



TOWN OF QUISPAMSIS

GENERAL SPECIFICATIONS
FOR
MUNICIPAL SERVICES

ISSUED: APRIL 2023

REVISION NO. 00

TOWN OF QUISPAMSIS



[CLICK AND TYPE CONTRACT NAME]
CONTRACT NO.[#]

[MONTH YEAR]

Rev. No.	Description	Reviewed by:	Date	Issued by:
			[YYYY/MM/DD	

[CLICK AND TYPE DISCIPLINE]:

Seal:

[Engineer Name & Designation]

Telephone:

Email:

[CLICK AND TYPE DISCIPLINE]:

Seal:

[Engineer Name & Designation]

Telephone:

Email:

[CLICK AND TYPE DISCIPLINE]:

Seal:

[Engineer Name & Designation]

Telephone:

Email:

[CLICK AND TYPE DISCIPLINE]:

Seal:

[Engineer Name & Designation]

Telephone:

Email:

END OF SECTION

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END OF SECTION

PART I

CONTRACT AND GENERAL REQUIREMENTS

DEFINITIONS

- .1 **Change Order:** Refer to Definitions from CCDC18-2001.
- .2 **Construction Equipment:** Refer to Definition from CCDC18-2001.
- .3 **Consultant:** Refer to Definition from CCDC18-2001.
- .4 **Contract:** Refer to Definition from CCDC18-2001.
- .5 **Contract Documents:** Refer to Definition from CCDC18-2001.
- .6 **Contract Price:** Refer to Definition from Section 00 73 10 - Supplementary General Conditions.
- .7 **Contract Time:** Refer to Definition from CCDC18-2001.
- .8 **Contractor:** Refer to Definition from CCDC18-2001.
- .9 **Drawings:** Refer to Definition from Section 00 73 10 - Supplementary General Conditions.
- .10 **Professional Engineer or Engineer** means engineer licensed to practice in the province of NB.
- .11 **Owner:** Refer to Definition from CCDC18-2001.
- .12 **Place of the Work:** Refer to Definition from CCDC18-2001.
- .13 **Product:** Refer to Definition from CCDC18-2001.
- .14 **Project:** Refer to Definition from CCDC18-2001.
- .15 **Provide:** Refer to Definition from CCDC18.
- .16 **Shop Drawings:** Refer to Definition from CCDC18-2001.
- .17 **Specifications:** Refer to Definition from CCDC18.
- .18 **Subcontractor:** Refer to Definition from CCDC18-2001.
- .19 **Substantial Performance of the Work:** Refer to Definition from CCDC18-2001.
- .20 **Supplier:** Refer to Definition from CCDC18-2001.
- .21 **Temporary Work:** Refer to Definition from CCDC18-2001.
- .22 **Unit Price:** Refer to Definition from CCDC18-2001.
- .23 **Value Added Taxes:** Refer to Definition from CCDC18-2001.
- .24 **Work:** Refer to Definition from CCDC18-2001.
- .25 **Working Day:** Refer to Definition from CCDC1-20018.
- .26 **Blaster:** means a person who holds a valid certificate of qualification in the blaster occupation or powderman trade issued under the *Apprenticeship and Occupational Certification Act* of New Brunswick.

END OF SECTION

1 DRAWING LIST

Drawing No.	Description	Revision No.
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C00	Cover Sheet	
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Civil
C01

Mechanical
M01

Electrical
E01

Structural
S01

END OF SECTION

1 GENERAL

1.1 INVITATION

.1 Tender Call:

- .1 Ensure offers are signed under seal, executed, and dated are received by Owner before [###:##] [a.m./p.m.] local time on [Date] day of [Month], [Year], hereinafter referred to as the Tender Closing..
- .2 Offers submitted after above time will be returned to Tenderer unopened.
- .3 Offers will be opened publicly immediately after time for receipt of Tender.
- .4 Amendments to submitted offers will be permitted if received in writing [48] hours prior to Tender closing and if endorsed by same party or parties who signed and sealed offer.

1.2 TENDER IDENTIFICATION

.1 Tenders shall be submitted in a sealed envelope marked as follows:

Tender for:

[Tender Name]

Tender No. [#]

To:

Town of Quispamsis

12 Landing Court, Quispamsis, NB, E2E 4R2

Attention: [Owner Contact]

1.3 TENDER DOCUMENTS

.1 A complete Tender is comprised of the following:

- .1 The Tender Form in its entirety, with all pages and spaces for entry of information by Tenderers filled in as instructed.
- .2 Acknowledgment of addenda received by the Tenderer during the tendering period.
- .3 Tender Security (refer to clause [clause #] herein).
- .4 Consent of Surety/Agreement to Bond (refer to clause [clause #] herein).
- .5 WorkSafe NB clearance letter.
- .6 Provincial Certificate of Recognition.
- .7 Supplementary Tender Information provided in Section 00 42 00.

1.4 COMPLETION TIME

- .1 Tenderer, in submitting an offer, accepts time period stated in Contract Documents for performing Work. Completion date in Agreement is completion time added to commencement date.
- .2 Tenderer, in submitting an offer, agrees to complete Work by date indicated in Contract Documents, but may propose a revision to Contract Time with adjustment to Tender price.
- .3 Consideration will be given to time of completion when reviewing Tender submitted.
- .4 Refer to Supplementary General Conditions for inclusion of taxes and procedures for tax rebate claims by Owner.

1.5 AVAILABILITY

- .1 Tender Documents are made available only for purpose of obtaining offers for this project. Their use does not confer license or grant for other purposes.
- .2 Tender Documents can be obtained from the New Brunswick Opportunities Network website.
- .3 Tender Documents are on display at offices of the New Brunswick Construction Association plan room facilities.
- .4 Upon receipt of Tender Documents verify that documents are complete.
- .5 Immediately notify the Consultant upon finding discrepancies or omissions in Tender Documents.

1.6 EXAMINATION OF SITE

- .1 Before tendering, Tenderers shall have examined the Site of the Work and shall have satisfied themselves as to the working conditions, including labour conditions and labour rules, the nature and kind of work to be done, any special risks associated therewith and all other matters which may be necessary in order to form a proper conception under which the Work will be required to be performed. Tenderers shall not be entitled to claim at any time after execution of the Contract that there was any misunderstanding in regard to all such conditions.
- .2 When forming their estimates and preparing their tenders, Tenderers shall take full cognizance of the content of all the Contract Documents listed in Section 00 41 43 – Tender Form.
- .3 Tenderers are required to attend a mandatory Site meeting, to be held at [place] at [time] on [date and day]. Questions may be asked and description of the Work may be discussed during this meeting, however no minutes of the meeting will be distributed and modifications made by way of addenda, to tendering requirements or the Contract Documents, shall be binding.

1.7 QUERIES AND ADDENDA

- .1 Any ambiguities, inconsistencies, or uncertainties in the Contract Documents which may

become apparent to Tenderers when tendering shall be advised in writing to the Consultant at [Consultant address], Attention: [PM's full name and title], at [PM's email], not less than [#] working days before date set for receipt of Tenders.

- .2 Reply will be in form of an addendum. Copy of addendum will be forwarded to known Tenderers no later than [five (5)] working days before Tender Closing.
- .3 Verbal answers are only binding when confirmed by written addenda.
- .4 Addenda may be issued during Tender period. Addenda will become part of Contract Documents. Include costs in Tender Price.

1.8 VALIDITY

- .1 All tenders shall be valid for acceptance for sixty (60) calendar days from the Closing Date.
- .2 The Civil Works Contract CCDC18 - 2001 is included in the Contract Documents at the time of tendering only for information and shall not be completed at the time of tendering.
- .3 The appending of any qualifying clauses to the tender or failure to comply with these instructions and with all other relevant provisions contained in the documents in the completing of any tender renders such tender liable to disqualification.
- .4 Contract Price to exclude HST. Harmonized sales tax shall be indicated as a separate amount and included in the Total Amount Payable.

1.9 AMENDMENT/WITHDRAWAL

- .1 Tenders may be amended or withdrawn by email to quispamsis@quispamsis.ca, prior to Tender Closing. Amendments shall not disclose either original or revised total price.
- .2 Label amendment or withdrawal email as follows: "[Amendment]/[Withdrawal]" of Tender for the "Town of Quispamsis, [Tender Name], [Tender No.]". Sign and seal as required for tender and submit at address given for receipt of tenders. All Submissions must be received prior to Tender Closing.

1.10 TENDER SECURITY

- .1 Each tender shall be accompanied by Tender Security in the amount of ten percent (10%) of the Total Amount Payable in evidence of the bona fide nature of the tender. This Tender Security shall be in favour of the Owner and shall be in the form of a Certified Cheque, Irrevocable Letter of Credit or a Bid Bond which shall guarantee to the Owner that in the event of the successful Tenderer declining to enter into a formal agreement with the Owner as called for in the Contract Documents, or declining or neglecting to provide the Insurance or Contract Security required by the Contract Documents, then the Owner will be reimbursed the additional cost of accepting another tender or Tender Security amount, whichever is the lesser.
- .2 The bonds shall be issued by a company whose guaranteed bonds are acceptable to the Government of Canada. Use latest edition of CCDC Form 220.
- .3 The Tender Security of the unsuccessful Tenderers will be returned to them after the Owner enters into a formal agreement with the successful Tenderer or the expiration of

validity of their tenders, whichever is the sooner.

- .4 If no contract is awarded, Tender Security will be returned.

1.11 CONSENT OF SURETY/AGREEMENT TO BOND

- .1 Submit with Tender Form and Bid Bond, [Consent of Surety] [Agreement to Bond], stating that surety providing Bid Bond is willing to supply Performance and Labour and Materials Payment Bond specified.
- .2 Include cost of bonds in Tender Price.

1.12 INSURANCE

- .1 Provide signed "Undertaking of Insurance" on standard form provided by insurance company stating intention to provide insurance to Tenderer in accordance with insurance requirements of Contract Documents.

1.13 ACCEPTANCE/REJECTION

- .1 On the written acceptance by the Owner of a tender, that tender becomes the Contract and the Tenderer who has submitted it becomes the Contractor. The Contractor will be required to enter into a formal agreement with the Owner following receipt of a written notice of acceptance from the Owner. The written notice of acceptance forms a Contract Agreement until the formal "Agreement" is executed.
- .2 Within seven (7) days of written acceptance of a tender that tender shall provide Contract Security in the amount and form as specified in GC11.2 and as supplemented in Section 00 73 10 – Supplementary General Conditions, and Insurance as specified in GC11.1.
- .3 Complete the Tender Form in ink and have corrections initialled by the individual signing the tender.
- .4 Where manufactured articles are described or specified in the Contract Documents by name, catalogue number of a manufacturer or supplier, Tenderers shall tender on the basis of using only such articles. Procedure concerning substitution of a specified article with another shall be in accordance with equivalents and alternates in Section 01 00 00 – Project Specific General Requirements.
- .5 The Owner will not defray any expenses whatsoever incurred by Tenderers in the preparation and submission of their tenders. The Owner reserves the right to waive any formality or technicality in any tender.
- .6 The Owner reserves the right to accept or to reject any or all tenders received, or to select a tender which is deemed by the Owner to be in its best interests.
- .7 Tenders, which in the opinion of the Owner are considered to be informal or unbalanced, may be rejected.

1.14 PRODUCT SUBSTITUTIONS

- .1 Where Tender Documents stipulate a particular product, substitutions will be considered up to [#] days before receipt of Tenders.
- .2 When request to substitute product is made, Owner or Consultant may approve substitution and will issue Addendum to known Tenderers.
- .3 In submission of substitutions to products specified, Tenderers are to include in their Tender changes required in Work to accommodate such substitutions. Later claims by Tenderer for addition to Contract Price as a result of changes in Work necessitated by use of substitutions will not be considered.
- .4 Substituted products will be considered during the tender period.
- .5 Ensure submission provides sufficient information to enable Owner to determine acceptability of such products.
- .6 Provide complete information on required revisions to other work to accommodate each substitution, dollar amount of additions to or reductions from Tender Price, including revisions to other work.
- .7 Provide specified products unless substitutions are submitted as noted and subsequently accepted.
- .8 Approval to submit substitutions prior to submission of Tender is not required.

1.15 TENDER SIGNING

- .1 Tender Form to be signed under seal by Tenderer.
- .2 Sole Proprietorship: signature of sole proprietor in presence of witness who shall also sign. Insert words "Sole Proprietor" under signature. Affix seal.
- .3 Partnership: signature of all partners in presence of witness who shall also sign. Insert word 'Partner' under each signature. Affix seal to each signature.
- .4 Limited Company: signature of duly authorized signing officer(s) in normal signatures. Insert officer's capacity in which signing officer acts, under each signature. Affix corporate seal. If Tender is signed by officials other than President and Secretary of company, or President-Secretary-Treasurer of company, copy of by-law resolution of Board of Directors authorizing them to do so must also be submitted with Tender in Tender envelope.
- .5 Incorporated Company: signature of duly authorized signing officer(s) in normal signatures. Insert officer's capacity in which signing officer acts, under each signature. Affix corporate seal. If Tender is signed by officials other than President and Secretary of company, or President-Secretary-Treasurer of company, copy of by-law resolution of Board of Directors authorizing them to do so must also be submitted with Tender in Tender envelope.
- .6 Joint Venture: each party of joint venture must execute Tender under respective seals in manner appropriate to such party as described above, similar to requirements of Partnership.
- .7 A [Geotechnical Investigation/Environmental Assessment] has been carried out at the Site. Information from [Geotechnical Investigation/ Environmental Assessment] Report No. [], dated [date], 20[##] prepared by [name of report producer], is available for viewing at the offices of the Owner or Consultant. Any interpretations shall be at the Tenderers own risk and neither the Consultant nor the Owner shall be held responsible for the interpretation of

this information.

1.16 PRESELECTED/PREPURCHASED EQUIPMENT

- .1 SPEC NOTE: The Tenderers shall take note that the Owner has pre-selected/pre-purchased certain items of equipment for incorporation into the Work by the Contractor. [If applicable: Copies of the Quotation Forms for these items of equipment are contained in the pertinent technical sections of the specifications]. Procedures for taking over pre-selected/pre-purchased equipment are specified in Section 01 00 00 – Project Specific General Requirements. Copies of the pre-selected/pre-purchased equipment shop drawings or other information is available for viewing at the office of the Owner or Consultant.

1.17 LIQUIDATED DAMAGES

- .1 The Owner and the Contractor will agree that, in the event that the Work, or portions of the Work, as identified in the Contract Documents, are not completed substantially as specified in the Contract Documents that the Owner will suffer damages, which are difficult to identify with precision because of the nature of the project. The Contractor and the Owner agree that a fair pre-estimate of the amount of set damages is five hundred dollars (\$500.00) per calendar day for the first 15 calendar days. The amount is \$1,000.00 per calendar day for every day after the first 15 calendar days. Therefore, the parties agree that the Contractor shall pay to the Owner for each and every calendar day after the identified Contract completion date, the sum of five hundred dollars (\$500.00), and \$1,000.00 per calendar day after that, as determined by the parties hereto to be liquidated damages, not a penalty. These damages will be deducted from the contract amount.

END OF SECTION

1 GENERAL

1.1 SALUTATION

.1 TO:

Town of Quispamsis
12 Landing Court
Quispamsis, NB E2E 4R2

.2 FOR:

Contract Name: _____

Contract No.: _____

.3 FROM:

1.2 TENDERER DECLARES

.1 That this tender was made without collusion or fraud.

.2 That the proposed work was carefully examined.

.3 To have personal knowledge of the location of the proposed Work and is informed as to the actual conditions and requirements, including labour conditions and labour rules and shall not claim at any time after execution of the Agreement that there was any misunderstanding in regard to such conditions and requirements.

.4 That Contract Documents and Addenda No. ____ to ____ inclusive were carefully examined.

.5 That all the above were taken into consideration in preparation of this Tender.

1.3 TENDERER AGREES

.1 To enter into a contract to supply all labour, material and equipment and to do all work necessary to construct the Work as described and specified herein for the unit prices stated in Subsection 4 hereunder, Schedule of Quantities and Unit Prices.

.2 That the estimated Contract Price shall be the sum of the products of the tendered unit prices times the estimated quantities in Subsection 4 hereunder.

.3 That this Tender is valid for acceptance for sixty (60) days from the time of Tender Closing.

- .4 That measurement and payment for items listed in Subsection 4 hereunder shall be in accordance with corresponding items in the General Specification.
- .5 Upon request to provide evidence of ability and experience within seven (7) days of request, including experience in similar work, work currently under contract, senior supervisory staff available for the project, equipment available for use on the Work, and financial resources.
- .6 To execute in triplicate the Agreement and forward same together with the specified contract security and insurance documents to the Owner within fourteen (14) days of written notice of award.
- .7 That failure to enter into a formal contract and give specified insurance documents and tender security within time required will constitute grounds for forfeiture of certified cheque or enforcement of bid bond.
- .8 That if certified cheque is forfeited, Owner will retain difference in money between amount of Tender and amount for which Owner legally contracts with another party to perform the Work and will refund balance, if any, to Tenderer.
- .9 Declares to have carefully examined the documents and Addenda No ._____ to _____ referred to in the first paragraph of this Tender Form, and the Tenderer hereby accepts and agrees to the same as forming a part of the Contract.
- .10 Understands that in the event that the tendered Contract Price is not within the project budget, the Owner has the right to negotiate the Contract with the low bidder or reject all tenders received.
- .11 Agrees that the Warranty Period defined in the Contract Documents shall be for a period of one (1) year from the date of Substantial Performance of the Work.
- .12 Understands that Substantial Performance of the Work will be established in accordance with General Conditions of the Contract and applicable lien legislation.
- .13 Understands that after the issuance of the certificate of Substantial Performance of the Work by the Consultant, provided that the Contractor has relieved the Owner from any and all claims, demands and lien claims for and in respect of the Contract, and has completed all outstanding items and corrected all deficiencies, the Contractor shall submit an application for Final Payment and the Consultant will thereafter prepare the Final Certificate for payment in accordance with the General Conditions of the Contract and applicable lien legislation.
- .14 Understands that the payment of holdback will be in accordance with the General Conditions of the Contract and subject to the provisions of the lien legislation applicable to the Place of Work.
- .15 Understands the occupational Health and Safety Legislation and any Workers or Workplace compensation legislation applicable to the Place of the Work and declares that they are in good standing and have all necessary certification as required by such legislation.
- .16 Agrees that time shall be construed as being of the essence of the Contract.
- .17 That the Contract Documents include:
 - .1 Drawing List.
 - .2 Tender Form.
 - .3 Supplementary Tender Information.

- .4 Civil Works Contract - CDC18 – 2001.
- .5 Supplementary General Conditions to CCDC18 – 2001.
- .6 Supplementary Technical Specifications.
- .7 Drawings:
 - Drawing. No. Title
- .8 [Appendices]
- .9 Addenda as issued and as confirmed in Subsection 1.2.4 of this Section.

1.4 SCHEDULE OF QUANTITIES AND UNIT PRICES

ITEM NO.	DESCRIPTION	SECTION NUMBER	UNIT OF MEASURE	EST. QTY.	UNIT PRICE	TOTAL PRICE
A – SITE WORKS						
1	<u>Environmental Protection - Supply & Install</u>	01 35 43				
a	Straw Bale Control Structure (NBDTI Type C)		each			
b	Sediment Control Fence		m			
2	<u>Dust Control - Supply & Place</u>	01 35 43				
a	Calcium Chloride		per 40kg bag			
3	<u>Clearing and Grubbing</u>	31 11 00				
a	<u>Clear and grub (includes 0.2m of organic removal)</u>		m ²			
4	<u>Excavating, Trenching and Backfilling</u>	31 23 33.01				
a	Common borrow excavation (for berm construction and road widening)		m ³			
b	Common waste excavation (edge of shoulder to clearing limits)		m ³			
c	Rock excavation		m ³			
d	Unshrinkable Fill		m ³			

ITEM NO.	DESCRIPTION	SECTION NUMBER	UNIT OF MEASURE	EST. QTY.	UNIT PRICE	TOTAL PRICE
e	Geotextile Fabric - Terratrack 400W (by Terrafix Geosynthetics Inc. or approved equal)		m ²			
f	Geogrid - TX140 geogrid by Tensar or approved equal) for placement in designated areas, as directed by the Engineer		m ²			
g	Brick and grout abandoned structures and pipes		each			
h	Removal of abandoned structures		each			
i	Removal of abandoned pipes		m			
5	<u>Rip Rap - Supply & Place</u>	31 37 00				
a	R-5 Rip Rap		t			
b	R-25 Rip Rap		t			
c	Random Rip Rap R-5 mix		t			
d	Random Rip Rap R-25 mix		t			
AMOUNT A – SITE WORKS						
B – ROADBED CONSTRUCTION						
1	<u>Road Aggregate Placement - Supply & Place</u>	32 11 23				
a	Pit Run Gravel Subbase (125mm minus)		m ³			

ITEM NO.	DESCRIPTION	SECTION NUMBER	UNIT OF MEASURE	EST. QTY.	UNIT PRICE	TOTAL PRICE
b	Crushed Gravel Subbase (100mm minus)		m ³			
c	Crushed Rock Subbase (75mm Minus)		m ³			
d	Crushed Gravel Base (31.5mm Minus)		m ³			
e	Crushed Rock Base (31.5mm Minus)		m ³			
2	<u>Shoulder Aggregate Placement - Supply & Place</u>	32 11 23				
a	Crushed Shoulder Material (19mm minus)		t			
b	RAP Material		t			
3	<u>Driveway Aggregate Placement - Supply & Place</u>	32 11 23				
a	Granular A crushed gravel to match existing		t			
b	Limestone crushed rock to match existing		t			
AMOUNT B - ROADBED CONSTRUCTION						
C - ROAD SURFACE						
1	<u>Asphalt Paving - Supply & Place</u>	32 12 16				
a	Superpave 9.5mm (Type D) 0.3 to < 3 million ESALs		t			
b	Superpave 12.5mm (Type C) 0.3 to < 3 million ESALs		t			

ITEM NO.	DESCRIPTION	SECTION NUMBER	UNIT OF MEASURE	EST. QTY.	UNIT PRICE	TOTAL PRICE
c	Superpave 19mm (Type B) 3 to < 10 million ESALs		t			
d	Superpave 9.5mm (Type D) 0.3 to < 3 million ESALs Miscellaneous Handwork		t			
e	Superpave 9.5mm (Type D) 0.3 to < 3 million ESALs Padding		t			
f	Asphalt Cold Milling		m ²			
g	Bituminous Tack Coat		m ²			
AMOUNT C - ROAD SURFACE						
D - CURBS, GUTTERS, AND SIDEWALKS						
1	<u>Concrete Curb (Regular & Depressed) - Construct</u>	32 16 00				
a	Concrete curb (regular & depressed) Excavation and backfill included - Method A		m			
b	Concrete curb (regular & depressed) Excavation and backfill NOT included - Method B		m			
2	<u>Concrete Curbs & Gutters (Regular & Depressed) - Construct</u>	32 16 00				
a	Concrete curb & gutter (regular & depressed) Excavation and backfill included - Method A		m			
b	Concrete curb & gutter (regular & depressed) Excavation and backfill NOT included - Method B		m			

ITEM NO.	DESCRIPTION	SECTION NUMBER	UNIT OF MEASURE	EST. QTY.	UNIT PRICE	TOTAL PRICE
2	<u>Concrete Sidewalk (Regular & Depressed) - Construct</u>	32 16 00				
a	1.5m wide concrete sidewalk (Regular) Excavation and backfill included - Method A		m			
b	1.5m wide concrete sidewalk (Regular) Excavation and backfill NOT included - Method B		m			
c	1.5m wide concrete sidewalk (Depressed) Excavation and backfill included - Method A		m			
d	1.5m wide concrete sidewalk (Depressed) Excavation and backfill NOT included - Method B		m			
e	Variable width concrete sidewalk (Regular) Excavation and backfill included - Method A		m ²			
f	Variable width concrete sidewalk (Regular) Excavation and backfill NOT included - Method B		m ²			
g	Variable width concrete sidewalk (Depressed) Excavation and backfill included - Method A		m ²			
h	Variable width concrete sidewalk (Depressed) Excavation and backfill NOT included - Method B		m ²			
i	Supply and install 152mm x 152mm welded wire fabric, gauge no. 6/6, as directed by the Engineer		m ²			
AMOUNT D - CURB, GUTTERS, AND SIDEWALKS						

ITEM NO.	DESCRIPTION	SECTION NUMBER	UNIT OF MEASURE	EST. QTY.	UNIT PRICE	TOTAL PRICE
E - LANDSCAPING						
1	<u>Landscaping - Supply & Place</u>	32 92 20				
a	Topsoil - 100mm thickness		m ³			
b	Hydro-seed		m ²			
c	Nursery Sod (minimum thickness 40mm)		m ²			
d	Flexible Reinforcement Mat-FRM		m ²			
AMOUNT E - LANDSCAPING						
F – WATER						
1	<u>Precast Concrete Structures - Supply & Install</u>	33 05 16				
a	1200mm Ø valve chamber c/w standard frame & cover and tracer wire		each			
2	<u>Water Distribution Piping - Supply & Install</u>	33 14 16				
a	20mm Ø Type "K" copper pipe including tracer wire and connections		m			
b	25mm Ø Type "K" copper pipe including tracer wire and connections		m			
c	25mm Ø Muncipex cross-linked polyethylene (PEX) tubing including tracer wire and connections		m			
d	150mm Ø PVC DR18, Class 150 including tracer wire and connections		m			
e	200mm Ø PVC DR18, Class 150 including tracer wire and connections		m			

ITEM NO.	DESCRIPTION	SECTION NUMBER	UNIT OF MEASURE	EST. QTY.	UNIT PRICE	TOTAL PRICE
f	20mm corporation (main) stop complete with service saddle (incl. connection to main, existing service pipe with all fittings, excavation and backfill)					
g	25mm corporation (main) stop complete with service saddle (incl. connection to main, existing service pipe with all fittings, excavation and backfill)					
h	20mm curb stops complete, incl. connection to existing service piping with necessary fittings					
i	25mm curb stops complete, incl. connection to existing service piping with necessary fittings					
j	150mm Ø Coupling for connection to existing watermain					
k	200mm Ø Coupling for connection to existing watermain					
l	200mm x 11 ¼° Bend					
m	200mm x 22 ½° Bend					
n	200mm x 45 ° Bend					
o	200mm x 90 ° Bend					
p	200mm x 200mm x 150mm Tee					
q	200mm Bell and Spigot Restrainer					
r	200mm x 150mm Reducer					
s	150mm Gate Valve					
t	200mm Gate Valve					

ITEM NO.	DESCRIPTION	SECTION NUMBER	UNIT OF MEASURE	EST. QTY.	UNIT PRICE	TOTAL PRICE
u	400mm Butterfly Valve					
v	200mm Mechanical Joint Cap					
w	50mm Brass Cap					
x	19mm to 25mm main adapter					
y	105mm Service Box & tracer wire					
z	130mm Service Box & tracer wire					
	130mm Mueller Composite Valve Box with Adjustable top complete with tracer wire					
	Fire hydrant complete, including anchor tee, 150mm GV, 130mm VB, restraints, concrete thrust blocks, vertical piping, polyethylene encasement, tracer wire					
	100mm Ø Combination Air Valve including chamber & vent piping					
	100mm Ø Pressure Reducing Valve and strainer					
	50mm thick insulation					
AMOUNT F - WATER						
G – SANITARY						
1	<u>Precast Concrete Structures - Supply & Install</u>	33 05 16				
a	1050mm Ø Sanitary Manhole c/w standard frame and cover, incl. all labour & materials necessary to connect to new and existing mains & laterals		each			

ITEM NO.	DESCRIPTION	SECTION NUMBER	UNIT OF MEASURE	EST. QTY.	UNIT PRICE	TOTAL PRICE
b	1200mm Ø Sanitary Manhole c/w standard frame and cover, incl. all labour & materials necessary to connect to new and existing mains & laterals		each			
c	1200mm Ø interior drop Sanitary Manhole c/w standard frame and cover, incl. all labour & materials necessary to connect to new and existing mains & laterals		each			
2	<u>Sanitary Sewer Gravity Piping - Supply & Install</u>	33 31 11				
a	100mm Ø PVC DR35		m			
b	150mm Ø PVC DR35		m			
c	200mm Ø PVC DR35		m			
d	250mm Ø PVC DR35		m			
e	300mm Ø PVC DR35		m			
f	100mm sewer lateral connections to main (incl. fitting and bends typ.)		each			
g	150mm sewer lateral connections to main (incl. fittings and bends typ.)		each			
h	Connection of new 100mm pipe to existing 100mm pipe incl. coupling		each			
i	Connection of new 150mm pipe to existing 150mm pipe incl. coupling		each			
j	Connection of new 200mm pipe to existing 200mm pipe incl. coupling		each			
k	Core drill opening into existing pre-cast manhole and connect new pipe		each			
l	100mm Ø Cap		each			

ITEM NO.	DESCRIPTION	SECTION NUMBER	UNIT OF MEASURE	EST. QTY.	UNIT PRICE	TOTAL PRICE
m	150mm Ø Cap		each			
n	200mm Ø Cap		each			
o	200 x 200 x 200mm Tee		each			
p	200mm x 22.5° Bend		each			
q	200mm x 45° Bend		each			
r	50mm thick insulation		m ²			
s	Inspection Chamber - backflow preventer, single service chamber with flap and incl. 200mm Ø riser and surface locking inspection cap		each			
t	Pressure Grout		m ³			
u	CCTV Video Inspection		m			
3	<u>Sanitary Sewer Pressure Piping - Supply & Install</u>	33 31 23				
a	300mm Ø PVC DR 21		m			
b	300mm Ø Gate Valve		each			
c	300mm Ø Cap		each			
d	300 x 300 x 300mm Tee		each			
e	300mm x 22.5° Bend		each			
f	300mm x 45° Bend		each			
g	50mm thick insulation		m ²			
h	Pressure Grout		m ³			
AMOUNT G - SANITARY						

ITEM NO.	DESCRIPTION	SECTION NUMBER	UNIT OF MEASURE	EST. QTY.	UNIT PRICE	TOTAL PRICE
H – STORM						
1	<u>Precast Concrete Structures</u> <u>- Supply & Install</u>	33 05 16				
a	1050mm Ø Storm Manhole c/w standard frame and cover , incl. all labour & materials necessary to connect to new and existing mains & laterals		each			
b	1050mm Ø Storm Manhole c/w standard frame and grate , incl. all labour & materials necessary to connect to new and existing mains & laterals		each			
c	1200mm Ø Storm Manhole c/w standard frame and cover , incl. all labour & materials necessary to connect to new and existing mains & laterals		each			
d	1200mm Ø Storm Manhole c/w standard frame and grate , incl. all labour & materials necessary to connect to new and existing mains & laterals		each			
e	750mm Ø Catch Basin c/w standard frame and grate, incl. all labour & materials necessary to connect to new and existing mains & laterals		each			
f	1050mm Ø Catch Basin c/w standard frame and grate, incl. all labour & materials necessary to connect to new and existing mains & laterals		each			
g	1200mm Ø Catch Basin c/w standard frame and grate, incl. all labour & materials necessary to connect to new and existing mains & laterals		each			
h	750mm Ø concrete headwall complete with wing walls. Installation includes connection to storm sewer and all necessary excavation and backfill		each			

ITEM NO.	DESCRIPTION	SECTION NUMBER	UNIT OF MEASURE	EST. QTY.	UNIT PRICE	TOTAL PRICE
2	<u>Storm Sewer Piping - Supply & Install</u>	33 41 00				
a	100mm Ø HDPE Filtered perforated pipe (High density polyethylene, Type III), complete with geotextile wrap TX-80 or approved equal (for french drain use)		m			
b	100mm Ø PVC (Color - White)		m			
c	150mm Ø PVC (Color - White)		m			
d	200mm Ø PVC		m			
e	375mm Ø PVC		m			
f	375mm Ø Concrete, class III		m			
g	450mm Ø PVC		m			
h	450mm Ø concrete, class III		m			
i	600mm Ø PVC		m			
j	600mm Ø concrete, class III		m			
k	750mm Ø concrete, class III		m			
l	900mm Ø concrete, class III		m			

ITEM NO.	DESCRIPTION	SECTION NUMBER	UNIT OF MEASURE	EST. QTY.	UNIT PRICE	TOTAL PRICE
m	Tension bars assembly, c/w 2 bars with associated hardware (4 bolt/threaded rod, 8 nuts & washers)		each			
	600mm Ø x 45° Bend concrete, class III		each			
n	100mm Ø PVC Cap		each			
o	150mm Ø PVC Cap		each			
p	Inlet Control Device		each			
q	100mm storm sewer lateral connections to main (incl. fitting and bends typ.)		each			
r	150mm storm sewer lateral connections to main (incl. fittings and bends typ.)		each			
s	Connection of new 100mm pipe to existing 100mm pipe incl. coupling		each			
t	Connection of new 150mm pipe to existing 150mm pipe incl. coupling		each			
u	Cut opening into existing cast-in-place manhole and connect new pipe		each			
v	Connect existing drain tile to new storm sewer or extend drain tile piping to new ditch line. Includes coupling to existing and up to 2.0m of 100mm or 150mm diameter drain tile pipe as required		each			
w	Connect existing 450mm storm pipe into new 600mm storm pipe @ Fullyer Drive including drilling, coupler or cast-in place		each			

ITEM NO.	DESCRIPTION	SECTION NUMBER	UNIT OF MEASURE	EST. QTY.	UNIT PRICE	TOTAL PRICE
x	50mm thick insulation		m ²			
y	Pressure Grout		m ³			
z	CCTV Video Inspection		m			
AMOUNT H - STORM						
I - MISCELLANEOUS						
1	<u>Adjustment of Existing Structures</u>	33 05 16				
a	Adjust existing 105mm and 130mm Ø valve boxes to finish grade		each			
b	Adjust top section to finish grade as required, using <u>existing</u> frame & cover including top 10 cm		each			
c	Adjust top section to finish grade as required, using <u>new</u> Standard frame & cover including top 10 cm		each			
d	Rebuild manhole and catch basin top sections as required (does not include final adjustment up to 10 cm)		cm			
2	<u>Vehicle W-Beam Guide Rail</u>	34 71 13.25				
a	Supply and install new guide rail including installation of new hardware		m			
AMOUNT I - MISCELLANEOUS						
SUBTOTAL (A + B + C + D + E + F + G + H + I)					\$	

ITEM NO.	DESCRIPTION	SECTION NUMBER	UNIT OF MEASURE	EST. QTY.	UNIT PRICE	TOTAL PRICE
TENDER SUMMARY						
		CONTRACT PRICE (EXCLUDING HST)			\$	
		HST (15% OF THE CONTRACT PRICE)			\$	
		TOTAL AMOUNT PAYABLE			\$	

TENDERER'S HST REGISTRATION NO. _____

1.5 COMPLETION TIME

- .1 Tenderer agrees to start on-site construction by Month, Day, Year and complete Substantial Performance of the Work on or before Month, Day, Year.

1.6 SIGNATURE *

Dated this ____ day of ____, 20____.

Name of Firm Tendering

Signature of Signing Officer

Witness

Name and Title (Printed)

Name and Title (Printed)

Signature of Signing Officer

Witness

Name and Title (Printed)

Name and Title (Printed)

Company Address

Telephone No.

Fax No.

[Seal]

*NOTE: Tenders submitted by or on behalf of any Corporation must be signed and sealed in the name of such Corporation by a duly authorized officer or agent.

END OF SECTION

The information requested in this section is a requirement of the tender submission and is to be completed and submitted with Section 00 41 43 - Tender Form.

.1 Referee as to Tenderer's financial status:

Name: _____

Address: _____

Contact: _____
Telephone: _____

.2 Name and address of company who has agreed to underwrite the Bonds for Performance and for Labour and Material Payment. Refer to Clause GC 11.2 – Contract Security in the General Conditions.

Name: _____

Address: _____

Telephone: _____

.3 Name and address of company who has agreed to underwrite insurance on this Contract and the type and amount of insurance. Refer to Clause GC 11.1 – Insurance in the General Conditions.

Name: _____

Address: _____

Telephone: _____

Type of Insurance	Amount
	\$
	\$
	\$
	\$
	\$

.4 Particulars of Tenderer's recent contracts:

- .1 The Tenderer shall furnish particulars of at least three, and if possible, five contracts successfully completed or currently being carried to completion. The projects quoted should preferably be approximate in nature to the Works now tendered for and be of comparable or greater size.

Owner: _____

Project Description: _____

Start Date: _____

Finish Date: _____

Contract Value \$ _____

Owner: _____

Project Description: _____

Start Date: _____

Finish Date: _____

Contract Value \$ _____

Owner: _____

Project Description: _____

Start Date: _____

Finish Date: _____

Contract Value \$ _____

[illegible]

.7 List of Sub-contractors to be used:

- .1 The Tenderer's attention is drawn to the General Conditions GC 3.8 – Subcontractors and Suppliers. The Tenderer shall enter the name and address of each Sub-Contractor used in making up the tender. Only one Sub-Contractor shall be named for each part of the Work to be sublet.
- .2 After the tender has been accepted by the Owner, the Contractor shall not be allowed to substitute other sub-contractors in place of those named in the tender without written approval from the Consultant.

Sub-Trade: _____

Contractor Name & Address: _____

Scope of Work: _____

Value of Work: \$ _____

Sub-Trade: _____

Contractor Name & Address: _____

Scope of Work: _____

Value of Work: \$ _____

Sub-Trade: _____

Contractor Name & Address: _____

Scope of Work: _____

Value of Work: \$ _____

Sub-Trade: _____

Contractor Name & Address: _____

Scope of Work: _____

Value of Work: \$ _____

Sub-Trade: _____

Contractor Name & Address: _____

Scope of Work: _____

Value of Work: \$ _____

.8 Project personnel:

- .1 The Tenderer shall include below, the names, qualifications and previous experience of those people who will be directly involved with the project. The names shall, for example, include Site supervisor, superintendent contractor's engineer and or construction manager.

Name: _____

Position: _____

Years of Experience: _____ Years with Company: _____

Related Experience: _____

Name: _____

Position: _____

Years of Experience: _____ Years with Company: _____

Related Experience: _____

Name: _____

Position: _____

Years of Experience: _____ Years with Company: _____

Related Experience: _____

Name: _____

Position: _____

Years of Experience: _____ Years with Company: _____

Related Experience: _____

Name: _____

Position: _____

Years of Experience: _____ Years with Company: _____

Related Experience: _____

.9 Tenderer's Safety Data

.1 The Owner is committed to working with safe contractors. Before the Tenderer or the Tenderer's subcontractor is allowed to work, safety performance will be reviewed by the Owner. The Owner requires that all Tenderers and subcontractors be registered and in good standing with the WorkSafeNB.

.2 Recordable Incidents:
Indicate Tenderer's WorkSafeNB registration number. _____

.3 Using the Tenderer's last year's Accident Statements, complete the following:

.1	Number of injury related fatalities:	_____
.2	Number of injuries with lost workdays:	_____
.3	Number of injuries requiring medical attention, but no lost work days:	_____

Note: No "First Aid" cases should be included in the above.

.4 Number of "First Aid" cases in addition to above: _____

.5 Number of employee hours worked last year:

Field: _____

Supervisory: _____

Total: _____

.4 Safety Program:

.1 Do you hold safety meetings for:

	<u>Yes</u>	<u>No</u>	<u>Frequency</u>	<u>Title of Person Conducting Meeting</u>
Employees	_____	_____	_____	_____
Subcontractors	_____	_____	_____	_____

Do you conduct job safety inspections? Yes: _____ No: _____

Do you have a formal safety program? Yes: _____ No: _____

.10 Who will be your designated safety contact person on Site? _____

.11 List the names of those employees who will be on the Owner's Site that are certified in first aid. (Attach a separate list, if necessary.)

<u>Employee Name</u>	<u>Expiry Date of Certificate</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

This is to certify that the data and information provided is accurate. It also gives permission to the Owner to verify the above information with WorkSafeNB.

Signature_____

Name_____

Title*_____

Date_____

* President or senior company officer.

END OF SECTION

CIVIL WORKS CONTRACT
CCDC18 - 2001

civil works contract

Project:

Apply a CCDC 18 copyright seal here. The application of the seal demonstrates the intention of the party proposing the use of this document that it be an accurate and unamended form of CCDC 18 – 2001 except to the extent that any alterations, additions or modifications are set forth in supplementary conditions.



Canadian Construction Documents Committee

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CCDC 18 is the product of a consensus-building process aimed at balancing the interests of all parties on the construction project. It reflects recommended industry practices. CCDC 18 can have important consequences. The CCDC and its constituent member organizations do not accept any responsibility or liability for loss or damage which may be suffered as a result of the use or interpretation of CCDC 18.

AGREEMENT BETWEEN OWNER AND CONTRACTOR

This Agreement made on the _____ day of _____ in the year _____.

by and between

hereinafter called the "*Owner*"

and

hereinafter called the "*Contractor*"

The *Owner* and the *Contractor* agree as follows:

ARTICLE A-1 THE WORK

The *Contractor* shall:

1.1 perform the *Work* required by the *Contract Documents* for _____

insert above the title of the Work

located at _____
insert above the Place of the Work

for which the Agreement has been signed by the parties, and for which _____

insert above the name of the Consultant

is acting as and is hereinafter called the "*Consultant*" and

1.2 do and fulfill everything indicated by the *Contract Documents*, and

1.3 commence the *Work* by the _____ day of _____ in the year _____ and, subject to adjustment in *Contract Time* as provided for in the *Contract Documents*, attain *Substantial Performance of the Work*, by the _____ day of _____ in the year _____

ARTICLE A-2 AGREEMENTS AND AMENDMENTS

- 2.1 The *Contract* supersedes all prior negotiations, representations, or agreements, either written or oral, relating in any manner to the *Work*, including the bidding documents that are not expressly listed in Article A-3 of the Agreement - CONTRACT DOCUMENTS.
- 2.2 The *Contract* may be amended only as provided in the *Contract Documents*.

ARTICLE A-3 CONTRACT DOCUMENTS

- 3.1 The following are the *Contract Documents* referred to in Article A-1 of the Agreement - THE WORK:
- Agreement Between Owner and Contractor
 - Definitions
 - The General Conditions of the Contract
- *

- * (Insert here, attaching additional pages if required, a list identifying all other Contract Documents e.g.:
- Supplementary Conditions;
 - Schedule of Prices;
 - Specifications, giving a list of contents with section numbers and titles, number of pages, and date;
 - Drawings, giving drawing number, title, date, revision date or mark;
 - Addenda, giving title, number, date;
 - Information documents, or parts thereof, to be incorporated in the Contract Documents identifying them by title, date, name of preparer and, if not included in their entirety, the page or sheet numbers to be included).

ARTICLE A-4 CONTRACT PRICE

- 4.1 * *Unit Prices* form the basis for payment of the *Contract Price*. Quantities in the *Schedule of Prices* are estimated. The estimated *Contract Price*, which is the total extended amount indicated in the *Schedule of Prices*, is:

OR

* A lump sum stipulated price forms the basis for payment of the *Contract Price*. The *Contract Price* is:

* *(Manually strike out inapplicable paragraph)*

_____/100 dollars \$ _____

- 4.2 All amounts are in Canadian funds and exclude Value Added Taxes.

- 4.3 These amounts shall be subject to adjustments as provided in the *Contract Documents*.

ARTICLE A-5 PAYMENT

- 5.1 Subject to the provisions of the *Contract Documents*, and in accordance with legislation and statutory regulations respecting holdback percentages and, where such legislation or regulations do not exist or apply, subject to a holdback of _____ ten percent _____ percent (_____ 10 _____ %), the *Owner* shall in Canadian funds:

- .1 make progress payments to the *Contractor* on account of the *Contract Price* when due in the amount certified by the *Consultant* together with such *Value Added Taxes* as may be applicable to such payment, and
- .2 upon *Substantial Performance of the Work*, pay to the *Contractor* the unpaid balance of the holdback amount when due together with such *Value Added Taxes* as may be applicable to such payment, and
- .3 upon the issuance of the final certificate for payment, pay to the *Contractor* the unpaid balance of the *Contract Price* when due together with such *Value Added Taxes* as may be applicable to such payment.

- 5.2 In the event of loss or damage occurring where payment becomes due under the property and boiler insurance policies, payments shall be made to the *Contractor* in accordance with the provisions of GC 11.1 - INSURANCE.

- 5.3 Interest

- .1 Should either party fail to make payments as they become due under the terms of the *Contract* or in an award by arbitration or court, interest at two percent (2%) per annum above the prime rate on such unpaid amounts shall also become due and payable until payment. Such interest shall be compounded and adjusted on a monthly basis. The prime rate shall be the rate of interest quoted by _____ Bank of Canada _____ for prime business loans. *(Insert name of chartered lending institution whose prime rate is to be used)*
- .2 Interest shall apply at the rate and in the manner prescribed by paragraph 5.3.1 of this Article on the settlement amount of any claim in dispute that is resolved either pursuant to Part 8 of the General Conditions - DISPUTE RESOLUTION or otherwise, from the date the amount would have been due and payable under the *Contract*, had it not been in dispute, until it is paid.

ARTICLE A-6 RECEIPT OF AND ADDRESSES FOR NOTICES

- 6.1 Notices in writing between the parties or between them and the *Consultant* shall be considered to have been received by the addressee on the date of delivery if delivered to the individual, or to a member of the firm, or to an officer of the corporation for whom they are intended by hand or by registered post; or if sent by regular post, to have been delivered within 5 *Working Days* of the date of mailing when addressed as follows:

The *Owner* at _____

street and number and postal box number if applicable

post office or district, province or territory, postal code

The *Contractor* at _____

street and number and postal box number if applicable

post office or district, province or territory, postal code

The *Consultant* at _____

street and number and postal box number if applicable

post office or district, province or territory, postal code

ARTICLE A-7 LANGUAGE OF THE CONTRACT

- 7.1 When the *Contract Documents* are prepared in both the English and French languages, it is agreed that in the event of any apparent discrepancy between the English and French versions, the English / French * language shall prevail.
* (Complete this statement by striking out inapplicable term)

- 7.2 This Agreement is drawn in English at the request of the parties hereto. La présente convention est rédigée en anglais à la demande des parties.

ARTICLE A-8 SUCCESSION

- 8.1 The *Contract* shall enure to the benefit of and be binding upon the parties hereto, their respective heirs, legal representatives, successors, and assigns.

In witness whereof the parties hereto have executed this Agreement by the hands of their duly authorized representatives.

SIGNED AND DELIVERED

in the presence of:

Owner

name of Owner

signature

name and title of person signing

signature

name and title of person signing

WITNESS

signature

name and title of person signing

Contractor

name of Contractor

signature

name and title of person signing

WITNESS

signature

name and title of person signing

- N.B. Where legal jurisdiction, local practice, or Owner or Contractor requirement calls for:
- (a) proof of authority to execute this document, attach such proof of authority in the form of a certified copy of a resolution naming the representative(s) authorized to sign the Agreement for and on behalf of the corporation or partnership; or
 - (b) the affixing of a corporate seal, this Agreement should be properly sealed.

DEFINITIONS

The following definitions shall apply to all *Contract Documents*.

1. Change Directive

A *Change Directive* is a written instruction prepared by the *Consultant* and signed by the *Owner* directing the *Contractor* to proceed with a change in the *Work* within the general scope of the *Contract Documents* prior to the *Owner* and the *Contractor* agreeing upon an adjustment in *Contract Price* and *Contract Time*.

2. Change Order

A *Change Order* is a written amendment to the *Contract* prepared by the *Consultant* and signed by the *Owner* and the *Contractor* stating their agreement upon:

- a change in the *Work*;
- the method of adjustment or the amount of the adjustment in the *Contract Price*, if any; and
- the extent of the adjustment in the *Contract Time*, if any.

3. Construction Equipment

Construction Equipment means all machinery and equipment, either operated or not operated, that is required for preparing, fabricating, conveying, erecting, or otherwise performing the *Work* but is not incorporated into the *Work*.

4. Consultant

The *Consultant* is the person or entity identified as such in the Agreement. The *Consultant* is the Engineer or other entity licensed to practise in the province or territory of the *Place of the Work*. The term *Consultant* means the *Consultant* or the *Consultant's* authorized representative.

5. Contract

The *Contract* is the undertaking by the parties to perform their respective duties, responsibilities, and obligations as prescribed in the *Contract Documents* and represents the entire agreement between the parties.

6. Contract Documents

The *Contract Documents* consist of those documents listed in Article A-3 of the Agreement - CONTRACT DOCUMENTS and amendments agreed upon between the parties.

7. Contract Price

When *Unit Prices* form the basis of payment, the *Contract Price* is the sum of the product of each *Unit Price* stated in the *Schedule of Prices* multiplied by the appropriate actual quantity of each item that is incorporated in or made necessary by the *Work*, plus lump sums, if any, and allowances, if any, stated in the *Schedule of Prices*. When a lump sum stipulated price forms the basis of payment, the *Contract Price* is the amount stipulated in Article A-4 of the Agreement - CONTRACT PRICE.

8. Contract Time

The *Contract Time* is the time stipulated in paragraph 1.3 of Article A-1 of the Agreement - THE WORK from commencement of the *Work* to *Substantial Performance of the Work*.

9. Contractor

The *Contractor* is the person or entity identified as such in the Agreement. The term *Contractor* means the *Contractor* or the *Contractor's* authorized representative as designated to the *Owner* in writing.

10. Drawings

The *Drawings* are the graphic and pictorial portions of the *Contract Documents*, wherever located and whenever issued, showing the design, location, and dimensions of the *Work*, generally including plans, elevations, sections, details, schedules, and diagrams.

11. Owner

The *Owner* is the person or entity identified as such in the Agreement. The term *Owner* means the *Owner* or the *Owner's* authorized agent or representative as designated to the *Contractor* in writing, but does not include the *Consultant*.

12. Place of the Work

The *Place of the Work* is the designated site or location of the *Work* identified in the *Contract Documents*.

13. **Product**
Product or *Products* means material, machinery, equipment, and fixtures forming the *Work*, but does not include *Construction Equipment*.
14. **Project**
The *Project* means the total construction contemplated of which the *Work* may be the whole or a part.
15. **Provide**
Provide means to supply and install.
16. **Schedule of Prices**
The *Schedule of Prices* is the schedule listed in Article A-3 - CONTRACT DOCUMENTS identifying items of work, estimated quantities, units of measure, and *Unit Prices*.
17. **Shop Drawings**
Shop Drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures, *Product* data, and other data which the *Contractor* provides to illustrate details of portions of the *Work*.
18. **Specifications**
The *Specifications* are that portion of the *Contract Documents*, wherever located and whenever issued, consisting of the written requirements and standards for *Products*, systems, workmanship, and the services necessary for the performance of the *Work*.
19. **Subcontractor**
A *Subcontractor* is a person or entity having a direct contract with the *Contractor* to perform a part or parts of the *Work*, or to supply *Products* worked to a special design for the *Work*.
20. **Substantial Performance of the Work**
Substantial Performance of the Work is as defined in the lien legislation applicable to the *Place of the Work*. If such legislation is not in force or does not contain such definition, or if the *Work* is governed by the Civil Code of Quebec, *Substantial Performance of the Work* shall have been reached when the *Work* is ready for use or is being used for the purpose intended and is so certified by the *Consultant*.
21. **Supplemental Instruction**
A *Supplemental Instruction* is an instruction, not involving adjustment in the *Contract Price* or *Contract Time*, in the form of *Specifications*, *Drawings*, schedules, samples, models, or written instructions, consistent with the intent of the *Contract Documents*. It is to be issued by the *Consultant* to supplement the *Contract Documents* as required for the performance of the *Work*.
22. **Supplier**
A *Supplier* is a person or entity having a direct contract with the *Contractor* to supply *Products* not worked to a special design for the *Work*.
23. **Temporary Work**
Temporary Work means temporary supports, structures, facilities, services, and other temporary things, excluding *Construction Equipment*, required for the execution of the *Work* but not incorporated into the *Work*.
24. **Unit Price**
A *Unit Price* is the amount payable for a single unit of work as stated in the *Schedule of Prices*.
25. **Value Added Taxes**
Value Added Taxes means such sum as shall be levied upon the *Contract Price* by the Federal or any Provincial or Territorial Government and is computed as a percentage of the *Contract Price* and includes the Goods and Services Tax, the Quebec Sales Tax, the Harmonized Sales Tax, and any similar tax, the collection and payment of which is by the *Contractor* as imposed by the tax legislation.
26. **Work**
The *Work* means the total construction and related services required by the *Contract Documents*.
27. **Working Day**
Working Day means a day other than a Saturday, Sunday, statutory holiday or statutory vacation day that is observed by the construction industry in the area of the *Place of the Work*.

GENERAL CONDITIONS OF THE CIVIL WORKS CONTRACT

PART 1 GENERAL PROVISIONS

GC 1.1 CONTRACT DOCUMENTS

- 1.1.1 The intent of the *Contract Documents* is to include the labour, *Products*, and services necessary for the performance of the *Work* by the *Contractor* in accordance with these documents. It is not intended, however, that the *Contractor* shall supply products or perform work not consistent with, not covered by, or not properly inferable from the *Contract Documents*.
- 1.1.2 Except for the provisions of article 12.3.6, nothing contained in the *Contract Documents* shall create any contractual relationship between:
 - .1 the *Owner* and a *Subcontractor*, a *Supplier*, or their agent, employee, or other person performing any of the *Work*.
 - .2 the *Consultant* and the *Contractor*, a *Subcontractor*, a *Supplier*, or their agent, employee, or other person performing any of the *Work*.
- 1.1.3 The *Contract Documents* are complementary, and what is required by any one shall be as binding as if required by all.
- 1.1.4 Words and abbreviations which have well known technical or trade meanings are used in the *Contract Documents* in accordance with such recognized meanings.
- 1.1.5 References in the *Contract Documents* to the singular shall be considered to include the plural as the context requires.
- 1.1.6 Neither the organization of the *Specifications* nor the arrangement of *Drawings* shall control the *Contractor* in dividing the work among *Subcontractors* and *Suppliers*.
- 1.1.7 If there is a conflict within the *Contract Documents*:
 - .1 the order of priority of documents, from highest to lowest, shall be
 - the Agreement between the *Owner* and the *Contractor*,
 - the Definitions,
 - Supplementary Conditions,
 - the General Conditions,
 - the *Specifications*,
 - material and finishing schedules,
 - the *Drawings*.
 - .2 *Drawings* of larger scale shall govern over those of smaller scale of the same date.
 - .3 dimensions shown on *Drawings* shall govern over dimensions scaled from *Drawings*.
 - .4 later dated documents shall govern over earlier documents of the same type.
- 1.1.8 The *Owner* shall provide the *Contractor*, without charge, sufficient copies of the *Contract Documents* to perform the *Work*.
- 1.1.9 *Specifications*, *Drawings*, models, and copies thereof furnished by the *Consultant* are and shall remain the *Consultant's* property, with the exception of the signed *Contract* sets, which shall belong to each party to the *Contract*. All *Specifications*, *Drawings*, and models furnished by the *Consultant* are to be used only with respect to the *Work* and are not to be used on other work. These *Specifications*, *Drawings*, and models are not to be copied or altered in any manner without the written authorization of the *Consultant*.
- 1.1.10 Models furnished by the *Contractor* at the *Owner's* expense are the property of the *Owner*.

GC 1.2 LAW OF THE CONTRACT

- 1.2.1 The law of the *Place of the Work* shall govern the interpretation of the *Contract*.

GC 1.3 RIGHTS AND REMEDIES

- 1.3.1 Except as expressly provided in the *Contract Documents*, 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.
- 1.3.2 No action or failure to act by the *Owner*, *Consultant*, 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.

GC 1.4 ASSIGNMENT

- 1.4.1 Neither party to the *Contract* shall assign the *Contract* or a portion thereof without the written consent of the other, which consent shall not be unreasonably withheld.

PART 2 ADMINISTRATION OF THE CONTRACT

GC 2.1 AUTHORITY OF THE CONSULTANT

- 2.1.1 The *Consultant* will have authority to act on behalf of the *Owner* only to the extent provided in the *Contract Documents*, unless otherwise modified by written agreement as provided in paragraph 2.1.2.
- 2.1.2 The duties, responsibilities, and limitations of authority of the *Consultant* as set forth in the *Contract Documents* shall be modified or extended only with the written consent of the *Owner*, the *Contractor*, and the *Consultant*.
- 2.1.3 If the *Consultant's* employment is terminated, the *Owner* shall immediately appoint or reappoint a *Consultant* against whom the *Contractor* makes no reasonable objection and whose status under the *Contract Documents* shall be that of the former *Consultant*.

GC 2.2 ROLE OF THE CONSULTANT

- 2.2.1 The *Consultant* will provide administration of the *Contract* as described in the *Contract Documents* during construction until issuance of the final certificate for payment, and subject to GC 2.1 - AUTHORITY OF THE CONSULTANT and with the *Owner's* concurrence, from time to time until the completion of any correction of defects as provided in paragraph 12.3.3 of GC 12.3 - WARRANTY.
- 2.2.2 The *Consultant* may provide at the *Place of the Work*, one or more project representatives to assist in carrying out the *Consultant's* responsibilities. The duties, responsibilities, and limitations of authority of such project representatives shall be as set forth in writing to the *Contractor*.
- 2.2.3 The *Consultant* will review the *Work* at intervals appropriate to the progress of construction to:
 - .1 become familiar with the progress and quality of the *Work*,
 - .2 determine if the *Work* is proceeding in general conformity with the *Contract Documents*, and
 - .3 verify quantities of *Work* performed under a *Schedule of Prices*.
- 2.2.4 Based on the *Consultant's* observations and evaluation of the *Contractor's* applications for payment, the *Consultant* will determine the amounts owing to the *Contractor* under the *Contract* and will issue certificates for payment as provided in Article A-5 of the Agreement - PAYMENT, GC 5.6 - PROGRESS PAYMENT, and GC 5.10 - FINAL PAYMENT.
- 2.2.5 The *Consultant* will not be responsible for and will not have control, charge, or supervision of construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs required in connection with the *Work* in accordance with the applicable construction safety legislation, other regulations, or general construction practice. The *Consultant* will not be responsible for the *Contractor's* failure to carry out the *Work* in accordance with the *Contract Documents*. The *Consultant* will not have control over, charge of, or be responsible for the acts or omissions of the *Contractor*, *Subcontractors*, *Suppliers*, or their agents, employees, or any other persons performing portions of the *Work*.

- 2.2.6 The *Consultant* will be, in the first instance, the interpreter of the requirements of the *Contract Documents* and shall make findings as to the performance thereunder by both parties to the *Contract*, except with respect to GC 5.1 - FINANCING INFORMATION REQUIRED OF THE OWNER. Interpretations and findings of the *Consultant* shall be consistent with the intent of the *Contract Documents*. When making such interpretations and findings the *Consultant* will not show partiality to either the *Owner* or the *Contractor*.
- 2.2.7 Matters in question relating to the performance of the Work or the interpretation of the *Contract Documents*, except for GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER, shall be referred initially to the *Consultant* by notice in writing given to the *Consultant* and to the other party for the *Consultant's* interpretation and finding which will be given by notice in writing to the parties within a reasonable time. With respect to claims, the *Consultant* will make findings as set out in GC 6.6 - CLAIMS, paragraph 6.6.5.
- 2.2.8 The *Consultant* will have authority to reject work which in the *Consultant's* opinion does not conform to the requirements of the *Contract Documents*. Whenever the *Consultant* considers it necessary or advisable, the *Consultant* will have authority to require inspection or testing of work, whether or not such work is fabricated, installed, or completed. However, neither the authority of the *Consultant* to act nor any decision either to exercise or not to exercise such authority shall give rise to any duty or responsibility of the *Consultant* to the *Contractor*, *Subcontractors*, *Suppliers*, or their agents, employees, or other persons performing any of the *Work*.
- 2.2.9 During the progress of the *Work* the *Consultant* will furnish *Supplemental Instructions* to the *Contractor* with reasonable promptness or in accordance with a schedule for such instructions agreed to by the *Consultant* and the *Contractor*.
- 2.2.10 The *Consultant* will review and take appropriate action upon such *Contractor's* submittals as *Shop Drawings*, *Product data*, and samples, as provided in the *Contract Documents*.
- 2.2.11 The *Consultant* will prepare *Change Orders* and *Change Directives* as provided in GC 6.2 - CHANGE ORDER and GC 6.3 - CHANGE DIRECTIVE.
- 2.2.12 The *Consultant* will conduct reviews of the *Work* to determine the date of *Substantial Performance of the Work* as provided in GC 5.7 - SUBSTANTIAL PERFORMANCE OF THE WORK.
- 2.2.13 All certificates issued by the *Consultant* will be to the best of the *Consultant's* knowledge, information, and belief. By issuing any certificate, the *Consultant* does not guarantee the *Work* is correct or complete.
- 2.2.14 The *Consultant* will receive and review written warranties and related documents required by the *Contract* and provided by the *Contractor* and will forward such warranties and documents to the *Owner* for the *Owner's* acceptance.

GC 2.3 REVIEW AND INSPECTION OF THE WORK

- 2.3.1 The *Owner* and the *Consultant* shall have access to the *Work* at all times. The *Contractor* shall provide sufficient, safe, and proper facilities at all times for the review of the *Work* by the *Consultant* and the inspection of the *Work* by authorized agencies. If parts of the *Work* are in preparation at locations other than the *Place of the Work*, the *Owner* and the *Consultant* shall be given access to such work whenever it is in progress.
- 2.3.2 If work is designated for tests, inspections, or approvals in the *Contract Documents*, or by the *Consultant's* instructions, or the laws or ordinances of the *Place of the Work*, the *Contractor* shall give the *Consultant* reasonable notice of when the work will be ready for review and inspection. The *Contractor* shall arrange for and shall give the *Consultant* reasonable notice of the date and time of inspections by other authorities.
- 2.3.3 The *Contractor* shall furnish promptly to the *Consultant* two copies of certificates and inspection reports relating to the *Work*.
- 2.3.4 If the *Contractor* covers, or permits to be covered, work that has been designated for special tests, inspections, or approvals before such special tests, inspections, or approvals are made, given or completed, the *Contractor* shall, if so directed, uncover such work, have the inspections or tests satisfactorily completed, and make good covering work at the *Contractor's* expense.

- 2.3.5 The *Consultant* may order any portion or portions of the *Work* to be examined to confirm that such work is in accordance with the requirements of the *Contract Documents*. If the work is not in accordance with the requirements of the *Contract Documents*, the *Contractor* shall correct the work and pay the cost of examination and correction. If the work is in accordance with the requirements of the *Contract Documents*, the *Owner* shall pay the cost of examination and restoration.
- 2.3.6 The *Contractor* shall pay the cost of making any test or inspection, including the cost of samples required for such test or inspection, if such test or inspection is designated in the *Contract Documents* to be performed by the *Contractor* or is designated by the laws or ordinances of the *Place of the Work*.
- 2.3.7 The *Contractor* shall pay the cost of samples required for any test or inspection to be performed by the *Consultant* or the *Owner* if such test or inspection is designated in the *Contract Documents*.

GC 2.4 DEFECTIVE WORK

- 2.4.1 The *Contractor* shall promptly remove from the *Place of the Work* and replace or re-execute defective work that has been rejected by the *Consultant* as failing to conform to the *Contract Documents* whether or not the defective work has been incorporated in the *Work* and whether or not the defect is the result of poor workmanship, use of defective products, or damage through carelessness or other act or omission of the *Contractor*.
- 2.4.2 The *Contractor* shall make good promptly other contractors' work destroyed or damaged by such removals or replacements at the *Contractor's* expense.
- 2.4.3 If in the opinion of the *Consultant* it is not expedient to correct defective work or work not performed as provided in the *Contract Documents*, the *Owner* may deduct from the amount otherwise due to the *Contractor* the difference in value between the work as performed and that called for by the *Contract Documents*. If the *Owner* and the *Contractor* do not agree on the difference in value, they shall refer the matter to the *Consultant* for a determination.

PART 3 EXECUTION OF THE WORK

GC 3.1 CONTROL OF THE WORK

- 3.1.1 The *Contractor* shall have total control of the *Work* and shall effectively direct and supervise the *Work* so as to ensure conformity with the *Contract Documents*.
- 3.1.2 The *Contractor* shall be solely responsible for construction means, methods, techniques, sequences, and procedures and for co-ordinating the various parts of the *Work* under the *Contract*.

GC 3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS

- 3.2.1 The *Owner* reserves the right to award separate contracts in connection with other parts of the *Project* to other contractors and to perform work with own forces.
- 3.2.2 When separate contracts are awarded for other parts of the *Project*, or when work is performed by the *Owner's* own forces, the *Owner* shall:
- .1 provide for the co-ordination of the activities and work of other contractors and *Owner's* own forces with the *Work* of the *Contract*;
 - .2 assume overall responsibility for compliance with the applicable health and construction safety legislation at the *Place of the Work*;
 - .3 enter into separate contracts with other contractors under conditions of contract which are compatible with the conditions of the *Contract*;
 - .4 ensure that insurance coverage is provided to the same requirements as are called for in GC 11.1 - INSURANCE and co-ordinate such insurance with the insurance coverage of the *Contractor* as it affects the *Work*; and
 - .5 take all reasonable precautions to avoid labour disputes or other disputes on the *Project* arising from the work of other contractors or the *Owner's* own forces.

- 3.2.3 When separate contracts are awarded for other parts of the *Project*, or when work is performed by the *Owner's* own forces, the *Contractor* shall:
- .1 afford the *Owner* and other contractors reasonable opportunity to introduce and store products and use the *Owner's* or other contractor's construction equipment to execute their work;
 - .2 cooperate with other contractors and the *Owner* in reviewing their construction schedules; and
 - .3 where part of the *Work* is affected by or depends upon for its proper execution the work of other contractors or *Owner's* own forces, promptly report to the *Consultant* in writing and prior to proceeding with that part of the *Work*, any apparent deficiencies in such work
- 3.2.4 Where the *Contract Documents* identify the work to be performed by other contractors or the *Owner's* own forces, the *Contractor* shall coordinate and schedule the *Work* with the work of other contractors and the *Owner's* own forces and interface as specified in the *Contract Documents*.
- 3.2.5 Where a change in the *Work* is required as a result of the co-ordination and interface of the work of other contractors or *Owner's* own forces with the *Work*, the changes shall be authorized and valued as provided in GC 6.1 - CHANGES, GC 6.2 - CHANGE ORDER, and GC 6.3 - CHANGE DIRECTIVE.
- 3.2.6 Disputes, and other matters in question between the *Contractor* and other contractors shall be dealt with as provided in Part 8 of the General Conditions - DISPUTE RESOLUTION provided the other contractors have reciprocal obligations. The *Contractor* shall be deemed to have consented to arbitration of any dispute with any other contractor whose contract with the *Owner* contains a similar agreement to arbitrate.

GC 3.3 TEMPORARY WORK

- 3.3.1 The *Contractor* shall have the sole responsibility for the design, erection, operation, maintenance, and removal of *Temporary Work*.
- 3.3.2 The *Contractor* shall engage and pay for registered professional engineering personnel skilled in the appropriate disciplines to perform those functions referred to in paragraph 3.3.1 where required by law or by the *Contract Documents* and in all cases where such *Temporary Work* is of such a nature that professional engineering skill is required to produce safe and satisfactory results.
- 3.3.3 Notwithstanding the provisions of GC 3.1 - CONTROL OF THE WORK, paragraph 3.3.1, and paragraph 3.3.2 or provisions to the contrary elsewhere in the *Contract Documents* where such *Contract Documents* include designs for *Temporary Work* or specify a method of construction in whole or in part, such designs or methods of construction shall be considered to be part of the design of the *Work* and the *Contractor* shall not be held responsible for that part of the design or the specified method of construction. The *Contractor* shall, however, be responsible for the execution of such design or specified method of construction in the same manner as for the execution of the *Work*.

GC 3.4 DOCUMENT REVIEW

- 3.4.1 The *Contractor* shall review the *Contract Documents* and shall report promptly to the *Consultant* any error, inconsistency, or omission the *Contractor* may discover. Such review by the *Contractor* shall be to the best of the *Contractor's* knowledge, information, and belief and in making such review the *Contractor* does not assume any responsibility to the *Owner* or the *Consultant* for the accuracy of the review. The *Contractor* shall not be liable for damage or costs resulting from such errors, inconsistencies, or omissions in the *Contract Documents*, which the *Contractor* did not discover. If the *Contractor* does discover any error, inconsistency, or omission in the *Contract Documents*, the *Contractor* shall not proceed with the work affected until the *Contractor* has received corrected or missing information from the *Consultant*.

GC 3.5 CONSTRUCTION SCHEDULE

3.5.1 The *Contractor* shall:

- .1 prepare and submit to the *Owner* and the *Consultant* prior to the first application for payment, a construction schedule that indicates the timing of the major activities of the *Work* and provides sufficient detail of the critical events and their inter-relationship to demonstrate the *Work* will be performed in conformity with the *Contract Time*;
- .2 monitor the progress of the *Work* relative to the construction schedule and update the schedule on a monthly basis or as stipulated by the *Contract Documents*; and
- .3 advise the *Consultant* of any revisions required to the schedule as the result of extensions of the *Contract Time* as provided in Part 6 of the General Conditions - CHANGES IN THE WORK.

GC 3.6 SUPERVISION

- 3.6.1 The *Contractor* shall provide all necessary supervision and appoint a competent representative who shall be in attendance at the *Place of the Work* while the *Work* is being performed. The appointed representative shall not be changed except for valid reason.
- 3.6.2 The appointed representative shall represent the *Contractor* at the *Place of the Work* and notices and instructions given to the appointed representative by the *Consultant* shall be held to have been received by the *Contractor*.

GC 3.7 LAYOUT OF THE WORK

- 3.7.1 The *Owner* shall, in consultation with the *Contractor*, establish reference points for construction which are necessary for the *Contractor* to proceed with the *Work*.
- 3.7.2 The *Contractor* shall be responsible for laying out the *Work*, shall preserve and protect the established reference points, and shall not change or relocate the established reference points without the approval of the *Consultant*.
- 3.7.3 The *Contractor* shall advise the *Consultant* whenever any established reference point is lost, destroyed, damaged, or requires relocation as a result of the *Contractor's* operations. The cost to reestablish any reference point that is lost, destroyed, damaged, or requires relocation as a result of the *Contractor's* operations, shall be at the *Contractor's* expense.

GC 3.8 SUBCONTRACTORS AND SUPPLIERS

- 3.8.1 The *Contractor* shall preserve and protect the rights of the parties under the *Contract* with respect to work to be performed under subcontract, and shall:
 - .1 enter into contracts or written agreements with *Subcontractors* and *Suppliers* to require them to perform their work as provided in the *Contract Documents*;
 - .2 incorporate the terms and conditions of the *Contract Documents* into all contracts or written agreements with *Subcontractors* and *Suppliers*; and
 - .3 be as fully responsible to the *Owner* for acts and omissions of *Subcontractors*, *Suppliers*, and of persons directly or indirectly employed by them as for acts and omissions of persons directly employed by the *Contractor*.
- 3.8.2 The *Contractor* shall indicate in writing, at the request of the *Owner*, those *Subcontractors* or *Suppliers* whose bids have been received by the *Contractor* which the *Contractor* would be prepared to accept for the performance of a portion of the *Work*. Should the *Owner* not object before signing the *Contract*, the *Contractor* shall employ those *Subcontractors* or *Suppliers* so identified by the *Contractor* in writing for the performance of that portion of the *Work* to which their bid applies.
- 3.8.3 The *Owner* may, for reasonable cause, at any time before the *Owner* has signed the *Contract*, object to the use of a proposed *Subcontractor* or *Supplier* and require the *Contractor* to employ one of the other subcontract bidders.
- 3.8.4 If the *Owner* requires the *Contractor* to change a proposed *Subcontractor* or *Supplier*, the *Contract Price* and *Contract Time* shall be adjusted by the differences occasioned by such required change.

- 3.8.5 The *Contractor* shall not be required to employ as a *Subcontractor* or *Supplier*, a person or firm to which the *Contractor* may reasonably object.
- 3.8.6 The *Owner*, through the *Consultant*, may provide to a *Subcontractor* or *Supplier* information as to the percentage of the *Subcontractor's* or *Supplier's* work which has been certified for payment.

GC 3.9 LABOUR AND PRODUCTS

- 3.9.1 The *Contractor* shall provide and pay for labour, *Products*, tools, *Construction Equipment*, water, heat, light, power, transportation, and other facilities and services necessary for the performance of the *Work* in accordance with the *Contract*.
- 3.9.2 *Products* provided shall be new. *Products* which are not specified shall be of a quality consistent with those specified and their use acceptable to the *Consultant*.
- 3.9.3 The *Contractor* shall maintain good order and discipline among the *Contractor's* employees engaged on the *Work* and shall not employ on the *Work* anyone not skilled in the tasks assigned.

GC 3.10 DOCUMENTS AT THE SITE

- 3.10.1 The *Contractor* shall keep one copy of current *Contract Documents*, submittals, reports, and records of meetings at the *Place of the Work*, in good order and available to the *Owner* and the *Consultant*.

GC 3.11 SHOP DRAWINGS

- 3.11.1 The *Contractor* shall provide *Shop Drawings* as required in the *Contract Documents*.
- 3.11.2 The *Contractor* shall review all *Shop Drawings* prior to submission to the *Consultant*. The *Contractor* represents by this review that:
- .1 the *Contractor* has determined and verified all field measurements, field construction conditions, materials, *Product* requirements, catalogue numbers, and similar data or will do so; and
 - .2 the *Contractor* has checked and co-ordinated each *Shop Drawing* with the requirements of the *Contract Documents*.
- 3.11.3 The *Contractor* shall confirm the review of each shop drawing by stamp, date, and signature of the person responsible for the review. At the time of submission the *Contractor* shall notify the *Consultant* in writing of any deviations in the *Shop Drawings* from the requirements of the *Contract Documents*.
- 3.11.4 The *Contractor* shall submit *Shop Drawings* to the *Consultant* to review in orderly sequence and sufficiently in advance so as to cause no delay in the *Work* or in the work of other contractors. Upon request of the *Contractor* or the *Consultant*, they jointly shall prepare a schedule of the dates for submission and return of *Shop Drawings*. *Shop Drawings* which require approval of any legally constituted authority having jurisdiction shall be submitted to such authority by the *Contractor* for approval.
- 3.11.5 The *Contractor* shall submit *Shop Drawings* in the form specified or as the *Consultant* may direct. The *Consultant* will review and return *Shop Drawings* in accordance with the schedule agreed upon, or otherwise with reasonable promptness so as to cause no delay. The *Consultant's* review is for conformity to the design concept and for general arrangement only. The *Consultant's* review shall not relieve the *Contractor* of responsibility for errors or omissions in the *Shop Drawings* or for meeting all requirements of the *Contract Documents* unless the *Consultant* expressly notes the acceptance of a deviation on the *Shop Drawings*.
- 3.11.6 Upon the *Consultant's* request, the *Contractor* shall revise and resubmit *Shop Drawings* which the *Consultant* rejects as inconsistent with the *Contract Documents* unless otherwise directed by the *Consultant*. The *Contractor* shall notify the *Consultant* in writing of any revisions to the resubmission other than those requested by the *Consultant*.

