ᐃᖃᓗᐃᑦ

Iqaluit

City of Iqaluit

Standard Specifications

Version 1

October 2026

This page intentionally left blank

Section Number	Section Title
01 14 19	Contractor Use of Premises
01 20 00	Measurement and Payment
01 23 00	Site Conditions and Instructions
01 29 83	Testing and Laboratory Services
01 32 18	Construction Progress Schedule
01 33 00	Shop Drawings and Submittals
01 35 30	Health and Safety Requirements
01 35 43	Environmental Procedures
01 41 00	Regulatory Requirements
01 45 00	Quality Control
01 52 00	Construction Facilities
01 55 26	Traffic Control
01 56 00	Temporary Barriers and Enclosures
01 61 00	Common Product Requirements
01 71 10	Dewatering
01 74 11	Cleaning
01 74 19	Construction/Demolition Waste Management and Disposal
01 78 00	Closeout Submittals
01 78 39	Project Record Drawings
01 91 13	Start-up, Testing, and Trial Operation
02 21 19	Selective Demolition
10 14 53	Traffic Signs
31 05 16	Aggregates
31 22 13	Site Grading
31 23 16.26	Rock Removal
31 23 33.01	Trenching and Backfilling
31 32 19.16	Geotextiles
31 36 00	Gabion Boxes and Matresses
31 37 00	Rip-Rap

Section Number	Section Title
32 11 23	Roadway Grading
32 12 16	Asphalt Paving
32 16 00.01	Portland Cement Concrete
32 16 00.02	Curbs and Sidewalks
32 31 13	Chain Link Fencing
33 05 14.03	Access Vaults
33 14 16.13	Water Distribution Pipe
33 31 11	Sanitary Sewer Pipe
33 42 13	Pipe Culverts
34 71 13.25	Guide Rail
40 05 14	Temporary Serving

Standard Specification Figures

Figure Number	Figure Title
SS-001	Access Vault Excavation
SS-002	Access Vault Detail
SS-003	Bumper Post & Pipe Support Detail
SS-004	Access Vault Wall Penetration Water Mains
SS-005	25mm & 50mm Wall Penetration Details
SS-006	Access Vault Wall Penetration Sewer Mains
SS-007	Sanitary Vault Cleanout Type 1 - Tee
SS-008	Sanitary Vault Cleanout Type 2 - Wye
SS-009	Sanitary Vault Cleanout Type 3
SS-010	Sanitary Sewer Flush Port
SS-011	Water Main Latrolet & Drain
SS-012	Ladder & Miscellaneous Access Vault Details

Figure Number	Figure Title
SS-013	Bleeder Detail
SS-014	Access Vault Cover Details
SS-015	Access Vault Cover Details
SS-016	Vault Valve Access and Ladder Extension
SS-017	Fire Hydrant Details
SS-018	Water And Sewer Main Trenching, Backfill & Insulation
SS-019	Residential Service Trench Detail
SS-020	Joint Detail Sanitary Sewer or Water Main
SS-021	Water Service Pipe
SS-022	Water Service Connection at Main
SS-023	Water Service Details
SS-024	Sanitary Service Connection at Main
SS-025	Sanitary Service Insulation Form
SS-026	Water Service Riser at House
SS-027	Sanitary Service Riser (Civil Contractor)
SS-028	Sanitary Service House Connection Detail (Building Contractor)
SS-029	Typical Residential Service Connection & Sewer Service Cleanout
SS-030	Water Meter & Recirculation Pump Schematic
SS-031	Water Main Pipe Termination
SS-032	Sanitary Sewer Main / Service Pipe Termination
SS-033	Temporary Water Supply Piping Details
SS-034	Water Service Abandonment
SS-035	Typical Roadway Construction
SS-036	Standard Sign

Figure Number	Figure Title
SS-037	Typical Ditching Detail
SS-038	Typical Culvert Details
SS-039	Culvert Marker
SS-040	Sidewalk in Boulevard
SS-041	Sidewalk Construction Joints
SS-042	Pedestrian Curb Ramp with Boulevard
SS-043	Concrete Sidewalk Ramp at Signalized Intersections
SS-044	Tactile Walking Surface Indicator Details
SS-045	Curb Return Entrances - Uncontrolled
SS-046	Curb Return Entrances - Controlled
SS-047	Traditional Vehicle Crossing & Transitions
SS-048	Monolithic Concrete Sidewalk
SS-049	Pedestrian Curb Ramp without Boulevard
SS-050	Concrete Barrier Curb
SS-051	Concrete Mountable Curb with Wide Gutter
SS-052	Concrete Mountable Curb with Narrow Gutter
SS-053	Concrete Barrier Curb with Standard Gutter

Terms of Use

These Standard Specifications establish the minimum requirements for the design and construction of municipal infrastructure within the City of Iqaluit. Compliance with these Specifications does not relieve the Engineer of Record (EoR) or the Contractor of their responsibility to ensure that the work is designed and constructed in accordance with accepted engineering practice, applicable codes and regulations, safety requirements, and the specific conditions of the project. The EoR retains full responsibility for all sealed designs and technical submissions provided to the City of Iqaluit.

Any proposed deviation from these Specifications shall be submitted to the City of Iqaluit in writing as a Request for Variance and shall include a technical justification signed and sealed by the EoR. Approval of a variance by the City of Iqaluit does not relieve the EoR or Contractor of their professional or contractual responsibilities.

Where clarification is required regarding the interpretation, intent, accuracy, or applicability of any specification, guideline, or standard drawing contained herein, or where conflicts exist with manufacturer or supplier recommendations, the user shall seek clarification from the City of Iqaluit prior to proceeding with the work.

These Specifications are provided for general use by the City of Iqaluit without warranty or guarantee, either express or implied. The City of Iqaluit assumes no responsibility for damages, losses, or costs arising from the use, interpretation, or application of these Specifications.

This page intentionally left blank

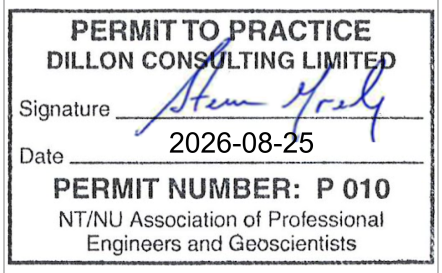
Professional Seals

The technical specifications contained within this document have been prepared by or under the direct supervision of the undersigned Engineering Professional, who is registered and in good standing with the Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists (NAPEG).

NAPEG Professional Seal



NAPEG Permit to Practice



This page intentionally left blank

PART 1 GENERAL

1.1 Description

.1 This Section specifies requirements for Contractor's use of the Project Site.

1.2 General

.1 The existing Site has space for accommodation for the Contractor's tools and materials. Exact location will be identified in the pre-construction meeting.

.2 Make arrangements with the City of Iqaluit if additional areas are required. Obtain written agreements and submit copies to the City of Iqaluit.

1.3 Owner/Operations Occupancy

.1 Operations will occupy premises during the entire construction period for execution of normal and emergency operations. No claims for delays caused by operations will be approved.

.2 Cooperate with the City of Iqaluit in scheduling operations to minimize conflict and to facilitate operation of the station. The needs of operations take precedence.

1.4 Work Areas

.1 Confine operations within areas designated for construction, storage, and access as determined in the pre-construction meeting.

.2 Install and maintain fencing along working and storage areas and access routes.

.3 Do not enter upon or occupy with people, tools, or materials any lands other than public streets, roadways, rights-of-way, or easements shown on Contract Drawings except after written consent has been received from property owner.

.4 Do not unreasonably encumber Site with materials or equipment.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

.1 Not used.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 General

.1 This section of the specification forms part of the Contact Documents and shall be read in conjunction with them.

.2 Additional instructions for measurement and/or payment for items of the Work are contained in specific sections of the Technical Specifications.

