the Contractor.
- .4 The Contractor will sign the carrier's bill of lading to indicate receipt of the required number of crates, packages, etc., and will note thereon any apparent shortages of or visible damage to such crates, packages, etc. The supplier shall furnish to the Contractor, lists showing the contents of the said crates, packages, etc., complete with all necessary handling and off-loading instructions. Such lists shall be furnished sufficiently early so that copies will be available at the site when delivery of the said equipment and appurtenances is made. Within seven days after the date of delivery to the site, the Contractor will notify the Supplier in writing of shortages or damage in equipment delivered.
- .5 The Contractor will provide unloading facilities and place the equipment in location or storage. The Contractor will be responsible for off-loading at site, for storing the equipment, appurtenances and materials and for protection against weather loss, damage, or theft. The supplier shall provide full instructions of all precautions to be observed in connection with the handling, storing and protection of the equipment.

3.3 INSTALLATION

- .1 Install all pumping equipment in strict accordance with manufacturer's and supplier's instructions.
- .2 Any damage resulting from either failure to observe the installation instructions or as a result of proceeding with the work without complete knowledge of how it is to be done will be the Contractor's responsibility.
- .3 Make equipment installation and connections by skilled tradesmen to the best standard.
- .4 Carry out work to produce a neat, accurate, secure, functional installation.
- .5 Repair at own expense, any damage done to the installation of materials while carrying out the work.
- .6 Install anchor bolts and concrete bases in advance of equipment installation in accordance with manufacturer's instructions.
- .7 Set sole pumps in place and shim to correct alignment. Grout as required.
- .8 Upon completion of installation, fill, add to, and check equipment requiring lubricating oils, greases and coolants. Types and amounts to be in strict accordance with manufacturer's recommendations.

3.4 EQUIPMENT TESTING PROCEDURE

- .1 Submit a thorough description of the procedures to be employed in testing this equipment. The procedure will be reviewed by the Engineer for suitability and should be submitted 3 weeks prior to any testing.

3.5 FIELD TESTING

- .1 When equipment installation has been completed to the standards indicated by these specifications, arrange for the services of the equipment manufacturer's technical representative.
- .2 The equipment manufacturer's technical representative shall inspect the installation to ensure that the equipment has been installed in accordance with the manufacturer's requirements. If the installation is not in order, correct the deficiencies indicated by the technical representative. Start, run and adjust equipment at this time. The technical representative shall then advise the Engineer in writing that the installation has been checked, has been installed correctly and is in working order.
- .3 Bear all the costs of the equipment manufacturer's technical representative.
- .4 Use only personnel who have taken an active part in the actual installation of the system. Do not designate a subtrade as representative at any time during the construction prior to final inspection.

3.6 EQUIPMENT MANUFACTURER'S REPRESENTATIVE

- .1 The equipment manufacturer's technical representative shall be familiar with the equipment supplied and shall come prepared with both knowledge and equipment to perform and interpret the test, inspections and procedures recommended by the manufacturer for the starting of equipment that has not previously been run.
- .2 The equipment manufacturer's technical representative shall, immediately after completion of the inspection, convey to the Engineer in writing, confirmation of the tests and inspections carried out and the result of this examination of the work.
- .3 If the inspection reveals defects in the work, correct as soon as possible and repeat the entire inspection procedure. Repeat until the work passes the inspection.
- .4 Document the results of the inspection by the equipment manufacturer's representative.
- .5 Ensure the installation meets all manufacturer's requirements for durable and trouble-free operation.

3.7 FIELD INSPECTION

- .1 Final inspection will be made by the Engineer only after the equipment manufacturer's technical representative has advised that equipment installation is in order and the Contractor has advised in writing that the system can be operated.

- .2 The Engineer will request that the equipment be operated to demonstrate that it will perform as specified. The Engineer will note deficiencies, and if possible, the deficiency will be corrected immediately by the Contractor. All deficiencies that cannot be corrected at the time of inspection will be noted by the Engineer who will advise the Contractor of these deficiencies in writing. Correct the deficiencies as soon as possible and advise the Engineer of their correction. Should the deficiencies be of a sufficiently serious nature to require the work to be re-inspected, the cost of the inspection will be borne by the Contractor.

3.8 OPERATOR TRAINING

- .1 Supplier shall provide the services of a skilled technical representative for a minimum period of two (2) hours at the site to instruct plant personnel in the operation and service of the equipment.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Supply operational submersible sump pump(s) to the requirements indicated on the Contract Drawings and in this Specification.
- .2 Approved Manufacturer: Goulds Pumps
- .3 Alternates:
 - .1 As approved by Engineer
 - .2 Equipment supplied by approved alternate must be of the same or greater quality than equipment from specified manufacturer.
 - .3 All alternate pumps must conform to the intent of the approved manufacturer including technical specification, type, performance, flanges, materials of construction, motors, seals, etc.
 - .4 The Contractor is responsible for any piping, valving, and fitting modifications that may occur from using approved alternate pump selection.
 - .5 The Contractor is responsible for any electrical modifications including VFD's, generator sizing, wiring, etc. that may occur from using alternate pump selection.
 - .6 The Contractor is responsible for any additional engineering fees incurred by MPE Engineering Ltd., necessitated as a result of the supply of an alternative pump.
- .4 All pumps to be provided by one manufacturer.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01340.
- .2 Shop drawings and product data to include the following:
 - .1 Performance curves, which include total dynamic head and capacity.
 - .2 Outline and arrangement drawings.
 - .3 Cross-section drawings.

1.3 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into the manual specified in Section 01790.
- .2 Maintenance data to include the following:

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- .1 Manufacturer's name, type, model year, capacity and serial number.
- .2 Details of operation, servicing, and maintenance.
- .3 Recommended spare parts list with names and addresses.
- .4 As-built wiring diagrams.
- .5 Performance curves.

1.4 DESIGN

- .1 Unless stated herein or waived in writing by the Engineer, submersible sump pump construction, materials, methods and performance shall conform to AWWA Standard E101-77, latest revision.

2. PRODUCTS

2.1 SUMP PUMP (P 4911A, P 4911B)

- .1 Applicable Equipment: P 4911A, P 4911B
 - .1 Liquid Type:
 - .1 Water: P P 4911A, P 4911B,
 - .2 Location:
 - .1 Pump Room: P P 4911A, P 4911B
 - .3 Specified Equipment: P P 4911A, P 4911B
 - .1 Manufacturer: Goulds Pumps
 - .2 Model: Model 3871 EP05, or approved equivalent.
 - .3 Order No: EP0511AC
 - .4 Motor: Single phase; 0.5 HP; 115 V; 60 Hz; 1550 rpm; built in overload with automatic reset; fully submerged in high grade oil-filled chamber
 - .5 Impeller: Thermoplastic full vortex design with pump out vanes for mechanical seal protection
 - .6 Mechanical Seal: Carbon-rotary/ceramic-stationary, BUNA-N elastomers
 - .7 Fasteners: 300 Series Stainless Steel
 - .8 Motor Housing: Cast iron
 - .9 Motor Cover: Thermoplastic cover with integral handle and float switch attachments
 - .10 Power Cable: 10 ft Severe duty rated; oil and water resistant
 - .11 Bearings: Upper and lower heavy duty ball bearing construction.
 - .12 Weight: 10.4 kg (23 lbs)
 - .13 Conditions
 - .1 Capable of running dry without damage to components.
 - .2 Designed for continuous operation, when fully submerged.
 - .3 Solids Handling: Up to ¾" inch
 - .4 Flow: 2.8 L/sec (44.4 USgpm)

- .5 TDH: 6.1 m (20.0 ft.)
- .14 Accessories:
 - .1 Mechanical float switch assembled and preset at factory.

.4 Tag #'s: P 4911A, P 4911B

3. EXECUTION

3.1 INSTALLATION

- .1 Install all pumping equipment in strict accordance with manufacturer's and supplier's instructions.
- .2 Any damage resulting from either failure to observe the installation instructions or as a result of proceeding with the work without complete knowledge of how it is to be done will be the Contractor's responsibility.
- .3 Make equipment installation and connections by skilled tradesmen to the best standard.
- .4 Carry out work to produce a neat, accurate, secure, functional installation.
- .5 Repair at own expense, any damage done to the installation of materials while carrying out the work.
- .6 Install anchor bolts and concrete bases in advance of equipment installation in accordance with manufacturer's instructions.
- .7 Set sole plates in place and shim to correct alignment. Grout as required.
- .8 Upon completion of installation, fill, add to, and check equipment requiring lubricating oils, greases and coolants. Types and amounts to be in strict accordance with manufacturer's recommendations.

3.2 EQUIPMENT TESTING PROCEDURE

Not Applicable

3.3 FIELD TESTING

Allow water to fill sump and operate pump for 0.5 hrs.

3.4 EQUIPMENT MANUFACTURER'S REPRESENTATIVE

Not Applicable

3.5 FIELD INSPECTION

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- .1 The Engineer will request that the equipment be operated to demonstrate that it will perform as specified. The Engineer will note deficiencies, and if possible, the deficiency will be corrected immediately by the Contractor. All deficiencies that cannot be corrected at the time of inspection will be noted by the Engineer who will advise the Contractor of these deficiencies in writing. Correct the deficiencies as soon as possible and advise the Engineer of their correction. Should the deficiencies be of a sufficiently serious nature to require the work to be re-inspected, the cost of the inspection will be borne by the Contractor.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Supply operational submersible mixer as indicated on the Contract Drawings and in this Specification.
- .2 Submersible mixer with shielded propeller intended for liquids containing long-string fibers and solids such as often occurring in wastewater and sludge
- .3 Approved Manufacturers:
 - .1 ITT Flygt
 - .2 Or As Approved by Engineer
- .4 Approved Suppliers:
 - .1 Xylem Inc.
Bat 10, 3111 Nilar Avenue
Saskatoon, SK
S7K 6N3
(306) 933-4849
 - .2 Approved Alternates:
 - .1 As approved by Engineer
 - .2 Equipment supplied by approved alternate must be of the same or greater quality than equipment from specified manufacturer.
 - .3 All alternate mixers must conform to the intent of the approved manufacturer including technical specification, type, performance, flanges, materials of construction, motors, seals, etc.
 - .4 The Contractor is responsible for any piping, valving, and fitting modifications that may occur from using approved alternate pump selection.
 - .5 The Contractor is responsible for any electrical modifications including VFD's, generator sizing, wiring, etc. that may occur from using alternate pump selection.
 - .6 The Contractor is responsible for any additional engineering fees incurred by MPE Engineering Ltd., necessitated as a result of the supply of an alternative pump.

1.2 RELATED SECTIONS

- .1 Section 01340 - Shop Drawings, Product Data and Samples
- .2 Section 01790 - Operation and Maintenance Data and Manuals
- .3 Section 13311 - Instrumentation - Wiring

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- .4 Section 15015 - Mechanical General Requirements
- .5 Section 15020 - Detailed Piping Specifications
- .6 Section 15110 - Valves

1.3 REFERENCE STANDARDS

- .1 ANSI Standards:
 - B-16.5 Pipe Flanges and Flanged Fittings
- .2 OH&S Standards:
 - Applicable Standards

1.4 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01340.
- .2 Shop drawings and product data to include the following:
 - .1 Performance curves, which include differential head, efficiency, water NPSHR, and brake horsepower.
 - .2 Outline and arrangement drawings.
 - .3 Cross-section drawings.
 - .4 Materials of construction.
 - .5 Details of stuffing box or mechanical seal arrangement.

1.5 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into the manual specified in Section 01790.
- .2 Maintenance data to include the following:
 - .1 Manufacturer's name, type, model year, capacity and serial number.
 - .2 Details of operation, servicing, and maintenance.
 - .3 Recommended spare parts list with names and addresses.
 - .4 As-built wiring diagrams.
 - .5 Performance curves.

1.6 DESIGN CRITERIA

- .1 Unless stated herein or waived in writing by the Engineer, submersible mixer construction, materials, methods and performance shall conform to AWWA Standards.
- .2 All electrical equipment shall be CSA approved and rated for Class I, Division I (Zone 1)
- .3 All electrical connection external to this equipment will be performed under Division 13 and 16.

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- .4 Where equipment is supplied with larger power requirements than that specified, the Contractor shall coordinate the power supply to ensure compatibility with the electrical and control components without any additional costs to the owner.

1.7 TAGGING

- .1 Provide each piece of equipment with a tag stamped or engraved with the appropriate equipment number, as listed in this Specification.
- .2 Tags to be 20mm high, 75mm long, and 1.5mm thick, plastic Romark "Ultra Suede", 8mm high alphanumeric characters, Helvetica font (01040 cutter), reverse engraved. Characters to be white on coloured background. Background colour to be red.
- .3 The code lettering and number system shall be as shown on the P & I drawings or as directed by the Engineer.
- .4 Affix tags to equipment securely.

1.8 QUALITY ASSURANCE

- .1 Ensure that installations conform to all applicable local, Provincial, and/or Federal codes, standards, and regulations in effect at time of bid.
- .2 Comply with the requirements of the following organizations, at minimum:
 - .1 CSA, Canadian Standards Association.
 - .2 NEC, National Electric Code.
 - .3 NEMA, Standards of National Electrical Manufacturers Association.
 - .4 ANSI, American National Standards Institute.
 - .5 ASTM, American Society for Testing and Materials.
 - .6 AISI, American Iron and Steel Institute.
 - .7 AGMA, American Gear Manufacturer's Association.
 - .8 AISC, American Institute of Steel Construction
 - .9 AWS, American Welding Society.
 - .10 ASME, American Society of Mechanical Engineers
 - .11 NSF, National Sanitation Foundation

1.9 MATERIALS

- .1 All materials to be new, free from defects and conforming to applicable reference standards.
- .2 Where any standard referenced has been superseded prior to bidding, the Contractor shall comply with the current standard.

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2. PRODUCTS

2.1 SUBMERSIBLE MIXER (MX 1012)

.1 Location:

.1 Equalization Tank.

.2 Conditions

- .1 Liquid: Wastewater
- .2 Capable of running dry without damage to components.
- .3 Designed for continuous operation, when fully submerged.
- .4 Installation: submerged
- .5 Liquid Temp: 40°C Max
- .6 Liquid Viscosity: 5000 cp
- .7 pH: 1-12

.3 Approved Products:

.1 Specified Equipment: MX 1012

- .1 Manufacturer: Xylem
- .2 Model: 4630
- .3 316 Stainless Steel construction and components
- .4 Mechanical Seal: Corrosion resistant cemented carbide
- .5 Vortex Protection Shield
- .6 Guide Bars
 - .1 Upper Bracket support
 - .2 Lower Bracket support
 - .3 Intermediate Support
- .7 Motor:
 - .1 Three phase; 575 VAC; 60 Hz; 710 rpm; 2.5HP; SF 1.15
 - .2 NEMA –B design induction type with squirrel cage rotor
 - .3 Motor housed in air filled, water tight chamber
 - .4 Protection:
 - .1 Thermal Switches in series to monitor temperature
 - .2 Leakage sensor to detect water in stator chamber
 - .3 Leakage sensor to detect water in Oil chamber
 - .5 Power Cable:
 - .1 Severe duty rated; oil, Chemical and water resistant
 - .2 Length to suit

.8 Accessories:

- .1 Provide all anchor bolts, shims and miscellaneous accessories necessary for installation of the pumping equipment and drivers.
- .2 Provide the following spare parts, to be delivered to the site and handed over to the Owner at the time of commissioning:
 - i) Sufficient lubricating oils and greases of correct grade and specification for 12 months operation of all equipment requiring such.

- ii) Any other spares which may be required to comply with the manufacturer's operating and maintenance instructions and recommendations during the course of the first 12 months of operation.
- .3 Supply special tools required for servicing in the field.
- .4 Tag#'s: MX 1012

3. EXECUTION

3.1 MARKING, PACKING, AND PACKAGING

- .1 Equipment shall be marked to identify the product, date (month and year) of manufacture, capacity, and serial number. Equipment shall be shipped with a label containing equipment description, manufacturing order number, part number, serial number, manufacturer, and date.
- .2 The proper caution or warning signs as prescribed by OH&S standard shall be customer determined and supplied.
- .3 All packing, packaging, and marking provisions of ASTM Practice D3892 shall apply to this standard.