GC 3.12 USE OF THE WORK

- 3.12.1 The *Contractor* shall confine *Construction Equipment*, *Temporary Work*, storage of *Products*, waste products and debris, and operations of employees to limits indicated by laws, ordinances, permits, or the *Contract Documents* and shall not unreasonably encumber the *Place of Work* with *Products*.
- 3.12.2 The *Contractor* shall not load or permit to be loaded any part of the *Work* with a weight or force that will endanger the safety of the *Work*.

GC 3.13 CUTTING AND REMEDIAL WORK

- 3.13.1 The *Contractor* shall do the cutting and remedial work required to make the several parts of the *Work* come together properly.
- 3.13.2 The *Contractor* shall co-ordinate the *Work* to ensure that this requirement is kept to a minimum.
- 3.13.3 Should the *Owner*, the *Consultant*, other contractors or anyone employed by them be responsible for ill-timed work necessitating cutting or remedial work to be performed, the cost of such cutting or remedial work shall be valued as provided in GC 6.1 - CHANGES, GC 6.2 - CHANGE ORDER, and GC 6.3 - CHANGE DIRECTIVE.
- 3.13.4 Cutting and remedial work shall be performed by specialists familiar with the *Products* affected and shall be performed in a manner to neither damage nor endanger the *Work*.

GC 3.14 CLEANUP

- 3.14.1 The *Contractor* shall maintain the *Work* in a safe and tidy condition and free from the accumulation of waste products and debris, other than that caused by the *Owner*, other contractors or their employees.
- 3.14.2 Before applying for *Substantial Performance of the Work* as provided in GC 5.7 - SUBSTANTIAL PERFORMANCE OF THE WORK, the *Contractor* shall remove waste products and debris, other than that resulting from the work of the *Owner*, other contractors or their employees, and shall leave the *Work* clean and suitable for use or occupancy by the *Owner*. The *Contractor* shall remove products, tools, *Construction Equipment* and *Temporary Work* not required for the performance of the remaining work.
- 3.14.3 Prior to application for the final certificate for payment, the *Contractor* shall remove any remaining products, tools, *Construction Equipment*, *Temporary Work*, and waste products and debris, other than those resulting from the work of the *Owner*, other contractors or their employees.

PART 4 ALLOWANCES

GC 4.1 CASH ALLOWANCES

- 4.1.1 The *Contract Price* includes the cash allowances, if any, stated in the *Contract Documents*. The scope of work or costs included in such cash allowances shall be as described in the *Contract Documents*.
- 4.1.2 The *Contract Price*, and not the cash allowances, includes the *Contractor's* overhead and profit in connection with such cash allowances.
- 4.1.3 Expenditures under cash allowances shall be authorized by the *Owner* through the *Consultant*.
- 4.1.4 Where costs under any cash allowance exceed the amount of the allowance, the *Contractor* shall be compensated for the excess incurred and substantiated plus an amount for overhead and profit on the excess as set out in the *Contract Documents*. Where costs under any cash allowance are less than the amount of the allowance, the *Owner* shall be credited for the unexpended portion of the cash allowance, but not for the *Contractor's* overhead and profit on such amount. Multiple cash allowances shall not be combined for the purpose of calculating the foregoing.
- 4.1.5 The *Contract Price* shall be adjusted by *Change Order* to provide for any difference between the actual cost and each cash allowance.

- 4.1.6 The value of the work performed under a cash allowance is eligible to be included in progress payments.
- 4.1.7 The *Contractor* and the *Consultant* shall jointly prepare a schedule that shows when the *Consultant* and *Owner* must authorize ordering of items called for under cash allowances to avoid delaying the progress of the *Work*.

GC 4.2 CONTINGENCY ALLOWANCE

- 4.2.1 The *Contract Price* includes the contingency allowance, if any, stated in the *Contract Documents*.
- 4.2.2 Expenditures under the contingency allowance shall be authorized and valued as provided in GC 6.1 - CHANGES, GC 6.2 - CHANGE ORDER, and GC 6.3 - CHANGE DIRECTIVE.
- 4.2.3 The *Contract Price* shall be adjusted by *Change Order* to provide for any difference between the expenditures authorized under paragraph 4.2.2 and the contingency allowance.

PART 5 PAYMENT

GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

- 5.1.1 The *Owner* shall, at the request of the *Contractor*, before signing the *Contract*, and promptly from time to time thereafter, furnish to the *Contractor* reasonable evidence that financial arrangements have been made to fulfill the *Owner's* obligations under the *Contract*.
- 5.1.2 The *Owner* shall notify the *Contractor* in writing of any material change in the *Owner's* financial arrangements during performance of the *Contract*.

GC 5.2 BASIS OF PAYMENT FOR UNIT PRICE WORK

- 5.2.1 Payment for *Unit Price* work shall be based on the *Unit Prices* in the *Contract*.
- 5.2.2 The *Contractor* shall measure the *Work* and the *Consultant* will verify such measurements to determine payment to the *Contractor* in accordance with the measurement provisions of the *Contract Documents*.

GC 5.3 BASIS OF PAYMENT FOR LUMP SUM WORK

- 5.3.1 Payment for lump sum work shall be based on the stipulated price(s) in the *Contract*.

GC 5.4 BASIS OF PAYMENT FOR COST PLUS WORK

- 5.4.1 Payment for cost plus work shall be based on the cost of such work, as provided in paragraph 5.4.2, plus a fee calculated as a percentage of the cost of such work, for the *Contractor's* overhead and profit. The percentage amount shall be as provided in the *Contract Documents* but shall not be applied to the cost of *Construction Equipment* when such cost is based on rates which already include the *Contractor's* overhead and profit.
- 5.4.2 The cost of cost plus work shall be at rates prevailing in the locality of the *Place of the Work* and shall include the following cost elements as applicable to such work:
- .1 wages and benefits paid for labour in the direct employ of the *Contractor* under applicable collective bargaining agreements, or under a salary or wage schedule agreed upon by the *Owner* and *Contractor*;
 - .2 salaries, wages, and benefits of the *Contractor's* personnel, when stationed at the field office, in whatever capacity employed; or personnel at shops or on the road, engaged in expediting the production or transportation of materials or equipment;
 - .3 contributions, assessments, or taxes incurred for such items as employment insurance, provincial or territorial health insurance, workers' compensation, and Canada or Quebec Pension Plan, insofar as such cost is based on wages, salaries, or other remuneration paid to employees of the *Contractor* and included in the cost of the *Work* as provided in paragraphs 5.4.2.1 and 5.4.2.2;
 - .4 travel and subsistence expenses of the *Contractor's* personnel described in paragraphs 5.4.2.1 and 5.4.2.2;
 - .5 the cost of all *Products* including cost of transportation thereof;

- .6 the cost of materials, supplies, *Construction Equipment*, *Temporary Work*, and hand tools not owned by the workers, including transportation, and maintenance thereof, which are consumed in the performance of the *Work*; and cost less salvage value on such items used but not consumed, which remain the property of the *Contractor*;
 - .7 the cost of all tools and *Construction Equipment*, exclusive of hand tools used in the performance of the *Work*, whether rented from or provided by the *Contractor* or others, including installation, minor repairs and replacements, dismantling, removal, transportation and delivery cost thereof;
 - .8 deposits lost;
 - .9 the amounts of all subcontracts;
 - .10 the cost of quality assurance such as independent inspection and testing services;
 - .11 charges levied by authorities having jurisdiction at the *Place of the Work*;
 - .12 royalties, patent license fees, and damages for infringement of patents and cost of defending suits therefor subject always to the *Contractor's* obligations to indemnify the *Owner* as provided in paragraph 10.3.1 of GC 10.3 - PATENT FEES;
 - .13 any adjustment in premiums for all bonds and insurance which the *Contractor* is required, by the *Contract Documents*, to purchase and maintain;
 - .14 any adjustment in taxes and duties for which the *Contractor* is liable;
 - .15 charges for long distance telephone and facsimile communications, courier services, expressage, and petty items incurred in relation to the performance of the *Work*;
 - .16 the cost of removal and disposal of waste products and debris; and
 - .17 cost incurred due to emergencies affecting the safety of persons or property.
- 5.4.3 The *Contractor* shall obtain the *Owner's* approval prior to subcontracting or entering into other agreements for cost plus work.
- 5.4.4 The *Consultant* may refuse to certify payment for all or part of the cost of any item under any cost element, where the item in question was unsuitable, unnecessary or the cost was otherwise improperly incurred in the performance of the *Work*.
- 5.4.5 The *Contractor* shall keep full and detailed accounts and records necessary for the documentation of the cost of cost plus work and shall provide the *Consultant* with copies thereof when requested.
- 5.4.6 The *Owner* shall be afforded reasonable access to all of the *Contractor's* books, records, correspondence, instructions, drawings, receipts, vouchers, and memoranda related to the cost of cost plus work, and for this purpose the *Contractor* shall preserve such records for a period of one year from the date of *Substantial Performance of the Work*.

GC 5.5 APPLICATIONS FOR PROGRESS PAYMENT

- 5.5.1 Applications for payment on account as provided in Article A-5 of the Agreement - PAYMENT may be made monthly as the *Work* progresses.
- 5.5.2 Applications for payment shall be dated the last day of the agreed monthly payment period and the amount claimed shall be for the value, proportionate to the amount of the *Contract*, of work performed and *Products* delivered to the *Place of the Work* at that date.
- 5.5.3 Where the basis of payment of the *Contract Price* is *Unit Prices*, applications for payment shall include quantity measurements and any other data requested by the *Consultant* to assist the *Consultant* in evaluating the application and verifying quantity measurements.
- 5.5.4 Where the basis of payment of the *Contract Price* is a lump sum stipulated price:
- .1 the *Contractor* shall submit to the *Consultant*, at least 10 *Working Days* before the first application for payment, a schedule of values for the parts of the *Work*, aggregating the total amount of the *Contract Price*, so as to facilitate evaluation of applications for payment;
 - .2 the schedule of values shall be made out in such form and supported by such evidence as the *Consultant* may reasonably direct and when accepted by the *Consultant*, shall be used as the basis for applications for payment, unless it is found to be in error; and
 - .3 the *Contractor* shall include a statement based on the schedule of values with each application for payment.

- 5.5.5 Where the basis of payment for a portion of the *Work* is cost plus, applications for payment shall be based on the cost of the work performed plus the amount of the fee earned, in accordance with GC 5.4 - BASIS OF PAYMENT FOR COST PLUS WORK.
- 5.5.6 Applications for payment for *Products* delivered to the *Place of the Work* but not yet incorporated into the *Work* shall be supported by such evidence as the *Consultant* may reasonably require to establish the value and delivery of the *Products*.

GC 5.6 PROGRESS PAYMENT

- 5.6.1 The *Consultant* will issue to the *Owner*, no later than 5 *Working Days* after the receipt of an application for payment from the *Contractor* submitted in accordance with GC 5.2 - APPLICATIONS FOR PROGRESS PAYMENT, a certificate for payment in the amount applied for or in such other amount as the *Consultant* determines to be properly due. If the *Consultant* amends the application, the *Consultant* will promptly notify the *Contractor* in writing giving reasons for the amendment.
- 5.6.2 The *Owner* shall make payment to the *Contractor* on account as provided in Article A-5 of the Agreement - PAYMENT no later than 5 *Working Days* after the date of a certificate for payment issued by the *Consultant*.
- 5.6.3 Where the basis of payment of the *Contract Price* is *Unit Prices*, quantities for progress payments shall be considered approximate until final verification of quantities by the *Consultant*. A certificate for progress payment shall not be construed as the *Consultant's* final verification of quantities. Final verification of quantities will be made after all work of an item is completed.

GC 5.7 SUBSTANTIAL PERFORMANCE OF THE WORK

- 5.7.1 When the *Contractor* considers that the *Work* is substantially performed, or if permitted by the lien legislation applicable to the *Place of the Work* a designated portion thereof which the *Owner* agrees to accept separately is substantially performed, the *Contractor* shall prepare and submit to the *Consultant* a comprehensive list of items to be completed or corrected and apply for a review by the *Consultant* to establish *Substantial Performance of the Work* or substantial performance of the designated portion of the *Work*. Failure to include an item on the list does not alter the responsibility of the *Contractor* to complete the *Contract*.
- 5.7.2 No later than 15 *Working Days* after the receipt of the *Contractor's* list and application, the *Consultant* will review the *Work* to verify the validity of the application and notify the *Contractor* whether the *Work* or the designated portion of the *Work* is substantially performed.
- 5.7.3 The *Consultant* will state the date of *Substantial Performance of the Work* or designated portion of the *Work* in a certificate.
- 5.7.4 Immediately following the issuance of the certificate of *Substantial Performance of the Work*, the *Contractor*, in consultation with the *Consultant*, shall establish a reasonable date for finishing the *Work*.

GC 5.8 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF THE WORK

- 5.8.1 After the issuance of the certificate of *Substantial Performance of the Work*, the *Contractor* shall:
- .1 submit an application for payment of the holdback amount,
 - .2 submit a sworn or affirmed statement that all accounts for labour, subcontracts, *Products*, *Construction Equipment*, and other indebtedness which may have been incurred by the *Contractor* in the *Substantial Performance of the Work* and for which the *Owner* might in any way be held responsible have been paid in full, except for amounts properly retained as a holdback or as an identified amount in dispute.
- 5.8.2 After the receipt of an application for payment from the *Contractor* and the sworn or affirmed statement as provided in paragraph 5.8.1, the *Consultant* will issue a certificate for payment of the holdback amount.

- 5.8.3 Where the holdback amount required by the applicable lien legislation has not been placed in a separate holdback account, the *Owner* shall, 5 *Working Days* prior to the expiry of the holdback period stipulated in the lien legislation applicable to the *Place of the Work*, place the holdback amount in a bank account in the joint names of the *Owner* and the *Contractor*.
- 5.8.4 In the common law jurisdictions, the holdback amount authorized by the certificate for payment of the holdback amount is due and payable on the day following the expiration of the holdback period stipulated in the lien legislation applicable to the *Place of the Work*. Where lien legislation does not exist or apply, the holdback amount shall be due and payable in accordance with other legislation, industry practice, or provisions which may be agreed to between the parties. The *Owner* may retain out of the holdback amount any sums required by law to satisfy any liens against the *Work* or, if permitted by the lien legislation applicable to the *Place of the Work*, other third party monetary claims against the *Contractor* which are enforceable against the *Owner*.
- 5.8.5 In the Province of Quebec, the holdback amount authorized by the certificate for payment of the holdback amount is due and payable no later than 30 days after the issuance of the certificate. The *Owner* may retain out of the holdback amount any sums required to satisfy any legal hypothecs that have been taken, or could be taken, against the *Work* or other third party monetary claims against the *Contractor* which are enforceable against the *Owner*.

GC 5.9 PROGRESSIVE RELEASE OF HOLDBACK

- 5.9.1 In the common law jurisdictions, where legislation permits and where, upon application by the *Contractor*, the *Consultant* has certified that the work of a *Subcontractor* or *Supplier* has been performed prior to *Substantial Performance of the Work*, the *Owner* shall pay the *Contractor* the holdback amount retained for such subcontract work, or the *Products* supplied by such *Supplier*, on the first *Working Day* following the expiration of the holdback period for such work stipulated in the lien legislation applicable to the *Place of the Work*.
- 5.9.2 In the Province of Quebec, where, upon application by the *Contractor*, the *Consultant* has certified that the work of a *Subcontractor* or *Supplier* has been performed prior to *Substantial Performance of the Work*, the *Owner* shall pay the *Contractor* the holdback amount retained for such subcontract work, or the *Products* supplied by such *Supplier*, no later than 30 days after such certification by the *Consultant*. The *Owner* may retain out of the holdback amount any sums required to satisfy any legal hypothecs that have been taken, or could be taken, against the *Work* or other third party monetary claims against the *Contractor* which are enforceable against the *Owner*.
- 5.9.3 Notwithstanding the provisions of the preceding paragraph, and notwithstanding the wording of such certificates, the *Contractor* shall ensure that such subcontract work or *Products* is protected pending the issuance of a final certificate for payment and be responsible for the correction of defects or work not performed regardless of whether or not such was apparent when such certificates were issued.

GC 5.10 FINAL PAYMENT

- 5.10.1 When the *Contractor* considers that the *Work* is completed, the *Contractor* shall submit an application for final payment.
- 5.10.2 The *Consultant* will, no later than 15 *Working Days* after the receipt of an application from the *Contractor* for final payment, review the *Work* to verify the validity of the application and notify the *Contractor* that the application is valid or give reasons why it is not valid.
- 5.10.3 When the *Consultant* finds the *Contractor's* application for final payment valid, the *Consultant* will promptly issue a final certificate for payment.
- 5.10.4 Subject to the provision of paragraph 10.4.1 of GC 10.4 - WORKERS' COMPENSATION, and any lien legislation applicable to the *Place of the Work*, the *Owner* shall, no later than 5 *Working Days* after the issuance of a final certificate for payment, pay the *Contractor* as provided in Article A-5 of the Agreement - PAYMENT.

GC 5.11 WITHHOLDING OF PAYMENT

- 5.11.1 If because of climatic or other conditions reasonably beyond the control of the *Contractor*, there are items of work that cannot be performed, payment in full for that portion of the *Work* which has been performed as certified by the *Consultant* shall not be withheld or delayed by the *Owner* on account thereof, but the *Owner* may withhold, until the remaining portion of the *Work* is finished, only such an amount that the *Consultant* determines is sufficient and reasonable to cover the cost of performing such remaining work.

GC 5.12 NON-CONFORMING WORK

- 5.12.1 No payment by the *Owner* under the *Contract* nor partial or entire use or occupancy of the *Work* by the *Owner* shall constitute an acceptance of any portion of the *Work* or *Products* which are not in accordance with the requirements of the *Contract Documents*.

PART 6 CHANGES

GC 6.1 CHANGES

- 6.1.1 The *Owner*, through the *Consultant*, without invalidating the *Contract*, may make:
- .1 changes in the *Work* consisting of additions, deletions, or other revisions to the *Work* by *Change Order* or *Change Directive*, and
 - .2 changes to the *Contract Time* for the *Work*, or any part thereof, by *Change Order*.
- 6.1.2 The *Contractor* shall not perform a change in the *Work* without a *Change Order* or a *Change Directive*.

GC 6.2 CHANGE ORDER

- 6.2.1 When a change in the *Work* or the *Contract Time* is proposed or required, the *Consultant* will provide notice in writing to the *Contractor* describing the proposed change. The *Contractor* shall present, in a form acceptable to the *Consultant*, a method of adjustment or an amount of adjustment of the *Contract Price*, if any, and the adjustment in the *Contract Time*, if any, for the proposed change.
- 6.2.2 The method of adjustment of the *Contract Price* presented by the *Contractor* may be:
- .1 *Unit Prices* listed in the *Schedule of Prices* that are applicable to the change in the *Work* or, if *Unit Prices* listed in the *Schedule of Prices* are not directly applicable, by unit prices deduced or extrapolated from such *Unit Prices*,
 - .2 a lump sum or unit price quotation, or
 - .3 the cost plus method as provided in GC 5.4 - BASIS OF PAYMENT FOR COST PLUS WORK.
- 6.2.3 When the *Owner* and *Contractor* agree to the adjustments in the *Contract Price* and *Contract Time* or to the method to be used to determine the adjustments, such agreement shall be effective immediately and shall be recorded in a *Change Order*, signed by *Owner* and *Contractor*. The value of the work performed as the result of a *Change Order* shall be included in applications for progress payment.

GC 6.3 CHANGE DIRECTIVE

- 6.3.1 If the *Owner* requires the *Contractor* to proceed with a change in the *Work* prior to the *Owner* and the *Contractor* agreeing upon the adjustment in *Contract Price* and *Contract Time*, the *Owner*, through the *Consultant*, shall issue a *Change Directive*.
- 6.3.2 A *Change Directive* shall only be used by the *Owner* to direct a change in the *Work* that is within the general scope of the *Contract Documents*.
- 6.3.3 Upon receipt of a *Change Directive*, the *Contractor* shall proceed promptly with the change in the *Work*.

- 6.3.4 The adjustment in the *Contract Price* for a change in the *Work* carried out by way of a *Change Directive* shall be on the basis of the *Contractor's* actual expenditures and savings attributable to the change. If a change in the *Work* results in expenditures only, the change in the *Work* shall be valued as cost plus work in accordance with GC 5.4 - BASIS OF PAYMENT FOR COST PLUS WORK.
- 6.3.5 If a change in the *Work* results in savings only, the amount of the credit shall be the actual cost savings to the *Contractor*, without deduction for overhead or profit.
- 6.3.6 If a change in the *Work* results in both expenditures and savings, the change in the *Work* shall be valued as specified in GC 6.3.4 and GC 6.3.5, except that overhead and profit on the cost plus work shall be payable only on the net increase, if any, with respect to that change in the *Work*.
- 6.3.7 Pending determination of the final amount of a *Change Directive*, the undisputed value of the work performed as the result of a *Change Directive* is eligible to be included in progress payments.
- 6.3.8 If the *Owner* and *Contractor* do not agree on the proposed adjustment in the *Contract Time* or the method of determining it, the adjustment shall be referred to the *Consultant* for determination.
- 6.3.9 If at any time after the start of the work directed by a *Change Directive*, the *Owner* and the *Contractor* reach agreement on the adjustment to the *Contract Price* and to the *Contract Time*, this agreement shall be recorded in a *Change Order* signed by *Owner* and *Contractor*.

GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

- 6.4.1 If the *Owner* or the *Contractor* discover conditions at the *Place of the Work* which are:
- .1 subsurface or otherwise concealed physical conditions which existed before the commencement of the *Work* which differ materially from those indicated in the *Contract Documents*; or
 - .2 physical conditions, other than conditions due to weather, that are of a nature which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the *Contract Documents*;
- then the observing party shall notify the other party in writing before conditions are disturbed and in no event later than 5 *Working Days* after first observance of the conditions.
- 6.4.2 The *Consultant* will promptly investigate such conditions and make a finding. If the finding is that the conditions differ materially and this would cause an increase or decrease in the *Contractor's* cost or time to perform the *Work*, the *Consultant*, with the *Owner's* approval, will issue appropriate instructions for a change in the *Work* as provided in GC 6.2 - CHANGE ORDER or GC 6.3 - CHANGE DIRECTIVE.
- 6.4.3 If the *Consultant* finds that the conditions at the *Place of the Work* are not materially different or that no change in the *Contract Price* or the *Contract Time* is justified, the *Consultant* will report the reasons for this finding to the *Owner* and the *Contractor* in writing.
- 6.4.4 The *Contractor* shall not be entitled to an adjustment in the *Contract Price* or the *Contract Time* if such conditions were reasonably apparent prior to the time of bid closing.

GC 6.5 DELAYS

- 6.5.1 If the *Contractor* is delayed in the performance of the *Work* by an action or omission of the *Owner*, *Consultant*, or anyone employed or engaged by them directly or indirectly, contrary to the provisions of the *Contract Documents*, then the *Contract Time* shall be extended for such reasonable time as the *Consultant* may recommend in consultation with the *Contractor*. The *Contractor* shall be reimbursed by the *Owner* for reasonable costs incurred by the *Contractor* as the result of such delay.
- 6.5.2 If the *Contractor* is delayed in the performance of the *Work* by a stop work order issued by a court or other public authority and providing that such order was not issued as the result of an act or fault of the *Contractor* or any person employed or engaged by the *Contractor* directly or indirectly, then the *Contract Time* shall be extended for such reasonable time as the *Consultant* may recommend in consultation with the *Contractor*. The *Contractor* shall be reimbursed by the *Owner* for reasonable costs incurred by the *Contractor* as the result of such delay.

- 6.5.3 If the *Contractor* is delayed in the performance of the *Work* by
- .1 labour disputes, strikes, lock-outs (including lock-outs decreed or recommended for its members by a recognized contractors' association, of which the *Contractor* is a member or to which the *Contractor* is otherwise bound),
 - .2 fire, unusual delay by common carriers or unavoidable casualties,
 - .3 abnormally adverse weather conditions, or
 - .4 any other cause beyond the *Contractor's* control, other than one resulting from a default of or breach of *Contract* by the *Contractor*,
- then the *Contract Time* shall be extended for such reasonable time as the *Consultant* may recommend in consultation with the *Contractor*. The extension of time shall not be less than the time lost as the result of the event causing the delay, unless the *Contractor* agrees to a shorter extension. The *Contractor* shall not be entitled to payment for costs incurred by such delays unless such delays result from actions by the *Owner*.
- 6.5.4 No extension shall be made for delay unless notice in writing of the cause of delay is given to the *Consultant* not later than 10 *Working Days* after the commencement of delay, providing however, that in the case of a continuing cause of delay only one notice shall be necessary.
- 6.5.5 If no schedule is made under paragraph 2.2.9 of GC 2.2 - ROLE OF THE CONSULTANT, then no request for extension shall be made because of failure of the *Consultant* to furnish instructions until 10 *Working Days* after demand for such instructions has been made and not then, unless the request is reasonable.

GC 6.6 CLAIMS

- 6.6.1 If the *Contractor* intends to make a claim for additional payment, or if the *Owner* intends to make a claim for a credit to the *Contract Price* or for damages of any kind, the party that intends to make the claim shall give notice in writing of intent to claim to the other party and to the *Consultant* as soon as practicable, but no later than 10 *Working Days* after commencement of the event or series of events giving rise to the claim. Failure to provide such notification shall invalidate the claim.
- 6.6.2 Upon commencement of the event or series of events giving rise to the claim, the party intending to make a claim shall:
- .1 take all reasonable measures to mitigate any loss or damage which may be incurred as a result of such event or series of events, and
 - .2 keep such records as may be necessary to support the claim.
- 6.6.3 Within 30 *Working Days* after commencement of the event or series of events giving rise to the claim, or such other reasonable time as may be agreed by the *Consultant*, the party making the claim shall submit to the *Consultant* a detailed account of the amount claimed and the grounds upon which the claim is based.
- 6.6.4 Where the event or series of events giving rise to the claim has a continuing effect, the detailed account submitted under paragraph 6.6.3 shall be considered to be an interim account and the party making the claim shall, at such intervals as the *Consultant* may reasonably require, submit further interim accounts giving the accumulated amount of the claim and any further grounds upon which it is based. The party making the claim shall submit a final account with 30 *Working Days* after the end of the effects resulting from the event or series of events.
- 6.6.5 The *Consultant's* findings, with respect to a claim made by either party, will be given by notice in writing to the other party within 30 *Working Days* after receipt thereof by the *Consultant*, or such other time period as may be agreed by the parties. If such finding is not acceptable to both parties, the claim shall be settled in accordance with Part 8 of the General Conditions - DISPUTE RESOLUTION.

GC 6.7 QUANTITY VARIATIONS

- 6.7.1 The *Owner* or the *Contractor* may request an adjustment to a *Unit Price* contained in a *Schedule of Prices* included in the *Contract* provided that the actual quantity of the item in the *Schedule of Prices* exceeds or falls short of the estimated quantity by more than 15%.
- 6.7.2 Where the actual quantity exceeds the estimated quantity by more than 15%, a *Unit Price* adjusted pursuant to paragraph 6.7.1 shall apply only to the quantity that exceeds 115% of the estimated quantity.

- 6.7.3 Where the actual quantity falls short of the estimated quantity by more than 15%, a *Unit Price* adjusted pursuant to paragraph 6.7.1 shall not exceed the *Unit Price* that would cause the extended amount to equal the original extended amount derived from the original *Unit Price* and estimated quantity.
- 6.7.4 If either party requests adjustment of a *Unit Price*, both parties shall make all reasonable efforts to agree on a revised *Unit Price*. The agreed revised *Unit Price* shall be recorded in a Change Order.
- 6.7.5 If agreement on a revised *Unit Price* is not reached, the matter shall be subject to final determination in accordance with Part 8 - DISPUTE RESOLUTION. Pending determination of the revised *Unit Price*, payment for the *Work* performed shall be included in progress payments based on the unrevised *Unit Price*.

PART 7 DEFAULT NOTICE

GC 7.1 OWNER'S RIGHT TO PERFORM THE WORK, STOP THE WORK, OR TERMINATE THE CONTRACT

- 7.1.1 If the *Contractor* is adjudged bankrupt, or makes a general assignment for the benefit of creditors because of the *Contractor's* insolvency, or if a receiver is appointed because of the *Contractor's* insolvency, the *Owner* may, without prejudice to any other right or remedy the *Owner* may have, by giving the *Contractor* or receiver or trustee in bankruptcy notice in writing, terminate the *Contract*.
- 7.1.2 If the *Contractor* neglects to prosecute the *Work* properly or otherwise fails to comply with the requirements of the *Contract* to a substantial degree and if the *Consultant* has given a written statement to the *Owner* and *Contractor* that sufficient cause exists to justify such action, the *Owner* may, without prejudice to any other right or remedy the *Owner* may have, notify the *Contractor* in writing that the *Contractor* is in default of the *Contractor's* contractual obligations and instruct the *Contractor* to correct the default in the 5 *Working Days* immediately following the receipt of such notice.
- 7.1.3 If the default cannot be corrected in the 5 *Working Days* specified, the *Contractor* shall be in compliance with the *Owner's* instructions if the *Contractor*:
 - .1 commences the correction of the default within the specified time, and
 - .2 provides the *Owner* with an acceptable schedule for such correction, and
 - .3 corrects the default in accordance with such schedule.
- 7.1.4 If the *Contractor* fails to correct the default in the time specified or subsequently agreed upon, without prejudice to any other right or remedy the *Owner* may have, the *Owner* may:
 - .1 correct such default and deduct the cost thereof from any payment then or thereafter due the *Contractor* provided the *Consultant* has certified such cost to the *Owner* and the *Contractor*, or
 - .2 terminate the *Contractor's* right to continue with the *Work* in whole or in part or terminate the *Contract*.
- 7.1.5 If the *Owner* terminates the *Contractor's* right to continue with the *Work* as provided in paragraphs 7.1.1 and 7.1.4, the *Owner* shall be entitled to:
 - .1 take possession of the *Work* and *Products* delivered to the *Place of the Work*, subject to the rights of third parties, and finish the *Work* by whatever method the *Owner* may consider expedient, but without undue delay or expense, and
 - .2 withhold further payment to the *Contractor* until a final certificate for payment is issued, and
 - .3 charge the *Contractor* the amount by which the full cost of finishing the *Work* as certified by the *Consultant*, including compensation to the *Consultant* for the *Consultant's* additional services and a reasonable allowance as determined by the *Consultant* to cover the cost of corrections to work performed by the *Contractor* that may be required under GC 12.3 - WARRANTY, exceeds the unpaid balance of the *Contract Price*; however, if such cost of finishing the *Work* is less than the unpaid balance of the *Contract Price*, the *Owner* shall pay the *Contractor* the difference, and
 - .4 on expiry of the warranty period, charge the *Contractor* the amount by which the cost of corrections to the *Contractor's* work under GC 12.3 - WARRANTY exceeds the allowance provided for such corrections, or if the cost of such corrections is less than the allowance, pay the *Contractor* the difference.
- 7.1.6 The *Contractor's* obligation under the *Contract* as to quality, correction, and warranty of the work performed by the *Contractor* up to the time of termination shall continue in force after such termination.

GC 7.2 CONTRACTOR'S RIGHT TO STOP THE WORK OR TERMINATE THE CONTRACT

- 7.2.1 If the *Owner* is adjudged bankrupt, or makes a general assignment for the benefit of creditors because of the *Owner's* insolvency, or if a receiver is appointed because of the *Owner's* insolvency, the *Contractor* may, without prejudice to any other right or remedy the *Contractor* may have, by giving the *Owner* or receiver or trustee in bankruptcy notice in writing, terminate the *Contract*.
- 7.2.2 If the *Work* is stopped or otherwise delayed for a period of 20 *Working Days* or more under an order of a court or other public authority and providing that such order was not issued as the result of an act or fault of the *Contractor* or of anyone directly or indirectly employed or engaged by the *Contractor*, the *Contractor* may, without prejudice to any other right or remedy the *Contractor* may have, by giving the *Owner* notice in writing, terminate the *Contract*.
- 7.2.3 The *Contractor* may notify the *Owner* in writing, with a copy to the *Consultant*, that the *Owner* is in default of the *Owner's* contractual obligations if:
- .1 the *Owner* fails to furnish, when so requested by the *Contractor*, reasonable evidence that financial arrangements have been made to fulfill the *Owner's* obligations under the *Contract*, or
 - .2 the *Consultant* fails to issue a certificate as provided in GC 5.3 PROGRESS PAYMENT, or
 - .3 the *Owner* fails to pay the *Contractor* when due the amounts certified by the *Consultant* or awarded by arbitration or court, or
 - .4 the *Owner* violates the requirements of the *Contract* to a substantial degree and the *Consultant*, except for GC 5.1 - FINANCING INFORMATION REQUIRED OF THE OWNER, confirms by written statement to the *Contractor* that sufficient cause exists.
- 7.2.4 The *Contractor's* notice in writing to the *Owner* provided under paragraph 7.2.3 shall advise that if the default is not corrected within 5 *Working Days* following the receipt of the notice in writing, the *Contractor* may, without prejudice to any other right or remedy the *Contractor* may have, stop the *Work* or terminate the *Contract*.
- 7.2.5 If the *Contractor* terminates the *Contract* under the conditions set out above, the *Contractor* shall be entitled to be paid for all work performed including reasonable profit, for loss sustained upon *Products* and *Construction Equipment*, and such other damages as the *Contractor* may have sustained as a result of the termination of the *Contract*.

PART 8 DISPUTE RESOLUTION

GC 8.1 AUTHORITY OF THE CONSULTANT

- 8.1.1 Differences between the parties to the *Contract* as to the interpretation, application or administration of the *Contract* or any failure to agree where agreement between the parties is called for, herein collectively called disputes, which are not resolved in the first instance by findings of the *Consultant* as provided in GC 2.2 - ROLE OF THE CONSULTANT, shall be settled in accordance with the requirements of Part 8 of the General Conditions - DISPUTE RESOLUTION.
- 8.1.2 If a dispute arises under the *Contract* in respect of a matter in which the *Consultant* has no authority under the *Contract* to make a finding, the procedures set out in paragraph 8.1.3 and paragraphs 8.2.3 to 8.2.8 of GC 8.2 - NEGOTIATION, MEDIATION, AND ARBITRATION, and in GC 8.3 - RETENTION OF RIGHTS apply to that dispute with the necessary changes to detail as may be required.
- 8.1.3 If a dispute is not resolved promptly, the *Consultant* will give such instructions as in the *Consultant's* opinion are necessary for the proper performance of the *Work* and to prevent delays pending settlement of the dispute. The parties shall act immediately according to such instructions, it being understood that by so doing neither party will jeopardize any claim the party may have. If it is subsequently determined that such instructions were in error or at variance with the *Contract Documents*, the *Owner* shall pay the *Contractor* costs incurred by the *Contractor* in carrying out such instructions which the *Contractor* was required to do beyond what the *Contract Documents* correctly understood and interpreted would have required, including costs resulting from interruption of the *Work*.

GC 8.2 NEGOTIATION, MEDIATION, AND ARBITRATION

- 8.2.1 In accordance with the latest edition of the Rules for Mediation of Construction Disputes as provided in CCDC 40, the parties shall appoint a Project Mediator
- .1 within 20 *Working Days* after the *Contract* was awarded, or
 - .2 if the parties neglected to make an appointment within the 20 *Working Day* period, within 10 *Working Days* after either party by notice in writing requests that the Project Mediator be appointed.
- 8.2.2 A party shall be conclusively deemed to have accepted a finding of the *Consultant* under GC 2.2 - ROLE OF THE CONSULTANT and to have expressly waived and released the other party from any claims in respect of the particular matter dealt with in that finding unless, within 15 *Working Days* after receipt of that finding, the party sends a notice in writing of dispute to the other party and to the *Consultant*, which contains the particulars of the matter in dispute and the relevant provisions of the *Contract Documents*. The responding party shall send a notice in writing of reply to the dispute within 10 *Working Days* after receipt of the notice of dispute setting out particulars of this response and any relevant provisions of the *Contract Documents*.
- 8.2.3 The parties shall make all reasonable efforts to resolve their dispute by amicable negotiations and agree to provide, without prejudice, frank, candid and timely disclosure of relevant facts, information, and documents to facilitate these negotiations.
- 8.2.4 After a period of 10 *Working Days* following receipt of a responding party's notice in writing of reply under paragraph 8.2.2, the parties shall request the Project Mediator to assist the parties to reach agreement on any unresolved dispute. The mediated negotiations shall be conducted in accordance with the latest edition of the Rules for Mediation of Construction Disputes as provided in CCDC 40.
- 8.2.5 If the dispute has not been resolved within 10 *Working Days* after the Project Mediator was requested under paragraph 8.2.4 or within such further period agreed by the parties, the Project Mediator shall terminate the mediated negotiations by giving notice in writing to both parties.
- 8.2.6 By giving a notice in writing to the other party, not later than 10 *Working Days* after the date of termination of the mediated negotiations under paragraph 8.2.5, either party may refer the dispute to be finally resolved by arbitration under the latest edition of the Rules for Arbitration of Construction Disputes as provided in CCDC 40. The arbitration shall be conducted in the jurisdiction of the *Place of the Work*.
- 8.2.7 On expiration of the 10 *Working Days*, the arbitration agreement under paragraph 8.2.6 is not binding on the parties and, if a notice is not given under paragraph 8.2.6 within the required time, the parties may refer the unresolved dispute to the courts or to any other form of dispute resolution, including arbitration, which they have agreed to use.
- 8.2.8 If neither party requires by notice in writing given within 10 *Working Days* of the date of notice requesting arbitration in paragraph 8.2.6 that a dispute be arbitrated immediately, all disputes referred to arbitration as provided in paragraph 8.2.6 shall be
- .1 held in abeyance until
 - (1) *Substantial Performance of the Work*,
 - (2) the *Contract* has been terminated, or
 - (3) the *Contractor* has abandoned the *Work*,whichever is earlier, and
 - .2 consolidated into a single arbitration under the rules governing the arbitration under paragraph 8.2.6.

GC 8.3 RETENTION OF RIGHTS

- 8.3.1 It is agreed that no act by either party shall be construed as a renunciation or waiver of any rights or recourses, provided the party has given the notices required under Part 8 of the General Conditions - DISPUTE RESOLUTION and has carried out the instructions as provided in paragraph 8.1.3.

- 8.3.2 Nothing in Part 8 of the General Conditions - DISPUTE RESOLUTION shall be construed in any way to limit a party from asserting any statutory right to a lien under applicable lien legislation of the jurisdiction of the *Place of the Work* and the assertion of such right by initiating judicial proceedings is not to be construed as a waiver of any right that party may have under paragraph 8.2.6 to proceed by way of arbitration to adjudicate the merits of the claim upon which such a lien is based.

PART 9 PROTECTION OF PERSONS AND PROPERTY

GC 9.1 PROTECTION OF WORK AND PROPERTY

- 9.1.1 The *Contractor* shall protect the *Work* and the *Owner's* property and property adjacent to the *Place of the Work* from damage which may arise as the result of the *Contractor's* operations under the *Contract*, and shall be responsible for such damage, except damage which occurs as the result of:
- .1 errors in the *Contract Documents*;
 - .2 acts or omissions by the *Owner*, the *Consultant*, other contractors, their agents and employees.
- 9.1.2 Before commencing any work, the *Contractor* shall determine the location of all known underground utilities and structures indicated in the *Contract Documents* or that are reasonably apparent in an inspection of the *Place of the Work*.
- 9.1.3 Should the *Contractor* in the performance of the *Contract* damage the *Work*, the *Owner's* property, or property adjacent to the *Place of the Work*, the *Contractor* shall be responsible for the making good such damage at the *Contractor's* expense.
- 9.1.4 Should damage occur to the *Work* or *Owner's* property for which the *Contractor* is not responsible, as provided in paragraph 9.1.1, the *Contractor* shall make good such damage to the *Work* and, if the *Owner* so directs, to the *Owner's* property. The *Contract Price* and *Contract Time* shall be adjusted as provided in GC 6.1 - CHANGES, GC 6.2 - CHANGE ORDER, and GC 6.3 - CHANGE DIRECTIVE.

GC 9.2 DAMAGES AND MUTUAL RESPONSIBILITY

- 9.2.1 If either party to the *Contract* should suffer damage in any manner because of any wrongful act or neglect of the other party or of anyone for whom the other party is responsible in law, then that party shall be reimbursed by the other party for such damage. The reimbursing party shall be subrogated to the rights of the other party in respect of such wrongful act or neglect if it be that of a third party.
- 9.2.2 If the *Contractor* has caused damage to the work of another contractor on the *Project*, the *Contractor* shall upon due notice in writing settle with the other contractor by negotiation or arbitration. If the other contractor makes a claim against the *Owner* on account of damage alleged to have been so sustained, the *Owner* shall notify the *Contractor* in writing and may require the *Contractor* to defend the action at the *Contractor's* expense. The *Contractor* shall satisfy a final order or judgment against the *Owner* and pay the costs incurred by the *Owner* arising from such action.
- 9.2.3 If the *Contractor* becomes liable to pay or satisfy a final order, judgment, or award against the *Owner*, then the *Contractor*, upon undertaking to indemnify the *Owner* against any and all liability for costs, shall have the right to appeal in the name of the *Owner* such final order or judgment to any and all courts of competent jurisdiction.

GC 9.3 TOXIC AND HAZARDOUS SUBSTANCES

- 9.3.1 For the purposes of applicable environmental legislation, the *Owner* shall be deemed to have control and management of the *Place of the Work* with respect to existing conditions.
- 9.3.2 Prior to the *Contractor* commencing the *Work*, the *Owner* shall:
- .1 take all reasonable steps to determine whether any toxic or hazardous substances are present at the *Place of the Work*, and
 - .2 provide the *Consultant* and the *Contractor* with a written list of any such substances that are known to exist and their locations.

- 9.3.3 The *Owner* shall take all reasonable steps to ensure that no person suffers injury, sickness, or death and that no property is damaged or destroyed as a result of exposure to, or the presence of, toxic or hazardous substances which were at the *Place of the Work* prior to the *Contractor* commencing the *Work*.
- 9.3.4 Unless the *Contract* expressly provides otherwise, the *Owner* shall be responsible for taking all necessary steps, in accordance with legal requirements, to dispose of, store or otherwise render harmless toxic or hazardous substances which were present at the *Place of the Work* prior to the *Contractor* commencing the *Work*.
- 9.3.5 If the *Contractor*
- .1 encounters toxic or hazardous substances at the *Place of the Work*, or
 - .2 has reasonable grounds to believe that toxic or hazardous substances are present at the *Place of the Work*, which were not disclosed by the *Owner*, as required under paragraph 9.3.2, or which were disclosed but have not been dealt with as required under paragraph 9.3.4, the *Contractor* shall
 - .3 take all reasonable steps, including stopping the *Work*, to ensure that no person suffers injury, sickness, or death and that no property is damaged or destroyed as a result of exposure to or the presence of the substances, and
 - .4 immediately report the circumstances to the *Consultant* and the *Owner* in writing.
- 9.3.6 If the *Contractor* is delayed in performing the *Work* or incurs additional costs as a result of taking steps required under paragraph 9.3.5.3, the *Contract Time* shall be extended for such reasonable time as the *Consultant* may recommend in consultation with the *Contractor* and the *Contractor* shall be reimbursed for reasonable costs incurred as a result of the delay and as a result of taking those steps.
- 9.3.7 Notwithstanding paragraphs 2.2.6 and 2.2.7 of GC 2.2 - ROLE OF THE CONSULTANT, or paragraph 8.1.1 of GC 8.1 - AUTHORITY OF THE CONSULTANT, the *Consultant* may select and rely upon the advice of an independent expert in a dispute under paragraph 9.3.6 and, in that case, the expert shall be deemed to have been jointly retained by the *Owner* and the *Contractor* and shall be jointly paid by them.
- 9.3.8 The *Owner* shall indemnify and hold harmless the *Contractor*, the *Consultant*, their agents and employees, from and against claims, demands, losses, costs, damages, actions, suits, or proceedings arising out of or resulting from exposure to, or the presence of, toxic or hazardous substances which were at the *Place of the Work* prior to the *Contractor* commencing the *Work*. This obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity set out in GC 12.1 - INDEMNIFICATION or which otherwise exist respecting a person or party described in this paragraph.
- 9.3.9 GC 9.3 - TOXIC AND HAZARDOUS SUBSTANCES shall govern over the provisions of paragraph 1.3.1 of GC 1.3 RIGHTS AND REMEDIES or GC 9.2 - DAMAGES AND MUTUAL RESPONSIBILITY.

GC 9.4 ARTIFACTS AND FOSSILS

- 9.4.1 Fossils, coins, articles of value or antiquity, structures, and other remains or things of scientific or historic interest discovered at the *Place or Work* shall, as between the *Owner* and the *Contractor*, be deemed to be the absolute property of the *Owner*.
- 9.4.2 The *Contractor* shall take all reasonable precautions to prevent removal or damage to discoveries as identified in paragraph 9.4.1, and shall notify the *Consultant* immediately upon discovery of such items.
- 9.4.3 The *Consultant* will investigate the impact on the *Work* of the discoveries identified in paragraph 9.4.1. If conditions are found that would cause an increase or decrease in the *Contractor's* cost or time to perform the *Work*, the *Consultant*, with the *Owner's* approval, shall issue appropriate instructions for a change in the *Work* as provided in GC 6.2 - CHANGE ORDER or GC 6.3 - CHANGE DIRECTIVE.

GC 9.5 CONSTRUCTION SAFETY

- 9.5.1 Subject to paragraph 3.2.2.2 of GC 3.2 - CONSTRUCTION BY OWNER OR OTHER CONTRACTORS, the *Contractor* shall be solely responsible for construction safety at the *Place or the Work* and for compliance with the rules, regulations, and practices required by the applicable construction health and safety legislation and shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the *Work*.

PART 10 GOVERNING REGULATIONS

GC 10.1 TAXES AND DUTIES

- 10.1.1 The *Contract Price* shall include all taxes and customs duties in effect at the time of the bid closing except for *Value Added Taxes* payable by the *Owner* to the *Contractor* as stipulated in Article A-4 of the Agreement - CONTRACT PRICE.
- 10.1.2 Any increase or decrease in costs to the *Contractor* due to changes in such included taxes and duties after the time of bid closing shall increase or decrease the *Contract Price* accordingly.

GC 10.2 LAWS, NOTICES, PERMITS, AND FEES

- 10.2.1 The laws of the *Place of the Work* shall govern the *Work*.
- 10.2.2 Except for the permits and fees, including those required under paragraph 10.2.3, which the *Contract Documents* specify as the responsibility of the *Contractor*, the *Owner* shall obtain and pay for all necessary approvals, permits, permanent easements, and rights of servitude.
- 10.2.3 The *Contractor* shall obtain and pay for permits, licenses, inspections and certificates necessary for performance of the *Work* and customarily obtained after signing of the *Contract*.
- 10.2.4 The *Contractor* shall give the required notices and comply with the laws, ordinances, rules, regulations, or codes which are or become in force during the performance of the *Work* and which relate to the *Work*, to the preservation of the public health, and to construction safety.
- 10.2.5 The *Contractor* shall not be responsible for verifying that the *Contract Documents* are in compliance with the applicable laws, ordinances, rules, regulations, or codes relating to the *Work*. If the *Contract Documents* are at variance therewith, or if, subsequent to the time of bid closing, changes are made to the applicable laws, ordinances, rules, regulations, or codes which require modification to the *Contract Documents*, the *Contractor* shall notify the *Consultant* in writing requesting direction immediately upon such variance or change becoming known. The *Consultant* will make the changes required to the *Contract Documents* as provided in GC 6.1 - CHANGES, GC 6.2 - CHANGE ORDER, and GC 6.3 - CHANGE DIRECTIVE.
- 10.2.6 If the *Contractor* fails to notify the *Consultant* in writing; and fails to obtain direction as required in paragraph 10.2.5; and performs work knowing it to be contrary to any laws, ordinances, rules, regulations, or codes; the *Contractor* shall be responsible for and shall correct the violations thereof; and shall bear the costs, expenses, and damages attributable to the failure to comply with the provisions of such laws, ordinances, rules, regulations, or codes.
- 10.2.7 If, subsequent to the time of bid closing, changes are made to applicable laws, ordinances, rules, regulations, or codes of authorities having jurisdiction which affect the cost of the *Work*, either party may submit a claim in accordance with the requirements of GC 6.6 - CLAIMS.

GC 10.3 PATENT FEES

- 10.3.1 The *Contractor* shall pay the royalties and patent licence fees required for the performance of the *Contract*. The *Contractor* shall hold the *Owner* harmless from and against claims, demands, losses, costs, damages, actions, suits, or proceedings arising out of the *Contractor's* performance of the *Contract* which are attributable to an infringement or an alleged infringement of a patent of invention by the *Contractor* or anyone for whose acts the *Contractor* may be liable.
- 10.3.2 The *Owner* shall hold the *Contractor* harmless against claims, demands, losses, costs, damages, actions, suits, or proceedings arising out of the *Contractor's* performance of the *Contract* which are attributable to an infringement or an alleged infringement of a patent of invention in executing anything for the purpose of the *Contract*, the model, plan, or design of which was supplied to the *Contractor* as part of the *Contract Documents*.

GC 10.4 WORKERS' COMPENSATION

- 10.4.1 Prior to commencing the *Work*, *Substantial Performance of the Work*, and the issuance of the final certificate for payment, the *Contractor* shall provide evidence of compliance with workers' compensation legislation at the *Place of the Work*, including payments due thereunder.
- 10.4.2 At any time during the term of the *Contract*, when requested by the *Owner*, the *Contractor* shall provide such evidence of compliance by the *Contractor* and *Subcontractors*.

PART 11 INSURANCE AND CONTRACT SECURITY

GC 11.1 INSURANCE

- 11.1.1 Without restricting the generality of GC 12.1 - INDEMNIFICATION, the *Contractor* shall provide, maintain, and pay for the insurance coverages specified in GC 11.1 - INSURANCE. Unless otherwise stipulated, the duration of each insurance policy shall be from the date of commencement of the *Work* until the date of the final certificate for payment. Prior to commencement of the *Work* and upon the placement, renewal, amendment, or extension of all or any part of the insurance, the *Contractor* shall promptly provide the *Owner* with confirmation of coverage and, if required, a certified true copy of the policies certified by an authorized representative of the insurer together with copies of any amending endorsements.
- .1 General Liability Insurance:
General liability insurance shall be in the joint names of the *Contractor*, the *Owner*, and the *Consultant*, with limits of not less than \$2,000,000 per occurrence and with a property damage deductible not exceeding \$2,500. The insurance coverage shall not be less than the insurance required by IBC Form 2100, or its equivalent replacement, provided that IBC Form 2100 shall contain the latest edition of the relevant CCDC endorsement form. To achieve the desired limit, umbrella, or excess liability insurance may be used. All liability coverage shall be maintained for completed operations hazards from the date of *Substantial Performance of the Work*, as set out in the certificate of *Substantial Performance of the Work*, on an ongoing basis for a period of 6 years following *Substantial Performance of the Work*. Where the *Contractor* maintains a single, blanket policy, the addition of the *Owner* and the *Consultant* is limited to liability arising out of the *Work* and all operations necessary or incidental thereto. The policy shall be endorsed to provide the *Owner* with not less than 30 days notice in writing in advance of any cancellation, and of change or amendment restricting coverage.
- .2 Automobile Liability Insurance:
Automobile liability insurance in respect of licensed vehicles shall have limits of not less than \$2,000,000 inclusive per occurrence for bodily injury, death, and damage to property, covering all licensed vehicles owned or leased by the *Contractor*, and endorsed to provide the *Owner* with not less than 15 days notice in writing in advance of any cancellation, change or amendment restricting coverage. Where the policy has been issued pursuant to a government-operated automobile insurance system, the *Contractor* shall provide the *Owner* with confirmation of automobile insurance coverage for all automobiles registered in the name of the *Contractor*.
- .3 Aircraft and Watercraft Liability Insurance:
Aircraft and watercraft liability insurance with respect to owned or non-owned aircraft and watercraft if used directly or indirectly in the performance of the *Work*, including use of additional premises, shall be subject to limits of not less than \$2,000,000 inclusive per occurrence for bodily injury, death, and damage to property including loss of use thereof and limits of not less than \$2,000,000 for aircraft passenger hazard. Such insurance shall be in a form acceptable to the *Owner*. The policies shall be endorsed to provide the *Owner* with not less than 15 days notice in writing in advance of cancellation, change, or amendment restricting coverage.

.4 Property and Boiler and Machinery Insurance:

- (1) "All risks" property insurance shall be in the joint names of the *Contractor*, the *Owner*, the *Consultant*, and all *Subcontractors*, insuring not less than the sum of the amount of the *Contract Price* and the full value, as stated in the Supplementary Conditions, of *Products* that are specified to be provided by the *Owner* for incorporation into the *Work*, with a deductible not exceeding \$2,500. The insurance coverage shall not be less than the insurance required by IBC Form 4042 or its equivalent replacement, provided that IBC Form 4042 shall contain the latest edition of the relevant CCDC endorsement form. The coverage shall be maintained continuously until 5 *Working Days* after the date of the final certificate for payment.
- (2) Boiler and machinery insurance shall be in the joint names of the *Contractor*, the *Owner*, and the *Consultant* for not less than the replacement value of the boilers, pressure vessels, and other insurable objects forming part of the *Work*. The insurance provided shall not be less than the insurance provided by the "Comprehensive Boiler and Machinery Form" and shall be maintained continuously from commencement of use or operation of the property insured and until 5 *Working Days* after the date of the final certificate for payment.
- (3) The policies shall allow for partial or total use or occupancy of the *Work*. If because of such use or occupancy the *Contractor* is unable to provide coverage, the *Contractor* shall notify the *Owner* in writing. Prior to such use or occupancy the *Owner* shall provide, maintain, and pay for all risk property and boiler insurance insuring the full value of the *Work*, as in sub-paragraphs (1) and (2), including coverage for such use or occupancy and shall provide the *Contractor* with proof of such insurance. 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 case 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* 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* shall be entitled to such reasonable extension of *Contract Time* relative to the extent of the loss or damage as the *Consultant* may recommend in consultation with the *Contractor*.
- (5) The *Contractor* shall be entitled to receive from the *Owner*, in addition to the amount due under the *Contract*, the amount at which the *Owner's* interest in restoration of the *Work* has been appraised, such amount to be paid as the restoration of the *Work* proceeds and as provided in GC 5.5 - APPLICATIONS FOR PROGRESS PAYMENT and GC 5.6 - PROGRESS PAYMENT. In addition 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*.
- (6) In the case of loss or damage to the *Work* arising from the work of another contractor, or *Owner's* own forces, the *Owner*, in accordance with the *Owner's* obligations under paragraph 3.2.2.4 of GC 3.2 - CONSTRUCTION BY OWNER OR OTHER CONTRACTORS, shall pay the *Contractor* the cost of restoring the *Work* as the restoration of the *Work* proceeds and as provided in GC 5.5 - APPLICATIONS FOR PROGRESS PAYMENT and GC 5.6 - PROGRESS PAYMENT.

.5 Contractors' Equipment Insurance:

"All risks" contractors' equipment insurance covering *Construction Equipment* used by the *Contractor* for the performance of the *Work*, including boiler insurance on temporary boilers and pressure vessels, shall be in a 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 15 days notice in writing in advance of cancellation, change, or amendment restricting coverage. Subject to satisfactory proof of financial capability by the *Contractor* for self-insurance, the *Owner* agrees to waive the equipment insurance requirement.

- 11.1.2 The *Contractor* shall be responsible for deductible amounts under the policies except where such amounts may be excluded from the *Contractor's* responsibility by the terms of GC 9.1 - PROTECTION OF WORK AND PROPERTY and GC 9.2 - DAMAGES AND MUTUAL RESPONSIBILITY.
- 11.1.3 Where the full insurable value of the *Work* is substantially less than the *Contract Price*, the *Owner* may reduce the amount of insurance required or waive the course of construction insurance requirement.

- 11.1.4 If the *Contractor* fails to provide or maintain insurance as required by the *Contract Documents*, then the *Owner* shall have the right to provide and maintain such insurance and give evidence to the *Contractor* and the *Consultant*. The *Contractor* shall pay the cost thereof to the *Owner* on demand or the *Owner* may deduct the amount which is due or may become due to the *Contractor*.
- 11.1.5 All required insurance policies shall be with insurers licensed to underwrite insurance in the jurisdiction of the *Place of the Work*.

GC 11.2 CONTRACT SECURITY

- 11.2.1 The *Contractor* shall, prior to commencement of the *Work* or within the specified time, provide to the *Owner* any contract security specified in the *Contract Documents*.
- 11.2.2 If the *Contract Documents* require surety bonds to be provided, such bonds shall be issued by a duly licensed surety company authorized to transact the business of suretyship in the province or territory of the *Place of the Work* and shall be maintained in good standing until the fulfillment of the *Contract*. The form of such bonds shall be in accordance with the latest edition of the CCDC approved bond forms.

PART 12 INDEMNIFICATION — WAIVER — WARRANTY

GC 12.1 INDEMNIFICATION

- 12.1.1 The *Contractor* shall indemnify and hold harmless the *Owner* and the *Consultant*, their agents and employees from and against claims, demands, losses, costs, damages, actions, suits, or proceedings (hereinafter called "claims"), by third parties that arise out of, or are attributable to, the *Contractor's* performance of the *Contract* provided such claims are:
- .1 attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property, and
 - .2 caused by negligent acts or omissions of the *Contractor* or anyone for whose acts the *Contractor* may be liable, and
 - .3 made in writing within a period of 6 years from the date of *Substantial Performance of the Work* as set out in the certificate of *Substantial Performance of the Work*, or within such shorter period as may be prescribed by any limitation statute of the province or territory of the *Place of the Work*.
- The *Owner* expressly waives the right to indemnity for claims other than those stated above.
- 12.1.2 The obligation of the *Contractor* to indemnify hereunder shall be limited to \$2,000,000 per occurrence from the commencement of the *Work* until *Substantial Performance of the Work* and thereafter to an aggregate limit of \$2,000,000.
- 12.1.3 The *Owner* shall indemnify and hold harmless the *Contractor*, the *Contractor's* agents and employees from and against claims, demands, losses, costs, damages, actions, suits, or proceedings arising out of the *Contractor's* performance of the *Contract* which are attributable to a lack of or defect in title or an alleged lack of or defect in title to the *Place of the Work*.
- 12.1.4 GC 12.1 - INDEMNIFICATION shall govern over the provisions of paragraph 1.3.1 of GC 1.3 - RIGHTS AND REMEDIES or GC 9.2 - DAMAGES AND MUTUAL RESPONSIBILITY.

GC 12.2 WAIVER OF CLAIMS

- 12.2.1 Waiver of Claims by *Owner*
- As of the date of the final certificate for payment, the *Owner* expressly waives and releases the *Contractor* from all claims against the *Contractor* including without limitation those that might arise from the negligence or breach of contract by the *Contractor* except one or more of the following:
- .1 those made in writing prior to the date of the final certificate for payment and still unsettled;
 - .2 those arising from the provisions of GC 12.1 - INDEMNIFICATION or GC 12.3 - WARRANTY;
 - .3 those arising from the provisions of paragraph 9.3.5 of GC 9.3 - TOXIC AND HAZARDOUS SUBSTANCES AND MATERIALS and arising from the *Contractor* bringing or introducing any toxic or hazardous substances and materials to the *Place of the Work* after the *Contractor* commences the *Work*.

In the Common Law provinces GC 12.2.1.4 shall read as follows:

- .4 those made in writing within a period of 6 years from the date of *Substantial Performance of the Work*, as set out in the certificate of *Substantial Performance of the Work*, or within such shorter period as may be prescribed by any limitation statute of the province or territory of the *Place of the Work* and arising from any liability of the *Contractor* for damages resulting from the *Contractor's* performance of the *Contract* with respect to substantial defects or deficiencies in the *Work* for which the *Contractor* is proven responsible. As used herein "substantial defects or deficiencies" means those defects or deficiencies in the *Work* which affect the *Work* to such an extent or in such a manner that a significant part or the whole of the *Work* is unfit for the purpose intended by the *Contract Documents*.

In the Province of Quebec GC 12.2.1.4 shall read as follows:

- .4 those arising under the provisions of Article 2118 of the Civil Code of Quebec.

12.2.2 Waiver of Claims by *Contractor*

As of the date of the final certificate for payment, the *Contractor* expressly waives and releases the *Owner* from all claims against the *Owner* including without limitation those that might arise from the negligence or breach of contract by the *Owner* except:

- .1 those made in writing prior to the *Contractor's* application for final payment and still unsettled; and
- .2 those arising from the provisions of GC 9.3 - TOXIC AND HAZARDOUS SUBSTANCES or GC 10.3 - PATENT FEES.

12.2.3 GC 12.2 - WAIVER OF CLAIMS shall govern over the provisions of paragraph 1.3.1 of GC 1.3 - RIGHTS AND REMEDIES, GC 6.6 - CLAIMS, and GC 9.2 - DAMAGES AND MUTUAL RESPONSIBILITY.

GC 12.3 WARRANTY

- 12.3.1 Except for extended warranties as described in paragraph 12.3.6, the warranty period under the *Contract* is one year from the date of *Substantial Performance of the Work*.
- 12.3.2 The *Contractor* shall be responsible for the proper performance of the *Work* to the extent that the design and *Contract Documents* permit such performance.
- 12.3.3 Subject to paragraph 12.3.2, the *Contractor* shall correct promptly, at the *Contractor's* expense, defects or deficiencies in the *Work* which appear prior to and during the warranty periods specified in the *Contract Documents*.
- 12.3.4 The *Owner*, through the *Consultant*, shall promptly give the *Contractor* notice in writing of observed defects and deficiencies which occur during the one-year warranty period.
- 12.3.5 The *Contractor* shall correct or pay for damage resulting from corrections made under the requirements of paragraph 12.3.3.
- 12.3.6 Any extended warranties required beyond the one-year warranty period, as described in paragraph 12.3.1, shall be as specified in the *Contract Documents*. Extended warranties shall be issued by the warrantor to the benefit of the *Owner*. The *Contractor's* responsibility with respect to extended warranties shall be limited to obtaining any such extended warranties from the warrantor. The obligations under such extended warranties are solely the responsibility of the warrantor.



Canadian Construction Documents Committee

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THESE SUPPLEMENTARY GENERAL CONDITIONS AMEND THE DEFINITIONS AND GENERAL CONDITIONS OF THE CIVIL WORKS CONTRACT – CCDC18 – 2001.

AGREEMENT BETWEEN OWNER AND CONTRACTOR

Page 1, add the following to Article A-1 after: “is acting as and is hereafter called the “Consultant” and,

Owner Consultant is acting as and is hereafter called the “Payment Certifier” and”

Page 4, after Article A-8 insert the following new articles:

“ARTICLE A-9 SEVERABILITY

9.1 Each and every paragraph, section, clause, sub-clause or other component of the Contract is severable one from the other. Should it be found by a court of competent jurisdiction that any one or more paragraphs or parts thereof are null and void, the validity of the remaining paragraphs or parts thereof shall not be affected.

ARTICLE A-10 TIME OF THE ESSENCE

“10.1 Time shall be deemed to be of the essence.”

DEFINITIONS

Page 6, delete Definition 7, **Contract Price**, and replace with the following new definition:

“The Contract Price shall be the sum of the products of the actual final quantities that are incorporated in, or made necessary by the Work, as confirmed by count and measurement, multiplied by the appropriate Unit Prices from the Tender Form together with any adjustments that are made in accordance with the provisions of the Contract Documents plus the amount of Harmonized Sales Tax.”

Page 6, Definition 10, **Drawings**, add the following sentence:

“Drawings shall be stamped by a Professional Engineer licensed to practice in the province of NB.”

Page 6, Definition 12, **Place of Work**, add the following sentence:

“Any reference within the Contract Documents to the term “Site” shall be considered interchangeable with the definition “Place of the Work”.

Page 7, Definition 21, Supplemental Instruction, and elsewhere in the document, change “**Supplemental Instruction**” to read “**Site Instruction**”.

Page 7, Add new definitions as follows:

- “28. **“Approved” or “Approval”**: means acceptance by the Consultant in accordance with the Consultant’s responsibilities described in Clause GC 2.2 ROLE OF THE CONSULTANT.
- 29. **“Total Amount Payable”** means the sum of the Contract Price in the Tender Form, subject to adjustments made in accordance with the provisions of the Contract Documents plus the amount of Value Added Taxes.
- 30. **“Period of Delay”** The period of time from the date stated in the Agreement and the actual date of Substantial Performance; if any.
- 31. **“Project Documents”** Project Documents are those documents prepared to supplement the Standard Specifications for the Work on a specific Project. Where applicable, they consist of the Information for Tenderers, Tender Form, Form of Agreement, Technical Specifications, drawings and addenda.
- 32. **“Site”** The Site means the geographical location of the Work identified in the Contract Documents and has the same meaning as Place of Work.
- 33. **“Pre-Purchased Equipment Supplier”** A Pre-Purchased Equipment Supplier means a firm or corporation with whom the Owner has entered into a contract for the supply of equipment and has placed a purchase order for equipment to be installed by the Contractor in the Work.
- 34. **“Pre-Selected Equipment Supplier”** A Pre-Selected Equipment Supplier means a firm or corporation with whom the Contractor shall enter into a contract with and place a purchase order to supply the equipment as Pre-Selected by the Owner, for incorporation into the Work.”

GENERAL CONDITIONS OF CIVIL WORKS CONTRACT

PART 2 ADMINISTRATION OF THE CONTRACT

GC 2.4 – DEFECTIVE WORK

Page 11, clause 2.4.3, add the following sentence at the end of the clause:

“If the Owner or Consultant determination is not accepted by either party, then the matter shall be settled in accordance with the requirements of Part 8 of the General Conditions – DISPUTE RESOLUTION.”

PART 3 EXECUTION OF THE WORK

GC 3.5 - CONSTRUCTION SCHEDULE

Page 13, clause 3.5.1.1, delete "prior to the first application for payment, ..." and replace with "not later than two (2) weeks after Contract Award,..."

GC 3.7 – LAYOUT OF THE WORK

Page 13, delete clause 3.7.1 in its entirety and replace with the following:

- "3.7.1 The Contractor shall have all reference points established on Site by a licensed surveyor, at the place of the Work, at no additional cost to the Owner."

GC 3.8 – SUBCONTRACTORS AND SUPPLIERS

Page 14, after clause 3.8.6, add the following:

- "3.8.7 A copy of the Contract or Agreement between the Contractor and any of his subcontractors shall be provided to the Consultant, if required."

GC 3.11 – SHOP DRAWINGS

Page 14, clause 3.11.4, delete second sentence and replace to read:

- "Contractor shall prepare and jointly review with Consultant, a schedule of dates for submission of shop drawings."

PART 5 PAYMENT

GC 5.4 – BASIS OF PAYMENT FOR COST PLUS WORK

Page 16, after clause 5.4.6, add the following:

- "5.4.7 The percentage fee as stated in clause 5.4.1 shall be ten percent (10%) of the cost plus work, but shall not be applied to the cost of Construction Equipment when such cost is based on rates which already include overhead and profit."

GC 5.6 – PROGRESS PAYMENT

Page 18, in clause 5.6.1, line 1, change "5 working days" to read "10 calendar days" and in line 2, change "GC 5.2" to read "GC 5.5".

Page 18, delete clause 5.6.2 in its entirety and replace with the following:

- "5.6.2 The Owner shall make payment to the Contractor on account as provided in Article A-5 of the Agreement – PAYMENT on or before thirty (30) calendar days after the later of:
- .1 Receipt by the Consultant of the application for payment; or
 - .2 The last day of the monthly payment period covered by the application for payment."

Page 18, after clause 5.6.3, add the following additional clause:

- "5.6.4 The Contractor shall agree interim quantities with the Consultant for the purposes of progress payment claims, prior to submission of progress payment application.
- "5.6.5 The Contractor shall pay promptly any and all accounts for labour, services and materials used for the purpose of the fulfillment of this Contract as and when such accounts become due and payable and shall furnish the Consultant with proof of payment of such accounts in such form and as often as the Consultant may request."

GC 5.7 – SUBSTANTIAL PERFORMANCE OF THE WORK

Page 18, after clause 5.7.4, add the following additional clause:

- "5.7.5 Fifteen (15) days before the Contractor submits the application for Substantial Performance of the Work, all Operations and Maintenance Manual materials shall be submitted to the Consultant in accordance with the Contract Documents. The Certificate of Substantial Performance will not be issued until the Consultant received the required documents."

Page 18, after clause 5.7.5, add the following additional clause:

- "5.7.6 If, within 60-days after the issue by the Consultant of the Certificate of the Substantial Performance, the Contractor has not corrected all the deficiencies, the Owner shall retain sufficient money to cover the cost of completing said deficiencies, as determined by the Consultant, in addition to holding monies retained in accordance with the provisions of this Contract and subject to the provisions of the *Construction Remedies Act* lien legislation of New Brunswick."

GC 5.8 - PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF THE WORK

Page 18, clause 5.8.1.2, first line change "sworn or affirmed statement" to read "Statutory Declaration on CCDC Form 9A, latest edition".

Page 18, after clause 5.8.1.2, add the following:

- "5.8.1.3 Submit a certificate by deed search to the Owner by a solicitor qualified to practice law in the Province of the Place of Work, certifying that no lien associated with the Work exists against the Owner's property or Work.
- 5.8.1.4 Submit a clearance letter from WorkSafe NB.
- 5.8.1.5 All such documents shall be dated not earlier than the expiry of the lien period."

Page 18, clause 5.8.2, first line, change "sworn or affirmed statement" to read "Statutory Declaration on CCDC Form 9A, latest edition".

Page 19, add new clause 5.8.4.1 as follows:

- "5.8.4.1 If, within sixty (60) days after the issue of the Certificate of Substantial Performance, the Contractor has not corrected all the documented deficiencies, the Owner shall retain sufficient monies, as determined by the Consultant, to cover the cost of completing said deficiencies. These monies shall be held in addition to holdback monies retained in accordance with the provisions of the Contract and subject to the terms of the Construction Remedies Act lien legislation of New Brunswick."

GC 5.10 – FINAL PAYMENT

Page 19, delete clause 5.10.1 in its entirety and replace with the following:

- “5.10.1 When the Contractor considers that the Work is completed, the Contractor shall submit an application for final payment. The Contractor’s application for final payment is considered to be valid when:
- .1 Work has been completed in compliance with the Contract Documents and the Consultant is satisfied that all the requirements of the Contract have been fulfilled by the Contractor.
 - .2 Defects have been corrected and deficiencies have been completed.
 - .3 Equipment and systems have been tested, adjusted and balanced and are fully operational and written reports as outlined in the Contract Documents have been provided to the Consultant.
 - .4 Certificates required by utility companies, manufacturer’s representative and inspectors have been submitted.
 - .5 Spare parts, maintenance materials, warranties and bonds have been provided.
- 5.10.2 If Work is deemed incomplete by the Consultant, complete outstanding items and request re-inspection.
- 5.10.3 If, in the opinion of the Consultant, it is not expedient to correct defective work or work is not performed in accordance with the requirements of the Contract, the Owner may deduct from the Contract Price the difference in value between work performed and that called for by the Contract Documents, the amount of which shall be determined by the Consultant.”

Page 19, renumber existing clauses 5.10.2, 5.10.3 and 5.10.4 to 5.10.4, 5.10.5, and 5.10.6 respectively. In renumbered clause 5.10.6, change “5 working days” to read “20 calendar days”.

PART 6 CHANGES

GC 6.2 – CHANGE ORDER

Page 20, add new clause 6.2.4 and 6.2.5 as follows:

- “6.2.4 If the method of adjustment of the Contract Price presented by the Contractor is a lump sum or a unit price quotation as indicated in 6.2.2.2, the mark-up on changes shall be as follow:
- .1 Direct basic wages paid for labour including machine operators and foremen (excluding on Site or office supervisory staff) required to perform the Work in accordance with directions and devoting their exclusive attention to this work.
 - .2 Twenty five percent (25%) of item (6.2.4.1) which shall be considered to cover the cost of small tools, on Site or office supervisory staff, WorkSafe NB, holiday pay, payments, Employment Insurance, insurance premiums, and all other payroll overheads.
 - .3 The necessary cost to the Contractor of the material required for the Works as furnished by the Contractor and delivered to the Site.

- .4 Fifteen percent (15%) of the sum of items (6.2.4.1), (6.2.4.2), and (6.2.4.3), which shall be considered as covering the Contractor's overhead expense, profit, head office and Site office overhead, including salaries of time-keeping, clerical, accounting, warehousing and other administrative personnel and all costs associated therewith.
- .5 Rental of Construction Equipment: The equipment rental rates shall be in accordance with equipment rental rates indicated in the latest edition of Roadbuilders' Equipment Rates. In the absence of Roadbuilders' Equipment Rates, New Brunswick Department of Transportation and Infrastructure (NBDTI) rates shall govern.

6.2.5 The price for extra, additional or omitted work shall be based on the sub-contractor's approved invoice plus 10 percent (10%) of the amount of this invoice, which shall be considered as covering all the Contractor's expenses and profit. A subcontractor who enters into an agreement with the Contractor to furnish labour and equipment and/or to perform work, which normally would be performed by the Contractor, shall not be considered as an approved sub-contractor for the purpose of valuation of variations, and the Contractor shall not be entitled to 10 percent (10%) of the other Contractor's invoice."