.3 All measurements shall be along a horizontal plane unless otherwise indicated.

.4 Unless otherwise specified, unit rates and lump sum price bid shall include all labour, materials, supply, installation, tools, equipment, operating and maintenance costs, temporary works, and for supervision, overhead and profit. It is further understood and agreed that the cost for each item includes all sales taxes, permits, and fees, and any or all Municipal, Territorial, and Federal charges in connection with the Work and that costs of a general nature that do not pertain to any one item or for which no particular reference is made in the descriptions are distributed among all items that are bid. Bids are full compensation for the Work necessary to complete each item in the Contract in combination with all other work necessary to the completion of the Work as a whole and not bid as a separate item.

.5 The whole of the Work shall be on a "Lump Sum" or “Unit Rates” basis as defined in the Schedule of Quantities.

.6 Payment shall not be made for Work requiring an inspection certificate until the certificate has been issued by the City of Iqaluit.

.7 All costs necessary to complete Work as specified and shown on the Drawings shall be allowed for in the bid prices tendered. Where an item of Work is not shown in the Schedule of Quantities, the cost of the item of Work shall be included with the most appropriate item of Work listed.

.8 Temporary facilities shall include any costs, moving equipment during the course of construction, materials, offices and other items, and any expenses associated with the project, including security fencing, barricades, channelizer barrels, survey, quality control testing, access road, Contractor’s Security Escort, etc.

Payment shall be on a lump sum basis as a percentage of the work complete, as agreed upon between the Contractor and Engineer.

.9 For the purposes of this Contract, supply and delivery will be paid once materials have been delivered to the Contractor's storage area in Iqaluit, outside of the shipping compound. In addition, an itemized list will be presented to the City of Iqaluit and the materials inspected prior to any payment being made in the form of a manifest.

1.2 Mobilization/Demobilization

.1 Mobilization shall be defined as the planning, coordination, preparation, loading, transportation, delivery, unloading, assembly, installation, and establishment of all personnel, temporary facilities, offices, equipment, machinery, materials, supplies, tools, storage areas, utilities, and other articles or resources necessary to commence and undertake the Work associated with the Contract. Mobilization shall include all activities and expenses necessary to prepare the Site and Contractor’s operations for the proper and timely execution of the Work, including, but not limited to, the movement of personnel, equipment, supplies, and incidentals to the Site; establishment of offices, storage areas, temporary structures, and other facilities; site security and illumination; and other preparatory activities required prior to commencement of the Work.

.2 Demobilization shall be defined as the planning, coordination, dismantling, removal, loading, transportation, unloading, and disposal or relocation of all personnel, temporary facilities, offices, equipment, machinery, surplus materials, supplies, tools, storage areas, utilities, and other articles or resources associated with the Contractor’s operations following completion of the Work. Demobilization shall include all activities and expenses necessary to discontinue the Contractor’s operations, remove temporary facilities and equipment from the Site, clear and clean work and storage areas, remove surplus materials and construction-related articles, and leave the Site in the condition required by the Contract Documents.

.3 Unless a specific unit price item is included in the Schedule of Quantities, all costs associated with the work outlined in this specification shall be deemed to be included in the appropriate unit and lump sum prices quoted.

.4 Where Mobilization and Demobilization shall consist of the necessary work and operations including, but not limited to, the movement of personnel, equipment, supplies and incidentals to the work, the establishment of offices and other facilities necessary to undertake the work. It will also be compensation for expenses incurred for other work and operations that must be performed prior to the commencement of the work. Unless included as separate pay items, the price for Mobilization / Demobilization shall also include costs related to project management, meetings, notifications, insurance, bonding, permits, temporary structures, storage, illumination, site security, existing signage removal/reinstallation, traffic accommodation plan and traffic accommodation, existing sanitary and watermain elevation checks for conflict avoidance, submittals, pre-construction site review.

.5 50% of the lump sum price will be paid upon confirmation by the City of Iqaluit that the Contractor has delivered the necessary material and equipment to complete the Work as outlined in the Contract Documents.

.6 40% of the lump sum price will be retained for demobilization, which will be paid upon successful commissioning of the new installation, and clean-up of the Site.

.7 10% of the lump sum price will be paid once site clean-up and restoration has been accepted.

END OF SECTION

PART 1 GENERAL

1.1 Examination of Site

.1 Prior to commencing actual construction Work, inspect field conditions in the presence of the City of Iqaluit, examine surface conditions, and stake out all water and sewer alignments and access vault locations as required to ensure correct execution of the Work. Submit a report and photo log to document existing site conditions prior to mobilization.

.2 Commencement of construction constitutes acceptance of existing conditions and means dimensions have been considered, verified and are acceptable.

.3 Recording of existing conditions: If rock removal, or construction activities may interfere with foundations of adjacent buildings, roads, fences, retaining walls, driveways, or other structures, take photographs to record existing conditions and review with the City of Iqaluit prior to commencing construction.

1.2 Documents/Instructions

.1 The City of Iqaluit will provide a reproducible PDF file that the Contractor can use to produce hard copy Drawings for their use during construction. The Contractor is responsible for the cost of production of hard copy Drawings and Specifications.

1.3 Discrepancies/Omissions

.1 Notify the City of Iqaluit immediately upon discovery of discrepancies or omissions in the Contract Documents or of any doubt as to the meaning or intent of any part thereof.

1.4 Documents on Site

.1 Maintain one (1) copy of all current Contract Documents and all Shop Drawings on Site, in good condition and available to the City of Iqaluit.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

.1 Not used.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 Work Included

.1 This Section is not intended to apply to mill test reports and certificates of compliance, tests to demonstrate or adjust and balance equipment and systems, or other similar requirements for quality control that are Contractor's responsibility. Particular requirements are specified in appropriate Sections related to the product, equipment, or system.

1.2 Related Requirements

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by the City of Iqaluit are specified in the related Sections.

1.3 Appointment and Payment

.1 No appointment or payment will be provided for services of testing laboratory for the following:

.1 Inspection and testing required by laws, ordinances, rules, regulations, or orders of public authorities.

.2 Inspection and testing performed exclusively for Contractor's convenience.

.3 Testing, adjustment, and balancing of conveying systems, mechanical and electrical equipment, and systems.

.4 Mill tests and certificates of compliance.

.5 Tests specified to be carried out by Contractor under the supervision of the City of Iqaluit.

.6 Additional tests specified in the following paragraph.

.7 Where tests or inspections by designated testing laboratory reveal Work not in accordance with Contract requirements, the Contractor shall pay costs for additional tests or inspections as the City of Iqaluit may require to verify acceptability of corrected Work.

1.4 Contractor’s Responsibilities

.1 Provide labour, equipment, and facilities to:

.1 Provide access to Work to be inspected and tested.

.2 Facilitate inspections and tests.

.3 Make good Work disturbed by inspections and tests.

.4 Provide storage on-site for laboratory's exclusive use to store equipment and cure test samples.

.2 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.3 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by the City of Iqaluit.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

.1 Not used.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 Definitions

.1 Activity: An element of Work performed during the course of the Project. An activity normally has an expected duration, expected cost, and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (Gantt Chart): A graphic display of schedule related information. In a typical bar chart, activities or other Project elements are listed down the left side of the chart, dates are shown across the top, and activity durations are shown as date placed horizontal bars. The Gantt Chart shall be derived from a commercially available computerized project management system.

.3 Baseline: Original approved plan (for Project, Work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Scheduled calendar working days per week. To be included as part of Bar (Gantt) Chart submission.

.5 Duration: Number of Work periods (not including holidays or other non-working periods) required to complete an activity or other Project element. Usually expressed as Work Days or Work Weeks.

.6 Master Plan: A summary level schedule that identifies major activities and key milestones.