3.2 SHIPPING, RECEIVING AND STORAGE

- .1 Various sections of the equipment to be properly match-marked to assist in positioning and assembly at the site.
- .2 The pumps shall be shipped to site assembled to the greatest extent possible to reduce installation and start-up costs.
- .3 Provide instructions on storage and protection well in advance of shipping. If any special instructions are necessary covering safe storage, give them to the Contractor.
- .4 The Contractor will sign the carrier's bill of lading to indicate receipt of the required number of crates, packages, etc., and will note thereon any apparent shortages of or visible damage to such crates, packages, etc. The supplier shall furnish to the Contractor, lists showing the contents of the said crates, packages, etc., complete with all necessary handling and off-loading instructions. Such lists shall be furnished sufficiently early so that copies will be available at the site when delivery of the said equipment and appurtenances is made. Within seven days after the date of delivery to the site, the Contractor will notify the Supplier in writing of shortages or damage in equipment delivered.
- .5 The Contractor will provide unloading facilities and place the equipment in location or storage. The Contractor will be responsible for off-loading at site, for storing the equipment, appurtenances and materials and for protection against weather loss, damage, or theft. The supplier shall provide full instructions of all precautions to be observed in connection with the handling, storing and protection of the equipment.

3.3 INSTALLATION

- .1 Install all pumping equipment in strict accordance with manufacturer's and supplier's instructions.
- .2 Any damage resulting from either failure to observe the installation instructions or as a result of proceeding with the work without complete knowledge of how it is to be done will be the Contractor's responsibility.
- .3 Make equipment installation and connections by skilled tradesmen to the best standard.
- .4 Carry out work to produce a neat, accurate, secure, functional installation.
- .5 Repair at own expense, any damage done to the installation of materials while carrying out the work.
- .6 Install anchor bolts and concrete bases in advance of equipment installation in accordance with manufacturer's instructions.
- .7 Set sole pumps in place and shim to correct alignment. Grout as required.
- .8 Upon completion of installation, fill, add to, and check equipment requiring lubricating oils, greases and coolants. Types and amounts to be in strict accordance with manufacturer's recommendations.

3.4 EQUIPMENT TESTING PROCEDURE

- .1 Submit a thorough description of the procedures to be employed in testing this equipment. The procedure will be reviewed by the Engineer for suitability and should be submitted 3 weeks prior to any testing.

3.5 FIELD TESTING

- .1 When equipment installation has been completed to the standards indicated by these specifications, arrange for the services of the equipment manufacturer's technical representative.
- .2 The equipment manufacturer's technical representative shall inspect the installation to ensure that the equipment has been installed in accordance with the manufacturer's requirements. If the installation is not in order, correct the deficiencies indicated by the technical representative. Start, run and adjust equipment at this time. The technical representative shall then advise the Engineer in writing that the installation has been checked, has been installed correctly and is in working order.
- .3 Bear all the costs of the equipment manufacturer's technical representative.

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- .4 Use only personnel who have taken an active part in the actual installation of the system. Do not designate a subtrade as representative at any time during the construction prior to final inspection.

3.6 EQUIPMENT MANUFACTURER'S REPRESENTATIVE

- .1 The equipment manufacturer's technical representative shall be familiar with the equipment supplied and shall come prepared with both knowledge and equipment to perform and interpret the test, inspections and procedures recommended by the manufacturer for the starting of equipment that has not previously been run.
- .2 The equipment manufacturer's technical representative shall, immediately after completion of the inspection, convey to the Engineer in writing, confirmation of the tests and inspections carried out and the result of this examination of the work.
- .3 If the inspection reveals defects in the work, correct as soon as possible and repeat the entire inspection procedure. Repeat until the work passes the inspection.
- .4 Document the results of the inspection by the equipment manufacturer's representative.
- .5 Ensure the installation meets all manufacturer's requirements for durable and trouble-free operation.

3.7 FIELD INSPECTION

- .1 Final inspection will be made by the Engineer only after the equipment manufacturer's technical representative has advised that equipment installation is in order and the Contractor has advised in writing that the system can be operated.
- .2 The Engineer will request that the equipment be operated to demonstrate that it will perform as specified. The Engineer will note deficiencies, and if possible, the deficiency will be corrected immediately by the Contractor. All deficiencies that cannot be corrected at the time of inspection will be noted by the Engineer who will advise the Contractor of these deficiencies in writing. Correct the deficiencies as soon as possible and advise the Engineer of their correction. Should the deficiencies be of a sufficiently serious nature to require the work to be re-inspected, the cost of the inspection will be borne by the Contractor.

3.8 OPERATOR TRAINING

- .1 Supplier shall provide the services of a skilled technical representative for a minimum period of two (2) hours at the site to instruct plant personnel in the operation and service of the equipment.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 The Owner has entered into an agreement with the process equipment suppliers listed below. The General Contractor will be required to enter into a Novation Agreement with each of the noted suppliers so that the suppliers become a subcontractor to the General Contractor.

.1 SUEZ Water Technologies & Solutions Canada for Supply and Installation of membrane treatment equipment.

- .2 The Contractor is to coordinate, receive, off-load equipment at site or Contractor storage facility, protect, insure, install, align, field pipe, wire, and commission all equipment and accessories, as outlined in this Section and the appended contract documents and the drawing submittals from each supplier.

- .3 Review the following drawing submittals in detail:

.1 Appendix B: Novated Agreement

.2 Appendix C to F: SUEZ Water Technologies & Solutions Canada Membrane Treatment Equipment Submittal.

Contact the Supplier to determine the form in which the equipment is to be shipped, the extent of field assembly required, and be responsible for all ancillary equipment required to complete the installation as shown on the Process & Instrumentation Diagrams and Contract Drawings.

As part of the equipment submission by preselected vendors, some of the valves and instruments are to be supplied by the pre-selected vendors. General Contractor is to review the vendor shop drawings provided in the appendices to determine equipment being supplied by the pre-selected vendors. All equipment being supplied by the General Contractor are outlined in the specification documents.

1.2 RELATED SECTIONS

- .1 Section 00800 – Supplementary Conditions
- .2 Section 01340 - Shop Drawings, Product Data and Samples
- .3 Section 01790 - Operation and Maintenance Data and Manuals
- .4 Section 13311 - Instrumentation - Wiring
- .5 Section 15015 - Mechanical General Requirements
- .6 Section 15020 - Detailed Piping Specifications

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- .7 Section 15110 - Valves
- .8 Section 15190 - Disinfection, Hydrostatic and Pressure Testing

1.3 REFERENCE STANDARDS

- .1 ANSI Standards:
 - B-16.5 Pipe Flanges and Flanged Fittings
- .2 OH&S Standards:
 - Applicable Standards

1.4 SHOP DRAWINGS AND PRODUCT DATA

- .1 Not Applicable.

1.5 MAINTENANCE DATA

- .1 The suppliers will provide the Contractor, before the equipment is ready for installation, with an electronic copy of the operation and maintenance data. The data is to include complete and detailed descriptions and instructions for the operation, maintenance and lubrication of all pieces of equipment and all auxiliaries furnished by the Supplier. Each set of data shall include a copy of the approved Shop Drawings.

1.6 DESIGN CRITERIA

- .1 Not Applicable.

1.7 TAGGING

- .1 Not Applicable.

1.8 QUALITY ASSURANCE

- .1 Ensure that installations conform with all applicable local, Provincial, and/or Federal codes, standards, and regulations in effect at time of bid.
- .2 Comply with the requirements of the following organizations, at minimum:
 - .1 CSA, Canadian Standards Association.
 - .2 NEC, National Electric Code.
 - .3 NEMA, Standards of National Electrical Manufacturers Association.
 - .4 ANSI, American National Standards Institute.
 - .5 ASTM, American Society for Testing and Materials.
 - .6 AISI, American Iron and Steel Institute.
 - .7 AGMA, American Gear Manufacturer's Association.
 - .8 AISC, American Institute of Steel Construction.
 - .9 AWS, American Welding Society.
 - .10 ASME, American Society of Mechanical Engineers.

- .11 NSF, National Sanitation Foundation.

1.9 MATERIALS

- .1 Not Applicable.

2. PRODUCTS

2.1 EQUIPMENT SUPPLY & INSTALLATION CONTRACT

- .1 Supplier submittals are available by request from MPE Engineering Ltd.
- .2 Membrane Treatment Equipment Supply
 - .1 The Owner has entered into an agreement for the supply of membrane treatment equipment for the Grasswoods (ERPM) Wastewater Treatment Facility. The system will be supplied by SUEZ Water Technologies & Solutions Canada and installed by the Contractor under the instruction of the supplier.
 - .2 The submittal includes, but is not limited to the major mechanical and electrical components of the membrane treatment system. Refer to the attached Diagrams for a complete listing of supplied components.
 - .3 The submittal drawings are included with the Contract Specifications as Appendices D to F.
 - .4 Supplier contact information:

SUEZ Water Technologies & Solutions Canada
3239 Dundas St. West
Oakville, ON, L6M 4B2

Attention: Jo-Ann Richard
Phone: 905 301 4275
Email: jo-ann.richard@suez.com
 - .5 The total value of the Contract is \$1,317,670.00 before GST.
 - .6 The remaining value of the Contract is \$1,250,670.00 before GST.

3. EXECUTION

3.1 MARKING, PACKING, AND PACKAGING

- .1 Equipment shall be marked to identify the product, date (month and year) of manufacture, capacity, and serial number. Equipment shall be shipped with a label containing equipment description, manufacturing order number, part number, serial

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number, manufacturer, and date.

- .2 The proper caution or warning signs as prescribed by OH&S standard shall be customer determined and supplied.
- .3 All packing, packaging, and marking provisions of ASTM Practice D3892 shall apply to this standard.

3.2 SHIPPING, RECEIVING AND STORAGE

- .1 Projected Equipment Delivery Dates:
 - .1 Contractor to correspond with individual vendors and schedule accordingly.
- .2 The equipment and appurtenances will be delivered to the site in a condition satisfactory to the Engineer and any omissions, discrepancies or damage evident on delivery will be made good by the Supplier at no cost to the Contractor.
- .3 The Contractor will sign the carrier's bill of lading to indicate receipt of the required number of crates, packages, etc., and will note thereon any apparent shortages of or visible damage to such crates, packages, etc. The Supplier shall furnish to the Contractor, lists showing the contents of said crates, packages, etc., complete with all necessary handling and off-loading instructions. Such lists shall be furnished sufficiently early so that copies will be available at the site when delivery of said equipment and appurtenances is made. Within seven (7) days after the date of delivery to the site, the Contractor will notify the Supplier in writing of shortages or damage in equipment delivered.
- .4 The Contractor will be responsible for off-loading at site, for storing and insuring the equipment, appurtenances and materials and for protection against weather loss, damage, fire, or theft. The Supplier shall provide full instructions of all precautions to be observed in connection with the handling, storing and protection of the equipment. The Contractor is required to provide a forklift as required for loading and unloading purposes.
- .5 The Contractor will be responsible for heated storage for all equipment if it arrives before the Contractor is ready to receive them. The Contractor will be responsible for all costs and coordination of transferring equipment from the storage site to the water treatment plant.

3.3 OPERATION AND MAINTENANCE MANUALS

- .1 Not Applicable.

3.4 INSTALLATION

- .1 The respective manufacturer will supply equipment. The Contractor shall contact the equipment manufacturer/Supplier and be responsible for coordinating schedule, installing equipment and any other onsite activities.

- .2 The Contractor is to review supplier documents closely for demolition and preparation work required for supplier to complete installation of equipment.
- .3 The Contractor will coordinate the staging of construction as per Section 00800 – Supplementary Conditions.
- .4 Contractor to provide equipment as necessary for transporting and transferring equipment and media on site to aid in supplier installation.
- .5 ERPM will be responsible for the operation of the wastewater treatment system during each stage of construction. The Contractor will be responsible for maintenance until Substantial Completion and honoring of warranties as stated herein.
- .6 Any damage resulting from either failure to observe the installation instructions or as a result of proceeding with the work without complete knowledge of how it is to be done, will be the Contractor's responsibility.
- .7 Equipment installation and connections to be performed by skilled tradespeople and carried out to the best standard.
- .8 The Contractor is responsible to carry out work to produce a neat, accurate, secure, functional installation.
- .9 Repair at own expense, any damage done to the installation of materials while carrying out the work.
- .10 Set base plates, sole plates and other supports for equipment in place and shim to correct alignment.
- .11 Upon completion of installation, fill, add to, and check equipment requiring lubricating oils, greases and coolants. Types and amounts to be in strict accordance with manufacturer's recommendations.
- .12 Install anchor bolts and concrete bases in advance of equipment installation in accordance with manufacturer's instructions.

3.5 SUPERVISION AND START-UP

- .1 The Supplier will provide a factory trained Supervisor skilled and experienced in the manufacture, assembly, installation, operation and maintenance of all equipment specified herein for each stage of construction, as specified above.
- .2 The Contractor shall be responsible for providing all labour, equipment, and materials necessary to install, assemble, and test equipment provided by clarification system Supplier, under supervision of the field technical representative.

- .3 The equipment manufacturer's technical representative shall inspect the installation to ensure that the equipment has been installed in accordance with manufacturer's requirements. If the installation is not in order, the Contractor will correct the deficiencies as indicated by the technical representative. At this time, in the presence of the equipment manufacturer's technical representative, start, run, and make required adjustments to the equipment.

3.6 FIELD INSPECTION AND TESTING

- .1 The Supplier shall provide a pre-installation checklist with the equipment. This checklist shall be completed by the Contractor and returned to the Engineer prior to requesting the Supplier's presence for the pre-installation inspection and installation services. When the preparation has been completed to the standards indicated by these specifications, the Contractor shall arrange for the services of the equipment manufacturer's installation team.
- .2 The Supplier's technical representative shall inspect the installation to ensure that the equipment has been installed in accordance with the manufacturer's requirements. If the installation is not in order, correct the deficiencies indicated by the technical representative. Start, run and adjust equipment at this time. The Technical representative shall then advise the Engineer in writing that the installation has been checked, has been installed correctly and is in working order.

3.7 FIELD SERVICE DAYS

- .1 The Supplier will provide personnel days for construction of field service as required by their proposal. The Contractor shall bear all the costs for any additional field services required due to deficiencies or Contractor delays in completing the work.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 This section refers to the supply, installation and satisfactory operation of storage tanks for the following systems for the Wastewater Treatment Plant.
 - .1 Alum Feed System
 - .2 Liquid Polymer Feed System
 - .3 Sodium Hypochlorite System (CIP)
 - .4 Citric Acid System (CIP)
- .2 This specification covers upright, cylindrical, flat and/or cone bottom tanks molded in one-piece seamless construction by rotational molding. The tanks are designed for aboveground, vertical installation and are capable of containing chemicals at atmospheric pressure. Included are requirements for materials, properties, design, construction, dimensions, tolerances, workmanship, and appearance. Tank capacities are from 60 L up to 680 L.
- .3 Approved Manufacturers / Suppliers:
 - .1 ACO Container Systems Ltd.
794 McKay Road
Pickering, ON L1W 2Y4
Phone: (905) 683-8222
Fax: (905) 683-2969
 - .2 Approved Alternates:
 - .1 As approved by Engineer
 - .3 All polyethylene chemical storage tanks to be provided by one manufacturer.

1.2 RELATED SECTIONS

- .1 Section 01340 - Shop Drawings, Product Data and Samples
- .2 Section 01790 - Operation and Maintenance Data and Manuals
- .3 Section 15015 - Mechanical General Requirements
- .4 Section 15020 - Detailed Piping Specifications
- .5 Section 15110 - Valves
- .6 Section 15190 – Disinfection, Hydrostatic and Pressure Testing

1.3 REFERENCE STANDARDS

- .1 ASTM (American Society for Testing and Materials) Standards:
 - D618 Conditioning Plastics and Electrical Insulating Materials for Testing
 - D638 Tensile Properties of Plastics
 - D790 Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
 - D883 Definitions of Terms Relating to Plastics
 - D1505 Density of Plastics by the Density-Gradient Technique
 - D1525 Test Method for Vicat Softening Temperature of Plastics
 - D1693 Test Method for Environmental Stress-Cracking of Ethylene Plastics
 - D1998 Standard Specification for Polyethylene Upright Storage Tanks
 - D2837 Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials
 - D3892 Practice for Packaging/Packing of Plastics
 - F412 Definitions of Terms Relating to Plastic Piping Systems
- .2 ARM (Association of Rotational Molders) Standards:
 - Low Temperature Impact Resistance (Falling Dart Test Procedure)
- .3 ANSI Standards:
 - B-16.5 Pipe Flanges and Flanged Fittings
- .4 OH&S Standards:
 - Applicable Standards

1.4 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01340.
- .2 Shop drawings and product data to include the following:
 - .1 Outline and arrangement drawings.
 - .2 Materials of construction.
 - .3 Details of all tank penetrations.