GC 6.3 – CHANGE DIRECTIVE

Page 21, in clause 6.3.8, add the following sentence at the end of the paragraph:

"If such determination by the Consultant is not accepted by either party, then the decision shall be made in accordance with Part 8 of the General Conditions – DISPUTE RESOLUTION."

GC 6.5 – DELAYS

Page 21, clause 6.5.2, delete last sentence of paragraph and replace with the following sentence:

"The Contractor will not be reimbursed by the Owner for costs incurred by the Contractor as a result of such delay."

PART 7 DEFAULT NOTICE

"GC 7.3 - SUSPENSION OF WORK

Page 24, add new clause GC 7.3 as follows:

- 7.3.1 The Contractor shall obtain the written permission of the Consultant before making any interruptions to the agreed program of works.
- 7.3.2 The Consultant may, by an order in writing, at any time stop or suspend any part of the Work, or direct any portion to be commenced or completed in priority to any other part or portion, or may cancel the order to proceed with the Work, or with any part thereof, and the Contractor shall not thereby be entitled to any additional payment, or claim for loss of profit or anticipated profit, or for damages or otherwise howsoever, by reason of such order. When, in the opinion of the Consultant, for any reason, it is deemed advisable to discontinue the Work, or any part thereof, the Contractor must, on written notice from the Consultant, forthwith place the Work in

proper and satisfactory condition for the accommodation of the public and for its effectual protection against damage from rain, snow, frost, ice, or other causes and must so maintain it."

PART 9 PROTECTION OF PERSONS AND PROPERTY

GC 9.5 – CONSTRUCTION SAFETY

Page 27, after GC 9.5.1, add the following:

"9.5.2 The Contractor is referred to Regulation 82-13 under the Workers' Compensation Act (O.C. 82-56) of the Province of New Brunswick.

Registration with Worksafe NB, shall be continuous during this contract. Should registration be scheduled to expire during the contract period, the Contractor shall submit a copy of the registration renewal one (1) month prior to the expiration of the current certificate.

Submit with the application for release of holdback monies, a Certificate of Clearance from the Worksafe NB in the Province of New Brunswick."

"9.5.3 W.H.M.I.S. – Workplace Hazardous Materials Information Systems & Hazardous Products Act – Government of Canada Regulations under the Hazardous Products Act and the regulation regarding the handling and storage of hazardous materials must be complied with (reference: Regulation 88-221). These regulations stipulate that employees must be trained in the proper handling of workplace hazardous material."

PART 10 GOVERNING REGULATIONS

GC 10.1 – TAXES AND DUTIES

Page 28, after clause 10.1.2, add the following:

"10.1.3 The Contractor shall indicate on each application for payment, as a separate amount, the appropriate Harmonized Sales Tax that the Owner is legally obliged to pay. This amount will be paid to the Contractor in addition to the amount certified for payment under the Contract."

GC 10.2 – LAWS, NOTICES, PERMITS AND FEES

Page 28, in paragraph 10.2.3, add new sentences to end of paragraph as follows:

"Various jurisdictions have requirements for posting non-refundable fees before excavations are carried out within public rights-of-way. The Contractor is responsible for the determination of the requirement for each specific project and for any required deposits."

PART 11 INSURANCE AND CONTRACT SECURITY

GC 11.1 - INSURANCE

Page 29, Item GC 11.1.1.1 - Insurance – change fourth sentence in paragraph to read as follows:

“All liability coverage shall be maintained for completed operations hazards from the date of Substantial Performance of the Work, as set out in the certificate of Substantial Performance of the Work, on an ongoing basis for a period of 1 year following Substantial Performance of the Work.”

GC 11.2 - CONTRACT SECURITY

Page 31, delete GC 11.2.1 in its entirety and replace with the following:

“11.2.1 The Contractor shall, prior to commencement of the Work, provide to the Owner a Performance Bond and a Labour and Materials Bond, each in the amount of 50% of the Total Amount Payable or an Irrevocable Letter of Credit in the amount of 20% of the Total Amount Payable. The Irrevocable Letter of Credit shall be issued by a certified financial institution for a period of no less than twelve (12) months after the issue of Substantial Performance Certificate. Include the cost of providing the Irrevocable Letter of Credit in Contract Price. Should it become apparent that the final cost of the project will exceed the Total Amount Payable by more than 10%, the Contractor shall arrange to have his bonds or Irrevocable Letter of Credit reissued, based on the projected final cost.”

Page 31, add new clause GC 11.2.3 as follows:

“11.2.3 The Contract Security will be retained until the expiration of the Warranty Period.”

PART 12 INDEMNIFICATION – WAIVER – WARRANTY

GC 12.3 – WARRANTY

Page 22, add new clause GC 12.3.7 as follows:

“12.3.7 All work of repair or replacement carried out during the Warranty Period shall be maintained for a period of one (1) year from the date of the Consultant’s acceptance of the Work of repair or replacement notwithstanding that the Warranty Period expires before the expiration of the said year. This clause shall not apply to normal operation maintenance, which shall be carried out by the Owner.”

END OF SECTION

1 GENERAL

1.1 SUMMARY OF WORK

- .1 Work of this Contract generally includes, but is not necessarily limited to, the [Description of the Work].

1.2 DATUM

- .1 All elevations shown on the Drawings are referred to the Canadian Geodetic Datum (CGVD28). Verify all elevations prior to commencing Work.

1.3 REFERENCES AND CODES

- .1 Perform Work in accordance with the latest adopted edition of the National Building Code (NBC), National Fire Code (NFC) 2010, National Plumbing Code (NPC) and/or any other code of provincial or local application.
- .2 Reference has been made to certain Domestic, National and International Standards throughout the various sections of the Specification contained herein. These Standards will be considered an integral part hereof and shall be read in conjunction with the Drawings and Specifications as if they were reproduced herein. Be completely familiar with their contents and requirements.

1.4 SETTING OUT THE WORK

- .1 No construction of Work shall commence until all required drawings have been submitted and reviewed and accepted by the Owner or Consultant.
- .2 Before the Work of the Contractor starts, the Owner or Consultant will only provide the data for sufficient reference points once to identify the Site on the ground. Contractor shall have reference points established on-Site by a licensed surveyor at own cost. Contractor shall maintain these, and/or re-establish points as required during the Contract period.
- .3 Before commencing any Work, agree to all levels of the original ground surface with the Owner or Consultant.

1.5 COST BREAKDOWN

- .1 Before submitting first progress claim, submit detailed breakdown of price as directed by Owner or Consultant. After approval by Owner or Consultant, cost breakdown will be used as the basis for progress payments.

1.6 WORK BY OTHERS

- .1 Co-operate with other Contractors in carrying out their respective Works and carry out instructions from Owner or Consultant.
- .2 If any part of Work under this Contract depends upon Work of another contractor, for its proper execution or result, report promptly to Owner or Consultant, in writing, any defects which may interfere with proper execution of Work.
- .3 Verify Work by other contractors which will be executed before start of the Work of this Contract, and which is specifically excluded from this Contract.

1.7 SUBMITTALS

- .1 Construction schedule:
 - .1 As soon as it is practicable, in any case not later than ten (10) Working days after the start of the Contract, submit to the Owner or Consultant for review and approval, a program and construction schedule showing the order of procedure, significant Contract dates, and method in which the Contractor proposes to carry out and complete the Work within time period required by Contract Documents.
 - .2 Provide information regarding the execution of the Work and of the equipment for Temporary Works, and labour which the Contractor intends to supply, use or construct as the case may be.
 - .3 The construction schedule shall be standard "bar" type, showing commencement, duration and completion of activities of all trades and suppliers involved.
 - .4 The construction schedule is subject to review by Owner or Consultant and shall be revised and resubmitted as directed.
 - .5 The construction schedule shall identify activities and Work of other contractors, or the Owner, required for full execution and coordination of the Work.
 - .6 Update schedules periodically and submit updated construction schedule two (2) days prior to routine construction meetings held with Owner or Consultant. Where Work has fallen behind the original schedule times, indicate methods proposed to correct such loss of time, to maintain the stated Completion Time.
- .2 Shop Drawings:
 - .1 The Owner or Consultant will provide a shop drawing list with IDs. Shop drawings are to have an ID written on them.
 - .2 Submit shop detail or Working drawings and manufacturer's data for all items requiring fabrication, on or off the Site, and for all proprietary equipment to the Owner or Consultant for review before any such items or equipment are incorporated into the Works. This review of Shop Drawings by Owner or Consultant is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean that Owner or Consultant approves the detailed design inherent in the Shop Drawings. Responsibility for the design will remain with the Contractor submitting them, and such review shall not relieve the Contractor of responsibility for errors or omissions in Shop Drawings or of responsibility for meeting all requirements of the Construction and Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job Site, for information that pertains solely to

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fabrication processes or to techniques of construction and installation, and for co-ordination of the Work of all sub-trades.

- .3 Submit one (1) electronic file in pdf file format of all relevant shop drawings to the Owner or Consultant. Upon approval of the Owner or Consultant, submit four (4) hard copies of shop drawings. For electronic submittals only submit one complete copy file, multiple PDF files for one item will not be accepted. An FTP Site can be set up for shop drawing submittals if required.
- .4 Submit shop drawings with such promptness as not to cause delay in this Work, or of the Works of any Sub-contractors.
- .5 The information submitted shall clearly show the dimensions, materials or construction, performance, finish, service and installation requirements and other characteristics in sufficient detail to permit the Owner or Consultant to evaluate the suitability of the articles for the use intended.
- .6 Make corrections required by the Owner or Consultant as noted, and resubmit corrected copies to the Owner or Consultant for review before fabrication.
- .7 If electronic files are received by the Owner or Consultant, they will markup and return one (1) electronic file. If paper copies are received the Owner or Consultant will retain three (3) copies of each drawing or document submitted and will mark comments on up to three (3) more copies for the Contractor's purposes. The Owner or Consultant may choose to convert the paper copies into PDF and return one (1) electronic copy to the Contractor.
- .8 The Owner or Consultant will not review shop drawings and other material involving a large amount of Work in those instances where it is evident that the Contractor has not used all the information contained in, or where such details are obviously not consistent with the Contract Documents.
- .3 Operation and Maintenance Manuals:
 - .1 Provide to the Owner certificates from the manufacturers of the equipment incorporated into the Works (or from their accredited agents) stating that their qualified representatives have tested the equipment which they supplied and have found everything to be satisfactorily installed and in proper Working order.
 - .2 Provide four (4) hard copy sets and one (1) electronic file in pdf file format of operations, installation and maintenance information for each system. Provide two (2) of the sets to the Owner or Consultant not less than four (4) weeks prior to commissioning. Obtain additional copies of installation and start-up instructions as required at no additional expense to the Contract.
 - .3 All such material must be new material. Photocopies of literature provided by manufacturers will not be accepted. Drawings to be unfolded and page size papers to be unperforated at the binding edge if possible.
 - .4 The Certificate of Substantial Performance will not be issued until this material has been completely provided.
- .4 Commissioning Plan:
 - .1

1.8 MEETINGS

- .1 Start-up Meeting:
 - .1 Within five (5) Working days after notification of intent to award a Contract, and before any Work commences onsite, request a meeting of parties to discuss and resolve administrative procedures and responsibilities.
 - .2 Owner, Consultant, Contractor, and major subcontractors are to be the parties in attendance.
 - .3 Establish time and location of meeting.
 - .4 Bring to the meeting the Contract for execution.
 - .5 Provide the agenda and record of minutes of the meeting. Agenda to include the following:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Establish project coordination meeting frequency and required attendees.
 - .3 Schedule of Work, showing key milestones such as equipment/material delivery dates and substantial completion date.
 - .4 Schedule of submission of shop drawings, samples and finish samples.
 - .5 Requirements for temporary facilities, Site sign, office, storage sheds, utilities, fences and laydown area.
 - .6 Security requirements will be reviewed.
 - .7 Discuss process for payment clauses, changes and other administrative requirements.
 - .8 Owner-furnished products.
 - .9 Insurance certificates and permits.
 - .10 Hours of Work and Site supervision requirements.
- .2 Progress Meetings:
 - .1 During course of Work and [#] weeks prior to project completion, schedule progress meetings monthly.
 - .2 Contractor, Owner, Consultant and Subcontractors involved in Work, are to be in attendance.
 - .3 Notify parties minimum [#] days prior to meetings.
 - .4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within [#] days after meeting.
 - .5 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.

- .4 Problems which impede construction schedule.
- .5 Review of off-Site fabrication delivery schedules.
- .6 Corrective measures and procedures to regain projected schedule.
- .7 Revision to construction schedule.
- .8 Progress schedule, during succeeding Work period.
- .9 Review submittal schedules: expedite as required.
- .10 Maintenance of quality standards.
- .11 Review proposed changes for effect on construction schedule and on completion date.
- .12 Other business.

1.9 EXISTING SERVICES AND UTILITIES

- .1 Where Work involves breaking into or connecting to existing services, carry out Work at times directed by governing authorities, with minimum of disturbance to pedestrian and vehicular traffic.
- .2 Before commencing Work, establish location and extent of service lines in area of Work and notify Owner or Consultant of findings.
- .3 Submit schedule to and obtain approval from Owner or Consultant for any shut-down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties.
- .4 Schedule Work to minimize interruptions to existing services and maintain existing services during construction.
- .5 Notify Owner or Consultant 48hours minimum in advance of any interruption in service. Owner to be onsite during connection to Owner infrastructure.
- .6 Where unknown services are encountered, immediately advise Owner or Consultant and confirm findings in writing.
- .7 Known subsurface services and utilities may be indicated on the drawings or otherwise identified. Prior to carrying out any subsurface excavation, contact applicable utilities and Owner or Consultant to precisely locate buried structures or utilities on the ground. All costs to locate and identify such buried services shall be deemed to be included in the Contract Price. Carefully excavate or hydrovac to locate such services and utilities.
- .8 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
- .9 Do not operate hydrants, valves, electrical, telephone or their controls on existing utility systems. Should it become necessary to operate such a control or make connection to such a system, do so only on the direct instruction of a representative of the utility or Owner concerned and shall carry out such Work in accordance with the specific instructions of the said representative. When the construction Work passes under and/or in close proximity to underground utility cables or utility poles, include in the unit price the cost for having a

representative of the utility company present during the Work.

- .10 When instructed by the Owner or Consultant, provide a letter from the owners of utilities, stating that all services damaged during construction of the Works have been repaired.
- .11 Arrange with appropriate authority for relocation of buried services that interfere with execution of Work: pay costs of relocating services.
- .12 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.
- .13 Record location of maintained, re-routed and abandoned underground lines.
- .14 Remove obsolete buried services within 2 m of foundations: cap cut-offs.

1.10 EXISTING CONDITIONS

- .1 Examine soil report if available.
- .2 Conduct, with Owner or Consultant, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey benchmarks and monuments which may be affected by Work.
- .3 Prior to the commencement of the Work, the Owner or Consultant may arrange for photographs to be taken of the Site of the Work and those properties adjacent to the Site of the Work. Be present or have an authorized representative present during the taking of photographs to make any comments on the conditions of the Site. These photographs, together with a written report on the condition of existing roads, trees, etc., as determined by mutual agreement between the Contractor and Owner or Consultant, will be retained by the Owner or Consultant as a record of Site conditions prior to commencement of Work.
- .4 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Owner or Consultant.
- .5 Where required for excavation, cut roots or branches as directed by Owner or Consultant.
- .6 Protection of existing road surfaces:
 - .1 Existing road surfaces are to be protected during all construction activities to ensure damage is kept to an absolute minimum and of a minor nature.
 - .2 Any areas receiving gouges, scratches, chips, scraping, indentations or other damage, to an extent that, in the opinion of the Owner, detracts from their appearance or would cause a premature deterioration or failure of the asphalt or base, will require a general seal overlay of the entire block. The Contractor, at no cost Owner, shall provide this seal.
 - .3 At the discretion of the Owner, major surface damage may require removal and replacement of the asphalt surface or base.

1.11 HISTORICAL OR ARCHAEOLOGICAL ITEMS

- .1 If at any time during construction, objects of potential historical or archaeological value are uncovered by the Contractor or contractor, all Work shall cease and shall not continue until the Site has been reviewed by the appropriate representatives and the Owner has approved resumption of the Work.

1.12 STREET CLEANING

- .1 The Contractor and their contractors shall take all necessary precautions to prevent the depositing of mud or debris on public or private roadways adjacent to the Work Site, and roadways accessing off-site areas used for disposal of excess materials or retrieval of borrow material.
- .2 Prompt clean-up of such debris is required, otherwise the Owner will direct necessary clean-up with all costs borne by the Contractor.
- .3 If, because of construction operations, travelled roads become dusty, muddy, rough, and in poor condition for the use by the public, the Contractor shall rectify the problem and keep the inconvenience or nuisance to a minimum. If, in the opinion of the Owner, the time over which the nuisance factor continues is excessive, arrangements shall be made for others to restore the road to a satisfactory condition, the cost for which Work shall be borne by the Contractor.

1.13 BLASTING

- .1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by Owner or Consultant.

1.14 TRAFFIC SIGNAGE AND CONTROL

- .1 The Work shall be done in a manner that creates the least interference with traffic, consistent with safe performance of the Work. The Contractor shall install and maintain such barriers, signs, lights and signallers as may be necessary for the safety and convenience of the public and Work area. Stop signs shall be erected at all intersections within the Work Site and at access points from municipal streets.
- .2 Supply and install signage to meet minimum TAC requirements including signs stating "Fines are Doubled in Construction Zone" and "Reduce Speed". All signage must meet minimum retroreflectivity as established by TAC.
- .3 All barricades and signage on municipal streets, at access points to the Work Site, and within the Work Site shall be in conformance with NBDTI signage requirements and the Manual of Uniform Traffic Control Devices for Canada for temporary conditions.
- .4 The Contractor or their contractor shall supply, in addition to required signage and barricades, the necessary number of flag persons at all times when:
 - .1 There is to be less than two (2) lanes of traffic.
 - .2 Closure of a street or portion of a street to traffic.
 - .3 Upon request by the Kennebecasis Regional Police Force.
 - .4 Heavy equipment is operating on or adjacent to a roadway open to public travel.
- .5 The flag persons shall be supplied with standard six hundred (600) millimetre "Stop/Slow" paddles and reflective clothing. The Contractor and their contractors shall be responsible for ensuring the flag persons have successfully completed a Traffic Signallers course and shall be responsible for the actions of all flag persons. Flagging shall be carried in accordance with the Work Area Traffic Control Manual (Transportation).

1.15 TRUCK ROUTES

- .1 All heavy equipment, including trucks hauling borrowed or excavated material or additional heavy equipment shall proceed to and from the Work Site by taking the shortest route to and from the nearest Town truck route and then the shortest route to and from the origins and destination of the required trip.
- .2 The Truck Routes are those as listed in Schedule G of the Town of Quispamsis Traffic By-law.
- .3 The Owner shall be informed of any streets being used to access the subdivision Work Site that are not part of the designated Town truck routes to ensure that proper weigh restrictions are adhered to and damage to the existing streets is minimum.
- .4 The Contractor and their contractors shall adhere to Spring Weight Restrictions that shall be enforced by the Owner in accordance with such sections in the Town of Quispamsis Traffic By-law. The Owner reserves the right to periodically and randomly spot check truck weights by use of the New Brunswick Department of Public Safety Commercial Vehicle Enforcement.
- .5 Trucks shall be clean of excess material and debris prior to hauling material on designated Truck Routes or alternated routes to and from the Work Site. The Owner may enforce covering of materials during the transporting of the materials to and from the Work Site.

1.16 SITE CONTROL AND ACCESS

- .1 Work of this Contract is located in an area where normal Working hours are:
 - .1 7:00 AM to 9:00 PM, Monday to Saturday inclusive.
 - .2 Work performed outside these hours require approval by the Owner or Consultant. Request approval in writing at least 48 hours in advance.
- .2 From time to time, pre-planned disruptions to process operations for periods of # hours will be permitted to accommodate tie-ins and other Work. A shut down of eight hours or more would require significant coordination with the Owner or Consultant.
- .3 If an office on Site is required, provide at own cost. No interior office space will be given to the Contractor. Contractor is responsible for communication needs, i.e., phone, internet, etc.
- .4 Make adequate provision, at own expense, for accommodation and protection of traffic and pedestrians and the owners and occupiers of adjacent premises in the form of bridgeways, guards and fences. Should the Contractor have to divert traffic over any path which is not a travelled vehicular public way, protect same from damage, and repair damage at no additional cost to the Contract.
- .5 During the Contract Period, maintain access to the Site by the Works as required. Such access shall be by means of existing gravel or unmade roads, or other existing tracks wherever these are public rights-of-way and private rights-of-way. In the absence of suitable or convenient existing public access, arrange for the use of private rights-of-way or other means of access in accordance with the Contract wherever required.
- .6 Maintain access to and within the Site to permit the execution of the Work as well as access for other persons and traffic that are entitled to such access.

- .7 Supply and install temporary granular materials or rock as necessary to maintain Site access and facilitate construction. Finished gravels or geotextile damaged or contaminated during the execution of the Work will not be accepted.
- .8 Wherever access over a public right-of-way must necessarily be denied because of the Work of the Contract, obtain, provide and maintain suitable detours and provide sign posts; all with the approval and to the requirements of the authorities having jurisdiction therein.
- .9 Contractor vehicles to be clearly marked with door signs and roof top safety lights.

1.17 TESTING AND SAMPLING

- .1 Pay for the services of testing laboratory including:
 - .1 Inspection and testing required by laws, ordinances, rules and regulations.
 - .2 Tests specified to be performed by Contractor.
 - .3 Inspection and testing performed exclusively for convenience of Contractor.
 - .4 Testing, adjustment and balancing of process, mechanical and electrical equipment systems.
 - .5 Testing to ensure a safe Work environment for employees or subcontractors employed by the Contractor.
- .2 Provide such assistance, labour and materials as are normally required for examining, measuring and testing the quality, weight or quantity and pay all costs of any material used, and supply samples of materials before incorporation in the Works for testing as may be selected and as specified.
- .3 Perform or arrange for the performance of all tests on all equipment in complete accordance with the relevant clauses of these Specifications and in the presence of the Owner or Consultant.
- .4 The cost of providing assistance, samples, etc., for testing and arranging tests shall be deemed to be covered by and included in the Contract Price unless noted otherwise, elsewhere in these Specifications.
- .5 The Contractor shall have no claim against the Owner or the Consultant in respect of any financial loss which may be suffered from the rejection of any materials or equipment due to their failure to meet specified test requirements, and the Contractor shall also bear the cost of remedying any defects such that the material or equipment will meet the specified tests, or failing this, of removing the material or equipment from the Site. The decision to repair or replace materials and equipment which have failed to meet test requirements will be made by the Owner or Consultant.
- .6 After award of the Contract, submit samples of the sizes and quantities as required by the Specifications, to the Owner or Consultant for review. Do not deliver materials to the Site for use until samples are approved in writing by the Owner or Consultant. Provide such samples without charge.
- .7 During the continuance of the Contract, provide necessary labour and tools to assist the Owner or Consultant in measuring, checking, testing and examining the Work and for the setting out and measurement of the Works, the cost of all such being deemed to be covered by and included in the Contract Price.

1.18 QUALITY CONTROL

.1 Materials and Workmanship:

- .1 All equipment, materials and Workmanship shall be the best of the respective kinds described in the Contract and in accordance with the Owner or Consultant instructions and shall be subjected from time to time to such standard tests as the Owner or Consultant may direct at the place of manufacture or fabrication or on the Site.
- .2 Before ordering materials for incorporation into the Works inform the Owner or Consultant of the source of the materials, except as regards trifling and unimportant matters, no order for such materials shall be given except with the authorization of the Owner or Consultant. Notwithstanding the fact that such authorization may have been given, the Owner or Consultant may forbid the use of any such materials, if upon delivery, they are found to be defective or unsuitable for incorporation in the Works. The Contractor shall keep the Owner or Consultant fully advised of the orders and delivery dates of materials.
- .3 All material and equipment required to be incorporated into the Work shall be new and unused. Any material found during the progress of the Work to have cracks, flaws, or other defects will be rejected by the Owner or Consultant.
- .4 Replace materials and equipment found defective in manufacturer or damaged in handling after delivery by the manufacturer. This shall include the furnishing of all materials and labour required for the replacement of installed material and equipment discovered defective prior to the final acceptance of the Work.

.2 Qualification:

- .1 Provide proof of qualifications when requested by Owner or Consultant.

1.19 NOISE AND VIBRATION

- .1 Operate Construction Equipment such that there is a minimum amount of noise and vibration. Should excessive noise and vibration be caused, at own expense, rectify the same to the approval of the Owner or Consultant.

1.20 BARRICADES

- .1 Protect persons from injury and avoid property damage by providing barricades, construction signs, torches, flushers, and guards as required during the progress of the construction Work. All material piles, equipment, plant or Construction Equipment which may serve as obstructions shall be enclosed by fences or barricades and shall be protected by proper lights when the visibility is poor.

1.21 DAMAGE AND INJURY

- .1 Bear costs of repairing damage to the Site, property of others and injuries of persons resulting from the Contractor's operation under the Contract.
- .2 Immediately inform the Owner or Consultant of damage or injury to persons, property, services or materials.

- .3 Relocate, under the direction of a qualified provincial land surveyor, survey markers, monuments, and pins moved during the construction of the Works. Costs to be borne by Contractor unless accommodated for in design.

1.22 TEMPORARY SERVICES

- .1 Provide water, lighting, and power for construction. Connect to the service with a back flow preventer.
- .2 Arrange and pay for temporary heat used during construction and during equipment storage, including cost of installation, fuel, operation, maintenance and removal of equipment.
- .3 Maintain temperatures of minimum 10°C and to the extent necessary to prevent condensation-forming conditions in areas where construction is in progress and in areas where materials and equipment are stored, unless indicated otherwise.
- .4 Ventilate heated areas and keep building free of exhaust or combustion gases.
- .5 Provide and maintain, so long as any Workers are employed on the Works, adequate sanitary conveniences for their use. Provide, maintain and remove sanitary conveniences in accordance with the requirements of all pertinent health regulations and to the approval of the Owner or Consultant.

1.23 WEATHER CONDITIONS

- .1 Do not perform Work when the weather is unsuitable. Do not place concrete, paving, or paint during freezing weather or upon frozen material unless approved in writing by the Owner or Consultant. When Work is performed during freezing weather, provide necessary means for heating and all materials required in the Work shall be heated. Do not use frozen materials for backfilling and embankment. If there is delay or interruption in the Work due to weather conditions, the necessary precautions shall be taken to bond new Work to old.
 - .1 Asphalt and concrete work not to be placed when either the ground is it to be placed on or air temperature is below 6°C.
 - .2 Concrete not to be placed on running nor pooling water.
 - .3 Asphalt not to be placed on pooling water.
 - .4 Seal asphalt to be placed in dry weather only.

1.24 DELIVERY, STORAGE AND HANDLING

- .1 All materials furnished by or to the Contractor shall be delivered and distributed at the Site by the Contractor and shall be loaded and unloaded so as to avoid shock or damage or dropping. If, however, any material is damaged, the repair or replacement shall be made by the Contractor in a manner approved by the Owner or Consultant, at no additional cost to the Contract.
- .2 Adequately store materials and equipment intended for the Work, until it has been incorporated in the completed project. Store materials and equipment in accordance with the manufacturer's recommendations. Keep interior of pipe, fittings, and other accessories

free from dirt and foreign matter at all times.

- .3 Comply with hauling and disposal regulations of authority having jurisdiction.

1.25 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

- .1 Keep Work, property, road surfaces, etc. in vicinity of the Site and in areas where Contractor's trucks will travel, in a clean and orderly condition, free from dirt, dust, snow, ice, rubbish, etc. at all times during the progress of the Work.
- .2 Maintain trucks so that no spillage will occur. Before leaving the Site, trim loads and free wheels of accumulations of soil.
- .3 Keep Site free from accumulations of waste material and rubbish to prevent an unsightly or hazardous condition. On the completion of the Works clear away and remove from the Site all Construction Equipment, surplus materials, rubbish and temporary Works of every kind and leave the whole of the Site and Works clean in a condition that meets the approval of the Owner or Consultant.
- .4 Do not dispose of volatile fluid wastes (such as mineral spirits, oil, or paint thinner) in storm or sanitary sewer systems or into streams or waterways. Owner to identify material that can be salvaged, such as pipe, and Contractor to deliver salvageable materials to Town of Quispamsis Works Department address.
- .5 Dispose of debris and waste materials in accordance with the latest regulations respecting Solid Waste Resource Management issued by New Brunswick Department of Environment and Local Government, at no additional cost to the Contract.
- .6 Dispose of all construction and demolition waste at an approved C&D waste disposal Site.
- .7 Where possible, divert construction and demolition waste to the appropriate recycling facilities. Minimize waste generated by the Work.
- .8 Store volatile waste in covered metal containers, and remove from premises at end of each Working day.
- .9 Burying rubbish and waste materials on Site is not permitted unless approved in writing by Owner or Consultant.
- .10 Excess excavated material:
 - .1 Unless a disposal Site is designated, all excess materials found upon or excavated from the Work Site shall become the property of the Contractor and shall be disposed of in accordance with all Federal, Provincial and Municipal regulations, including the acquisition of permits and disposal approvals. The excess material shall be considered in the custody and the sole responsibility of Contractor and their contractor until disposal at the designated Site, including hauling of the material.
 - .2 When sufficient space is not available to allow placing of excavated material within the boundary of Work Site, such excavated material shall be hauled and stockpiled at an off-Site location arranged for by the Contractor. When all excavation is complete, the Contractor or their contractor shall retrieve as much acceptable material as required from the disposal Site to properly refill all excavations or trenches or general backfilling purposes.
 - .3 Disposal of excess material, whether temporary or permanent, on any Municipal property or right-of-way without written approval is strictly prohibited, and the

Contractor shall be responsible for the removal and clean-up of such material immediately at no cost to the Owner.

1.26 APPROVED EQUIVALENTS

- .1 Where any particular brand of manufactured article is described or specified, it is to be regarded as a standard, but another brand equally as good may be accepted, at the discretion of the Owner or Consultant. No change in the Specification will be made prior to the acceptance of the tenders. If the Contractor wishes to make a substitution after the Contract has been awarded, make application, in writing, otherwise the Contractor will be held to the terms of the Specifications. No extra cost will be allowed for approved equivalents.
- .2 When the Owner is prepared to permit the use of a brand of manufactured article as an alternative to any specified brand of manufactured article even though such alternative may not be equivalent to that specified, it may be used at the discretion of the Owner or Consultant but only after price adjustments have been negotiated and approved by the Owner or Consultant.
- .3 If the alternative requires modifications, adjustments or additions to the specified Works, submit to the Owner or Consultant, drawings and specifications for these modifications, adjustments or additions in the same detail as presented in the Contract. Approval in principle by the Owner or Consultant of these modifications, adjustments or additions in no way relieves the Contractor of obligations or liabilities under the Contract to provide for finished piece of Work complete and operational in all essentials.
- .4 No change or substitution can be made without the written consent of the Owner or Consultant.
- .5 The Owner or Consultant will record the time required to evaluate equivalents and alternates proposed by the Contractor including making changes to the Contract Documents occasioned thereby. Whether or not the Owner or Consultant accepts a proposed substitute, reimburse the Owner for the charges of the Consultant for evaluating any proposed substitute.

1.27 DEMONSTRATION AND TRAINING

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Owner.
- .2 Owner will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.
- .3 When specified in individual sections, require manufacturer to provide authorized representative to demonstrate operation of equipment and systems, instruct Owner, and provide written report that demonstration and instructions have been completed.
- .4 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.
- .5 Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, and maintenance of each item of equipment at agreed upon times.
- .6 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.

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- .7 Review contents of manual in detail to explain all aspects of operation and maintenance.
- .8 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.

1.28 GUARANTEE

- .1 The Contract requires an operational combination of several components comprising the Works which are customarily guaranteed by their suppliers. Under this Contract, however, the Contractor shall provide a guarantee for the Works for a period of one (1) year following the date of Substantial Performance. Owner-supplied equipment and equipment moved/reinstalled from existing locations shall not be included in the operations guarantee. The terms of the Guarantee shall be as follows:
 - .2 Where failure or incipient failure of the material is apparent, the Contractor shall actively commence repair or other remedy not more than twenty-four (24) hours after receiving due notice of trouble.
 - .3 If the Contractor, on being notified, does not for any reason commence repairs within twenty-four (24) hours, the Owner shall have the right to have repairs made by others as necessary to restore or continue service. The cost of such repairs by others shall be borne by the Contractor. The Owner shall at all times inform or attempt to inform the Contractor before hiring others to affect any repairs. It shall, at all times, be the Contractor's right to be informed as soon as possible of difficulties and proposed remedial action by others, to make or where practical to complete such repairs at any other time of the guarantee period in preference to others.
 - .4 The employment of some other person or persons for reasons set out shall in no way affect the Contractor's obligation or liability hereunder or relieve the Contractor of the performance and fulfilment of any or all covenants, undertakings, obligations, or duties under the Contract.
 - .5 After the acceptance by the Owner or Consultant and during the guarantee period, the burden of maintenance shall fall upon the Owner. In the event of damage, failure or incipient failure of any part or parts directly attributable to inadequate or improper maintenance, the Contractor shall be responsible for remedial action but the cost of all such repairs will be reimbursed by the Owner.
 - .6 If the Contractor arranges that the manufacturer of some component, or some other party approved by the Owner or Consultant, provide the guarantee as his agent under the Contract, then due notice to the Agent will be taken as due notice to the Contractor. This will be a matter for Contractor's convenience only, and shall in no way affect the Contractor's obligations and liabilities hereunder or relieve the Contractor from the performance and fulfilment of any or all of his covenants, undertakings, or duties under this Contract.

1.29 PROJECT CLOSEOUT REQUIREMENTS

- .1 Collect reviewed submittals and assemble documents executed by Subcontractors, suppliers, and manufacturers.
- .2 Submit material prior to final Application for Payment.

- .3 Provide warranties fully executed and notarized.
- .4 Execute transition of Performance, and Labour and Materials Payment Bond to warranty period requirements.
- .5 Submit a final statement of accounting giving total adjusted Contract Price, previous payments, and monies remaining due.
- .6 Owner or Consultant will issue a final Change Order reflecting approved adjustments to Contract Price not previously made.
- .7 Record Drawings:
 - .1 After award of Contract, Owner or Consultant will provide two (2) sets of drawings for purpose of maintaining record drawings. Accurately and neatly record deviations from Contract Documents caused by Site conditions and changes ordered by Owner or Consultant.
 - .2 Identify drawings as "Project Record Copy". Maintain in new condition and make available for inspection on Site by Owner or Consultant.
 - .3 On completion of Work and prior to final inspection, submit record documents to Owner or Consultant.
 - .4 Contractor shall maintain as-built record drawings on Site as the Work progresses for all aspects of the Work.
 - .5 Owner will mark on "Project Record Copy" modifications made for Work under the Owner's Scope of Work.

1.30 CLEANING

- .1 Leave Work Site clean at end of each day.
- .2 Work Site clean-up:
 - .1 It is the Contractor's sole responsibility to be knowledgeable of and comply with all Federal, Provincial and Municipal regulations regarding the removal and disposal of all rubbish, trash and excess material from the Work Site. Rubbish, trash and unsalvageable excess material shall be disposed of in the approved Fundy Solid Waste Commission Landfill at Crane Mountain.
 - .2 The Owner reserves the right to clean-up the Work Site at cost should the Contractor or their contractors fail to complete clean-up operations within an acceptable timeframe as deemed by the Owner.
 - .3 Without limiting any foregoing regulations, the Owner does not permit:
 - .1 The disposal of waste materials and rubbish by burning, burial on-Site or on any publicly vested property, dumping into watercourses or storm drainage systems.
 - .2 The disposal of volatile wastes such as mineral spirits, oil, gas, or paint thinner into storm or sanitary sewer drains.
 - .4 Progress cleaning: clean and leave Work area clean at end of each day.
 - .5 Final cleaning to be approved by Owner. Upon completion of the Work, remove

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surplus materials, rubbish, tools, and equipment.

2 PRODUCTS – NOT USED.

3 EXECUTION – NOT USED.

END OF SECTION

1 GENERAL

1.1 REFERENCE STANDARDS

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations, SOR/86-304.
- .2 Occupational Health and Safety Act, S.N.B, 1983, C 00.2.
- .3 Town of Quispamsis Safety Manual, [date].

1.2 SUBMITTALS

- .1 Submit in accordance with Section 01 00 00 – Project Specific General Requirements.
- .2 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .3 Submit copies of incident and accident reports.
- .4 Submit WHMIS Safety Data Sheets (SDS) in accordance with Section 01 00 00 – Project Specific General Requirements.
- .5 []

1.3 SAFETY ASSESSMENTF

- .1 Perform Site specific safety hazard assessment related to project.

1.4 GENERAL SAFETY

- .1 Observe construction safety measures of Provincial Government, including but not limited to the Occupational Health and Safety Act, WorkSafe NB and Municipal authority provided that in any case of conflict or discrepancy the more stringent requirement shall apply.
- .2 Confirm pollution and environmental control of construction activities are exercised as specified and as required during the Work.

1.5 HAZARDOUS MATERIALS

- .1 Should material resembling hazardous materials other than those identified within the Contract Documents, including, but not limited to, spray or trowel applied asbestos, be encountered in course of work; stop work immediately. Do not proceed until written instructions have been received from Owner or Consultant.
- .2 Where work entails use, storage, or disposal of toxic or hazardous materials, chemicals and or explosives, or otherwise creates a hazard to life, safety, health, or the environment; work shall be in accordance with the Jurisdictional Authority.

- .3 Store volatile waste in closed containers and remove from premises daily.
- .4 WHMIS: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada and Health and Welfare Canada.
- .5 Contractor to have WHMIS 2015 training.

1.6 CONFINED SPACES

- .1 Carry out Work in confined spaces in compliance with the Provincial Occupational Health and Safety Act (OH&S), - Occupational Safety General Regulations, Part 12 - Confined Space Entry.
- .2 Provide approved air monitoring equipment where workers are working in confined spaces and ensure any test equipment to be used is calibrated, in good working order and used by trained persons.
- .3 Develop a confined space entry program specific to the nature of Work performed and in accordance with OH&S Act and Regulations and confirm supervisors and workers are trained in the confined space entry program.
- .4 Confirm that personal protective equipment and emergency rescue equipment appropriate to the nature of the Work being performed is provided and used.
- .5 Provide and maintain training of workers, as required by the Federal and Provincial Legislation.
- .6 Provide Owner or Consultant with a copy of an "Entry Permit" for each entry into the confined space to ensure compliance with Federal and Provincial Legislation.

1.7 FIRE SAFETY

- .1 Comply with and enforce compliance by all personnel all requirements of this specification section, and with all requirements of the latest adopted edition in the province of New Brunswick of the National Building Code of Canada (NBC), National Fire Code of Canada (NFC), including all subsequent revisions, issued by the National Research Council of Canada.
- .2 The Owner or Consultant reserve the right to require dismissal from the Site persons deemed careless or otherwise in violation of the Fire Safety Requirements.
- .3 Comply with all fire safety instructions. Post any applicable safety bulletins or literature in the Site trailer.
- .4 Co-operate with the local Fire Department personnel during Site reviews.
- .5 Confirm all personnel are aware of the location of the nearest fire alarm box and telephone.
- .6 Immediately report all fire incidents as follows:
 - .1 Activate nearest fire alarm box.
 - .2 Telephone 911 Emergency Response.

- .3 Person activating fire alarm box must remain at the main Site entrance to direct Fire Department to scene of fire.
- .4 When reporting a fire by telephone, provide location of fire, name or number of building and verify the location.
- .7 Existing fire protection and alarm systems must not be:
 - .1 Obstructed.
 - .2 Shut off.
 - .3 Left inactive at the end of a working day or shift without notification and written authorization from Owner.
 - .4 In addition to above, notify Owner's Facilities Management at least 48 hours prior if scheduling any unavoidable disruption to Fire Protection and Alarm Systems.
- .8 Do not commence with such work until approval and direction are received from the Owner or Consultant.
- .9 Provide and maintain fire extinguishers, necessary to protect the Work.

1.8 FIRST AID

- .1 During the progress of the Work, provide and maintain at all times and in easily accessible positions on the Works adequate first aid kits equal to those required by WorkSafe NB for the free use as necessary of all persons on Site.

1.9 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Owner or Consultant prior to commencement of Work.

1.10 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on Site, safety of property on Site and for protection of persons adjacent to Site and environment to extent that they may be affected by conduct of Work.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances.

1.11 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on Site in accordance with Acts and Regulations of [Province][Territory] having jurisdiction, and in consultation with Owner or Consultant.

1.12 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Owner or Consultant.
- .2 Provide Owner or Consultant with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Owner or Consultant may stop Work if non-compliance of health and safety regulations is not corrected.

1.13 BLASTING

- .1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by Owner or Consultant.

1.14 POWDER ACTUATED DEVICES

- .1 Use powder actuated devices only after receipt of written permission from Owner or Consultant.

1.15 WORK STOPPAGE

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

2 PRODUCTS – NOT USED.

3 EXECUTION – NOT USED.

END OF SECTION

Town of Quispamsis Standard Specifications for Municipal Services	PROJECT SPECIFIC ENVIRONMENTAL PROCEDURES	Section 01 35 43 Page 1 Month Year
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1 GENERAL

1.1 DEFINITIONS

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 00 00 – Project Specific General Requirements.
- .2 Submit Environmental Protection Plan (EPP) for review [and approval] by Owner or Consultant before delivering materials to Site or commencing construction activities.
- .3 EPP shall include comprehensive overview of known or potential environmental issues to be addressed on Site during construction.
- .4 Address topics at level of detail commensurate with environmental issue and required construction task(s).
- .5 Include in Environmental Protection Plan (EPP):
 - .1 Name(s) of person(s) responsible for ensuring adherence to EPP.
 - .2 Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from Site.
 - .3 Name(s) and qualifications of person(s) responsible for training Site personnel.
 - .4 Descriptions of environmental protection personnel training program.
 - .5 Submit a Site-specific Stormwater Pollution Prevention Plan (SPPP). Include the Site-specific Erosion and Sediment Control Plan (ESCP) identifying the type and location of erosion and sediment control measures to be provided on Site. Include monitoring and reporting requirements to ensure that ESCP control measures are in compliance with erosion and sediment control plan, Federal and Provincial regulations, and Municipal by-laws.
 - .6 Submit drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on Site.

Town of Quispamsis Standard Specifications for Municipal Services	PROJECT SPECIFIC ENVIRONMENTAL PROCEDURES	Section 01 35 43 Page 2 Month Year
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1.3 FIRES

- .1 Fires and burning of rubbish on Site is not permitted.
- .2 Where fires or burning is permitted, prevent staining or smoke damage to structures, materials or vegetation which is to be preserved.
 - .1 Restore, clean and return to new condition stained or damaged work.
- .3 Provide supervision, attendance and fire protection measures as directed.

1.4 DRAINAGE

- .1 Ensure that the ESCP measures are provided and that its recommendations are followed on Site, in accordance with the Site-specific SPPP, at all times during construction.
- .2 Provide temporary drainage and pumping as required to keep excavations on Site free of standing water.
- .3 Obtain Owner or Consultant approval before pumping standing water, which is free of suspended materials, into waterways, sewer or drainage systems.
- .4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with the Site-specific SPPP in compliance with the requirements of authorities having jurisdiction.

1.5 SITE CLEARING AND PLANT PROTECTION

- .1 Protect trees and plants on Site and adjacent properties in accordance with the Canadian Landscape Standard -First Edition [and] [Section # - Section Title].
- .2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of [two (2)] meters minimum. Ensure that control measures used for protection are in compliance with Municipal laws and regulations.
- .3 Protect roots of designated trees to dripline during excavation and Site grading to prevent disturbance or damage.
- .4 Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .5 Minimize stripping of topsoil and vegetation.
- .6 Restrict tree removal to areas where indicated or as directed by the Owner or Consultant. Obtain permits before trees removal in accordance with the requirements of the authorities having jurisdiction.

1.6 WORK ADJACENT TO WATERCOURSES AND WETLANDS

- .1 All work within 30m of a watercourse or wetland to be done in accordance with NBDELG and a WAWA permit to be obtained by Contractor prior to start of Work.
- .2 Construction Equipment to be operated on land only.

- .3 Limit the use of waterway beds for borrow material only after written receipt of approval from Owner or Consultant.
- .4 Avoid indicated spawning beds when constructing temporary crossings of waterways.
- .5 Keep waterways free of excavated fill, waste material and debris.
- .6 Design and construct temporary crossings to minimize waterways erosion.
- .7 Do not skid logs or construction materials across waterways.

1.7 POLLUTION CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this Contract in accordance with Site-specific SPPP.
 - .1 The Contractor and their contractors shall provide for and maintain temporary erosion and pollution control features where indicated on drawings or as directed by Owner or Consultant.
 - .2 The Contractor and their contractors shall provide for and maintain temporary silt fence where indicated on drawings or as directed by Owner or Consultant.
- .2 Control emissions from equipment and plant in accordance with local authorities' emission requirements. Check with local authorities for any environmental compliance requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.
- .4 Supply and install temporary enclosures where indicated or as directed by Owner or Consultant.
- .5 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.8 DUST CONTROL

- .1 Dust control:
 - .1 The Contractor and their contractors shall provide for and maintain dust control at times wherever:
 - .1 The operation of any equipment necessary to execute the Work of subdivision development causes dust that may cause a nuisance to residents of the area.
 - .2 Bare soil conditions are created in performing work included in, or pertaining to this project.
- .2 The Owner's decision as to what provisions are required to maintain adequate dust control shall be final. There shall be no compensation for water, sprinkling equipment, or any other dust control measures taken.
- .3 The application of water shall be the primary means of dust control. The water used shall

be contaminant-free and obtained from a source approved by the Owner and any other regulatory agency. The Contractor shall be responsible for obtaining the necessary approvals for retrieval of water from a source and the method use.

- .4 Water shall be applied by equipment capable of applying the water at a uniform and evenly distributed rate in amounts as required and/or as directed.
- .5 The use of calcium chloride shall be at the end of each working day or the end of the work week, if deemed necessary and at the approval of the Engineer.

1.9 NOTIFICATION

- .1 Owner or Consultant will notify Contractor in writing of observed noncompliance with Federal, Provincial environmental laws and regulations or Municipal environmental bylaws, permits, and other elements of Site-specific plans, such as EPP, SPPP, TCP, SCP, SWDP, APCP, CPP, WMP, PTP and IPP as applicable.
- .2 Contractor after receipt of such notice, shall inform Owner or Consultant of proposed corrective action and take such action to obtain the approval of Owner or Consultant.
- .3 Take action only after receipt of written approval by Owner or Consultant.
- .4 Owner or Consultant will issue stop order of work until satisfactory corrective action has been taken.
- .5 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

1.10 MEASUREMENT FOR PAYMENT

- .1 Measurement for payment for Erosion Control Structure Type C will on a Unit Price basis, for supply and installation.
- .2 Measurement for payment for silt fence will be lineal meters, for supply and installation.
- .3 Dust control shall be paid by the number of 40 kg bags of Calcium Chloride supplied and placed in the completed and accepted work.

2 PRODUCTS – NOT USED.

3 EXECUTION – NOT USED.

END OF SECTION

THIS SECTION SHALL BE READ IN CONJUNCTION WITH, AND TAKE PRECEDENCE, WHERE SPECIFICATIONS MAY DIFFER FROM TOWN OF QUISPAMSIS STANDARD SPECIFICATIONS FOR MUNICIPAL SERVICES.

1 SUPPLEMENTARY CONDITIONS TO THE STANDARD SPECIFICATIONS FOR MUNICIPAL SERVICES

1.1

.1

END OF SECTION

PART II

TECHNICAL SPECIFICATIONS

1 GENERAL

1.1 SECTION INCLUDES

- .1 This section specifies the requirements for supply and production of granular materials including sub-bedding, bedding, initial backfill, sub-base and base as shown on project drawings and according to project specifications.

1.2 REFERENCE STANDARDS

- .1 ASTM D5821-13 (2017), Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Samples:
 - .1 Provide aggregate grain size distribution from recent samples of materials that are to be incorporated into the Project. Samples and grain size distribution to be from samples taken within the last 30 days prior to submission.
 - .2 Submit product samples to Owner or Consultant two (2) weeks prior to start of work upon request.
 - .3 Allow continual sampling by Owner or Consultant during production upon request.
 - .4 Provide Owner or Consultant with access to source and processed material for sampling.
 - .5 Install sampling facilities at discharge end of production conveyor, to allow Owner or Consultant to obtain representative samples of items being produced. Stop conveyor belt when requested by Owner or Consultant to permit full cross section sampling.
 - .6 Provide front end loader or other suitable equipment including trained operator for stockpile sampling as necessary. Move samples to storage place as directed by Owner or Consultant.
 - .7 Supply new or clean sample bags or containers according appropriate to aggregate materials.
 - .8 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.
- .2 Storage: store washed materials or materials excavated from underwater 24 hours minimum to allow free water to drain and for materials to attain uniform water content.

2 PRODUCTS

2.1 MATERIALS

- .1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.
- .2 Aggregates satisfying requirements of applicable section to be one of following in grading limits % passing table below:

- .1 Grading Limits % Passing (Sub-base):

ASTM Sieve Size	Pit Run Gravel Sub-Base 125mm Passing	Crushed Gravel Sub-Base 100mm Passing	Crushed Rock Sub-Base 75mm Passing
125.0 mm	100		
100.0 mm	95 - 100	100	100
75.0 mm	82 - 100	80 - 100	95 - 100
50.0 mm	62 - 100	60 - 87	73 - 95
37.5 mm	52 - 100	50 - 81	58 - 87
19.0 mm	30 - 90	34 - 68	35 - 69
9.5 mm	22 - 79	25 - 58	25 - 54
4.75 mm	16 - 66	17 - 48	17 - 43
2.36 mm	12 - 55	13 - 39	12 - 35
1.18 mm	9 - 44	9 - 30	8 - 28
300 µm	4 - 25	4 - 17	4 - 16
75 µm	0 - 7	0 - 7	0 - 9

- .2 Grading Limits % Passing (Base):

ASTM Sieve Size	Crushed Gravel Base 31.5mm Passing	Crushed Rock Base 31.5mm Passing	Crushed Shoulder Material 19mm Passing
37.5 mm	100	100	
31.5 mm	95 - 100	95 - 100	
25.0 mm	83 - 100	81 - 100	100
19.0 mm	70 - 90	66 - 90	80 - 100
12.5 mm	55 - 78	50 - 77	
9.5 mm	45 - 72	41 - 70	60 - 80
4.75 mm	30 - 57	27 - 54	48 - 65
2.36 mm	20 - 46	17 - 43	35 - 50

1.18 mm	14 - 35	11 - 32	19 - 30
300 µm	5 - 19	4 - 19	13 - 23
75 µm	0 - 6	0 - 8	2 - 8

.3 Grading Limits % Passing (Screened Stone Sub-bedding and Bedding):

ASTM Sieve	Screened Stone
37.5 mm	100
25.0 mm	35 - 100
12.5 mm	20 - 60
4.75 mm	0

.4 Roadway Aggregates Physical Properties Requirements

Test / Method	Aggregate Type	Value
Micro-Deval (MTO LS-618)	Aggregate Base	Max. 25%
	Aggregate Subbase	Max. 30%
Freeze Thaw (MTO LS-619)	All Aggregates	Max. 20%
Flat & Elongated Particles @ 4:1 (MTO LS-608)	Crushed Rock Aggregates only (quarried rock)	Max. 35%
Crushed Particles (ASTM D5821) (at least 1 fractured face)	Crushed Gravel Base only	Min. 40%
Plasticity Index (AASHTO T89 & T90)	Aggregate Base	Max. 3
	Aggregate Subbase	Max. 5
Total Sulphur / Neutralizing Potential Ratio (NPR)	Crushed Rock Aggregates only (quarried rock)	Max. 0.3% or NPR ≥ 3

2.2 SOURCE QUALITY CONTROL

- .1 Inform Owner or Consultant of proposed source of aggregates and provide access for sampling 2 weeks minimum before starting production.
- .2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.
- .3 Advise Owner or Consultant two (2) weeks minimum in advance of proposed change of material source.
- .4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of conditions: verify that conditions are acceptable for topsoil stripping.

- .1 Visually inspect substrate in presence of Owner or Consultant.
- .2 Inform Owner or Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with topsoil stripping, only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Owner or Consultant.

3.2 PREPARATION

- .1 Topsoil stripping:
 - .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
 - .2 Begin topsoil stripping of areas as required after area has been cleared of brush, weeds and grasses and removed from Site.
 - .3 Strip topsoil to depths to avoid mixing topsoil with subsoil.
- .2 Aggregate source preparation:
 - .1 Quarried rock is specified for all subbase, base and shoulder material, however if a submitted alternative of crushed pit run to manufacture the various gravels will be considered.
 - .2 Pit and/or Quarry source must be approved with COA as issued by Province or Municipality.
- .3 Processing:
 - .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
 - .2 Blend aggregates, as required to meet physical requirements of specification to satisfy gradation requirements for material and, percentage of crushed particles, or particle shapes specified.
- .4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate gradation.
- .5 Where necessary, screen, crush, wash, classify and process aggregates with suitable equipment to meet requirements.
 - .1 Stockpiling:
 - .1 Stockpile aggregates in sufficient quantities to meet project schedules.
 - .2 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
 - .3 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.
 - .4 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.5 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Owner or Consultant within 48 hours of rejection.

.6 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.3 CLEANING

- .1 Leave aggregate stockpile Site in tidy, well drained condition, free of standing surface water.
- .2 Leave any unused aggregates in neat compact stockpiles.
- .3 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.
- .4 Restrict public access to temporary or permanently abandoned stockpiles.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

- .1 This section specifies requirements for clearing and grubbing of existing trees, brush, and vegetation.

1.2 DEFINITIONS

- .1 Clearing: consists of cutting off trees and brush vegetative growth to not more than 300 mm above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.
 - .1 Close-cut clearing: consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and disposing of fallen timber and surface debris.
 - .2 Clearing isolated trees: consists of cutting off to not more than 300 mm above ground of designated trees and disposing of felled trees and debris.
 - .3 Underbrush clearing: consists of removal from treed areas of undergrowth, deadwood, and trees smaller than 50 mm trunk diameter and disposing of fallen timber and surface debris.
- .2 Grubbing: consists of excavation and disposal of stumps and roots, boulders and rock fragments of specified size to not less than 200 mm depth below existing ground surface.
- .3 Erosion: deterioration, displacement, or transportation of land surface by wind or water, intensified by land clearing practices related to construction work.
- .4 Sediment: particulate matter transported and deposited as a layer of solid particles within a body of water.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Prevent damage to fencing, trees, shrubs, landscaping, natural features, benchmarks, existing buildings, existing pavement, utility lines, Site appurtenances, water courses and root systems of trees which are to remain.
 - .1 Repair damaged items to approval of Owner or Consultant.
 - .2 Replace any damaged trees designated to remain, as directed by Owner or Consultant.

1.4 ENVIRONMENTAL REQUIREMENTS

- .1 Perform clearing and grubbing work in accordance with the Site-specific specifications and as directed by Owner or Consultant.

- .2 Clean up spills of volatile materials immediately with absorbent material and safely discard to appropriate handling facility.
- .3 Do not dispose of unused volatile materials into sewer system, into streams, lakes, onto ground or in other location where they will pose health or environmental hazard.
- .4 Ensure safe use and disposal of volatile material complies with all Federal, Provincial and Municipal regulations, particularly the Canadian Environmental Assessment Act (CEAA) and the Canadian Environmental Protection Act, and the Pest Control Products Act.

1.5 MEASUREMENT FOR PAYMENT

- .1 Clearing and grubbing shall be paid on a square metre (m²) basis, including all material, equipment, and labour necessary to complete the Work.

2 PRODUCTS – NOT USED.

3 EXECUTION

3.1 EROSION AND SEDIMENT CONTROL

- .1 Erosion and sediment control measures as indicated in Section 31 23 33.01 – Excavating, Trenching and Backfilling.

3.2 PREPARATION

- .1 Inspect Site and verify with Owner or Consultant, any items designated to remain.
- .2 Locate and protect utility lines: preserve in operating condition active utilities traversing Site.
 - .1 Notify utility authority immediately of damage to or when unknown existing utility lines are encountered.
 - .2 When utility lines which are to be removed are encountered within area of operations, notify utility authority in ample time to minimize interruption of service.
- .3 Notify utility authorities before starting clearing and grubbing.
- .4 Keep roads and walks free of dirt and debris.

3.3 CLEARING

- .1 Clearing includes felling, trimming, and cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within cleared areas.
- .2 Clear as directed by Owner or Consultant, by cutting at height of not more than 300 mm

above ground. In areas to be subsequently grubbed, height of stumps left from clearing operations to be not more than 1000 mm above ground surface.

- .3 Cut off branches and cut down trees overhanging area cleared as directed by Owner or Consultant.
- .4 Cut off unsound branches on trees designated to remain as directed by Owner or Consultant.

3.4 CLOSE CUT CLEARING

- .1 Close cut clearing to within 100 mm of ground surface.
- .2 Cut off branches, down trees overhanging area cleared as directed by Owner or Consultant.
- .3 Cut off unsound branches on trees designated to remain as directed by Owner or Consultant.

3.5 ISOLATED TREES

- .1 Cut off isolated trees as directed by Owner or Consultant at height of not more than 300 mm above ground surface.
- .2 Grub out isolated tree stumps.
- .3 Prune individual trees as indicated.
- .4 Trim trees designated to be left standing within cleared areas of dead branches 4 cm or more in diameter; and trim branches to heights as indicated.
- .5 Cut limbs and branches to be trimmed close to bole of tree or main branches.

3.6 UNDERBRUSH CLEARING

- .1 Clear underbrush from areas as indicated to within 100 mm of ground surface.

3.7 GRUBBING

- .1 Remove and dispose of roots larger than 7.5 cm in diameter, matted roots, and designated stumps from indicated grubbing areas.
- .2 Grub out stumps and roots to not less than 200 mm below ground surface.
- .3 Grub out visible rock fragments and boulders, greater than 300 mm in greatest dimension, but less than 0.25 m³.
- .4 Fill depressions made by grubbing with suitable material and to make new surface conform with existing adjacent surface of ground.

3.8 REMOVAL AND DISPOSAL

- .1 Remove cleared and grubbed materials to disposal area approved by Owner or Consultant.
- .2 All merchantable timber may be salvaged and is the property of the contractor unless otherwise specified.
- .3 Disposal of cleared and grubbed materials by burning and burying is not permitted.
- .4 Spread hay mulch material on disturbed areas not scheduled for immediate restoration.

3.9 FINISHED SURFACE

- .1 Leave ground surface in condition suitable for immediate grading operations or stripping of topsoil to approval of Owner or Consultant.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

- .1 The Work included in this section consists of the excavation and disposal of excavated materials, bedding, backfilling and compaction necessary for the installation of water, sewer and storm piping and the construction and repairs of roadways as per the project drawings and specifications. Also includes topsoil removal, stockpiling and/or disposal.

1.2 REFERENCE STANDARDS

- .1 ASTM C117, Standard Test Method for Materials Finer than 75-Micrometer (No. 200) Sieve in Mineral Aggregates by Washing
- .2 ASTM C136M-9, Standard Test Method for Sieve Analysis of Fine and Course Aggregates
- .3 ASTM D422-63 (2007)e2, Standard Test Method for Particle-Size Analysis for Soil.
- .4 ASTM D698-00, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- .5 ASTM D4318-17e1, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .6 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series
- .7 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .8 CSA-A23.1:19/A23.2:19, Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.
- .9 CSA-A3000-18, Cementitious Materials compendium.

1.3 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation:
 - .1 Rock excavation: solid material in excess of 1.00 m³ and which cannot be removed by means of heavy-duty mechanical excavating equipment with 0.95 to 1.15 m³ bucket. Frozen material is not classified as rock.
 - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
 - .3 Unclassified excavation: excavation of deposits of whatever character encountered in Work.
- .2 Topsoil:
 - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

- .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimetres in any dimension.
- .3 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .4 Borrow material: material obtained from locations outside area to be graded and required for construction of fill areas or for other portions of Work.
- .5 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .6 Unsuitable materials:
 - .1 Weak, chemically unstable, and compressible materials.
 - .2 Frost susceptible materials:
 - .3 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136. Sieve sizes to CAN/CGSB-8.1CAN/CGSB-8.2.
 - .4 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.
- .7 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.4 QUALITY ASSURANCE

- .1 Submit design and supporting data at least ten (10) working days prior to beginning Work.
- .2 Design and supporting data submitted to bear stamp and signature of Professional Engineer licensed in New Brunswick, Canada.
- .3 Keep design and supporting data on Site.
- .4 Engage services of qualified Professional Engineer who is licensed in New Brunswick, Canada in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.
- .5 Do not use soil material until written report of soil test results are reviewed by Owner or Consultant.

1.5 MEASUREMENT FOR PAYMENT

- .1 Common and rock excavation shall be paid on a cubic metre (m3) basis, including all material, equipment, and labour necessary to acceptably shape and compact the material according to the Contract Drawings and Specifications.
- .2 Over excavation, beyond the limits and/or grades specified, shall not be considered for payment.
- .3 All excavation, disposal of excavated material, sand bedding, stone bedding, backfill and compaction necessary for the installation of water and sewer mains, manholes, catch basins, valve chambers, and all appurtenances shall be incidental to the unit price of the water and sewer main, water and sewer lateral pipe, manhole, valve chamber, catch basin

or related appurtenances.

- .4 Excavation for Buildings or Other Structures: The unit price for common excavation shall include for the removal and disposal of any existing concrete retaining walls, foundations, etc. The quantities shall be based on a theoretical width which shall be 1200 mm beyond the vertical wall or 300 mm beyond the footing, whichever is greater and to be 150 mm below the footing in common excavation or as specified by the Owner or Consultant.
- .5 Backfill for Buildings or Other Structures: Payment for backfilling for buildings shall be limited to the quantity required to fill between the approved limits of excavation minus the volume taken up by the structure in that excavation, and to the new finished elevations shown on the Drawings. Measurement for payment to be on a cubic metre (m3) basis of backfill material, compacted in place.
- .6 Unshrinkable Fill: Measurement for payment for unshrinkable fill material shall be on a cubic metre (m3) in place basis.
- .7 Rock Excavation: shall be paid on a cubic metre (m3) basis including blasting, excavation and disposal.
- .8 Measurement for Rock Excavation in new trenches shall be in accordance with the Standard Drawing for Trench Layout and Payment Limits for Rock Excavation. For rock excavation, the Contractor shall notify the Owner or Consultant if, during excavation, material which appears to conform to the classification for rock excavation is encountered. Material shall be stripped or exposed to such an extent that, in the opinion of the Owner or Consultant, elevations can be taken to calculate rock quantities. If the Contractor fails to give notice, the Owner or Consultant will not approve any quantity of excavated material as rock excavation before the Owner or Consultant sees it in its original state prior to its excavation.
- .9 Rock Cuts in Existing Trench: When renewing water and sewer mains where the existing trench or part of it was in rock, the average end area of rock will be paid on the basis of average depth of the rock by the Outside Diameter (O.D.) of the pipe plus 600 mm, minus the average depth of the rock by the Outside Diameter (O.D) of the pipe plus 300 mm. Depth is to a maximum of 300 mm below the invert of the new pipe.
- .10 Average End Area of Rock:
 - .1 Average End Area = ([Average Depth of Rock] x [O.D.+ 600 mm]) – ([Average Depth of Rock] x [O.D.+ 300 mm]) = (300 mm x [Average Depth of Rock]).
- .11 Common and rock excavation shall be paid on a cubic metre (m3) basis, including all material, equipment, and labour necessary to acceptably shape and compact the material according to the Contract Drawings and Specifications.
- .12 Additional common excavation and supply and placement of granular materials required due to soft subgrade conditions that existed at the start of construction, shall be paid according to the Schedule of Quantities and Unit Prices, upon authorization of the Owner or Consultant.
- .13 The unit of measurement for trench rock excavation will be the theoretical cubic metre as shown on the drawings. The price shall include all costs to break and/or remove solid rock using power operated hydraulic tools.
- .14 Excavation, sawcutting, removal and disposal of asphalt, concrete curb, sidewalk and common material will be considered incidental to the Work and will not be paid for separately.

- .15 Connection to existing structures and piping will be considered incidental to the Work and will not be paid for separately unless otherwise noted.
- .16 Any cutting, clearing, disposal, or relocating of trees in the working municipal easement will be considered incidental to the Work.
- .17 Geotextile Fabric: Geotextile fabric as specified on the Drawings or as requested by the Owner or Consultant shall be paid on a square metre (m2) basis. Measurement for payment will be the total horizontal or vertical area laid, but will not consider extra fabric used in wrinkles, folds or overlapping the edges. The unit rate will include the supply, placement and the preparation of the surface on which it is to be laid. Staking of the fabric on steep slopes shall be considered incidental to the Work.
- .18 Geotextile fabric shall be paid on a square metre (m2) basis including all material, equipment and labour necessary to acceptably install the material according to the Contract Drawings and Specifications.
- .19 Geogrid soil reinforcement shall be paid on a square meter (m2) basis including all material, equipment and labour necessary to acceptably install the material according to the Contract Drawings and Specifications.
- .20 Overlap joints, patches and seams shall be measured as a single layer of geotextile or geogrid material.
- .21 Brick and grout or removal of abandoned structures or pipes will be considered incidental to the Work and will not be paid for separately unless otherwise noted.

2 PRODUCTS

2.1 MATERIALS

- .1 Natural bank pit-run gravel, crushed gravel, crushed rock and screened stone fill properties to Section 31 05 16 - Aggregate Materials and the following requirements:
 - .1 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 and CAN/CGSB-8.2.
 - .2 Unshrinkable fill: proportioned and mixed to provide:
 - .1 Maximum compressive strength of 0.4 MPa at 28 days.
 - .2 Maximum cement content of 25 kg/m³ with 40% by volume fly ash replacement: to CSA-A3000, Type GU.
 - .3 Minimum strength of 0.07 MPa at 24 h.
 - .4 Concrete aggregates: to CSA-A23.1/A23.2.
 - .5 Cement: Type GU.
 - .6 Slump: 160 to 200 mm.
 - .3 Sediment control fence: preassembled silt fence with industrial netting pre-stapled to posts and intermediate posts:

- .1 Envirofence as manufactured by Mirafi Inc.
- .2 Terrafence as manufactured by Terrafix.
- .3 Approved equivalent.
- .4 Sediment control berm:
 - .1 Clear stone to Section 31 05 16 – Aggregate Materials.
 - .2 Bales of hay or straw densely compacted and securely tied.
 - .3 Rip rap to Section 31 37 00 – Rip Rap.
 - .4 Fabric shall be sheet of woven plastic yarn.
- .5 Sediment control pond:
 - .1 Clear stone to Section 31 05 16 – Aggregate Materials.
 - .2 Bales of hay or straw densely compacted and securely tied.
 - .3 Rip rap to Section 31 05 16 – Aggregate Materials.
 - .4 Fabric shall be sheet of woven plastic yarn.

3 EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENT CONTROL

- .1 Supply and install temporary erosion and sediment control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction or sediment and erosion control drawings specific to Site, that comply with authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove accumulated sediment from behind fences and berms regularly and when directed by Owner or Consultant.
- .4 Remove accumulated sediment from within settling pond regularly and as directed by Owner or Consultant.
- .5 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 SITE PREPARATION

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

3.3 PREPARATION/PROTECTION

- .1 Protect existing features that are not part of project removals.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Owner or Consultant approval.
- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .5 Protect buried services that are required to remain undisturbed.

3.4 STRIPPING OF TOPSOIL

- .1 Begin topsoil stripping of areas as indicated after area has been cleared of brush and grasses and removed from Site.
- .2 Strip topsoil to depths as directed by Owner or Consultant.
- .3 Do not mix topsoil with subsoil.
- .4 Stockpile in locations as directed by Owner or Consultant.
- .5 Stockpile height not to exceed 2 m and should be protected from erosion.
- .6 Dispose of unused topsoil to location off-site.

3.5 STOCKPILING

- .1 Stockpile fill materials in areas approved by Owner or Consultant.
- .2 Stockpile granular materials in manner to prevent segregation.
- .3 Protect fill materials from contamination.
- .4 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.6 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Health and Safety Act for the Province of New Brunswick.
- .2 Obtain permit from authority having jurisdiction for temporary diversion of watercourse.
- .3 Construct temporary Works to depths, heights and locations as directed by Owner or Consultant.
- .4 During backfill operation:
 - .1 Unless otherwise indicated or directed by Owner or Consultant, remove sheeting and shoring from excavations.

- .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
- .3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.
- .4 When sheeting is required to remain in place, cut off tops at elevations as indicated.
- .5 Upon completion of substructure construction:
 - .1 Remove cofferdams, shoring and bracing.
 - .2 Remove excess materials from Site and restore watercourses as directed by Owner or Consultant.

3.7 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for Owner or Consultant details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
- .3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
- .4 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .5 Protect open excavations against flooding and damage due to surface run-off.
- .6 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures to approved collection and runoff areas and in manner not detrimental to public and private property.
- .7 Supply, install and maintain temporary drainage ditches and other diversions outside of excavation limits.
- .8 Supply and install flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

3.8 EXCAVATION

- .1 Remove concrete, masonry, paving, walks, demolished foundations and rubble and other obstructions encountered during excavation.
- .2 Excavation must not interfere with bearing capacity of adjacent foundations.
- .3 Do not disturb soil within branch spread of trees or shrubs that are to remain.
- .4 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .5 For trench excavation, unless otherwise authorized by Owner or Consultant in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
- .6 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Owner or Consultant.
- .7 Restrict vehicle operations directly adjacent to open trenches.

- .8 Dispose of surplus and unsuitable excavated material in approved location off-site.
- .9 Do not obstruct flow of surface drainage or natural watercourses.
- .10 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .11 Notify Owner or Consultant when bottom of excavation is reached.
- .12 Obtain Owner or Consultant approval of completed excavation.
- .13 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Owner or Consultant.
- .14 Correct unauthorized over-excavation as follows:
 - .1 Fill under bearing surfaces and footings with pit run gravel fill compacted to not less than 100% of corrected Standard Proctor maximum dry density in accordance with Corrected Maximum Dry Density for Fill.
 - .2 Fill under other areas with pit run gravel fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density in accordance with Corrected Maximum Dry density for Fill.
- .15 Hand trim, make firm and remove loose material and debris from excavations:
 - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
 - .2 Clean out rock seams and fill with concrete mortar or grout to approval of Owner or Consultant.

3.9 FILL TYPES AND COMPACTION

- .1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698 in accordance with Corrected Maximum Dry Density for Fill.
- .2 Exterior side of perimeter walls: use pit run gravel fill to subgrade level. Compact to 95% of corrected maximum dry density.
- .3 Within building area: use pit run gravel to underside of base course for floor slabs. Compact to 100 % of corrected maximum dry density.
- .4 Under concrete slabs: provide 150 mm compacted thickness base course of crushed gravel fill to underside of slab. Compact base course to 100 %.
- .5 Retaining walls: use pit run gravel fill to subgrade level on high side for minimum 500 mm from wall and compact to 95 %. For remaining portion, use pit run gravel fill compacted to 95 %.
- .6 Place unshrinkable fill in areas as indicated.
- .7 If geogrid is used with retaining wall a crushed product would be required to satisfy the requirements of the geogrid manufacturer.

3.10 BEDDING OF UNDERGROUND SERVICES

- .1 Place granular material for bedding of underground services as indicated in trench details.
- .2 Place bedding material in unfrozen condition.

3.11 BACKFILLING

- .1 Do not proceed with backfilling operations until completion of following:
 - .1 Owner or Consultant has inspected and approved installations.
 - .2 Owner or Consultant has inspected and approved of construction below finish grade.
 - .3 Inspection, testing, approval, and recording location of underground utilities.
 - .4 Removal of concrete formwork.
 - .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
 - .1 Place bedding material as specified elsewhere.
 - .2 Do not backfill around or overcast-in-place concrete within 24 hours after placing of concrete.
 - .3 Place layers simultaneously on both sides of installed Work to equalize loading.
- .6 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
 - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Owner or Consultant. 80% of specified strength of concrete must be achieved prior to backfilling.
 - .2 Place unshrinkable fill in areas as indicated.
 - .3 Consolidate and level unshrinkable fill with internal vibrators.
 - .4 Install filter system in backfill as indicated on the Drawings.

3.12 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris. Trim slopes, and correct defects as directed by Owner or Consultant.
- .2 Replace topsoil as indicated.
- .3 Reinstall lawns to elevation which existed before excavation.

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- .4 Reinstall pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .5 Clean and reinstall areas affected by Work as directed by Owner or Consultant.
- .6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.
- .7 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

- .1 This section specifies the requirements for supplying and placing rip rap as shown on the associated drawings.
 - .1 This item consists of the supply and placement of rip rap.
 - .2 Rip rap for each rock shall have both thickness and breadth greater than or equal to one-third of its length.
 - .3 Rip rap shall consist of clean, hard, sound, durable rock, having a density of not less than 2.65 t/m³ and angular surfaces such that rocks interlock when placed.
 - .4 Acceptability of the rock will be determined by the Owner or Consultant and/or by laboratory and/or field-testing procedures carried out by qualified personnel.
 - .5 The contractor shall notify the Owner or Consultant, in writing, for approval of the source of supply of the rock materials, ten (10) working days in advance of obtaining material from the proposed source.

1.2 MEASUREMENT FOR PAYMENT

- .1 Measurement for payment for supply and placement of random rip rap material shall be the number of tonnes (t) of material acceptably supplied and placed.
- .2 Clearing and grubbing in random rip rap locations will be measured and paid as under Section 31 11 00 - Clearing and Grubbing.
- .3 Removal of debris, snow, ice and other unsuitable material and shaping the construction area prior to placing random rip rap material will not be measured for payment but shall be considered as incidental to the Work.

2 PRODUCTS

2.1 RANDOM RIP RAP MIXED

- .1 Random rip rap mixed shall be noted as R# mixed and shall consist of a random rip rap material of the designated size thoroughly mixed with a pit run gravel.
- .2 Finely shattered rock which meets the gradations of pit run gravel may be used as a substitute.
- .3 The random rip rap shall produce a consistent mixed homogenous blended supply of the specified mixture, mixed at the proportion of approximately 20% by weight to the random rip rap material indicated to form a very dense material.