.7 Milestone: A significant event in the Project, usually the completion of a major deliverable.

.8 Project Schedule: The planned dates for performing activities and the planned dates for meeting milestones. A dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout Project life cycle.

.9 Project Planning, Monitoring, and Control System: Overall system operated by the City of Iqaluit to enable monitoring of Project Work in relation to established milestones.

1.2 Requirements

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and timeframe.

.3 Limit activity durations to maximum of approximately 10 Working Days, to allow for progress reporting.

.4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this Contract.

1.3 Submittals

.1 Submit to the City of Iqaluit within fifteen (15) working days of Award of Contract, a Bar (Gantt) Chart, in PDF format, for planning, monitoring, and reporting of Project progress.

1.4 Project Schedule

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes at minimum milestone and activity types as follows:

.1 Award,

.2 Shop Drawings, samples,

.3 Mobilization,

.4 Site preparation, removals, and temporary servicing,

.5 Site survey and layout,

.6 Water and sewer installation,

.7 Road construction,

.8 Fence installations, and

.9 Final completion.

1.5 Project Schedule Reporting

.1 Update Project Schedule monthly reflecting activity changes and completions, as well as activities in progress.

.2 Show projected percentage of completion of each item as of first day of month.

.3 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impacts, with possible mitigation.

1.6 Project Meetings

.1 Discuss Project Schedule at regular Site meetings, identify activities that are behind schedule, and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

.2 Weather related delays with their remedial measures will be discussed and negotiated.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

.1 Not used.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 35 30 – Health and Safety Requirements.

.2 Section 01 35 43 – Environmental Procedures.

.3 Section 01 45 00 – Quality Control.

.4 Section 01 55 26 – Traffic Control.

.5 Section 01 78 00 – Closeout Submittals.

.6 Section 01 78 23 – Operation and Maintenance Manuals.

.7 Section 01 78 39 – Project Record Drawings.

1.2 Administrative

.1 Submit to the City of Iqaluit submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data, samples, and mock ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units, converted values are acceptable.

.5 Review submittals prior to submission to the City of Iqaluit. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated, and identified as to specific project will be returned without being examined and shall be considered rejected.

.6 Notify the City of Iqaluit, in writing at time of submission, of deviations from requirements of Contract Documents and state reasons for deviations.

.7 Verify field measurements and affected adjacent Work are coordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by the City of Iqaluit’s review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by the City of Iqaluit's review.

.10 Keep one reviewed copy of each submission on-site.

1.3 Shop Drawings and Product Data

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data which are to be provided by the Contractor to illustrate details of a portion of the Work.

.2 Submit shop drawings bearing the stamp and signature of qualified professional engineer registered or licensed by, and in good standing with, the Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists (NAPEG) where required.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes, and other information necessary for completion of the Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to Contract Documents.

.4 Allow 15 business days for the City of Iqaluit's review of each submission.

.5 Adjustments made on shop drawings by the City of Iqaluit are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the City of Iqaluit prior to proceeding with Work.

.6 Make changes in shop drawings as the City of Iqaluit may require. When resubmitting, notify the City of Iqaluit in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter containing:

.1 Date,

.2 Project title and number,

.3 Contractor's name and address,

.4 Identification and quantity of each shop drawing, product data, and sample, and

.5 Other pertinent data.

.8 Submissions shall include:

.1 Date and revision dates,

.2 Project title and number,

.3 Name and address of:

.1 Sub-contractor,

.2 Supplier, and

.3 Manufacturer.

.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements, and compliance with Contract Documents, and

.5 Details of appropriate portions of Work as applicable:

.1 Fabrication,

.2 Layout, showing dimensions, including identified field dimensions, and clearances,

.3 Setting or erection details,

.4 Capacities,

.5 Performance characteristics,

.6 Standards,

.7 Operating weight,

.8 Wiring diagrams,

.9 Single line and schematic diagrams, and

.10 Relationship to adjacent Work.

.9 Submit one (1) electronic copy of shop drawings for each requirement requested in specification Sections and as requested by the City of Iqaluit.

.10 Submit one (1) electronic of test reports for requirements requested in specification Sections and as requested by the City of Iqaluit.

.1 Report signed by authorized official of testing laboratory that material, product, or system identical to material, product, or system to be provided has been tested in accordance with specified requirements.

.2 Testing must have been within 3 years of date of Contract award for Project.

.11 Submit one (1) electronic of certificates for requirements requested in specification Sections and as requested by the City of Iqaluit.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system, or material attesting that product, system, or material meets specified requirements.

.2 Certificates must be dated after Contract award of Project, complete with project name.

.12 Submit three (3) paper copies and one (1) electronic copy of manufacturer's instructions for requirements requested in specification Sections and as requested by the City of Iqaluit.

.1 Pre-printed material describing installation of product, system, or material, including special notices and Material Safety Data Sheets concerning impedances, hazards, and safety precautions.

.13 Submit three (3) paper copies and one (1) electronic of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by the City of Iqaluit.

.14 Submit one (1) electronic copy of documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.15 Submit three (3) paper copies and one (1) electronic of Operation and Maintenance Data for requirements requested in specification Sections and as requested by the City of Iqaluit.

.16 Delete information not applicable to Project.

.17 Supplement standard information to provide details applicable to Project.

.18 If upon review by the City of Iqaluit, no errors or omissions are discovered or if only minor corrections are made, copies will be returned, and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.4 Photographic Documentation

.1 Submit electronic copy of colour digital photography in jpg format, fine resolution, monthly with progress statement as directed by the City of Iqaluit.

.2 Project identification: name and number of Project and date of exposure shall be indicated.

.3 Frequency of photographic documentation: as directed by the City of Iqaluit.

1.5 Certificates and Transcripts

.1 Immediately after award of Contract, submit Workers' Safety and Compensation Commission (WSCC) status.

.2 Submit transcription of insurance immediately after award of Contract.

1.6 Required Contractor Submittals

.1 General

.1 This Clause identifies the plans, programs, and documentation required prior to mobilization on Site and during the construction phase.

.2 Pre-Mobilization Submittals

.1 Project Schedule, detailing the schedule of the workdays required from Contractor, sub-contractors, suppliers, and consultants to complete each activity of the Project by road segment or location in order to meet the Substantial Completion date. In addition, for each activity, critical elements that could impact the schedule are to be identified. Submission shall include an electronic copy in a Bar Chart (Gantt Chart) format. Due within 21 calendar days of Contract Award.

.2 List of sub-contractors, suppliers, and consultants, their role and their key personnel, including names and positions, addresses, and telephone and cellular numbers. Due within 21 calendar days of Contract Award.

.3 Contractor Chain of Command, listing key Contractor personnel, including for each: name, position, qualification, experience, and telephone and cellular numbers. The list shall include the names and telephone/cellular numbers for contact persons who are available on a 24-hour basis in the event of emergencies. Due within 21 calendar days of Contract Award.

.4 Work Plan, describing in detail each activity and location, the Contractor's intended methods of construction, and materials, equipment, and labour, and public notifications that will be used to meet Substantial Completion date. The Work Plan must be linked to the Project Schedule. Due within 21 calendar days of Contract Award.

.5 Health and Safety Plan: The Contractor shall have a Certificate of Recognition (COR) or Registered Safety Plan (RSP) including a site-specific Health and Safety Plan acceptable to the City of Iqaluit. The Contractor shall implement and maintain the Health and Safety Plan during the Work. Health and Safety Plan must include in accordance with Section 01 35 30 – Health and Safety Requirements. Due within 21 calendar days of Contract Award.

.6 Material Logistics Plan: This plan must verify sealift/air-freight bookings and backup suppliers to mitigate project delays caused by missed Arctic shipping windows. Due within 30 calendar days of Contract Award.