1.5 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into the manual specified in Section 01790.
- .2 Maintenance data to include the following:
 - .1 Manufacturer's name, type, year fabricated, capacity and serial number.
 - .2 Details of operation, servicing, and maintenance.
 - .3 Recommended spare parts list with names and addresses.

1.6 DESIGN CRITERIA

- .1 Classification:
 - .1 Tanks are classified according to type as follows and it is the responsibility of the purchaser to specify Type I or Type II.
 - .1 Type I - Tanks molded from cross-linkable polyethylene resin.
 - .2 Type II - Tanks molded from linear polyethylene resin (not cross-linkable resin).

1.7 TAGGING

- .1 Provide each piece of equipment with a tag stamped or engraved with the appropriate equipment number, as listed in this Specification.
- .2 Tags to be 20mm high, 75mm long, and 1.5mm thick, plastic Romark "Ultra Suede", 8mm high alphanumeric characters, Helvetica font (01040 cutter), reverse engraved. Characters to be white on coloured background. Background colour to be red.
- .3 The code lettering and number system shall be as shown on the P & I drawings or as directed by the Engineer.
- .4 Affix tags to equipment securely.

1.8 QUALITY ASSURANCE

- .1 Ensure that installations conform with all applicable local, Provincial, and/or Federal codes, standards, and regulations in effect at time of bid.
- .2 Comply with the requirements of the following organizations, at minimum:
 - .1 CSA, Canadian Standards Association.
 - .2 NEC, National Electric Code.
 - .3 NEMA, Standards of National Electrical Manufacturers Association.
 - .4 ANSI, American National Standards Institute.
 - .5 ASTM, American Society for Testing and Materials.
 - .6 AISI, American Iron and Steel Institute.
 - .7 AGMA, American Gear Manufacturer's Association.
 - .8 AISC, American Institute of Steel Construction
 - .9 AWS, American Welding Society.
 - .10 ASME, American Society of Mechanical Engineers
 - .11 NSF, National Sanitation Foundation

1.9 MATERIALS

- .1 All materials to be new, free from defects and conforming to applicable reference standards

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- .2 All materials, linings and coatings in contact with water to be NSF approved for potable water.
- .3 Where any standard referenced has been superseded prior to bidding, the Contractor shall comply with the current standard.
- .4 All tanks should be constructed of materials which are chemically compatible with the chemical stored within it, as per the following:
 - .1 The material used shall be virgin polyethylene resin as compounded and certified by the manufacturer.
 - .2 All polyethylene resin material shall contain a minimum of a U.V. 8 stabilizer as compounded by the resin manufacturer. Pigments may be added at the purchaser's request, but shall not exceed 0.25% (dry blended) of the total weight.

2. PRODUCTS

2.1 ALUM TANK (TK 7141)

- .1 Location:
 - .1 Chemical Room: TK 7141
- .2 Conditions:
 - .1 The storage tank shall be suitable, in all respects, for use with alum.
 - .2 Alum has the following approximate characteristics:
 - .1 Formula: $\text{Al}_2(\text{SO}_4)_3 \cdot 14\text{H}_2\text{O}$
 - .2 Specific Gravity: 1.335
 - .3 pH: 1.9-2.3
 - .4 Solubility in Water: Completely miscible
 - .3 Storage Tank: TK 7141
 - .1 Volume: 310 L
 - .2 Material & Construction: Refer to Section 1 in this specification.
 - .3 Dimensions: 610 mm (24") D x 1270 mm (50") H
 - .4 Manufacturer: ACO Container Systems Ltd. or approved equivalent
 - .5 Model: CT-70
 - .6 Attachments:
 - .1 Flange(s):
 - .1 Not Applicable
 - .2 Bulk Head Fittings(s):
 - .1 All bulkhead fittings are to be supplied by the tank manufacturer, complete with elastomers

- suitable for service, holes drilled at required location, and installed by the Contractor. Bulkhead fitting quantities and locations are indicated on process drawing.
- .2 All tank penetration dimensions and locations are to be field verified by the Contractor.
- .3 Lid:
 - .1 Suitable for tank

.3 Tags: TK 7141,

2.2 LIQUID POLYMER TANK (TK 7341)

- .1 Location:
 - .1 Sludge Management Room
- .2 Conditions:
 - .1 The storage tank shall be suitable, in all respects, for use with sludge dewatering agents.
 - .2 The sludge dewatering agent has the following approximate characteristics:
 - .1 Formula: Polymer
 - .2 Specific Gravity: 1.04
 - .3 pH: 4-5
 - .4 Solubility in Water: Emulsifiable
 - .3 Storage Tank: TK 7341
 - .1 Volume: 180 L
 - .2 Material & Construction: Refer to Section 1 in this specification.
 - .3 Dimensions: 610 mm (24") D x 1295 mm (51") H
 - .4 Manufacturer: ACO Container Systems Ltd. or approved equivalent
 - .5 Model: DMT-40
 - .6 Attachments:
 - .1 Flange(s):
 - .1 Not Applicable
 - .2 Bulk Head Fittings(s):
 - .1 All bulkhead fittings are to be supplied by the tank manufacturer, complete with elastomers suitable for service, holes drilled at required location, and installed by the Contractor. Bulkhead fitting quantities and locations are indicated on process drawing.
 - .2 All tank penetration dimensions and locations are to be field verified by the Contractor.

- .3 Lid:
 - .1 Size: 150 mm diameter threaded

- .3 Tags: TK 7341

2.3 CITRIC ACID TANK (TK 7541)

- .1 Location:

- .1 Membrane Area: TK 7541

- .2 Conditions:

- .1 The storage tank shall be suitable, in all respects, for use with sodium hypochlorite
 - .2 The chemical has the following approximate characteristics
 - .1 Formula: $C_6H_8O_7$
 - .2 Specific Gravity: 1.66
 - .3 pH: 2.2
 - .4 Solubility in water: Soluble

- .3 Storage Tank: TK 7541

- .1 Volume: 340 L
 - .2 Material & construction: Refer to section 1 in this specification
 - .3 Dimensions: 610 mm (24") D x 1245 mm (49") H
 - .4 Manufacturer: ACO Container Systems Ltd. Or approved equivalent
 - .5 Model: OT-75-L
 - .6 Attachments:
 - .1 Flange(s):
 - .1 Not Applicable
 - .2 Bulk Head Fitting(s):
 - .1 All bulkhead fittings are to be supplied by the tank manufacturer, complete with elastomers suitable for service, holes drilled at required location, and installed by the Contractor. Bulkhead fitting quantities and locations are indicated on process drawing.
 - .2 All tank penetration dimensions and locations are to be verified by the contractor
 - .3 Lid:
 - .1 Suitable for tank

- .4 Tags: TK 7541

2.4 SODIUM HYPOCHLORITE (TK 7741)

- .1 Location:
 - .1 Membrane Area: TK 7741
- .2 Conditions:
 - .1 The storage tank shall be suitable, in all respects, for use with sodium hypochlorite
 - .2 The chemical has the following approximate characteristics
 - .1 Formula: NaOCl
 - .2 Specific Gravity: 1.11
 - .3 pH: 11
 - .4 Solubility in water: Soluble
 - .3 Storage Tank: TK 7741
 - .1 Volume: 340 L
 - .2 Material & construction: Refer to section 1 in this specification
 - .3 Dimensions: 610 mm (24") D x 1245 mm (49") H
 - .4 Manufacturer: ACO Container Systems Ltd. Or approved equivalent
 - .5 Model: OT-75-L
 - .6 Attachments:
 - .1 Flange(s):
 - .1 Not Applicable
 - .2 Bulk Head Fitting(s):
 - .1 All bulkhead fittings are to be supplied by the tank manufacturer, complete with elastomers suitable for service, holes drilled at required location, and installed by the Contractor. Bulkhead fitting quantities and locations are indicated on process drawing.
 - .2 All tank penetration dimensions and locations are to be verified by the contractor
 - .3 Lid:
 - .1 Suitable for tank
 - .4 Tags: TK 7741

3. EXECUTION

3.1 MARKING, PACKING, AND PACKAGING

- .1 Equipment shall be marked to identify the product, date (month and year) of manufacture, capacity, and serial number. Equipment shall be shipped with a label containing tank description, manufacturing order number, part number, serial number, manufacturer, and date.
- .2 The proper caution or warning signs as prescribed by OH&S standard shall be customer determined and supplied.
- .3 All packing, packaging, and marking provisions of ASTM Practice D3892 shall apply to this standard.

3.2 SHIPPING, RECEIVING AND STORAGE

- .1 Various sections of the equipment to be properly match-marked to assist in positioning and assembly at the site.
- .2 Tanks with capacities in excess of 2,000 gallons shall incorporate lifting lugs within their construction to assist in off-loading and installation.
- .3 Provide instructions on storage and protection well in advance of shipping. If any special instructions are necessary covering safe storage, give them to the Contractor.
- .4 The Contractor will sign the carrier's bill of lading to indicate receipt of the required number of crates, packages, etc., and will note thereon any apparent shortages of or visible damage to such crates, packages, etc. The supplier shall furnish to the Contractor, lists showing the contents of the said crates, packages, etc., complete with all necessary handling and off-loading instructions. Such lists shall be furnished sufficiently early so that copies will be available at the site when delivery of the said equipment and appurtenances is made. Within seven days after the date of delivery to the site, the Contractor will notify the Supplier in writing of shortages or damage in equipment delivered.
- .5 The Contractor will provide unloading facilities and place the equipment in location or storage. The Contractor will be responsible for off-loading at site, for storing the equipment, appurtenances and materials and for protection against weather loss, damage, or theft. The supplier shall provide full instructions of all precautions to be observed in connection with the handling, storing and protection of the equipment.

3.3 INSTALLATION

- .1 Installation of the tanks shall be in strict accordance with manufacturer's instructions. Any damage resulting from either failure to observe the installation instructions or as a result of proceeding with the work without complete knowledge of how it is to be done shall be the Contractor's responsibility.

- .2 Equipment installation and required connections shall be made by skilled tradesman to the best standard. The work shall be carried out to produce a neat, accurate, secure, functional installation. Where piping connections are made to equipment, unions and thread lubrications or other couplings allowing ease of disconnection, shall be provided. Any damage done to the equipment or materials while carrying out this work shall be repaired at the Contractor's expense.
- .3 Equipment shall be properly aligned with respect to drives and connecting piping. Under no circumstances will pipe springing be allowed.

3.4 EQUIPMENT TESTING PROCEDURE

- .1 Submit a thorough description of the procedures to be employed in testing this equipment. The procedure will be reviewed by the Engineer for suitability and should be submitted 3 weeks prior to any testing.

3.5 FIELD TESTING

- .1 When equipment installation has been completed to the standards indicated by these specifications, arrange for the services of the equipment manufacturer's technical representative.
- .2 The equipment manufacturer's technical representative shall inspect the installation to ensure that the equipment has been installed in accordance with the manufacturer's requirements. If the installation is not in order, correct the deficiencies indicated by the technical representative. Start, run and adjust equipment at this time. The technical representative shall then advise the Engineer in writing that the installation has been checked, has been installed correctly and is in working order.
- .3 Bear all the costs of the equipment manufacturer's technical representative.
- .4 Use only personnel who have taken an active part in the actual installation of the system. Do not designate a subtrade as representative at any time during the construction prior to final inspection.
- .5 Refer to Section 15190 – Disinfection, Hydrostatic and Pressure Testing for details on required testing procedures for polyethylene chemical storage tanks.

3.6 EQUIPMENT MANUFACTURER'S REPRESENTATIVE

- .1 Not Applicable

3.7 FIELD INSPECTION

- .1 Final inspection will be made by the Engineer only after the equipment manufacturer's technical representative has advised that equipment installation is in order and the Contractor has advised in writing that the system can be operated.

- .2 The Engineer will request that the equipment be operated to demonstrate that it will perform as specified. The Engineer will note deficiencies, and if possible, the deficiency will be corrected immediately by the Contractor. All deficiencies that cannot be corrected at the time of inspection will be noted by the Engineer who will advise the Contractor of these deficiencies in writing. Correct the deficiencies as soon as possible and advise the Engineer of their correction. Should the deficiencies be of a sufficiently serious nature to require the work to be re-inspected, the cost of the inspection will be borne by the Contractor.

3.8 OPERATOR TRAINING

- .1 Not Applicable

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 This Section refers to the supply, installation and satisfactory operation of a complete polymer feed system.
- .2 Approved Supplier:
 - .1 Velodyne Dynamics
c/o
Mequipco Ltd.
#305 2265 Pembina Hwy
Winnipeg, MB R3T 5J3
Phone: (204) 982-1040
 - .2 Approved Alternates:
 - .1 Fluid Dynamics
c/o
Capital H₂O Systems Inc.
Unit B, 5040 12A st SE.
Calgary, AB T2G 5K9
Phone: (403) 251-2438
Fax: (403) 251-0428
 - .2 Any proposed alternate must be proven to provide at least an equal level of performance, reliability, versatility and quality to the system specified. If, after installation, it is shown that the alternate system does not provide an equal level of performance, reliability, versatility and quality to that specified, the contractor shall replace the system with the specified system at their sole cost.
- .3 The Owner will be responsible for supplying all chemical required for the new chemical feed equipment. The Contractor will co-ordinate the requirement for chemicals with the Owner and Engineer.
- .4 Furnish two (2) polymer blending unit (PBU) with progressive cavity pump, motors and controls, including all integral piping, valves, fitting, pipe supports, special equipment and appurtenances in accordance with these specifications, including all incidental work necessary to make it complete, satisfactory and ready for operation.
- .5 The polymer dilution and feed system shall be capable of effectively activating and fully blending with water a homogenous polymer solution ranging from 0.1% to 1% concentration of emulsion polymers with active contents up to 75%

1.2 RELATED SECTIONS

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- .1 Section 01340 - Shop Drawings, Product Data and Samples
- .2 Section 01790 - Operation and Maintenance Data and Manuals
- .3 Section 13311 - Instrumentation - Wiring
- .4 Section 15015 - Mechanical General Requirements
- .5 Section 15020 - Detailed Piping Specifications
- .6 Section 15110 - Valves
- .7 Section 15190 - Disinfection, Hydrostatic and Pressure Testing

1.3 REFERENCE STANDARDS

- .1 ANSI Standards:
 - B-16.5 Pipe Flanges and Flanged Fittings
- .2 OH&S Standards:
 - Applicable Standards

1.4 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01340.
- .2 Shop drawings and product data to include the following:
 - .1 Outline and arrangement drawings.
 - .2 Cross-section drawings.
 - .3 Materials of construction.
 - .4 Details of stuffing box or mechanical seal arrangement.
- .3 Submit data completely describing product, including detailed scope of supply, detailed bill of materials and annotated specification sheets of all components.
- .4 Submit detailed specifications and shop drawings with both shaded isometric and orthogonal views of the proposed system, including dimensions and weights.
- .5 Submit wiring, control schematics, and control logic diagrams for all electrical and control components furnished.
- .6 Provide detailed Operations and Maintenance Manuals including storage, installation start-up and operating instructions. Provide safety precautions and warnings of all hazards operating equipment.

1.5 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into the manual specified in Section 01790.
- .2 Maintenance data to include the following:
 - .1 Manufacturer's name, type, model year, capacity and serial number.
 - .2 Details of operation, servicing, and maintenance.
 - .3 Recommended spare parts list with names and addresses.
 - .4 As-built wiring diagrams.