2.2 RIP RAP

.1 Rip Rap Grading Limits:

Mass	Size	Finer by Mass (%)									
(kg)	(mm)	R-A (Note 1)	R-5	R-10	R-25	R-50	R-100	R-250	R-500	R-1000	R-2000
6000	1600										100
4000	1400										70 - 90
3000	1300									100	
2000	1100									70 - 90	40 - 55
1500	1000								100		
1000	900								70 - 90	40 - 55	
750	820							100			
500	710							70 - 90	40 - 55		
300	600						100				
250	570							40 - 55			
200	530						70 - 90				0 - 15
150	480					100					
100	420					70 - 90	40 - 55			0 - 15	
75	380				100						
50	330				70 - 90	40 - 55			0 - 15		
25	260			100	40 - 50			0 - 15			
15	220	100	100	70-90							
10	190		70 - 90	40-55			0 - 15				
5	150		40 - 55			0 - 15					
2.5	120	0			0 - 15						
0.5	70		0 - 15								
Thickness (mm) (Note 2)		300	300		500	600	800	1100	1400	1600	2200

NOTES: 1) Random rip rap for abutment and slope protection
2) Measured perpendicular to the prepared surface

3 EXECUTION

3.1 PLACING

- .1 Where rip rap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated.
- .2 Fine grade area to be rip rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.

- .3 Place geotextile on prepared surface in accordance with Section 31 23 33.01 - Excavation, Trenching and Backfilling and as indicated.
- .4 Avoid puncturing geotextile.
- .5 Vehicular traffic over geotextile not permitted.
- .6 Place rip rap to thickness and details as indicated.
- .7 Place stones in manner approved by Owner or Consultant to secure surface and create a stable mass.
- .8 Place larger stones at bottom of slopes.
- .9 Hand placing:
 - .1 Use larger stones for lower courses and as headers for subsequent courses.
 - .2 Stagger vertical joints and fill voids with rock spalls or cobbles.
 - .3 Finish surface evenly, free of large openings and neat in appearance.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

- .1 This section specifies the requirements for supplying, placing and compaction of aggregates including sub-bedding, bedding, initial backfill, Granular B and Granular A as shown on project drawings and according to project specifications.

1.2 REFERENCE STANDARDS

- .1 ASTM C117, Standard Test Method for Materials Finer than 75-Micrometer (No. 200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C136M-9, Standard Test Method for Sieve Analysis of Fine and Course Aggregates.
- .3 ASTM D698-00, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- .4 ASTM D4318-17e1, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .5 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
- .6 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 31 05 16 - Aggregate Materials.
- .2 Storage and handling requirements: Stockpile minimum 50% of total aggregate required prior to beginning operation.

1.4 MEASUREMENT FOR PAYMENT

- .1 The installation of granular materials within the limits of the new piping installation will be considered incidental to the Work and will not be paid for separately. The incidental work shall include all labour and materials to supply, transport, place, spread, compact, fine grade and test the Granular B pit run gravel and Granular A crushed gravel or crushed rock materials to the grades and thicknesses shown the drawings.
- .2 The unit of measurement for Granular A crushed gravel for driveway restoration and shouldering will be the scaled metric tonne. The price shall include all costs to supply, transport, place, spread, fine grade, test and compact the material to the lines and grades shown on the drawings or as directed by the Consultant.
- .3 The unit of measurement for limestone crushed rock for driveway restoration will be the scaled metric tonne. The price shall include all costs to supply, transport, place, spread, fine grade and compact the material similar to the existing to the lines and grades shown

on the drawings or as directed by the Consultant.

- .4 Granular base and subbase materials shall be paid on a cubic metre (m3) basis, including all material, equipment and labour necessary to acceptably supply, place, grade and compact the material, according to the Contract Drawings and Specifications.

2 PRODUCTS

2.1 MATERIALS

- .1 Granular: material in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
 - .1 Crushed rock or gravel.
 - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2. Products to be used to be as per table in Section 31 05 16 – Aggregate Materials.
 - .3 Liquid limit: to ASTM D4318, maximum 25.
 - .4 Plasticity index: to ASTM D4318, maximum 6.
 - .5 Crushed particles: at least 60% of particles by mass within each sieve designation ranges to have at least 1 freshly fractured face. Material to be divided into ranges using methods of ASTM C136.

3 EXECUTION

3.1 PREPARATION

- .1 Temporary erosion and sedimentation control:
 - .1 Temporary erosion and sedimentation control to be as per Section 31 23 33.01 – Excavation, Trenching and Backfilling.
 - .2 Supply and install temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction and specific to Site, whichever is more stringent.
 - .3 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - .4 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PLACEMENT AND INSTALLATION

- .1 Place Granular A base, Granular B sub-base, subgrade after previous surface is inspected

and approved in writing by Owner or Consultant and by Contractor's Materials Testing Firm.

.2 Placing:

- .1 Construct granular materials to depth and grade in areas indicated.
- .2 Ensure no frozen material is placed.
- .3 Place material only on clean unfrozen surface, free from snow and ice.
- .4 Place material using methods which do not lead to segregation or degradation of aggregate.
- .5 Place base material to full width in uniform layers not less than 150mm thick. Place sub-base material to full width in uniform layers not less than 300mm thick.
- .6 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .7 Remove and replace that portion of layer in which material becomes segregated during spreading.

.3 Compaction equipment:

- .1 Ensure compaction equipment is capable of obtaining required material densities.

.4 Compacting:

- .1 Compact to density not less than amounts specified corrected maximum dry density and maximum dry density to ASTM D698.
- .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
- .3 Apply water as necessary during compacting to obtain specified density.
- .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved in writing by Owner or Consultant.
- .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

.5 Proof rolling:

- .1 For proof rolling use equipment that is intended to be used throughout project.
- .2 Proof roll at level in granular materials as indicated.
- .3 Make sufficient passes with proof roller to subject every point on surface to three separate passes.
- .4 Where proof rolling reveals defective granular materials, remove defective materials to depth and extent as directed by Owner or Consultant and Materials Testing Firm and replace with new materials in accordance with this section at no extra cost.

.6 Source Filter Criteria

- .1 The use of a filter fabric (geotextile) as a separator must be used when the following soil filter criteria is not met when two different gradation materials are placed directly above each other.
- .2 Filter Criteria $\Rightarrow D_{15}(\text{coarse}) / D_{85}(\text{fine}) < 4 < D_{15}(\text{coarse}) / D_{15}(\text{fine})$.

Where:

- $D_{15}(\text{coarse})$ = particle diameter below which 15% of the soil particles (by weight) are smaller on the coarser material.
 - $D_{85}(\text{fine})$ = particle diameter below which 85% of the soil particles (by weight) are smaller on the finer material.
 - $D_{15}(\text{coarse})$ = particle diameter below which 15% of the soil particles (by weight) are smaller on the finer material.
- .3 Appropriate geotextile must be used and installed as per the supplier recommendations if the Soil Filter Criteria is not met.

3.3 COMPACTION AND TESTING

- .1 Compaction: Granular materials placed in buried infrastructure (pipe), roadway construction, roadway widening, curb and sidewalk projects to conform to the following requirements:
- .1 Sub-bedding material for pipe trenches: Screened stone sub-bedding to be used in conditions of rock trenches or where the existing sub-grade material is soft. The excavation is to be 300 mm below the invert of pipe. A 150 mm layer of screened stone is to be placed. Screened stone is not compacted but is to be evenly placed and made smooth.
 - .1 Where gradings of granular material are used above or below stone bedding differ by filter criteria described in 3.2.6, filter fabric will be required to keep materials separate.
 - .2 Bedding material for pipe trenches: Bedding material from 150 mm below invert of pipe to 300 mm above obvert of all pipes to be screened stone. Upon finished installation of all pipes and bedding material, a full trench width of filter fabric is to be placed above the bedding material prior to placement of other granular material. In areas where the selected backfill is excavated rock, the bedding is to be placed 600 mm above the top of pipe. Screened stone is not compacted but is to be evenly placed and made smooth.
 - .1 Where gradings of granular material are used above or below stone bedding differ by filter criteria described in 3.2.6, filter fabric will be required to keep materials separate.
 - .3 Selected backfill for pipe trenches: Selected backfill is common excavated material and broken rock from the excavation. The excavated material can be used as selected backfill as long as the material meets the gradations of pit run gravel to be compacted to 95 % standard proctor density. Selected backfill is to be placed in 300 mm lifts and compaction achieved prior to placement of next lift.
 - .4 Granular sub-base for pipe trenches: Granular sub-base in pipe trenches is to be a 300 mm layer of pit run gravel, crushed gravel or crushed rock on local roads and 450 mm layer on collector roads. Pit run gravel, crushed gravel and crushed rock used is to be compacted to 95 % standard proctor density. Granular sub-base is to be placed in 300 mm lifts and compaction achieved prior to placement of next lift.

- .5 Granular base for pipe trenches: Granular base in pipe trenches is to be a 150 mm layer of crushed gravel or crushed rock. Crushed gravel and crushed rock to be compacted to 95 % standard proctor density.
- .6 Common borrow for roadway construction, widening, curb and sidewalk: Common borrow is common excavated material and broken rock from the roadway cut. The cut material can be used as common borrow as long as the material meets the gradations of pit run gravel to be compacted to 95 % standard proctor density. Common borrow is to be placed in 300 mm lifts and compaction achieved prior to placement of next lift.
- .7 Granular sub-base for roadway construction: Widening, curb and sidewalk is to be a 300 mm layer of pit run gravel, crushed gravel or crushed rock on local roads and 450 mm layer collector roads. Pit run gravel, crushed gravel and crushed rock used is to be compacted to 95 % standard proctor density. Granular sub-base is to be placed in 300 mm lifts and compaction achieved prior to placement of next lift.
- .8 Granular base for roadway construction, widening, curb and sidewalk: Is to be a 150 mm layer of crushed gravel or crushed rock. Crushed gravel and crushed rock to be compacted to 95 % standard proctor density.
- .9 Shoulder base for roadway construction: Granular base for Roadway shouldering is to be a 100 mm layer of crushed gravel or crushed rock. Crushed gravel and crushed rock to be compacted to 95 % standard proctor density.
- .2 Testing: Granular materials placed in buried infrastructure (pipe), roadway construction, roadway widening, curb and sidewalk projects to conform to the following compaction requirements:
 - .1 Materials Testing Firm shall be engaged by Contractor to perform all laboratory and field-testing requirements for granular materials.
 - .2 Materials Testing Firm shall be registered in the Province of New Brunswick and be qualified in the Work required.
 - .3 All results from the laboratory and field-testing program shall be submitted to the Owner or Consultant for review and approval once tests are completed.
 - .4 Field-testing of the aggregate materials shall be performed using a calibrated nuclear densometer.
 - .5 At the end of project, Contractor is to submit final report encompassing all laboratory and fields-testing results.
 - .6 As a minimum testing frequency, Contractor's Materials Testing Firm is to complete compaction testing of aggregates as per following table:

Minimum Testing Frequency for Compaction of Soils

Item No.	Description	Test Method	Testing Frequency	Remarks
1	Trench Work	ASTM D698	Minimum of one Proctor test is required per material type prior to placement. Nuclear density testing	Nuclear gauge testing. Owner or Consultant to

Item No.	Description	Test Method	Testing Frequency	Remarks
	(Water & Sewer)		done to create a compaction pattern for both bedding and backfill to establish a benchmark to continue until a noticeable change in material. Once procedure is established, Contractor must ensure that the recommended method is followed on all trenches. During pipe trench backfilling, minimum of one (1) nuclear density test per 100m of trench work, for each 300mm lift, or equivalent for shorter trenches.	make field notes on method and results.
2	Subgrade Testing (Borrow or Fill Sections)	ASTM D698 Proof Rolling	<p>Minimum of one Proctor test is required per material type prior to placement. One nuclear density field test section per material type - to develop a definite compaction procedure (equipment, lift thickness, moisture application and number of passes), which will produce the required density.</p> <p>Visual deflection test of all subgrade surfaces with a fully loaded tandem truck.</p> <p>Minimum one (1) nuclear density test per 20 m of street, for each 300 mm lift.</p>	Nuclear gauge testing.
3	Subgrade Testing (Cut Sections)	Proof Rolling	Carry out visual deflection test of all subgrade surfaces with a fully loaded tandem truck.	Owner or Consultant to verify in field notes that this was carried out and record the results.
4	Granular Base and Subbase	ASTM D698	Minimum one (1) test per 20 m of street, for each lift of material added.	Nuclear gauge testing.

3.4 SITE TOLERANCES

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

3.5 PROTECTION

- .1 Maintain finished granular materials in condition conforming to this Section until succeeding material is applied or until acceptance by Owner or Consultant.

3.6 CLEANING

- .1 Refer to Section 01 00 00 – Project Specific General Requirements.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

- .1 This section specifies the requirements for construction of asphalt concrete pavement. It includes supplying and placing asphalt concrete material in accordance with these specifications and detailed drawings or as directed by the Owner.

1.2 REFERENCE STANDARDS

- .1 ASTM D698-00, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- .2 ASTM D977-20, Standard Specification for Emulsified Asphalt.
- .3 ASTM D995-95, Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
- .4 ASTM D2397M-20, Standard Specification for Cationic Emulsified Asphalt.
- .5 AASHTO M 332-21 Standard Specification for Performance-Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR) Test.

1.3 DEFINITIONS

- .1 For the purposes of this Specification, the following definitions apply:
- .1 Hot Mix Asphalt (HMA) – hot-mixed, hot-laid Superpave asphalt concrete.
- .2 Lot – The asphalt concrete material of one mix type placed in one day.
- .3 Reclaimed Asphalt Pavement (RAP) – processed HMA material that is recovered by partial or full depth removal.

1.4 MEASUREMENT FOR PAYMENT

- .1 The unit of measurement for payment for hot-mix, hot-laid asphalt concrete shall be the number of tonnes (t) of HMA, scale weighed, acceptably incorporated into the Work at the specified thickness, including all preparatory work. Any HMA quantity placed in excess of 110% of the theoretical quantity in tonnes (t) shall not be included for payment unless otherwise authorized in writing by the Owner or Consultant. The theoretical HMA quantity shall be determined by the following formula: (specified thickness in mm x final measured asphalt concrete pavement area in m² x in place density in kg/m³) / 1,000,000.
- .2 All HMA that is delivered to the Site shall be accompanied by an electronic truck weigh ticket showing the truck number, type of HMA, Contract number, truck loading time at the hot-mix plant, tare mass to the nearest 50 kg, gross mass to the nearest 50 kg, net mass in kg and driver's signature. The tare mass for the truck shall include the vehicle, operator, fuel, spare tire, etc.

- .3 The Contractor shall be responsible for ensuring that the truck weigh ticket for each load is handed to the Owner or Consultant inspecting the asphalt paving operation at the time the delivery truck unloads at the paving Site. The Owner or Consultant will not accept any responsibility for delivery tickets that are not submitted at the proper time, or are submitted in groups after the delivery trucks have left the Site. Asphalt weigh tickets are to be signed on-Site by the Owner or Consultant during placement, with one (1) copy being retained by the Owner or Consultant and the other copy to be submitted with the Contractor's monthly invoice.
- .4 The following items shall not be measured for payment and shall be considered as incidental to the Work:
 - .1 Hauling of HMA to the Site, sweeping and cleaning, and Site restorations.
 - .2 Sampling and testing of aggregates, calibration of asphalt plants, and trial batches.
 - .3 Removal of surplus granular material as a result of fine grading, including disposal off-site.
 - .4 Cutting existing asphalt concrete edges prior to resurfacing.
 - .5 Handwork to complete HMA paving around catch basins, street hardware, valves, etc., to complete swales or any other place where handwork is carried out concurrently with the spreader operation.
 - .6 Removal and replacement of any part of the Work not meeting the requirements of the Specifications; and
 - .7 The use of tack coat at joints, curb lines, aprons, around street hardware and catch basin frames or any other vertical faces.
- .5 Measurement for payment of HMA padding shall be the number of tonnes (t) scale weighed and acceptably incorporated into the Work.
- .6 Measurement for payment of HMA patching shall be the number of tonnes (t) scale weighed and acceptably incorporated into the Work.
- .7 Measurement for payment of asphalt concrete curb and asphalt concrete sidewalk shall be per metre (m) of curb or sidewalk, including all labour, materials and equipment necessary to complete the Work.
- .8 Measurement for payment of miscellaneous HMA work shall be the number of tonnes (t) scale weighed miscellaneous HMA acceptably incorporated into the Work.
- .9 Measurement for payment for cold milling shall be per square metre (m²) of asphalt concrete pavement acceptably removed and hauled from the Site to an approved location.
- .10 Tack coat that is specified to treat the entire cold milled, aged asphalt concrete or any other surfaces, shall be measured for payment per square metre (m²) of acceptably tack-coated surface.

1.5 PRICE ADJUSTMENT

- .1 A payment adjustment for the change in price of asphalt binder between the month preceding the month in which tenders were opened for the Contract and the time of the placement of the HMA will apply to the quantity of asphalt binder (cement) accepted into the Work and will be calculated as follows if the price index between the two (2) months

differs by more than 5%:

- .1 PA = Payment adjustment for asphalt binder in dollars.
- .2 T = PG asphalt binder price index for the month prior to tender opening.
- .3 P = PG asphalt binder price index for the month of paving.
- .4 Q = Quantity of asphalt binder in tonnes.

When $P > 1.05 T$, the Contractor receives additional payment as follows:

$$PA = (P - 1.05T) \times Q$$

When $P < 0.95 T$, the Owner receives a credit as follows:

$$PA = (0.95T - P) \times Q$$

- .5 This payment adjustment for the change in the price of asphalt binder during the Work is not considered to be extra work.

2 MATERIALS

2.1 BITUMINOUS TACK COAT

- .1 Tack coat shall be RS-1 or CRS-1 Grade asphalt emulsion and shall conform with the provisions of ASTM D977 and ASTM D2397, respectively.
- .2 Non-tracking emulsion shall be diluted with 40% water and shall meet the requirements of NBDTI Table 259-1 – Non-tracking Emulsion Requirements (Prior to Dilute).

2.2 ASPHALT BINDER

- .1 Asphalt binder shall meet the requirements of AASHTO M332, Table 1 – Performance Graded Asphalt Binder Specification.
- .2 Unless otherwise specified in the project detailed drawings or specifications or at the direction of the Owner, the performance-graded (PG) asphalt shall be PG 58S-28.

2.3 COARSE AGGREGATE

- .1 Coarse aggregate shall be prepared by crushing rock and shall consist of hard, sound, durable particles, free from adherent coatings, shale, clay, loam, schist, and other soft or disintegrated pieces of deleterious substances.
- .2 Coarse aggregate used in the production of HMA shall meet the criteria in NBDTI Standard Specifications for Highway Construction, Table 261-1: Physical Requirements for Coarse Aggregate.
- .3 Coarse aggregate may be accepted or rejected on the basis of past performance.

2.4 FINE AGGREGATE AND BLENDING SAND

- .1 Fine aggregate shall be prepared by crushing rock or screening a manufactured sand and shall consist of hard, sound, durable particles, free from adherent coatings, shale, clay, loam, schist, and other soft or disintegrated pieces of deleterious substances.
- .2 Fine aggregate used in the production of HMA shall meet the criteria in NBDTI Standard Specifications for Highway Construction, Table 261-1: Physical Requirements for Fine Aggregate.
- .3 Blending sand may be used up to a maximum of 10% of the total mass of the aggregate fraction of the asphalt concrete mix to achieve the specified mix properties. Blending sand shall have 100% passing the 9.5 mm sieve prior to introduction to the asphalt plant cold feed.
- .4 Fine aggregate and blending sand may be accepted or rejected on the basis of past performance.

2.5 RECLAIMED ASPHALT PAVEMENT (RAP)

- .1 All RAP shall meet the processing, quality, and use guidelines in NCHRP Report 452. The coarse aggregate fraction of the RAP shall meet the aggregate physical properties criteria in NBDTI Standard Specifications for Highway Construction, Table 261-1: Physical Requirements for Coarse Aggregate.

2.6 ANTI-STRIPPING ADMIXTURES

- .1 If tensile strength ratio (TSR) testing performed during the asphalt concrete mix design phase indicates that an anti-stripping admixture is required, an anti-stripping admixture shall be added to the asphalt concrete mix at a dosage at which the TSR specification is met.
- .2 Anti-stripping admixtures shall be from the list of approved NBDTI admixtures unless otherwise approved by the Owner.

2.7 ASPHALT CONCRETE MIX

- .1 Superpave HMA Design Mix Formula (DMF):
 - .1 Preparation and submission of an asphalt DMF for the Owner's approval is the responsibility of the Contractor.
 - .2 The Contractor shall use an qualified, independent laboratory to design the asphalt concrete mix. The mix design shall be completed within the same calendar year as the Work is to be completed unless otherwise approved by the Owner.
 - .3 The asphalt concrete mix design shall follow AASHTO R35 Standard Practice for Superpave Volumetric Design for Hot-Mix Asphalt (HMA). The asphalt mix design shall meet the requirements of NBDTI Table 261-1 Superpave Asphalt Concrete Mix Requirements and Physical Requirements for Asphalt Concrete. The number of design gyrations shall be in accordance with project-specific detailed drawings or

specifications or as directed by the Owner.

- .4 The amount of reclaimed asphalt pavement (RAP) in the hot mixed recycled asphalt concrete base mix shall not exceed 15% of the total mass of the combined materials.
- .5 The amount of reclaimed asphalt pavement (RAP) in the hot mixed recycled asphalt concrete surface mix shall not exceed 15% of the total mass of the combined materials.

.2 Superpave HMA Job Mix Formula (JMF):

- .1 The JMF shall be submitted to the Owner prior to beginning asphalt concrete production. The JMF shall include the following information:
 - .2 The percentage by mass of each aggregate to be used in the asphalt concrete mix.
 - .3 The percentage by mass passing the 4.75 mm and 0.075 mm sieves of the combined aggregates.
 - .4 The asphalt binder content.
 - .5 The asphalt binder supplier and grade.
 - .6 The production and compaction temperature of the asphalt mix.
 - .7 The type of anti-stripping admixture in the mix, if applicable.
 - .8 The JMF target values shall not deviate from the DMF values by more than the following:
 - +/- 3% for material passing the 4.75 mm sieve.
 - +/- 0.8% for material passing the 0.075 mm sieve.
 - +/- 0.3% for asphalt cement content.
- .9 A maximum of three (3) JMF adjustments per mix type will be accepted. Any additional adjustments to the asphalt mix will require the design of a new DMF in accordance with item 2.7.1.

2.8 MATERIALS CERTIFICATION

- .1 The Contractor shall submit supplier test data and certification that the performance graded (PG) asphalt binder meets the requirements of AASHTO M332, Table 1 – Performance Graded Asphalt Binder Specification.
- .2 The Contractor shall submit a temperature-viscosity chart that provides optimum mixing and compaction temperature for the asphalt binder.
- .3 The Contractor shall submit test data from a qualified independent laboratory that demonstrates that the coarse and fine aggregates meet the requirements of NBDTI Standard Specifications for Highway Construction, Table 261-1.
- .4 The aggregates testing shall be completed within the same calendar year as the Work is to be completed unless otherwise approved by the Owner.

2.9 SUPERPAVE HMA MIX DESIGN(S)

- .1 The Contractor shall submit a copy of the DMF for review and approval by the Owner ten (10) days before the beginning of asphalt concrete production. The Owner or a testing laboratory representing the Owner reserves the right to sample aggregates and asphalt binder from the Contractor at any time prior to or during paving for mix verification and ignition oven calibration purposes.
- .2 The Contractor shall submit a JMF to the Owner three (3) days prior to beginning asphalt concrete production. Any adjustments to the JMF during production shall be submitted 1 day prior to the adjustment being made.

2.10 QUALITY CONTROL PLAN

- .1 At least ten (10) days before the commencement of work, the Contractor shall submit to the Owner a Quality Control Plan (QCP) that includes, as a minimum, the following information:
- .2 Details of asphalt mix constituent materials sources and properties and evidence that all performance specifications are met.
- .3 Information on control of asphalt concrete and constituent materials during production including but not limited to details on handling, stockpiling, mixing, storage, and transportation procedures.
- .4 Placement and compaction procedures including detailed information on procedures to avoid segregation, paving and compaction joints, spreader and roller equipment details, and rolling patterns.

3 EXECUTION

3.1 PREPARATION FOR PLACEMENT OF ASPHALT CONCRETE

- .1 Granular Materials:
 - .1 Immediately prior to placing any course of Superpave HMA on a granular material grade, the crushed rock or crushed gravel surface shall be fine graded to within thirty (10) millimetres of design grade and compacted to a minimum of ninety-five percent (95%) of the maximum dry density as determined by Standard Proctor (ASTM D698).
 - .2 HMA placement shall not be carried out if the roadbed is frozen. The granular grade shall be free of standing water at the time of HMA placement.
- .2 Existing Asphalt Concrete Pavement:
 - .1 Prior to placing any HMA, all HMA and concrete surfaces shall be clean of all loose, broken, and foreign materials. Milled surfaces shall be swept with a power broom. The Contractor shall carry out such cleaning, brooming and flushing, as necessary. All costs associated with cleaning, brooming and flushing shall be considered incidental to the Work.
 - .2 The surface of a pavement upon which HMA is to be placed shall be dry at the time of

HMA placement. An HMA course shall not be placed on a previously laid course until a the temperature of the previous course is 60°C or less, and the paving equipment does not damage the previously laid course.

- .3 For asphalt patching and restoration, including utility trenches, slug work base repairs for new curb, and base repair for hardware adjustments, the existing asphalt concrete shall be saw cut or milled to make a clean joint.
- .4 Obtain Owner or Consultant approval of milled keyways, and milled surface and/or base gravels before placement of tack coat and pavement.
- .5 Frames and Appurtenances:
 - .1 The Contractor shall check and adjust all frames and appurtenances to grade, including longitudinal and transverse slopes. All costs associated with the adjustment of frames and appurtenances shall be considered incidental to the Work.
- .6 Application of Tack Coat:
 - .1 Tack coat shall be applied to all cold-milled asphalt surfaces, all asphalt surfaces not paved within the past 24 hours, or any other surface specified by the Owner, prior to placement of HMA.
 - .2 Tack coat shall be used at all joints, curb lines, aprons, around street hardware, frames and appurtenances, or any other vertical face(s) that the new asphalt concrete will terminate against, unless directed otherwise by the Owner.
 - .3 Immediately before the application of tack coat, and prior to delivery of any HMA to the paving location, the Contractor shall carry out power or hand brooming when deemed necessary by the Owner.
 - .4 The tack coat shall be applied in a uniform manner by means of a pressure distributor at a minimum diluted rate of 0.4 L/m², or as directed by the Owner. Tack coat shall not be applied during wet weather or on a wet surface. Care shall be taken during the application of tack coat to prevent the defacing of adjacent infrastructure. The tack coat shall be allowed to properly cure (break), with any traffic diverted until the tack coat has cured to eliminate tracking.

3.2 EQUIPMENT

- .1 The asphalt mixing plant shall meet the requirements of ASTM D995.
- .2 The paver shall be a self-powered, mechanical spreader capable of spreading asphalt concrete mixture true to line, grade, and cross-slope.
 - .1 The paver shall be equipped with screws that promote even distribution of the asphalt concrete mix in front of the screed, without segregation.
 - .2 The paver shall be equipped with a vibrating screed. The vibrating function of the screed shall be in operation at all times.
 - .3 The paver shall be equipped with a heater capable of preheating the screed and extensions. The heater shall be in operation at all times.
- .3 At a minimum, three rollers shall be used for compaction of asphalt concrete:
 - .1 A vibratory breakdown roller with a minimum mass of 8 t;

- .2 A rubber tire roller equipped with means to prevent the asphalt concrete mix from adhering to the rubber tires;
- .3 A steel drum finishing roller.
- .4 Trucks used to transport asphalt concrete from the plant to the paving Site shall have tight metal boxes free of foreign material.
 - .1 The trucks shall be equipped with tarpaulins of sufficient size to overhang the fully loaded truck boxes and be tight to the box to prevent air infiltration. Tarpaulins shall be used to cover the asphalt mix during transport and shall not be removed until immediately prior to dumping the load into the paver.

3.3 PLACEMENT

- .1 Base course asphalt concrete shall not be placed with conditions of rain prevail or when standing water is present upon the granular surface upon which paving is to occur.
- .2 Surface course asphalt concrete shall not be placed when weather conditions of fog or rain prevail, or when the surface upon which paving is to occur shows any sign of surface moisture.
 - .1 The surface upon which paving is to occur shall be free of any loose or foreign material prior to placing asphalt concrete.
 - .2 The surface upon which paving is to occur shall be at a minimum 5°C, and rising, prior to placing asphalt concrete.
- .3 The asphalt concrete shall be placed in a manner that ensures that the finished mat is smooth, free from surface defects, and is constructed with proper grades, cross-slopes, and road width.
- .4 The speed of the paver shall be matched to the rate of asphalt material delivery to ensure continuous operation of the paver.
- .5 All placement, spreading, and compaction shall occur only during daylight hours unless otherwise approved by the Owner.
- .6 Spreading of asphalt concrete by hand shall be kept to a minimum.
- .7 Broadcasting loose asphalt on an asphalt surface generated with a spreader is prohibited.
- .8 When spreading asphalt full width, placing by hand will be prohibited.
- .9 The compacted thickness of the asphalt concrete course shall be in accordance with detailed drawings or specifications or as directed by the Owner.
- .10 All placement of base course asphalt concrete is to be completed on or before October 31st.
- .11 All placement of surface course asphalt concrete is to be completed on or before October 15th.
- .12 Extension beyond October 15th seal and October 31st base will only be allowed upon written approval of the Owner.
- .13 Paving operations beyond the specified dates for seal asphalt (October 15th) and base asphalt (October 31st) will require Contractor to increase warranty to two (2) years total.

Contractor to provide the warranty in writing.

3.4 COMPACTION

- .1 A level of compactive effort suitable to achieve the specified in-place density of the asphalt concrete shall be used. The required level of compactive effort for a mix shall be determined by a rolling pattern established with the use of a nuclear density gauge.
- .2 The temperature range within which compaction shall occur shall be guided by data from the submitted asphalt binder temperature-viscosity chart.
- .3 Compaction equipment shall not sit idle on a hot asphalt mat.
- .4 Along infrastructure and in areas not accessible to full-sized rollers, the mixture shall be compacted with smaller equipment such as vibrating plate tampers or hand tampers.

3.5 QUALITY CONTROL (QC) TESTING

- .1 The Contractor shall be totally responsible for quality control testing throughout every stage of the asphalt paving work to ensure that materials and workmanship meet the requirements of this Specification.
- .2 The Contractor shall engage a qualified independent laboratory to perform quality control testing of the asphalt concrete. The testing laboratory shall be approved by the Owner.
- .3 The approved testing laboratory shall perform a complete suite of Superpave tests on a loose sample of each asphalt concrete mix type produced daily. The asphalt concrete material shall meet the specifications of NBDTI Table 261-5: Acceptance Criteria.
- .4 The approved QC testing laboratory shall take 2 additional loose samples from each mix type daily for additional testing should the results of the first sample result in a dispute.
- .5 For each asphalt concrete mix type, the Contractor shall establish a rolling pattern using a nuclear density gauge. Upon completion of the establishment of the rolling pattern, the Contractor shall submit a copy to the Owner. The rolling pattern data shall be submitted on the same day on which it is established.
- .6 The approved testing laboratory shall sample a minimum of 2 core samples from the compacted asphalt concrete for laboratory measurement of density and thickness from each street paved daily. The in-place density shall be a minimum of 92.5% of the maximum theoretical relative density, as determined by testing of the daily loose asphalt concrete sample.

3.6 QUALITY ASSURANCE (QA) TESTING

- .1 The Owner shall engage a qualified independent laboratory to perform quality assurance testing of the asphalt concrete.
- .2 The approved testing laboratory shall perform a complete suite of Superpave tests on a loose sample of each asphalt concrete mix type produced daily. The asphalt concrete material shall meet the specifications of NBDTI Table 261-5: Acceptance Criteria.
- .3 The approved testing laboratory shall sample a minimum of 2 core samples from the

compacted asphalt concrete for laboratory measurement of density and thickness daily. The in-place density shall be a minimum of 92.5% of the maximum theoretical relative density, as determined by testing of the daily loose asphalt concrete sample.

3.7 DEFECTS, REPAIRS, AND ACCEPTANCE/REJECTION

- .1 The finished surface of any pavement course shall have a uniform texture and be free of surface defects which include but are not limited to:
 - .1 Individual bumps and dips that exceed 13.4 mm over a 3.0 m horizontal distance.
 - .2 Areas of segregation.
 - .3 Areas of excess or insufficient asphalt binder.
 - .4 Roller marks.
 - .5 Cracking or tearing.
 - .6 Improper matching of longitudinal and transverse joints.
 - .7 Tire marks.
 - .8 Improper reinstatement of sample location.
 - .9 Improperly constructed patches.
 - .10 Improper cross slope.
 - .11 Fuel spills.
 - .12 Surface defects shall be removed and replaced or otherwise repaired to the satisfaction of the Owner; and,
 - .13 Repair should be done to full lane width to a minimum of 3.0 m each side of repair section.
- .2 Acceptance or rejection of a day's paving shall be determined by taking the mean of the QC and QA results.
 - .1 If the results of the QC and QA testing are not within the tolerances provided in NBDTI Table 261-4: Acceptance Tolerance for Combining QA and QC Lot Test Results, the acceptance or rejection shall be determined using only the QA results.
- .3 If the mean of the QC and QA results meet the criteria in NBDTI Table 261-5: Acceptance Criteria, no further testing will be required and the lot will be paid at 100%.
- .4 If the mean of the QC and QA results do not meet the criteria in NBDTI Table 261-5, the Owner will require an extended warranty of a length to be determined by the Owner but not less than 2 years in addition to the reduction in payment.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

- .1 This Section includes requirements for constructing cement concrete sidewalks, curbs and curbs and gutters to the lines, grades, dimensions and typical cross-sections indicated or directed.

1.2 REFERENCE STANDARDS

- .1 ASTM C309-19, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .2 ASTM C117, Standard Test Method for Materials Finer than 75-Micrometer (No. 200) Sieve in Mineral Aggregates by Washing.
- .3 ASTM C136M-9, Standard Test Method for Sieve Analysis of Fine and Course Aggregates.
- .4 ASTM D698-00, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (1-182,400 ft-lbf/ft³ (600 kN-m/m³)).
- .5 ASTM D1751-18, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- .6 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .7 CSA A283:19, Qualification Code for Concrete Testing Laboratories.
- .8 CSA G30.3-M1983 (R1998), Cold-Drawn Steel Wire for Concrete Reinforcement.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Portland cement shall be Normal, Type 10. Mix shall be submitted to the Owner or Consultant ten (10) working days prior to commencing work.
- .2 Product Data:
- .1 Submit WHMIS SDS for Hazardous Materials used.
- .2 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, and limitations.
- .3 Inform Owner or Consultant of proposed source of materials and provide access for sampling minimum (ten) 10 working days prior to commencing work.
- .4 If materials have been tested by accredited testing laboratory testing laboratory approved by Owner or Consultant within previous 2 months and have passed tests equal to requirements of this specification, submit test certificates from testing laboratory showing suitability of materials for this project.
- .5 The ready-mix concrete supplier shall provide the Owner or Consultant the following:

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- .1 Be certified in accordance with the requirements published by the Atlantic Concrete Association (ACA).
- .2 Current certification of conformance and plant membership
- .3 Current certification of conformance with CSA A23.1 with respect to the requirements for materials and methods in the proportioning, mixing, transport and inspection of cast-in-place Portland cement (PCC).

1.4 MEASUREMENT FOR PAYMENT

- .1 Saw cutting and construction of joints in concrete shall be considered incidental to the placement of concrete.
- .2 Concrete Curb:
 - .1 Method A: Including Excavation and Backfill: In areas where construction is limited to the replacement of existing curb or placement of new curb, measurement for payment shall be made per metre (m) of curb which shall include all labour, material and equipment necessary to complete the Work including cutting of asphalt, all excavation (excluding rock), backfilling, compaction, curing and protection of the concrete. Rock excavation shall be measured and paid in accordance with Section 31 23 33.01 – Excavating, Trenching and Backfilling.
 - .2 Method B: Excluding Excavation and Backfill measurement for payment for installation of curb on new construction or on street reconstruction shall be made per metre (m) of curb which includes all labour, material and equipment necessary to complete the Work including curing and protection of the concrete.
- .3 Reinforced Concrete Sidewalk:
 - .1 Method A:
 - .1 Including Excavation and Backfill In areas where construction is limited to the replacement of existing sidewalk or placement of new sidewalk, measurement for payment shall be made per metre (m) of sidewalk for 1.5 m wide sidewalk and per square metre (m²) for variable width sidewalk. Measurement for payment shall include all labour, material and equipment necessary to complete the Work including cutting of asphalt, all excavation (excluding rock), backfilling, compaction, curing and protection of the concrete. Rock excavation will be measured and paid in accordance with Section 31 23 33.01 – Excavating, Trenching and Backfilling.
 - .2 The length of concrete sidewalk at driveway locations, including the transition sections, to be measured for payment shall be the number of metres (m) of depressed sidewalk acceptably placed.
 - .3 The area of variable width of concrete sidewalk at driveway locations, including the transition sections to be measured for payment, shall be the square metres (m²) of depressed sidewalk acceptably placed.
 - .2 Method B:

- .1 Excluding Excavation and Backfill Payment for installation of sidewalk on new construction or on street reconstruction shall be made per metre (m) of sidewalk for 1.5 metre wide sidewalk and per square metre (m²) for variable width sidewalk. Measurement for payment shall include all labour, material and equipment necessary to complete the Work including curing and protection of the concrete.
- .2 The length of concrete sidewalk at driveway locations including the transition sections to be measured for payment shall be the number of metres (m) of depressed sidewalk acceptably placed.
- .3 The area of variable width of concrete sidewalk at driveway locations, including the transition sections to be measured for payment shall be the square metre (m²) of depressed sidewalk acceptably placed.
- .4 Excavation and backfill will be measured for payment in accordance with Division 13, "Excavation, Trenching and Backfill Requirements".
- .5 Measurement for payment for welded wire fabric shall be the number of square metres (m²) acceptably placed.

2 PRODUCTS

2.1 MATERIALS

- .1 Concrete mixes and materials:
 - .1 Concrete curb and concrete curb and gutter:

Table: Portland Cement Concrete Curb Mix Requirements

Minimum Cement Content	380 kg/m³ for a Slipform Curb Machine 400 kg/m³ for Metal Forms
Normal Maximum Size of Coarse Aggregate	20 mm
Maximum Sand Content by Weight of Total	40 %
Maximum Water/Cement Ratio by Mass (w/c)	0.45
Air Content (a/c)	5 % - 8 %
Maximum Compressive Strength at 28 Days	32 MPa
Slump (Slipform Curb Machine)	40 mm +/- 10 mm

.2 Concrete sidewalk:

Table: Portland Cement Concrete Sidewalk Mix Requirements

Minimum Cement Content	400 kg/m ³ for Metal Forms
Normal Maximum Size of Coarse Aggregate	20 mm
Maximum Sand Content by Weight of Total	40 %
Maximum Water/Cement Ratio by Mass (w/c)	0.45
Air Content (a/c)	5 % - 8 %
Maximum Compressive Strength at 28 Days	32 MPa
Slump	80 mm +/- 20 mm

.3 Welded wire fabric (mesh) on all sidewalk and as follows:

- .1 Wire gauge 6.
- .2 Size of mesh 152 mm x 152 mm (MW18.7 x MW18.7).
- .3 Welded wire manufactured to CSA G30.3-M.

.4 Expansion joint filler: Pre-moulded bituminous fiber board, conforming to ASTM D1751 on all sidewalk and as follows:

- .1 Six (6) meter intervals in sidewalk and isolation of structures including manholes, catch basins, valve boxes, light posts, adjacent to buildings, etc.:
 - .1 Joint filler to be asphalt impregnated fiberboard:
 - .1 Joint filler to be full depth of sidewalk.
 - .2 Deck-O-Foam expansion joint filler.
 - .3 Approved equivalent.

.5 Expansion joint filler sealant on all sidewalk and as follows:

- .1 Sealant to be self-leveling polyurethane sealant:
 - .1 Joint filler to be full depth of sidewalk.
 - .2 SikaFlex 2C 2L.
 - .3 Sonolastic SL 2.
 - .4 Approved equivalent.

.6 Curing agent: to ASTM C309 for cast-in-place concrete:

- .1 Curing agent "Liquid Membrane-Forming Compounds for Curing Concrete".

.7 Granular sub-base and base: material to Section 31 05 16 - Aggregate Materials and following requirements:

- .1 Sub-base pit-run gravel, crushed gravel or crushed rock.
- .2 Base crushed gravel or crushed rock.
- .3 Gradations: within limits specified when tested to ASTM C136 and ASTM C117.

.8 Non-staining mineral type form release agent: chemically active release agents containing

compounds reacting with free lime to provide water-soluble soap.

3 EXECUTION

3.1 GRADE PREPARATION

- .1 Prepare grade in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Construct embankments using excavated material free from organic matter or other objectionable materials.
 - .1 Dispose of surplus and unsuitable excavated material in approved location on Site or off-site.
- .3 When constructing embankment provide for minimum 0.6 m shoulders, where applicable, outside of neat lines of concrete.
- .4 Place fill in maximum 150 mm layers and compact to minimum 95% of maximum dry density to ASTM D698.

3.2 GRANULAR SUB-BASE AND BASE

- .1 Obtain Owner or Consultant approval of subgrade before placing granular sub-base.
- .2 Place granular sub-base and base material to lines, widths, and depths as indicated.
- .3 Compact granular sub-base and base in maximum 150 mm layers to minimum 95% of maximum density to ASTM D698.

3.3 CONCRETE

- .1 Obtain Owner or Consultant approval of granular base prior to placing concrete curb and sidewalk.
- .2 Obtain Owner or Consultant approval of reinforcing steel prior to placing concrete sidewalk.
- .3 Immediately after floating, give sidewalk surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom side to side across sidewalk.
- .4 Provide edging as indicated with 10 mm radius edging tool.
- .5 Immediately after floating, give curb surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom parallel with curb.

3.4 QUALITY CONTROL/QUALITY ASSURANCE

- .1 Engage services of qualified Professional Engineer licensed in New Brunswick, Canada to

perform all sampling and testing.

- .1 Quality Control testing is to be performed on all concrete to ensure it conforms to the requirements of the specifications.
- .2 All testing conducted in accordance with CSA-A23.1 / A23.2.
- .3 Minimum testing frequency:
 - .1 Slump, air test and compressive strength on each of the first two loads.
 - .2 Slump, air test and compressive strength on every third load after first two loads.
 - .3 Slump and air test is to be done on the first portion of load prior to placement.
 - .4 Compressive strength test shall consist of three concrete cylinders. Compressive strength testing shall be done at seven days and twenty-eight days. Third cylinder is spare.
- .4 Lab used to do concrete testing shall be certified with CSA A283.
- .5 All test results are to be submitted to Owner or Consultant as soon as tests are completed.
- .6 All lab and field test results shall be recorded on Concrete testing Summary forms and submitted to Owner or Consultant at end of project. Forms to be developed and submitted to Owner or Consultant for approval prior to use.
- .7 Owner or Consultant has the authority to assign a quality assurance designate to perform testing on concrete used.

3.5 TOLERANCES

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

3.6 EXPANSION AND CONTRACTION JOINTS

- .1 Install tooled transverse contraction joints after floating, when concrete stiff, but still plastic, at intervals of 1.5 m for sidewalk.
- .2 Install control saw cuts at 3.0 m for curb once concrete surface has cured. Saw cut shall be 6 mm wide and 25 mm deep.
- .3 Install expansion joints at intervals of 6 m.
- .4 When sidewalk adjacent to curb, make joints of curb, gutters and sidewalk coincide.

3.7 ISOLATION JOINTS

- .1 Install isolation joints around manholes and catch basins and along length adjacent to

concrete curbs, catch basins, buildings, or permanent structure.

.2 Install joint filler in isolation joints as indicated.

.3 Seal isolation joints with sealant.

3.8 CURING

.1 Cure concrete by adding moisture continuously in accordance with CSA-A23.1/A23.2 to exposed finished surfaces for minimum 1 day after placing, or sealing moisture in by curing compound.

.2 Where burlap used for moist curing, place two prewetted layers on concrete surface and keep continuously wet during curing period.

.3 Apply curing compound evenly to form continuous film, in accordance with manufacturer's requirements.

3.9 BACKFILL

.1 Allow concrete to cure for 7 days prior to backfilling.

.2 Backfill to designated elevations with material as directed by Owner or Consultant.

.1 Compact and shape to required contours.

3.10 ADDITIONAL GENERAL REQUIREMENTS

.1 Water is not to be added to the concrete other than at the batch plant.

.2 Maximum time limit from batching to placing of concrete is 120 minutes.

.3 Concrete to be retested for conformance to air content when more than 90 minutes have elapsed since batching.

.4 Aggregates that are suspected to be reactive to alkali in cement are not to be used.

.5 Only air entrainment agent admixture can be added to the concrete mix. Other admixtures can be added only with the approval of the Owner or Consultant.

.6 Under adverse weather conditions, arrangement acceptable to the Owner or Consultant shall be made to prevent damage to fresh concrete. All curb and sidewalk are to be protected until completion and final acceptance of the Work.

.7 For extreme temperatures below 5 degrees Celsius or above 27 degrees Celsius, adequate protection of the concrete shall be provided for the duration of the required curing period.

.1 During cold weather, adequate protection of the concrete shall be provided by means of heated enclosures, coverings, insulation, or suitable combination.

.2 During hot weather, adequate protection of the concrete shall be provided by means of water spray or saturated absorptive fabrics.

.8 Concrete operations shall be completed by October 15 unless approved by the Owner or Consultant.

- .9 Any curb or sidewalk that needs to be replaced, is to be done from joint to joint.
- .10 Concrete sidewalk to be 100 mm in height, 150 mm across residential driveways and 200 mm across commercial/industrial/institutional driveways.
- .11 Control joints shall be placed at the bottom of the transition at each side and at the centre of driveway entrances.
- .12 Concrete curb and sidewalk to be depressed at driveway entrances, pedestrian crosswalks and other locations directed by Owner or Consultant.
- .13 Height of depression:
 - .1 Curb at driveway entrances to be 20 mm maximum above finished asphalt.
 - .2 Curb at access ramps shall be flush with finished asphalt.
- .14 Width of depressed curb and sidewalk to be as shown on respective Drawings.
- .15 Access to properties once concrete has attained sufficient strength is to be done immediately by Contractor and maintained until asphalt reinstatement is completed.
- .16 All curb or curb and gutter with a length greater than 20 m is to be placed by means of slipforming.
- .17 Curb and sidewalk shall be protected from all elements, including vandalism until completion of the Contract. Curb and sidewalk damaged before Final Acceptance of the Work shall be removed and replaced by the Contractor at no additional cost to the Owner.

3.11 CLEANING

- .1 Refer to Section 01 00 00 – Project Specific General Requirements.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

- .1 This Section specifies the requirements for supplying and installing various items including concrete, chain link fence fabric, posts, braces and rails, tie wire fasteners, gates and gate frames, finishes, etc. as shown on the Drawings.

1.2 REFERENCE STANDARDS

- .1 ASTM A53/A53M-22, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- .2 ASTM A653/A653M-22, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .3 ASTM C618-22, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- .4 CAN/CGSB-138.1-96, Fabric for Chain Link Fence.
- .5 CAN/CGSB-138.2-96, Steel Framework for Chain Link Fence.
- .6 CAN/CGSB-138.3-96, Installation of Chain Link Fence.
- .7 CAN/CGSB-138.4-96, Gates for Chain Link Fence.
- .8 CSA-A3000-18, Cementitious Materials Compendium.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to Site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
- .1 Store materials in accordance with manufacturer's recommendations.
 - .2 Store and protect pipes from damage.
 - .3 Replace defective or damaged materials with new.

1.4 MEASUREMENT FOR PAYMENT

- .1 Payment shall be made per metre (m) of fence which includes the supply of all necessary materials, labour, and equipment for the supply and installation of all fencing, including, grading (cuts or fills), foundation excavation, and concrete footings whether in rock or common material.

- .2 Payment for gates shall be made under a unit price basis which includes the supply of all necessary materials, labour and equipment for the supply and installation of gates, including grading (cuts or fills), foundation excavation, and concrete footings whether in rock or common material.

2 PRODUCTS

2.1 MATERIALS

- .1 Concrete mixes and materials:
- .1 Nominal coarse aggregate size: 20-5.
 - .2 Compressive strength: 20 MPa minimum at 28 days.
 - .3 Additives: fly ash to CSA A3000 and ASTM C618.
- .2 Chain-link fence fabric: to CAN/CGSB-138.1.
- .1 Refer to CAN/CGSB-138.1 tables 2, 3 and 4 for type, class, style and grade desired.
 - .2 Type 1, Class A, style 2, Grade 2 constructed of 3.5 mm steel wire in a 50 mm mesh.
 - .3 Height of fabric: as indicated in design drawings.
- .3 Posts: to CAN/CGSB-138.2, 60 mm outside diameter (O.D), hot dipped galvanized steel pipe with 4 mm wall thickness, schedule 40 and complete with galvanized metal caps.
- .4 Top Rails: to CAN/CGSB-138.2, 43 mm outside diameter (O.D), hot dipped galvanized steel pipe with 3.6 mm wall thickness, schedule 40 and complete with sleeves that allow contraction and expansion. Stretcher bands must be steel bands (3 m x 19 mm) or aluminum bands (5 m x 19 mm). Stretcher bars must be 3 m x 19 mm.
- .5 Terminal and Gate Posts: to CAN/CGSB-138.2, 89 mm outside diameter (O.D), hot dipped galvanized steel pipe with 5.5 mm wall thickness, Schedule 40 and complete with galvanized metal caps and stretching bands and bars for attaching the fabric to the posts and bands for attaching the braces.
- .6 Braces: to CAN/CGSB-138.2. Gate, corner and end posts shall be braced by a centre rail of the same material as the top rail, between the gate corner, or end post and the next post.
- .7 Top and bottom tension wire: to CAN/CGSB-138.2, single strand, electro-galvanized steel wire.
- .8 Tie wire fasteners: steel wire.
- .9 Tension bar: to ASTM A653/A653M, 5 x 20 mm minimum galvanized steel.
- .10 Gates: to CAN/CGSB-138.4.
- .11 Gate frames: to ASTM A53/A53M, galvanized steel pipe, 43 mm outside diameter pipe for outside frame, 35 mm outside diameter pipe for interior bracing and all schedule 40.
- .1 Fabricate gates as indicated with electrically welded joints, and hot dip galvanized after welding.
 - .2 Fasten fence fabric to gate with twisted selvage at top.

- .3 Furnish gates with galvanized malleable iron hinges, latch and latch catch with provision for padlock which can be attached and operated from either side of installed gate.
- .4 Furnish double gates with chain hook to hold gates open and centre rest with drop bolt for closed position.
- .5 Gates over 4.4 m² in area shall have diagonal bracing, 33 mm O.D., schedule 40, hot dip galvanized and welded at joints.
- .12 Fittings and hardware: to CAN/CGSB-138.2, galvanized steel.
 - .1 Tension bar bands: 3 x 20 mm minimum galvanized steel or 5 x 20 mm minimum aluminum.
 - .2 Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail.
 - .3 Overhang tops to provide waterproof fit, to hold top rails.
- .13 Grounding rod: 16 mm diameter copper well rod, 3 m long.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for fence and gate installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Owner or Consultant.
 - .2 Inform Owner or Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

- .1 Supply and install temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- .4 Grading:
 - .1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.
 - .1 Provide clearance between bottom of fence and ground surface of 30 mm to 50 mm.

3.3 ERECTION OF FENCE

- .1 Erect fence along lines as indicated and to CAN/CGSB-138.3.
- .2 Excavate post holes to dimensions indicated.
- .3 Space line posts 3 m apart, measured parallel to ground surface.
- .4 Space straining posts at equal intervals not to exceed 150 m if distance between end or corner posts on straight continuous lengths of fence over reasonably smooth grade, is greater than 150 m.
- .5 Install additional straining posts at sharp changes in grade.
- .6 Install corner post where change in alignment exceeds 10 degrees.
- .7 Install end posts at end of fence and at buildings.
 - .1 Install gate posts on both sides of gate openings.
- .8 Place concrete in post holes then embed posts into concrete to depths indicated.
 - .1 Extend concrete 50 mm above ground level and slope to drain away from posts.
 - .2 Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.
- .9 Install fence fabric after concrete has cured, minimum of 5 days.
- .10 Install brace between end and gate posts and nearest line post, placed in centre of panel and parallel to ground surface.
 - .1 Install braces on both sides of corner and straining posts in similar manner.
- .11 Install overhang tops and caps.
- .12 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.
- .13 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.
- .14 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300 mm intervals.
 - .1 Knuckled selvedge at bottom.
 - .2 Twisted selvedge at top.
- .15 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 450 mm intervals.
 - .1 Give tie wires minimum two twists.
- .16 Install grounding rods as indicated on Drawings.

3.4 INSTALLATION OF GATES

- .1 Install gates in locations as indicated on Drawings.

- .2 Level ground between gate posts and set gate bottom approximately 40 mm above ground surface.
- .3 Determine position of centre gate rest for double gate.
 - .1 Cast gate rest in concrete as directed by Owner or Consultant.
 - .2 Dome concrete above ground level to shed water.
- .4 Install gate stops where indicated on Drawings.

3.5 TOUCH UP

- .1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas as indicated.
- .2 Pre-treat damaged surfaces according to manufacturers' instructions for zinc-rich paint.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

- .1 This section specifies the requirements for supplying all tools, labour, equipment and materials required to restore the site to its original condition as shown on the drawings and/or as ordered all in accordance with this specification.
- .2 Reshaping of disturbed surfaces is to be completed and approved prior to the placement of the topsoil and sod.

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 00 00 – Project Specific General Requirements and with manufacturer's written instructions.

1.3 MEASUREMENT FOR PAYMENT

- .1 Preparation of sub-grade for placing of topsoil will not be measured for payment.
- .2 Measurement shall be made for supplying, placing and spreading topsoil in cubic metres as determined from actual surface area covered and depth of topsoil specified.
- .3 Measurement shall be made for supplying and placing sod in square metres as determined from actual surface area covered.
- .4 Measurement shall be made for supplying and placing hydroseed in square metres as determined from actual surface area covered.
- .5 No payment will be made for watering and fertilizing of lawned areas as required;
- .6 No payment will be made for returning the following spring to fertilize.

2 PRODUCTS

2.1 TOPSOIL

- .1 Shall be fertile, friable soil, reasonably free from subsoil, clay lumps, stones, roots, weeds or other objectionable materials. Contain no toxic elements or growth inhibiting materials.
- .2 Finished surface free from:
 - .1 Debris and stones over 50 mm diameter.
 - .2 Coarse vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

- .3 Consistency: friable when moist.

2.2 SOD

- .1 Sod Shall be # 1 Canada Nursery Sod cut at the source with approved and appropriate equipment to ensure an even thickness of 25mm to 38mm. The cut edge shall be clean and vertical.

2.3 HYDROSEED MIXTURE

- .1 The mixture to be used for hydroseeding shall contain the following elements:

- .1 Grass seed -135 kilograms per hectare
- .2 Approved Mulch - 1350 kilograms per hectare
- .3 Fertilizer sufficient to promote a densely matted growth.
- .4 Organic base adhesive - 45 kilograms per hectare

2.4 FLEXIBLE REINFORCED MATRIX (FRM)

- .1 Acceptable FRM products:

- .1 Flexterra (FRM), as manufactured by Profile Products
- .2 Flex Guard (FRM), as manufactured by Mat Inc.

3 EXECUTION

3.1 EXAMINATION

- .1 Lawned areas shall be restored within three (3) weeks of disturbance unless otherwise approved in writing. Lawn restoration shall be completed by an approved landscaping contractor.
- .2 Application of the FRM shall be in accordance with the manufacturer's recommended procedures.
- .3 The Contractor is to notify the Consultant 48 hours prior to placement of the FRM.

3.2 PREPARATION OF EXISTING GRADE

- .1 Verify that grades are correct.
 - .1 If discrepancies occur, notify Owner or Consultant and do not start work until instructed by Owner or Consultant.

- .2 Grade soil, eliminate uneven areas and low spots, ensure positive drainage.
- .3 Remove debris, roots, branches, stones in excess of [50] mm diameter and other deleterious materials.
 - .1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
 - .2 Remove debris which protrudes more than [75] mm above surface.
 - .3 Dispose of removed material off site.

3.3 PLACING AND SPREADING OF TOPSOIL

- .1 Place topsoil after Owner has accepted subgrade.
- .2 Keep topsoil 15mm below finished grade for sodded areas.
- .3 Spread topsoil to 100mm minimum depth after settlement.
- .4 Manually spread topsoil/planting soil around trees, shrubs and obstacles.
- .5 Avoid spreading or grading in wet, frozen, or saturated state.

3.4 FINISH GRADING

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

3.5 PLACING OF SOD

- .1 After the area to be sodded has been top soiled as outlined above, the sod shall be laid lengthwise across the length of a slope. Sod shall be placed tightly together without gaps to eliminate surface area for weed growth. Joints in adjacent rows shall best staggered. If necessary, sod shall be cut to nearly match adjoining existing lawn areas. In no case shall sod be placed over existing grass. Sod shall be pounded to form a smooth uniform surface. On slopes greater than 3:1, every sod in the bottom three rows shall be pegged, and in every third row above, with pegs driven flush with the sod. During the establishment period, any break which may occur through slipping of sod shall be removed and replaced. No sod shall be laid when in a frozen condition or upon frozen ground.
- .2 During this period, any break which may occur through slipping of sod shall be removed and replaced. No sod shall be laid when in a frozen condition or upon frozen ground.
- .3 The Contractor shall water sodded areas in sufficient quantities and at a 'Frequency required to maintain optimum soil moisture condition to a depth of 75mm to 100mm until such times as the sod is established. Any sod which turns yellow shall be replaced

immediately.

- .4 Any sodded area which fails to grow satisfactorily shall be repaired at the Contractor's expense until such growth is achieved

3.6 WARRANTY

- .1 Areas hydroseeded in the fall shall be fertilized the following spring with a slow release nitrogen fertilizer (25-15-10 or equivalent) at a rate of 3.65 grams per square metre. The area to be fertilized shall be examined prior to fertilizing and any bare patches re-seeded prior to application of fertilizer. Re-seeding and fertilizing shall be completed by May 15th of the following construction year.
- .2 Any hydroseeded area which fails to grow satisfactorily shall be repaired at the Contractor's expense until such growth is achieved. End-of-warranty inspection will be conducted by Owner or Consultant.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

- .1 This Section includes the requirements for supplying and installing precast concrete manholes, catch basins and valve chambers as shown on the associated drawings.

1.2 REFERENCE STANDARDS

- .1 ASTM A48/A48M-22, Standard Specification for Gray Iron Castings.
- .2 ASTM A536-84(2019)e1, Standard Specification for Ductile Iron Castings.
- .3 ASTM C109/C109M-21, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens)
- .4 ASTM C139-17, Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes
- .5 ASTM C191-21, Standard Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle
- .6 ASTM C478/C478M-22, Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
- .7 ASTM C827/C827M-16, Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures
- .8 ASTM C882/C882M-20, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear
- .9 ASTM C920-18, Standard Specification for Elastomeric Joint Sealants.
- .10 ASTM D698-00, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- .11 COE CRD C 588, 1997 Edition, Corps of Engineers Specification for Nonshrink Grout.
- .12 COE CRD C 621, 1998 Edition, Corps of Engineers Spec. for Non-Shrink Grout.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for manholes, catch basin and valve chambers and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Shop Drawings: Refer to Section 01 00 00 – Project Specific General Requirements.

1.4 QUALITY ASSURANCE

.1 Certifications:

- .1 Submit manufacturer's test data and certification at least ten (10) working days prior to beginning Work. Include manufacturer's drawings, information and shop drawings where pertinent.
- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Manufacturer's instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures, etc.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to Site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and handling requirements:
 - .1 Store materials in accordance with manufacturer's recommendations.
 - .2 Store and protect manholes, catch basins and valve chambers from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.6 MEASUREMENT FOR PAYMENT

- .1 Measurement for payment shall be the total number of complete manholes, catch basins and valve chambers of each unit installed, or adjusted. The unit price shall include all labour, materials and equipment necessary for the full completion of the Work, including excavation, backfill, compaction, installation of the adjustable or standard frame, cover or grate, as well as other work described in this Specification.
- .2 Measurement for payment for adjustment of existing structures with adjustable frames and covers shall be made on a per unit basis. The price shall include all labour, materials and equipment, including asphalt placement underneath the flange of the inner frame, to adjust the structure to the required elevations.
- .3 Measurement for payment for adjustment of existing structures with standard frame and covers shall be on a unit basis. The price shall include all labour, materials and equipment, including asphalt padding around frame, to adjust structure to required elevations.
- .4 Measurement for payment for adjustment of existing structures with standard frame and covers shall be on a unit basis. The price shall include all labour, materials and equipment, including asphalt padding around frame, to adjust structure to required elevations.
- .5 All structures other than new structures, shall be measured for adjustment, even when rebuilding must take place.
- .6 Measurement for payment for additional height for rebuilding structures with standard

frames and covers shall be on a vertical lineal measurement basis. It shall be measured from the top of the undisturbed surface of the structure to the bottom of the frame less 50 mm. Payment for the top 50 mm is included in the unit price of adjustment.

- .7 The "collaring", permanent or temporary, of the adjusted standard frames and covers with asphalt concrete shall be considered incidental to the Contract and no additional payment shall be made for any labour, materials or equipment, including asphalt concrete. Asphalt thickness for this purpose shall be a minimum of 75 mm.
- .8 In high volume traffic areas, streets are to be returned to normal use after each day's work by the Contactor, as directed by the Owner or Consultant. Temporary asphalt concrete collaring of standard frames and covers for this purpose shall also be considered incidental to the Contract, as specified with respect to "collaring" above.
- .9 Measurement for payment for frame and cover cushions shall be made on a per unit basis.

2 PRODUCTS

2.1 MATERIALS

- .1 Precast manhole units: to ASTM C 478M, circular:
 - .1 Top section flat slab top type with opening offset for vertical ladder access.
 - .2 Intermediate sections to diameter specified and to the depth required.
 - .3 Base section to be precast concrete with reinforced concrete slabs within. Sanitary manhole bases to have cast in wedge-type gasket or approved equivalent to suit outside diameter (OD) of each inlet and outlet pipes.
 - .4 Base sections for sanitary manholes to be pre-benched during manufacturing. Storm manholes to be inside flat bottom.
- .2 Precast catch basin sections: to ASTM C139 and ASTM C478M:
 - .1 Catch basins to be type and size as indicated with precut holes of size to fit OD of inlets and outlets.
 - .2 Catch basin for single pipe outlet to be 750 mm diameter and top section, intermediate section to be all included in one piece.
 - .3 All catch basins shall have sumps provided in concrete bases and shall be 300 mm unless otherwise indicated.
- .3 Precast valve chambers: to ASTM C139 and ASTM C478M:
 - .1 Valve Chambers to be type and standard size of 1200 mm diameter unless otherwise indicated.
 - .2 Top section flat slab top type with opening centered for plumb vertical access to valve operating nut.
 - .3 Intermediate sections to diameter specified and to the depth required.
 - .4 Intermediate sections to be set on reinforced concrete pads. Size of pads to be 1524 mm x 406 mm x 203 mm unless oversize required for larger valve chambers.

- .4 Joints: made watertight using O-ring gaskets and sealed with 19 mm x 9.5 mm butyl rubber sealant:
 - .1 Sealant Conseal CS102.
 - .2 Single offset gasket.
 - .3 Approved equivalent.
- .5 Grade and adjusting rings:
 - .1 Adjusting rings to be manufactured from expanded polypropylene (EPP).
 - .2 Each unit to have grade rings, finished ring and angle ring. Angle only required on sloping surfaces.
 - .3 Finished grade to be within 6 mm of finished grade.
 - .4 EPP material shall be capable of supporting frame and grate/cover in all traffic loading conditions.
 - .5 EPP material shall be chemical and corrosion resistant in sanitary and storm sewer environments.
 - .6 Acceptable Products:
 - .1 Pro-Ring by Cretex.
 - .2 Approved equivalent.
- .6 Mortar and grout:
 - .1 Mortar:
 - .1 Mortar to be quick set, high strength, non-shrink polymer modified Cementitious mortar meeting ASTM C109 for compressive strength. and C-78 for flexural strength and ASTM C882 for Slant Shear Bond Strength.
 - .2 Mortar shall not contain any chlorides, gypsums, plasters, iron particles, aluminum powder or gas-forming agents and shall not promote corrosion of any metal in contact with.
 - .3 Acceptable products:
 - .1 Octocrete by IPA Systems.
 - .2 Approved equivalent.
 - .2 Grout:
 - .1 Grout to be a premixed, non-metallic, high strength, non-shrink grout which meets the requirements of ASTM C191 and ASTM C827 as well COE CRD C 588 and COE CRD C 621.
 - .2 Grout shall have a minimum one-day strength of 6000 psi (41 MPa) and a 28-day strength of 9000 psi (62 MPa).
 - .3 Acceptable Products:
 - .1 PennGrout by IPA Systems.

- .2 Approved equivalent.
- .7 Adhesive/Sealant:
 - .1 Each EPP grade ring, adjusting ring and finish ring are to be made watertight with M-1 Structural adhesive/sealant between each ring.
 - .2 Adhesive/Sealant to meet the following:
 - .1 ASTM C920, Type S, Grade NS, Class 25, Uses NT, T, M, G, A and O.
- .8 Frames, gratings, covers to dimensions as indicated and following requirements:
 - .1 On Streets Manhole/Valve Chamber Frames and Covers
 - .1 Adjustable manhole frames and covers shall meet the requirements of the latest ASTM A536 for ductile iron castings or ASTM A48, Class 30, for cast iron castings, and to be CSA approved.
 - .2 Castings to be coated with two applications of asphalt varnish sand blasted or cleaned and ground to eliminate surface imperfections.
 - .3 Manhole covers shall be complete with two 20 mm found lifting holes.
 - .4 Manhole frames: Top of manhole guide frame to be set level to top of subgrade.
 - .5 Frames and covers shall be resilient seated seat with conical guide.
 - .6 Covers for manhole and gate valve to be 624 mm diameter and for air valve cover to be 775 mm diameter.
 - .7 Gate Valve cover to have 125 mm center button for access to valve nut.
 - .2 Off Streets Manhole/Valve Chamber Frames and Covers
 - .1 Standard manhole frames and covers shall meet the requirements of the latest ASTM A48, Class 30, for cast iron castings.
 - .2 Castings to be coated with two applications of asphalt varnish sand blasted or cleaned and ground to eliminate surface imperfections.
 - .3 Manhole covers shall be complete with two 20 mm found lifting holes.
 - .4 Covers for manhole and gate valve to be 635 mm diameter and for air valve cover to be 749 mm diameter.
 - .5 Gate Valve cover to have 125 mm center button for access to valve nut.
 - .3 Catch Basin Frames and Grates
 - .1 Standard catch basin frames and grates shall meet the requirements of the latest ASTM A48, Class 30, for cast iron castings.
 - .2 Castings to be coated with two applications of asphalt varnish sand blasted or cleaned and ground to eliminate surface imperfections.

- .3 Flat and pyramid style grates to be 610 mm square.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Contracts are acceptable for manholes, valve chambers and catch basin structures installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Owner or Consultant.
- .2 Inform Owner or Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 EXCAVATION AND BACKFILL

- .1 Excavate and backfill in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling and as indicated.
- .2 Obtain approval of Owner or Consultant before installing, manholes, valve chambers or catch basins.

3.3 INSTALLATION

- .1 Construct units in accordance with details indicated, plumb and true to alignment and grade.
- .2 Complete units as pipe laying progresses.
- .1 Maximum of 3 units behind point of pipe laying will be allowed.
- .3 Dewater excavation to approval of Owner or Consultant and remove soft and foreign material before placing concrete base.
- .4 Set precast concrete base on 150 mm minimum of granular bedding compacted to 95% corrected maximum dry density or maximum density to ASTM D698.
- .5 Precast units:
- .1 Set bottom section of precast unit in bedding material.
- .2 Make each successive joint watertight with approved single offset gaskets, O-ring gasket, bituminous compound, or combination of these materials.
- .3 Clean surplus mortar and joint compounds from interior surface of unit as work progresses.
- .4 Plug lifting holes with cement mortar or grout.
- .6 For sanitary sewers:
- .1 Bench to provide smooth U-shaped channel.

- .1 Side height of channel to be full diameter of sewer.
- .2 Slope adjacent floor at 1 in 20.
- .3 Curve channels smoothly.
- .4 Slope invert to establish sewer grade.
- .7 Compact granular backfill to 95% corrected maximum dry density or maximum density to ASTM D698.
- .8 Place frame and cover on top section to elevation as indicated.
 - .1 All manholes, valve chambers and catch basins to have a minimum of 100 mm and maximum of 300 mm in adjustment rings.
 - .2 If the flat top of the manhole, valve chamber or catch basin is not level or irregular, a mortar/grout bed is to be used to make level before placement of the first grade ring.
 - .3 The first grade ring is to be embedded in the mortar/grout bed before setting and level. If no mortar/grout is required, the first grade ring and all other rings are to be set with adhesive/sealant.
- .9 Clean units of debris and foreign materials.
 - .1 Remove fins and sharp projections.
 - .2 Prevent debris from entering system.
 - .3 Remove lifting devices and grout opening.

3.4 ADJUSTING TOPS OF EXISTING UNITS

- .1 Remove existing frames, covers and grates] and store for re-use at locations designated by Owner or Consultant.
- .2 Sectional units:
 - .1 Raise or lower straight walled sectional units by adding or removing precast sections as required.
 - .2 When amount of raise is less than 600 mm use EPP grade rings, mortar/grout and adhesive/sealant specified under section 2.1.
- .3 Re-use existing frames covers and gratings upon approval of Owner or Consultant.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

- .1 This section specifies the requirements for supplying and installing various diameters water main and water services. Work includes excavation, supply and installation of pipe, fittings, valves, restraints and cathodic protection, bedding materials, backfill, compaction and testing of pipe as shown on the Drawings.

1.2 REFERENCE STANDARDS

- .1 ANSI/AWWA C104/A21.4-16, Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
- .2 ANSI/AWWA C105/A21.5-18, Polyethylene Encasement for Ductile-Iron Pipe Systems.
- .3 ANSI/AWWA C110/A21.10-21, Ductile-Iron and Gray-Iron Fittings.
- .4 ANSI/AWWA C111/A21.11-17, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe Fittings.
- .5 ANSI/AWWA C151/A21.51-17, Ductile-Iron Pipe, Centrifugally Cast, for Water.
- .6 ANSI/AWWA C153/A21.53-19, Ductile-Iron Compact Fittings.
- .7 ANSI/AWWA C205-18, Cement-Mortar Protective Lining and Coating for Steel Water Pipe, 4 In. (100 mm) and Larger, Shop Applied.
- .8 ANSI/AWWA C208-17, Dimensions for Fabricated Steel Water Pipe Fittings.
- .9 ANSI/AWWA C502-18, Dry-Barrel Fire Hydrants.
- .10 ANSI/AWWA C509-15, Resilient-Seated Gate Valves for Water-Supply Service.
- .11 ANSI/AWWA C515, Underground Service Line Valves and Fittings.
- .12 ANSI/AWWA C600-17, Installation of Ductile-Iron Water Mains and Their Appurtenances.
- .13 ANSI/AWWA C651-14, Disinfecting Water Mains.
- .14 ANSI/AWWA C900-22, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In. (100 mm Through 1,500 mm).
- .15 ANSI/AWWA C905-01(2012), Standard Test Methods for Apparent Density of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
- .16 ANSI/AWWA C909-22, Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe, 4 In. (100 mm) and Larger.
- .17 ASTM B88M-20, Standard Specification for Seamless Copper Water Tube (Metric).
- .18 ASTM A307-21, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
- .19 ASTM F1674-18, Standard Test Method for Joint Restraint Products for Use with PVC Pipe.
- .20 ASTM C94/C94M-22a, Standard Specification for Ready-Mixed Concrete.

- .21 ASTM D698-00, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- .22 AWWA M17, M17: Fire Hydrants: Installation, Field Testing, and Maintenance, 2016.
- .23 CSA-A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

1.3 SCHEDULE OF WORK

- .1 Scheduling:
 - .1 Schedule Work to minimize interruptions to existing services.
 - .2 Submit schedule of expected interruptions for approval to the Owner or Consultant and adhere to interruption schedule as approved by Owner or Consultant.
 - .3 Notify Owner or Consultant minimum of 48 hours in advance of interruption in service.
 - .4 Do not interrupt water service for more than 8 hours and confine this period between 9:00am and 6:00pm local time unless otherwise authorized.
 - .5 Notify fire department of planned or accidental interruption of water supply to hydrants.
 - .6 Supply and post "Out of Service" sign on hydrant not in use.
 - .7 Advise local police department of anticipated interference with movement of traffic.
- .2 All materials that will come in contact with potable water must meet certification of NSF/ANSI Standard 61: Drinking Water System Components.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and acceptance requirements: deliver materials to Site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and handling requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect water distribution piping from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
 - .4 All water distribution piping ends to be covered (capped) until ready for installation.