.7 Quality Control Plan in accordance with Section 01 45 00 – Quality Control, including Quality Control checklist examples. Due a minimum of twenty-one (21) calendar days prior to the planned date of mobilization or site disturbance.

.8 Traffic Management Plan, in accordance with the requirements of Section 01 55 26 –Traffic. Due within 21 calendar days of Mobilization.

.9 Environmental Protection Plan (EPP) that meets the requirements of Section 01 35 43 – Environmental Procedures. Submission of EPP must allow 2 weeks for review by the City of Iqaluit, in accordance with Section 01 35 43 – Environmental Procedures. Due a minimum of twenty-one (21) calendar days prior to the planned date of mobilization or site disturbance.

.10 Site Access and Detour Plans shall include, but not be limited to, engineered drawings and procedures for accessing all areas of the Work or for proposed detours. Due a minimum of twenty-one (21) calendar days prior to the planned date of mobilization or site disturbance.

.11 Survey Plan describing the Contractor's intended methods of surveying during the Project, listing of control points, description of georeferencing and calibration data, process and frequency of validation checks. Due a

minimum of twenty-one (21) calendar days prior to the planned date of mobilization or site disturbance.

.12 Emergency Procedures Protocol plan in consultation with the City of Iqaluit. On site Plan to address standard operating procedures to be implemented during emergency situations. Due a minimum of twenty-one (21) calendar days prior to the planned date of mobilization or site disturbance.

.13 Utilities Coordination Plan, including notifications to Utility Owners, municipality, fire department and health department. Due a minimum of twenty-one (21) calendar days prior to the planned date of mobilization or site disturbance.

.14 The Contractor shall not begin any Work on the Site until the City of Iqaluit has provided a Notice to Proceed.

.15 The Contractor shall not begin any Site Work until the City of Iqaluit has authorized acceptance of submittals in writing.

.3 Construction Phase Submittals

.1 Property & Right-of-Way (ROW) Restoration reports: Prior to commencing site disturbance or mobilization, the Contractor shall conduct and submit a comprehensive pre-construction survey consisting of high-resolution, time-stamped, and georeferenced video and photographic logs of all adjacent private properties, public ROWs, structures, driveways, and drainage features. Upon completion of the Work, the Contractor shall submit a post-construction survey report demonstrating that all disturbed lands, ditches, driveways, and structures have been restored to original condition or better, to the satisfaction of the City of Iqaluit. Acceptance of this report and completion of all required restoration work shall be a mandatory prerequisite for Final Payment.

.2 Weekly Progress Reports that outline the detailed Work (Contractor, sub-contractors, suppliers, consultants) completed to date as well as the anticipated Work to be performed for the following week on a day-by-day basis. Work to be linked to activities by road segment or location identified in project schedule and to provide information on materials, equipment, and labour. Weekly progress reports must include a red-line markup of the project drawings showing areas where work is complete

and where work is in progress. Alternate Work to be identified if Work, or a portion of, cannot be done due to weather, equipment breakdown, delays in delivery, etc. Weekly Progress Reports shall be submitted at the end of each week.

.3 Quality Control Inspection Reports - The Contractor shall maintain a daily inspection report that itemizes the results of all Quality Control inspections conducted by the Contractor. The reports shall be submitted to the City of Iqaluit with the Weekly Progress Report. A summary of all Quality Control inspections conducted to date shall be submitted by the Contractor with each Weekly Progress Report. Provide test results for pipe pressure testing, hydrant flow testing, bacteriological testing, density testing, weld testing, per the applicable Specification.

.4 Shop Drawings and Mix Designs – The Contractor shall submit all design drawings, shop drawings, and mix designs required to fabricate and/or conduct the Work a minimum fifteen (15) business days prior to fabrication / production.

.5 Temporary Servicing Plan – The Contractor shall submit a comprehensive plan describing materials and procedures for temporary overland potable water servicing and sewer by-pass pumping, per Section 40 05 14.

.6 Record of Quantities - The Contractor shall maintain and submit detailed records of all installed material quantities. Scale and weight tickets shall be submitted daily. Itemized records of lengths, areas, and volumes—supported by field measurements, haul tickets, and survey data—shall be submitted weekly, on the first business day of each week for the preceding week's Work. All submitted quantities are subject to verification and approval by the City of Iqaluit prior to inclusion in any progress payment claim.

.7 Progress Photographs:

.1 Format:

.1 Electronic: jpg files, minimum three (3) mega pixels.

.2 Submission requirements: one (1) set of electronic files.

.3 Identification: Name and number of Project, description of photograph, and date.

.4 Viewpoints: viewpoints determined by the City of Iqaluit.

.5 Submission Frequency: prior to commencement of Work and weekly thereafter with progress statement, or as directed by the City of Iqaluit.

.6 Covered Works: Any scheduled Work to be completed and covered or buried outside of the scheduled on-site work hours of the City of Iqaluit must be approved by the City of Iqaluit at least 48 hours prior to the scheduled Work completion. Covered Works must be sufficiently measured and photographed by the Contractor, for quality assurance or inspection requirement purposes, to the satisfaction of the City of Iqaluit . Electronic pictures of covered Works shall be emailed to the City of Iqaluit daily. If the Work or electronic pictures are unsatisfactory to the City of Iqaluit, no payment shall be issued for that quantity of bid item until corrected.

.7 Submit all electronic pictures as part of closeout package.

.8 Submit an electronic copy of Contractor's authorized representative's work site health and safety inspection reports to the City of Iqaluit and authority having jurisdiction, weekly.

.9 Submit copies of reports or directions issued by Federal and Territorial health and safety inspectors immediately.

.10 Submit copies of incident and accident reports immediately.

.4 Project Completion Submittals

.1 Record Drawings – The Contractor shall submit copies of all Contractor's Drawings revised as necessary to record all as-built changes to the Work and the Contractor shall submit a set of Contract Drawings clearly marked to record as-built changes to the Work.

.2 Record drawings shall be provided to the City of Iqaluit within 3 weeks of Substantial Completion.

.3 Record Surveys – The Contractor shall provide digital survey point files in a CSV and DWG format. Survey files shall include the horizontal and vertical location of all built infrastructure, including pipes, roads, and drainage. Surveys shall be georeferenced to the same mapping projection as used in the development of the Design Drawings. Surveys shall be

completed using conventional total station or GNSS survey equipment. Drone collected data is not acceptable.

.4 Quality Control Records – The Contractor shall submit a PDF electronic file containing an itemized set of project quality control documentation.

.5 All other documents noted within the Contract Documents, and under Section 01 78 00 – Closeout Submittals.

.6 The Contractor shall not construe the City of Iqaluit's authorization of the submittals to imply approval of any particular method or sequence for conducting the Work, or for addressing health and safety concerns. Authorization of the programs shall not relieve the Contractor from the responsibility to conduct the Work in strict accordance with the requirements of Federal or Territorial regulations and this specification, or to adequately protect the health and safety of all workers involved in the Project and any members of the public who may be affected by the Project. The Contractor shall remain solely responsible for the adequacy and completeness of the programs and work practices, and adherence to them.

.7 The City of Iqaluit may, at their sole discretion, withhold payment from the Contractor for Work completed until acceptable submittal documents have been provided by the Contractor to the City of Iqaluit.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

.1 Not used.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Include costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 33 00 – Shop Drawings and Submittals.

1.2 Construction Safety Measures

.1 Safety is the Contractor's responsibility. The Contractor will be the "Constructor" as defined in the Occupational Health and Safety (OH&S) Act.

.2 Observe and enforce construction safety measures of National Building Code of Canada (NBCC), latest edition, Part 8, Territorial Government, Workers' Safety & Compensation Commission (WSCC), municipal statutes, WHMIS, and local authorities.