1.6 DESIGN CRITERIA

- .1 All components for the packaged chemical feed system shall be designed and supplied by a single vendor.
- .2 All components of the chemical storage and feed systems shall be specifically designed for handling the intended chemicals, and shall be constructed from appropriate corrosion and abrasion resistant materials.
- .3 All electrical equipment shall be CSA approved.
- .4 All electrical connection external to this equipment will be performed under Division 13 and 16.
- 5. Where equipment is supplied with larger power requirements than that specified, the Contractor shall coordinate the power supply to ensure compatibility with the electrical and control components without any additional costs to the owner.
- 6. Polymer Type: Emulsion
- 7. Polymer Activity (percent active): 30 to 75
- 8. Solution Concentration Range: 0.1% to 2% based on neat polymer
- 9. Solution Concentration Design Point: 0.5% based on neat polymer

1.7 TAGGING

- .1 Provide each piece of equipment with a tag stamped or engraved with the appropriate equipment number, as listed in this Specification.

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- .2 Tags to be 20mm high, 75mm long, and 1.5mm thick, plastic Romark "Ultra Suede", 8mm high alphanumeric characters, Helvetica font (01040 cutter), reverse engraved. Characters to be white on coloured background. Background colour to be red.
- .3 The code lettering and number system shall be as shown on the P & I drawings or as directed by the Engineer.
- .4 Affix tags to equipment securely.

1.8 QUALITY ASSURANCE

- .1 Ensure that installations conform with all applicable local, Provincial, and/or Federal codes, standards, and regulations in effect at time of bid.
- .2 Comply with the requirements of the following organizations, at minimum:
 - .1 CSA, Canadian Standards Association.
 - .2 NEC, National Electric Code.
 - .3 NEMA, Standards of National Electrical Manufacturers Association.
 - .4 ANSI, American National Standards Institute.
 - .5 ASTM, American Society for Testing and Materials.
 - .6 AISI, American Iron and Steel Institute.
 - .7 AGMA, American Gear Manufacturer's Association.
 - .8 AISC, American Institute of Steel Construction
 - .9 AWS, American Welding Society.
 - .10 ASME, American Society of Mechanical Engineers
 - .11 NSF, National Sanitation Foundation
- .3 Prior to shipment the system shall be inspected for quality of construction verifying all fasteners and fittings are tight, all wires are secure and connections whisker-free.
- .4 The complete system shall be fully factory tested prior to shipment. Testing shall include: setting and verification of all instrumentation and sensors per the design requirements of the application; pressure testing all plumbing systems for a minimum of one hour at 100 psi. If leaks are found they shall be fixed and a new test shall be conducted for one hour at 100 psi until the plumbing system is verified to be leak free; verification of system design flow rates, and; complete functional simulation of operation.

1.9 MATERIALS

- .1 All materials to be new, free from defects and conforming to applicable reference standards.
- .2 All materials, linings and coatings in contact with water to be NSF approved for potable water.

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- .3 Where any standard referenced has been superseded prior to bidding, the Contractor shall comply with the current standard.

2. PRODUCTS

2.1 POLYMER FEED SYSTEM (P 7341)

- .1 General:
 - .1 The unloading, storage, mixing, and feeding facilities shall be suitable in all respects for use with various emulsifying polymers.
 - .2 Location:
 - .1 Sludge Management Room: P 7341
 - .3 Conditions:
 - .1 Temperature: 15.6°C (60°F)
 - .4 Polymer has the following approximate characteristics:
 - .1 Formula: polymer
 - .2 Specific Gravity: 1.04
 - .3 pH: 4 to 5
 - .4 Packaging: 210-liter Drums
- .2 Specified Product: P 7341
 - .1 Manufacturer: Velodyne Dynamics, VeloBlend, VM-series
 - .1 Alternates:
 - .1 Fluid Dynamics, mini BLEND, L4S Series
 - .2 Model: P 7341: VN-0.5P-120-D-0-A-1
 - .1 Solution: Sludge Thickening (1.0% Solids):
 - .2 Metering Pump Range: 0.015 – 1.58L/hr. (0.004 – 0.42 gph)
 - .3 Dilution Water Range: 38 – 375 L/hr. (10 – 100 gph)
- .3 Materials
 - .1 System skid: 304 stainless steel
 - .2 Hardware: Type 18-8 stainless steel
 - .3 Inlet and Outlet fittings: 304 stainless steel
 - .4 Piping & pipe fittings: schedule 80 PVC
 - .5 Tubing and tube fittings: polyethylene, polypropylene, stainless steel and Viton
 - .6 Water solenoid valve: brass
 - .7 Pressure gauges: stainless steel, liquid filled
 - .8 Pressure switches: NEMA 4, brass connection

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- .9 Flow meter: acrylic, stainless steel, PVC and or polypropylene
 - .10 Water control valve: stainless steel with stainless steel seat
 - .11 Mixing chamber body / flanges: stainless steel
 - .12 Mixing chamber cover / chamber: clear polycarbonate
 - .13 Mixing Chamber Discharge: stainless steel
 - .14 Impeller: 304 stainless steel
 - .15 Impeller shaft seal: Viton, stainless steel, ceramic, carbon
 - .16 Mixing chamber pressure relief valve: brass, stainless steel or PVC
 - .17 Metering pump wetted parts: stainless steel & Viton
 - .18 Metering Pump Shaft Seals: Viton, stainless steel ceramic, carbon
 - .19 Control enclosure: FRP
 - .20 Connections – Plumbing
 - .1 Dilution water inlet, 1” FNPT
 - .2 Neat polymer inlet, 1” FNPT
 - .3 Solution discharge, 1” FNPT
 - .21 Connections – Electrical
 - .1 Standard, grounded male plug – 120 / 1 / 60, 15 amps
 - .2 Plug in connection – 4-20 mA signal input
 - .3 Terminal blocks – dry contact input for remote start
 - .4 Terminal blocks – dry contact alarm output
 - .5 Terminal blocks – dry contact run output
 - .6 Terminal block – control switch status output
- .4 Polymer Activation & Blending Chamber:
- .1 Multi-stage, multi-zone, Hydro-Mechanical polymer activation & blending technology.
 - .2 Non-mechanical or mechanical mixing methods:
 - .1 Non-Mechanical Stage:
 - .1 Capable of activating and blending polymer based on 30 psid or greater plant water pressure.
 - .2 Injection quill positioned such that the non-mechanical mixing energy is no way diminished prior to polymer and water contact.
 - .3 Design such that the velocity of the mixing energy-producing water jet is maintained or increases as flow decreases.
 - .2 Hydro-Mechanical mixing Stage:
 - .1 Capable of producing its mixing energy independent of plant water pressure through a variable intensity, controllable stainless steel hydro-mechanical mixer.

- .2 The mixing impeller shall be fully controllable and capable of inducing ultra-high, non-damaging mixing energy at all flow rates.
 - .1 The polymer mixing impeller to produce both axial and radial flow.
 - .3 Mixers that rely solely on plant water pressure and or flow for mixing energy will not be acceptable.
- .3 Mixing chamber to maintain high velocity in the entire chamber.
- .4 Mixing impeller shall be controlled by an SCR motor controller and driven by a wash-down duty motor.
 - .1 Motor shall be mounted horizontally or above the mixing chamber.
- .5 The mixer drive shaft shall be sealed by a mechanical seal which shall have an integrally mounted and factory plumbed seal flush.
 - .1 A drain port behind the seal shall be provided in the mixing chamber to drain the polymer solution in case of a seal failure.
 - .2 The seal shall be easily accessible for replacement. All bearings shall be external from the mixing chamber.
- .6 Both mechanical and non-mechanical mixing zones shall be clear polycarbonate. The clear cover shall have a stainless steel reinforced gusseted flange with a stainless steel discharge connection.
- .7 The mixing chamber shall have a maximum rated pressure of 100 psi. Provide a pressure relief on the mixing chamber factory set at 75 psi.
- .8 Provide a neat polymer check valve.
 - .1 The valve shall be designed with an open, unobstructed path to the valve seat.
 - .2 The minimum open area up to and including the valve seat shall be 3/16".
 - .3 The valve body shall be constructed of Teflon with Viton seals.
 - .4 The valve poppet and spring shall be stainless steel.
 - .1 The spring shall be outside of the polymer flow path.
 - .5 The locking pin used to hold the valve in place shall be attached to the mixing chamber with a lanyard.
 - .6 The valve shall be readily accessible for cleaning and shall not require tools for removal, cleaning or replacement.

- .7 Conventional check valves, valves that rely on ball seals, and or check valves that are installed inside the mixing chamber, or which require mixing chamber disassembly for servicing will not be accepted.
- .5 Dilution Water Assembly:
 - .1 The dilution water flow rate shall be monitored by a Rotameter flow meter having the range as specified.
 - .1 Unions or flanges shall be provided on the flow meter to allow easy removal for cleaning.
 - .2 The unit shall have an electric solenoid valve for on/off control of total dilution water flow.
 - .3 A differential pressure type low water differential pressure alarm shall be provided.
 - .1 Adjustable between 9 and 60 psid.
 - .2 Static working pressure, 500 psi.
 - .3 Proof pressure shall be 2000 psi minimum.
 - .4 Manufactured by Ashcroft.
 - .4 Provide a 2-1/2" stainless steel liquid filled pressure gauge to monitor dilution water inlet pressure.
- .6 Progressive Cavity Neat Polymer Metering Pump:
 - .1 One (1) neat polymer metering pump(s) integrally mounted on the systems skid.
 - .1 Flow range as specified.
 - .2 Positive displacement, progressive cavity type constructed of stainless steel and Viton.
 - .3 The shaft seal shall be a lip seal type riding on a ceramic sleeve.
 - .4 A 90 VDC wash-down duty motor drive.
 - .5 A gear reducer shall be provided to produce a maximum pump shaft speed of not more than 545 RPM.
 - .6 The motor shall be controlled by an SCR motor controller located in the system control panel.
 - .2 Provide a calibration column with two full port PVC ball valves having Viton o-rings.
 - .1 Calibrated for a one minute draw-down at maximum pump rate and read in LPH and milliliters.
 - .2 Rigidly mounted to the systems frame with a minimum of two heavy duty brackets.

- .3 Provide a breather plug in the top of the calibration column designed to allow adequate displacement of air during calibration while preventing water or other foreign material from entering the calibration column.
- .3 Provide a pressure relief on the discharge of the metering pump.
 - .1 Adjustable between 25 and 100 psi.
 - .2 Factory plumbed to the suction of the pump.
 - .3 Stainless steel or PVC body with stainless steel, Viton and Teflon internals.
- .4 Provide a pressure gauge / switch assembly with stainless steel diaphragm isolator to monitor polymer line pressure.
- .5 Provide a thermal flow sensor for loss of polymer flow detection, and protection of progressive cavity pump.
- .7 Solution Discharge Assembly:
 - .1 Provide a 2-1/2" stainless steel liquid filled pressure gauge to monitor system discharge pressure.
 - .2 Provide a swing type check valve to prevent back flow.
 - .1 The check valve shall be sized for the total solution flow of the system, constructed of PVC and Viton.
- .8 Controls:
 - .1 A control panel integral to the systems frame shall be provided.
 - .1 NEMA 4X enclosure and constructed of FRP.
 - .2 Consist of all controllers, digital displays, potentiometers, switches, lights, relays, and other control devices required for a complete operable system.
 - .3 The control panel and all components shall be industrial duty.
 - .4 All skid mounted electrical components interconnected to the control panel shall terminate at numbered and labeled terminal blocks.
 - .5 The terminal blocks shall be sized for 14 ga. wire.
 - .6 Wires shall be neatly run through wire race-way and numbered with shrink tubing type labels.
 - .7 Adhesive labels shall not be used.

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- .8 The control panel shall be positioned such that there are no obstructions in front of the control panel per related NFPA requirements.
- .2 Power: 120 VAC, 1Ph, 60/50 Hz. with a 10' power cord and receptacle,
- .3 A circuit breaker on the main control circuit and on each motor shall be provided as manufactured by Allen Bradley or equal. Fuses shall not be used for circuit protection.
- .4 Operator Interface – Discrete Selector Switch:
 - .1 System ON / OFF(reset) / Remote
 - .2 One-Turn Potentiometer – Mixer Speed
 - .3 Ten-Turn Potentiometer – Progressive Cavity Metering Pump Control
- .5 Status / Alarm Indicators:
 - .1 Main Power ON
 - .2 Display of Metering Pump Rate
 - .3 Low Water Differential Pressure Alarm
 - .4 Low Polymer Flow Alarm
- .6 Inputs (signals by others):
 - .1 Remote Start / Stop (discrete dry contact)
 - .2 Pacing Signal Based on Process Flow (4-20mA)
- .7 Outputs:
 - .1 System Running (discrete dry contact)
 - .2 Remote Mode (discrete dry contact)
 - .3 Common Alarm (discrete dry contact)
- .8 Emergency Stop Button
- .9 System Skid:
 - .1 The system's frame shall be of rugged 304 stainless steel construction. No mild steel shall be used. All piping shall be rigidly supported.
 - .2 Under no circumstance shall the pump suction exceed 5" from the bottom of the skid for progressive cavity pumps.
 - .3 The skid shall have an integral stainless steel drip pan located under the neat polymer metering pump. Provide one dozen absorbent pads designed for oil and sized to fit within the drip pan.
 - .4 The overall system dimensions shall not exceed 34"W x 24"D X 42"H.
- .10 Accessories:
 - .1 N/A

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.11 Spare Parts & Special Tools

- .1 One (1) progressive cavity pump stator.
- .2 One (1) progressive cavity pump lip seal.
- .3 One (1) banding clamp tool for replacement of the progressive cavity metering pump pin joint banding clamps.
- .4 Provide one (1) neat polymer check valve, complete.

.6 Tag #'s: P 7341

2.2 MODE OF OPERATION

- .1 Emulsifying polymer will be delivered in bulk liquid form in 210 litre drums.
- .2 The polymer will be transferred from the drum into a 210 litre day tank using a chemical transfer pump. The pump will be manually operated by the Operator. The chemical metering pump on the polymer feed system will draw polymer from the day tank.
- .3 A low level switch located in the day tank will be triggered when the product level drops to an Operator determined set point.
- .4 The polymer feed system will be controlled by the WWTP main PLC.

3. EXECUTION

3.1 MARKING, PACKING, AND PACKAGING

- .1 Equipment shall be marked to identify the product, date (month and year) of manufacture, capacity, and serial number. Equipment shall be shipped with a label containing equipment description, manufacturing order number, part number, serial number, manufacturer, and date.
- .2 The proper caution or warning signs as prescribed by OH&S standard shall be customer determined and supplied.
- .3 All packing, packaging, and marking provisions of ASTM Practice D3892 shall apply to this standard.

3.2 SHIPPING, RECEIVING AND STORAGE

- .1 Various sections of the equipment to be properly match-marked to assist in positioning and assembly at the site.
- .2 The equipment shall be shipped to site assembled to the greatest extent possible to reduce installation and start-up costs.

- .3 Provide instructions on storage and protection well in advance of shipping. If any special instructions are necessary covering safe storage, give them to the Contractor.
- .4 The Contractor will sign the carrier's bill of lading to indicate receipt of the required number of crates, packages, etc., and will note thereon any apparent shortages of or visible damage to such crates, packages, etc. The supplier shall furnish to the Contractor, lists showing the contents of the said crates, packages, etc., complete with all necessary handling and off-loading instructions. Such lists shall be furnished sufficiently early so that copies will be available at the site when delivery of the said equipment and appurtenances is made. Within seven days after the date of delivery to the site, the Contractor will notify the Supplier in writing of shortages or damage in equipment delivered.
- .5 The Contractor will provide unloading facilities and place the equipment in location or storage. The Contractor will be responsible for off-loading at site, for storing the equipment, appurtenances and materials and for protection against weather loss, damage, or theft. The supplier shall provide full instructions of all precautions to be observed in connection with the handling, storing and protection of the equipment.