1.5 MEASUREMENT FOR PAYMENT

- .1 Measurement for payment for watermain pipe and water service laterals shall be per metre (m) of completed pipe. The measurement of completed watermain and water service laterals shall include the supply of all labour, materials and equipment for excavation,

- disposal of unsuitable or surplus excavated material, shoring, dewatering, bedding, supply & installation of pipe, polyethylene encasement, backfilling, compaction, testing of pipe and all incidental items. The length of installed pipe shall be measured horizontally with no deduction for valves or fittings. Supply and installation of tracer wire is incidental and shall be considered as included in the Contract Unit Price for the item requiring tracer wire.
- .2 Measurement for payment for valves, valve boxes, bends, tees, hydrants, curb stops, corporation main stops complete with saddles, anodes, etc. shall be based on each unit, including all labour, materials and equipment required to properly supply and install these units. Payment shall include supply, excavation, dewatering, bedding, installation, thrust blocks, backfilling, plus all other incidental items.
 - .3 Measurement for payment for bell and spigot restrainers shall be based on each bell and spigot restrainer unit and shall include all items required to restrain a complete bell and spigot joint.
 - .4 For purpose of measurement, a hydrant shall be considered as all the material and labour necessary to supply and install the hydrant including the 150 mm gate valve, 130 mm valve box, the restraints, anchor tee, vertical piping and thrust blocks. Payment for the supply and installation of a hydrant extension, where required, will be on a per unit basis. Payment for the horizontal hydrant lead shall be made as watermain pipe. Payment shall include connecting the hydrant to the gate valve, the gate valve to the hydrant anchor tee, excavation and backfilling, polyethylene encasement of the vertical hydrant piping, and all incidental items.
 - .5 All labour, materials and equipment for the installation of corporation stops, saddles, anodes and flushings for testing and chlorinating as shown on the Contract Drawings shall be included in the Contract Unit Price of the pipe. If the initial bacteriological test fails, the City shall re-flush and clean the watermain in accordance with the latest AWWA C651 Standard. The Contractor shall pay for the re-flushing, cleaning, re-chlorinating, re-testing and any other associated costs. There will be no compensation for delays due to this testing procedure. Disinfection procedures when cutting into and connecting to existing watermains shall be considered as incidental to the Schedule of Quantities and Unit Prices, Division 4 of the Contract Specifications. Removal and off-site disposal of existing watermain and fittings outside of the normal trench excavation shall be measured for payment at the Contract Unit Prices for common excavation and backfill. Payment shall include excavation, removal, off-site disposal and backfilling of trench.
 - .6 Service box and/or curb stop renewals where existing water service lateral piping does not require renewal shall be measured for payment on a per unit basis including all excavation, backfilling, connections to existing and incidentals.
 - .7 There shall be no separate measurement for payment for thrust blocks. Include costs in items requiring thrust blocks with such items as bends, tees, caps, etc.
 - .8 There shall be no separate measurement for payment for restrainers. Include costs in items requiring restrainers with such items as valves, bends, tees, reducers, caps, etc.
 - .9 Measurement for payment for air valves shall be on a per unit basis for each complete valve installed including corporation main stops, saddles, nipples, etc., connection to watermain, chamber, insulation of chamber, complete with vent pipe assembly, as per the Standard Drawing.
 - .10 Measurement for payment for insulation shall be on a square metre (m²) basis and to be based on 50 mm thickness.

2 PRODUCTS

2.1 PIPE, JOINTS AND FITTINGS

.1 Water mains shall be:

- .1 Ductile iron pipe: to ANSI/AWWA C151/A21.51, pressure class 350 for cement mortar lined to ANSI/AWWA C104/A21.4 in all sizes.
- .2 All ductile iron in buried installation shall be polyethylene encased (wrapped) meeting the requirements of latest AWWA C105.
- .3 Ductile iron pipe for flanged ends: to ANSI/AWWA C151/A21.51, special class 54 for cement mortar lined to ANSI/AWWA C104/A21.4 in all sizes. Flanged pipe not to be used in buried applications.
- .4 Polyvinyl chloride pressure pipe: to ANSI/AWWA C900, pressure class 150, DR 18, cast iron outside diameter in sizes 100 mm to 300 mm.
- .5 Polyvinyl chloride pressure pipe: to ANSI/AWWA C905, class 235, DR 18, cast iron outside diameter in sizes 350 mm to 900 mm.
- .6 Molecularly Oriented Polyvinyl Chloride (PVCO): to ANSI/AWWA C909, pressure class 235 (100 mm to 450 mm), cast iron outside diameter.
- .7 Joints and fittings for.
 - .1 Joints ductile iron:
 - .1 Push-on joints: to ANSI/AWWA C111/A21.11.
 - .2 Rubber gasket for pipe joints: to ANSI/AWWA C111/A21.11.
 - .3 Rubber gasket for flange pipe joints 1.6 mm thick: to ANSI/AWWA C111/A21.11.
 - .4 Bolts, nuts, hex head with washers: to ASTM A307, heavy series.
- .8 Joints PVC:
 - .1 Push-on joints: watertight.
 - .2 Rubber gasket for mechanical pipe joints: to ANSI/AWWA C111/A21.11.
 - .3 Bell to be integral and homogeneous part of pipe.
- .9 Fittings:
 - .1 Mechanical joint cast iron and ductile iron fittings NPS 75 mm and larger: to ANSI/AWWA C110/A21.10.
 - .2 Flanged cast iron fittings NPS 75 mm and larger: to ANSI/AWWA C110/A21.10.
 - .3 Compact Fittings to ANSI/AWWA C153/A21.53.
 - .4 Pipe fittings: to ANSI/AWWA C208, cement mortar lined to ANSI/AWWA C205, and exterior protected with epoxy coated.

- .5 Fittings to include tee, crosses, bends, caps and couplings.
- .10 Hydrant anchor tees:
 - .1 Hydrant anchor tees to be mechanical joint swivel, ductile iron class 350 as per ANSI/AWWA C153/A21.53.
 - .2 Anchor tee: cement mortar lined to ANSI/AWWA C205, and exterior protected with epoxy coated.
 - .3 Acceptable products for hydrant anchor tee:
 - .1 Bibby Ste. Croix.
 - .2 Sigma.
 - .3 Star Pipe Products.
 - .4 Approved equivalent.

2.2 CATHODIC PROTECTION

- .1 Provide means of protection for ductile iron pipe with 8-mil poly wrap in accordance with ANSI/AWWA C105/A21.5.
- .2 Criteria for corrosion protection shall meet or exceed NACE RP0169.
- .3 Anode Corrosion Protection:
 - .1 All mechanical joint fittings including tees, crosses, bends, couplings, caps and valves 200 mm diameter or less to be protected with 5.5 kg zinc anode.
 - .2 All hydrants, corporation stop, curb stop, copper service longer than 20 meters and tees, crosses, bends, caps and valves greater than 200 mm but less than 350 mm to be protected with 11 kg zinc anode.
 - .3 Acceptable products for zinc anode suppliers are:
 - .1 Interprovincial Corrosion Control.
 - .2 Corrosion Services.
 - .3 Exothermal Industries.
 - .4 Integrity Anode Corporation.
 - .5 Bren Technologies Inc.
 - .4 Anodes shall be installed by wrapping around bolts and securing with a second nut.
 - .5 Anti-corrosion petrolatum paste, mastic and tape:
 - .1 Shall be applied on all fittings greater than 300 mm.
 - .2 Prior to applying the paste, surface of fittings to be free of loose coating, rust soil, and any other foreign matter.
 - .3 Technique for applying paste, mastic and wrap is to be followed as per manufacture specifications.

.4 Acceptable products for petrolatum paste, mastic and tape systems are as follows:

- .1 Petro Coating Systems.
- .2 PetroWrap.
- .3 STAC.
- .4 Trenton.
- .5 Denso.
- .6 PetroGuard.
- .7 Approved equivalent.

2.3 VALVES AND VALVE BOXES

.1 Gate Valves:

- .1 Gate valves to open counterclockwise.
- .2 Gate valves to be complete with steel tee bolts and nuts and a 50 mm square operating nut.
- .3 Gate Valves are to be used in all valves up to and including 300 mm diameter. Valves for sizes greater than 300 mm are to be determined at time of design.
- .4 All gate valves to be Factory Mutual (FM) approved and ULC listed.
- .5 Gate valves: to be resilient seated conforming to ANSI/AWWA C509 or C515, epoxy coated interior and exterior, standard cast iron body, brass mounted wedge valves encapsulated with rubber, non-rising stems, suitable for 1 Pa with mechanical joints.
- .6 Acceptable products for gate valves are as follows:
 - .1 Clow Model 2639/2640.
 - .2 Mueller Model 2361.
 - .3 Approved equivalent.

.2 Air and vacuum release valves:

- .1 Heavy duty combination air release valves employing direct acting kinetic principle.
- .2 Fabricate valves of cast iron body and cover, with bronze trim, stainless steel floats with shock-proof synthetic seat suitable for 1034 kPa working pressure.
- .3 Valves to expel air at high rate during filling, at low rate during operation, and to admit air while line is being drained.
- .4 Valve complete with surge check unit.
- .5 Unless otherwise specified, inlet shall be 50 mm (large) and outlet 2.3 mm (Small).
- .6 Refer to standard detailed drawing for connection to pipe by saddle, corporation stop for isolation, venting and chamber.
- .7 All air and vacuum release valves to be 50 mm unless otherwise noted.
- .8 Acceptable products for air and vacuum release valves are as follows:

- .1 Apco Valve Model 145C.
 - .2 Val-Matic Model 202C.2.
 - .3 Crispin Valve UL Series Model UL20.
 - .4 Vent-O-Mat Model 050 RBX 2521.
 - .5 Approved equivalent.
- .3 Cast iron valve boxes:
- .1 Three piece sliding type adjustable over minimum of 450 mm.
 - .2 Base to be large round type with minimum diameter of 300 mm complete with centering disc.
 - .3 Top of box to be marked "WATER".
 - .4 Size of box to be 130 mm.
 - .5 Acceptable products for valve boxes are as follows:
 - .1 Bibby Ste-Croix.
 - .2 Mueller Canada.
 - .3 Star Pipe Canada.
 - .4 Approved equivalent.

2.4 SERVICE CONNECTIONS

- .1 Copper tubing: to ASTM B88M type K seamless, annealed.
- .2 All residential single-family homes to be 25 mm diameter. Copper tubing to be used up to and including 50 mm diameter for service connections requiring large than 25 mm.
- .3 For services greater than 50 mm, pipe to be as per section 2.01.
- .4 Brass corporation stops:
 - .1 Outlet connection having compression type and inlet having standard corporation threads to ANSI/AWWA C800.
 - .2 Acceptable products for brass corporation stops are as follows:
 - .1 Bibby Ste-Croix.
 - .2 Mueller Canada.
 - .3 Star Pipe Canada.
 - .4 Approved equivalent.
- .5 Brass curb stops:
 - .1 Compression type without drains.
 - .2 Curb stops to have 105 mm diameter adjustable cast iron service box located at the

street/property line.

.3 Top of cast iron box marked "WATER".

.4 Acceptable products for brass curb stops are as follows:

.1 A.Y. MacDonald Mfg. Co.

.2 Mueller Canada Series B25209.

.3 Cambridge Brass, Model No. 202.

.4 Ford Meter Box Company, Inc.

.5 Approved equivalent.

.6 Service Saddles:

.1 Service saddles for PVC DR18 pipe:

.1 Service connections less than 50 mm: require corporation stop, connected to main complete with double strap stainless service saddle.

.2 Service saddle to consist of circumferential band type complete with side bars and fingers, keeper bar, stud bolts, nuts, washers and gaskets.

.3 Saddle to be cast iron supplied with fusion-bonded epoxy or nylon coating.

.4 Saddles to have a minimum working pressure of 1034 kPa.

.5 Acceptable products for service saddles connected to PVC DR18:

.1 Robar 2506.

.2 Romac 202NS.

.3 Ford FC202.

.4 Approved equivalent.

.2 Service saddles for Molecularly Oriented Polyvinyl Chloride (PVCO) pipe:

.1 Service connections for 50 mm or less: require corporation stop, connected to main complete with full body single piece stainless service saddle.

.2 Service saddle to consist of full body circumferential band type complete with side bars and fingers, keeper bar, stud bolts, nuts, washers and gaskets.

.3 Saddle to be fully passivated for corrosion protection.

.4 Saddles to have a minimum working pressure of 1034 kPa.

.5 Acceptable products for service saddles connected to Molecularly Oriented Polyvinyl Chloride (PVCO) pipe 100 mm to 300 mm:

.1 Cambridge Brass model 8403/8407.

.2 Robar model 2616/2626.

.3 Approved equivalent.

.3 Service saddles for Pressure Class 350 Ductile Iron (DI) pipe:

- .1 Service connections 50 mm or less: require corporation stop, connected to main complete with double strap stainless service saddle.
- .2 Service saddle to consist of circumferential band type complete with side bars and fingers, keeper bar, stud bolts, nuts, washers and gaskets.
- .3 Saddle to be cast iron supplied with fusion-bonded epoxy or nylon coating.
- .4 Saddles to have a minimum working pressure of 1034 kpa.
- .5 Acceptable products for service saddles connected to DI PC350 pipe:
 - .1 Robar 2506.
 - .2 Romac 202NS.
 - .3 Ford FC202.
 - .4 Approved equivalent.
- .4 Service connections greater than 50mm: Use tee fitting and gate valve or tapping valve and sleeve.

2.5 FIRE HYDRANTS

- .1 Fire Hydrants: Compression type hydrant complete with safety flange, to CAN/ULC-S520, designed for minimum working pressure of 1034 kPa with two 65 mm threaded hose outlets, one 100 mm threaded pumper connection, 150 mm riser barrel, 125 mm bottom valve and 150 mm connection for main.
 - .1 Fire Hydrants to open counterclockwise, threads to local standard, fittings to be internal lug quick-connect to CAN/ULC-S543. Provide metal caps and chains.
 - .2 Provide key operated gate valve open counterclockwise located at hydrant anchor tee.
 - .3 Depth of bury 1.95 m unless otherwise greater in specified design.
 - .4 Fire Hydrants and connections shall be in accordance with the latest AWWA C502, ULC and FM Standards.
 - .5 Drain holes in the fire hydrant boot shall be permanently plugged internally.
 - .6 Acceptable products for Fire Hydrants:
 - .1 Canada Valve Century.
 - .2 Clow Brigadier M-67.
 - .3 Mueller Modern Centurion.
 - .4 Approved equivalent.

2.6 COUPLINGS

- .1 In all cases where full mechanical joint gray-iron or ductile iron couplings combined with mechanical joint restraints can be used, they are to be the preferred coupling system.

- .2 If sleeve style coupling is required, acceptable coupling will require Owner or Consultant approval before use.

2.7 PIPE RESTRAINTS FOR MECHANICAL JOINTS AND THRUST BLOCKS

- .1 Pipe restraints: Pipe restraints to be used on all mechanical joints:
 - .1 Pipe restraints to be used in combination with thrust blocks on all tees, crosses, bends, couplings, caps, fire hydrants, etc.:
 - .1 Pipe restraints to be cast iron supplied with fusion-bonded epoxy.
 - .2 Pipe restraints to have a minimum working pressure of 1034 kPa.
 - .3 Pipe restraints shall be in accordance with latest addition of ASTM F1674.
 - .4 Pipe restraints to have a minimum working pressure of 1034 kPa.
 - .2 Pipe restraints acceptable products for PVC DR18 pipe:
 - .1 Clow 300 C restrainer.
 - .2 EBAA IRON Series 2000 PV.
 - .3 Uni-Flange Series 1300/1500.
 - .4 Sigma One-Lok SLC Series.
 - .5 Star Pipe Products PVC Stargrip Series 4000.
 - .6 Star Pipe Products PVC Ring Lock Series 3500.
 - .7 Clow TUFGRIP Dual Wedge Restraint (Universal).
 - .8 Approved equivalent.
 - .3 Pipe restraints acceptable products for ductile iron pipe:
 - .1 EBAA IRON Series 1100.
 - .2 Romac Industries RomaGrip.
 - .3 Sigma One-Lok SLD Series.
 - .4 Star Pipe Products PVC Stargrip Series 3000.
 - .5 Clow TUFGRIP Dual Wedge Restraint (Universal).
 - .6 Approved equivalent.
 - .4 Pipe restraints acceptable products for PVCO pipe:
 - .1 Clow TUFGRIP Dual Wedge Restraint (Universal).
 - .2 Approved equivalent.
- .2 Concrete thrust block:
 - .1 Cast-in-place thrust blocks shall be installed on all tees, bends, crosses, caps, fire

hydrants, etc.

- .2 Thrust block design and dimensions shall be as shown on the Drawings.
- .3 All thrust blocks shall bear against undisturbed soil.
- .4 All concrete used for thrust blocks shall be ready-mix concrete from supplier certified under ASTM C94 and CSA-A23.1.
- .5 Concrete used for thrust blocks to be 32 Mpa at 28 days.
- .6 Prior to pouring concrete thrust block, place 8 mil poly barrier around fitting. Fitting bolts, nuts and washers to be accessible after the thrust block has been poured.

2.8 INSULATION

- .1 Extruded polystyrene foam insulation board for watermains and service laterals is to be used when depth of cover of 1.8 m cannot be achieved and when crossing under or over storm sewers. Acceptable products for foam board insulation are as follows:
 - .1 Styrofoam HI 40.
 - .2 Foamular 400.
 - .3 Approved equivalent.
- .2 Curved insulation to be used on valve chambers, combination air valve chambers and other specified locations.
 - .1 Expanded polystyrene insulation with woven white polypropylene radiant blocker facing, laminated both sides of core.
 - .2 White Laminated facing to be treated for acid and UV resistance.
 - .3 Board to have a bursting strength of 172 lbs/sq. inch.
 - .4 The facing shall extend beyond the edge forming a self-adhesive overlap flap.
 - .5 Acceptable products for cured insulation board is as follows:
 - .1 P2000 Insulation Systems.
 - .2 Approved equivalent.

2.9 TRACER WIRE

- .1 Tracer wire will be required on all PVC and PVCO main line distribution pipe and PVC and PVCO fire hydrant leads.
- .2 Tracer wire shall be RWU90, 10-gauge (AWG), single strand, insulated copper wire with cross-linked polyethylene (XLPE) insulation, specifically manufactured for direct bury applications.
- .3 All spliced or repaired wire connections in the tracer wire system shall be made using appropriate connectors. Acceptable products for connectors are as follows:
 - .1 DryConn Direct Bury Lug-Aqua connectors.

- .2 Approved equivalent.
- .4 All bare ends of tracer wire connections to be enclosed and waterproofed. Acceptable products for connector ends are as follows:
 - .1 DryConn King 6 Blue connectors.
 - .2 Approved equivalent.
- .5 Tracer wire shall be attached to the top of the pipe at every fitting, valve and at intervals not exceeding 1.0 m using 50 mm wide tape. Tape shall also be used to attached tracer wire to valve boxes. Acceptable products for tape are as follows:
 - .1 T-Tape Gray PE, by Tapecoat.
 - .2 Approved equivalent.

2.10 PIPE BEDDING AND SURROUND MATERIALS

- .1 Pipe bedding and surround material to Section 31 05 16 - Aggregate Materials and following requirements:
 - .1 Crushed or screened stone.

2.11 BACKFILL MATERIAL

- .1 Selected backfill in accordance with Section 32 11 23 - Aggregate Placement and sub-base and base in accordance with Section 31 05 16 - Aggregate Materials.
- .2 Unshrinkable fill: to Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of conditions: verify that conditions of substrate previously installed under other sections or contracts are acceptable for distribution piping installation in accordance with manufacturer's written instructions:
 - .1 Visually inspect substrate in presence of Owner or Consultant.
 - .2 Inform Owner or Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

- .1 Clean pipes, fittings, valves, hydrants, and appurtenances of accumulated debris and water before installation:
 - .1 Inspect materials for defects for approval of Owner or Consultant.

- .2 Remove defective materials from Site as directed by Owner or Consultant.

3.3 TRENCHING

- .1 Do trenching work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Ensure trench depth allows coverage over pipe of 1.8 m minimum from finished grade.
- .3 Trench alignment and depth require Owner or Consultant approval prior to placing bedding material and pipe.

3.4 GRANULAR BEDDING

- .1 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth of 150 mm below invert of pipe.
- .2 Do not place material in frozen condition.
- .3 Shape bed true to grade to provide continuous uniform bearing surface for pipe.
- .4 Shape transverse depressions in bedding as required to suit joints.
- .5 Grade each layer full width of bed to prior to placement of next layer.
- .6 Fill authorized or unauthorized excavation below design elevation of bottom of specified bedding in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling with compacted pit run gravel or approved equivalent.

3.5 BACKFILL

- .1 Place selected backfill, sub-base and base materials, above pipe bedding, in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.
- .2 Do not place backfill materials in frozen condition.
- .3 Under roadways and sidewalks, compact backfill to at least 95% corrected maximum dry density 95% maximum density to ASTM D698:
- .4 In other areas, compact to at least 90% corrected maximum dry density 90% maximum density to ASTM D698.

3.6 PIPE INSTALLATION

- .1 Lay ductile iron pipes to ANSI/AWWA C600 and PVC/PVCO to manufacturer's standard instructions and specifications:
- .1 Do not use blocks except as specified.
- .2 Join ductile iron pipes in accordance with ANSI/AWWA C600 and PVC/PVCO in accordance with manufacturer's recommendations.
- .3 Bevel or taper ends of PVC/PVCO pipe to match fittings.

- .4 Handle pipe by methods approved by Owner or Consultant and recommended by pipe manufacturer. Chains or cables are not to be passed through pipe bore for lifting.
- .5 Lay pipes on prepared bed, true to line and grade:
 - .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
 - .2 Remove and replace defective pipe.
 - .3 Correct pipe which is not in true alignment or grade or pipe which shows differential settlement after installation greater than 10 mm in 3 m.
- .6 Face bell ends of pipe in direction of laying and up-grade.
- .7 Do not exceed permissible deflection at joints as recommended by pipe manufacturer.
- .8 Keep jointing materials and installed pipe free of dirt and water and other foreign materials:
 - .1 Whenever work is stopped, install a removable watertight bulkhead/cap at open end of last pipe laid to prevent entry of foreign materials.
- .9 Position and join pipes with equipment and methods approved by Owner or Consultant.
- .10 Cut pipes in approved manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .11 Align pipes before jointing.
- .12 Install gaskets to manufacturer's recommendations. Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
- .13 Avoid displacing gasket or contaminating with dirt or other foreign material:
 - .1 Remove disturbed or contaminated gaskets.
 - .2 Clean, lubricate and replace before jointing is attempted again.
- .14 Complete each joint before laying next length of pipe.
- .15 Minimize deflection after joint has been made.
- .16 Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations.
- .17 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes or as otherwise approved by Owner or Consultant.
- .18 When stoppage of work occurs, cap and block pipes in an approved manner to prevent creep during down time.
- .19 Recheck plastic pipe joints assembled above ground after placing in trench to ensure that no movement of joint has taken place.
- .20 Do not lay pipe on frozen bedding.
- .21 Do hydrostatic and leakage test and have results approved by Owner or Consultant before surrounding and covering joints and fittings with granular material.
- .22 Backfill remainder of trench.

3.7 VALVE INSTALLATION

- .1 Install valves to manufacturer's recommendations at locations as indicated.
- .2 Support valves located in valve boxes or valve chambers by means of concrete located between valve and solid ground. Bedding same as adjacent pipe. Maximum length of pipe on each end of valve shall be 1 m. Valves not to be supported by pipe.

3.8 VALVE CHAMBERS

- .1 Use precast units as approved by Owner or Consultant.
- .2 Construct units as indicated, plumb and centred over valve nut, true to alignment and grade, and not resting on pipe.
- .3 Set precast concrete slab on 150 mm minimum of compacted granular bedding.
- .4 Make each successive joint watertight with approved rubber ring gaskets, mastic joint filler, cement mortar, or combination thereof.
- .5 Plug lifting holes with cement mortar.
- .6 Set flat top cover with 600 mm diameter centre hole.
- .7 Set frame and cover to required elevation with a minimum 100mm rubber riser grade rings and a maximum of 300 mm.
- .8 Place frame and cover on top section to elevation indicated.
- .9 Clean valve chambers of debris and foreign materials; remove fins and sharp projections.

3.9 SERVICE CONNECTIONS

- .1 Terminate water service at property line opposite point of connection to main:
 - .1 Install curb stop, 300 mm of service pipe and coupling necessary for connection to building plumbing.
 - .2 If plumbing is already installed, make connection, otherwise cap or seal end of pipe and place temporary marker (38 x 89 stud from invert of pipe to 600 mm above finished grade in grassed areas and 600 mm below finished grade in asphalt areas) to locate pipe end. Paint exposed portion of stud blue with designation "WATER SERVICE LINE" in black.
- .2 Do not install final service connections until satisfactory completion of hydrostatic and leakage tests of water main.
- .3 Construct service connections at right angles to water main unless otherwise directed. Locate curb stops 300 mm inside right-of-way.
- .4 Direct tapping on PVC, PVCO or DI is not permitted. Connection of service pipe to be service saddles as indicated in Section 2.04.
- .5 Employ only competent personnel equipped with suitable tools to carry out tapping of mains,
- .6 Tap main at 2:00 o'clock or 10:00 o'clock position only; not closer to joint nor closer to

adjacent service connections than recommended by manufacturer, or 1 m minimum, whichever is greater.

- .7 Leave corporation stop valves fully open.
- .8 In order to relieve strain on connections, install service pipe in "Goose Neck" form "laid over" into horizontal position.
- .9 Install curb stop with valve box on services 50 mm or less in diameter:
 - .1 Equip larger services with gate valve and cast-iron box.
 - .2 Set box plumb over stop and adjust top flush with final grade elevation.
 - .3 Leave curb stop valves fully closed.

3.10 FIRE HYDRANTS

- .1 Install fire hydrants at locations as indicated.
- .2 Install fire hydrants in accordance with AWWA M17.
- .3 Install 150 mm gate valve and cast-iron valve box on fire hydrant service leads as indicated.
- .4 Set fire hydrants plumb, with hose outlets parallel with edge of pavement or curb line, with pumper connection facing roadway and with body flange set at elevation of 50 mm above final grade.
- .5 Place concrete thrust blocks as indicated and specified.
- .6 Place appropriate sign on installed hydrants indicating not in service during construction.
- .7 Hydrant dead ends.

3.11 CONCRETE THRUST BLOCKS AND RESTRAINED JOINTS

- .1 Place concrete thrust blocks between valves, tees, plugs, caps, bends, changes in pipe diameter, reducers, fire hydrants and fittings on undisturbed ground as indicated by the Owner or Consultant.
- .2 Keep joints and couplings free of concrete.
- .3 Do not backfill over concrete within 24 hours after placing.
- .4 For restrained joints: only use restrained joints approved under Section 2.07.

3.12 HYDROSTATIC AND LEAKAGE TESTING

- .1 Do tests in accordance with ANSI/AWWA C600.
- .2 Provide labour, equipment and materials required to perform hydrostatic and leakage tests hereinafter described.
- .3 Notify Owner or Consultant at least 24 hours in advance of proposed tests:

- .1 Perform tests in presence of Owner or Consultant.
- .4 Where section of system is provided with concrete thrust blocks, conduct tests at least 5 days after placing concrete.
- .5 Test pipeline in sections not exceeding 400 m in length, unless otherwise authorized by Owner or Consultant.
- .6 Upon completion of pipe laying and after Owner or Consultant has inspected Work in place, surround and cover pipes between joints with approved granular material placed to dimensions indicated
- .7 Leave fire hydrants and valves exposed for operation during testing.
- .8 Ensure all valves are in open position in testing section.
- .9 Expel air from main by slowly filling main with potable water from lowest elevation point.
 - .1 Install corporation stops at high points in main where no air-vacuum release valves or fire hydrants are installed.
 - .2 Remove stops after satisfactory completion of test and seal holes with brass plugs.
- .10 Apply hydrostatic test pressure of 1034 kPa based on elevation of lowest point in main and corrected to elevation of test gauge, for period of 2 hours.
- .11 The allowable leakage shall be determined by the following formula:
$$Q = \frac{N \times D \times (P^{0.5})}{130,400}$$

Where L = Allowable leakage, in liters/hour
N = Number of Joints
D = Nominal Diameter (mm)
P = Test Pressure (kpa)
- .12 When testing against a closed valve, an additional leakage of 0.0012 litres/hour/mm diameter/valve is allowed.
- .13 Measure leakage of water as measured by a water meter approved by the Owner or Consultant. Proof of recent calibration maybe required.
- .14 Locate and repair defects if leakage is greater than allowable amount.
- .15 Repeat test until leakage is within specified allowance for full length of water main. Repeated tests carried out at Contractor's expense. Repeated tests are to continue until all remedial measures have been successful.

3.13 FLUSHING AND DISINFECTING

- .1 Flushing and disinfection of water mains to completed after pressure test, in accordance with AWWA C651.
- .2 Flushing and disinfecting operations: under witness by Owner or Consultant carried out by specialist contractor.
 - .1 Notify Owner or Consultant at least 4 days in advance of proposed date when disinfecting operations will begin.

- .2 Flush water mains through available outlets with a sufficient flow of potable water to produce velocity of 1.5 m/s, within pipe for minimum 10 minutes, or until foreign materials have been removed and flushed water is clear. Owner or Consultant must approve timing of flushing to ensure adequate water is available for customer use.

- .3 Flushing flows as follows:

Pipe Size NPS	Flow (L/s) Minimum
150 and below	38
200	75
250	115
300	150

- .4 Provide connections and pumps for flushing as required.
- .5 If satisfactory results cannot be achieved by flushing, swab pipes by approved methods and re-flush.
- .6 Open and close valves, hydrants and service connections to ensure thorough flushing.
- .7 When flushing has been completed to Owner or Consultant approval, introduce chlorine solution as approved by Owner or Consultant into water main and ensure that it is distributed throughout entire system.
- .8 Rate of 1% chlorine solution application to be proportional to rate of water entering pipe. Chlorine application to be close to point of filling water main and to occur at same time. Prepare stock chlorine with concentrate of 1% free chlorine by volume as follows:

Product	Amount of Compound	Quality of Water
5.25% (CL)	1.0 liter	1.0 liter
10.5% (CL)	1.0 liter	7.0 liters

- .9 The following table indicates the quantity of 1% chlorine stock solution required per 100-meter length of pipe.

Pipe Diameter (mm)	1% Chlorine Stock Solution (liters)
100mm	4.9
150mm	10.9
200mm	19.4
250mm	30.4
300mm	42.9

- .10 Take water samples at all fire hydrants and termination points, in suitable sequence, to test chlorine residual. When tests indicate minimum chlorine residual of 50 mg/l, leave system charged with disinfection solution to ensure minimum chlorine solution of 25 mg/l throughout system after 24 hours.
- .11 Operate valves, fire hydrants and appurtenances while main contains chlorine solution.
- .12 Flush line to remove chlorine solution after 24 hours. Add 1% Hydrogen Peroxide reducing agent to the disinfectant solution at point of discharge or within a retention facility such that the solution is disposed to the environment with a 0.0 chlorine residual. Check chlorine residual before disposal and at regular intervals during disposal to ensure compliance. The dichlorination requirement can only be excluded with written consent of the New Brunswick Department of Environment and Local Government.
- .13 Dispose of dechlorinated disinfectant solution. Where disposing to the environment, disposal of the dechlorinated solution must be at least 100 m from the nearest watercourse.
- .14 Where disinfectant solution is dechlorinated at point of discharge, inject stock reducing agent at a rate proportional to discharge rate. Injection and discharge rates must be monitored continuously to ensure proper proportioning.
- .15 Prepare stock reducing agent by volume with concentration of 1% hydrogen peroxide by mass. Using liquid reducing agent (35% By Mass), for 1 liter of agent use 34 liters of water.
- .16 The following table indicates quantity of 1% hydrogen peroxide required to reduce total chlorine residual of disinfectant solution per 100-meter length of pipe, 50 mg/l to 0 mg/l.

Pipe Diameter (mm)	1% Chlorine Stock Solution (liters)
100mm	4.5
150mm	10.2
200mm	18.1
250mm	28.2
300mm	40.6

- .17 Measure chlorine residuals at furthest end of pipeline being tested.
- .18 Perform bacteriological tests on water main, after chlorine solution has been flushed out:
 - .1 Take samples on two (2) consecutive days 24 hours apart.
 - .2 Coliform tests must indicate 0 on two consecutive days combined with background count of less than 15.
 - .3 Should contamination remain or recur during this period, repeat

disinfecting procedure.

.4 Contractor to submit copy of test results from an accredited laboratory to Owner for acceptance.

3.14 SURFACE RESTORATION

.1 After installing and backfilling over water mains, restore surface to original condition as directed by Owner or Consultant

3.15 CLEANING

.1 Refer to Section 01 00 00 – Project Specific General Requirements.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

- .1 This Section specifies the requirements for supplying and installing various diameters of sanitary gravity sewer and sanitary gravity sewer laterals. Work includes excavation, supply and installation of pipe, fittings, bedding materials, backfill, compaction and testing of pipe as shown on the associated drawings.

1.2 REFERENCE STANDARDS

- .1 ASTM C828-11(2011), Standard Test Method for Low-Pressure Air Test of Vitrified Clay Pipe Lines.
- .2 ASTM D3034-21, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- .3 ASTM D3212-21, Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- .4 ASTM F477-14(2021), Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- .5 ASTM C443M-21, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).
- .6 ASTM C76M-22a, Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric).
- .7 CSA B1800:21, Thermoplastic Nonpressure Piping Compendium (Standard CSA B182.2).
- .8 CSA A257 Series:19, Standards for Concrete Pipe and Manhole Sections.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Scheduling: refer to Section 01 00 00 – Project Specific General Requirements.
 - .1 Schedule Work to minimize interruptions to existing services and maintain existing sewage flows during construction.
 - .2 Submit schedule of expected interruptions for approval and adhere to approved schedule.
 - .3 Notify Owner or Consultant 24 hours minimum in advance of any interruption in service.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

- .2 Delivery and acceptance requirements: deliver materials to Site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in accordance with manufacturer's recommendations.
 - .2 Store and protect pipes from damage.
 - .3 Replace defective or damaged materials with new.

1.5 MEASUREMENT FOR PAYMENT

- .1 Measurement for payment for sewer main pipe and sewer laterals shall be per metre (m) of completed pipe. Sewer mains shall be measured between centres of manholes. In the case of storm outfalls, measurement shall be from the centre of the manhole to the end of the pipe installed. The length of installed pipe shall be measured horizontally. The measurement for payment of completed sewer main and sewer laterals shall include the supply of all labour, materials and equipment for excavation, disposal of surplus or unsuitable excavated materials, shoring, dewatering, by-pass pumping, bedding, supply & installation of pipe, backfilling, compaction, flushing, testing of pipe and all incidental items.
- .2 Measurement for payment for connecting each sewer lateral shall be on a per unit basis and shall include all necessary labour, material and equipment to connect the lateral to the sewer main or manhole. This shall include, where necessary, the following
 - .1 The proper "tee wye" or "wye" on the main or proper manhole connection, and;
 - .2 Any necessary bends, plus any other labour and materials necessary for making the connection.
- .3 Measurement for payment for insulation to be on a square metre (m²) basis and to be based on 50 mm thickness.
- .4 Measurement for payment for inlet control devices (ICDs) shall be based on a unit price basis.
- .5 Measurement for payment for sanitary or storm service inspection chambers shall be measured for payment on a per unit basis including all excavation, backfilling, connections and incidentals.
- .6 Measurement for payment for abandonment of sewer mains with grout to be based on theoretical pipe volume per cubic metre (m³) basis and shall include the supply and installation of grout and all incidentals. Any losses in volume pumped are to be considered incidental.
- .7 Measurement for payment for video inspection shall be measured on a per metre (m) basis from centre of manhole to centre of manhole and payment shall be based on a unit price basis. Video inspection is to be completed on both main line piping and service laterals to the connection or cap.

2 PRODUCTS

2.1 CONCRETE PIPE

- .1 Reinforced concrete pipe: to CSA A257, ASTM C76M and minimum Class 65D (Class III), designed for flexible rubber gasket joints to CSA A257 and ASTM C443M.
- .2 All reinforced concrete pipe to be pre-tested prior to shipment. Minimum 3 pipe per test section. All pipe passing pre-testing to be labeled as passed or tested and documentation of the testing to accompany the delivery of the pipe.
- .3 Lifting holes:
 - .1 Pipe 900 mm and less diameter - no lift holes.
 - .2 Pipe greater than [900] mm diameter - lift holes not to exceed [two] in a piece of pipe.
 - .3 Provide prefabricated plugs to seal lift holes tight after installation of pipe.

2.2 PLASTIC PIPE

- .1 Type PSM Polyvinyl Chloride (PVC): to ASTM D3034 and CSA B182.2.
 - .1 Standard Dimensional Ratio (SDR): 35.
 - .2 Locked-in gasket and integral bell system.
 - .3 Nominal lengths: 4 m.

2.3 SERVICE CONNECTIONS

- .1 Type PSM Polyvinyl Chloride (PVC) lateral pipe:
 - .1 To ASTM D3034 and CSA B182.2.
 - .2 Standard Dimensional Ratio (SDR): 35.
 - .3 Locked-in gasket and integral bell system.
 - .4 Nominal lengths: 4 m.
- .2 Service connections tees to PVC:
 - .1 To ASTM D3034 and CSA B182.2.
 - .2 Standard Dimensional Ratio (SDR): 35.
 - .3 Locked-in gasket and integral bell system.
- .3 Service connections tees to reinforced concrete:
 - .1 To ASTM F477 and ASTM D3212.
 - .2 Locked-in gasket and integral bell system.
 - .3 Connection to reinforced concrete to be "Inserta-Tee" or "Quick Seal" with stainless steel straps.

2.4 COUPLINGS

- .1 Couplings connecting PVC to PVC: Type PSM Polyvinyl Chloride (PVC): to ASTM D3034 and CSA B182.2.
 - .1 Standard Dimensional Ratio (SDR): 35.
 - .2 Locked-in gasket and integral to coupling.
- .2 Couplings connecting dissimilar pipe:
 - .1 Flexible Rubber Repair Coupling.
 - .2 Stainless steel bands with stainless steel shear ring.
 - .3 Acceptable products:
 - .1 Fernco.
 - .2 Mission.
 - .3 Indiana Steel.
 - .4 Approved equal.

2.5 INSULATION

- .1 Insulation for sewer mains and laterals shall be a 50 mm thick Styrofoam insulation board:
- .2 Acceptable products:
 - .1 Dow HI40.
 - .2 Owens Corning Formular 400.
 - .3 Approved equal.

2.6 PIPE BEDDING

- .1 Granular bedding material for PVC pipe to Section 31 05 16 - Aggregate Materials and following requirements:
 - .1 Crushed or screened stone.
- .2 Granular bedding material for reinforced concrete pipe to Section 31 05 16 - Aggregate Materials and following requirements:
 - .1 Pit run gravel, screened pit run or crushed rock.
 - .2 Compacted to 95 % standard proctor density for under pavement or sidewalks.
 - .3 Compacted to 90 % standard proctor density for grassed areas.

2.7 BACKFILL MATERIAL

- .1 Selected backfill in accordance with Section 32 11 23 - Aggregate Placement and sub-base and base in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

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- .2 Unshrinkable fill: to Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of conditions: verify that conditions of substrate previously installed under other sections or contracts are acceptable for sewer pipe installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Owner or Consultant.
 - .2 Inform Owner or Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

- .1 Clean pipes, fittings and appurtenances of accumulated debris and water before installation:
- .1 Inspect materials for defects to approval of Owner or Consultant.
 - .2 Remove defective materials from the Site as directed by Owner or Consultant.

3.3 TRENCHING

- .1 Do trenching Work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Protect trench from contents of sewer or sewer connection.
- .3 Trench alignment and depth require approval of Owner or Consultant prior to placing bedding material and pipe.

3.4 GRANULAR BEDDING

- .1 Place granular bedding materials in uniform layers not exceeding 150 mm thickness to depth of 150 mm below invert of pipe.
- .2 Do not place material in frozen condition.
- .3 Shape bed true to grade to provide continuous, uniform bearing surface for pipe.
 - .1 Do not use blocks when bedding pipe.
- .4 Shape transverse depressions in bedding as required to suit joints.
- .5 Hand place bedding material in uniform layers not exceeding 150 mm thickness as indicated.
 - .1 Do not dump material directly onto pipe.

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- .6 Place layers uniformly and simultaneously on each side of pipe.
- .7 Place each layer from bottom of trench to haunch line of pipe and chink to underside of pipe.
- .8 For pit run bedding on reinforced concrete pipe, compact each layer as required in Section 2.06.
- .9 Place each layer from haunch line of pipe to underside of backfill.
- .10 Fill excavation below bottom of specified bedding adjacent to manholes or structures with bedding material.
- .11 Fill authorized or unauthorized excavation below design elevation of bottom of specified bedding in accordance with Section 31 23 33.01 – Excavation, Trenching and Backfilling with compacted pit run gravel or approved equal.
- .12 Prior to placing backfill, install filter fabric from top of screened stone bedding full width of trench.

3.5 BACKFILL

- .1 Place selected backfill, sub-base and base materials, above pipe bedding in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.
- .2 Do not place backfill material in frozen condition.
- .3 Under asphalt and sidewalks, compact backfill to at least 95% standard proctor density.
 - .1 In other grassed areas, compact to at least 90% standard proctor density.

3.6 PIPE INSTALLATION

- .1 Handle pipe using methods approved by Owner or Consultant.
 - .1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.
- .2 Lay pipes on prepared bed, true to line and grade, with pipe invert smooth and free of sags or high points.
 - .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
- .3 Begin laying at outlet and proceed in upstream direction with bell ends of pipe facing upgrade.
- .4 Joint deflection permitted within limits recommended by pipe manufacturer.
- .5 Water not to flow through pipe during construction, unless permitted Owner or Consultant.
- .6 Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
- .7 Install plastic pipe and fittings in accordance with CSA B182.11.
- .8 Pipe jointing:
 - .1 Install gaskets in accordance with manufacturer's written recommendations.

- .2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
- .3 Align pipes before joining.
- .4 Maintain pipe joints free from mud, silt, gravel and foreign material.
- .5 Avoid displacing gasket or contaminating with dirt or foreign material. Gaskets so disturbed to be removed, cleaned and lubricated and replaced before joining is attempted.
- .6 Complete each joint before laying next length of pipe.
- .7 Minimize joint deflection after joint has been made to avoid joint damage.
- .8 At rigid structures, install pipe joints not more than 1.2 m from side of structure.
- .9 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.
- .9 When stoppage of Work occurs, block pipes as directed by Owner or Consultant to prevent creep during down time.
- .10 Plug lifting holes with prefabricated plugs or grout approved by Owner or Consultant.
- .11 Cut pipes as required for special inserts, fittings or closure pieces as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .12 Make watertight connections to manholes.
- .13 Use prefabricated couplings for field connections approved by Owner or Consultant for connecting pipes to existing sewer pipes of same material.
 - .1 Joints to be structurally sound and watertight.
- .14 When connecting dissimilar sewer pipe materials, use a flexible rubber repair coupling, with stainless steel bands and stainless-steel sheer ring, or approved equal.

3.7 SERVICE CONNECTIONS

- .1 Install pipe to CSA B182.11 and manufacturer's instructions and specifications.
- .2 Maintain grade for 100 mm diameter sewers at 2 % minimum unless directed by Owner or Consultant.
- .3 Service connections to main sewer: Molded PVC Tee fitting for PVC pipe connection and Inserta-Tee for Concrete pipe connection.
 - .1 Do not use break-in and mortar patch-type joints.
- .4 Service connection pipe: not to extend into interior of main sewer.
- .5 Make up required horizontal and vertical bends from 45 degrees bends or less, separated by straight section of pipe with minimum length of 4 pipe diameters.
 - .1 Use long sweep bends where applicable.
- .6 Plug service laterals with watertight caps or plugs.
- .7 Place location marker at ends of plugged or capped unconnected sewer lines.

- .1 Each marker: 38 x 89 mm stake extending from pipe end at pipe level to 600 mm above finished grade in grassed areas and 600 mm below finished grade in asphalt areas to locate pipe end.
- .2 Paint exposed portion of stake green with designation SAN SWR LINE in black.

3.8 FIELD TESTING

- .1 All sewers 900 mm or less and 100mm or greater to be tested.
- .2 Remove foreign material from sewers and related appurtenances by flushing with water.
 - .1 Flushing to be completed with high pressure flushing equipment capable of removal and collection of debris.
 - .2 All debris is to be collected and prevented from entering other sections of sewer mains outside the Work area.
- .3 All sewers to be video inspected:
 - .1 All closed-circuit television inspection (CCTV) work shall conform to National Association of Sewer Service Companies (NASSCO) – Pipeline Assessment Certification Program (PACP) standards.
 - .2 Camera operator shall be a PACP certified operator and proof of certification shall be submitted to the Owner or Consultant prior to starting CCTV.
 - .3 Sewers to be videoed with colored (CCTV) from manhole to manhole.
 - .4 Camera shall be capable of tilt and pan.
 - .5 Camera shall pause, tilt and pan at all end pipes, service lateral connections, pipe defects, sags, etc.
 - .6 All inspections shall accurately measure linear distance. Measurements shall be accurately displayed in the videos.
 - .7 All videos and pdf video inspection reports are to be submitted to the Owner or Consultant at the completion of the Work.
 - .8 No asphalt restoration is to be completed until videos and reports have been submitted and reviewed by the Owner or Consultant.
 - .9 All defects identified in the videos and reports are to be corrected prior to asphalt restoration.
 - .10 Building Permit(s) will not be issued until Owner or Consultant has reviewed both the passing Air Test(s), following 3.8.8 as outlined below, and the Sanitary Inspection Video.
- .4 Perform exfiltration testing as soon as practicable after jointing and bedding are complete, and service connections have been installed.
- .5 Do exfiltration test to ASTM C828.
- .6 Do exfiltration testing as specified herein.
 - .1 Perform tests in presence of Owner or Consultant.
 - .2 Notify Owner or Consultant 24 hours minimum in advance of proposed tests.

- .7 Carry out tests on each section of sewer between successive manholes including service connections.
- .8 Exfiltration test (Air):
- .1 Air tests only to be completed on pipe 600 mm PVC or less. For large diameter reinforced concrete pipe, consult with Owner or Consultant for acceptable test method.
 - .2 Use equipment design to operate above ground. Equipment to include air compressor, air relief valve and pressure gauge from 0 – 70 kpa with accuracy of + or – 0.25 kpa.
 - .3 Supply and install plugs at each end of section to be tested with one end equipped with air inlet connection.
 - .4 Fill test section with air to a constant pressure of 28 kpa.
 - .5 Allow period of 2 minutes for air temperature to stabilize, adding air to only maintain 28 kpa.
 - .6 Decrease pressure to 24 kpa. Measure time required for pressure to reach 17 kpa. Following table is minimum time for pressure drop:

Pipe Diameter (mm)	Minimum Time (mm:ss)
100mm	1:53
150mm	2:50
200mm	3:47
250mm	4:43
300mm	5:40
375mm	7:05
450mm	8:30
525mm	9:55
600mm	11:20

- .9 Repair and retest sewer line as required, until test results are within limits specified.
- .10 Repair visible leaks regardless of test results.

3.9 CLEANING

- .1 Refer to Section 01 00 00 – Project Specific General Requirements.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

- .1 This Section specifies the requirements for supplying and installing various diameters of sanitary sewer force main. Work includes excavation, supply and installation of pipe, fittings, bedding materials, backfill, compaction and testing of pipe as shown on the associated drawings.

1.2 REFERENCE STANDARDS

- .1 ANSI/AWWA C105/A21.5-18, Polyethylene Encasement for Ductile-Iron Pipe Systems.
- .2 ANSI/AWWA C110/A21.10-21, Ductile-Iron and Gray-Iron Fittings.
- .3 ANSI/AWWA C111/A21.11-17, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe Fittings.
- .4 ANSI/AWWA C153/A21.53-19, Ductile-Iron Compact Fittings.
- .5 ANSI/AWWA C205-18, Cement-Mortar Protective Lining and Coating for Steel Water Pipe, 4 In. (100 mm) and Larger, Shop Applied.
- .6 ANSI/AWWA C208-17, Dimensions for Fabricated Steel Water Pipe Fittings.
- .7 ASTM A307-21, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
- .8 ASTM C94/C94M-22a, Standard Specification for Ready-Mixed Concrete.
- .9 ASTM D698-00, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- .10 ASTM F1674-18, Standard Test Method for Joint Restraint Products for Use with PVC Pipe.
- .11 CSA-A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Scheduling: Refer to Section 01 00 00 – Project Specific General Requirements.
 - .1 Schedule Work to minimize interruptions to existing services and maintain existing sewage flows during construction.
 - .2 Submit schedule of expected interruptions for approval and adhere to approved schedule.
 - .3 Notify Consultant 24 hours minimum in advance of any interruption in service.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to Site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in accordance with manufacturer's recommendations.
 - .2 Store and protect pipes from damage.
 - .3 Replace defective or damaged materials with new.

1.5 MEASUREMENT FOR PAYMENT

- .1 Measurement for payment for forcemain shall be per metre (m) of forcemain installed measured horizontally. The measurement of completed forcemain shall include the supply of all labour, materials and equipment for excavation, disposal of surplus or unsuitable excavated materials, shoring, dewatering, bedding, supply & installation of pipe, backfilling, compaction, flushing, testing of pipe and all incidental items.
- .2 Measurement for payment for forcemain fittings such as bends, tees, etc. shall be based on each unit, including all labour, materials and equipment, thrust blocks, restrainers, excavation, bedding and backfilling plus all incidental items.
- .3 Measurement for payment for abandonment of sewer mains with grout to be based on theoretical pipe volume per cubic metre (m³) basis and shall include the supply and installation of grout and all incidentals. Any losses in volume pumped are to be considered incidental.
- .4 Measurement for payment for video inspection shall be measured on a per metre (m) basis from centre of manhole (Sewage Lift Station) to centre of manhole and payment shall be based on a unit price basis.

2 PRODUCTS

2.1 PIPES, JOINTS AND FITTINGS

- .1 Force mains shall be:
 - .1 Ductile iron pipe: to ANSI/AWWA C151/A21.51, pressure class depended upon design requirements and to be cement mortar lined to ANSI/AWWA C104/A21.4 in 100 mm sizes and larger.
 - .2 All ductile iron in buried installation shall be polyethylene encased (wrapped) meeting the requirements of latest AWWA C105.
 - .3 Ductile iron pipe for flanged ends: to ANSI/AWWA C151/A21.51, special class 54 for cement mortar lined to ANSI/AWWA C104/A21.4 in 100 mm sizes. Flanged pipe not to be used in buried applications.

- .4 Polyvinyl chloride pressure pipe: to ANSI/AWWA C900, pressure class depended upon design requirements, cast iron outside diameter in sizes 100 mm to 300 mm.
- .5 Joints and fittings for.
 - .1 Joints Ductile Iron:
 - .1 Push-on joints: to ANSI/AWWA C111/A21.11.
 - .2 Rubber gasket for mechanical pipe joints: to ANSI/AWWA C111/A21.11.
 - .3 Rubber gasket for flange pipe joints 1.6 mm thick: to ANSI/AWWA C111/A21.11.
 - .4 Bolts, nuts, hex head with washers: to ASTM A307, heavy series.
- .6 Joints PVC:
 - .1 Push-on joints: watertight.
 - .2 Rubber gaskets for pipe joints: to ANSI/AWWA C111/A21.11.
 - .3 Bell to be integral and homogeneous part of pipe.
- .7 Fittings:
 - .1 Mechanical joint cast iron and ductile iron fittings NPS 100 mm and larger: to ANSI/AWWA C110/A21.10.
 - .2 Flanged cast iron fittings NPS 100 mm and larger: to ANSI/AWWA C110/A21.10.
 - .3 Compact Fittings to ANSI/AWWA C153/A21.53.
 - .4 Pipe fittings: to ANSI/AWWA C208, cement mortar lined to ANSI/AWWA C205, and exterior protected with epoxy coated.
 - .5 Fittings to include bends and couplings.
 - .6 Rubber gasket for mechanical joints to be transition gaskets where pipe outside diameter is not DIPS.

2.2 CATHODIC PROTECTION

- .1 Provide means of protection for ductile iron pipe with 8-mil poly wrap in accordance with ANSI/AWWA C105/A21.5.
- .2 Criteria for corrosion protection shall meet or exceed National Association of Corrosion Engineers standard RP0169 latest addition.
- .3 Anode Corrosion Protection:
 - .1 All mechanical joint fittings including tees, crosses, bends, couplings, caps and valves 200 mm diameter or less to be protected with 5.4 kg zinc anode.
 - .2 All hydrants, corporation stop, curb stop, copper service longer than 20 meters and tees, crosses, bends, caps and valves greater than 200 mm but less than 350 mm to be

protected with 11 kg zinc anode.

.3 Acceptable products for Zinc Anode suppliers are:

- .1 Interprovincial Corrosion Control.
- .2 Corrosion Services.
- .3 Exothermal Industries.
- .4 Integrity Anode Corporation.
- .5 Bren Technologies Inc.

.4 Anodes shall be installed by wrapping around bolts and securing with a second nut.

.4 Anti-corrosion petrolatum paste, mastic and tape:

- .1 Shall be applied on all fittings greater than 300 mm.
- .2 Prior to applying the paste, surface of fittings to be free of loose coating, rust soil, and any other foreign matter.
- .3 Technique for applying paste, mastic and wrap is to be followed as per manufacture specifications.
- .4 Acceptable products for petrolatum paste, mastic and tape systems are as follows:
 - .1 Petro Coating Systems.
 - .2 PetroWrap.
 - .3 STAC.
 - .4 Trenton.
 - .5 Denso.
 - .6 PetroGuard.
 - .7 Approved equivalent.

2.3 VALVES AND VALVE BOXES

.1 Gate Valves:

- .1 Gate valves to open counterclockwise.
- .2 Gate valves to be complete with steel tee bolts and nuts and a 50 mm square operating nut.
- .3 Gate valves are to be used in all valves up to and including 300 mm diameter.
- .4 All gate valves to be FM approved and ULC listed.
- .5 Gate valves: to be resilient seated conforming to ANSI/AWWA C509 or C515, epoxy coated interior and exterior, standard cast iron body, brass mounted wedge valves encapsulated with rubber, non-rising stems, suitable for 1 Pa with mechanical joints.
- .6 Acceptable products for gate valves are as follows:

- .1 Clow Model 2639/2640.
 - .2 Mueller Model 2361.
 - .3 Approved equivalent.
- .2 Cast iron valve boxes:
 - .1 Three piece sliding type adjustable over minimum of 450 mm.
 - .2 Base to be large round type with minimum diameter of 300 mm complete with centering disc.
 - .3 Size of box to be 130 mm.
 - .4 Acceptable products for valve boxes are as follows:
 - .1 Bibby Ste-Croix.
 - .2 Mueller Canada.
 - .3 Star Pipe Canada.
 - .4 Approved equivalent.

2.4 COUPLINGS

- .1 In all cases where full mechanical joint gray-iron or ductile iron couplings combined with mechanical joint restraints can be used, they are to be the preferred coupling system.
- .2 If sleeve style coupling is required, acceptable coupling will require Owner or Consultant approval before use.

2.5 PIPE RESTRAINTS FOR MECHANICAL JOINTS AND THRUST BLOCKS

- .1 Pipe restraints: Pipe restraints to be used on all mechanical joints:
 - .1 Pipe Restraints to be used in combination with thrust blocks on all bends, couplings, etc.:
 - .1 Pipe restraints to be cast iron supplied with fusion-bonded epoxy.
 - .2 Pipe restraints to have a minimum working pressure of 1034 kpa.
 - .3 Pipe restraints shall be in accordance with latest addition of ASTM F1674.
 - .4 Pipe restraints to have a minimum working pressure of 1034 kpa.
- .2 Pipe restraints acceptable products for PVC pipe:
 - .1 Clow 300 C restrainer.
 - .2 EBAA IRON Series 2000 PV.
 - .3 Uni-Flange Series 1300/1500.
 - .4 Sigma One-Lok SLC Series.

- .5 Star Pipe Products PVC Stargrip Series 4000.
- .6 Star Pipe Products PVC Ring Lock Series 3500.
- .7 Clow TUF Grip Dual Wedge Restraint (Universal).
- .8 Approved equivalent.
- .3 Pipe restraints acceptable products for ductile iron pipe:
 - .1 EBAA IRON Series 1100.
 - .2 Romac Industries RomaGrip.
 - .3 Sigma One-Lok SLD Series.
 - .4 Star Pipe Products PVC Stargrip Series 3000.
 - .5 Clow TUF Grip Dual Wedge Restraint (Universal).
 - .6 Approved equivalent.
- .4 Concrete thrust block:
 - .1 Cast-in-place thrust blocks shall be installed on all bends, couplings, etc.
 - .2 Thrust block design and dimensions shall be as shown on the Standard Detail Drawings.
 - .3 All thrust blocks shall bear against undisturbed soil.
 - .4 All concrete used for thrust blocks shall be ready-mix concrete from supplier certified under ASTM C94 and CSA-A23.1.
 - .5 Concrete used for thrust blocks to be 32 Mpa at 28 days.
 - .6 Prior to pouring concrete thrust block, place 8 mil poly barrier around fitting. Fitting bolts, nuts and washers to be accessible after the thrust block has been poured.

2.6 INSULATION

- .1 Extruded polystyrene foam insulation board for force mains is to be used when depth of cover of 1.8 m cannot be achieved and when crossing under or over storm sewers. Acceptable products for foam board insulation are as follows:
 - .1 Styrofoam HI 40.
 - .2 Foamular 400.
 - .3 Approved equivalent.
- .2 Curved insulation to be used on chambers and other specified locations.
 - .1 Expanded polystyrene insulation with woven white polypropylene radiant blocker facing, laminated both sides of core.
 - .2 White laminated facing to be treated for acid and UV resistance.
 - .3 Board to have a bursting strength of 172 lbs/sq. inch.
 - .4 The facing shall extend beyond the edge forming a self-adhesive overlap flap.
 - .5 Acceptable products for cured insulation board is as follows:

- .1 P2000 Insulation Systems.
- .2 Approved equivalent.

2.7 TRACER WIRE

- .1 Tracer wire will be required on all PVC force main.
- .2 Tracer wire shall be RWU90, 10-gauge (AWG), single strand, insulated copper wire with cross-linked polyethylene (XLPE) insulation, specifically manufactured for direct bury applications.
- .3 All spliced or repaired wire connections in the tracer wire system shall be made using appropriate connectors. Acceptable products for connectors are as follows:
 - .1 DryConn Direct Bury Lug-Aqua connectors.
 - .2 Approved equivalent.
- .4 All bare ends of tracer wire connections to be enclosed and waterproofed. Acceptable products for connector ends are as follows:
 - .1 DryConn King 6 Blue connectors.
 - .2 Approved equivalent.
- .5 Tracer wire shall be attached to the top of the pipe at every fitting, valve and at intervals not exceeding 1.0 m using 50 mm wide tape. Tape shall also be used to attached tracer wire to valve boxes. Acceptable products for tape are as follows:
 - .1 T-Tape Gray PE, by Tapecoat.
 - .2 Approved equivalent.

2.8 PIPE BEDDING

- .1 Pipe bedding and surround material to Section 31 05 16 - Aggregate Materials and following requirements:
 - .1 Crushed or screened stone.

2.9 BACKFILL MATERIAL

- .1 Selected backfill in accordance with Section 32 11 23 - Aggregate Placement, and sub-base and base in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Unshrinkable fill: to Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for distribution piping installation in accordance with manufacturer's written instructions:
 - .1 Visually inspect substrate in presence of Consultant.
 - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

- .1 Clean pipes, fittings, valves and appurtenances of accumulated debris and water before installation:
 - .1 Inspect materials for defects to approval of Consultant.
 - .2 Remove defective materials from Site as directed by Consultant.

3.3 TRENCHING

- .1 Do trenching work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Ensure trench depth allows coverage over pipe of 1.8 m minimum from finished grade.
- .3 Trench alignment and depth require Owner or Consultant approval prior to placing bedding material and pipe.

3.4 GRANULAR BEDDING

- .1 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth of 150 mm below invert of pipe.
- .2 Do not place material in frozen condition.
- .3 Shape bed true to grade to provide continuous uniform bearing surface for pipe.
- .4 Shape transverse depressions in bedding as required to suit joints.
- .5 Grade each layer full width of bed to prior to placement of next layer.
- .6 Fill authorized or unauthorized excavation below design elevation of bottom of specified bedding in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling with compacted pit run gravel or approved equivalent.

3.5 BACKFILL

- .1 Place selected backfill, sub-base and base materials, above pipe bedding, in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.

- .2 Do not place backfill materials in frozen condition.
- .3 Under paving and walks, compact backfill to at least 95% corrected maximum dry density 95% maximum density to ASTM D698.
- .4 In other areas, compact to at least 90% corrected maximum dry density 90% maximum density to ASTM D698.

3.6 PIPE INSTALLATION

- .1 Lay ductile iron pipes to ANSI/AWWA C600 and PVC to manufacturer's standard instructions and specifications:
 - .1 Do not use blocks except as specified.
- .2 Join ductile iron pipes in accordance with ANSI/AWWA C600 and PVC to manufacturer's recommendations.
- .3 Bevel or taper ends of PVC pipe to match fittings.
- .4 Handle pipe by methods approved by Owner or Consultant and recommended by pipe manufacturer. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends.
- .5 Lay pipes on prepared bed, true to line and grade:
 - .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
 - .2 Take up and replace defective pipe.
 - .3 Correct pipe which is not in true alignment or grade or pipe which shows differential settlement after installation greater than 10 mm in 3 m.
- .6 Face bell ends of pipe in direction of laying and up-grade.
- .7 Do not exceed permissible deflection at joints as recommended by pipe manufacturer.
- .8 Keep jointing materials and installed pipe free of dirt and water and other foreign materials:
 - .1 Whenever work is stopped, install a removable watertight bulkhead/cap at open end of last pipe laid to prevent entry of foreign materials.
- .9 Position and join pipes with equipment and methods approved by Owner or Consultant.
- .10 Cut pipes in approved manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .11 Align pipes before jointing.
- .12 Install gaskets to manufacturer's recommendations. Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
- .13 Avoid displacing gasket or contaminating with dirt or other foreign material:
 - .1 Remove disturbed or contaminated gaskets.
 - .2 Clean, lubricate and replace before jointing is attempted again.
- .14 Complete each joint before laying next length of pipe.

- .15 Minimize deflection after joint has been made.
- .16 Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations.
- .17 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes or as otherwise approved by Owner or Consultant.
- .18 When stoppage of work occurs, block pipes in an approved manner to prevent creep during down time.
- .19 Recheck plastic pipe joints assembled above ground after placing in trench to ensure that no movement of joint has taken place.
- .20 Do not lay pipe on frozen bedding.
- .21 Do hydrostatic and leakage test and have results approved by Owner or Consultant before surrounding and covering joints and fittings with granular material.
- .22 Backfill remainder of trench.

3.7 VALVE INSTALLATION

- .1 Install valves to manufacturer's recommendations at locations as indicated.
- .2 Support valves located in valve boxes by means of concrete located between valve and solid ground. Bedding same as adjacent pipe. Maximum length of pipe on each end of valve shall be 1 m. Valves not to be supported by pipe.

3.8 CONCRETE THRUST BLOCKS AND RESTRAINED JOINTS

- .1 Place concrete thrust blocks between valves, bends, changes in pipe diameter, reducers and fittings on undisturbed ground as indicated by the Owner or Consultant.
- .2 Keep joints and couplings free of concrete.
- .3 Do not backfill over concrete within 24 hours after placing.
- .4 For restrained joints: only use restrained joints approved under Section 2.5.

3.9 BACKFILL

- .1 Do tests in accordance with ANSI/AWWA C600.
- .2 Provide labour, equipment and materials required to perform hydrostatic and leakage tests hereinafter described.
- .3 Notify Owner or Consultant at least 24 hours in advance of proposed tests:
 - .1 Perform tests in presence of Owner or Consultant.
- .4 Where section of system is provided with concrete thrust blocks, conduct tests at least 5 days after placing concrete.
- .5 Test pipeline in sections not exceeding 400 m in length, unless otherwise authorized by Owner or Consultant.

- .6 Upon completion of pipe laying and after Owner or Consultant has inspected Work in place, surround and cover pipes between joints with approved granular material placed to dimensions indicated
- .7 Leave valves exposed for operation during testing.
- .8 Ensure all valves are in open position.
- .9 Expel air from main by slowly filling main with potable water.
- .1 Install corporation stops at high points in main where no air-vacuum release valves are installed.
- .2 Remove stops after satisfactory completion of test and seal holes with plugs.
- .10 Apply hydrostatic test pressure of 1034 kPa based on elevation of lowest point in main and corrected to elevation of test gauge, for period of 2 hours.
- .11 The allowable leakage shall be determined by the following formula:
- $$Q = \frac{N \times D \times (P^{0.5})}{130,400}$$
- Where
- L = Allowable leakage, in liters/hour
- N = Number of Joints
- D = Nominal Diameter (mm)
- P = Test Pressure (kpa)
- .12 When testing against a closed valve, an additional leakage of 0.0012 liters/hour/mm diameter/valve is allowed.
- .13 Measure leakage of water as measured by a water meter approved by the Owner or Consultant. Proof of recent calibration maybe required.
- .14 Locate and repair defects if leakage is greater than amount specified.
- .15 Repeat test until leakage is within specified allowance for full length of force main. Repeated tests carried out at Contractor's expense. Repeated tests are to continue until all remedial measures have been successful.

3.10 SURFACE RESTORATION

- .1 After installing and backfilling over force mains, restore surface to original condition as directed by Owner or Consultant.

3.11 CLEANING

- .1 Refer to Section 01 00 00 – Project Specific General Requirements.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

- .1 This Section specifies the requirements for supplying and installing various diameters of storm sewer and storm sewer laterals. Work includes excavation, supply and installation of pipe, fittings, bedding materials, backfill, compaction and testing of pipe as shown on the associated drawings.

1.2 REFERENCE STANDARDS

- .1 ASTM C76M-22a, Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric).
- .2 ASTM C443M-21, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).
- .3 ASTM D3034-21, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- .4 ASTM D3212-21, Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- .5 ASTM F477-14(2021), Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- .6 ASTM F794-21, Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
- .7 CSA A257 Series:19, Standards for Concrete Pipe and Manhole Sections.
- .8 CSA B1800;21, Thermoplastic Nonpressure Piping Compendium (Standard CSA B182.2).
- .9 CSA B1800;21, Thermoplastic Nonpressure Piping Compendium (Standard CSA B182.4).
- .10 CSA B1800;21, Thermoplastic Nonpressure Piping Compendium (Standard B182.11).

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Scheduling: Refer to Section 01 00 00 – Project Specific General Requirements.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to Site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in accordance with manufacturer's recommendations.

- .2 Store and protect pipes from damage.
- .3 Replace defective or damaged materials with new.

1.5 MEASUREMENT FOR PAYMENT

- .1 Measurement for payment for pipe shall be per metre (m) of pipe, supplied and installed, which shall include the cost of all material, couplers, gaskets, common excavation, dewatering, compacting, pipe laying, bedding and backfilling to grade.
- .2 The unit of measurement for storm sewer piping will be lineal metres. The price includes the supply and installation of storm sewer including excavation, bedding, installation of rubber gasket at each joint, connections to new or existing piping, manholes and catch basins, and backfilling, Granular B pitrun gravel, Granular A crushed gravel, compaction and testing. Measurements will be taken along the centreline of the pipe continuously through manholes.
- .3 The unit of measurement for storm sewer fittings will be the number (each). The unit price includes the supply and installation of the fittings, excavation, bedding, backfilling, Granular B pitrun gravel, Granular A crushed gravel, and compaction.
- .4 The unit of measurement for storm sewer lateral connections will be the number (each). This includes the tee connections, long sweep bends, couplings, etc. The unit price includes the supply and installation of the fittings, excavation, bedding, gaskets, backfilling, Granular B pitrun gravel, Granular A crushed gravel, and compaction.
- .5 Measurement for payment for each headwall shall be on a Unit Price basis, for supply and installation.
- .6 The unit of measurement for RC Class 5 piping will be lineal metres. The price includes the supply and installation of storm sewer including excavation, bedding, installation of rubber gasket at each joint, backfilling, Granular B crushed gravel, Granular A crushed gravel, compaction, inlet ditching, outlet ditching and plunge pool. Measurements will be taken along the centreline of the pipe.
- .7 The unit of measurement for RC Class 3 piping will be lineal metres. The price includes the supply and installation of storm sewer including excavation, bedding, installation of rubber gasket at each joint, backfilling, Granular B crushed gravel, Granular A crushed gravel, compaction, inlet ditching, outlet ditching and plunge pool. Measurements will be taken along the centreline of the pipe.
- .8 The unit of measurement for Reinforced Concrete Culvert Class 3 will be lineal metres. The price includes the supply and installation of pipe, excavation, bedding, backfilling, Granular B crushed gravel, Granular A crushed gravel and compaction.
- .9 The unit of measurement for Reinforced Concrete Inlet Headwall complete with Cutoff Wall will be the number each. The price includes the supply and installation of Reinforced Concrete Inlet Headwall, Cutoff Wall, excavation, bedding, backfilling, Granular B crushed gravel, Granular A crushed gravel and compaction.
- .10 The unit of measurement for Reinforced Concrete Headwall complete with Outlet Grate will be the number each. The price includes the supply and installation of Reinforced Concrete Headwall, Outlet Grate, excavation, bedding, backfilling, Granular B crushed gravel, Granular A crushed gravel and compaction.

2 PRODUCTS

2.1 CONCRETE PIPE

- .1 Reinforced concrete pipe: to CSA A257, ASTM C76M and minimum class 65D (Class III), designed for flexible rubber gasket joints to CSA A257 and ASTM C443M.
- .2 All reinforced concrete pipe to be pre-tested prior to shipment. Minimum 3 pipe per test section. All pipe passing pre-testing to be labeled as passed or tested and documentation of the testing to accompany the delivery of the pipe.
- .3 Lifting holes:
 - .1 Pipe 900 mm and less diameter - no lift holes.
 - .2 Pipe greater than [900] mm diameter - lift holes not to exceed [two] in a piece of pipe.
 - .3 Supply prefabricated plugs to seal lift holes tight after installation of pipe.

2.2 PLASTIC PIPE

- .1 Type PSM Polyvinyl Chloride (PVC) Ribbed Pipe: to ASTM F794 and CSA B182.4.
 - .1 Ribbed PVC sizes 200 mm to 600 mm.
 - .2 Removable gasket and integral bell system.
 - .3 Nominal lengths: 4 m.
 - .4 SDR35 for storm pipe.

2.3 SERVICE CONNECTIONS

- .1 Type PSM Polyvinyl Chloride (PVC) lateral pipe:
 - .1 To ASTM D3034 and CSA B182.2.
 - .1 Standard Dimensional Ratio (SDR): 35.
 - .2 Locked-in gasket and integral bell system.
 - .3 Nominal lengths: 4 m.
- .2 Service Connections Tees to PVC:
 - .1 To ASTM F794 and CSA B182.4.
 - .2 Standard Dimensional Ratio (SDR): 35.
 - .3 Removable gasket and integral bell system.
- .3 Service Connections Tees to Reinforced Concrete:
 - .1 To ASTM F477 and ASTM D3212.
 - .2 Removable gasket and integral bell system.

- .3 Connection to reinforced concrete to be "Inserta-Tee" or "Quick Seal" with stainless steel straps.

2.4 COUPLINGS

- .1 Couplings connecting ribbed PVC to ribbed PVC:
 - .1 Fabricated fittings certified ASTM F794 and CSA B182.4.
 - .2 Removable gasket and integral to coupling.
- .2 Couplings connecting dissimilar pipe:
 - .1 Flexible rubber repair coupling.
 - .2 Stainless steel bands with stainless steel shear ring.
 - .3 Acceptable Products:
 - .1 Fernco.
 - .2 Mission.
 - .3 Indiana Steel.
 - .4 Approved Equal.

2.5 PIPE INSULATION

- .1 Insulation for storm sewer mains and laterals shall be a 50 mm thick Styrofoam insulation board:
 - .1 Acceptable Products:
 - .1 Dow HI40.
 - .2 Owens Corning Formular 400.
 - .3 Approved Equal.

2.6 BEDDING

- .1 Granular bedding material for ribbed PVC pipe to Section 31 05 16 - Aggregate Materials and following requirements:
 - .1 Crushed or screened stone.
- .2 Granular bedding material for reinforced concrete pipe to Section 31 05 16 - Aggregate Materials and following requirements:
 - .1 Pit run gravel, screened pit run or crushed rock.
 - .2 Compacted to 95 % standard proctor density for under pavement or sidewalks.
 - .3 Compacted to 90 % standard proctor density for grassed areas.

2.7 BACKFILL MATERIAL

- .1 Selected backfill in accordance with Section 32 11 23 - Aggregate Placement and sub-base and base in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Unshrinkable fill: to Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of conditions: verify that conditions of substrate previously installed under other Contracts are acceptable for storm sewer pipe installation in accordance with manufacturer's written instructions.
- .2 Visually inspect substrate in presence of Owner or Consultant.
- .3 Inform Owner or Consultant of unacceptable conditions immediately upon discovery.
- .4 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

- .1 Clean pipes, fittings and appurtenances of accumulated debris and water before installation:
 - .1 Inspect materials for defects to approval of Owner or Consultant.
 - .2 Remove defective materials from Site as directed by Owner or Consultant.

3.3 TRENCHING

- .1 Do trenching Work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Protect trench from contents of storm sewer or storm sewer connection.
- .3 Trench alignment and depth require approval of Owner or Consultant prior to placing bedding material and pipe.

3.4 GRANULAR BEDDING

- .1 Place granular bedding materials in uniform layers not exceeding 150 mm thickness to depth of 150 mm below invert of pipe.
- .2 Do not place material in frozen condition and do not place material in a frozen trench.
- .3 Shape bed true to grade to provide continuous, uniform bearing surface for pipe.
 - .1 Do not use blocks when bedding pipe.

- .4 Shape transverse depressions in bedding as required to suit joints.
- .5 Hand place bedding material in uniform layers not exceeding 150 mm thickness as indicated.
 - .1 Do not dump material directly onto pipe.
- .6 Place layers uniformly and simultaneously on each side of pipe.
- .7 Place each layer from bottom of trench to haunch line of pipe and chink to underside of pipe.
- .8 For pit run bedding on reinforced concrete pipe, compact each layer as required in section 2.06.
- .9 Place each layer from haunch line of pipe to underside of backfill.
- .10 Fill excavation below bottom of specified bedding adjacent to manholes or structures with bedding material.
- .11 Fill authorized or unauthorized excavation below design elevation of bottom of specified bedding in accordance with Section 31 23 33.01 – Excavation, Trenching and Backfilling with compacted pit run gravel or approved equal.
- .12 Prior to placing backfill, install filter fabric from top of screened stone bedding to full width of trench.

3.5 BACKFILL

- .1 Place selected backfill, sub-base and base materials, above pipe bedding in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.
- .2 Do not place backfill material in frozen condition.
- .3 Under asphalt and sidewalks, compact backfill to at least 95% standard proctor density.
 - .1 In other grassed areas, compact to at least 90% standard proctor density.