.3 Before any Work at the Site is started, the Contractor shall have prepared a Health and Safety Plan and Manual for project specific health and safety precautions and programs, safety of property on Site, and for protection of persons adjacent to Site and environment to the extent that they may be affected by conduct of the Work. The plan shall be complete with respect to procedures and actions that the Contractor needs to follow in order for the Contractor and all others to comply with all applicable laws and regulations.

.4 Contractor to comply with and enforce compliance by workers of Contract Documents, applicable Federal, Territorial, and Local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan and Manual and all other specific City of Iqaluit requirements.

.5 The Contractor shall designate a qualified and experienced safety representative at the Site.

1.3 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Shop Drawings and Submittals.

.2 Submit site-specific Health and Safety Plan to the City of Iqaluit: within seven days after date of Notice to Proceed, prior to commencement of the Work. Health and Safety Plan and Manual shall include:

.1 Results of site-specific safety hazard assessment, and

.2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

.3 Submit electronic copies of Contractor's authorized representative's work site health and safety inspection reports to the City of Iqaluit and authority having jurisdiction, weekly.

.4 Submit copies of reports or directions issued by Federal and Territorial health and safety inspectors.

.5 Submit copies of incident and accident reports.

.6 Contractor to maintain up to date WHMIS SDS – Safety Data Sheets on Site in an area accessible to working staff and the City of Iqaluit.

.7 The City of Iqaluit will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within fifteen (15) business days of receipt. Revise plan as appropriate and resubmit plan to the City of Iqaluit for acceptance.

.8 The City of Iqaluit's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.9 Medical Surveillance: where prescribed by legislation, regulation, or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to the City of Iqaluit; and

.10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.4 Filing of Notice

.1 File Notice of Project with Territorial authorities prior to commencing Work and provide a copy to the City of Iqaluit. Notice of Project to be posted on Site upon mobilization and remain posted until project completion.

1.5 Safety Assessment and Meetings

.1 Perform site specific safety hazard assessment related to project.

.2 Schedule and administer Health and Safety meeting with staff and the City of Iqaluit prior to commencement of Work.

.3 Do Work in accordance with Regulatory Requirements.

1.6 Unforeseen Hazards

.1 When unforeseen or peculiar safety-related factors, hazards, or conditions occur during performance of the Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Territory having jurisdiction and advise the City of Iqaluit verbally and in writing.

1.7 Correction of Non-Compliance

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by the City of Iqaluit.

.2 Provide the City of Iqaluit with written report of action taken to correct non-compliance of health and safety issues identified.

.3 The City of Iqaluit may stop Work if non-compliance of health and safety regulations is not corrected.

.4 The City of Iqaluit will not be responsible for monitoring health and safety compliance. The Contractor is solely responsible for conformance to OH&S regulations.

1.8 Fire Safety Requirements

.1 Comply with requirements of NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations, latest edition.

.2 Comply with local standards and regulations including any requirements set by the Nunavut Fire Marshal's Office (NFMO).

1.9 Overloading

.1 Ensure no part of Work is subjected to a load which will endanger its safety or will cause permanent deformation.

1.10 Falsework

.1 Design and construct falsework in accordance with CSA S269.1, latest edition.

.2 All falsework design shall be certified by a Professional Engineer registered, and in good standing, with the Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists (NAPEG).

1.11 Scaffolding

.1 Design and construct scaffolding in accordance with CSA S269.2 M87, latest edition.

.2 The Shop Drawings shall be submitted to the City of Iqaluit and shall include Detail Drawings and Design Calculations for scaffolding. The City of Iqaluit will not be responsible for review of scaffolding.

.3 The Detail Drawings and Design Calculations for scaffolding shall bear the signature and stamp of a Professional Engineer registered, and in good standing, with NAPEG and experienced in scaffolding design.

.4 The Professional Engineer, whose signature and seal appear on the Detail Design Drawings and Design Calculations, shall inspect and check the completed scaffolding and certify in writing that the scaffolding is in accordance with Calculations and Drawings; certification in writing shall be submitted to the City of Iqaluit.

.5 The scaffolding shall be re-inspected after any change in detail or placement to ensure that it is properly placed, rigid, and secure before commencing Work. Each re-inspection will be certified by the Professional Engineer whose signature and seal appear on the Calculations and Drawings.

.6 Submit such certifications to the City of Iqaluit before commencing Work.

1.12 Materials on Site

.1 Comply with WHMIS requirements regarding all materials stored on Site. Submit Safety Data Sheets to the City of Iqaluit prior to shipping materials.

1.13 Confined Space Entry

.1 In a confined space in which there is likely to exist hazardous gas, vapor, dust, fumes, or oxygen deficiency, the worker must first test and record atmospheric conditions in the confined space, wear breathing apparatus and safety harness when entering, and monitor atmosphere at all times while working in the confined space.

.2 At no time will a worker enter a confined space where a hazardous condition exists, without first notifying the supervisor and following the adopted procedure.

.3 The following procedures shall apply to all confined spaces and/or areas where a potential hazard could exist:

.1 Do not enter confined space areas where the safety equipment supplied is not suitable or available.

.2 Comply with Regional Safety Specifications.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

.1 Not used.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 Environmental Protection Plan (EPP)

.1 Prior to any construction or on-site Work activities, the Contractor shall develop and submit to the City of Iqaluit a comprehensive and project specific EPP for the City of Iqaluit's review and approval.

.2 Allow ten (10) business days for the City of Iqaluit to review the EPP and each subsequent revision, if required.

.3 The City of Iqaluit may request that subsequent revisions are made to the EPP in the event the document does not sufficiently address all required environmental concerns or mitigations.

.4 Installation of mitigation measures, construction Works, and delivery of any materials or equipment to Site shall not commence without an approved EPP.

.5 The EPP shall describe the Contractor's site-specific environmental protection actions and responsibilities during project implementation.

.6 The EPP shall include comprehensive overview of known or potential environmental issues to be addressed during construction.

.7 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.8 At a minimum, the EPP shall include the following:

.1 Names of persons responsible for ensuring adherence to the Environmental Protection Plan.

.2 Names and qualifications of persons responsible for identifying hazardous waste to be removed from Site.

.3 Names and qualifications of persons responsible for training Site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 A complete list of anticipated vehicles, equipment, and materials.

.6 The current Project Schedule.

.7 Work Area Site Plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.

.1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized Work areas.

.2 Plan to include all proposed parking, staging, laydown, and refueling areas.

.3 Plan to include 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.

.4 Plan to include locations of stationary Fire Control equipment.

.8 Hazardous Waste Management and Contaminant Prevention Plan.

.9 Non-Hazardous Solid Waste Disposal Plan.

.10 Air Pollution Control Plan.

.11 Wastewater Management Plan.

.12 Spill Response Plan to include procedures, instructions, and reports to be used in the event of an unforeseen spill of a regulated substance.

.13 Emergency Response Plan in accordance with the Occupational Health and Safety Act.

.14 Dewatering Plan.

.15 Traffic Management Plan.

1.2 Notification

.1 The City of Iqaluit will have the right to notify the Contractor in writing of any observed noncompliance with Federal, Territorial, or Municipal environmental laws or regulations, permits, and other elements of the Contractor's Environmental Protection Plan.

.2 The Contractor is responsible for monitoring and ensuring compliance with Federal, Territorial, and Municipal environmental laws and regulations, permits, and other elements of Contractor's Environmental Protection Plan. Notification by the City of Iqaluit is a courtesy only and shall not be relied upon.

.3 After notification or observation of any noncompliance, inform the City of Iqaluit of proposed corrective actions.

.4 Take action only after receipt of written approval from the City of Iqaluit, unless immediate action is necessary to prevent further noncompliance.

.5 The City of Iqaluit may issue a stop work order until satisfactory corrective action has been taken.

.6 No time extensions or payment adjustments will be allowed for such suspensions.