3.3 INSTALLATION

- .1 Install all equipment in strict accordance with manufacturer's and supplier's instructions.
- .2 Any damage resulting from either failure to observe the installation instructions or as a result of proceeding with the work without complete knowledge of how it is to be done will be the Contractor's responsibility.
- .3 Make equipment installation and connections by skilled tradesmen to the best standard.
- .4 Carry out work to produce a neat, accurate, secure, functional installation.
- .5 Repair at own expense, any damage done to the installation of materials while carrying out the work.
- .6 Install anchor bolts and concrete bases in advance of equipment installation in accordance with manufacturer's instructions.
- .7 Shim equipment to correct alignment. Grout as required.
- .8 Upon completion of installation, fill, add to, and check equipment requiring lubricating oils, greases and coolants. Types and amounts to be in strict accordance with manufacturer's recommendations.

3.4 EQUIPMENT TESTING PROCEDURE

- .1 Submit a thorough description of the procedures to be employed in testing this equipment. The procedure will be reviewed by the Engineer for suitability and should be submitted 3 weeks prior to any testing.

3.5 FIELD TESTING

- .1 When equipment installation has been completed to the standards indicated by these specifications, arrange for the services of the equipment manufacturer's technical representative.
- .2 The equipment manufacturer's technical representative shall inspect the installation to ensure that the equipment has been installed in accordance with the manufacturer's requirements. If the installation is not in order, correct the deficiencies indicated by the technical representative. Start, run and adjust equipment at this time. The technical representative shall then advise the Engineer in writing that the installation has been checked, has been installed correctly and is in working order.
- .3 Bear all the costs of the equipment manufacturer's technical representative.
- .4 Use only personnel who have taken an active part in the actual installation of the system. Do not designate a subtrade as representative at any time during the construction prior to final inspection.

3.6 EQUIPMENT MANUFACTURER'S REPRESENTATIVE

- .1 The equipment manufacturer's technical representative shall be familiar with the equipment supplied and shall come prepared with both knowledge and equipment to perform and interpret the test, inspections and procedures recommended by the manufacturer for the starting of equipment that has not previously been run.
- .2 The equipment manufacturer's technical representative shall, immediately after completion of the inspection, convey to the Engineer in writing, confirmation of the tests and inspections carried out and the result of this examination of the work.
- .3 If the inspection reveals defects in the work, correct as soon as possible and repeat the entire inspection procedure. Repeat until the work passes the inspection.
- .4 Document the results of the inspection by the equipment manufacturer's representative.
- .5 Ensure the installation meets all manufacturer's requirements for durable and trouble-free operation.

3.7 FIELD INSPECTION

- .1 Final inspection will be made by the Engineer only after the equipment manufacturer's technical representative has advised that equipment installation is in order and the Contractor has advised in writing that the system can be operated.

- .2 The Engineer will request that the equipment be operated to demonstrate that it will perform as specified. The Engineer will note deficiencies, and if possible, the deficiency will be corrected immediately by the Contractor. All deficiencies that cannot be corrected at the time of inspection will be noted by the Engineer who will advise the Contractor of these deficiencies in writing. Correct the deficiencies as soon as possible and advise the Engineer of their correction. Should the deficiencies be of a sufficiently serious nature to require the work to be re-inspected, the cost of the inspection will be borne by the Contractor.

3.8 OPERATOR TRAINING

- .1 Supplier shall provide the services of a skilled technical representative for a minimum period of one (1) day at the site to instruct plant personnel in the operation and service of the equipment.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Supply and install thickener complete with auxiliary equipment and appurtenances to thicken Wastewater Activated Sludge (WAS) as indicated on the Contract Drawings and in this Specification.
- .2 Approved Manufacturers:
 - .1 JWC / IPEC Consultants Ltd.
 - .2 Alternate:
 - .1 Alfa Laval Inc.
 - .1 Equipment supplied by approved alternate must be of the same or greater quality than equipment from specified manufacturer.
 - .2 All alternates must conform to the intent of the approved manufacturer including technical specification, type, performance, flanges, materials of construction, motors, seals, etc.
 - .3 The Contractor is responsible for any piping, valving, and fitting modifications that may occur from using approved alternate pump selection.
 - .4 The Contractor is responsible for any electrical modifications including VFD's, generator sizing, wiring, etc. that may occur from using alternate pump selection.
 - .5 The Contractor is responsible for any additional engineering fees incurred by MPE Engineering Ltd., necessitated as a result of the supply of an alternative pump.
- .3 All thickening equipment to be provided by one (1) manufacturer.
- .4 All control of screening equipment to be performed by WWTP main PLC. No integral control panel is to be supplied with thickening equipment.

1.2 RELATED SECTIONS

- .1 Section 01340 - Shop Drawings, Product Data and Samples
- .2 Section 01790 - Operation and Maintenance Data and Manuals
- .3 Section 13311 - Instrumentation - Wiring
- .4 Section 15015 - Mechanical General Requirements
- .5 Section 15020 - Detailed Piping Specifications
- .6 Section 15110 - Valves

1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit product data and shop drawings including operation and maintenance manuals to the Engineer for review in accordance with Section 01340.
- .2 Shop drawings and product data to include the following:
 - .1 Make, model, and weight of each equipment assembly.
 - .2 Complete catalog information, descriptive literature, specifications, and materials of construction.
 - .3 Detailed structural and mechanical drawings showing the equipment dimensions, size, and installation.
 - .4 Detailed structural and mechanical drawings showing motors, thickener drives, schematic wiring diagrams and interconnections wiring diagrams, interconnecting piping, pipe supports, and size and length of each support frame member.
 - .5 Factory protective coatings.
 - .6 Anchor bolt calculations and mounting details for each equipment assembly.
 - .7 Electrical information including, but not limited to, full load current and locked rotor current.
 - .8 All submittal information as required per Division 16.
 - .9 Details of storage and off-loading requirements.
 - .10 Sample warranty.
- .3 Quality Control Submittals:
 - .1 Factory functional test report.
 - .2 Field performance test report.
 - .3 Certified test results for sludge conditioning system.
 - .4 Certificate of Installation.
 - .5 Manufacturer's installation manuals.
- .4 Maintenance Manual: Submit the following:
 - .1 Lubrication instructions.
 - .2 Maintenance instructions.
 - .3 Operation instructions.
 - .4 Start-up instructions.
 - .5 Unloading and handling methods.
- .5 Manufacturer's Qualifications: Submit all information proving conformance with manufacturer's qualifications requirements.
- .6 Warranties.
- .7 Certificates.
- .8 Technician Qualifications Resume: Submit resume of technician to perform rotary drum thickener adjustments, inspections, performance testing, and training.
- .9 Training Course Outline.

1.4 REFERENCE STANDARDS

- .1 ANSI Standards:
B-16.5 Pipe Flanges and Flanged Fittings
- .2 OH&S Standards:
Applicable Standards

1.5 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into the manual specified in Section 01790.
- .2 Maintenance data to include the following:
 - .1 Manufacturer's name, type, model year, capacity and serial number.
 - .2 Details of operation, servicing, and maintenance.
 - .3 Recommended spare parts list with names and addresses.
 - .4 As-built wiring diagrams.

1.6 DESIGN CRITERIA

- .1 The RDT unit is to be designed to achieve the following performance parameters:
 - .1 Thicken Wasted Activated Sludge following a Membrane Bioreactor Treatment Process
 - .2 Maximum Month Flow Sludge Production
 - .1 Flow: 6.7 - 10.9 m3/d
 - .2 %Solids: 1.0 – 1.2
 - .3 Solids Loading: 2.79 – 5.49 kg/hr.
 - .2 Thickened Sludge Consistency Minimum: 4%
 - .3 Capture: 96% - 98%
 - .4 Operation: Intermittent
 - .5 Temperature: 2-25°C (60°F)

1.7 TAGGING

- .1 Provide each piece of equipment with a tag stamped or engraved with the appropriate equipment number, as listed in this Specification.
- .2 Tags to be 20mm high, 75mm long, and 1.5mm thick, plastic Romark "Ultra Suede", 8mm high alphanumeric characters, Helvetica font (01040 cutter), reverse engraved. Characters to be white on coloured background. Background colour to be red.

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- .3 The code lettering and number system shall be as shown on the P & I drawings or as directed by the Engineer.
- .4 Affix tags to equipment securely.

1.8 QUALITY ASSURANCE

- .1 Ensure that installations conform with all applicable local, Provincial, and/or Federal codes, standards, and regulations in effect at time of bid.
- .2 Comply with the requirements of the following organizations, at minimum:
 - .1 CSA, Canadian Standards Association.
 - .2 NEC, National Electric Code.
 - .3 NEMA, Standards of National Electrical Manufacturers Association.
 - .4 ANSI, American National Standards Institute.
 - .5 ASTM, American Society for Testing and Materials.
 - .6 AISI, American Iron and Steel Institute.
 - .7 AGMA, American Gear Manufacturer's Association.
 - .8 AISC, American Institute of Steel Construction
 - .9 AWS, American Welding Society.
 - .10 ASME, American Society of Mechanical Engineers
 - .11 NSF, National Sanitation Foundation
- .3 Prior to shipment the system shall be inspected for quality of construction verifying all fasteners and fittings are tight, all wires are secure and connections whisker-free.
- .4 The complete system shall be fully factory tested prior to shipment. Testing shall include: setting and verification of all instrumentation and sensors per the design requirements of the application; pressure testing all plumbing systems for a minimum of one hour at 100 psi. If leaks are found they shall be fixed and a new test shall be conducted for one hour at 100 psi until the plumbing system is verified to be leak free; verification of system design flow rates, and; complete functional simulation of operation.

1.9 MATERIALS

- .1 All materials to be new, free from defects and conforming to applicable reference standards.
- .2 Where any standard referenced has been superseded prior to bidding, the Contractor shall comply with the current standard.

2. PRODUCTS

2.1 ROTARY DRUM THICKENER (RDT 3101)

- .1 Location:

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- .1 DRT 3101: Treatment Area
- .2 Approved Products: RDT 3101
 - .1 IPEC Model IFT 2448 internally fed rotary drum thickener, in all 304 stainless steel construction, as supplied by *Mequipco Ltd.*, (204) 982-1040.
 - .1 Screen Drum
 - .1 Material: Type 304 Stainless Steel;
 - .2 Screen Cage: 3/8" X 2" And 3/8" X 1-1/2" Flatbar;
 - .3 Rollends: 3/16" Plate With 1/4" Flanges;
 - .4 Panels: Stainless Steel Mesh On PVC Coated Stainless Steel 1-1/2 – 13 F Expanded Metal;
 - .5 Panel Configuration: 24" Of 425 Micron And 24" Of 500 Micron.
 - .6 Screen Mechanical:
 - .1 Wheels: 6 OD x 2" wide; UHMW polyurethane; 75 durometer.
 - .2 Wheel Bearings: double row ball bearings; double lip seals.
 - .3 Wheel Axle: 1" diameter.
 - .4 Gearbox: helical geardrive; ratio – 55.76 : 1;
 - .5 Motor: 1/3 hp; 1750 rpm; 575/3/60, EX Class 1 Div.1; 1.15 SF.
 - .6 Driven Sprocket: material - type 304 stainless steel; 90 tooth; 3/4" pitch.
 - .7 Drive Sprocket: material - type 304 stainless steel; 15 tooth; 1" pitch.
 - .8 Chain #60 single pitch stainless steel roller chain.
 - .9 Drum: 610 mm Diameter by 1220 mm long
 - .2 Housing
 - .1 Material: Type 304 Stainless Steel;
 - .2 Splash Guards: 11 Gauge;
 - .3 Drainage Pan: 11 Gauge;
 - .4 Discharge Chute: 11 Gauge;
 - .5 Legs 3" X 3" X 1/8" Tubing;
 - .6 Frame 2" X 2" X 1/8" Tubing;
 - .7 Arch Framing: 2" X 2" X 1/8" Tubing;
 - .8 Mechanical Mounts: 1/2" Plate;
 - .9 Drain Fitting: 2" Sch 10 C/W 150" Stainless Steel ANSI Flange;
 - .10 Solids: 8" X 12" Flanged.
 - .3 Covers
 - .1 Material: Type 304 Stainless Steel;
 - .2 Top And Top Sides: 12 Gauge;
 - .3 Ends: 12 Gauge;
 - .4 Fittings Inspection: 12 Gauge, Hinged With Latch.

- .4 Headbox & Internals
 - .1 Material: Type 304 Stainless Steel;
 - .2 Influent Pipe: 4" Sch 10 C/W 150# Stainless Steel Flange;
 - .3 Distribution Tank: 10 Gauge;
 - .4 Drain: 2" Opening;
 - .5 Spray Collection: 11 Gauge.
- .5 External Spray Bar
 - .1 Material: Type 304 Stainless Steel;
 - .2 Pipe: 1" Sch 40 And MNPT Both Ends, Fittings C/W One (1) End Cap;
 - .3 Nozzles: 14 Fan Jet Spray Pattern;
 - .4 Water Usage: 1.0 USgpm @ 40 Psi Each Nozzle;
 - .5 Connections: Connect To 1" Sch 40 Manifold;
 - .6 Ball Valve 1" Meridian;
 - .7 Actuated Ball Valve 1" (BAV 3168);
 - .8 Pressure Regulator: 1" (PR 3131);
 - .9 1-100 Pressure Gauge ENFM (PI 3131);
 - .10 1" Pressure Switch (PSL 3131);
 - .10 1" NC solenoid valve (FV 3168, SPARE)
 - .1 Manufacturer: ASCO or equivalent.
 - .2 Model: 8210
 - .3 Type: Two way pilot operated solenoid globe valve
 - .1 Operation:
 - .1 Normally Closed: FV 2168
 - .2 Normally Open: N/A
 - .4 Operating Pressure Differential: 0 to 1035 kPa (150 psi)
 - .5 Materials:
 - .1 Body: Brass
 - .2 Seals & Discs: Buna "N"
 - .3 Core Tube: 305 Stainless Steel
 - .4 Core and Plugnut: 430F Stainless Steel
 - .5 Springs: 302 Stainless Steel
 - .6 Specified Solenoid:
 - .1 Power: 120 VAC; 60 Hz
 - .2 Electrical Connection: 1/2" NPT
 - .3 Enclosure:
 - .1 EF: Combination Explosion proof and Water Tight, Types 1, 2, 3, 3S, 4, and 4X
 - .7 Approved Alternate:
 - .1 Burkert 6213
 - .8 Tag #'s: FV 2168, SPARE
- .6 Flocculation Swirl Tank
 - .1 Material: Type 304 Stainless Steel;
 - .2 Tank: Sch 10 Pipe;

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- .3 Influent Pipe: 2" ANSI Flange;
- .4 Outlet Pipe: 4" Sch Pipe C/W 150# Stainless Steel Ansi Flange;
- .5 Drain Fitting: 2" FNPT C/W Stainless Steel Ball Valve;
- .6 Access: 6" X 6".
- .7 Size: 273 mm diameter by 886mm High

- .7 Polymer Injection Fitting / Mixing Valve
 - .1 4 Point Injection Ring On 2" Pipe;
 - .2 ANSI Flange; Line Connection; 1" FNPT Polymer Inlet;
 - .3 Variable Orifice With Adjustable Weight Lever;
 - .4 All 304 SS Wetted Parts;
 - .5 Polymer Injections Shall Be Supplied For Field Installation Inline 2-10 Meters Upstream Of Screen Inlet.

- .8 Accessories
 - .1 800mm High Structural SS Stand to support the Screen. Contractor to provide concrete pad for the Flocculator as per drawings.
 - .2 Sch 10S S.S. Transition Box to 200 IPS class 150# flange for thickened sludge outlet

- .2 Tag #: RDT 3101

2.4 ACCESSORIES

- .1 Provide all anchor bolts, shims and miscellaneous accessories necessary for installation of the equipment.
- .2 Provide the following spare parts, to be delivered to the site and handed over to the Owner at the time of commissioning:
 - .1 Sufficient lubricating oils and greases of correct grade and specification for 12 months operation of all equipment requiring such.
 - .2 Any other spare parts which may be required to comply with the manufacturer's operating and maintenance instructions and recommendations during the course of the first 12 months of operation.

3. EXECUTION

3.1 MARKING, PACKING, AND PACKAGING

- .1 Equipment shall be marked to identify the product, date (month and year) of manufacture, capacity, and serial number. Equipment shall be shipped with a label containing tank description, manufacturing order number, part number, serial number, manufacturer, and date.