3.6 PIPE INSTALLATION

- .1 Handle pipe using methods approved by Owner or Consultant.
 - .1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.
- .2 Lay pipes on prepared bed, true to line and grade, with pipe invert smooth and free of sags or high points.
 - .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
- .3 Begin laying at outlet and proceed in upstream direction with bell ends of pipe facing upgrade.
- .4 Joint deflection permitted within limits recommended by pipe manufacturer.
- .5 Tension rod/bar assemblies shall be required on all reinforced concrete outlet ends that do not terminate at a structure and are greater than 3% grade.

- .6 Tension rod/bar assemblies shall be supplied as indicated in NBDTI Standard Drawing 140-1 for pipes specifically identified in the Contract Documents.
- .7 Tension rod/bar assemblies shall be installed as indicated in NBDTI Standard Drawing 140-1 and in the Contract Documents.
- .8 Water not to flow through pipe during construction, unless permitted Owner or Consultant.
- .9 Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
- .10 Install plastic pipe and fittings in accordance with CSA B182.11.
- .11 Pipe jointing:
 - .1 Install gaskets in accordance with manufacturer's written recommendations.
 - .2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
 - .3 Align pipes before joining.
 - .4 Maintain pipe joints free from mud, silt, gravel and foreign material.
 - .5 Avoid displacing gasket or contaminating with dirt or foreign material. Gaskets so disturbed to be removed, cleaned and lubricated and replaced before joining is attempted.
 - .6 Complete each joint and place bedding before laying next length of pipe.
 - .7 Minimize joint deflection after joint has been made to avoid joint damage.
 - .8 At rigid structures, install pipe joints not more than 1.2 m from side of structure.
 - .9 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.
- .12 When stoppage of Work occurs, support pipes as directed by Owner or Consultant to prevent creep during down time.
- .13 Plug lifting holes with prefabricated plugs or grout approved by Owner or Consultant.
- .14 Cut pipes as required for special inserts, fittings or closure pieces as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .15 Make watertight connections to manholes.
- .16 Use prefabricated couplings for field connections approved by Owner or Consultant for connecting pipes to existing storm sewer pipes of same material.
 - .1 Joints to be structurally sound and watertight.
- .17 When connecting dissimilar storm sewer pipe materials, use a flexible rubber repair coupling, with stainless steel bands and stainless-steel sheer ring.

3.7 SERVICE CONNECTIONS

- .1 Install pipe to manufacturer's instructions and specifications.
- .2 Maintain grade for 100 mm diameter storm sewers at 1 % minimum unless directed by

Owner or Consultant.

- .3 Service connections to main storm sewer: Fabricated PVC Tee fitting for ribbed pipe connection and Inserta-Tee for Concrete pipe connection.
 - .1 Do not use break-in and mortar patch-type joints.
- .4 Service connection pipe: not to extend into interior of main storm sewer.
- .5 Make up required horizontal and vertical bends from 45 degrees bends or less, separated by straight section of pipe with minimum length of 4 pipe diameters.
 - .1 Use long sweep bends where applicable.
- .6 Plug service laterals with watertight caps or plugs.
- .7 Place location marker at ends of plugged or capped unconnected storm sewer lines.
 - .1 Each marker: 38 x 89 mm stake extending from pipe end at pipe level to 600 mm above finished grade in grassed areas and 600 mm below finished grade in asphalt areas to locate pipe end.
 - .2 Paint exposed portion of stake pink with designation ST SWR LINE in black.

3.8 FIELD TESTING

- .1 All storm sewers to be flushed and videoed.
- .2 Remove foreign material from storm sewers and related appurtenances by flushing with water.
 - .1 Flushing to be completed with high pressure flushing equipment capable of removal and collection of debris.
 - .2 All debris is to be collected and prevented from entering other sections of storm sewer mains outside the Work area.
- .3 All storm sewers to be video inspected:
 - .1 All CCTV work shall conform to National Association of Sewer Service Companies (NASSCO) – Pipeline Assessment Certification Program (PACP) standards.
 - .2 Camera Operator shall be a PACP certified operator and proof of certification shall be submitted to the Owner or Consultant prior to starting CCTV.
 - .3 Storm sewers to be videoed with coloured closed-circuit television inspection (CCTV) from manhole to manhole.
 - .4 Camera shall be capable of tilt and pan.
 - .5 Camera shall pause, tilt and pan at all end pipes, service lateral connections, pipe defects, sags, etc.
 - .6 All inspections shall accurately measure linear distance. Measurements shall be accurately displayed in the videos.
 - .7 All videos and pdf video inspection reports are to be submitted to the Owner or Consultant at the completion of the Work.
 - .8 No asphalt restoration is to be completed until videos and reports have been

submitted and reviewed by the Owner or Consultant.

- .9 All defects identified in the videos and reports are to be corrected prior to asphalt restoration.

3.9 CLEANING

- .1 Refer to Section 01 00 00 – Project Specific General Requirements.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

- .1 This Section specifies the requirements for supplying and installing steel W-beam guide rail. Work includes excavation, supply and installation of wooden posts, wooden offset posts, hardware, steel w-beam sections and terminal sections of w-beam as shown on the associated drawings.

1.2 REFERENCE STANDARDS

- .1 AASHTO M180-18 (2021), Standard Specification for Corrugated Sheet Steel Beams for Highway Guardrail.
- .2 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .3 ASTM A307-21, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
- .4 CAN/CSA O80 Series:21, Wood Preservation.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Scheduling: Refer to Section 01 00 00 – Project Specific General Requirements.
 - .1 Schedule Work to minimize interruptions to existing services and maintain existing traffic during construction.
 - .2 Submit schedule of expected interruptions for approval and adhere to approved schedule.
 - .3 Notify Owner or Consultant 24 hours minimum in advance of any interruption in service.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and acceptance requirements: deliver materials to Site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and handling requirements:
 - .1 Store materials in accordance with manufacturer's recommendations.
 - .2 Store and protect pipes from damage.
 - .3 Replace defective or damaged materials with new.

1.5 MEASUREMENT FOR PAYMENT

- .1 Payment for guide rail shall be made per lineal metre (m) of guide rail supplied and installed in accordance with this Item. All hardware to be included in the guide rail unit price.
- .2 Payment for guide posts shall be made under a unit price basis for the number of guide posts supplied and installed in accordance with this Item.

2 PRODUCTS

2.1 MATERIALS

- .1 Steel W-beam guide rail as indicated and as follows:
 - .1 Steel rail and terminal sections: to AASHTO M180, class A, Type 2 zinc coated.
 - .2 Bolts, nuts and washers: to ASTM A307, hot dip galvanized to ASTM A123/A123M.
- .2 Sawn timber posts and offset blocks:
 - .1 Species: Maple, birch or beech hardwood.
 - .2 Type: pressure treated in accordance with CAN/CSA-O80 Series.
 - .3 Grade: No. 1.
 - .4 Dimensions: as indicated.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for guide rail installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Owner or Consultant.
 - .2 Inform Owner or Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

- .1 Temporary erosion and sedimentation control:
 - .1 Supply and install temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, as per requirements of authorities having jurisdiction.

- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 ERECTION

- .1 Set posts by instrument for alignment, and locations as indicated.
- .2 Excavate post holes to depths as indicated and to diameter of 360 mm plus or minus 20 mm.
 - .1 Compact bottom to provide firm foundation.
 - .2 Set post plumb and square in hole.
 - .3 Backfill around posts using excavated material and compact in uniform layers not exceeding 150 mm compacted thickness.
 - .4 Cut off tops of posts as indicated, with tops parallel to grade of pavement edge.
 - .5 Worker protection: ensure workers wear gloves, respirators, dust masks, long sleeved clothing, eye protection and protective clothing when handling, drilling, sawing, cutting or sanding preservative treated wood and applying preservative materials.
 - .6 Treat cut tops with 2 coats of preservative.
 - .7 Construct anchorages to details as indicated.
 - .1 Place and compact backfill for anchors as indicated on the Drawings.
 - .8 Erect steel W-beam components to details as indicated. Lap joints in direction of traffic.
 - .1 Tighten nuts to 100 N.m torque.
 - .1 Maximum protrusion of bolt 12 mm beyond nut.

3.4 CLEANING

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.5 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by guide rail installation.

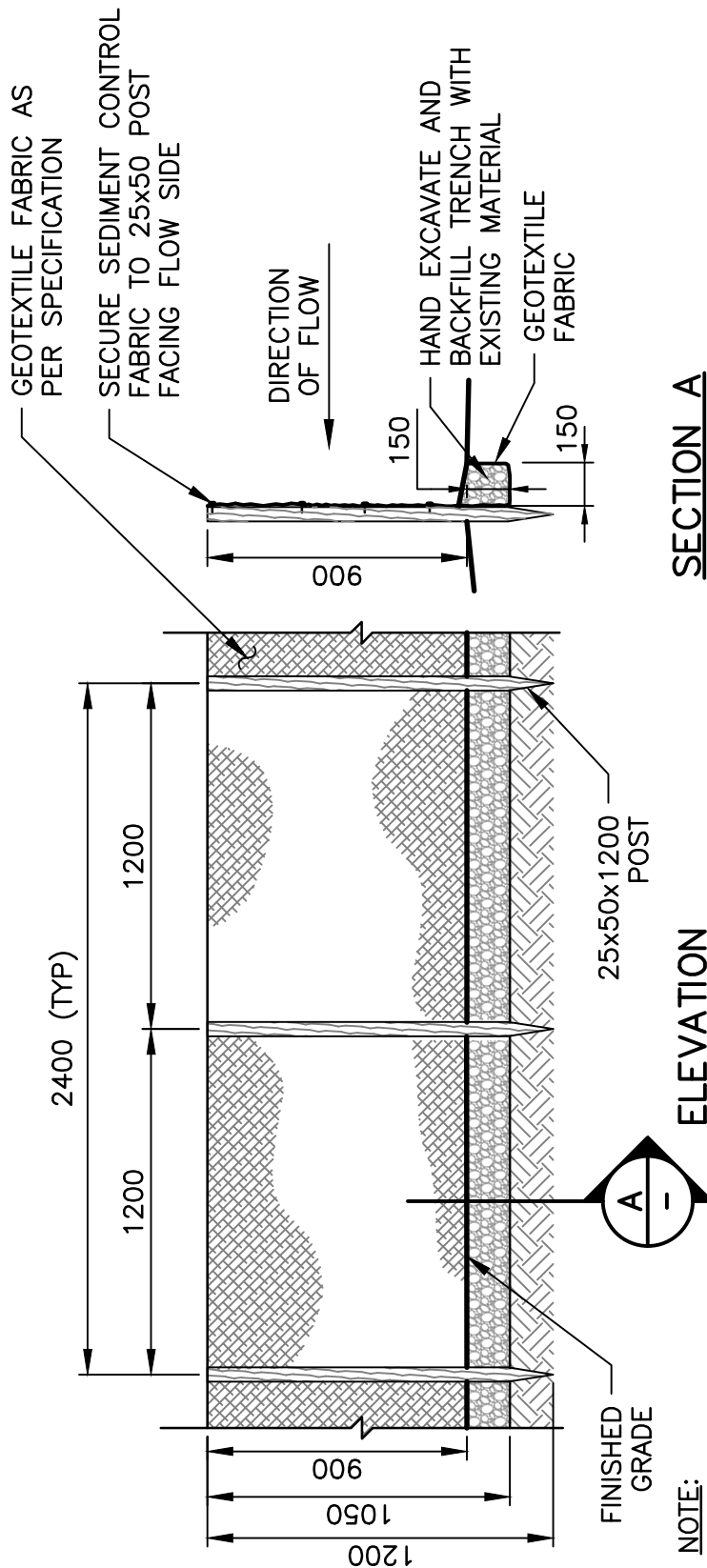
END OF SECTION


APPENDIX A

ADDITIONAL TECHNICAL SPECIFICATIONS

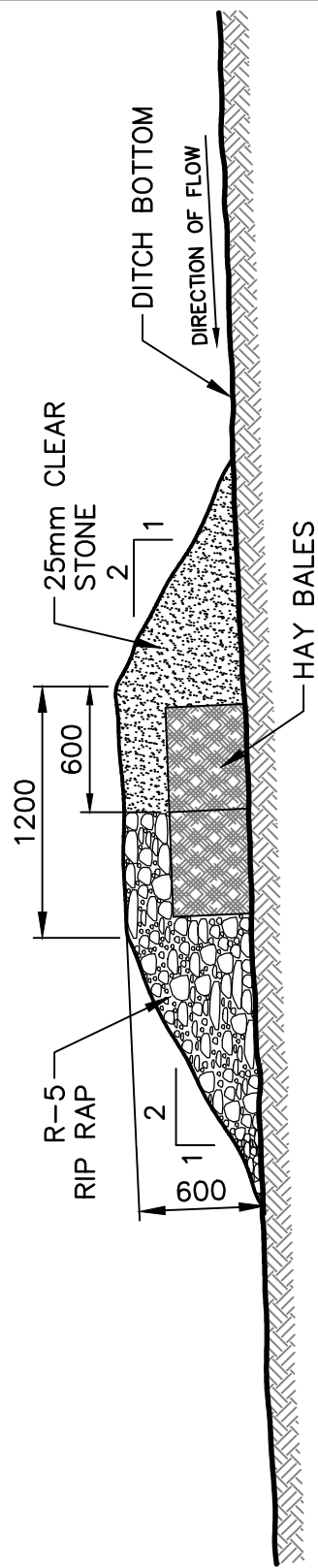
PART III

STANDARD DETAILS

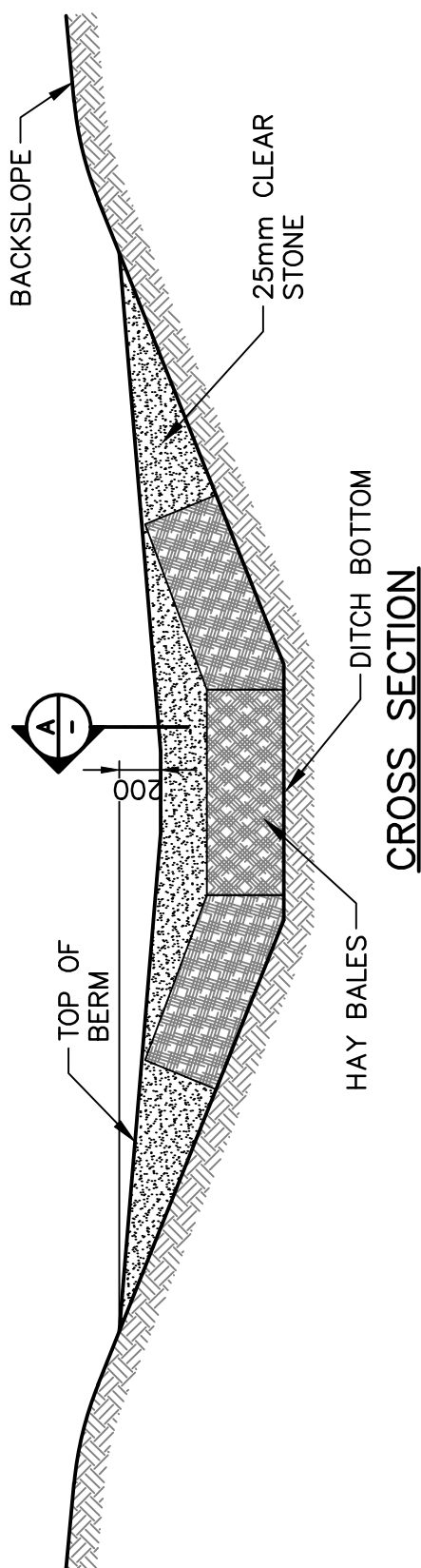


No.	Description	No.	Description	No.	Description
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		TOWN OF QUISPAMSIS			Drawing 31.SD01
		SEDIMENT CONTROL FENCE			


DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPEC\31.SD02 SEDIMENT CONTROL BERM.DWG LAYOUT NAME: SK-5 SEDIMENT CONTROL BERM PLOT DATE: December 13, 2022 11:49:27 AM CAD OPERATOR: TRAVIS M

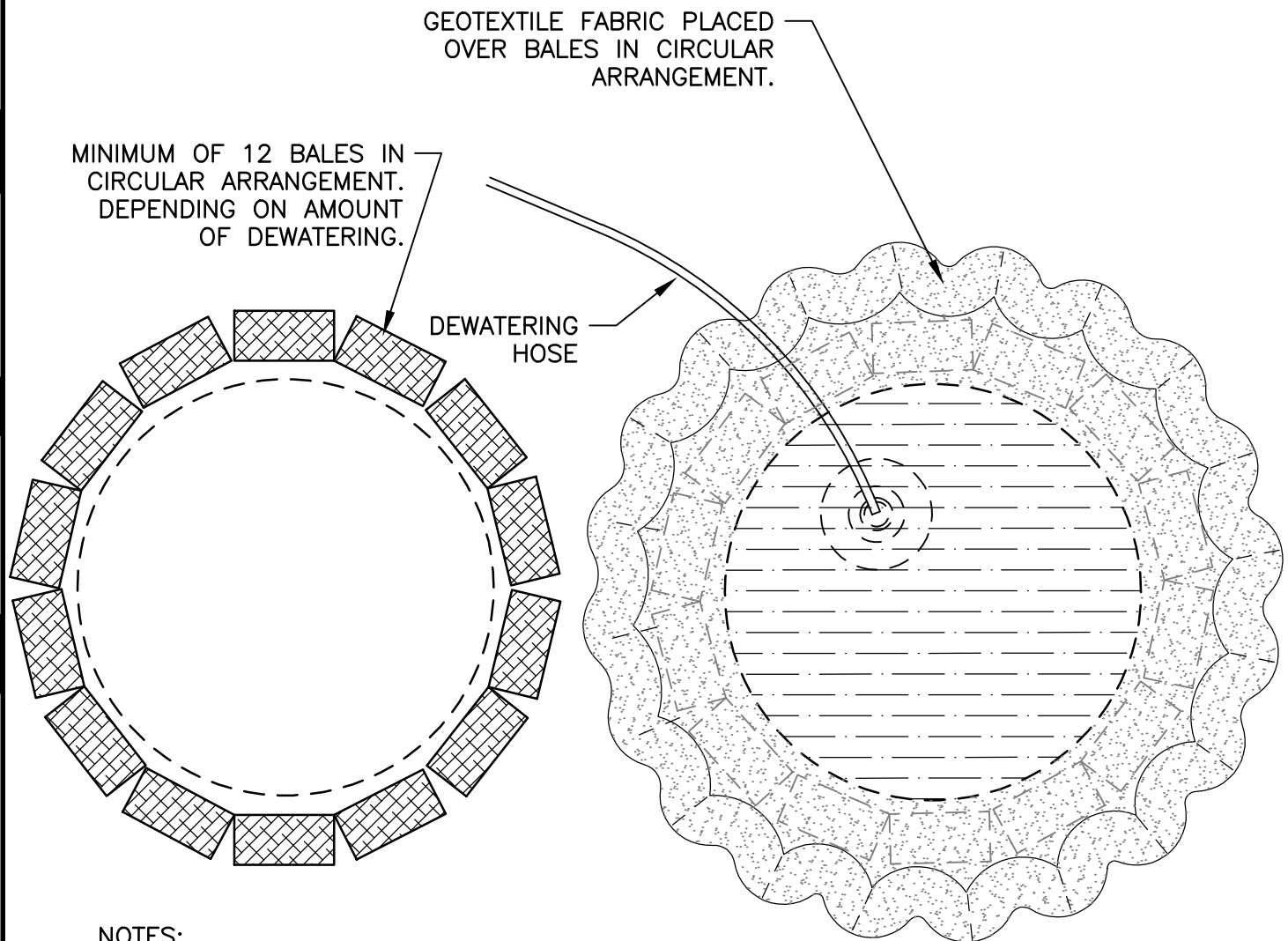


SECTION A



CROSS SECTION

No.	Description	No.	Description	No.	Description
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		TOWN OF QUISPAMIS			Drawing 31.SD02
		SEDIMENT CONTROL BERM			



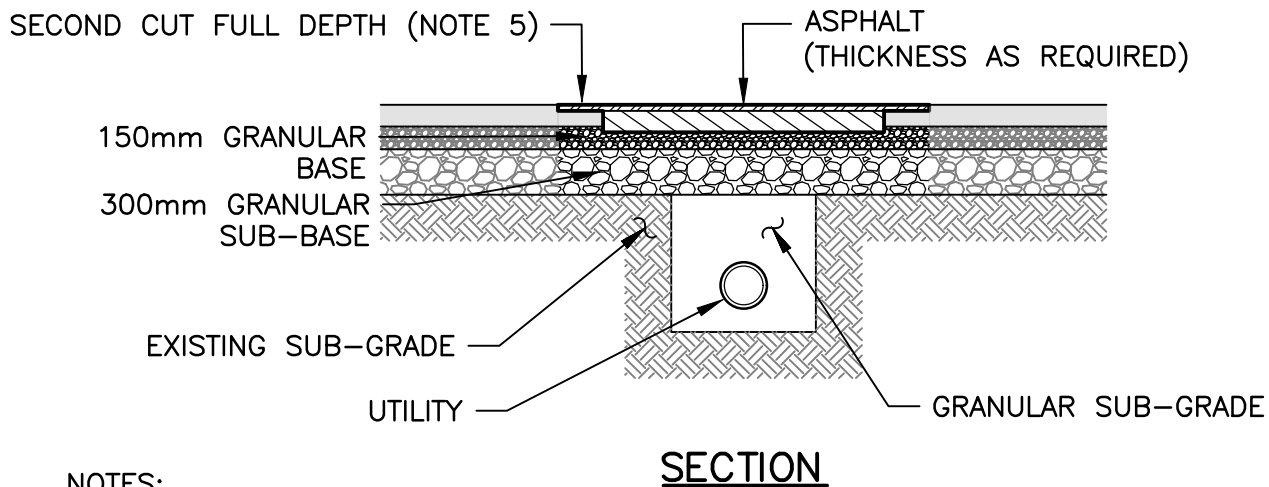
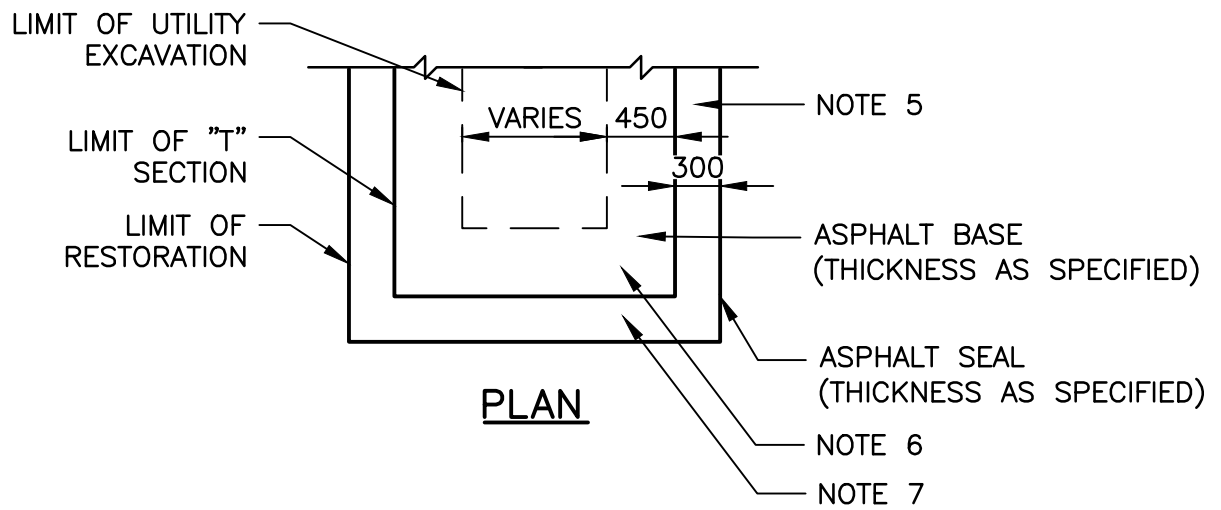
NOTES:

1. REPLACE GEOTEXTILE WHEN SEDIMENTS RESTRICT FILTERING ACTION.
2. SEDIMENTS COLLECTED TO BE DISPOSED OF OFF SITE.
3. IF SETTLING POND OVERFLOWS EXCESSIVELY, SIZE OF POND MUST BE INCREASED.

STRAW BALES MAY ALSO BE PLACED ON TOP TO SECURE GEOTEXTILE.


No.		Description	No.		Description	No.		Description
Date	2021-01-21		Scale	N.T.S.		Drawn	THM	
			TOWN OF QUISPAMSIS			Drawing <h1>31.SD03</h1>		
			SEDIMENT SETTLING POND					

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPECIFICATIONS\01 UTILITY RESTORATION ASPHALT CONCRETE T PATCH PLOT.DWG LAYOUT NAME: SK-36 UTILITY RESTORATION ASPHALT CONCRETE T PATCH PLOT.DWG DATE: December 13, 2022 11:51:29 AM CAD OPERATOR: CAD OPERATOR

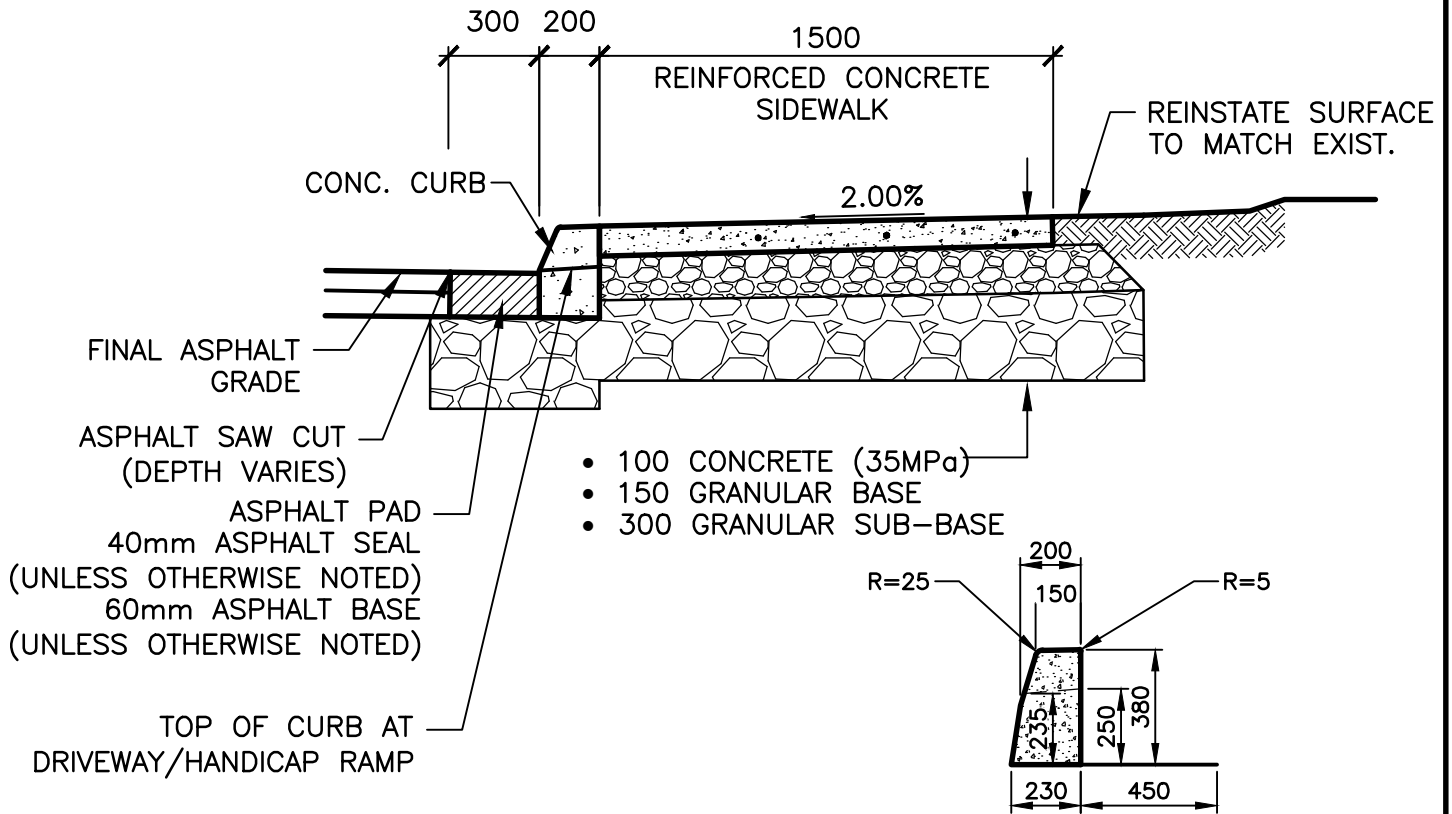


NOTES:

1. PIPE BEDDING AND GRANULAR SUB-BASE AS PER TOWN SPECIFICATIONS.
2. EXCAVATE AND REMOVE ANY UNDERMINED ASPHALT.
3. REMOVE ADDITIONAL PAVEMENT TO A PAINTED LANE STRIPE, CURB OR AN EDGE OF PAVEMENT IF SUCH STREET FEATURE IS WITHIN 600mm OF THE SECOND CUT IN THE ASPHALT.
4. THE LIMITS OF RESTORATION SHALL BE RECTANGLE AREA 300mm BEYOND THE OUTER EDGE OF THE WIDEST PORTION OF THE "T" SECTION. THE EXISTING CONCRETE SHALL BE REMOVED TO THE DEPTH EQUAL TO THE THICKNESS OF THE SURFACE COURSE BY COLD MILLING.
5. NEATLY CUT THE PERIMETER OF ALL EXCAVATIONS TO PROVIDE CLEAN STRAIGHT VERTICAL SIDES.
6. CONSTRUCT NEW ASPHALT BASE AS SPECIFIED.
7. CONSTRUCT NEW ASPHALT SEAL AS SPECIFIED.
8. PROVIDE FULL TACK COAT COVERAGE ON ALL VERTICAL AND MILLED SURFACES.
9. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE TOWN'S SPECIFICATIONS.

No.	Description	No.	Description	No.	Description
Date		Scale		Drawn	
2021-01-21		1:50		THM	
		TOWN OF QUISPAMIS			Drawing
		UTILITY RESTORATION ASPHALT CONCRETE "T" PATCH			
		32.SD01			


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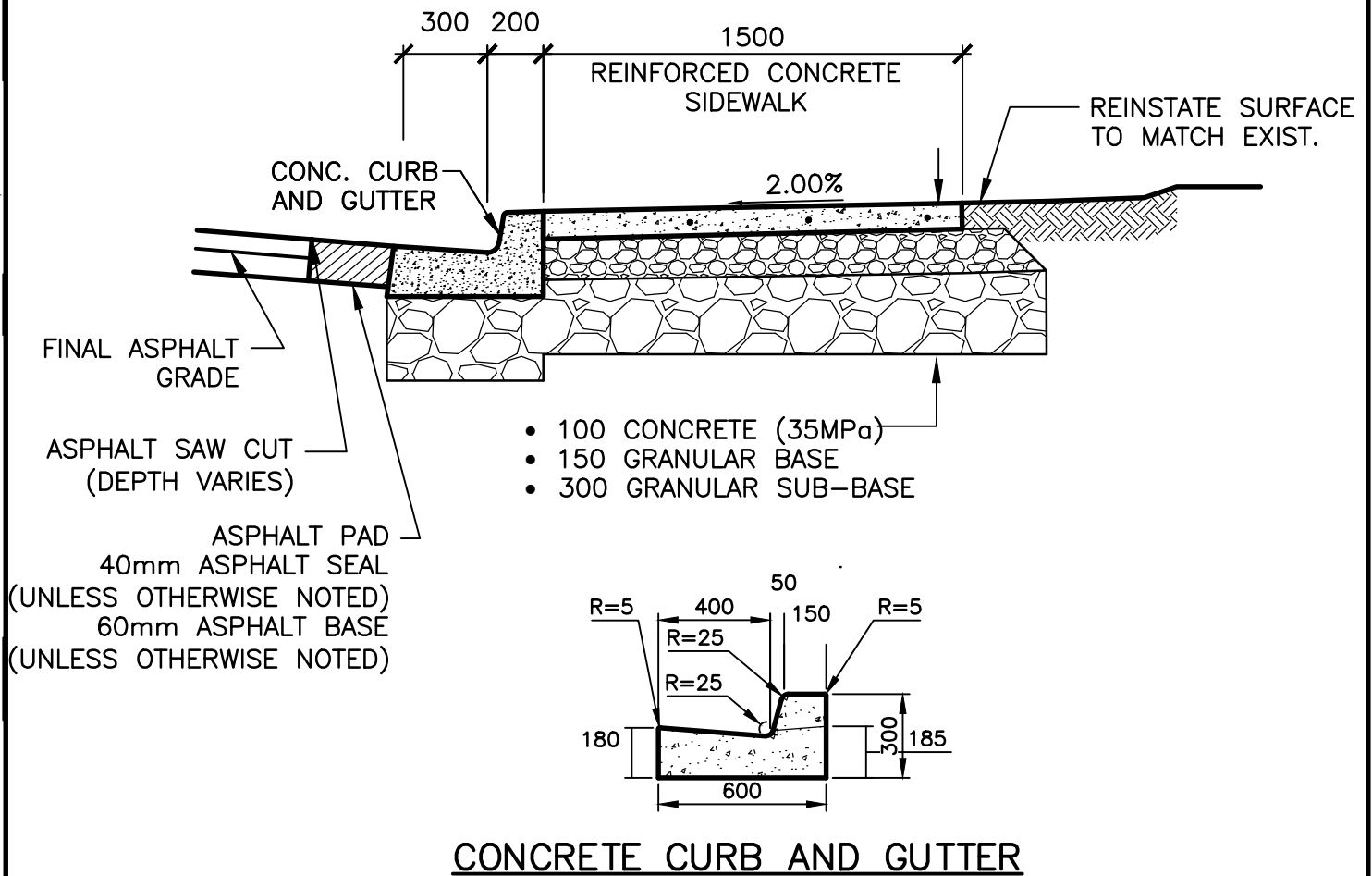
CONCRETE CURB

NOTES:

1. FIBERBOARD EXPANSION JOINT REQUIRED AT BUILDINGS, FIRE HYDRANTS, ETC.
2. SIDEWALK TO BE 150mm THICK AT ALL RESIDENTIAL DRIVEWAYS AND 200mm THICK AT ALL COMMERCIAL DRIVEWAYS.
3. EXPANSION JOINTS REQUIRED AT EVERY 6000mm AND DUMMY JOINTS AT EVERY 1500mm.
4. ALL SIDEWALKS TO HAVE REINFORCED WIRE MESH WWF150x150 AT MID SLAB.


No.	Description	No.	Description	No.	Description
Date		Scale		Drawn	
2021-01-21		1:25		THM	
		TOWN OF QUISPAMISIS			Drawing
		CONCRETE CURB AND SIDEWALK			
					32.SD02

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPECIFICATIONS\08 SD03 CONCRETE CURB AND GUTTER AND SIDEWALK.DWG LAYOUT NAME: SK-38 CONCRETE CURB AND GUTTER AND SIDEWALK K PLOT DATE: December 13, 2022 11:53:13 AM CAD OPERATOR: TRAVIS




NOTES:

1. FIBERBOARD EXPANSION JOINT REQUIRED AT BUILDINGS, FIRE HYDRANTS, ETC.
2. SIDEWALK TO BE 150mm THICK AT ALL RESIDENTIAL DRIVEWAYS AND 200mm THICK AT ALL COMMERCIAL DRIVEWAYS.
3. EXPANSION JOINTS REQUIRED AT EVERY 6000mm AND DUMMY JOINTS AT EVERY 1500mm.
4. ALL SIDEWALKS TO HAVE REINFORCED WIRE MESH WWF150x150 AT MID SLAB.

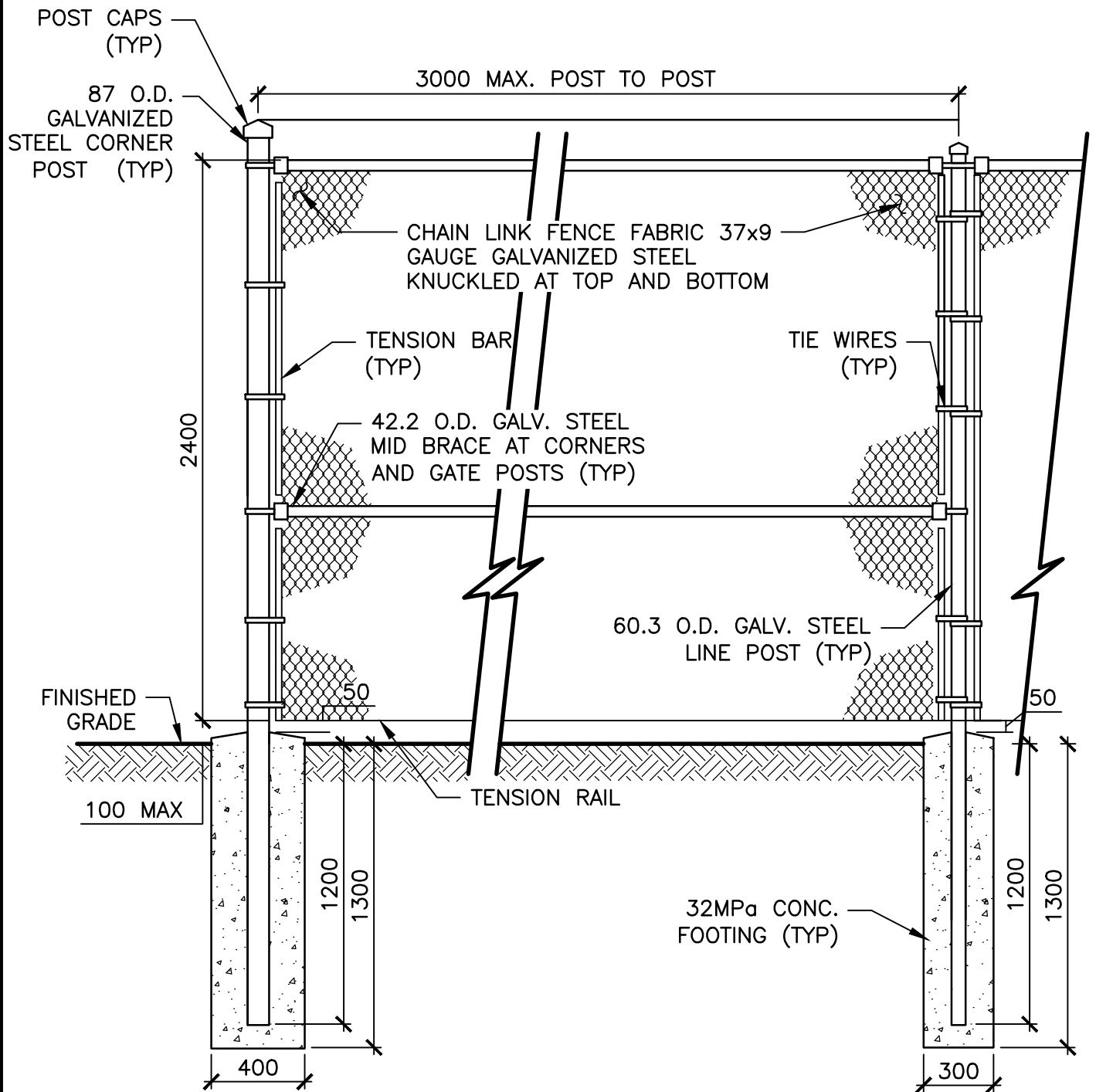
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2021-01-21		1:25		THM	
		TOWN OF QUISPAMIS			Drawing
		CONCRETE CURB AND GUTTER AND SIDEWALK			
					32.SD03


DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUIPSAM\S MUNICIPAL SPECIFICATIONS\08 SPECS\CIVIL CAD DETAILS\32 SD04 SIDEWALK ACCESS RAMP.DWG LAYOUT NAME: SK-39 SIDEWALK ACCESS RAMP SPECIFICATION PLOT DATE: December 13, 2022 11:54:06 AM CAD OPERATOR: TRAVIS

-
- PLAN**
1:100
- SECTION "A-A"**
1:25
- Labels and Dimensions:**
- TOPSOIL AND SOD
 - FACE OF CONC CURB AND GUTTER
 - 1500 (MIN.)
 - RADIUS AS SPECIFIED
 - 1500 (MIN.)
 - 1500
 - 1500
 - 1500
 - CONC. SIDEWALK
 - 4500
 - STREET LINE CUT BACK
 - FACE OF LOW PROFILE CONC. CURB & GUTTER (SEE NOTE 2)
 - 1500 MIN.
 - 8% MAX.
 - 100 CONC. SIDEWALK
 - 150 GRANULAR BASE
 - 300 GRANULAR SUB-BASE

No.	Description	No.	Description	No.	Description
Date	2021-01-21	Scale	1:100 / 1:25	Drawn	THM
		TOWN OF QUISPAMSIS		Drawing <h1>32.SD04</h1>	
		SIDEWALK ACCESS RAMPS			


DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPECS\CIVIL CAD DETAILS\32.SD05 CHAIN LINK FENCE DWG LAYOUT NAME: SK-42 CHAIN LINK FENCE PLOT DATE: December 13, 2022 11:54:49 AM CAD OPERATOR: TRAVIS M

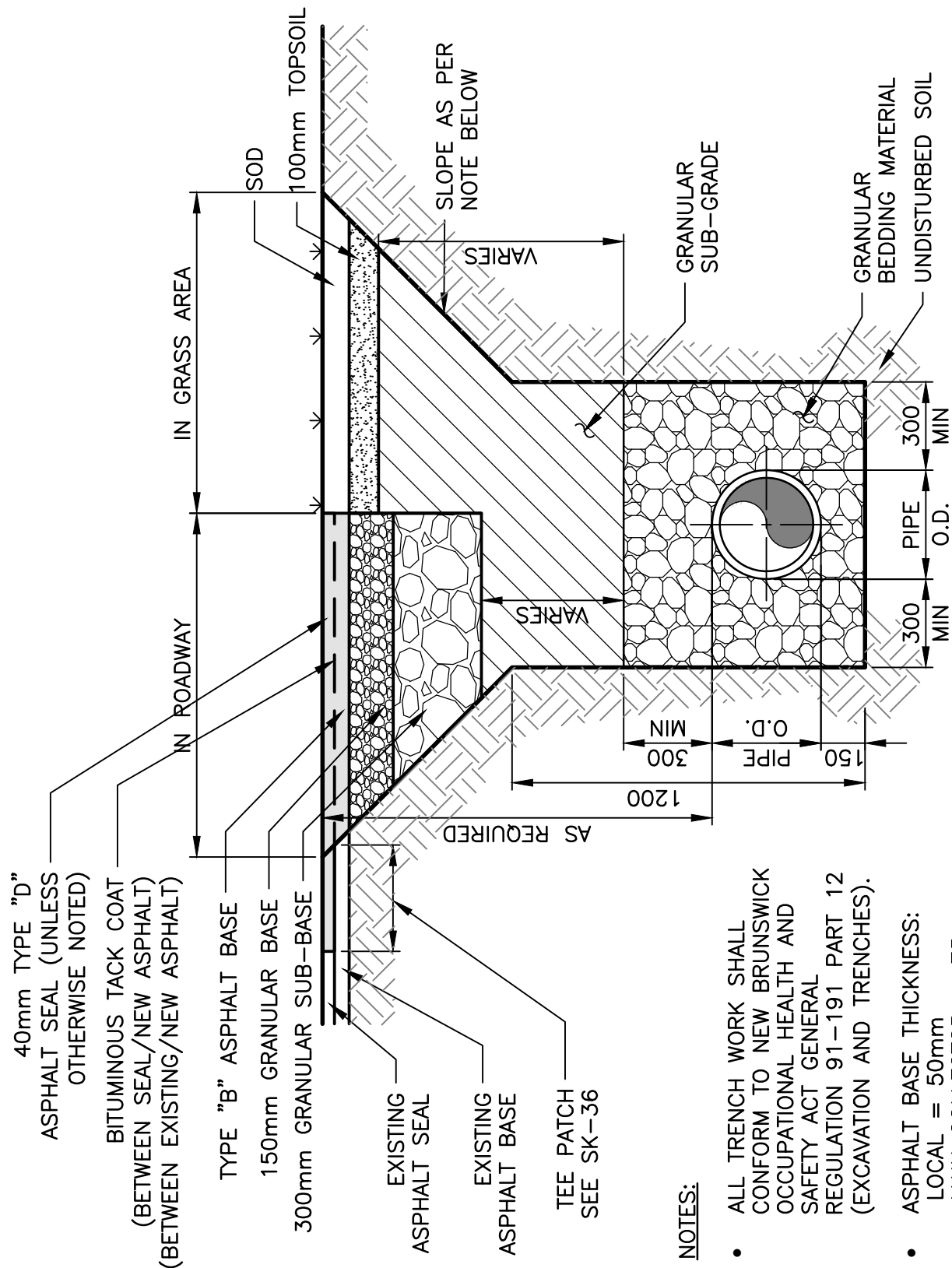


No.	Description	No.	Description	No.	Description
Date		Scale		Drawn	
2021-01-21		1:25		THM	
		TOWN OF QUISPAMIS			Drawing 32.SD05
		CHAIN LINK FENCE			




- NOTES:
1. INSTALL CORNER POSTS WHERE CHANGES IN ALIGNMENT EXCEED 10".
 2. INSTALL BRACE BETWEEN END AND GATE POSTS AND NEAREST LINE POST. INSTALL BRACES ON BOTH SIDES OF CORNER AND STRAINING POSTS.
 3. INSTALL OVERHANG TOPS AND CAPS.
 4. PLACE TENSION BAR BANDS @ 3000 INTERVALS.
 5. SECURE FABRIC TO TOP RAILS, LINE POSTS AND BOTTOM TENSION RAIL WITH TIE WIRES AT 450mm INTERVALS.
 6. ALL FENCE FABRIC, STEEL FRAMEWORK, GATES AND INSTALLATION TO CONFORM WITH CAN/CGSB-138.1 THROUGH 138.4.
 7. POSTS TO BE SCHEDULE 40, HOT DIPPED GALVANIZED STEEL COATED WITH A 3mil
 8. GATES TO BE DOUBLE SWING, FRAMED WITH 42 O.D. FRAMING, 2.0mm WALL THICKNESS.
 9. PROVIDE CLEARANCES BETWEEN BOTTOM OF FENCE AND GROUND SURFACE OF 150mm.
- POSTS TO BE SCHEDULE 40, HOT DIPPED GALVANIZED STEEL COATED WITH A 3mil

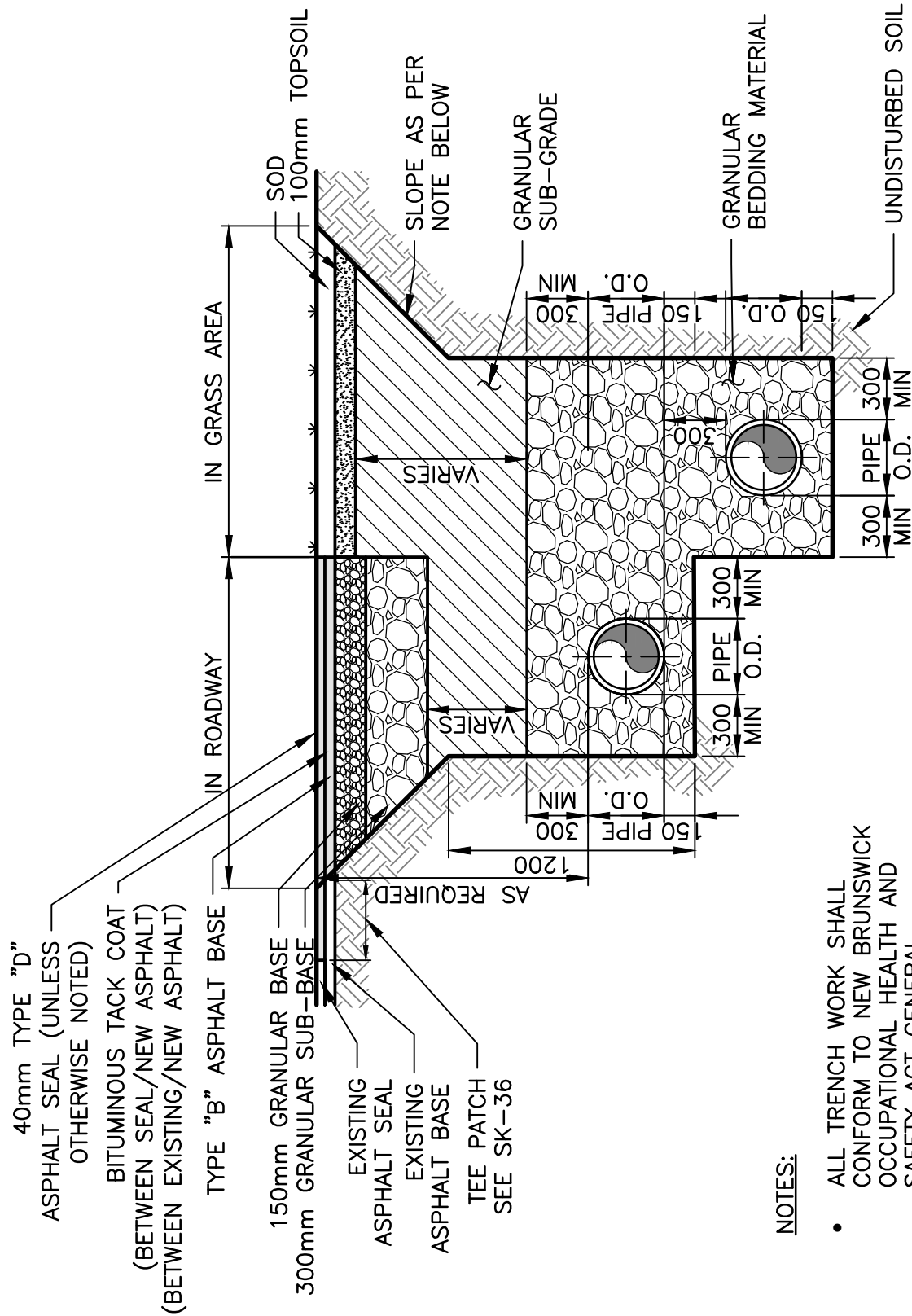
No.	Description	No.	Description	No.	Description
Date	2021-01-21	Scale	1:40	Drawn	THM
		TOWN OF QUISPAMSIS		Drawing 32.SD06	
		CHAIN LINK SECURITY GATE WITH VEHICLE GATE			




NOTES:

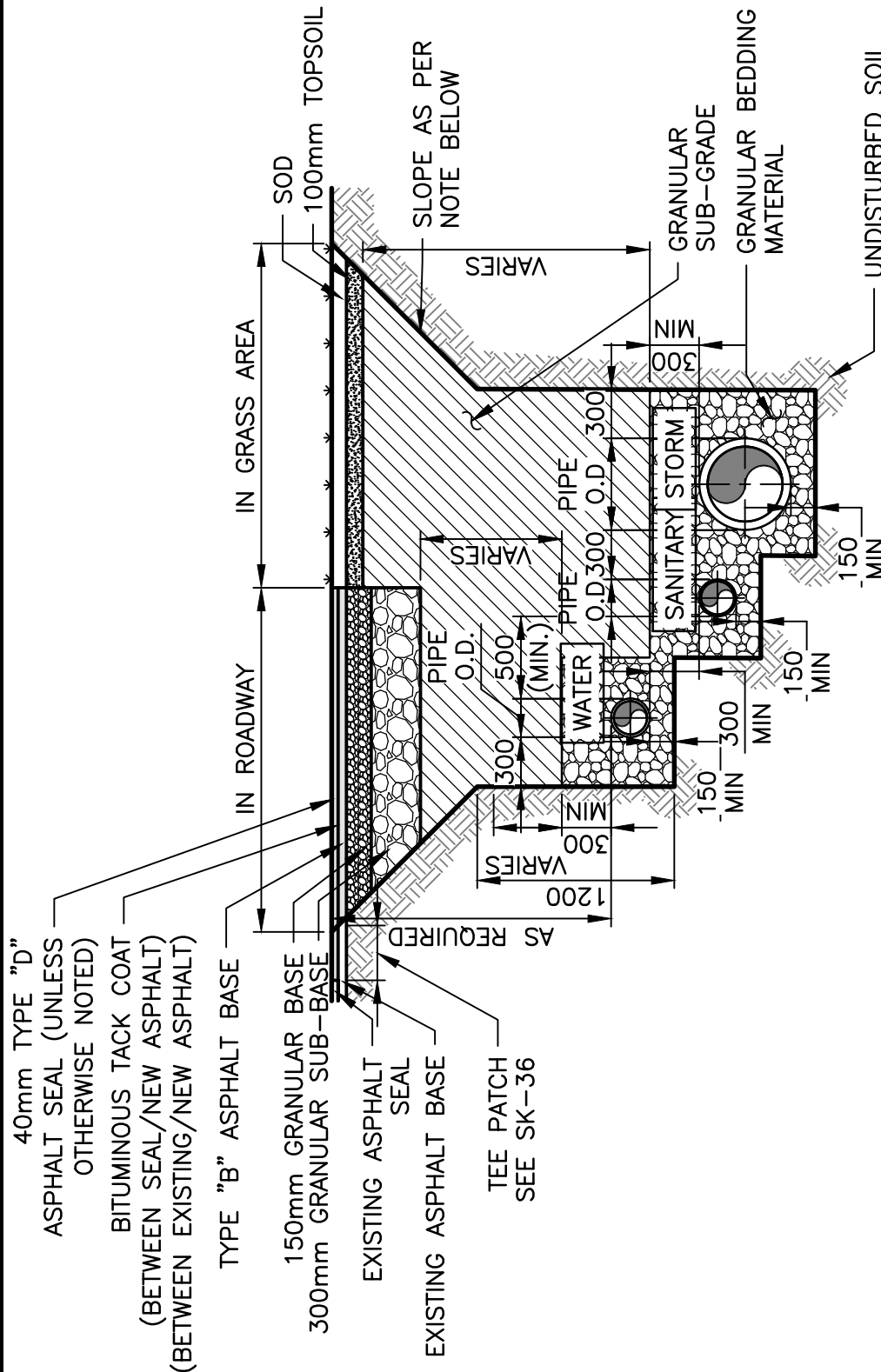
- ALL TRENCH WORK SHALL CONFORM TO NEW BRUNSWICK OCCUPATIONAL HEALTH AND SAFETY ACT GENERAL REGULATION 91-191 PART 12 (EXCAVATION AND TRENCHES).
- ASPHALT BASE THICKNESS:
LOCAL = 50mm
MAIN COLLECTOR = 75mm
COLLECTOR = 100mm

No.	Description	No.	Description	No.	Description
Date		Scale		Drawn	
2021-01-21		1:20		THM	
		TOWN OF QUISPAMIS			Drawing
		SINGLE PIPE TRENCH			
					33.SD01



- NOTES:**
- ALL TRENCH WORK SHALL CONFORM TO NEW BRUNSWICK OCCUPATIONAL HEALTH AND SAFETY ACT GENERAL REGULATION 91-191 PART 12 (EXCAVATION AND TRENCHES).
 - ASPHALT BASE THICKNESS:
LOCAL = 50mm
MAIN COLLECTOR = 75mm
COLLECTOR = 100mm

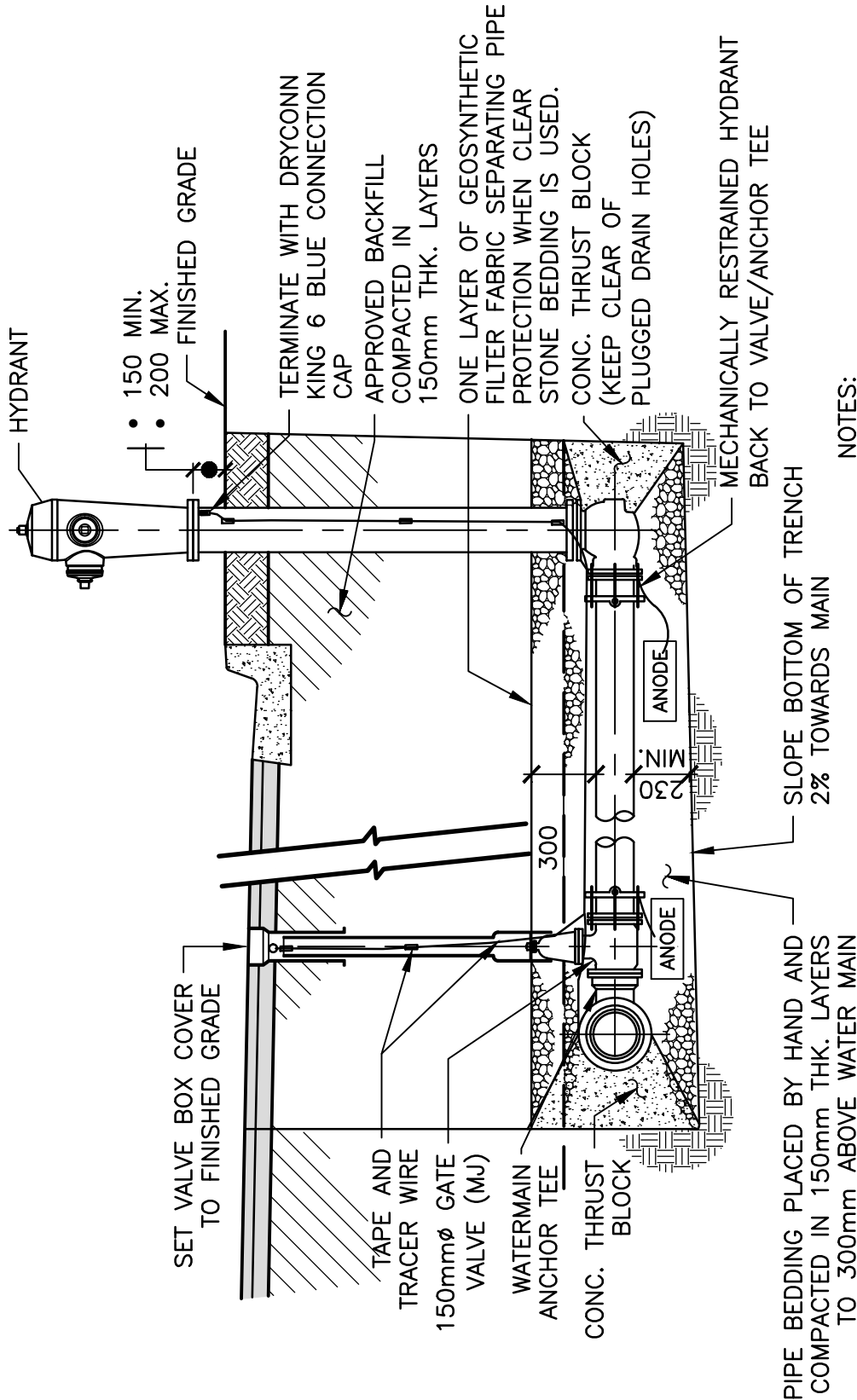
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Date		Scale		Drawn	
2021-01-21		1:30		THM	
		TOWN OF QUISPAMIS		Drawing 33.SD02	
		TWO PIPE TRENCH			



NOTES:


1. ALL TRENCH WORK SHALL CONFORM TO NEW BRUNSWICK OCCUPATIONAL HEALTH AND SAFETY ACT GENERAL REGULATION 91-191 PART 12 (EXCAVATION AND TRENCHES).
2. ASPHALT BASE THICKNESS:
 - LOCAL = 50mm
 - MAIN COLLECTOR = 75mm
 - COLLECTOR = 100mm
3. IF CROWNS OF STORMWATER AND WASTEWATER SEWERS ARE NOT MATCHED.

No.		Description	No.		Description
Date	2021-01-21		Scale	1:40	
			Drawn	THM	
 QUISPAMISIS <small>There Is No Other</small>			TOWN OF QUISPAMISIS		
			THREE PIPE TRENCH		
			Drawing		
			33.SD03		

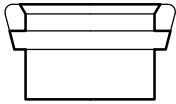


NOTES:

- 1. ANODES TO BE ZINC 24-48 TYPE INSTALLED BY USE OF DOUBLE NUT.
- 2. USE ONLY APPROVED PRODUCTS FOR MECHANICAL RESTRAINT.

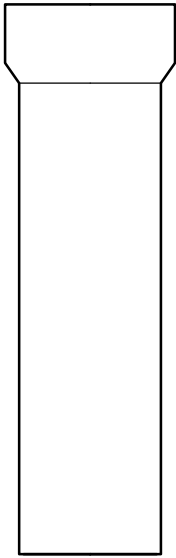
No.	Description	No.	Description	No.	Description
Date		Scale		Drawn	
2021-01-21		1:30		THM	
		TOWN OF QUISPAMISIS			Drawing
		FIRE HYDRANT			
					33.SD04

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPECS\CIVIL CAD DETAILS\33.SD05 SLIDE VALVE BOX.DWG LAYOUT NAME: SK-8 SLIDE VALVE BOX PLOT DATE: December 13, 2022 12:06:25 PM CAD OPERATOR: TRAVIS M



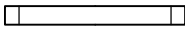
COVER

(FLUSH SHOWN)
OPTIONS – RECESSED
/LOCKABLE



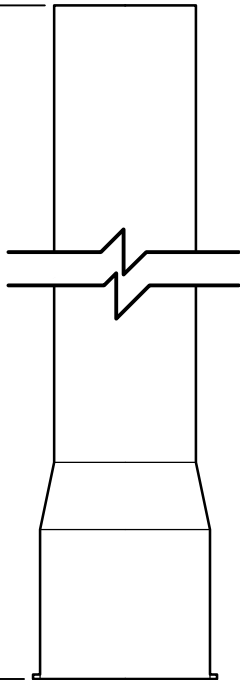
UPPER SECTION

750
(SLIDING)



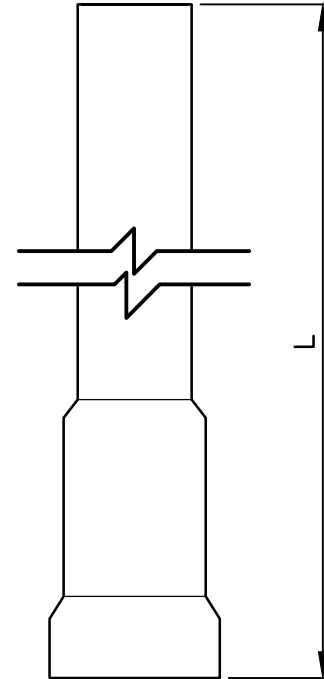
LOCKING RING

(SLIDE STOP)



LOWER SECTION

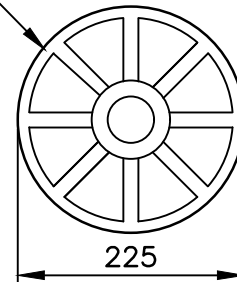
L = 900, 1200, 1500



L = 300, 450, 600
(ALSO CUSTOM)


EXTENSION

ONLY FOR
130mm VB

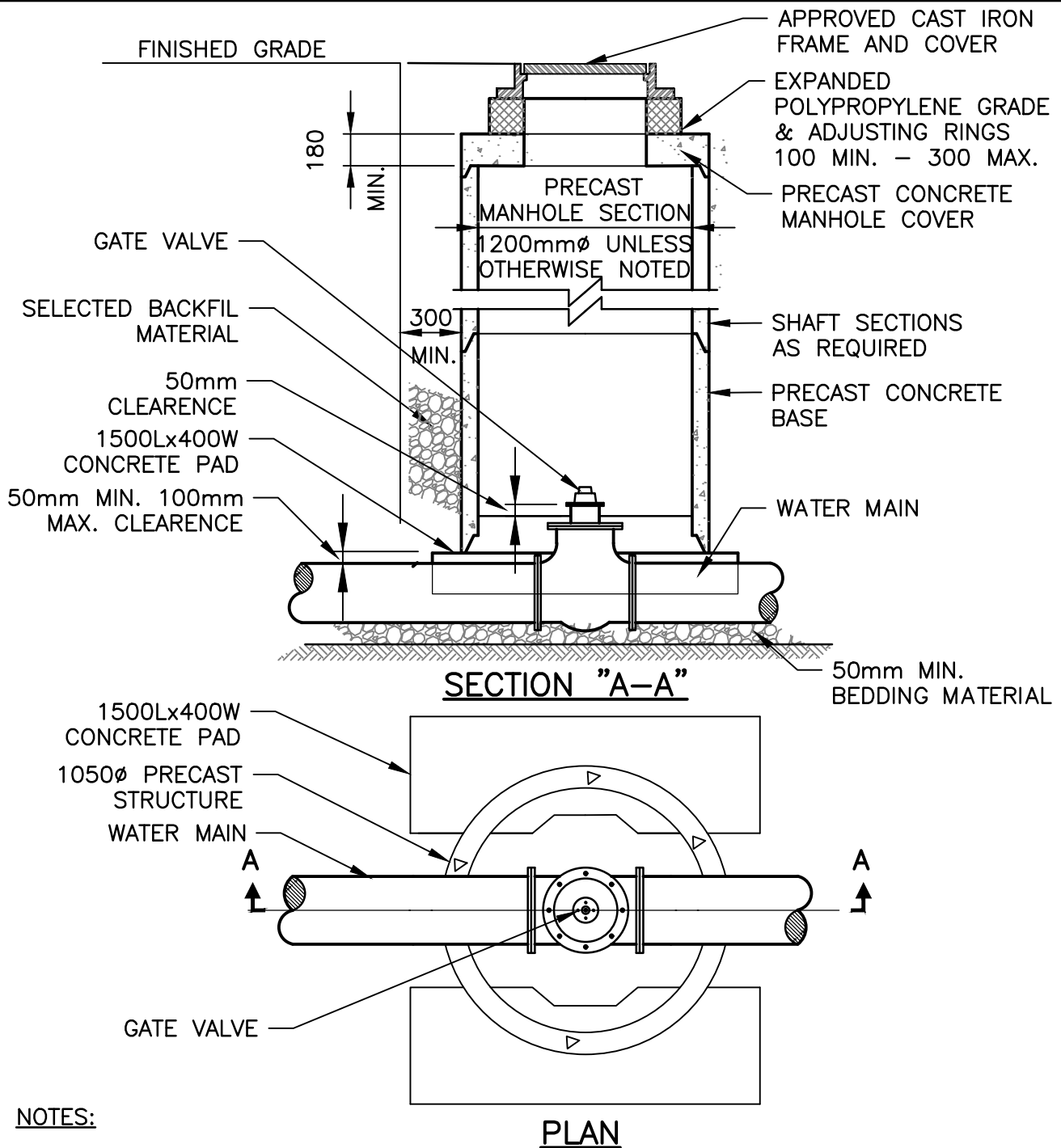


GUIDE PLATE

GUIDE PLATE
SIDE VIEW


No.	Description	No.	Description	No.	Description
Date		Scale		Drawn	
2021-01-21		1:10		THM	
		TOWN OF QUISPAMSIS		Drawing 33.SD05	
		SLIDE VALVE BOX (105mm & 130mm)			

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPECS\CIVIL CAD DETAILS\33.SD06 GATE VALVE AND CHAMBER.DWG LAYOUT NAME: SK-9 GATE VALVE AND CHAMBER.DWG LAYOUT DATE: December 13, 2022 12:07:24 PM CAD OPERATOR: TRAVIS



NOTES:

- STRUCTURE TO CONFORM TO ASTM C478.
- CONCRETE TO BE AIR ENTRAINED IN ACCORDANCE WITH CAN/CSA A23.1-M.
- ALL TRENCH WORK SHALL CONFORM TO NEW BRUNSWICK OCCUPATIONAL HEALTH AND SAFETY ACT GENERAL REGULATION 91-191 PART 12 (EXCAVATION AND TRENCHES).

No.	Description	No.	Description	No.	Description		
Date		Scale		Drawn			
2021-01-21		1:30		THM			
		TOWN OF QUISPAMIS				Drawing 33.SD06	
		GATE VALVE AND CHAMBER					

IN ALL GATE VALVE CHAMBERS, THE WIRE SHALL BE BROUGHT TO THE UNDERSIDE OF THE FRAME AND COVER BY ATTACHING IT TO THE SIDE OF THE CHAMBER. THIS SHALL BE DONE BY USING 13mm RIGID PVC CONDUIT AND CLAMPS FROM TOP OF THE WATER MAIN TO THE UNDERSIDE OF THE FRAME & COVER. LEAVE A MINIMUM OF 0.6m OF WIRE EXPOSED AT TOP.

SPLICE SEE
DETAIL

FIRE
HYDRANT

VALVE CHAMBER —
VALVE IN CHAMBER

SPLICE SEE
DETAIL

SPLICE SEE
DETAIL

SPLICE SEE
DETAIL

SPLICE SEE
DETAIL

CONTINUOUS 10
GAUGE WIRE

COPPER WATER
SERVICE

PVC WATER MAIN

SPLICE SEE
DETAIL

TFF

TRACER WIRE TO BE
SECURED TO TOP OF THE
PIPE AT EVERY FITTING,
VALVE & AT INTERVALS NOT
EXCEEDING 1.0m BY USE
OD 50mm WIDE T-TAPE
GRAY PE BY TAPECOAT OR
EQUIVALENT

VALVE CHAMBER

0.6m LONG WIRE
COILED WITH
WATERPROOF CAP

13mm RIGID
PVC CONDUIT

- COIL EXTRA 0.6m
OF WIRE UNDER LID

HOLE IN
VALVE BOX

- WIRE TO BE
SECURED TO OUTSIDE
OF BOX WITH TAPE

TRACER WIRE

PROVIDE SOME
SLACK IN WIRE NEAR
THE SLIP JOINT

VALVE BOXES FOR CURB STOPS & GATE VALVES

ELECTRICAL CONNECTOR:
 DRYCONN DIRECT BURY
 LUG – AQUA FOR
 SPLICING WIRES OR
 APPROVED EQUAL

TRACER WIRE TO
SERVICE OR WATER
MAIN BRANCH

- INSTALL DRYCONN KING
6 BLUE CONNECTOR AT
THE BARE END OF
EACH WIRE

0.6m LONG WIRE
COILED WITH
WATERPROOF CAP

10 GAUGE SINGLE
STRAND INSULATED
COPPER WIRE

CONNECTION MUST
BE WATERPROOF

SECURE CONNECTORS TO PIPE WITH T-TAPE


SPLICE DETAIL

TRACER WIRE ON
WATER MAIN

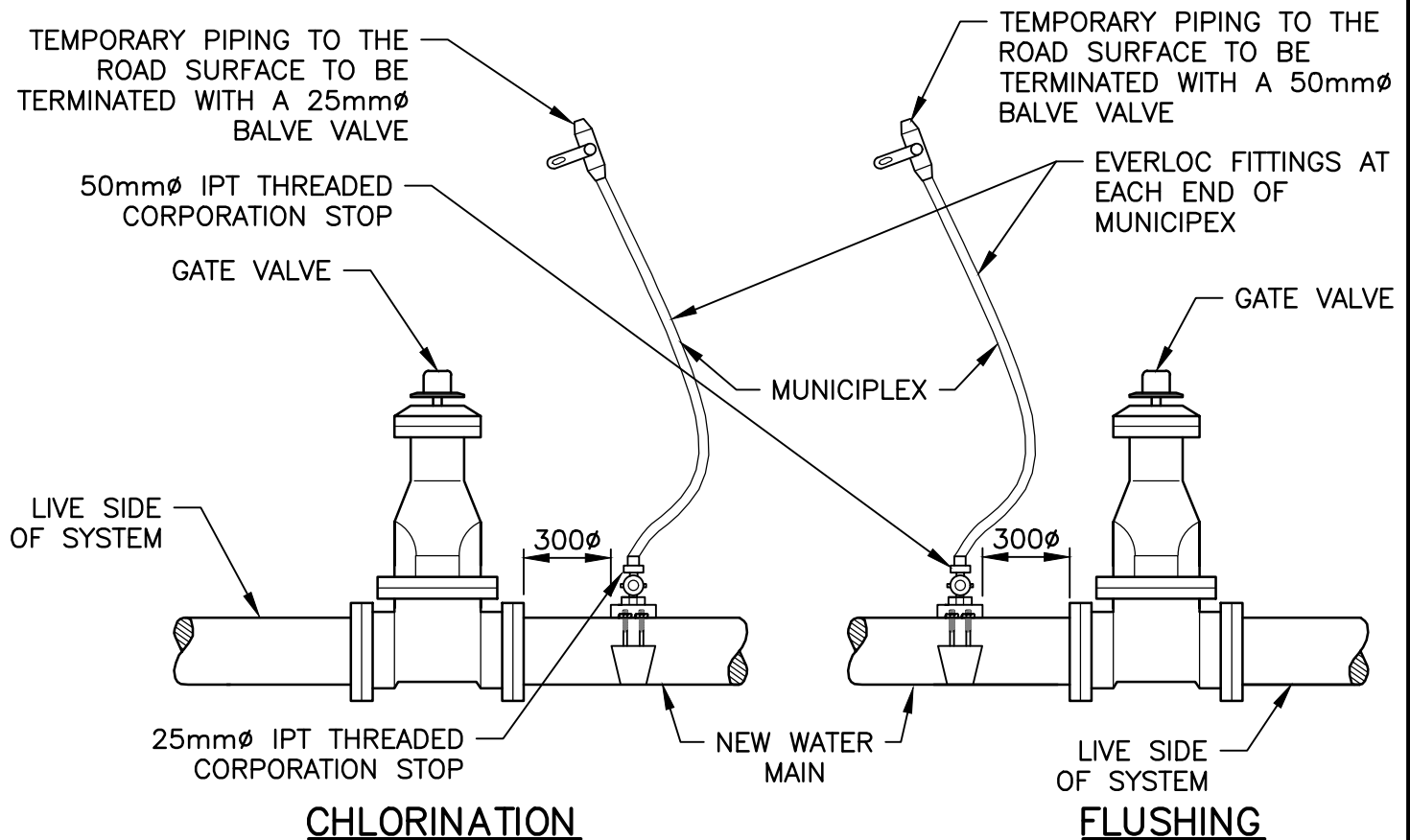
COILED WIRE ENDS

NOTES:

1. ALL CONNECTIONS MUST BE WATERPROOFED.
2. SPLICING OF TRACER WIRE IS NOT ALLOWED UNLESS SPECIFIED OR APPROVED.
3. TRACER WIRE CONTINUITY OF CURRENT MUST BE TESTED OR APPROVED.