1.3 Fires

.1 A fire extinguisher shall be carried and available for use on each machine or vehicle in the event of any fire to prevent the fire from burning the unit or spreading to other fuels in the immediate area.

.2 Machinery and equipment shall be operated in accordance with all original manufacturer's safety devices to prevent ignition of flammable materials in the area.

.3 Care shall be taken when extinguishing or disposing of any potential fire ignition source.

.4 In case of fire, the Contractor (or any staff present) shall follow their own Emergency Response Plan and take immediate action to extinguish the fire provided it is safe to do so and will notify the local fire department and the City of Iqaluit immediately.

.5 Any fire or burning of waste materials is not permitted.

1.4 Disposal of Wastes

.1 Do not bury rubbish or waste materials on Site unless approved by the City of Iqaluit.

.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil, or paint thinner into waterways, storm sewers, or sanitary sewers.

1.5 Drainage

.1 Develop and submit with the EPP a Dewatering Plan indicating procedures for dewatering the groundwater from the identified excavation during construction.

.2 Develop and submit with the EPP a Traffic Management Plan including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.

.3 Provide temporary drainage and pumping as necessary to keep excavations and Site free from water.

.4 Ensure pumped water into waterways, sewers, or drainage systems is free of suspended materials.

.5 Control disposal or runoff of water containing suspended materials or other harmful substances with use of siltation fences, sedimentation ponds, diversion ditches, silt curtains, sedimentation blankets, slope stabilization, and the like, all in accordance with required environmental regulations and permits.

1.6 Site Clearing and Plant Protection

.1 Protect trees and plants on Site and on adjacent properties.

.2 Minimize stripping of topsoil and vegetation.

.3 Minimize disruption to active layer.

.4 Restrict tree removal to areas indicated or designated by the City of Iqaluit.

1.7 Work Adjacent to Waterways

.1 Do not operate construction equipment in waterways.

.2 Do not use waterway beds for borrow material.

.3 Do not dump excavated fill, waste material, or debris into waterways.

.4 Design and construct temporary crossings to minimize erosion to waterways.

.5 Do not skid logs or construction materials across waterways.

.6 No concrete debris, paint, collected debris from pier/abutment caps, or other foreign materials shall be permitted to enter any watercourse.

1.8 Pollution Control

.1 Maintain all temporary erosion and pollution control features installed under this Contract.

.2 Develop and submit with the EPP a Hazardous Waste Management and Contaminant Prevention Plan identifying potentially hazardous substances to be used on job Site, intended actions to prevent introduction of such materials into air, water, or ground, and detailing provisions for compliance with Federal, Territorial, and Municipal laws and regulations for storage and handling of these materials.

.3 Develop and submit with the EPP a Non-Hazardous Solid Waste Disposal Plan identifying methods and locations for solid waste disposal including clearing debris.

.4 Develop and submit with the EPP an Air Pollution Control Plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project Site.

.5 Develop and submit with the EPP a Wastewater Management Plan identifying methods and procedures for management and discharge of wastewater which is directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of groundwater, disinfection water, hydrostatic test water, and water used in the flushing of lines.

.6 Control emissions from equipment and plant to local authorities' emission requirements.

.7 Prevent sandblasting and other extraneous materials from contaminating air beyond application area by providing temporary enclosures.

.8 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.9 Additional Mitigation Measures

.1 All Work and associated costs related to required environmental mitigation measures are incidental to the Contract scope of Work and are the responsibility of the Contractor.

.2 Work shall be scheduled so that no site is left in a state of partial completion for an extended period of time or during any shutdown period such as during winter months.

.3 All disturbed areas from construction activities require rehabilitation as part of the Contract. Erosion of steep banks shall be minimized by limiting foot, vehicle, and equipment traffic.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

.1 Not used.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 Summary

.1 This Section references laws, by-laws, ordinances, rules, regulations, codes, orders of Authority Having Jurisdiction, and other legally enforceable requirements applicable to Work and that are; or become, in force during performance of Work.

1.2 References to Regulatory Requirements

.1 Perform Work in accordance with National Building Code of Canada (NBCC), latest edition, including amendments up to tender closing date and other codes of Territorial and Local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Specific design and performance requirements listed in specifications or indicated on Drawings may exceed minimum requirements established by referenced Building Code; these requirements will govern over the minimum requirements listed in Building Code.

1.3 Hazardous Material Discovery

.1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop Work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition Work. Notify the City of Iqaluit.

.2 Polychlorinated Biphenyl (PCB): stop Work immediately when material resembling PCB is encountered during demolition Work. Notify the City of Iqaluit.

.3 Mold: stop Work immediately when material resembling mold is encountered during demolition Work. Notify the City of Iqaluit.

1.4 Building Smoking Environment

.1 Comply with smoking restrictions and Municipal by-laws.

1.5 Regulatory Requirements

.1 Except as otherwise specified, the Contractor shall apply for, obtain, and pay fees associated with permits, licenses, certificates, and approvals required by regulatory requirements and Contract Documents, based on General Conditions of Contract and the following:

.1 Regulatory requirements and fees in force on date of Bid submission.

.2 A change in regulatory requirements or fees scheduled to become effective after date of tender submission and of which public notice has been given before date of tender submission.

PART 2 PRODUCTS

2.1 Permits and Licenses

.1 The Contractor shall apply for, obtain, pay for, and comply with all required construction and equipment permits as required by relevant Local and regional authorities which may include, but not be limited to:

.1 Development Permit

.2 Building Permit

.3 Electrical Permit

.4 Quarry Permit

.5 Boiler Permit

.6 Occupancy Permit

.1 The Contractor shall apply for, obtain, and pay for occupancy permits, including partial occupancy permits where required by authority having jurisdiction.

.2 The City of Iqaluit shall issue appropriate instructions to Contractor for correction to Work where Contract Document deficiencies are required to be corrected in order to obtain occupancy permits, including partial occupancy permits.

.3 The Contractor shall correct deficiencies in accordance with the City of Iqaluit's instructions. Where deficiency is not corrected, the City of Iqaluit reserves the right to make corrections and charge the Contractor for costs incurred.

.4 The Contractor shall turn occupancy permits over to the City of Iqaluit.

PART 3 EXECUTION

.1 Not used.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 33 00 – Shop Drawings and Submittals.

1.2 Testing by the Contractor

.1 Testing required to provide quality control to assure that the Work strictly complies with the Contract requirements shall include, but not be limited to:

.1 Testing all concrete, grout, reinforcing steel, asphalt concrete pavement, structural backfill, miscellaneous metals, and all source acceptance testing.

.2 All testing specified in the Contract Documents.

.3 Any other testing required as a condition for deviation from the specified Contract procedures.

.2 All Quality Control technicians are to be certified by Canadian Council of Independent Laboratories (CCIL) for testing asphalt, aggregates, and concrete, as applicable to the testing requirements for that item of Work.

.3 The Contractor shall be fully responsible and bear all costs for all quality control testing and shall conduct such testing in the following manner:

.1 Provide testing facilities and personnel for the tests and inform the City of Iqaluit in advance to enable the City of Iqaluit to witness the tests if they so desired.

.2 Notify the City of Iqaluit when sampling will be conducted.

.3 Within one Day after completion of testing, submit test results to the City of Iqaluit.

.4 Identify test reports with the name and address of the organization performing all tests and the date of the tests.

.5 Approval of tested samples will be for characteristics or use named in such approval and shall not change or modify any Contract requirements.

.6 Testing agencies, their inspectors, and their representatives are not authorized to revoke, alter, relax, enlarge, or release any requirement of the Contract Documents, nor to approve or accept any part of the Work.

1.3 Inspection

.1 Allow the City of Iqaluit access to the Work. If part of the Work is in preparation at locations other than the Place of Work, allow access to such Work whenever it is in progress.