- .2 The proper caution or warning signs as prescribed by OH&S standard shall be customer determined and supplied.
- .3 All packing, packaging, and marking provisions of ASTM Practice D3892 shall apply to this standard.

3.2 SHIPPING, RECEIVING, AND STORAGE

- .1 Various sections of the equipment to be properly match-marked to assist in positioning and assembly at the site.
- .2 The equipment shall be shipped to site assembled to the greatest extent possible to reduce installation and start-up costs.
- .3 Provide instructions on storage and protection well in advance of shipping. If any special instructions are necessary covering safe storage, give them to the Contractor.
- .4 The Contractor will sign the carrier's bill of lading to indicate receipt of the required number of crates, packages, etc., and will note thereon any apparent shortages of or visible damage to such crates, packages, etc. The supplier shall furnish to the Contractor, lists showing the contents of the said crates, packages, etc., complete with all necessary handling and off-loading instructions. Such lists shall be furnished sufficiently early so that copies will be available at the site when delivery of the said equipment and appurtenances is made. Within seven days after the date of delivery to the site, the Contractor will notify the Supplier in writing of shortages or damage in equipment delivered.
- .5 The Contractor will provide unloading facilities and place the equipment in location or storage. The Contractor will be responsible for off-loading at site, for storing the equipment, appurtenances and materials and for protection against weather loss, damage, or theft. The supplier shall provide full instructions of all precautions to be observed in connection with the handling, storing and protection of the equipment.

3.3 INSTALLATION

- .1 Install all equipment in strict accordance with manufacturer's and supplier's instructions.
- .2 Any damage resulting from either failure to observe the installation instructions or as a result of proceeding with the work without complete knowledge of how it is to be done will be the Contractor's responsibility.
- .3 Make equipment installation and connections by skilled tradesmen to the best standard.
- .4 Carry out work to produce a neat, accurate, secure, functional installation.
- .5 Repair at own expense, any damage done to the installation of materials while carrying out the work.

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- .6 Install anchor bolts and concrete bases in advance of equipment installation in accordance with manufacturer's instructions.
- .7 Grout as required.
- .8 Upon completion of installation, fill, add to, and check equipment requiring lubricating oils, greases and coolants. Types and amounts to be in strict accordance with manufacturer's recommendations.

3.4 EQUIPMENT TESTING PROCEDURE

- .1 Submit a thorough description of the procedures to be employed in testing this equipment. The procedure will be reviewed by the Engineer for suitability and should be submitted 3 weeks prior to any testing.

3.5 FIELD TESTING

- .1 When equipment installation has been completed to the standards indicated by these specifications, arrange for the services of the equipment manufacturer's technical representative.
- .2 The equipment manufacturer's technical representative shall inspect the installation to ensure that the equipment has been installed in accordance with the manufacturer's requirements. If the installation is not in order, correct the deficiencies indicated by the technical representative. Start, run and adjust equipment at this time. The technical representative shall then advise the Engineer in writing that the installation has been checked, has been installed correctly and is in working order.
- .3 Bear all the costs of the equipment manufacturer's technical representative.
- .4 Use only personnel who have taken an active part in the actual installation of the system. Do not designate a subtrade as representative at any time during the construction prior to final inspection.

3.6 EQUIPMENT MANUFACTURER'S REPRESENTATIVE

- .1 The equipment manufacturer's technical representative shall be familiar with the equipment supplied and shall come prepared with both knowledge and equipment to perform and interpret the test, inspections and procedures recommended by the manufacturer for the starting of equipment that has not previously been run.
- .2 The equipment manufacturer's technical representative shall, immediately after completion of the inspection, convey to the Engineer in writing, confirmation of the tests and inspections carried out and the result of this examination of the work.
- .3 If the inspection reveals defects in the work, correct as soon as possible and repeat the entire inspection procedure. Repeat until the work passes the inspection.
- .4 Document the results of the inspection by the equipment manufacturer's representative.

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- .5 Ensure the installation meets all manufacturer's requirements for durable and trouble-free operation.

3.7 FIELD INSPECTION

- .1 Final inspection will be made by the Engineer only after the equipment manufacturer's technical representative has advised that equipment installation is in order and the Contractor has advised in writing that the system can be operated.
- .2 The Engineer will request that the equipment be operated to demonstrate that it will perform as specified. The Engineer will note deficiencies, and if possible, the deficiency will be corrected immediately by the Contractor. All deficiencies that cannot be corrected at the time of inspection will be noted by the Engineer who will advise the Contractor of these deficiencies in writing. Correct the deficiencies as soon as possible and advise the Engineer of their correction. Should the deficiencies be of a sufficiently serious nature to require the work to be re-inspected, the cost of the inspection will be borne by the Contractor.

3.8 OPERATOR TRAINING

- .1 Supplier shall provide the services of a skilled technical representative for a minimum period of one (1) day at the site to instruct plant personnel in the operation and service of the equipment.

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 This section refers to the supply, delivery, installation and on-site inspection of miscellaneous process equipment.
- .2 Read this Section in conjunction with Division 15 and Division 16.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The Contractor shall submit the shop drawings and the information for the mixing equipment in accordance with Section 01330 – Submittals. Information shall include, but is not limited to the following:
 - .1 General layout of the equipment.
 - .2 Detailed layout of each component with materials of construction and dimensions (including details of chemical diffuser).
 - .3 Performance characteristics at design flows. (i.e.: head loss, G-value, Velocity).
 - .4 Coating material and application information.
 - .5 Manuals for Installation and Operation & Maintenance (including spare parts list) together with the goods delivery.

1.3 OPERATION & MAINTENANCE DATA

- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01790 Operation & Maintenance Manual.
- .2 Data to include:
 - .1 Manufacturer's name, type, model, year, capacity and serial number.
 - .2 Details of operation, service and maintenance.
 - .3 Recommended spare parts list with names and addresses of suppliers.

2. PRODUCTS

2.1 PORTABLE CHEMICAL TRANSFER PUMP

- .1 Applicable Equipment: TP 7100, TP 7300, TP 7500, TP 7700
 - .1 Liquid Type:
 - .1 Alum: TP 7100

- .2 Polymer: TP 7300
- .3 Citric Acid: TP 7500
- .4 Sodium Hypochlorite (12%): TP 7700
- .2 Location:
 - .1 Treatment Area: TP 7100, TP 7300, TP 7500, TP 7700
- .3 Specified Equipment:
 - .1 Manufacturer: Lutz Inc.
 - .2 Motor: B36
 - .1 640 W; 120 VAC, 1 phase, 60 Hz
 - .3 Tube No.: MSL-PVDF 41-R HC
 - .4 Tube: Suitable for application
 - .5 Impeller: ETFE
 - .6 Tube Length: 39"
 - .7 Tube Diameter: 41 mm
 - .8 Accessories:
 - .1 PVC discharge tubing. Refer to Contract drawings for length.
- .4 Tag #'s: TP 7100, TP 7300, TP 7500, TP 7700

2.4 FLEXIBLE HOSE

- .1 Heavy duty 25 mm industrial flexible hose to be supplied in in the following areas:
 - .1 Treatnebt Area,
 - .2 Headworks Area,
 - .3 Pump Room.
- .2 Hose to be suitable for washing floor and equipment.
 - .1 Minimum hose length: 15m (50')
 - .2 Provide suitable hose rack in all locations as per the Contract drawings

2.5 DISPOSAL BINS

- .1 Heavy duty 2-wheeled garbage container or trash cart with a molded in. axle and attached lid.
 - .1 Material: medium density polyethylene.
 - .2 Manufacturer: Toter or approved equal
 - .3 Model: Greenstone
 - .4 Capacity: 32 Gal.

- .5 Compatible with automated and semi-automated garbage collection trucks.
- .6 Heavy Duty all Terrane wheels
- .7 Quantity: Six (4)

2.7 ACCESSORIES

- .1 Provide all anchor bolts, shims and miscellaneous accessories necessary for installation of the equipment and drives.
- .2 Provide the following spare parts, to be delivered to the site and handed over to the Owner at the time of commissioning:
 - .1 Sufficient lubricating oils and greases of correct grade and specification for 12 months operation of all equipment requiring such.
 - .2 Any other spares which may be required to comply with the manufacturer's operating and maintenance instructions and recommendations during the course of the first 12 months of operation.

3. EXECUTION

3.1 INSTALLATION

- .1 Installation of the equipment shall be in strict accordance with manufacturer's instructions. Any damage resulting from either failure to observe the installation instructions or as a result of proceeding with the work without complete knowledge of how it is to be done shall be the Contractor's responsibility.
- .2 Equipment installation and required connections shall be made by skilled tradesman to the best standard. The work shall be carried out to produce a neat, accurate, secure, functional installation. Where piping connections are made to equipment, unions and thread lubrications or other couplings allowing ease of disconnection, shall be provided. Any damage done to the equipment or materials while carrying out this work shall be repaired at the Contractor's expense.
- .3 Equipment shall be properly aligned with respect to drives and connecting piping. Under no circumstances will pipe springing be allowed.
- .4 The unit shall operate freely with no evidence of sticking, binding or misalignment and to the satisfaction of the Engineer.

3.2 EQUIPMENT TESTING

- .1 N/A.

3.3 FINAL INSPECTION

- .1 Final inspection will be made by the Engineer only after the equipment installation is in order and the Contractor has advised the Engineer, in writing, that the system can be operated.
- .2 The Engineer will require that the equipment be operated to demonstrate that it will perform as specified. Deficiencies will be corrected immediately by the Contractor. All deficiencies that cannot be corrected at the time of inspection will be noted by the Engineer who will advise the Contractor, in writing, of the deficiencies. The Contractor shall correct the deficiencies as soon as possible and advise the Engineer of their correction.
- .3 Should the deficiencies be of sufficiently serious nature to require the work to be re-inspected, the cost of inspection shall be borne by the Contractor.

3.4 TRAINING

- .1 N/A

END OF SECTION

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1. GENERAL

1.1 INTENT

- .1 Supply and install complete chain hoist system as indicated on the Contract Drawings and in this Specification.
 - .1 Electric hoist c/w push button pendent control required at 1.2 meter above floor attached to hoist.
 - .2 Manual chain hoist, varying rated load capacity, low headroom type, and dual lifting speeds.
 - .3 Trolley shall be heavy duty with at least four (4) wheels of drop forged hardened steel, suitably framed to carry the hoisting equipment. With regulation safety lugs.
 - .4 The load hook is to swivel on ball bearings. A spring loaded retaining clip shall be provided on the hook.
 - .5 Chain container shall be included.
 - .6 Drip trays mounted on hoist to prevent oil spills and dripping.
 - .7 Supply of power as required for proper functioning of the electric hoist to allow free movement along entire length of runway and bridge.
- .2 Approved Supplier:
 - .1 Kristian Electric Ltd. or approved equivalent.
 - .1 Contact: Kristian Electric Ltd.
Ph: (306) 343-9111

1.2 RELATED SECTIONS

- .1 Section 01340 - Shop Drawings, Product Data and Samples
- .2 Section 01790 - Operation and Maintenance Data and Manuals
- .3 Section 13311 - Instrumentation - Wiring
- .4 Section 15015 - Mechanical General Requirements

1.3 REFERENCE STANDARDS

- .1 American Institute of Steel Construction (AISC):

- .1 Manual of Steel Construction, Part 5, Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts.
- .2 American National Standards Institute (ANSI):
 - .1 ANSI/ASME HST-4-1999 Performance Standard For Overhead Electric Wire Rope Hoists
 - .2 ANSI/ASME B30.16-2003 Overhead Hoists (Underhung)
 - .3 ANSI/ASME B30.2-2001 Overhead and Gantry Cranes (Top Running Bridge, Single Or Multiple Girder, Top Running Trolley Hoist)
 - .4 ANSI/ASME B30.11-2004 Monorails and Underhung Cranes
 - .5 ANSI/ASME B30.17-2003 Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist)
- .3 American Society for Testing and Materials (ASTM) Publications:
 - .1 ASTM A36 - Carbon Structural Steel.
 - .2 ASTM A325 - Structural Bolts, Steel, Heat Treated, 120/150 ksi Minimum Tensile Strength.
 - .3 ASTM A490 - Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
- .4 American Welding Society (AWS):
 - .1 AWS D1.1 - Structural Welding Code.
- .5 Crane Manufacturer's Association of America (CMAA)
 - .1 Specifications for Top Running Bridge & Gantry Type Multiple Girder Electric Overhead Traveling Cranes - No. 70 (2004)
 - .2 Specifications for Top Running and Under Running Single Girder Electric Overhead Cranes Utilizing Under Running Trolley Hoist - No. 74 (2004)
- .6 Occupational Safety and Health Administration (OSHA):
 - .1 OSHA Specification 1926.554 - Overhead Hoists
 - .2 OSHA Specification 1910.179 - Overhead and Gantry Cranes.

1.4 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01340.

- .2 Shop drawings and product data to include the following:
 - .1 Outline and arrangement drawings.
 - .2 Cross-section drawings.
 - .3 Materials of construction.
 - .4 Details of mounting arrangement.

1.5 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into the manual specified in Section 01790.
- .2 Maintenance data to include the following:
 - .1 Manufacturer's name, type, model year, capacity and serial number.
 - .2 Details of operation, servicing, and maintenance.
 - .3 Recommended spare parts list with names and addresses.
 - .4 As-built wiring diagrams.

1.6 TAGGING

- .1 Provide each instrument with a tag stamped or engraved with the equipment number.
- .2 Tags to be 20mm high, 75mm long, and 1.5mm thick Lamecoid with 10 mm high alphanumeric characters, Helvetica font, reverse engraved. Characters to be white on coloured background. Background colour to be red.
- .3 The code lettering and number system shall be as shown on the P & I drawings or as directed by the Engineer.
- .4 Affix tags to equipment securely.

1.7 QUALITY ASSURANCE

- .1 Ensure that installations conform with all applicable local, Provincial, and/or Federal codes, standards, and regulations in effect at time of bid.
- .2 Comply with the requirements of the following organizations, at minimum:
 - .1 CSA, Canadian Standards Association.
 - .2 NEC, National Electric Code.
 - .3 NEMA, Standards of National Electrical Manufacturers Association.
 - .4 ANSI, American National Standards Institute.
 - .5 ASTM, American Society for Testing and Materials.
 - .6 AISI, American Iron and Steel Institute.
 - .7 AGMA, American Gear Manufacturer's Association.
 - .8 AISC, American Institute of Steel Construction
 - .9 AWS, American Welding Society.
 - .10 ASME, American Society of Mechanical Engineers

1.8 MATERIALS

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- .1 All materials to be new, free from defects and conforming to applicable reference standards
- .2 Where any standard referenced has been superseded prior to bidding, the Contractor shall comply with the current standard.