No.	Description	No.	Description	No.	Description
Date		Scale		Drawn	
2021-01-21		1:40		THM	
 QUISPAMSIS There is No Other		TOWN OF QUISPAMSIS		Drawing 33.SD07	
		TRACER WIRE DETAIL			

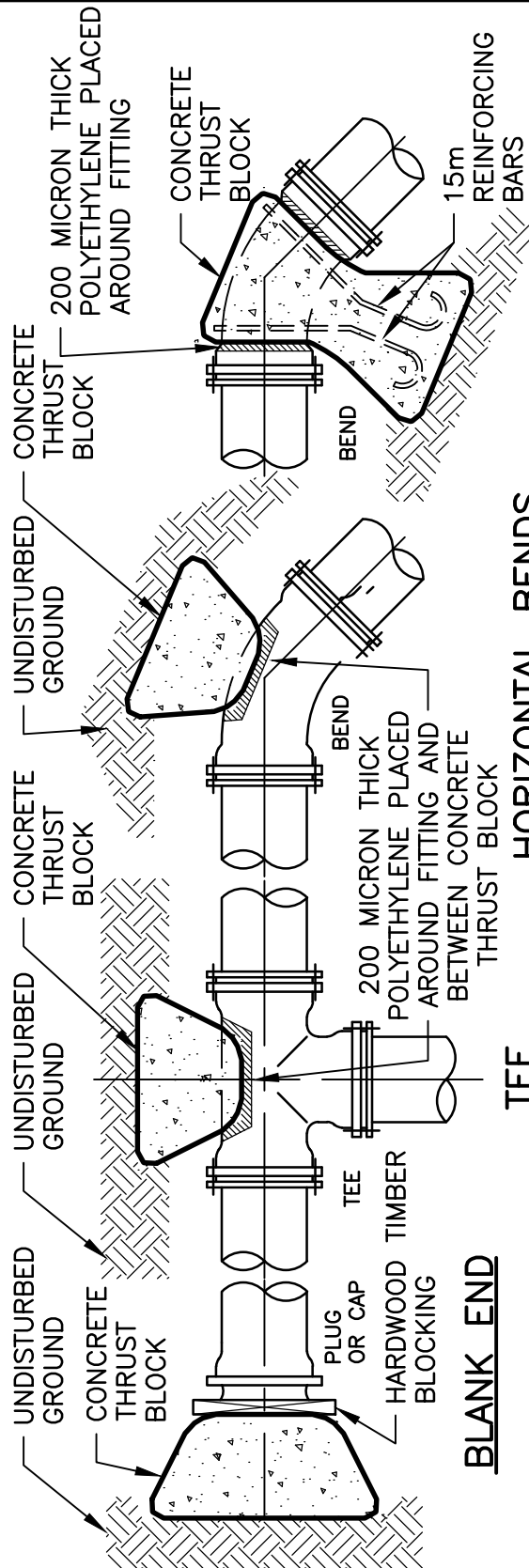
DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUIPSAMIS MUNICIPAL SPECIFICATIONS\08 SPEC\08 CHLORINATION AND FLUSHING.DWG LAYOUT NAME: SK-11 CHLORINATION AND FLUSHING PLOT DATE: December 13, 2022 12:14:44 PM CAD OPERATOR: TRAVIS M



NOTES:

- CONTACT TOWN WATER DEPARTMENT TO PRESSURIZE LINE.
- SUCCESSFUL PRESSURE TEST IS REQUIRED BEFORE CHLORINATION CAN COMMENCE.
- TOWN WATER DEPARTMENT WILL FLUSH NEW LINES.
- TWO SUCCESSFUL BACTERIOLOGICAL TESTS ARE REQUIRED BEFORE LINE CAN BE PUT INTO SERVICE.
- TOWN WILL PUT LINES IN SERVICE.
- WHEN USING A CHAMBER, IT SHALL BE A 1200mmØ MINIMUM WHEN CHLORINATION OR FLUSHING CONNECTIONS ARE REQUIRED.

No.	Description	No.	Description	No.	Description
Date	2021-01-21	Scale	1:25	Drawn	THM
		TOWN OF QUISPAMSIS			Drawing 33.SD08
		CHLORINATION & FLUSHING			



VERTICAL BENDS

NOTE:
CONC. COVER TO BE MIN. 75
OVER BARS AND FITTINGS

NOTES:
1. ALL CONCRETE 25MPa

2. REINFORCING BARS ARE TO BE
PRESHAPED PRIOR TO INSTALLATION

HORIZONTAL BENDS

MINIMUM CONTACT AREAS FOR
CONC. THRUST BLOCKS

PIPE Ø	AREA m ² FOR SOIL SUPPORTING CAPACITY OF 100 kPa
mm	CAP/PLUG TEE 90° BEND 45° BEND 22.5° BEND 1.25° BEND
100	0.25 0.25 0.32 0.20 0.16 0.16
150	0.48 0.48 0.64 0.40 0.24 0.16
200	0.80 0.80 1.12 0.64 0.32 0.16
250	1.28 1.28 1.76 0.96 0.48 0.24
300	1.76 1.76 2.56 1.44 0.72 0.40

VERTICAL THRUST BLOCKS
THRUST COMPENSATED FOR
BY MASS OF CONCRETE (m³)

PIPE Ø mm	45° BEND	22.5° BEND	1.25° BEND
100	0.40	0.20	0.20
150	0.80	0.40	0.40
200	1.40	0.70	0.70
250	2.10	1.10	1.10
300	3.00	1.50	1.50

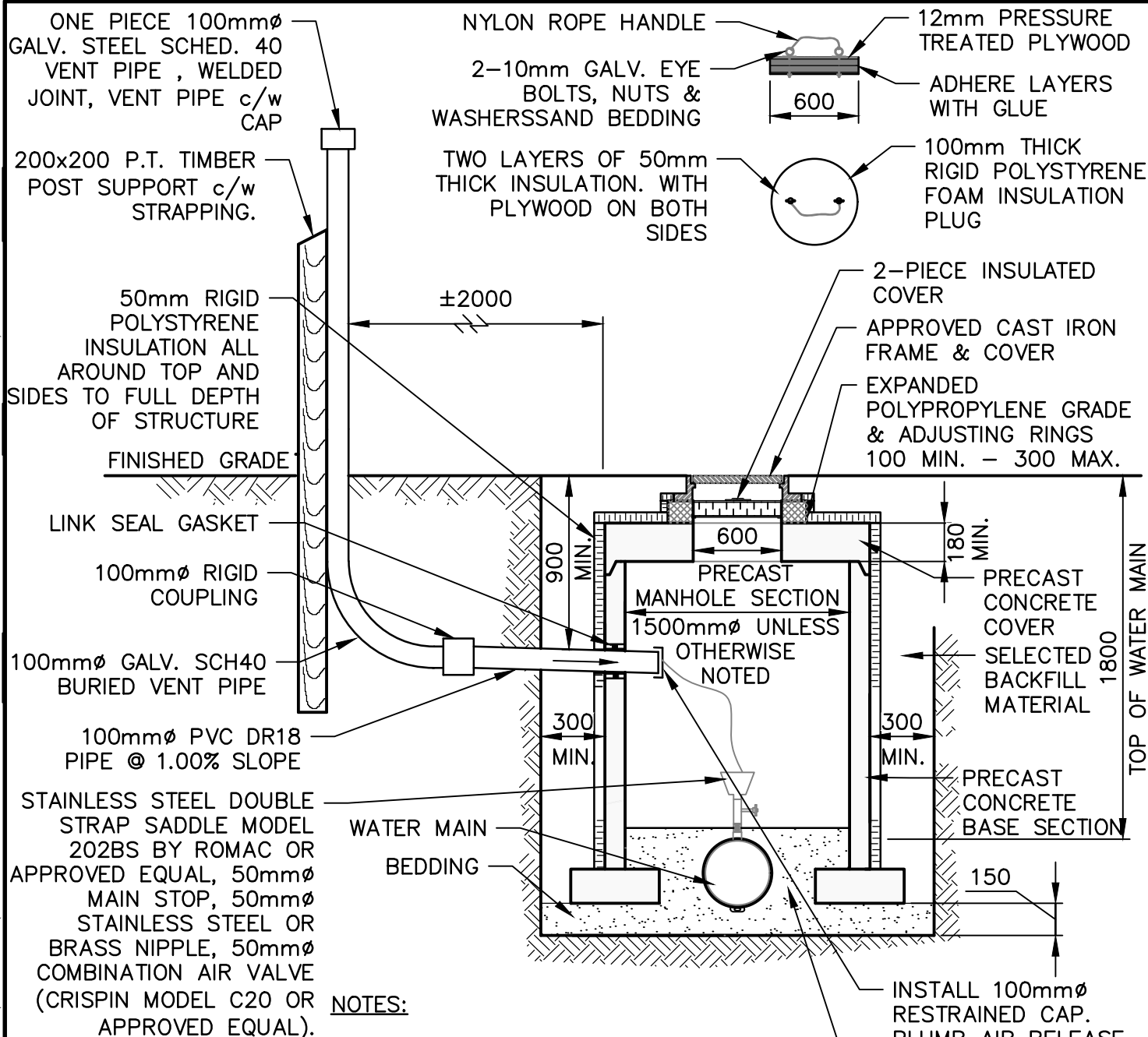
MINIMUM DISTANCE FROM
FITTING TO UNDISTURBED GROUND

PIPE Ø mm	mm
100	450
150	450
200	450
250	600
300	750

BLANK END

TEE

No.	Description	No.	Description	No.	Description
Date	2021-01-21	Scale	N.T.S.	Drawn	THM
		TOWN OF QUISPAMIS		Drawing	
		CONCRETE THRUST BLOCKS		33.SD09	




NOTES:

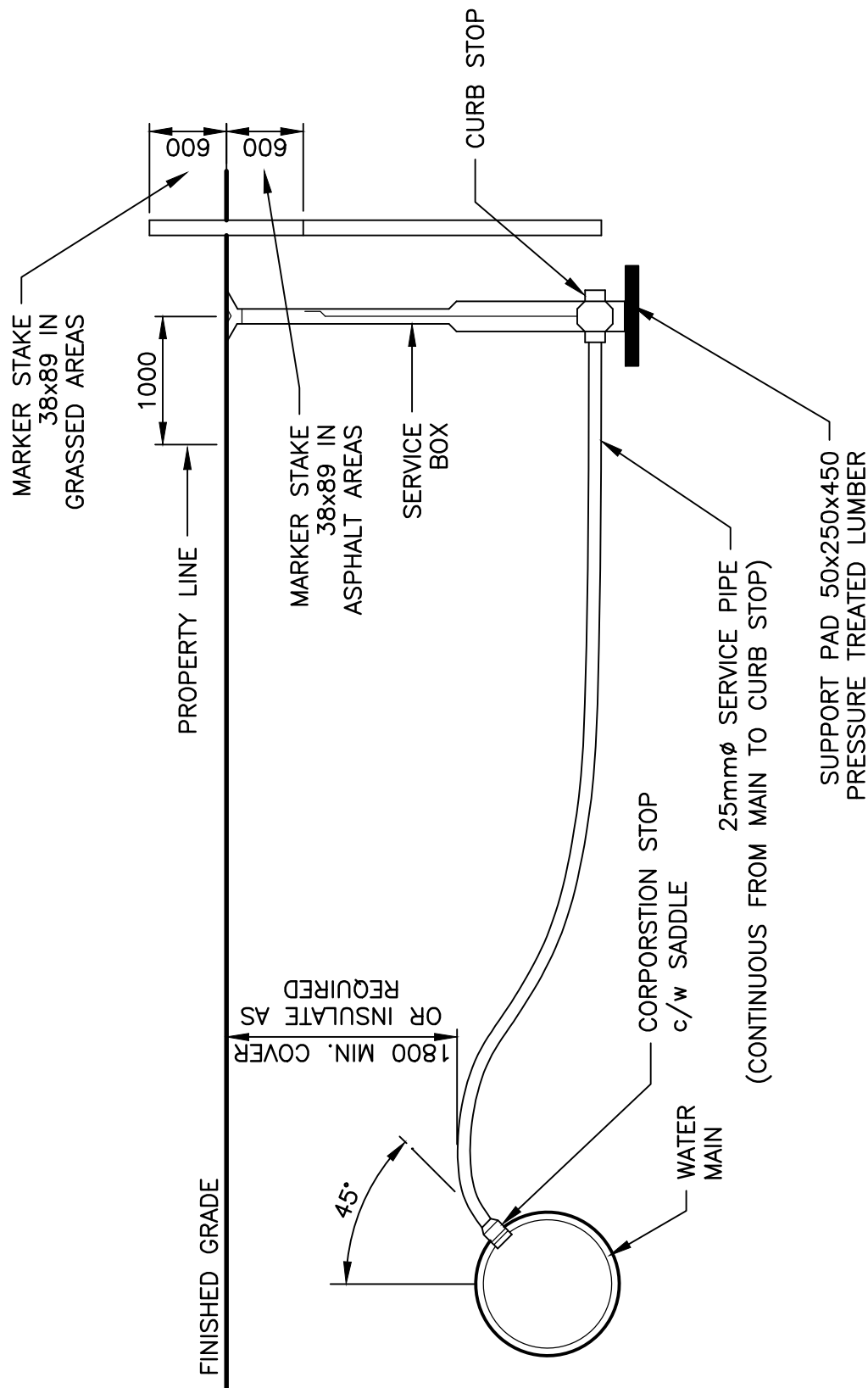
- ALL SECTIONS TO BE MADE WATERTIGHT WITH RUBBER GASKET TO ASTM C443.
- STRUCTURE TO CONFORM TO ASTM C478.
- CONCRETE TO BE AIR ENTRAINED IN ACCORDANCE WITH CAN/CSA A23.1-M.
- ALL TRENCH WORK SHALL CONFORM TO NEW BRUNSWICK OCCUPATIONAL HEALTH AND SAFETY ACT GENERAL REGULATION 91-191 PART 12 - EXCAVATION AND TRENCHES.


INSTALL 100mmØ
RESTRAINED CAP.
PLUMB AIR RELEASE
VACUUM LINES AND
CONNECT TO CAP
WATER TIGHT.

- GRANULAR BEDDING MATERIAL

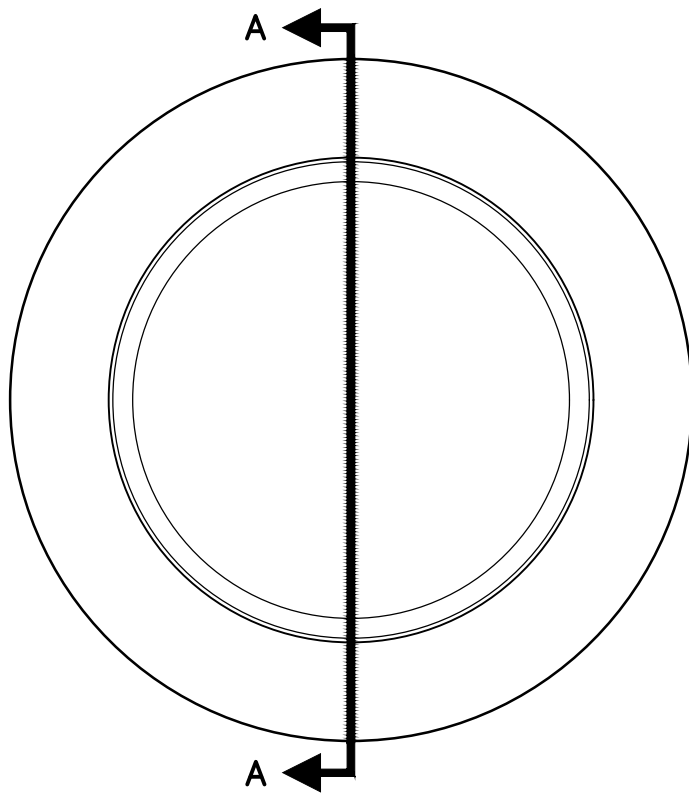
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Date	2021-01-21		Scale	1:40		Drawn	THM	
 QUISPAMISIS There Is No Other			TOWN OF QUISPAMISIS			Drawing <div style="font-size: 2em; font-weight: bold;">33.SD10</div>		
			AIR RELEASE VALVE CHAMBER					

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMSIS MUNICIPAL SPECIFICATIONS\08 SPECS\CIVIL CAD DETAILS\33.SD11 WATER SERVICE CONNECTION.DWG LAYOUT NAME: SK-14 WATER SERVICE CONNECTION PLOT DATE: December 13, 2022 12:17:33 PM CAD OPERATOR: TRAVIS M

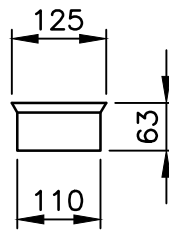


No.	Description	No.	Description	No.	Description
Date		Scale		Drawn	
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		TOWN OF QUISPAMSIS			Drawing
		WATER SERVICE CONNECTION			
					33.SD11

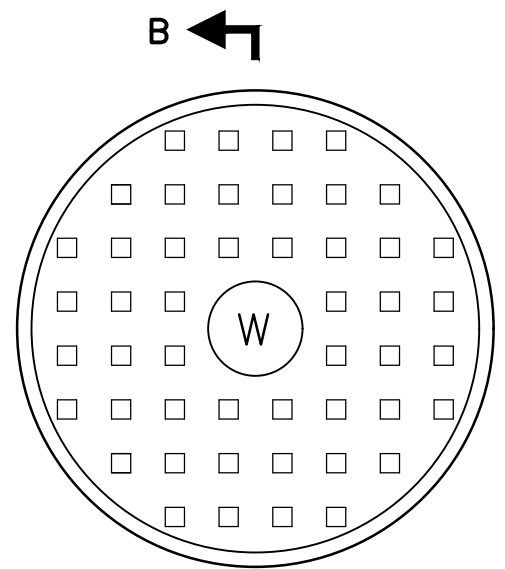
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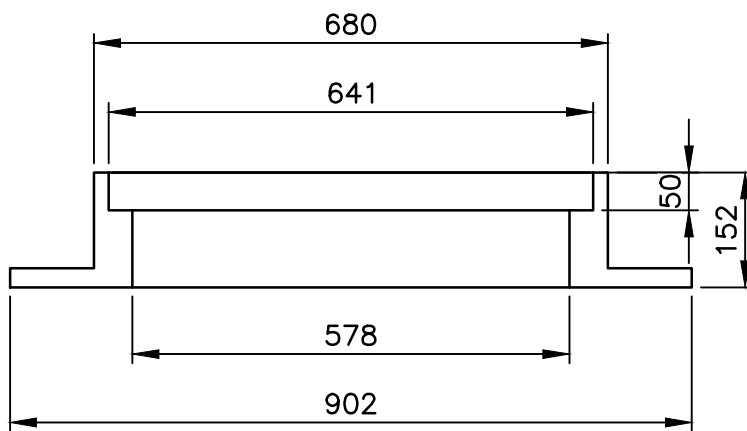
FRAME
TOP VIEW



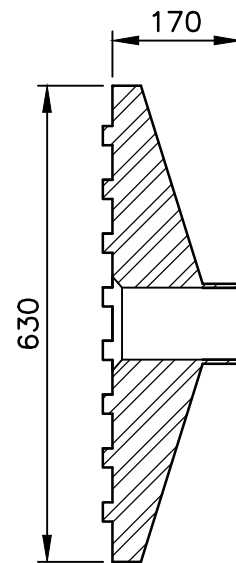
PLUG




COVER
TOP VIEW

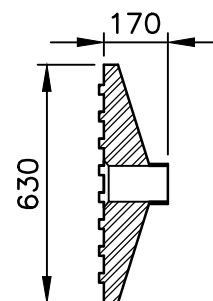
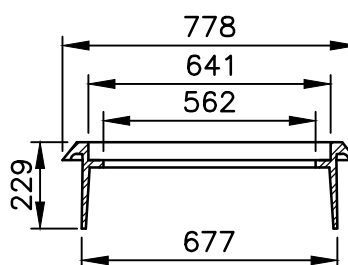
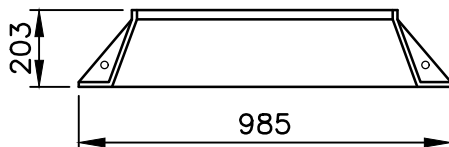
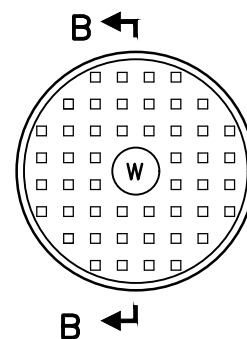
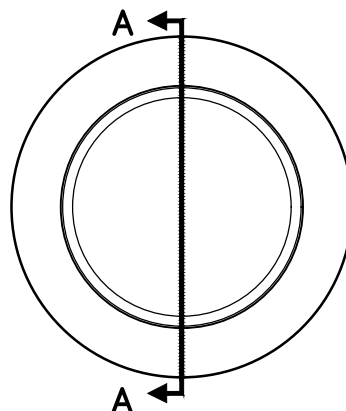
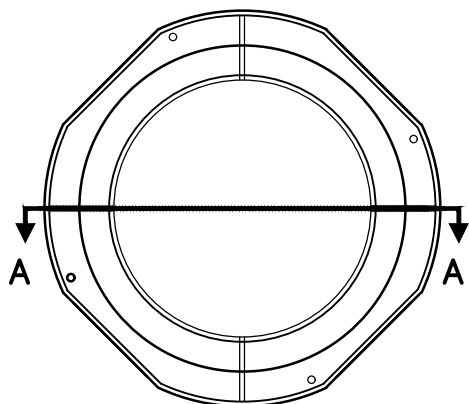
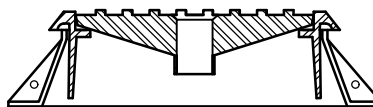
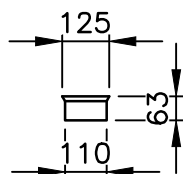


FRAME
SECTION "A-A"




COVER
SECTION "B-B"

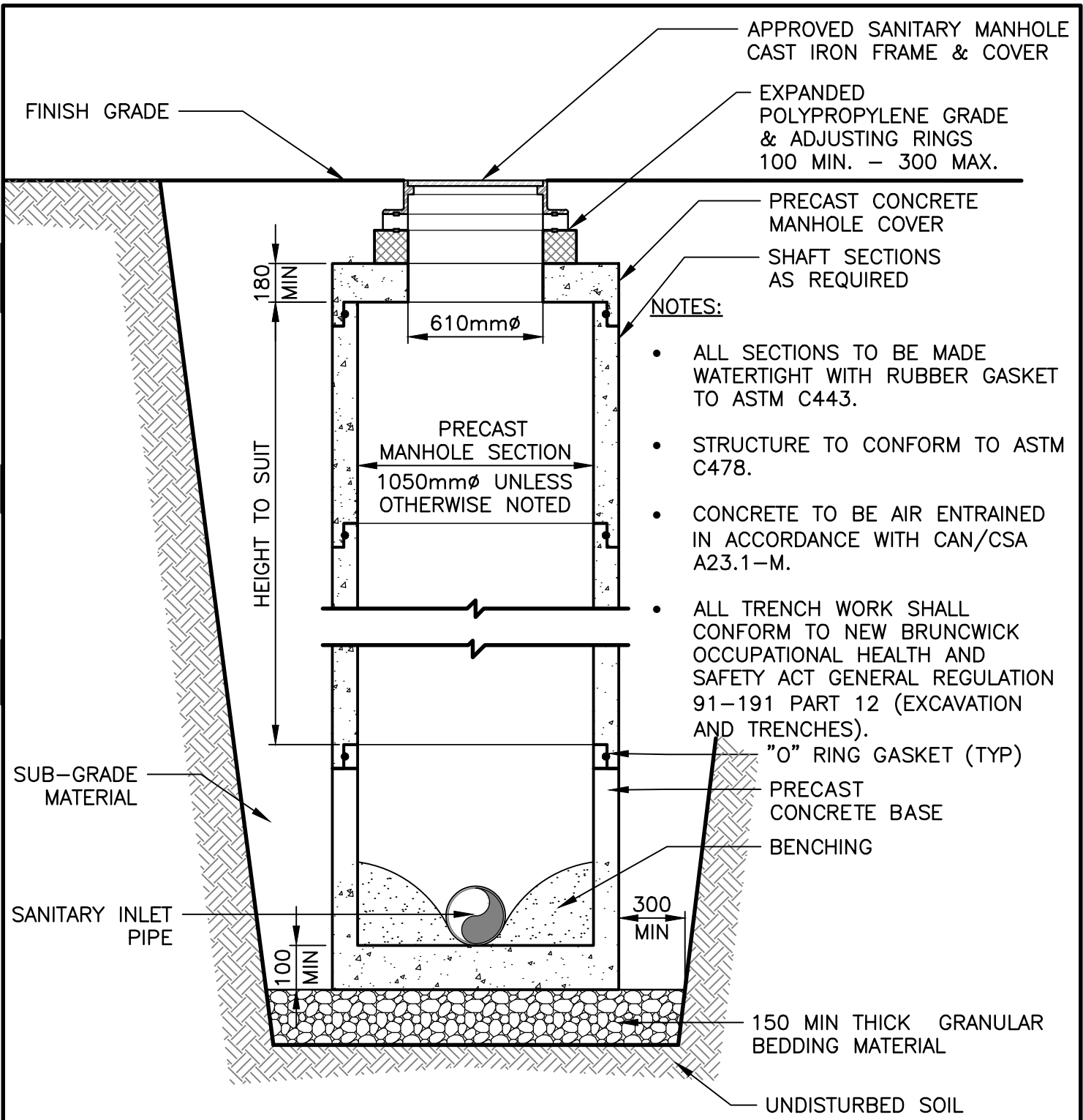
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Date	2021-01-21	Scale	1:10	Drawn	THM
		TOWN OF QUISPAMISIS			Drawing 33.SD12
		VALVE CHAMBER STANDARD FRAME & COVER (GATE VALVE)			




COVER
SECTION "B-B"

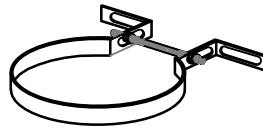
No.	Description	No.	Description	No.	Description
Date	2021-01-21	Scale	1:20	Drawn	THM
		TOWN OF QUISPAMISIS			Drawing
		VALVE CHAMBER ADJUSTABLE FRAME & COVER (GATE VALVE)			33.SD13

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMISIS MUNICIPAL SPECIFICATIONS\08 SPECIFICATIONS\08 SANITARY MANHOLE.DWG LAYOUT NAME: SK-17 SANITARY MANHOLE PLOT DATE: December 13, 2022 12:32:15 PM CAD OPERATOR: TRAVIS



No.	Description	No.	Description	No.	Description
Date		Scale		Drawn	
2021-01-21		1:25		THM	
		TOWN OF QUISPAMISIS			Drawing
		SANITARY MANHOLE			
		33.SD14			

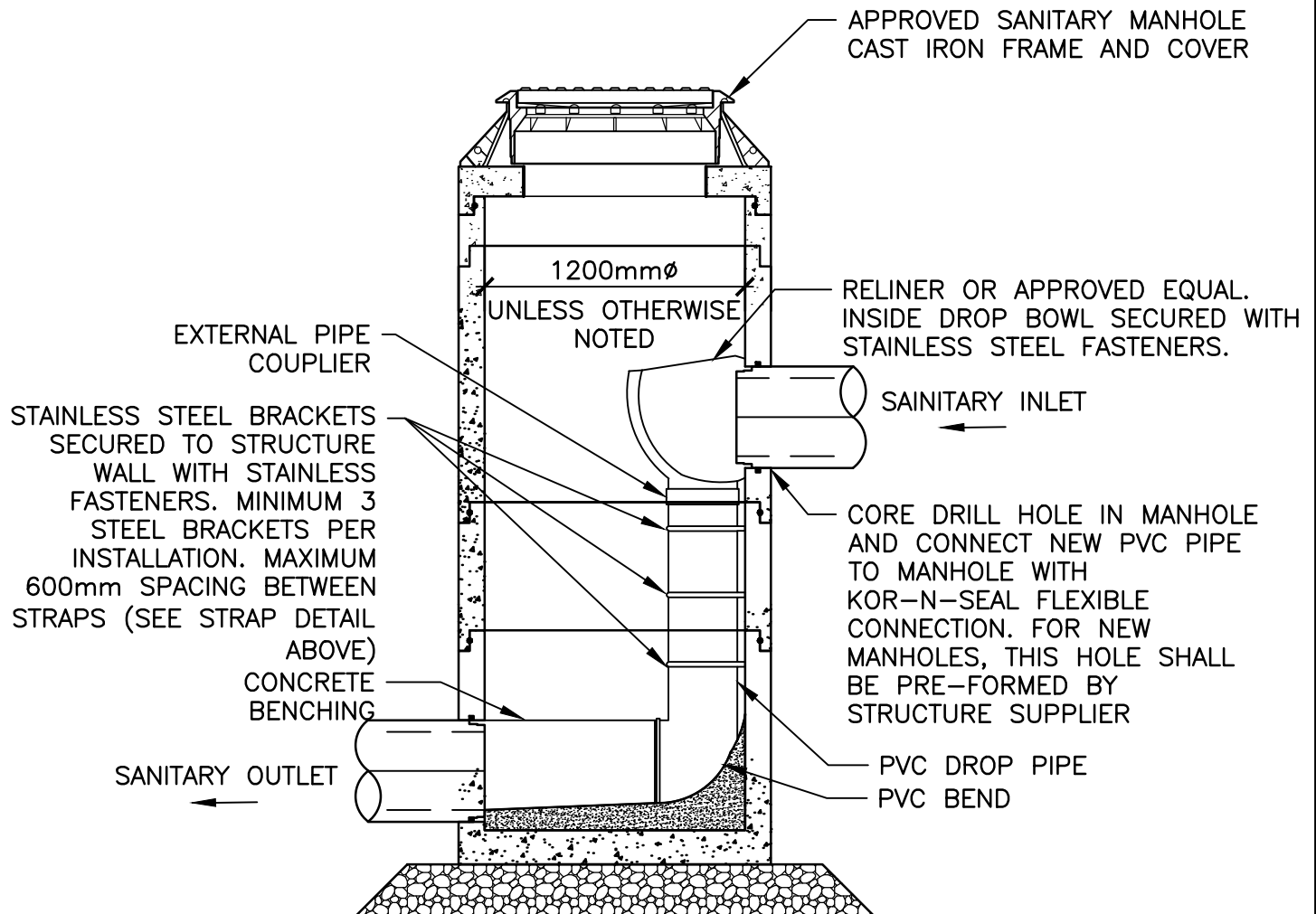
ATTACH BRACKET TO MANHOLE WITH HILTI 6mmØ. 18-8 STAINLESS STEEL DROP-IN ANCHORS AND BOLTS. 2 ANCHORS EACH BRACKET.



3mm THK x 25mm WIDE 11 GAUGE STAINLESS STEEL BRACKETS.


11 GAUGE 304 STAINLESS STEEL

BRACKET DETAIL

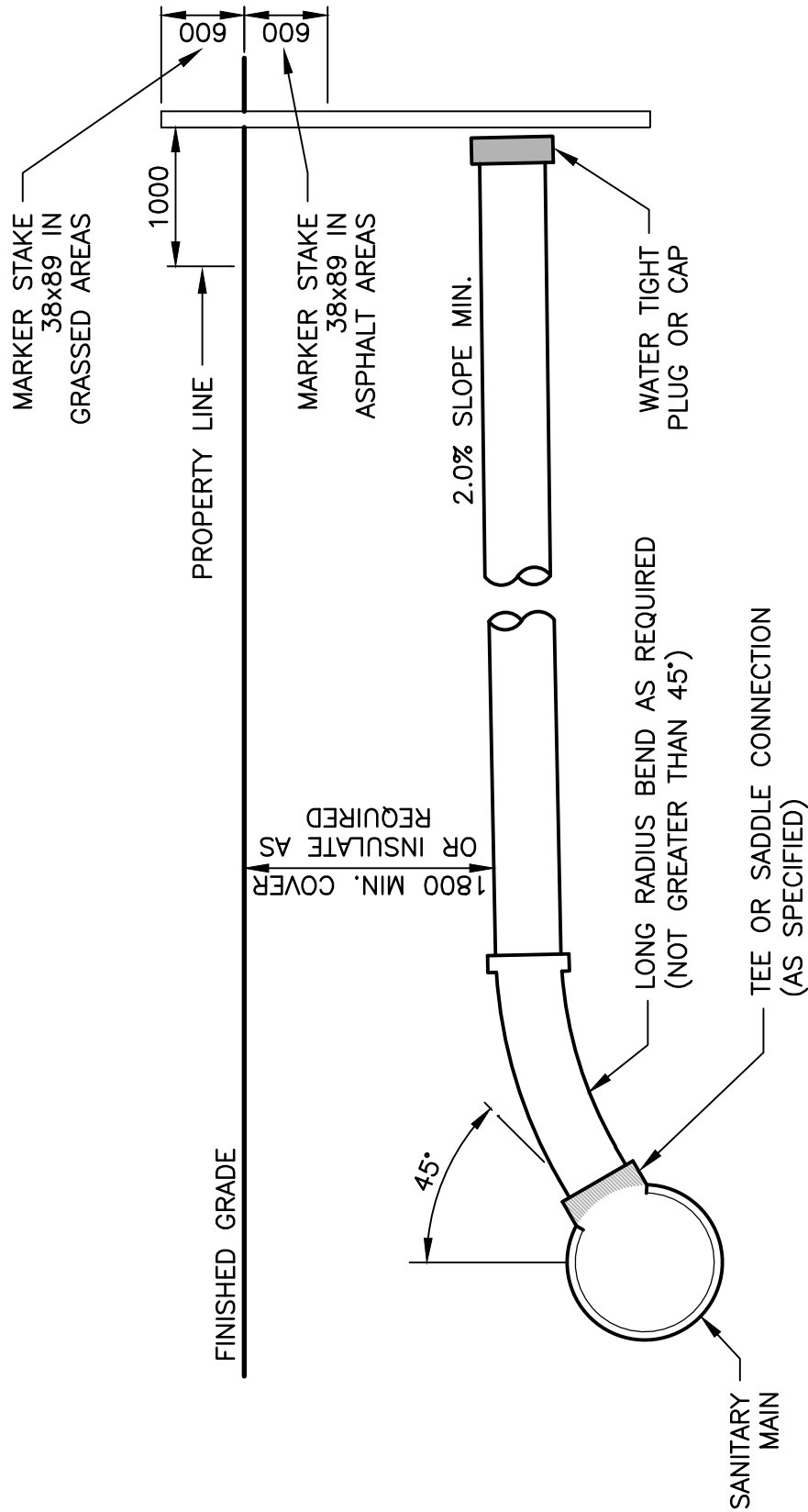



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. STRUCTURE TO CONFORM TO CSA A257.4.
3. CONCRETE TO BE AIR ENTRAINED IN ACCORDANCE WITH CSA A23.1
4. INTERIOR DROP DIMENSIONS FOR EACH APPLICATION TO BE SPECIFIED BY THE ENGINEER.

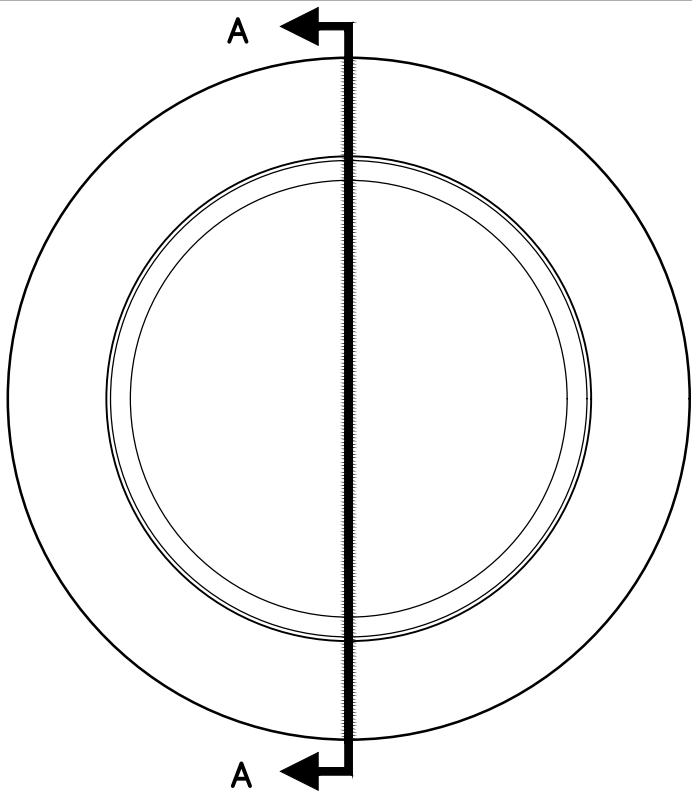
No.	Description	No.	Description	No.	Description
Date		Scale		Drawn	
2021-01-21		1:40		THM	
		TOWN OF QUISPAMSIS			Drawing
		INTERIOR DROP MANHOLE			
					33.SD15

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPEC\33.SD16 SANITARY SERVICE CONNECTION.DWG LAYOUT NAME: SK-19 SANITARY SERVICE CONNECTION PLOT DATE: December 13, 2022 12:34:33 PM CAD OPERATOR: TRAVIS M

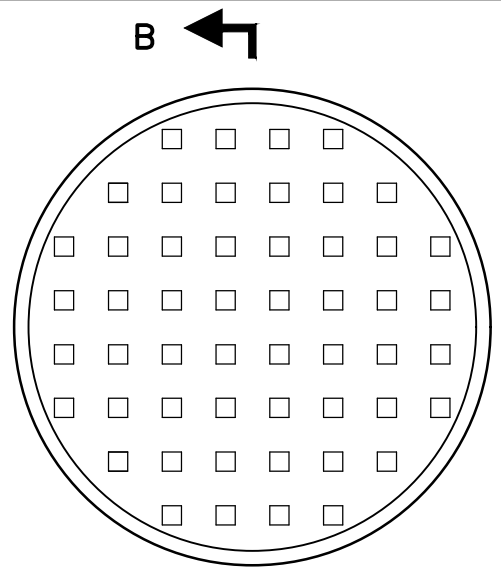


No.	Description	No.	Description	No.	Description
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		TOWN OF QUISPAMIS			Drawing 33.SD16
		SANITARY SERVICE CONNECTION			

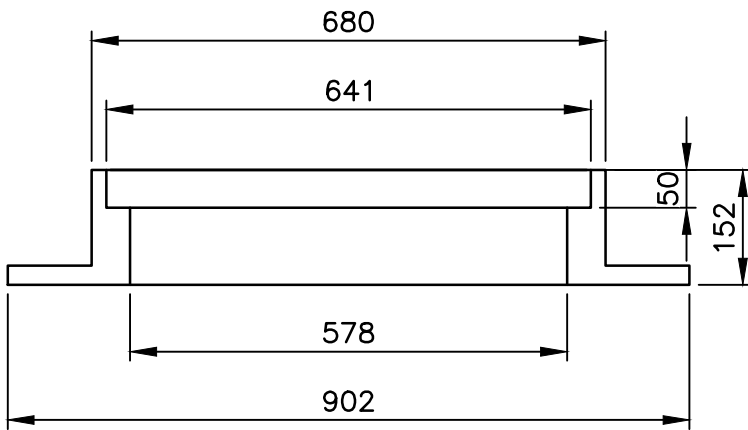
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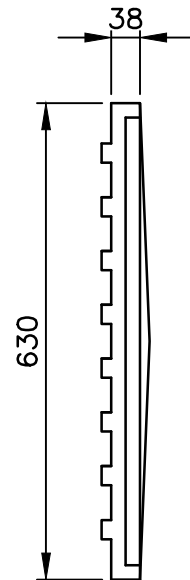
FRAME
TOP VIEW




COVER
TOP VIEW



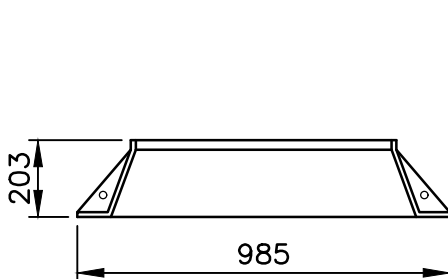
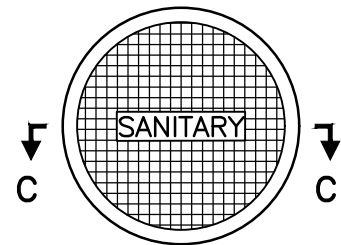
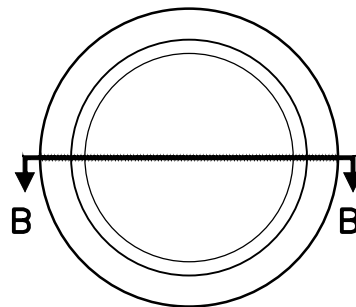
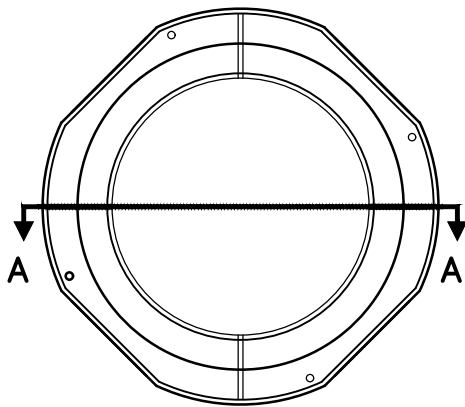
FRAME
SECTION "A-A"



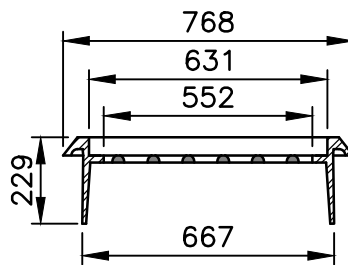
COVER
SECTION "B-B"

No.	Description	No.	Description	No.	Description
Date	2021-01-21	Scale	1:10	Drawn	THM
		TOWN OF QUISPAMISIS			Drawing 33.SD17
		SANITARY STANDARD MANHOLE FRAME & COVER			

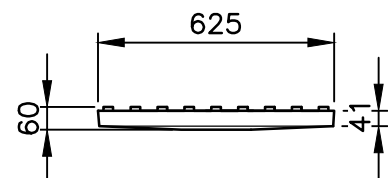
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CONICAL GUIDE



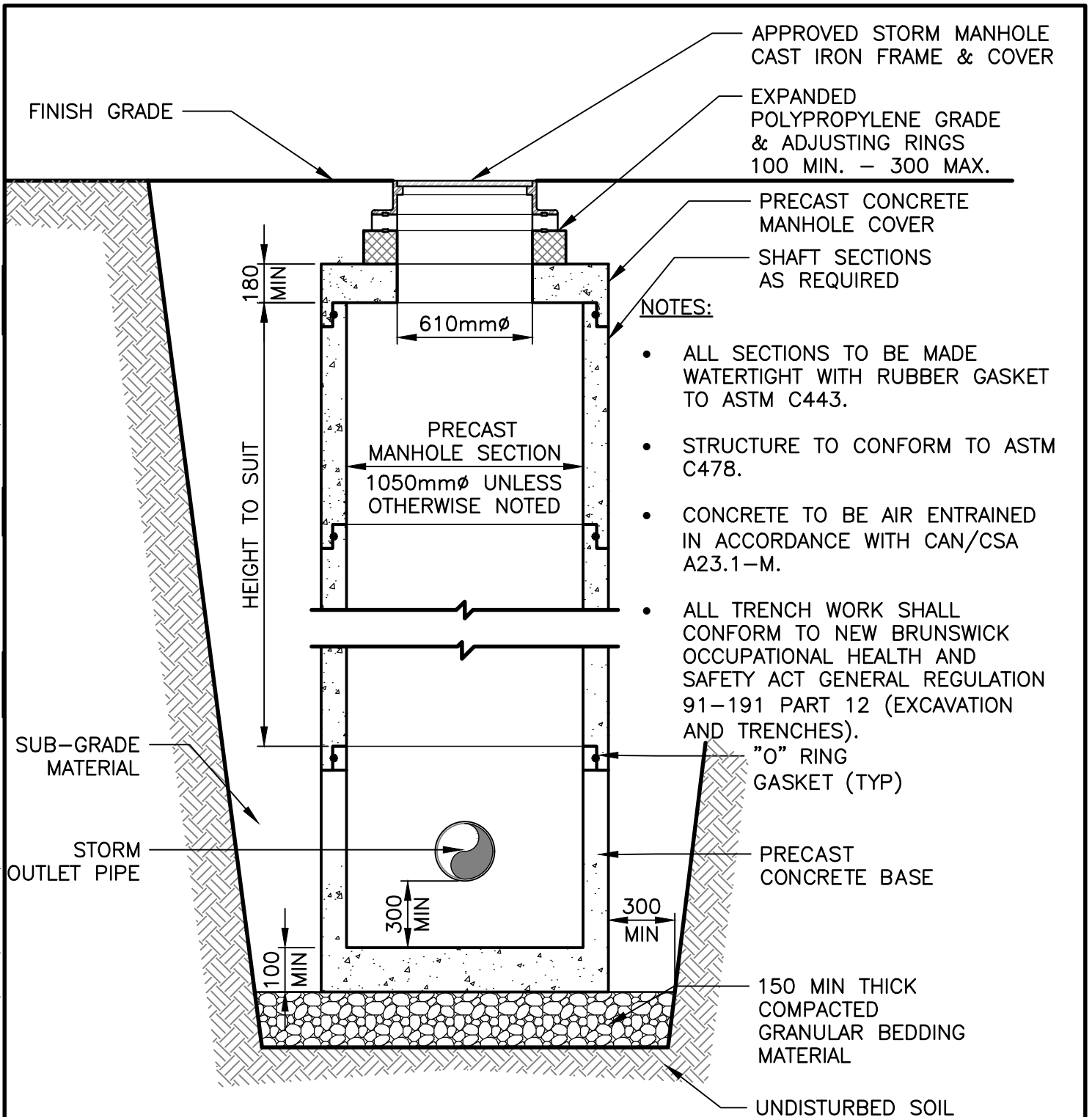
FRAME




COVER

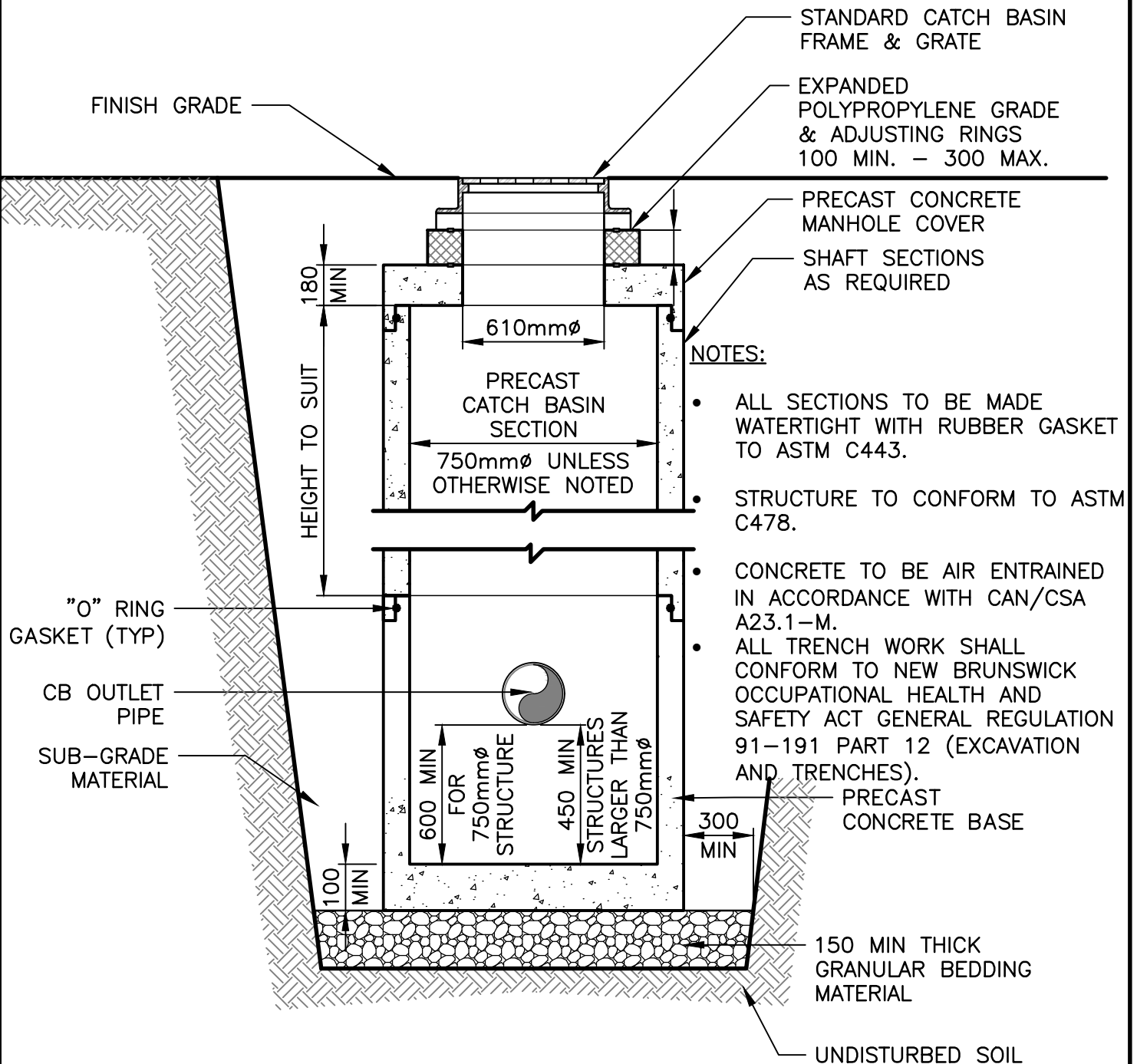
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Date	2021-01-21	Scale	1:20	Drawn	THM
		TOWN OF QUISPAMIS			Drawing 33.SD18
		SANITARY MANHOLE ADJUSTIBLE FRAME & COVER			


DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMISIS MUNICIPAL SPECIFICATIONS\08 SPECIFICATIONS\08 STORM MANHOLE.DWG LAYOUT NAME: SK-22 STORM MANHOLE PLOT DATE: December 13, 2022 12:38:32 PM CAD OPERATOR: TRAVIS/M



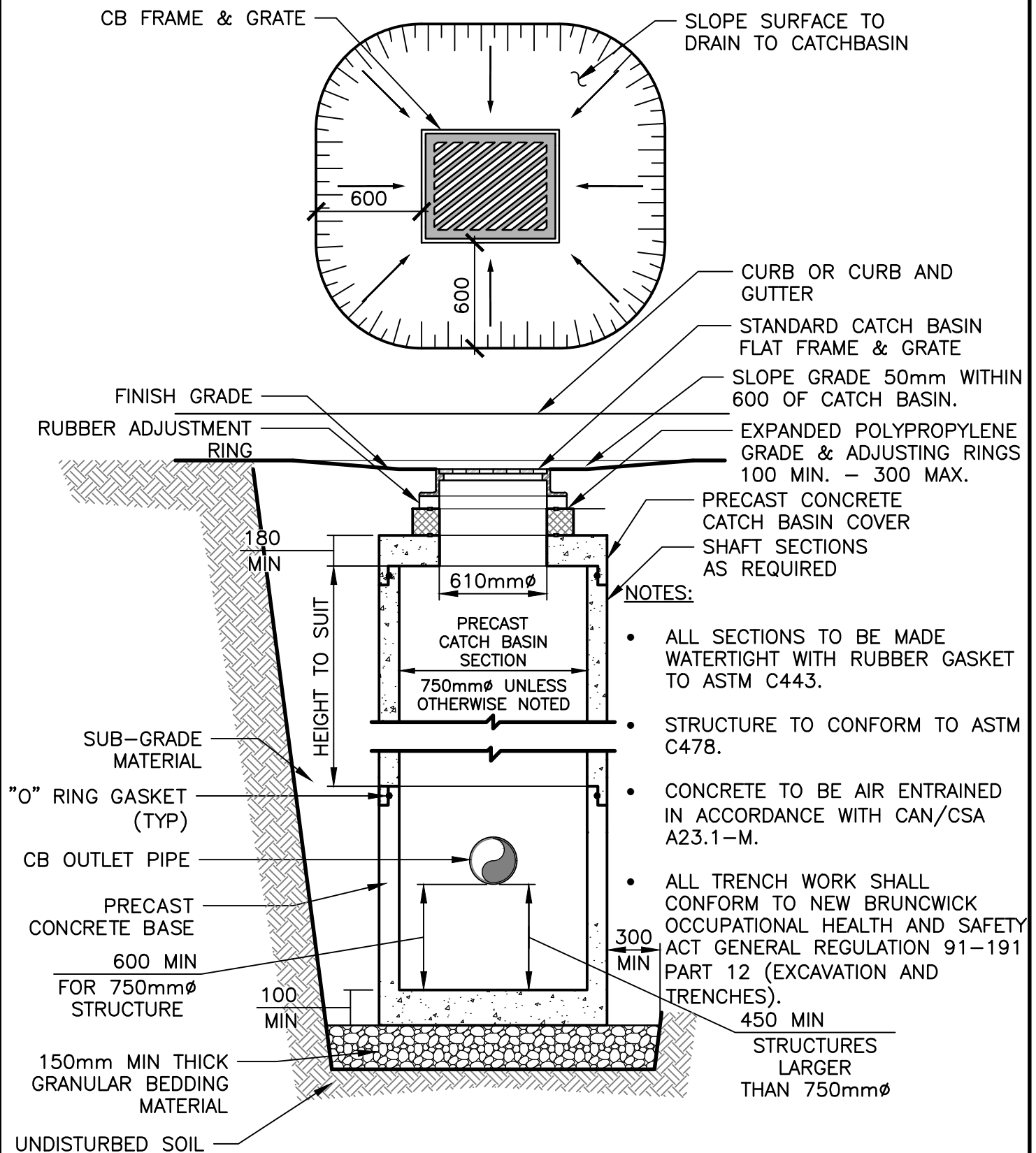
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Date	2021-01-21	Scale	1:25	Drawn	THM
		TOWN OF QUISPAMISIS		Drawing	
		STORM MANHOLE		33.SD19	


DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPEC\33.SD20 CATCH BASIN PLOT.DWG LAYOUT NAME: SK-23 CATCH BASIN PLOT DATE: December 13, 2022 12:39:24 PM CAD OPERATOR: TRAVIS M



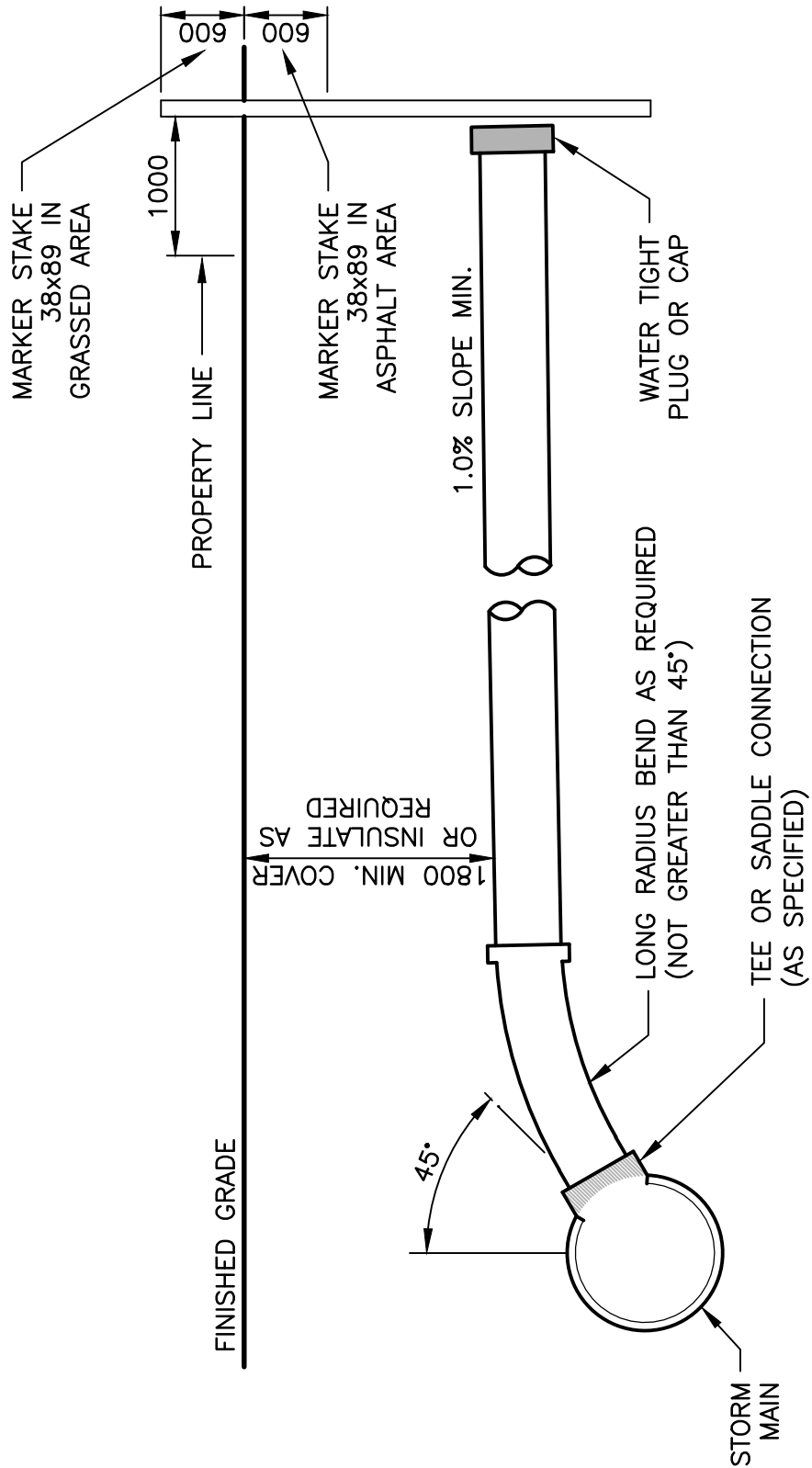
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Date	2021-01-21	Scale	1:25	Drawn	THM
		TOWN OF QUISPAMISIS			Drawing 33.SD20
		CATCH BASIN			


DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPEC\33.SD21 CATCH BASIN AT CURB-CURB AND GUTTER.DWG LAYOUT NAME: SK-24 CATCH BASIN AT CURB-CURB AND GUTTER PLOT DATE: December 13, 2022 12:40:17 PM CAD OPERATOR: TRAVIS M



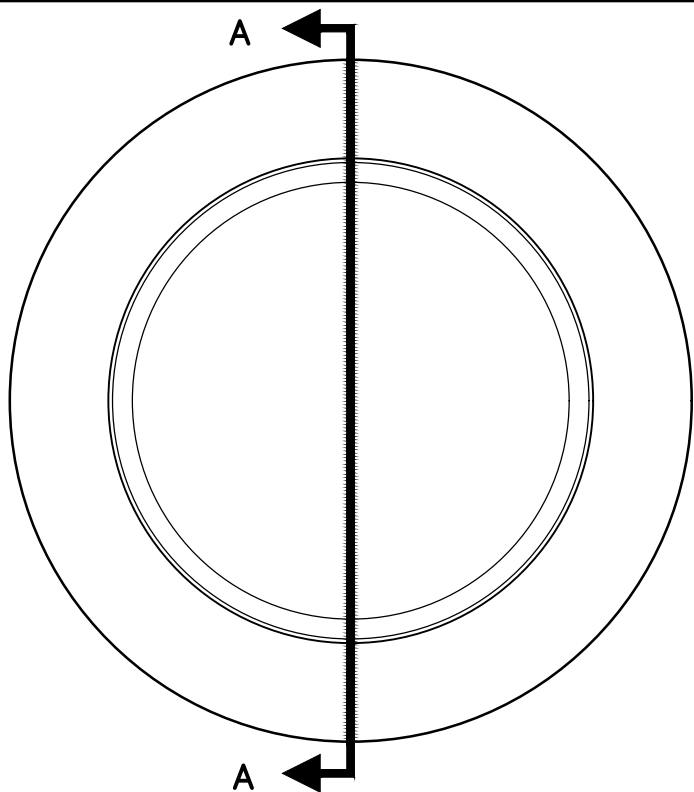
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Date	2021-01-21	Scale	1:30	Drawn	THM
		TOWN OF QUISPAMISIS		Drawing 33.SD21	
		CATCH BASIN AT CURB OR CURB AND GUTTER			

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMISIS MUNICIPAL SPECIFICATIONS\08 SPECS\CIVIL CAD DETAILS\33.SD22 STORM SERVICE CONNECTION.DWG LAYOUT NAME: SK-25 STORM SERVICE CONNECTION PLOT DATE: December 13, 2022 12:41:02 PM CAD OPERATOR: TRAVIS M

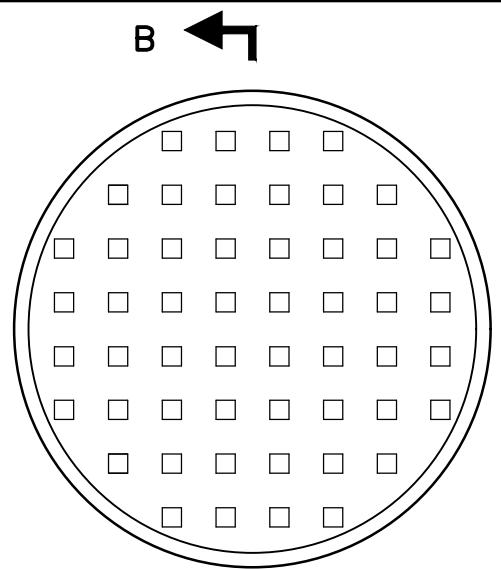


No.	Description	No.	Description	No.	Description
Date 2021-01-21		Scale 1:50		Drawn THM	
		TOWN OF QUISPAMISIS			Drawing 33.SD022
		STORM SERVICE CONNECTION			

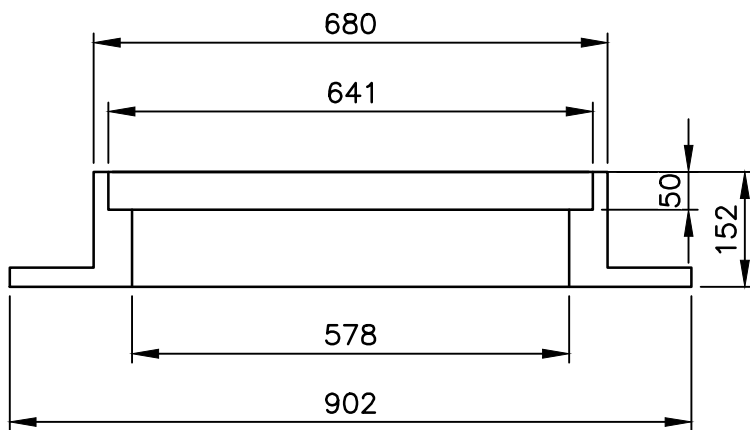
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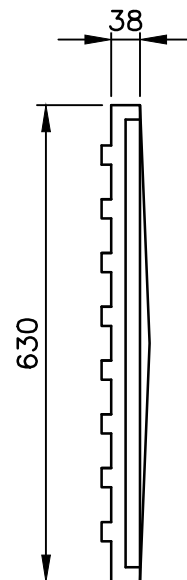
FRAME
TOP VIEW




COVER
TOP VIEW



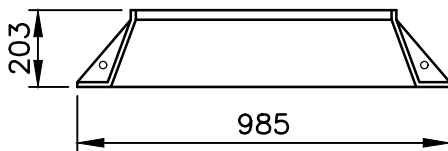
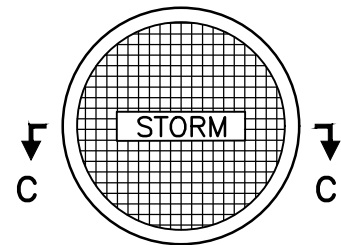
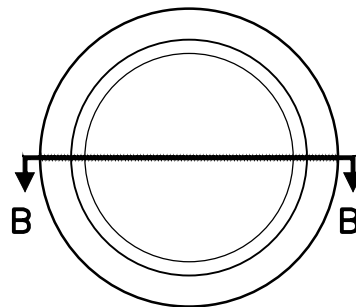
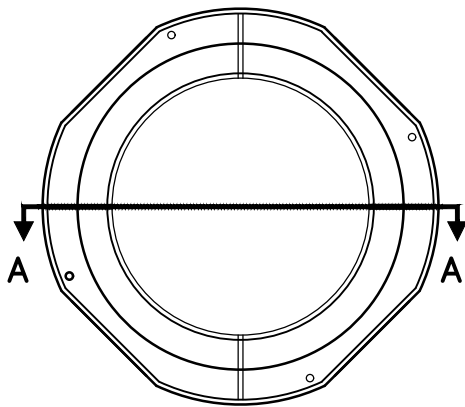
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SECTION "A-A"



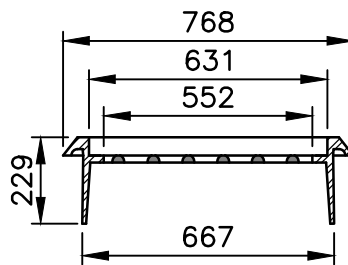
COVER
SECTION "B-B"

No.	Description	No.	Description	No.	Description
Date	2021-01-21	Scale	1:10	Drawn	THM
		TOWN OF QUISPAMISIS			Drawing 33.SD23
		STORM MANHOLE STANDARD FRAME & COVER			

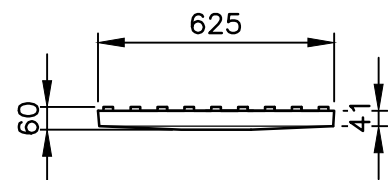
DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPEC\33.SD24 STORM MANHOLE ADJUSTABLE FRAME AND COVER.DWG LAYOUT NAME: SK-27 STORM MANHOLE ADJUSTABLE FRAME AND COVER PLOT DATE: December 13, 2022 12:44:34 PM CAD OPERATOR




CONICAL GUIDE



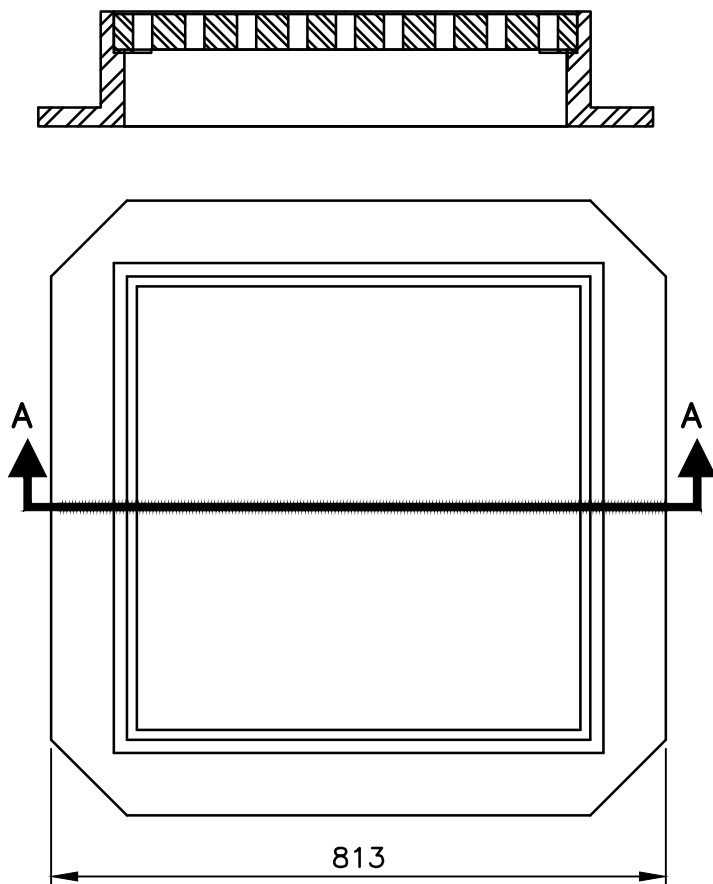
FRAME



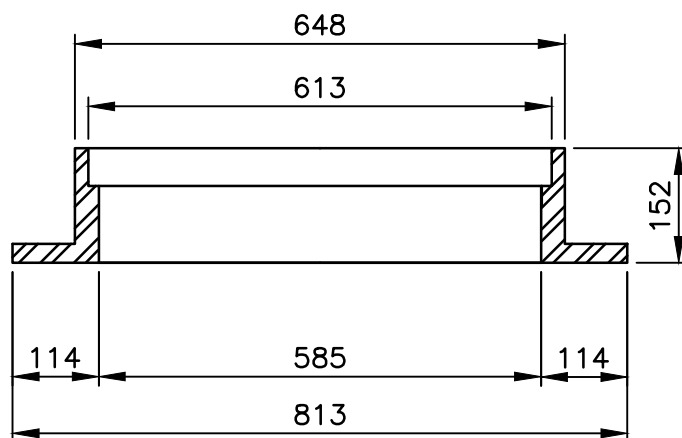
COVER

No.	Description	No.	Description	No.	Description
Date	2021-01-21	Scale	1:20	Drawn	THM
		TOWN OF QUISPAMIS			Drawing 33.SD24
		STORM MANHOLE ADJUSTABLE FRAME & COVER			

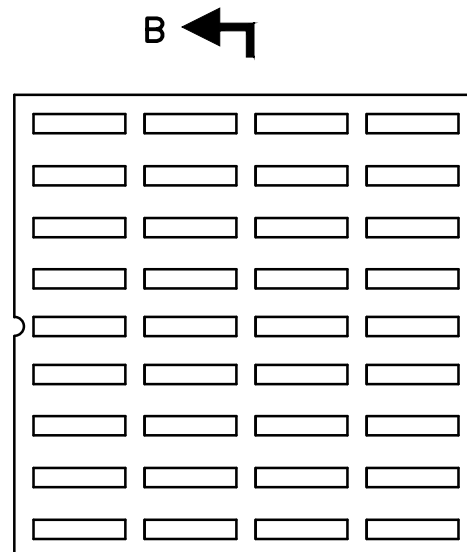
DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPECS\CIVIL CAD DETAILS\33.SD25 CATCH BASIN STANDARD FRAME AND FLAT GRATE PLOT DATE: December 13, 2022 12:45:28 PM CAD OPERATOR: TR



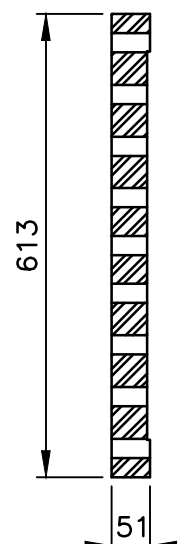
FRAME
TOP VIEW




FRAME
SECTION "A-A"



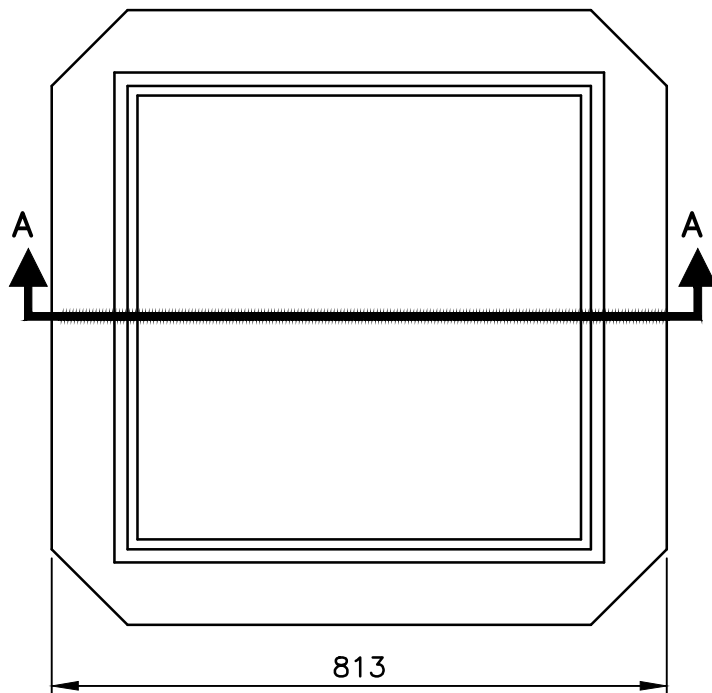
COVER
TOP VIEW



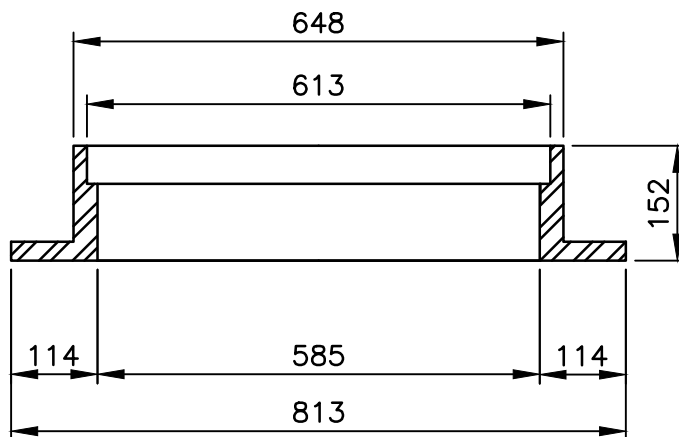
COVER
SECTION "B-B"

No.	Description	No.	Description	No.	Description
Date	2021-01-21	Scale	1:10	Drawn	THM
		TOWN OF QUISPAMIS			Drawing 33.SD25
		CATCH BASIN STANDARD FRAME & FLAT GRATE			

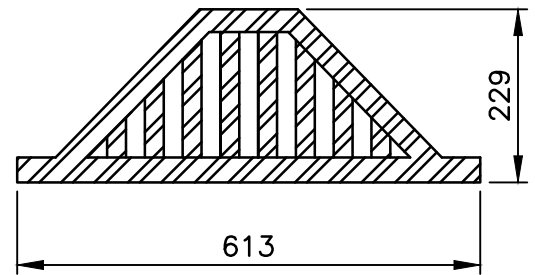
DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPECS\CIVIL CAD DETAILS\33.SD26 CATCH BASIN PYRAMID FRAME AND COVER.DWG LAYOUT NAME: SK-29 CATCH BASIN PYRAMID FRAME AND COVER.DWG CAD OPERATOR: TRAVIS M



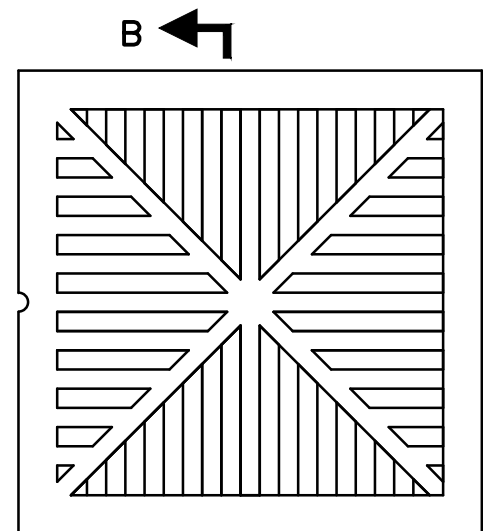
**FRAME
TOP VIEW**



**FRAME
SECTION "A-A"**



**COVER
SECTION "B-B"**



**COVER
TOP VIEW**


No.	Description	No.	Description	No.	Description
Date	2021-01-21	Scale	1:10	Drawn	THM
		TOWN OF QUISPAMIS			Drawing
		CATCH BASIN PYRAMID FRAME & COVER			
					33.SD26

Diagram of a right-angled triangle with a grid. The base is labeled A and the height is labeled A . The hypotenuse is labeled B . A small angle is indicated at the top vertex, labeled 10° and ANGLE .