.2 Give at least 48 hours' notice requesting inspection if Work is designated for special tests, inspections, or approvals by the City of Iqaluit's instructions, or law of Place of Work.

.3 If Contractor covers, or permits to be covered, Work that has been designated for special tests, inspections, or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed, and make good such Work.

.4 The City of Iqaluit shall order part of the Work to be examined if the Work is suspected to not be in accordance with the Contract Documents. If, upon examination, such Work is found to not be in accordance with the Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found to be in accordance with the Contract Documents, the City of Iqaluit shall pay cost of examination and replacement.

1.4 Contractor's Quality Control Program

.1 The Contractor shall prepare a Quality Control Program. The purpose of the program shall be to ensure the performance of the Work in accordance with the Contract requirements.

.2 The Quality Control Program shall be described in a Quality Control Plan. The Contractor shall submit the Plan to the City of Iqaluit for review in accordance with Section 01 33 00 – Shop Drawings and Submittals. The Plan shall develop a logical system for tracking and documenting the Quality Control of the Work. A systematic format and a set of procedures patterned on a recognized Quality Control Standard may be acceptable, subject to review by the City of Iqaluit.

.3 The Quality Control Plan shall include the following information:

.1 Distribution list, providing a list of names to whom the Plan shall be distributed.

.2 Title page, identifying the Contract and Contractor.

.3 Revision page, identifying the revision number and date of the Plan.

.4 Table of contents.

.5 Revision control, tabulating the revision number, date of revision, description of revisions, and authorized signature.

.6 Details of measuring and testing equipment including methods and frequency of calibration.

.7 Purchasing details of all materials and equipment including procurement documents and vendor's Quality Control Program standards.

.8 Procedures for inspection of incoming items, in-process inspection, and final inspection and tagging of all supply items.

.9 Details of special processes as identified by the City of Iqaluit, including qualifications of personnel and certification.

.10 Procedures for shipping, packaging, and storage of materials.

.11 Procedures for maintaining quality records and Statements of Compliance, including filing and storage of documents for a period of one year after Completion of the Works.

.12 Details of any non-conformance, including identification and recording of deficiencies, tagging procedures for "HOLD" or "REJECT" items, and final disposition of non-conformance forms by the Quality Control Manager.

.13 Inspection and test checklists, including tabulated checklists describing all manufacturing and delivery activities such as Inspection or Test, frequency of tests, description of tests, acceptance criteria of tests, such as verification, witnessing, or holding tests, and sign-off by the Quality Control Manager and the City of Iqaluit, if the City of Iqaluit witnesses the tests.

.14 Forms used to ensure the application of the inspection and test checklist requirements. These forms shall be identified in the checklists and describe all testing requirements for Contract Document compliance.

.4 The Contractor shall appoint a qualified and experienced project team member as the Quality Control Manager dedicated to quality matters and who will report regularly to the Contractor's management at a level that shall ensure that Quality Control requirements are not subordinated to manufacturing, construction, or delivery. The Quality Control Manager shall be empowered to resolve quality matters expediently and report to the City of Iqaluit as required.

.5 The Quality Control Plan shall include samples of all forms to be filled in by the Quality Control Inspectors. All forms shall be signed by the Quality Control Manager and submitted promptly to the City of Iqaluit who will add their review signature.

.6 An independent check of all Work shall be performed by the Contractor. The Contractor shall appoint Quality Control Inspectors to ensure compliance of products and workmanship with Contract requirements.

.7 At completion of the Work, a bound and itemized copy of all Quality Control documents and reports shall be prepared by the Contractor's Quality Manager and submitted to the City of Iqaluit.

1.5 Independent Inspection Agencies

.1 Independent Inspection/Testing Agencies shall be engaged by the Contractor for the purpose of inspecting and/or testing the Work. The cost of such services shall be borne by the Contractor.

.2 The following items require independent inspection/testing:

.1 Aggregate Source Approval, in accordance with Section 31 05 16 - Aggregates.

.2 Compaction Testing, in accordance with Section 31 23 33.01 - Trenching and Backfilling.

.3 Compaction Testing, in accordance with Section 32 11 23 - Roadway Grading.

.3 Provide equipment required for executing inspection and testing by appointed agencies.

.4 Employment of inspection/testing agencies does not relax the Contractor's responsibility to perform the Work in accordance with the Contract Documents.

.5 If defects are revealed during inspection and/or testing, the appointed agency shall request additional inspection and/or testing to ascertain the full degree of the defect. The Contractor shall correct defects and irregularities as advised by the City of Iqaluit. The Contractor shall pay the costs for retesting and re-inspection.

1.6 Access to Work

.1 Allow inspection/testing agencies access to the Work and off site manufacturing and fabrication plants.

.2 Cooperate to provide reasonable facilities for such access.

1.7 Procedures

.1 Notify the appropriate agency and the City of Iqaluit in advance of the requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in the Work.

.3 Provide labour and facilities to obtain and handle samples and materials on Site. Provide sufficient space to store and cure test samples.

1.8 Rejected Work

.1 Remove defective Work, whether result of poor workmanship, use of defective products, or damage and whether incorporated into the Work or not, which has been rejected by the City of Iqaluit as failing to conform to the Contract Documents. Replace or re-execute in accordance with the Contract Documents.

.2 Make good other Contractor's Work damaged by such removals or replacements promptly.

1.9 Reports

.1 Submit electronic copies of inspection and test reports to the City of Iqaluit.

.2 Provide copies to sub-contractor, manufacturer, or fabricator of Work being inspected or tested.

1.10 Tests and Mix Designs

.1 Furnish test results and mix designs as requested.

.2 Cost of tests and mix designs beyond those called for in the Contract Documents or beyond those required by law of Place of Work will be appraised by the City of Iqaluit and may be authorized as recoverable.

1.11 Mock-Ups

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.

.2 Construct in locations acceptable to the City of Iqaluit.

.3 Prepare mock-ups for the City of Iqaluit's review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 If requested, the City of Iqaluit will assist in preparing schedule fixing dates for preparation.

.6 Remove mock-up at conclusion of the Work or when acceptable to the City of Iqaluit .

.7 Mock-ups may remain as part of the Work.

.8 Specification Section identifies whether mock-up may remain as part of the Work or if it is to be removed and when.

1.12 Mill Tests

.1 Submit mill test certificates as required in relevant specification Section or as requested by the City of Iqaluit.

1.13 Equipment and Systems

.1 Submit adjustment and balancing reports for mechanical, electrical, and building equipment systems.

.2 Refer to relevant Sections for definitive requirements.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

.1 Not used.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 56 00 - Temporary Barriers and Enclosures.

1.2 Reference Standards

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.189, Exterior Alkyd Primer for Wood.

.2 CAN/CGSB-1.59, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA Group)

.1 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CSA O121, Douglas Fir Plywood.

.3 CSA S269.2, Access Scaffolding for Construction Purposes.

.4 CSA Z321, Signs and Symbols for the Workplace

1.3 Installation and Removal

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area, and details of fence installation.

.2 Identify areas which have to be graveled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

.4 Provide construction facilities in order to execute Work expeditiously.

.5 Remove from Site all such Work after use.

1.4 Scaffolding

.1 Scaffolding shall be in accordance with CSA S269.2.

.2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms, temporary stairs, and any other equipment required to safely access and complete the Work.

1.5 Hoisting

.1 Provide, operate, and maintain hoists and cranes required for moving of workers, materials, and equipment. Make financial arrangements with Sub-contractors for use thereof.

.2 Hoists and cranes shall be operated by qualified operator.

1.6 Site Storage/Loading

.1 Confine Work and operations of workers by the Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load, or permit to be loaded, any part of the Work with a weight or force that will endanger the Work.