2. PRODUCTS

2.1 ELECTRIC HOISTS

- .1 Applicable Equipment: EH 4601
 - .1 Intent
 - .1 Supply and install complete under running single bridge crane system consisting of bridge crane, electric wire rope hoist, and electric trolleys as indicated on the Contract Drawings and in this Specification.
 - .2 Provide ceiling mounted bridge crane with overhead hanger assemblies, two runways, bridge moving perpendicular to runways, and equipped with end trucks, hoist trolley, tractor drive, festooning system, bumpers, and all required accessories.
 - .2 Location:
 - .1 EH 4601: Treatment Area
 - .3 Capacity:
 - .1 EH 4601: 2 Ton (4000 lb)
 - .4 Specified Equipment: EH 4601
 - .1 Manufacturer: Gorbel Inc. or Approved Equivalent
 - .2 Model No.: GLCS/(TD)-20.5-42.3
 - .3 Type: Work station, all-steel construction
 - .4 Dimensions:
 - .1 Runway Length: 12.9 m (42.3 ft)
 - .2 Bridge Length: 6.25 m (20.5 ft)
 - .5 Lift: 4.302 m (14.11 ft)
 - .6 Classification:
 - .1 Crane to be designed and constructed to CMAA Specification # 70 or #74, as applicable, for Class "C" service requirements and operation in a non-hazardous environment.
 - .7 Runway:
 - .1 Quantity: Two (2)
 - .2 Type: Enclosed, cold formed, steel box track, end trucks and festoon carries to ride along runway
 - .3 Lower running flanges: Fabricated with 2 degree taper to center truck within track

- .4 Splice Joint: Channel-shaped track with bolts, lockwashers, and nuts for joining runway sections
- .5 Festoon Stack Section: Enclosed track extension to provide stacking festoon carries at end of runway
- .8 Hanger Assemblies:
 - .1 Type: Flush-Mounted, Perpendicular, one-piece assembly
 - .2 Quantity: Six (6)
- .9 Bridge:
 - .1 Quantity: One (1)
 - .2 Type: Enclosed, cold formed, steel box track, hoist trolley and festoon carries to ride along lower inside flanges
 - .3 Lower running flanges: Fabricated with 2 degree taper to center truck within track
- .10 End trucks:
 - .1 Quantity: Two (2)
 - .2 Type: Rigid frame end truck designed to ride inside enclosed runway track and connect to bridge
 - .3 Construction: Steel with vertical and horizontal wheels
 - .4 Wheels: Removable, self-centering wheels with sealed lifetime lubricated bearings
 - .5 Drop lugs: Provide on both sides of truck to limit truck drop to 25 mm maximum
 - .6 Connection: Provide rigid connection between bridge and end truck
- .11 Hoist trolley:
 - .1 Qty: One (1)
 - .2 Type: Rigid-body trolley designed to ride inside enclosed track of bridge and carry hoist and load
 - .3 Construction: Two-piece steel body with two wheels each side and tapered clevis positioning hoist hook at center of trolley c/w removable clevis pin
 - .4 Wheels: Removable, self-centering wheels with sealed lifetime lubricated bearings
 - .6 Drop lugs: Provide on both sides of truck to limit truck drop to 25mm maximum
- .12 End stops:
 - .1 Molded composite, resilient bumper
- .13 Tractor Drive:
 - .1 Quantity: Three (3)
 - .2 Provide electric tractor drive for motorized operation of hoist trolley and end truck.
 - .3 Type: Variable Frequency drive assembly with worm gear reducer, molded polyurethane tread, and adjustable counter-balance.
 - .4 Speed: 30 fpm
 - .5 Motor: 1/3 HP, 1800 RPM, 208 VAC, 3 phase, 60 Hz
 - .6 Control: 24 VDC control package with transformer, terminal strips, fusing enclosure, and mounting brackets, to be factory wired to drive motor

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- .14 Electric Chain Hoist:
 - .1 Manufacturer: Coffing Hoists or Approved Equivalent
 - .2 Model No.: JLC-4008
 - .3 No. of Chains: Two (1)
 - .4 Lift Speed: 16 fpm
 - .5 Lift Height: 9.8 m (32 ft)
 - .6 Motor: 1 HP, 208 VAC, 3 phase, 60 Hz
 - .7 Power Supply: Festoon system
 - .8 Accessories:
 - .1 Chain Container
 - .2 8.8 m (29 ft) control pendant
 - .3 Regulation Safety Lugs
 - .15 Festoon System:
 - .1 Provide sufficient length of electrical cable to supply lifting device and festoon along bridge and runway
 - .2 Festoon Trolleys: Four-wheeled trolleys with pivoting saddle and U-bolt clamp to support electrical cable on runway and bridge
 - .3 Festoon Clamp: Steel clamp assembly attached to track
 - .16 Finish: Baked enamel
- .5 Tag #'s: EH 4601

2.2 ACCESSORIES

- .1 Provide all bolts, shims and miscellaneous accessories necessary for installation of the equipment.
- .2 Provide the following spare parts, to be delivered to the site and handed over to the Owner at the time of commissioning:
 - .1 Sufficient lubricating oils and greases of correct grade and specification for 12 months operation of all equipment requiring such.
 - .2 Any other spares which may be required to comply with the manufacturer's operating and maintenance instructions and recommendations during the course of the first 12 months of operation.

3. EXECUTION

3.1 FABRICATION

- .1 All appurtenances, fittings and accessories necessary for the proper functioning of the equipment or reasonably inferable from the drawings and specifications shall be supplied and installed with the equipment whether indicated on the drawings or specified herein, or not.

- .2 Design shall conform to the best modern practices for equipment of this class and particular care shall be taken to provide for reliability of operation and accessibility to all parts for inspection and repairs.

3.2 MARKING, PACKING, AND PACKAGING

- .1 Equipment shall be marked to identify the product, date (month and year) of manufacture, capacity, and serial number. Equipment shall be shipped with a label containing equipment description, manufacturing order number, part number, serial number, manufacturer, and date.
- .2 The proper caution or warning signs as prescribed by OH&S standard shall be customer determined and supplied.
- .3 All packing, packaging, and marking provisions of ASTM Practice D3892 shall apply to this standard.

3.3 SHIPPING, RECEIVING AND STORAGE

- .1 Various sections of the equipment to be properly match-marked to assist in positioning and assembly at the site.
- .2 The mixer shall be shipped to site assembled to the greatest extent possible to reduce installation and start-up costs.
- .3 Provide instructions on storage and protection well in advance of shipping. If any special instructions are necessary covering safe storage, give them to the Contractor.
- .4 The Contractor will sign the carrier's bill of lading to indicate receipt of the required number of crates, packages, etc., and will note thereon any apparent shortages of or visible damage to such crates, packages, etc. The supplier shall furnish to the Contractor, lists showing the contents of the said crates, packages, etc., complete with all necessary handling and off-loading instructions. Such lists shall be furnished sufficiently early so that copies will be available at the site when delivery of the said equipment and appurtenances is made. Within seven days after the date of delivery to the site, the Contractor will notify the Supplier in writing of shortages or damage in equipment delivered.
- .5 The Contractor will provide unloading facilities and place the equipment in location or storage. The Contractor will be responsible for off-loading at site, for storing the equipment, appurtenances and materials and for protection against weather loss, damage, or theft. The supplier shall provide full instructions of all precautions to be observed in connection with the handling, storing and protection of the equipment.

3.4 INSTALLATION

- .1 Installation of the hoists shall be in strict accordance with manufacturer's instructions. Any damage resulting from either failure to observe the installation instructions or as a

result of proceeding with the work without complete knowledge of how it is to be done shall be the Contractor's responsibility.

- .2 Equipment installation and required connections shall be made by skilled tradesman to the best standard. The work shall be carried out to produce a neat, accurate, secure, functional installation. Where piping connections are made to equipment, unions and thread lubrications or other couplings allowing ease of disconnection, shall be provided. Any damage done to the equipment or materials while carrying out this work shall be repaired at the Contractor's expense.
- .3 The unit shall operate freely with no evidence of sticking, binding or misalignment and to the satisfaction of the Engineer.

3.5 EQUIPMENT TESTING PROCEDURE

- .1 Submit a thorough description of the procedures to be employed in testing this equipment. The procedure will be reviewed by the Engineer for suitability and should be submitted 3 weeks prior to any testing.

3.6 FIELD TESTING

- .1 When equipment installation has been completed to the standards indicated by these specifications, arrange for the services of the equipment manufacturer's technical representative.
- .2 The equipment manufacturer's technical representative shall inspect the installation to ensure that the equipment has been installed in accordance with the manufacturer's requirements. If the installation is not in order, correct the deficiencies indicated by the technical representative. Start, run and adjust equipment at this time. The technical representative shall then advise the Engineer in writing that the installation has been checked, has been installed correctly and is in working order.
- .3 A fully-assembled field load test shall be carried out with test loads equivalent to 125% of rated load capacity. The load shall be applied and moved through any normal operating sequence as directed by the Engineer. The Engineer shall have the right to witness such test and shall be given at least one (1) week notice prior to test. Certified test results shall be submitted to Engineer for review.
- .4 All crane equipment shall be operated through a complete lift and lowering cycle and through a complete travel of the bridge and trolley to determine that the equipment will perform smoothly and safely and that the pendant cable length is sufficient to permit operation from desired floor levels. The bridge crane supplier shall provide the test weight loads
- .5 Under test loads, there shall be no slippage of the load or any apparent over stressing or permanent deformation.
- .6 Bear all the costs of the equipment manufacturer's technical representative.

- .7 Use only personnel who have taken an active part in the actual installation of the system. Do not designate a subtrade as representative at any time during the construction prior to final inspection.

3.7 EQUIPMENT MANUFACTURER'S REPRESENTATIVE

- .1 The equipment manufacturer's technical representative shall be familiar with the equipment supplied and shall come prepared with both knowledge and equipment to perform and interpret the test, inspections and procedures recommended by the manufacturer for the starting of equipment that has not previously been run.
- .2 The equipment manufacturer's technical representative shall, immediately after completion of the inspection, convey to the Engineer in writing, confirmation of the tests and inspections carried out and the result of this examination of the work.
- .3 If the inspection reveals defects in the work, correct as soon as possible and repeat the entire inspection procedure. Repeat until the work passes the inspection.
- .4 Document the results of the inspection by the equipment manufacturer's representative.
- .5 Ensure the installation meets all manufacturer's requirements for durable and trouble-free operation.

3.8 FIELD INSPECTION

- .1 Final inspection will be made by the Engineer only after the equipment manufacturer's technical representative has advised that equipment installation is in order and the Contractor has advised in writing that the system can be operated.
- .2 The Engineer will request that the equipment be operated to demonstrate that it will perform as specified. The Engineer will note deficiencies, and if possible, the deficiency will be corrected immediately by the Contractor. All deficiencies that cannot be corrected at the time of inspection will be noted by the Engineer who will advise the Contractor of these deficiencies in writing. Correct the deficiencies as soon as possible and advise the Engineer of their correction. Should the deficiencies be of a sufficiently serious nature to require the work to be re-inspected, the cost of the inspection will be borne by the Contractor.

3.9 OPERATOR TRAINING

- .1 Supplier shall provide the services of a skilled technical representative for a minimum period of one (1) day at the site to instruct plant personnel in the operation and service of the equipment.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 This section refers to the work unique to the supply and installation of a 4" Septage Receiving Station control system capable of receiving trucked liquid waste at a rate of 300 GPM, including the electrical panel used to control the associated equipment and the software used to configure and collect the data generated by the users of the station.
- .2 The Contractor shall furnish, install and place into operation a complete 4" (100mm) system for receiving septage from haulers. This specification outlines the required system, controls and software that shall, as a minimum, identify permitted users, accept a volume of septage and communicate the data for each transaction to an administrator's office PC and other networked PCs (Laptop, IT Database Manager, etc.).
- .3 Refer to other sections of this specification for requirements for building, truck connection fittings, pumps, valves, and instrumentation.

1.2 QUALITY ASSURANCE

- .1 The equipment, control system and software furnished under the section shall be provided by a manufacturer who has been regularly engaged in the design and manufacture of systems for at least 10 years.
- .2 The approved manufacturer of this system shall be required to demonstrate a fully functional system that complies with this specification. An Online presentation shall be provided with references and contact information for ten (10) installations.
- .3 The control systems shall be manufactured in accordance with all local and applicable standards and shall be inspected as an "Industrial Control Assembly" with either UL or CSA label identification.
- .4 The manufacturer shall provide documentation necessary for the installation and operation of all associated components of the system.
- .5 The products defined in this specification shall be furnished complete, without imposing any obligation onto the SCADA system or proposed SCADA system or the owner to create a database, reports, or other features. Systems that imply that features are included, yet reference these features as being provided by SCADA shall not be accepted on this project.
- .6 Ensure that installations conform with all applicable local, Provincial, and/or Federal codes, standards, and regulations in effect at time of bid.
- .7 Comply with the requirements of the following organizations, at minimum:
 - .1 CSA, Canadian Standards Association.
 - .2 NEC, National Electric Code.
 - .3 NEMA, Standards of National Electrical Manufacturers Association.

- .4 ANSI, American National Standards Institute.
- .5 ASTM, American Society for Testing and Materials.
- .6 AISI, American Iron and Steel Institute.
- .7 AGMA, American Gear Manufacturer's Association.
- .8 AISC, American Institute of Steel Construction
- .9 AWS, American Welding Society.
- .10 ASME, American Society of Mechanical Engineers
- .11 NSF, National Sanitation Foundation

1.3 APPROVED MANUFACTURER

- .1 The products specified shall be a manufactured by Flowpoint Environmental Systems or approved equivalent. The software specified is Septage+ or approved equal.
- .2 This Specification is based on Septage Receiving Station design by Flowpoint. Contractor shall be responsible for any and all additional costs of other manufacturers' alternative equipment designs. Additional costs associated with alternative equipment designs may include, but not be limited to, concrete slab and foundation design, electrical and control modifications, piping, conduit, cable, anchors, and supports.

1.4 WARRANTY

- .1 The manufacturer shall guarantee all components furnished as part of this specification for a period of one (1) year from date of shipment.
- .2 The manufacturer shall provide software updates and phone support services for a period of one (1) year from date of shipment.

1.5 USAGE & LICENSING

- .1 The manufacturer shall provide a multi-user license to the facility to allow the software to be installed on multiple PCs (administrative office, lab, etc.) as is required without additional charge.

1.6 RELATED SECTIONS

- .1 Section 01340 - Shop Drawings, Product Data and Samples
- .2 Section 01790 - Operation and Maintenance Data and Manuals
- .3 Section 03300 – Cast-in-Place Concrete
- .4 Section 13311 - Instrumentation - Wiring
- .5 Section 15015 - Mechanical General Requirements
- .6 Section 15020 - Detailed Piping Specifications
- .7 Section 15110 – Valves

- .8 Division 16 – Electrical, all sections.

1.7 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01340.
- .2 Shop drawings and product data to include the following:
 - .1 Outline and arrangement drawings.
 - .2 Cross-section drawings.
 - .3 Detailed Cutsheets of each equipment.
 - .4 Bill of Materials
 - .5 Installation, Operation and Maintenance Manuals

1.8 REFERENCE STANDARDS

- .1 ANSI Standards:
 - B-16.5 Pipe Flanges and Flanged Fittings
- .2 OH&S Standards:
 - Applicable Standards
- .3 AGMA Standards:
 - 6010-E-88
 - 6019-E-89
 - 6023-A88

1.9 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into the manual specified in Section 01790.
- .2 Maintenance data to include the following:
 - .1 Manufacturer's name, type, model year, capacity and serial number.
 - .2 Details of operation, servicing, and maintenance.
 - .3 Recommended spare parts list with names and addresses.
 - .4 As-built wiring diagrams.

1.10 TAGGING

- .1 Provide each piece of equipment with a tag stamped or engraved with the appropriate equipment number, as listed in this Specification.
- .2 Tags to be 20mm high, 75mm long, and 1.5mm thick, plastic Romark "Ultra Suede", 8mm high alphanumeric characters, Helvetica font (01040 cutter), reverse engraved. Characters to be white on coloured background. Background colour to be red.
- .3 The code lettering and number system shall be as shown on the P & I drawings or as directed by the Engineer.

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- .4 Affix tags to equipment securely.

1.11 MATERIALS

- .1 All materials to be new, free from defects and conforming to applicable reference standards
- .2 Where any standard referenced has been superseded prior to bidding, the Contractor shall comply with the current standard.

1.12 DESIGN CRITERIA

- .1 All electrical connection external to this equipment will be performed under Division 13 and 16.
- .2 Where equipment is supplied with larger power requirements than that specified, the Contractor shall coordinate the power supply to ensure compatibility with the electrical and control components without any additional costs to the owner.

2. PRODUCTS

2.1 ENCLOSURE

- .1 A. The entire system must be enclosed in an approved enclosure designed for this purpose. The system shall be housed within a lockable, weatherproof and insulated kiosk style enclosure fabricated from panels consisting of 1.5" (37.5 mm) thick foamed polyurethane core surrounded by a profiled 26 gauge coated galvanized steel exoskeleton on all four sides and insulated for heat and cold protection (minimum R10 insulation value). The enclosure shall have provisions for heat necessary to protect the system from extreme cold weather.