A technical drawing of a trapezoidal structure, likely a cross-section of a dam or a similar engineering component. The structure is defined by a top horizontal edge, a bottom horizontal edge, and two slanted side edges. The bottom horizontal edge is labeled with the dimension A , and the vertical height from the bottom edge to the top edge is labeled with the dimension B . The interior of the structure is filled with a series of vertical lines, suggesting a material or internal structure. The top edge is slightly wider than the bottom edge. There are small rectangular features at the corners of the top and bottom edges, possibly representing bolts or fasteners. Arrows point from the text labels A and B to their respective dimensions.

CULVERT CHART		
PIPE DIAMETER	DIMENSIONS	DIMENSIONS
	A	B
375—450	750	1060
600	900	1270
750	1050	1480
900	1200	1700
1050	1350	1910

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. ALL JOINTS TO BE FULLY WELDED
3. SIDE SHALL BE CONSTRUCTED OF 12.7mmØ ROUND BAR AT 150MM SPACING, EACH DIRECTION
4. USE 25.4mmØ ROUND BARS FOR FRONT SURFACE
5. FRAME CONSTRUCTED OF L50x50x10 STEEL ANGLE
6. GRATES SHALL BE SECURED TO HEADWALL. CONNECTION TO HEADWALL SHALL BE REMOVABLE FOR MAINTENANCE
7. NO GRATES ON CULVERTS GREATER THAN 1050mmØ UNLESS REQUIRED BY ENGINEER



CULVERT INLET GRATE

33.SD27

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPECS\CIVIL CAD DETAILS\33.SD28 CULVERT OUTLET GRATE.DWG LAYOUT NAME: SK-31 CULVERT OUTLET GRATE PLOT DATE: December 13, 2022 12:48:01 PM CAD OPERATOR: TRAVIS M

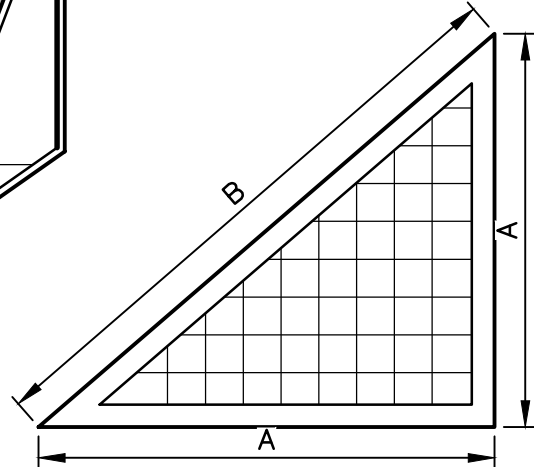
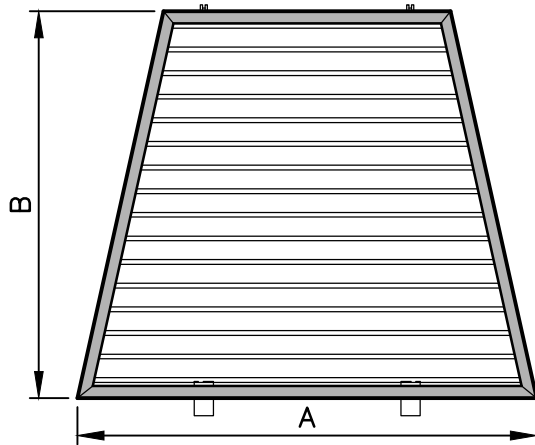
75mm x 10mm FLAT BAR
c/w 3 - 19mmØ HOLES

FRAME L50x50x10mm
STEEL ANGLE

FRAME
L50x50x10mm FLAT
BARS (TYPICAL)

SEE NOTE 3

75mm x 10mm
FLAT BAR c/w 3 -
19mmØ HOLES




CULVERT CHART

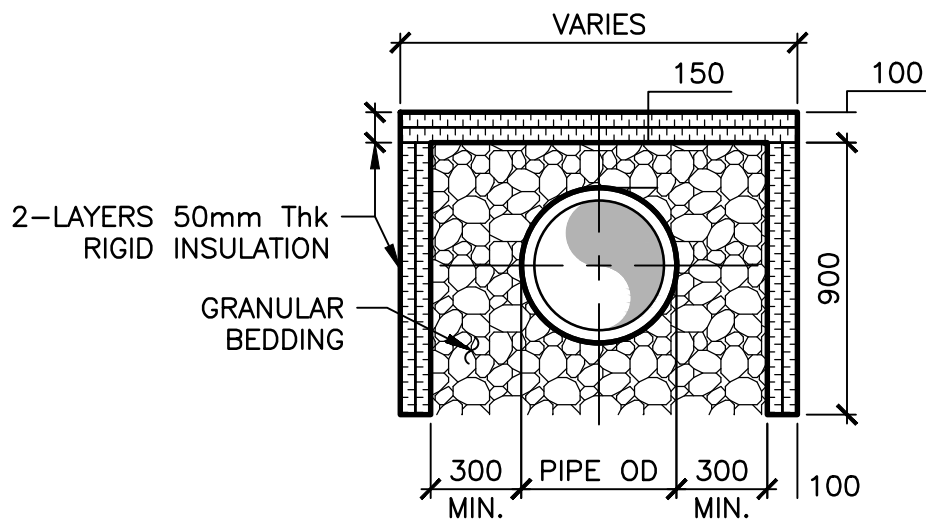
PIPE DIAMETER	DIMENSIONS	
	A	B
450	750	1060
600	900	1270
750	1050	1480
900	1200	1700
1050	1350	1910


NOTE:

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. ALL JOINTS TO BE FULLY WELDED
3. SIDE SHALL BE CONSTRUCTED OF 12.7mmØ ROUND BAR AT 150mm SPACING, EACH DIRECTION
4. FRAME CONSTRUCTED OF L50x50x10 STEEL ANGLE
5. GRATES SHALL BE SECURED TO HEADWALL. CONNECTION TO HEADWALL SHALL BE REMOVABLE FOR MAINTENANCE CONNECTION SHALL BE BASED ON FIELD CONDITIONS
6. NO GRATES ON CULVERTS GREATER THAN 1050mmØ UNLESS REQUIRED BY ENGINEER
7. GRATE BE PAINTED WITH RED OXIDE PRIMER
8. THIS DRAWING IS INTENDED TO SHOW GENERAL SIZE AND CONFIGURATION. FINAL DESIGN OF GRATE SHALL CORRESPOND WITH HEADWALL CONSTRUCTION

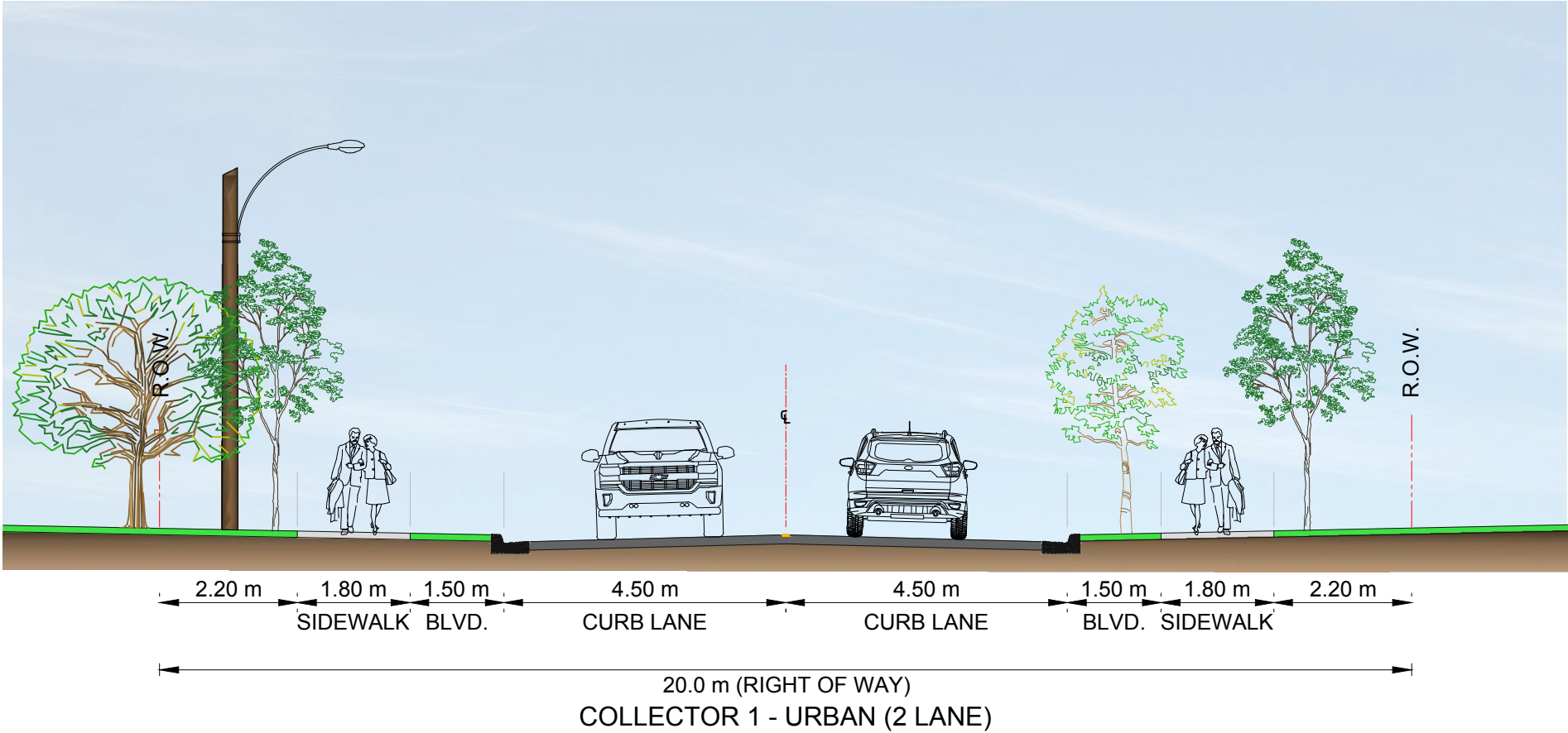
No.	Description	No.	Description	No.	Description
Date		Scale		Drawn	
2021-01-21		1:40		THM	
		TOWN OF QUISPAMIS			Drawing
		CULVERT OUTLET GRATE			
		33.SD28			

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMMSIS MUNICIPAL SPECIFICATIONS\08 SPECS\CIVIL CAD DETAILS\33.SD29 PIPE INSULATION COVER LESS THAN 1.8M.DWG LAYOUT NAME: SK-44 PIPE INSULATION COVER LESS THAN 1.8M PLOT DATE: December 13, 2022 3:14:42 PM CAD OPERATOR: TRAV/SM




No.	Description	No.	Description	No.	Description
Date		Scale		Drawn	
2021-01-21		1:25		THM	
		TOWN OF QUISPAMMSIS			Drawing
		PIPE INSULATION (WHERE COVER IS LESS THAN 1.8m)			
					33.SD29

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\2028\19.00 QUISPAMISIS MUNICIPAL SPECIFICATIONS\08 SPECS\2022-12\DEC-07 CAD TRANSPORTATION\2106081-1 PROPOSED STREET X-SECTIONS.DWG LAYOUT NAME: 34.SD01 PLOT DATE: December 22, 2022 8:07:22 AM CAD OPERATOR: TRAVIS/M

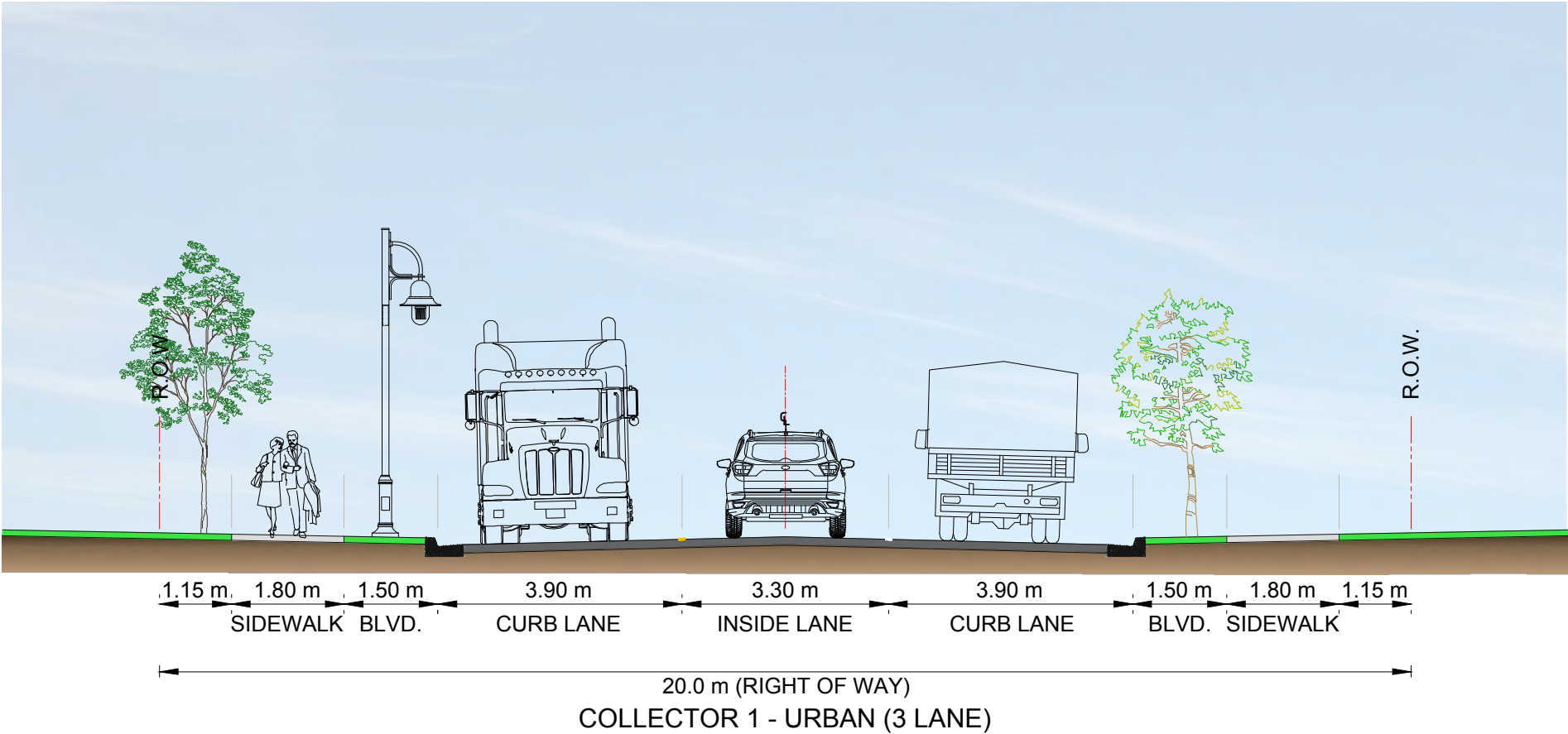


- NOTE:
- 1. Sidewalk and boulevard can be replaced with a monolithic sidewalk (minimum width 2.1 m) in constrained areas, as shown in Drawing 34.SD03.
 - 2. Power poles and high mast light standards to be located behind sidewalk where possible.
 - 3. Other municipal infrastructure to be located as per Town's Municipal Specifications.

No.	Description

Date 2022-09-19	Scale 1:100			Drawn JTGB	Checked RE/AN
		TOWN OF QUISPAMISIS		Drawing 34.SD01	
		COLLECTOR 1 - URBAN (2 LANE)			

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\2028\19_00 QUISPAMISIS MUNICIPAL SPECIFICATIONS\08 SPECS\2022-12\DEC-07 CAD TRANSPORTATION\2106081-1 PROPOSED STREET X-SECTIONS.DWG LAYOUT NAME: 34.SD02 PLOT DATE: December 22, 2022 8:11:10 AM CAD OPERATOR: TRAVIS/M

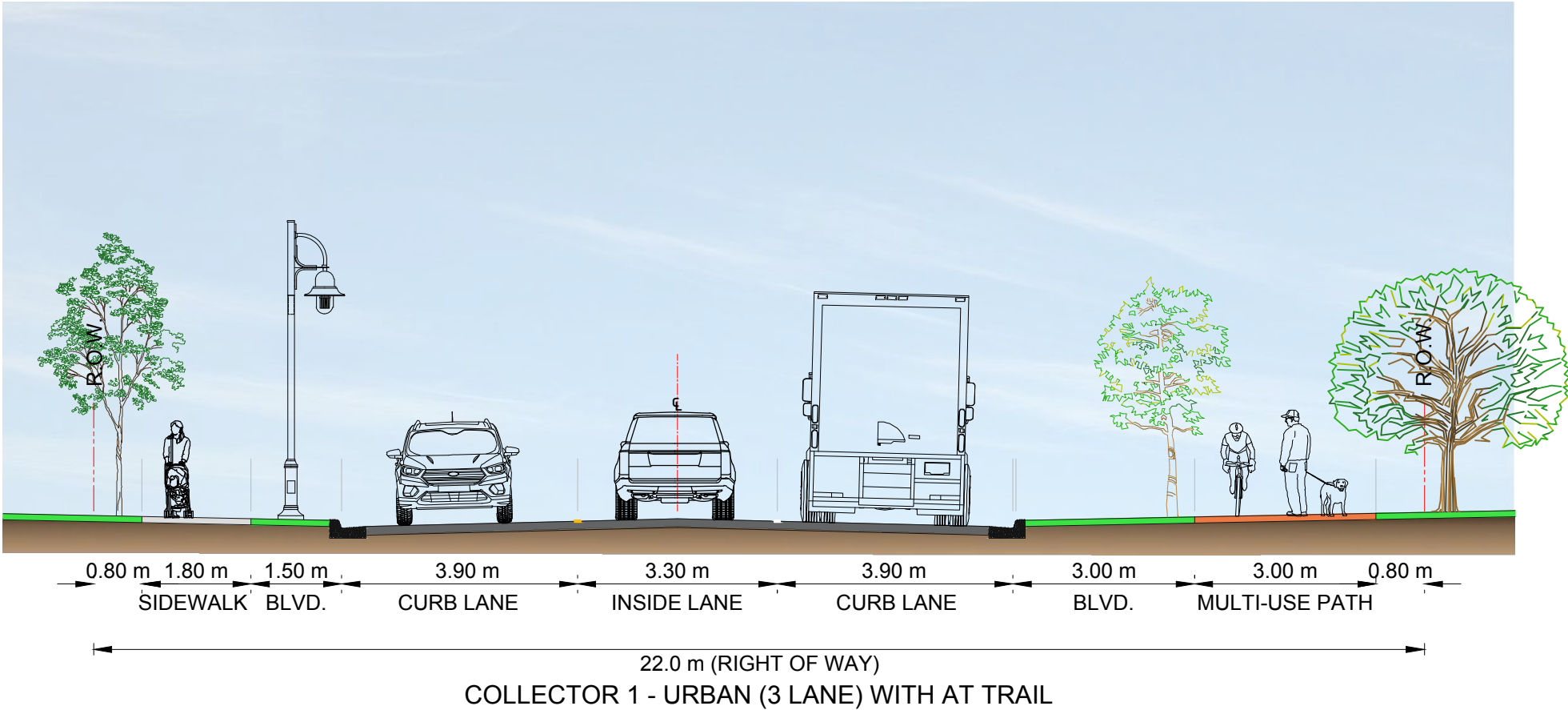


- NOTE:
- 1. Sidewalk and boulevard can be replaced with a monolithic sidewalk (minimum width 2.1 m) in constrained areas, as shown in Drawing 34.SD03.
 - 2. Power poles and high mast light standards to be located behind sidewalk where possible.
 - 3. Other municipal infrastructure to be located as per Town's Municipal Specifications.

No.	Description


Date 2022-09-19	Scale 1:100		Drawn JTGB	Checked RE/AN
		TOWN OF QUISPAMISIS	Drawing 34.SD02	
		COLLECTOR 1 - URBAN (3 LANE)		

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\2028\19.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPECS\2022-12\DEC-07 CAD TRANSPORTATION\2106081-1 PROPOSED STREET X-SECTIONS.DWG LAYOUT NAME: 34.SD04 PLOT DATE: December 22, 2022 8:15:22 AM CAD OPERATOR: TRAVIS/M

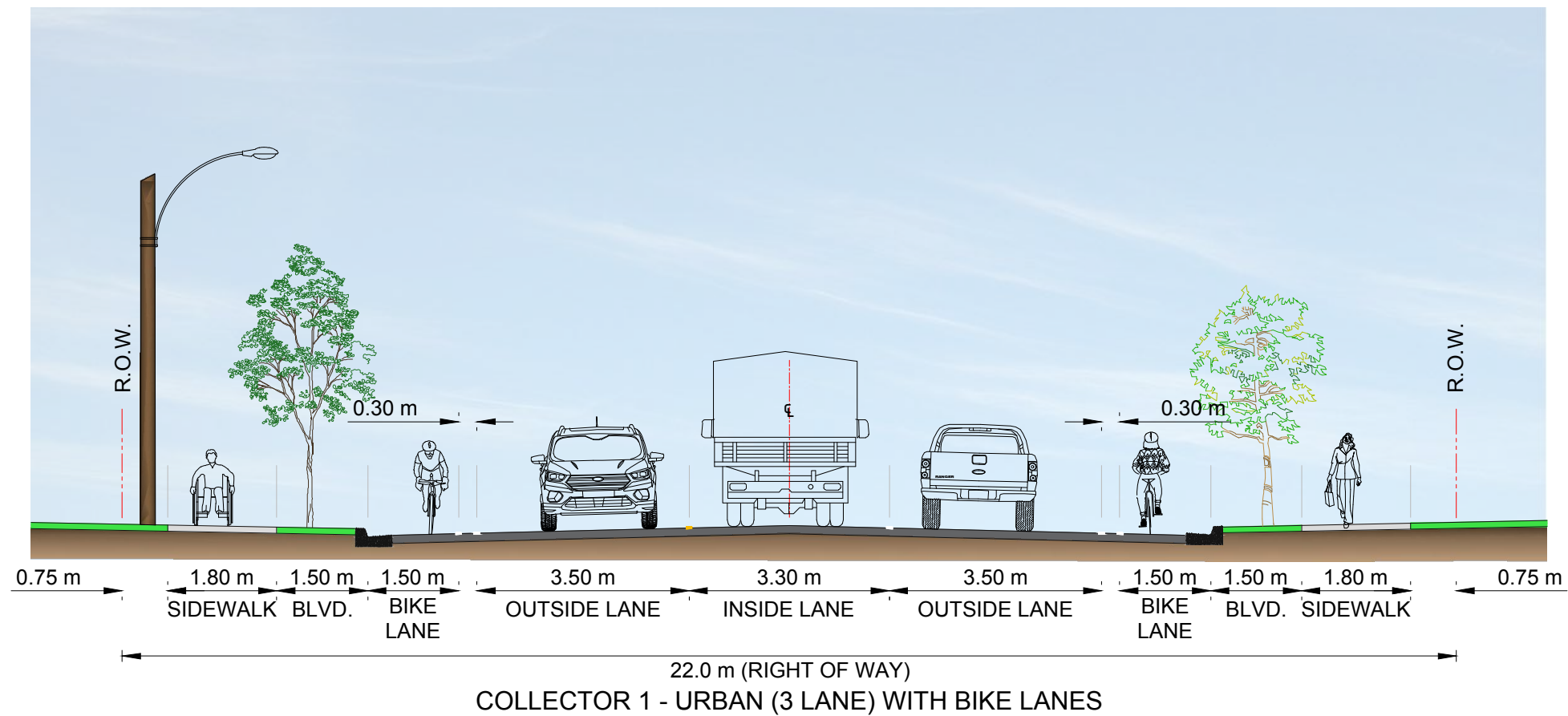


- NOTE:
- 1. Boulevard is required between travel lanes and M.U.P.
 - 2. Sidewalk and boulevard can be replaced with a monolithic sidewalk in constrained areas, as shown in Drawing 34.SD03.
 - 3. Power poles and high mast light standards to be located behind sidewalk where possible.
 - 4. Other municipal infrastructure to be located as per Town's Municipal Specifications.

No.	Description

Date 2022-09-19	Scale 1:100		Drawn JTGB	Checked AN/RE
	TOWN OF QUISPAMIS			Drawing 34.SD04
	COLLECTOR 1 - URBAN (3 LANE) WITH AT TRAIL			

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\2028\19.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPECS\2022-12\DEC-07 CAD TRANSPORTATION\2106081-1 PROPOSED STREET X-SECTIONS.DWG LAYOUT NAME: 34.SD05 PLOT DATE: December 22, 2022 8:16:51 AM CAD OPERATOR: TRAVIS/M

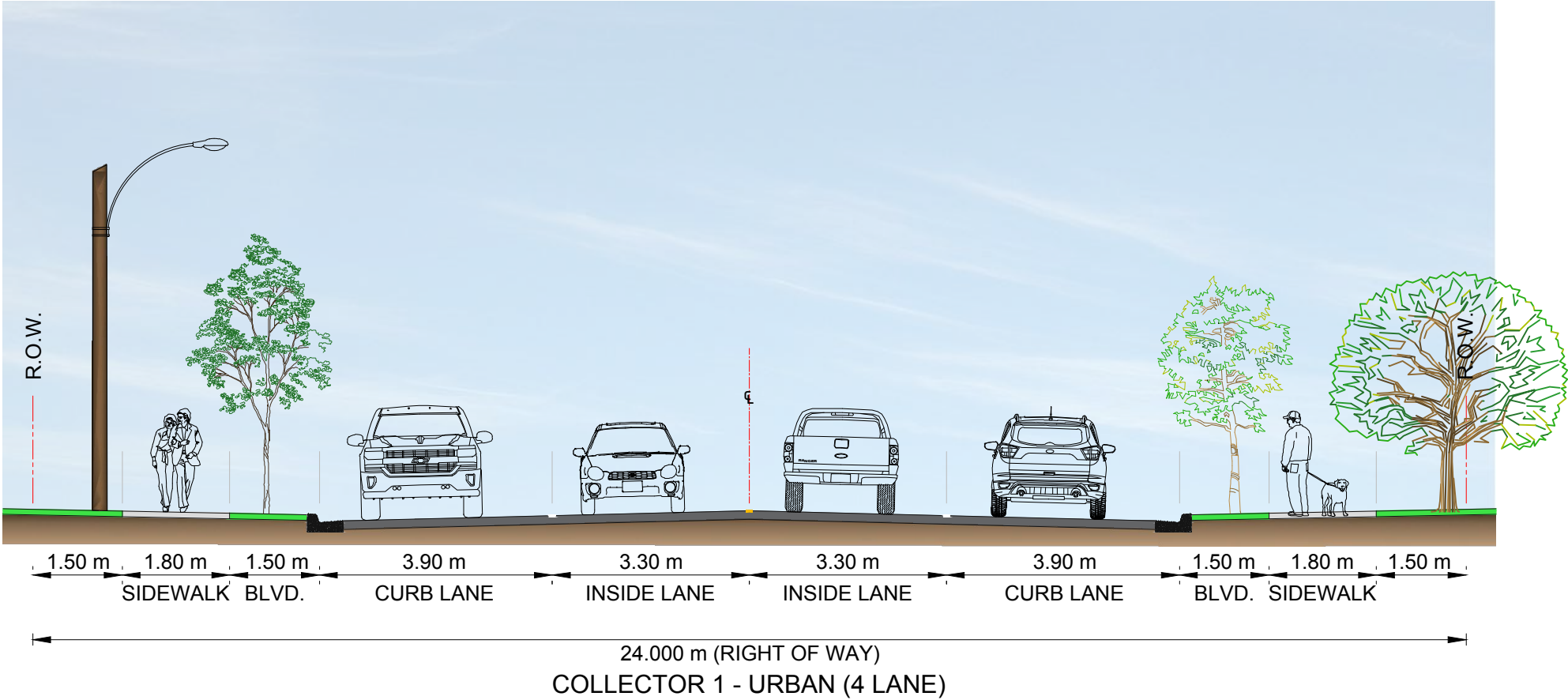


- NOTE:
- 1. Painted buffers (minimum 0.3 m width) should be provided between bike lanes and travel lanes where possible, but can be removed in constrained areas.
 - 2. Power poles and high mast light standards to be located behind sidewalk where possible.
 - 3. Other municipal infrastructure to be located as per Town's Municipal Specifications.

No.	Description

Date 2022-09-19	Scale 1:100		Drawn JTGB	Checked RE/AN
		TOWN OF QUISPAMIS	Drawing 34.SD05	
		COLLECTOR 1 - URBAN (3 LANE) WITH BIKE LANES		

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPECS\2022-12\DEC-07 CAD TRANSPORTATION\2106081-1 PROPOSED STREET X-SECTIONS.DWG LAYOUT NAME: 34.SD06 PLOT DATE: December 22, 2022 8:18:23 AM CAD OPERATOR: TRAVIS M

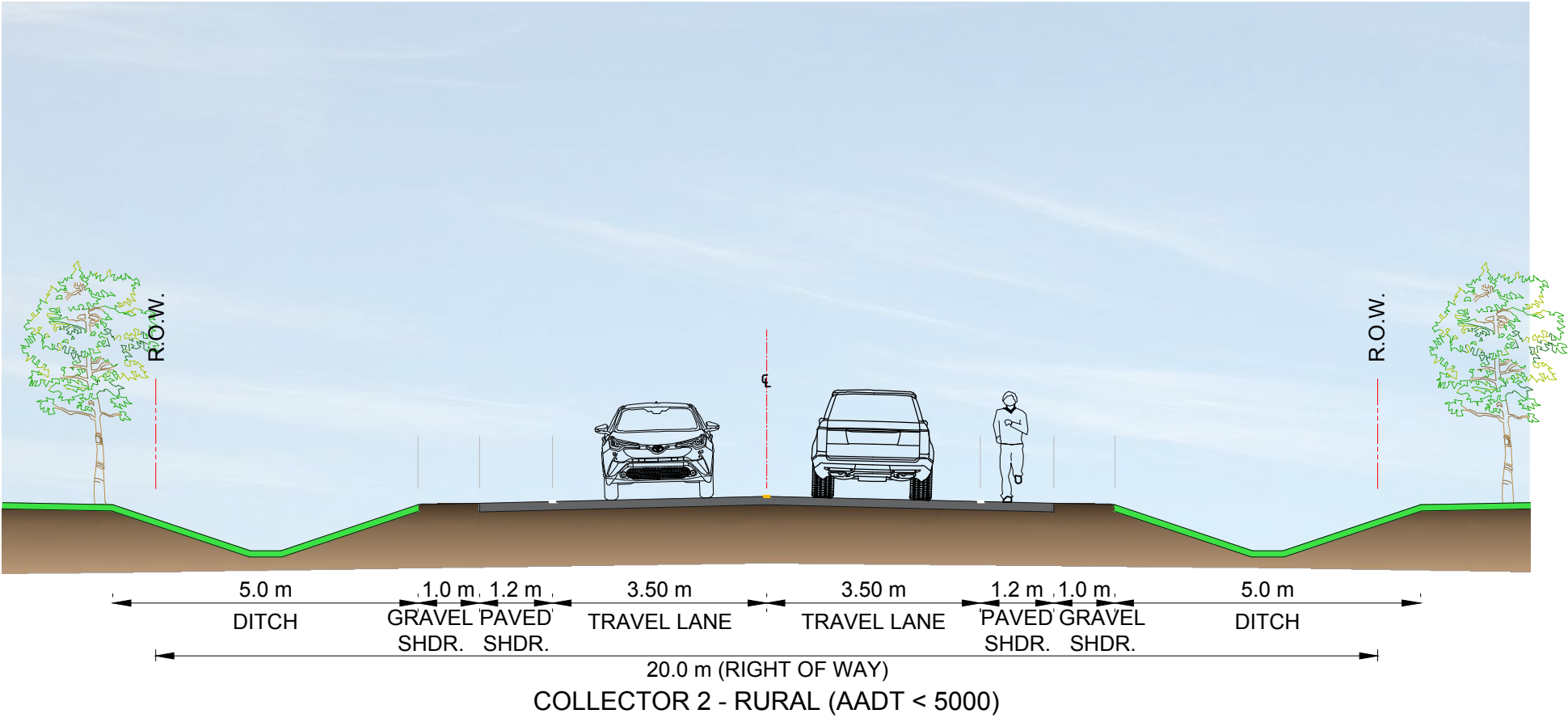


- NOTE:
- 1. Power poles and high mast light standards to be located behind sidewalk where possible.
 - 2. Other municipal infrastructure to be located as per Town's Municipal Specifications.

No.	Description

Date 2022-09-19	Scale 1:100		Drawn JTGB	Checked AN/RE
		TOWN OF QUISPAMIS	Drawing 34.SD06	
		COLLECTOR 1 - URBAN (4 LANE)		

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\2028\19.00 QUISPAMISIS MUNICIPAL SPECIFICATIONS\08 SPECS\2022-12\DEC-07 CAD TRANSPORTATION\2106081-1 PROPOSED STREET X-SECTIONS.DWG LAYOUT NAME: 34.SD07 PLOT DATE: December 22, 2022 8:19:31 AM CAD OPERATOR: TRAVIS/M



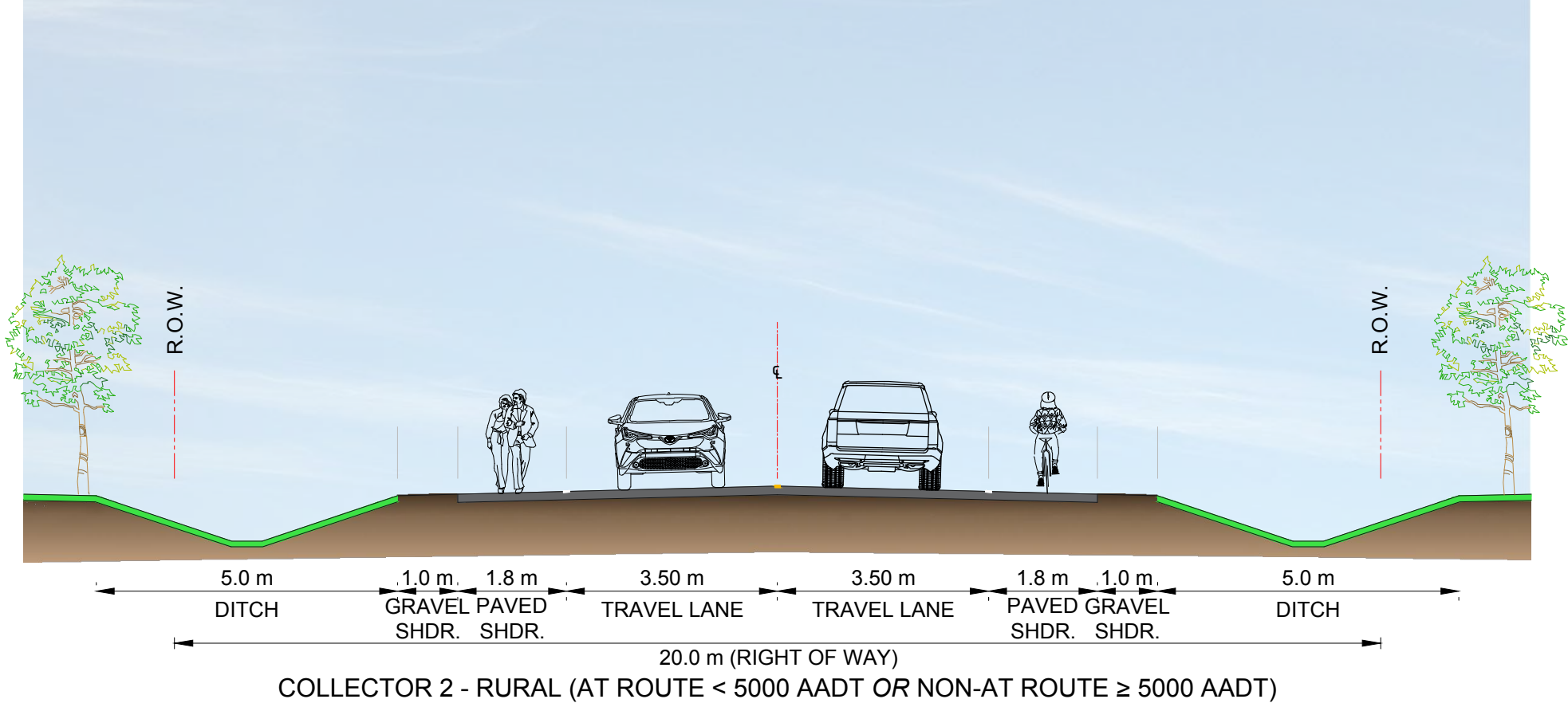
NOTE:

1. 1.2 m paved shoulders are considered "walkable".

No.	Description

Date 2022-09-19	Scale 1:100		Drawn JTGB	Checked RE/AN
		TOWN OF QUISPAMISIS	Drawing 34.SD07	
		COLLECTOR 2 - RURAL (AADT <5000)		

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\2028\19.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPECS\2022-12\DEC-07 CAD TRANSPORTATION\2106081-1 PROPOSED STREET X-SECTIONS.DWG LAYOUT NAME: 34.SD08 PLOT DATE: December 22, 2022 8:21:57 AM CAD OPERATOR: TRAVIS/M

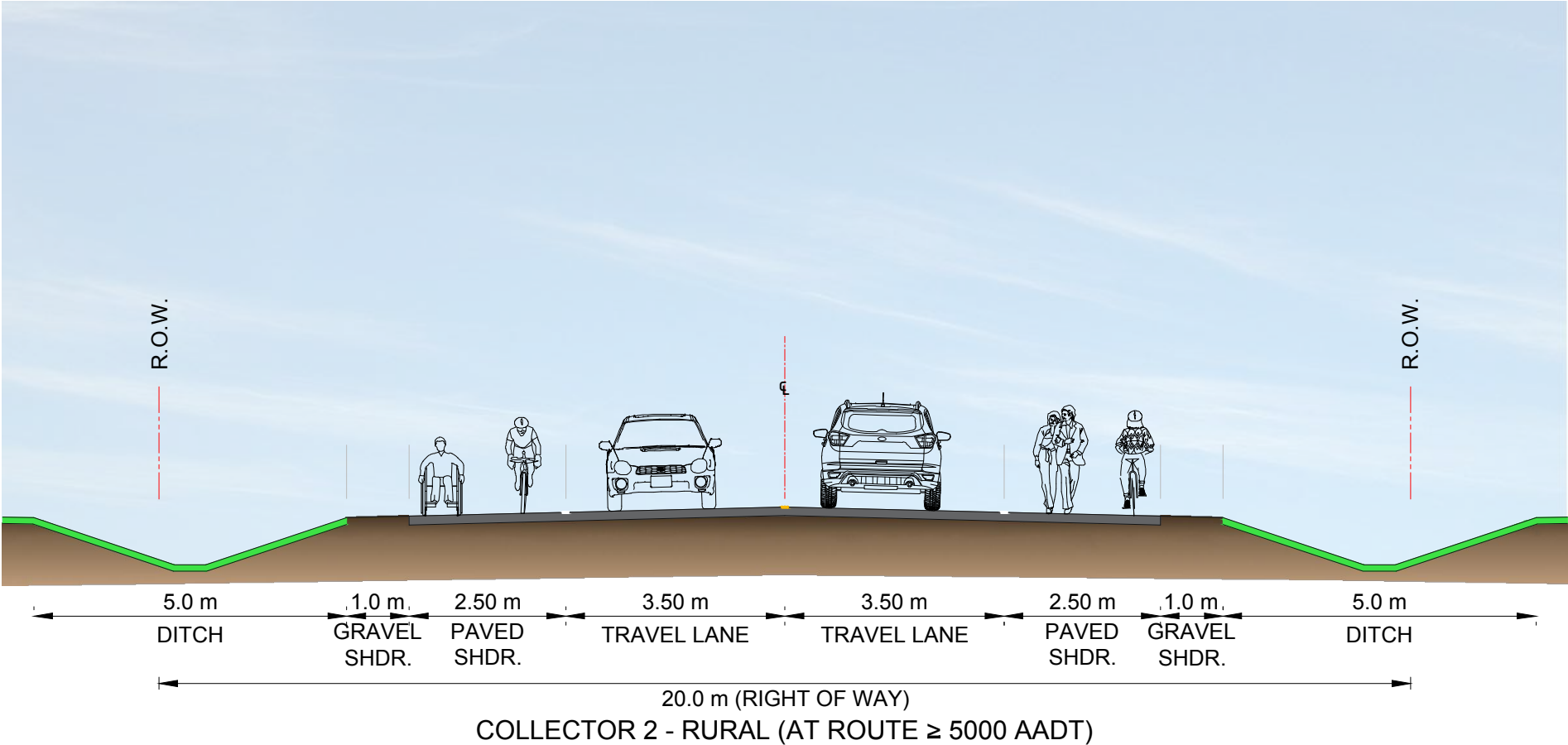


- NOTE:
- 1. 1.8 m paved shoulders are considered "walkable" and "bicycle-accessible".
 - 2. Wider (2.5 m) shoulders should be provided if road has an AADT greater than or equal to 5000 AADT and is designated as an AT route. Refer to Drawing 34.SD09.

No.	Description

Date 2022-09-19	Scale 1:100		Drawn JTGB	Checked RE/AN
		TOWN OF QUISPAMIS		
		COLLECTOR 2 - RURAL (AT ROUTE < 5000 AADT OR NON-AT ROUTE ≥ 5000 AADT)		
		Drawing 34.SD08		

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\2028\19.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPECS\2022-12\DEC-07 CAD TRANSPORTATION\2106081-1 PROPOSED STREET X-SECTIONS.DWG LAYOUT NAME: 34.SD09 PLOT DATE: December 22, 2022 8:25:41 AM CAD OPERATOR: TRAVIS/M

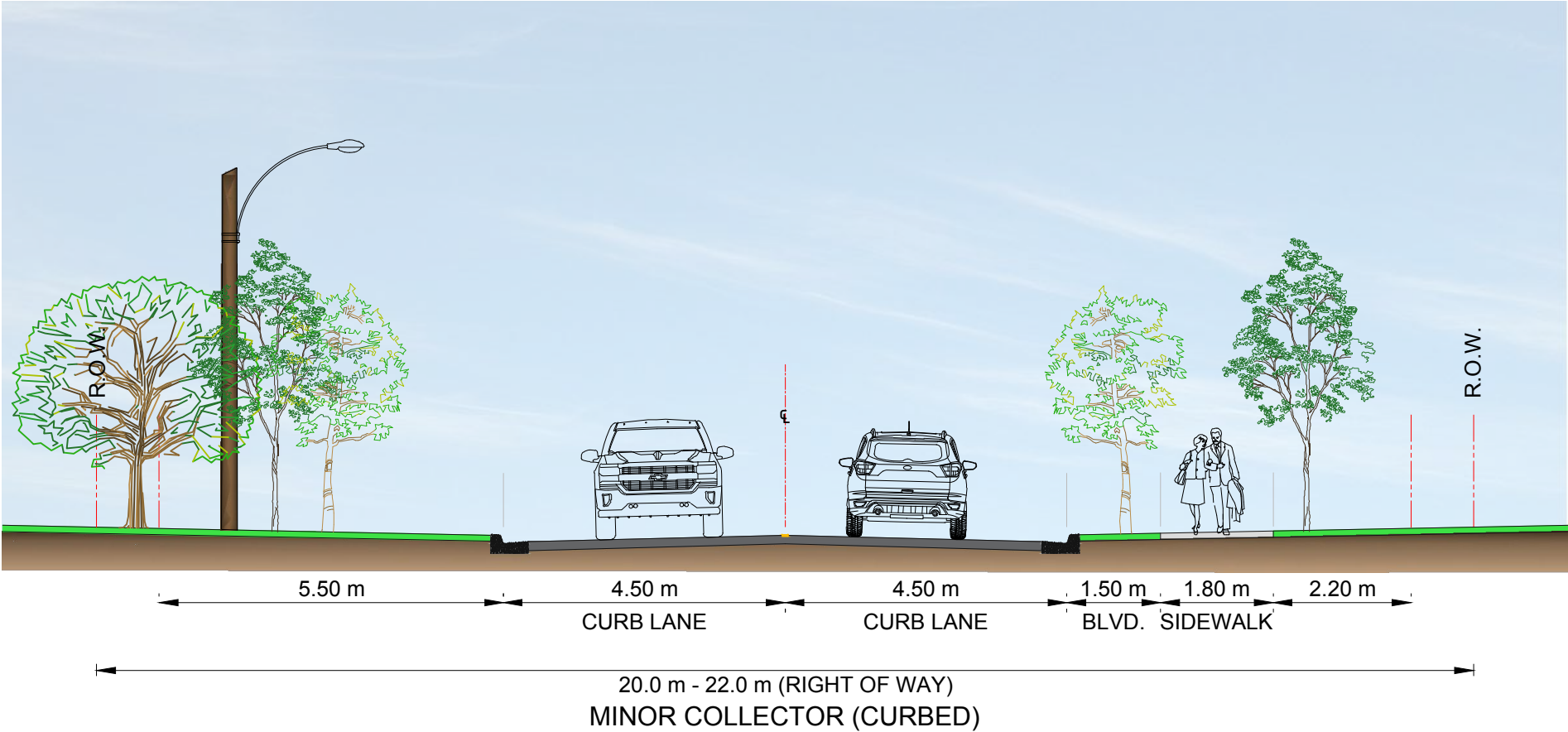


- NOTE:
- 1. Power poles and high mast light standards to be located behind sidewalk where possible.
 - 2. Other municipal infrastructure to be located as per Town's Municipal Specifications.

No.	Description

Date 2022-09-19	Scale 1:100		Drawn JTGB	Checked RE/AN
		TOWN OF QUISPAMIS	Drawing 34.SD09	
		COLLECTOR 2 - RURAL (AT ROUTE \geq 5000 AADT)		

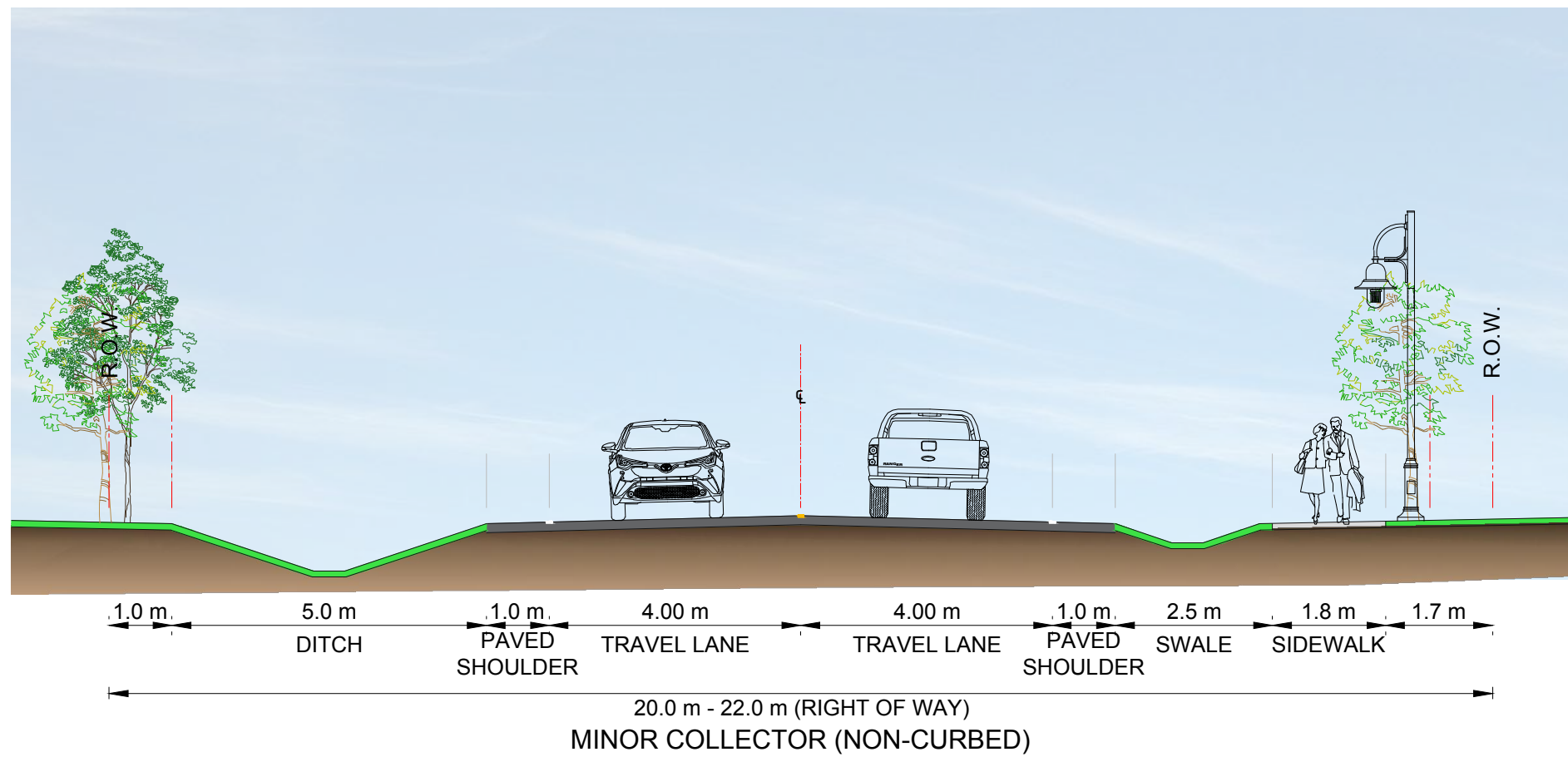
DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\2028\19.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPECS\2022-12\DEC-07 CAD TRANSPORTATION\2106081-1 PROPOSED STREET X-SECTIONS.DWG LAYOUT NAME: 34.SD10 PLOT DATE: December 22, 2022 8:27:19 AM CAD OPERATOR: TRAVIS M



- NOTE:
- 1. Power poles and high mast light standards to be located behind sidewalk where possible.
 - 2. Other municipal infrastructure to be located as per Town's Municipal Specifications.


No.	Description

Date 2022-09-19	Scale 1:100		Drawn JTGB	Checked RE/AN
		TOWN OF QUISPAMIS	Drawing 34.SD10	
		MINOR COLLECTOR (CURBED)		

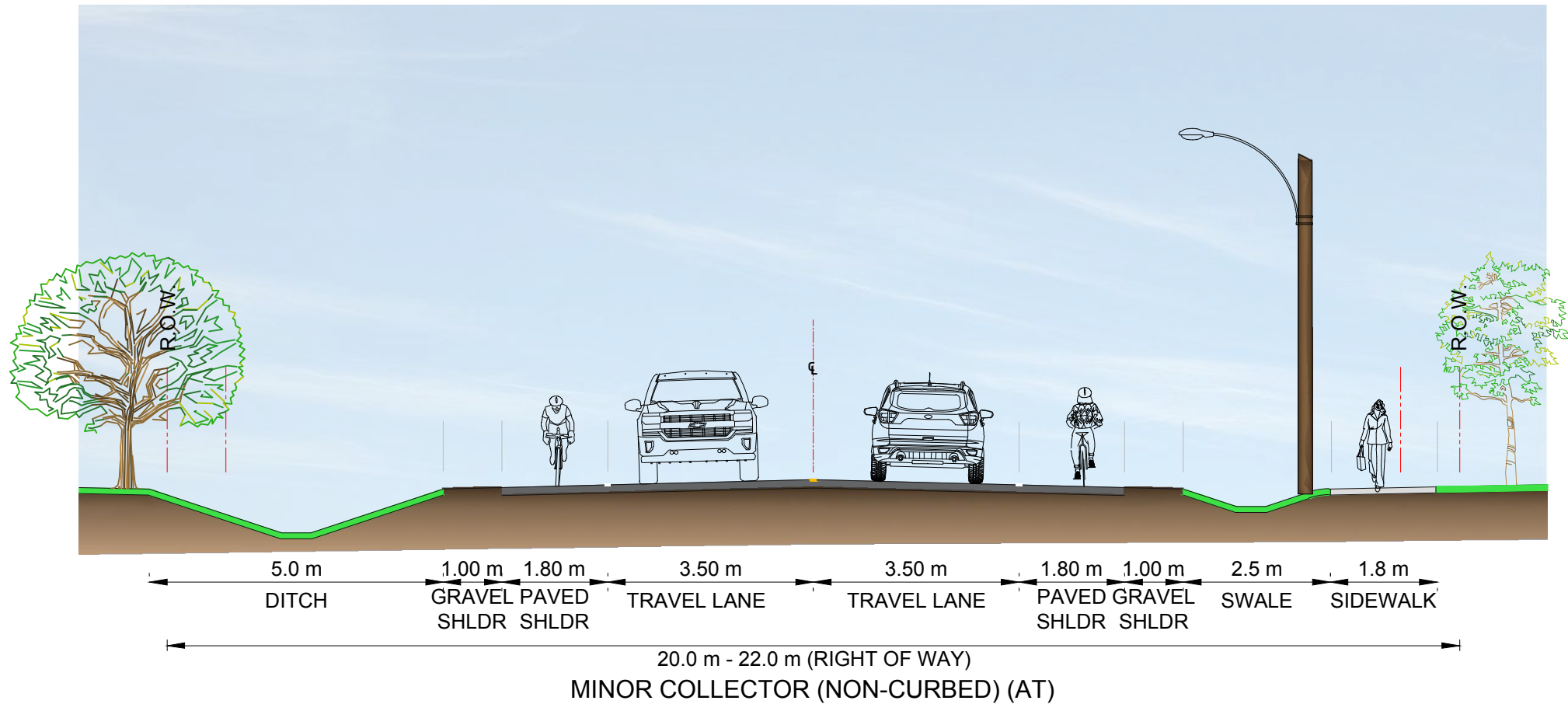


NOTE:

1. Power poles and high mast light standards to be located behind sidewalk where possible.
2. Other municipal infrastructure to be located as per Town's Municipal Specifications.

		Date 2022-09-19	Scale 1:100			Drawn JTGB	Checked RE/AN
				TOWN OF QUISPAMSIS		Drawing <h1>34.SD11</h1>	
				MINOR COLLECTOR (NON-CURBED)			
No.	Description						

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\2028\19.00 QUISPAMISIS MUNICIPAL SPECIFICATIONS\08 SPEC\2022-12\DEC-07 CAD TRANSPORTATION\2106081-1 PROPOSED STREET X-SECTIONS.DWG LAYOUT NAME: 34.SD12 PLOT DATE: December 22, 2022 8:30:22 AM CAD OPERATOR: TRAVIS/M

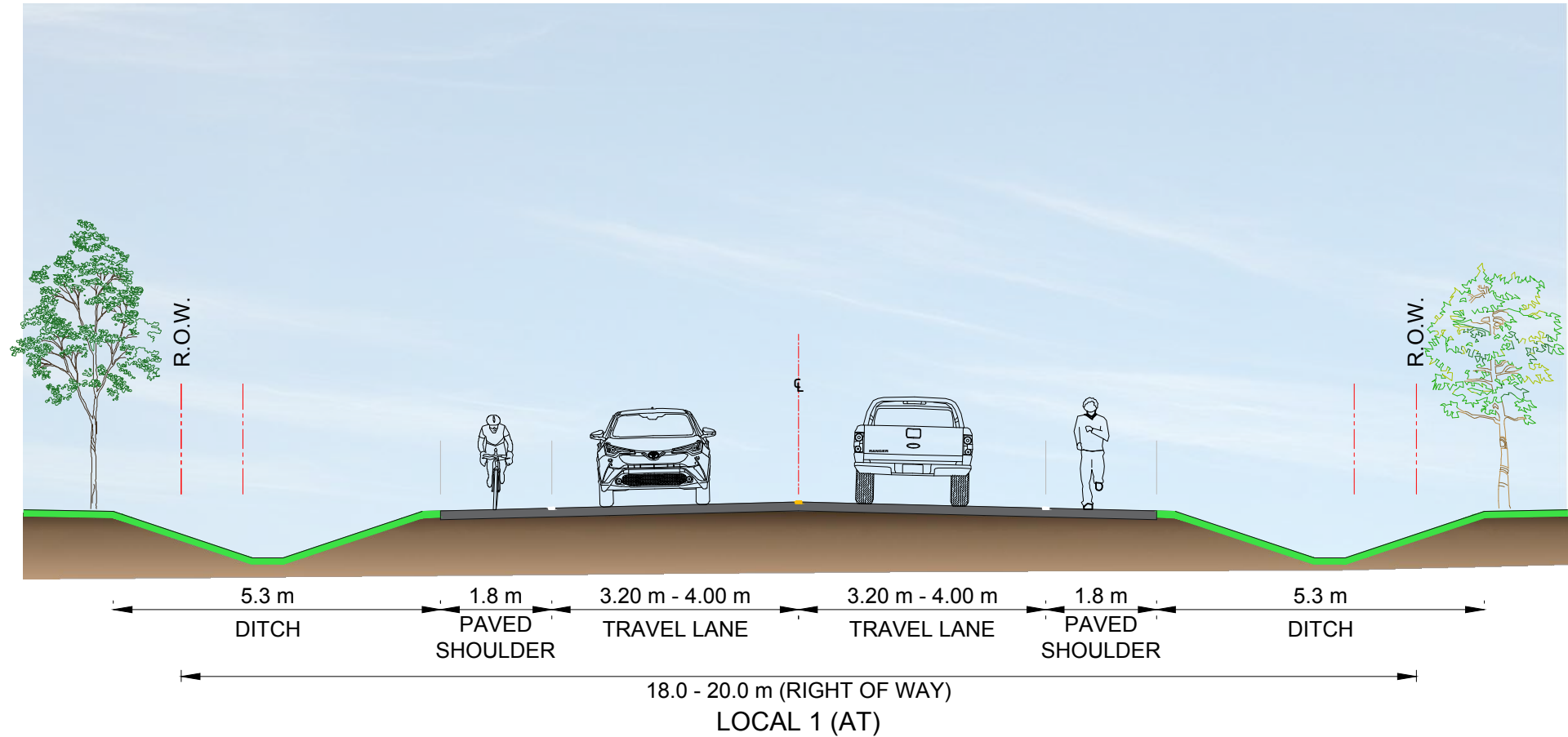


- NOTE:
- 1. Power poles and high mast light standards to be located behind sidewalk where possible.
 - 2. Other municipal infrastructure to be located as per Town's Municipal Specifications.


No.	Description

Date 2022-09-19	Scale 1:100		Drawn JTGB	Checked AN/RE
		TOWN OF QUISPAMISIS	Drawing 34.SD12	
		MINOR COLLECTOR (NON-CURBED AT)		

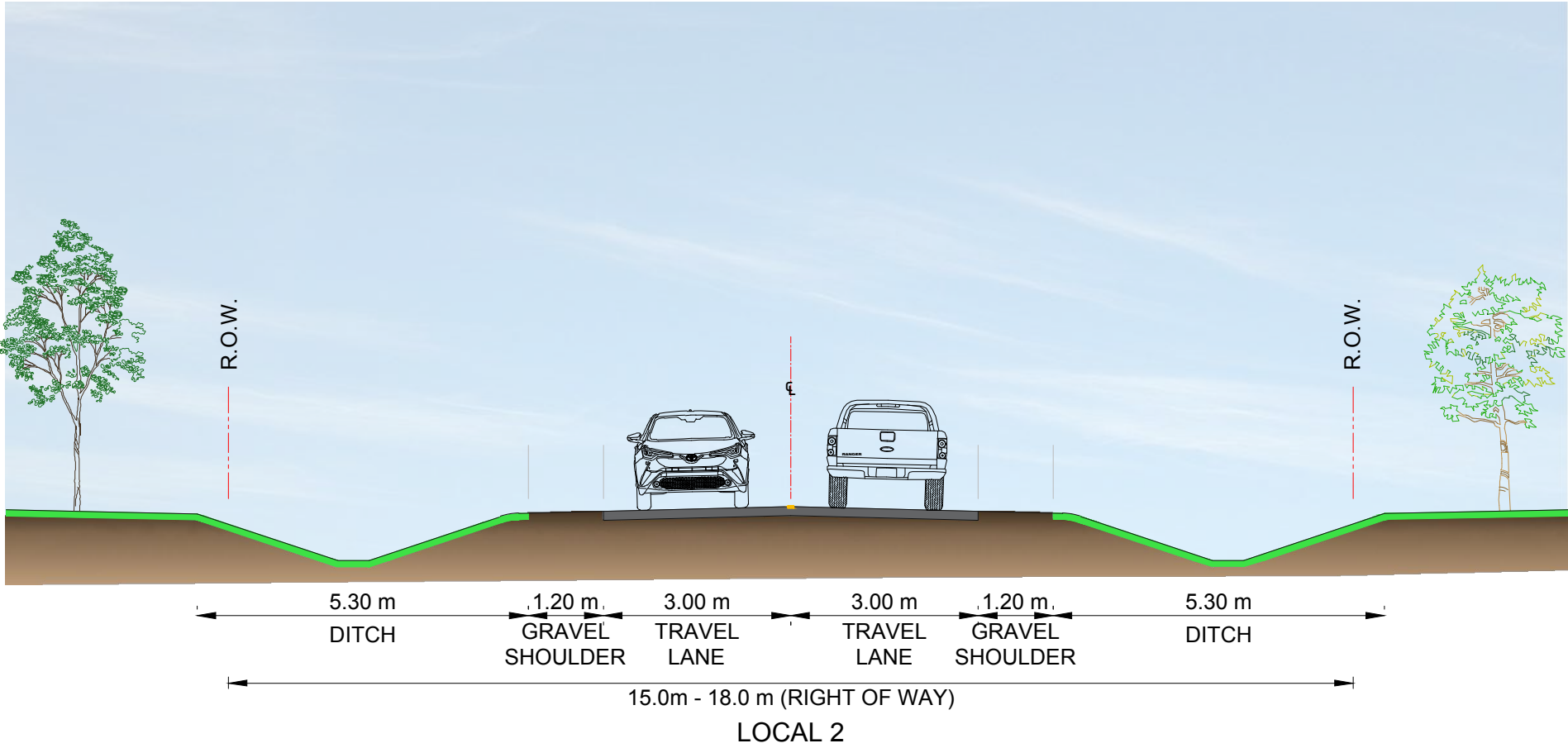
DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\2028\19.00 QUISPAMISIS MUNICIPAL SPECIFICATIONS\08 SPECS\2022-12\DEC-07 CAD TRANSPORTATION\2106081-1 PROPOSED STREET X-SECTIONS.DWG LAYOUT NAME: 34.SD14 PLOT DATE: December 22, 2022 8:33:23 AM CAD OPERATOR: TRAVIS M




No.	Description

Date 2022-09-19	Scale 1:100		Drawn JTGB	Checked AN/RE
		TOWN OF QUISPAMISIS	Drawing 34.SD14	
		LOCAL 1 (AT)		

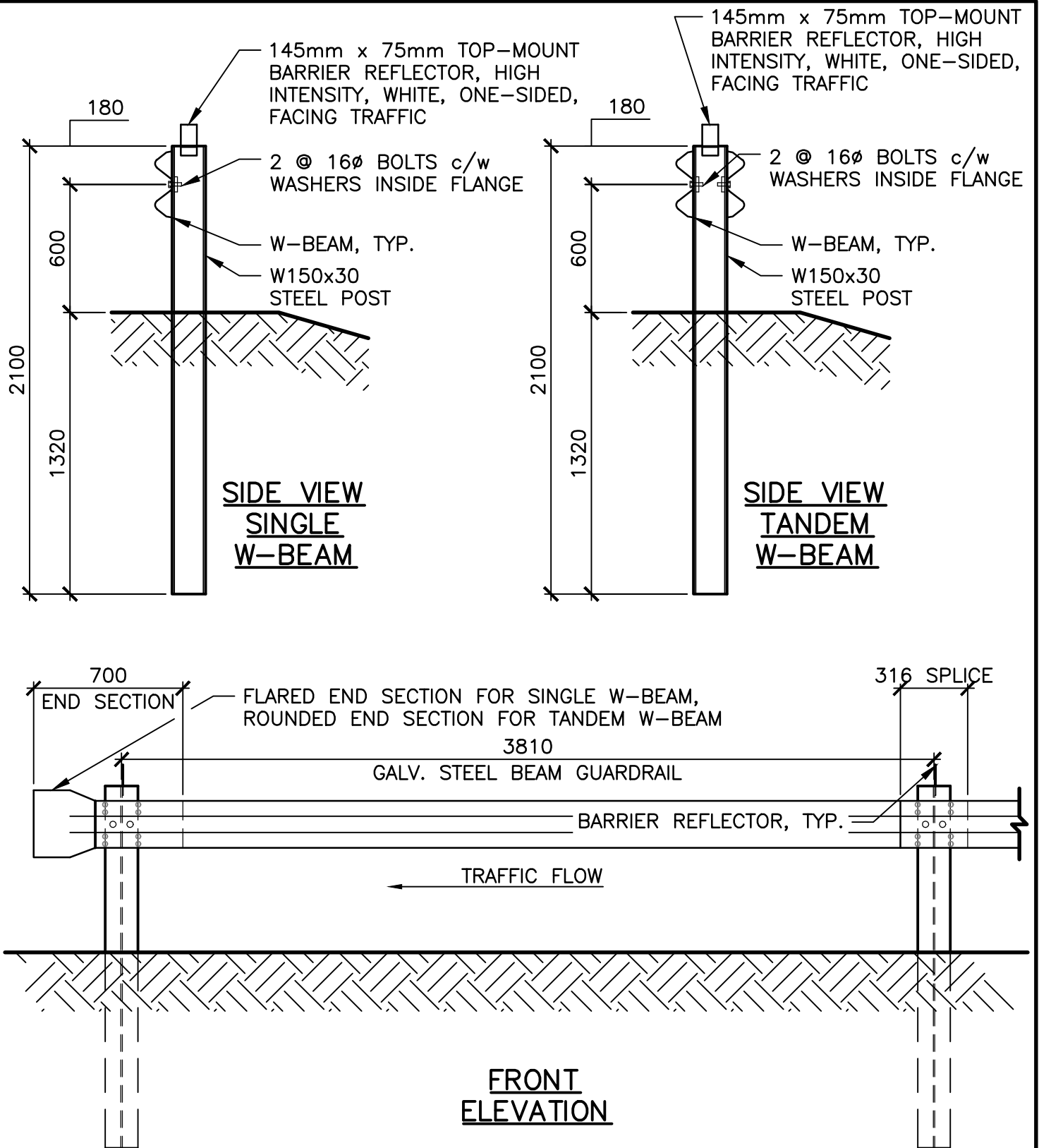
DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\2028\19.00 QUISPAMISIS MUNICIPAL SPECIFICATIONS\08 SPECS\2022-12\DEC-07 CAD TRANSPORTATION\2106081-1 PROPOSED STREET X-SECTIONS.DWG LAYOUT NAME: 34.SD15 PLOT DATE: December 22, 2022 8:35:03 AM CAD OPERATOR: TRAVISM




No.	Description

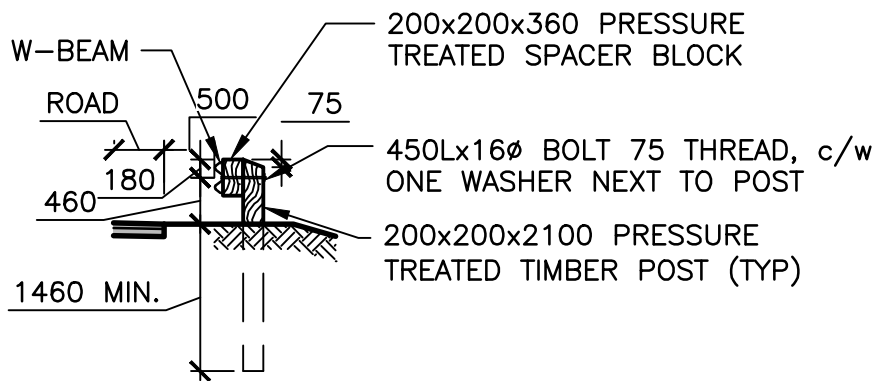
Date 2022-09-19	Scale 1:100			Drawn JTGB	Checked AN/RE
		TOWN OF QUISPAMISIS		Drawing 34.SD15	
		LOCAL 2			

DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPECS\CIVIL CAD DETAILS\34.SD16 GUIDE RAIL.DWG LAYOUT NAME: SK-40 GUIDE RAIL PLOT DATE: December 13, 2022 1:05:54 PM CAD OPERATOR: TRAVIS M

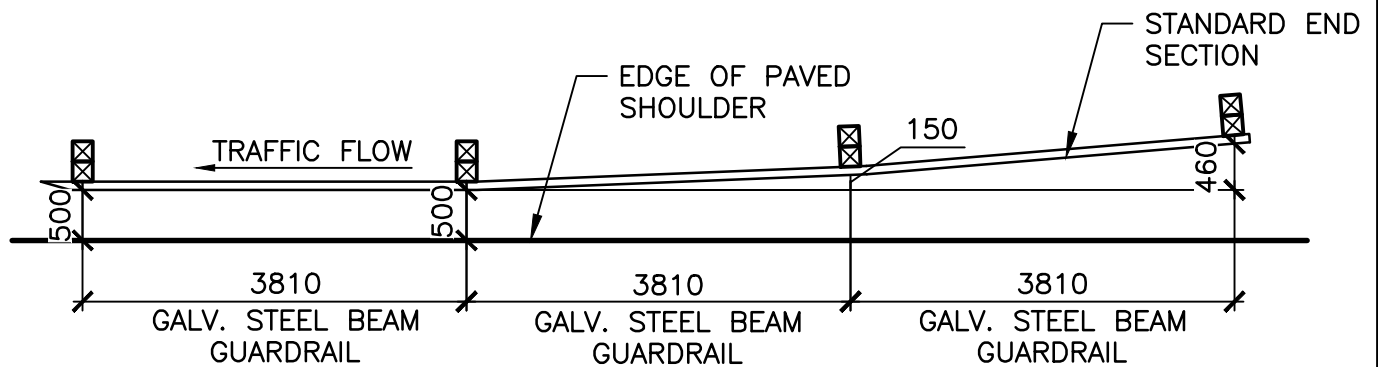


No.	Description	No.	Description	No.	Description
Date		Scale		Drawn	
2021-01-21		1:25		THM	
		TOWN OF QUISPAMIS			Drawing
		GUIDE RAIL			
					34.SD16

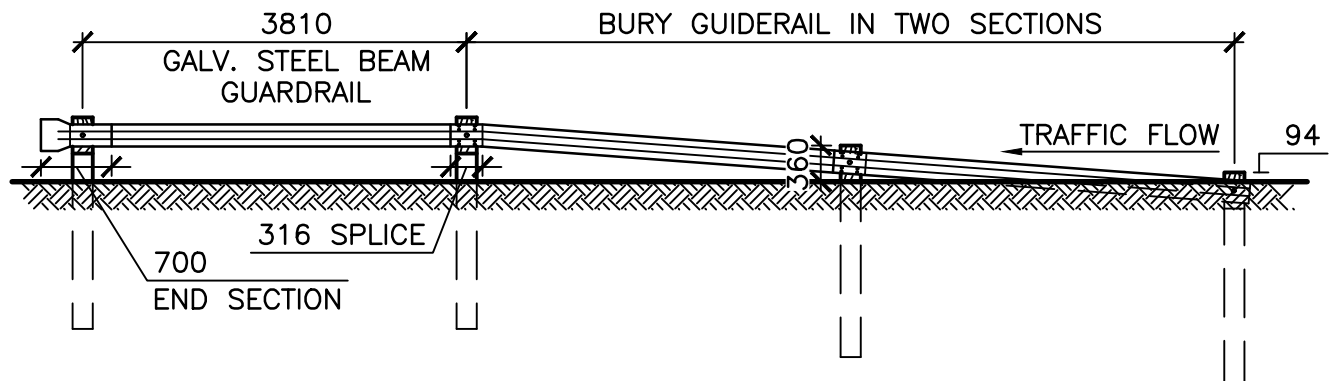
DRAWING NAME: Y:\SAINT JOHN\DATA\PROJECTS\2020\202819.00 QUISPAMIS MUNICIPAL SPECIFICATIONS\08 SPEC\34.SD17 GUIDE RAIL TERMINATION.DWG LAYOUT NAME: SK-41 GUIDE RAIL TERMINATION PLOT DATE: December 13, 2022 12:50:55 PM CAD OPERATOR: TRAVISM




SIDE VIEW



PLAN



FRONT ELEVATION

No.	Description	No.	Description	No.	Description
Date	2021-01-21	Scale	1:75	Drawn	THM
		TOWN OF QUISPAMIS			Drawing 34.SD17
		GUIDE RAIL TERMINATION			