2.2 HAULER ACCESS STATION

- .1 The manufacturer shall provide an access terminal hauler interface. The access station shall include a keypad, and digital display for users to log on and to see totalized volume of wastewater being offloaded.
- .2 The Hauler Access terminal shall be an integral part of a comprehensive fully-managed septage receiving station, including the necessary software as described later in this specification.
- .3 The Hauler Access terminal shall be constructed with corrosion resistant materials, with outer door and access panels that can be closed to enable a wash down without damaging the internal mounted electrical devices. The hauler access terminal shall be rated Type 3R.
- .4 The Hauler Access terminal shall be provided with a daylight visible display and outdoor-rated, robust keypad. The display shall prompt the hauler with log-on instruction and display responsive messages that allow the unattended use of the facility.

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- .5 The Hauler Access terminal shall be provided with an optional thermal receipt printer that will quickly print and cut the “on demand” receipt.
- .6 The Hauler Access terminal shall continue to function normally without a network connection to the office. All data shall be stored in non-volatile memory. When the network connection is established, all transaction data shall be automatically synchronized and securely stored to the database.
- .7 The Hauler Access terminal shall be maintained without requiring Arc Flash protective clothing. Motor starters or other high voltage devices must be located in a separate control panel.
- .8 The manufacturer shall provide a secured Hauler Access terminal that shall identify waste haulers and be configurable to interface with associated equipment such as doors, gates, valves, samplers, and screens & washers.
- .9 The Septage Station shall be provided with the following components:
 - .1 Hauler Access Terminal Enclosure
 - .1 External Swing-out door
 - .2 Powdercoated marine grade aluminum NEMA 3R rated
 - .3 Lockable Handle, insulated doors
 - .2 Hauler Access Terminal Keypad
 - .1 Flowpoint Model FP-KTECK-FUAB16 integrated Keypad/HMI
 - .2 Secure, robust, and outdoor rated
 - .3 Clear, backlit LCD display, visible in all levels of light.
 - .4 Advanced tamper-proof design
 - .3 Programmable logic controller, PLC, including;
 - .1 Allen-Bradley 1769-L19 Compactlogix PLC, Ethernet connection to Septage+ software.
 - .2 Cellular Ethernet by Sierra Wireless RV50
 - .3 Configurable spare digital I/O with optional analog
 - .4 Detachable terminals
 - .5 Non-volatile memory
 - .4 Control Valve and Flowmeter
 - .1 120 VAC Rotork RCEL Actuator mounted on a 4” (100 mm) Valmatic Plug Valve
 - .2 4” (100mm) Endress+Hauser Promag W400 or equivalent
 - .3 Totalizer
 - .5 Automated Wastewater Sampler
 - .1 Teledyne ISCO 5800 Refrigerated Wastewater Sampler
 - .2 24 – 1L bottle configuration c/w spare tray and spare 24 - 1L bottles
 - .6 Automated Flush Connection and exterior Hose Bibb
 - .1 1” (25mm) Flush connection c/w 1” (25mm) normally Closed ASCO 8221G7 Solenoid Valve and 1” (25mm) Wilkins 375 Reduced Pressure Backflow Preventor
 - .2 1/2” (12mm) Exterior Frost-Free Hose Bibb. Note: 1/2” (12mm) hose and hose hanger by others

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.7 **Piping**

- .1 All piping shall be 100mm (4") Stainless Steel (316) piping.
- .2 All piping connections shall be Victaulic Rigid Couplings (Style 107) and Victaulic VIC-Flange Adaptors (Style 741),
- .3 Piping shall be secured with adequate supports for the operation of the station. Pipe hangers are not acceptable.

2.3 MANAGEMENT SOFTWARE:

- .1 The Septage Receiving Station shall include the necessary software to allow a local or remote networked PC to seamlessly interface with one or multiple hauler station/s using an Ethernet connection.
- .2 The software shall allow the facility to connect and exchange data to one or more hauler stations, located at one or more sites.
- .3 The software shall be used to configure the station's access device and enable/disable hauler access codes.
- .4 The software shall be used to configure the devices that shall measure the volume. Other analog devices, if installed, shall also be configured.
- .5 The software shall monitor each station and automatically upload the hauler's transaction data.
- .6 The data shall be stored into a secure database. The data shall include Site ID, Station ID, Hauler ID, Date and Time of Transaction, Volume loaded, Rate ID, and Volume Remaining,
- .7 The software shall be installed on any site owned PC using Windows 10 Pro OS with a network card configured with Internet to communicate with the hauler access stations.

2.4 SERVER COMPUTER:

- .1 The Septage Receiving Station shall include the necessary server computer supplied loose for installation in the Waste Water Plant Network Rack.
- .2 The server computer shall meet, at minimum, all of the minimum system requirements for the Septage+ software, including but not limited to Rackmountable in 2U space or less, Ethernet connectivity, and Windows Server 2019 software.
- .3 The server computer and Septage+ software shall be configured by the system integrator as per Section 0800.

3.0 SYSTEM FEATURES AND OPERATION

3.1 CUSTOMER AND TRUCK FEATURES:

- .1 The software shall allow the facility to create a list of customers that will be billed for the stations use. A user-friendly interface shall be provided for entering customer details and account number. The software shall not limit the facility as to the number of customer accounts that can be created.
- .2 The software shall allow the facility to create multiple truck accounts and link these accounts to the customer (owner of truck). The software shall not limit the facility as to the number of trucks that can be assigned to each customer.
- .3 User-friendly interface shall be provided to enter the Hauler ID, PIN, and other details regarding the truck, including capacity, weight, and vehicle identification.
- .4 The customer shall be provided with a Hauler ID and 4-Digit PIN for each truck that will access the Septage Receiving Station. PIN assignment can be unique per owned truck or common to all owned trucks, depending on facility and customer preference. or allow manual entry of a PIN.
- .5 The software shall include an Overview Screen, divided into sections that shall display the Transaction Log, Customers, Truck Status, Customer Balances and quick-link to Reports. Data views shall be configurable to show customer and truck activity using built-in sorting tools.
- .6 The software must be able to configure up to 3 analog devices and a sampler to allow the owner to establish acceptable parameters for waste pre screening and sampling on a per truck or overall basis.
- .7 The software shall allow the facility to enable or disable a truck's access privilege. Once disabled, a Hauler's access shall be denied at all stations and at all sites upon station update. A message shall be displayed to inform the hauler to contact the office.
- .8 The software shall have multiple pre-formatted reports that can be printed to a networked printer, emailed or exported using common file formats. As a minimum, the software shall include reports to show Activity with daily totals, Statements, and Customer and Truck usage. Systems that only allow offer manual file retrieval from the station or manipulation of .CSV files are not acceptable.
- .9 User-friendly interface screens shall be included for the facility to enter billing rates, alarm identification, station name and location. This data shall be used in both the basic and advanced features of the system management.

3.2 BILLING RATE FEATURES:

- .1 Features
 - .1 System software must accept 1000 user definable Carrier Truck accounts (upgradable to 9998 users).
 - .2 System software must allow for software upgrade of extra Carrier Truck accounts
 - .3 System software must maintain information on Truck Carriers (including company name, billing address and billing discount %), Carrier Trucks

- (including Carrier Truck account number, PIN number, Truck Description, Plate number, Load Capacity, and Driver Name) and account balance.
 - .4 System software must allow User to configure and communicate with multiple Access Terminals located at any number of Septage Receiving Stations.
 - .5 System software must allow User to automatically upload Carrier Truck account information to each Access Terminal at Septage Receiving Station via remote modem.
 - .6 System software must automatically collect all transactions from each Access Terminal / Septage Receiving Station at a user defined interval.
 - .7 System software must have integrated on-line help screens
 - .8 System software must allow User to define "Volume Units" for bill generation (i.e. m3, ft3, litres, US Gal, Imp Gal)
 - .9 System software must allow User to define billing method either by Volume or by Load and by Discountable Rate based on customer.
 - .10 System software must allow User to manage accounts on either a "Credit" basis or a "Pre-pay/Debit" basis.
 - .11 System software must allow User to print a detailed Carrier Reports.
 - .12 System software must allow User to print a batch of Bills for all or one Carrier
 - .13 System software must allow User to re-print a batch of Bills for all or one Carrier
 - .14 Each Bill shall include detailed information for each transaction with a date stamp, time stamp, quantity, unit factor, unit rate and total.
 - .15 Each Bill shall include transactions for each Carrier: by Carrier Truck, Septage Receiving Station, Subtotals and Totals.
 - .16 The software must be able to provide for waste generator and waste class billing rates if desired. Once configured the access screen will prompt the user to enter these parameters.
-
- .2 The software shall allow the facility to define a list of allowed billing rates for received septage. The billing rate per 1/10/100/1000 units is used by the software to calculate the transaction's amount. Multiple billing rates offer the facility flexibility to allow volume or residential users a discount. The use of different rates is not required to use the software. Units can be user-defined (Gallons, liters, etc.).
 - .3 The software shall total the truck volume and calculate the total cost for the transaction.

3.4 BILLING & PAYMENT FEATURES:

- .1 The facility shall be able to use the features of this software to substantiate the data recorded for each transaction and accurately calculate the total cost on a per customer basis.
- .2 The facility shall have the option to use the software to create a billing statement or export the data to the primary accounting software. Export options shall include XML , CSV, Excel or HTML.
- .3 The software shall allow the facility to manage each customer on a debit or credit basis. The customer is required to pay in advance or the customer can pay after usage of the station.

- .4 The software shall debit the account balance automatically and auto-deactivate the truck's access privilege should the customer's balance drops below a minimum.
- .5 The software shall allow the facility to bill on a truck capacity basis, a metered basis. This feature shall be configured with Septage+.
- .6 The software shall allow the facility to enter payments if required. The total balance shall automatically recalculate once a payment is applied. A customer's account that is deactivated shall be automatically activated once money is received.

3.5 OTHER FEATURES:

- .1 The software shall allow the facility to define the Station's Operating Time Schedule. Each day shall be configured with Open and Close times. If closed, station shall prompt the hauler that the station is CLOSED.

3.6 OPERATION

- .1 Upon entering 4 Digit "Access Number" and 4 Digit "PIN Number" by customer, system to provide authorization to User and activate system.
- .2 Once authorized, when ready, press, "START" to begin the transaction.
- .3 System controls to open PLUG VALVE (PV), Start GRINDER to begin the transaction.
- .4 System must measure the volume of wastewater by receiving input from a magnetic flow meter.
- .5 If flagged, AUTOMATED SAMPLER shall draw a 750mL sample into the next available sample bottle (not composite sample). Station will record bottle number of sample.
- .6 PV to "close", GRINDER to shut off, if there is a No-Flow condition for a predetermined time or the access terminal "STOP" button is pressed.
- .7 Once PV reached 'Closed Limit', Flush Valve Solenoid (FV) to open to flush piping for a predetermined amount of time (variable set in Septage+)
- .8 Alarm Shutdown:
 - .1 The system shall automatically disable if an alarm condition is triggered. The valve shall close and the screen shall display out of order. If equipped with cellular modem, customer defined SMS text alarms are available.
- .9 Receipt:
 - .1 A. An On-demand receipt is printed at the hauler access terminal if requested by hauler for each load with the following information:
 - .1 Date and Time
 - .2 Station ID and Ticket Number
 - .3 Hauler Access Number

.4 Volume received

4. EXECUTION

4.1 MARKING, PACKING, AND PACKAGING

- .1 Equipment shall be marked to identify the product, date (month and year) of manufacture, capacity, and serial number. Equipment shall be shipped with a label containing equipment description, manufacturing order number, part number, serial number, manufacturer, and date.
- .2 The proper caution or warning signs as prescribed by OH&S standard shall be customer determined and supplied.
- .3 All packing, packaging, and marking provisions of ASTM Practice D3892 shall apply to this standard.

4.2 SHIPPING, RECEIVING AND STORAGE

- .1 Various sections of the equipment to be properly match-marked to assist in positioning and assembly at the site.
- .2 The equipment shall be shipped to site assembled to the greatest extent possible to reduce installation and start-up costs.
- .3 Provide instructions on storage and protection well in advance of shipping. If any special instructions are necessary covering safe storage, give them to the Contractor.
- .4 The Contractor will sign the carrier's bill of lading to indicate receipt of the required number of crates, packages, etc., and will note thereon any apparent shortages of or visible damage to such crates, packages, etc. The supplier shall furnish to the Contractor, lists showing the contents of the said crates, packages, etc., complete with all necessary handling and off-loading instructions. Such lists shall be furnished sufficiently early so that copies will be available at the site when delivery of the said equipment and appurtenances is made. Within seven days after the date of delivery to the site, the Contractor will notify the Supplier in writing of shortages or damage in equipment delivered.
- .5 The Contractor will provide unloading facilities and place the equipment in location or storage. The Contractor will be responsible for off-loading at site, for storing the equipment, appurtenances and materials and for protection against weather loss, damage, or theft. The supplier shall provide full instructions of all precautions to be observed in connection with the handling, storing and protection of the equipment.

4.3 INSTALLATION

- .1 Install all equipment in strict accordance with manufacturer's and supplier's instructions.

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- .2 Any damage resulting from either failure to observe the installation instructions or as a result of proceeding with the work without complete knowledge of how it is to be done will be the Contractor's responsibility.
- .3 Make equipment installation and connections by skilled tradesmen to the best standard.
- .4 Carry out work to produce a neat, accurate, secure, functional installation.
- .5 Repair at own expense, any damage done to the installation of materials while carrying out the work.
- .6 Install anchor bolts and concrete bases in advance of equipment installation in accordance with manufacturer's instructions.
- .7 Grout as required.
- .8 Upon completion of installation, fill, add to, and check equipment requiring lubricating oils, greases and coolants. Types and amounts to be in strict accordance with manufacturer's recommendations.

4.4 EQUIPMENT TESTING PROCEDURE

- .1 Submit a thorough description of the procedures to be employed in testing this equipment. The procedure will be reviewed by the Engineer for suitability and should be submitted 3 weeks prior to any testing.

4.5 FIELD TESTING

- .1 When equipment installation has been completed to the standards indicated by these specifications, arrange for the services of the equipment manufacturer's technical representative.
- .2 The equipment manufacturer's technical representative shall inspect the installation to ensure that the equipment has been installed in accordance with the manufacturer's requirements. If the installation is not in order, correct the deficiencies indicated by the technical representative. Start, run and adjust equipment at this time. The technical representative shall then advise the Engineer in writing that the installation has been checked, has been installed correctly and is in working order.
- .3 Bear all the costs of the equipment manufacturer's technical representative.
- .4 Use only personnel who have taken an active part in the actual installation of the system. Do not designate a subtrade as representative at any time during the construction prior to final inspection.

4.6 EQUIPMENT MANUFACTURER'S REPRESENTATIVE

- .1 The equipment manufacturer's technical representative shall be familiar with the equipment supplied and shall come prepared with both knowledge and equipment to

perform and interpret the test, inspections and procedures recommended by the manufacturer for the starting of equipment that has not previously been run.

- .2 The equipment manufacturer's technical representative shall, immediately after completion of the inspection, convey to the Engineer in writing, confirmation of the tests and inspections carried out and the result of this examination of the work.
- .3 If the inspection reveals defects in the work, correct as soon as possible and repeat the entire inspection procedure. Repeat until the work passes the inspection.
- .4 Document the results of the inspection by the equipment manufacturer's representative.
- .5 Ensure the installation meets all manufacturer's requirements for durable and trouble-free operation.

4.7 FIELD INSPECTION

- .1 Final inspection will be made by the Engineer only after the equipment manufacturer's technical representative has advised that equipment installation is in order and the Contractor has advised in writing that the system can be operated.
- .2 The Engineer will request that the equipment be operated to demonstrate that it will perform as specified. The Engineer will note deficiencies, and if possible, the deficiency will be corrected immediately by the Contractor. All deficiencies that cannot be corrected at the time of inspection will be noted by the Engineer who will advise the Contractor of these deficiencies in writing. Correct the deficiencies as soon as possible and advise the Engineer of their correction. Should the deficiencies be of a sufficiently serious nature to require the work to be re-inspected, the cost of the inspection will be borne by the Contractor.

4.8 OPERATOR TRAINING

- .1 The manufacturer shall provide online orientation and web-based training for initial software installation and configuration.
- .2 Supplier shall provide the services of a skilled technical representative for a minimum period of one (1) day at the site to instruct plant personnel in the operation and service of the equipment.

END OF SECTION