1.7 Construction Parking

.1 Parking will be permitted on Site provided it does not disrupt performance of the Work.

.2 Provide and maintain adequate access to Project Site.

.3 Build and maintain temporary roads where indicated and provide snow removal during period of the Work.

.4 If authorized to use existing roads for access to Project Site, maintain such roads for the duration of the Contract and make good damage resulting from the Contractors' use of roads.

1.8 Security

.1 Provide Site security measures as required to protect the Work, and as agreed by the City of Iqaluit.

.2 Any City of Iqaluit facilities need to remain a secure facility at all times throughout construction. Provide necessary security to ensure the safety of the existing infrastructure.

1.9 Equipment, Tools, and Materials Storage

.1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment, and materials.

.1 This includes space conditioning (heating and cooling) as required for proper storage of equipment as per the manufacturer’s requirements.

.2 Locate materials not required to be stored in weatherproof sheds on Site in a manner to cause the least interference with Work activities.

1.10 Temporary Camp Facilities

.1 The electrical installation for temporary camp facilities shall conform to the National Building Code of Canada.

.2 The Contractor shall provide drawings and specifications for temporary camp facilities to the City of Iqaluit for review prior to shipping the structures to the Site.

1.11 Sanitary Facilities

.1 Provide dedicated sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.12 Construction Signage

.1 Review any proposed signage with the City of Iqaluit in advance or erecting any signage.

.2 Provide and erect, as approved by the City of Iqaluit, a project sign in a location designated by the City of Iqaluit.

.3 Construction sign of wood frame and plywood construction painted with exhibit lettering produced by a professional sign painter.

.4 No other signs or advertisements, other than warning signs, are permitted on Site.

.5 Signs and notices for safety and instruction shall be in all official languages. Graphic symbols shall conform to CSA Z321.

.6 Maintain approved signs and notices in good condition for the duration of the Project and dispose of off-site on completion of project or earlier if directed by the City of Iqaluit.

1.13 Protection and Maintenance of Traffic

.1 Provide measures for protection and diversion of traffic, including provision of watchpersons and flag-persons, erection of barricades, placing of lights around and in front of equipment and Work, and erection and maintenance of adequate warning, danger, and direction signs.

.2 Protect travelling public from damage to person and property.

.3 Contractor's traffic on roads selected for hauling material to and from Site to interfere as little as possible with public traffic.

.4 Verify adequacy of existing roads and allowable load limit on these roads. The Contractor shall be responsible for repair of damage to roads caused by construction operations.

.5 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.6 Dust control: adequate to ensure safe operation at all times.

.7 Provide snow removal during period of Work as required to carry out the works safely.

1.14 Clean-up

.1 Remove construction debris, waste materials, and packaging material from Site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTON

.1 Not used.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Informational and Warning Devices.

.2 Protection and Control of Public Traffic.

.3 Operational Requirements.

1.2 Related Sections

.1 Section 01 52 00 – Construction Facilities

.2 Section 31 24 13 – Roadway Embankments

1.3 Reference Standards

.1 Manual of Uniform Traffic Control Devices for Canada, (MUTCDC), latest edition, Transportation Association of Canada (TAC).

.2 Workers' Safety and Compensation Commission (WSCC) Traffic Control Plan requirements.

1.4 TRAFFIC CONTROL PLAN (TCP)

.1 Prior to commencing Work within any existing right -of-way, and at least fifteen (15) days in advance of the proposed implementation of the traffic control measures, the Contractor shall submit (in PDF format) detailed traffic plans for all proposed lane closures, diversions, etc. to the City of Iqaluit, that will impact normal traffic movements. Traffic detours shall be applicable to through traffic movements only. The Contractor shall provide adequate means whereby access is maintained to properties fronting on closed sections of streets. No Work will be permitted until after the traffic plans have been submitted and approved by the City of Iqaluit.

.2 The TCP shall clearly outline the Contractor's strategy for accommodation of motor vehicles and pedestrians throughout construction. The TCP shall include:

.1 Figures showing planned detour routes for motor vehicles and pedestrians.

.2 Figures showing the type of signage and barricades and the signage and barricade location for each work zone, detour, or closure. For any specific work area, if there is no variance from the latest version of MUTCDC, the

figure may simply reference the appropriate Figure number within the latest version of MUTCDC.

.3 Figures showing project phasing and proposed schedule.

.4 The expected duration of road closures, path closures, and detours.

.5 Measures the Contractor intends to take to notify the public of detours and closures.

.6 Measures the Contractor intends to take to monitor the effectiveness of signage.

.3 The City of Iqaluit may reject the TCP if it is generic, incomplete, contains errors or if the strategy is not in accordance with the latest version of MUTCDC.

1.5 Detours

.1 Provide and maintain signage and barricades necessary to direct traffic around routes blocked by construction. MUTCDC shall be followed as a guideline.

.2 All signage and barricades shall be maintained and cleaned daily. Missing signs shall be replaced immediately.

.3 Type and size of detour signage shall be approved by the City of Iqaluit.

.4 The Contractor must provide fourteen (14) calendar days notice, to all businesses and residents in the area to be affected by detours and road closures, in advance of all planned disruptions to access. Notice shall be given in writing.

.5 Procedures for effecting detours and/or public traffic flow disruption shall be as follows:

.1 The Contractor shall propose method of traffic signage and control to the City of Iqaluit.

.2 The City of Iqaluit shall review proposal and, when satisfied, make recommendation to the City of Iqaluit.

.3 The City of Iqaluit shall approve, modify, or reject the proposal.

.6 Once proposal is approved, the City of Iqaluit will arrange radio advertisements, and advise the Fire Department, Municipal Enforcement, and the RCMP of the traffic control methods the Contractor will follow.

.7 The Contractor shall effect the detour and/or public traffic flow disruption on the day following the radio advertisements.

.8 For all road closures:

.1 Notification to be provided to the City of Iqaluit of all road and lane closures 48 hours prior to the closure. The notification is for a City of Iqaluit working day. Example, notification on Friday will allow for a closure on Monday (or Tuesday on a holiday Monday) at the same hour of the day that the notification is given.

.2 Closure only applies to areas where use of flagpersons is required for maintaining two-way traffic.

.9 The Contractor shall assign a representative on the Site to oversee barricades, signage, and traffic control.

.10 The City of Iqaluit will, if necessary, allow the closure of portions of roadways affected by the proposed Work for construction purposes. The City of Iqaluit may require that only these streets shall be closed at any time. Local traffic to apartments, businesses, and houses shall be maintained.

.11 The Contractor shall schedule Work such that only one (1) intersection is closed to vehicle traffic at any one time. Roadway closures require the Fire Chief's approval.

1.6 Public Traffic Flow

.1 Provide and maintain flagspersons, traffic signals, barricades, and flares/lights/lanterns as required to direct the flow of equipment used in performance of the Work and to protect public traffic. Make arrangements with local governing authorities when these facilities will disrupt the normal flow of public traffic.

.2 Unless otherwise authorized, organize working area such that two-way traffic flow is possible at all times.

.3 Provide detailed sketches of proposed signage plans and traffic flow patterns to the City of Iqaluit for approval at least fourteen (14) calendar days in advance of any modifications to existing conditions.

1.7 Protection of Public Traffic

.1 Comply with requirements of Acts, Regulations, and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.

.2 When working on travelled way:

.1 Place equipment in position to present minimum of interference and hazard to traveling public.

.2 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.

.3 Do not leave equipment on travelled way overnight.

.4 Do not close any lanes of road without approval of the City of Iqaluit. Before rerouting traffic, erect suitable signs and devices.

.5 Keep travelled way graded, free of potholes, and of sufficient width for required number of lanes of traffic.

.3 Provide minimum 7 m wide temporary roadway for traffic in two-way sections through Work and on detours.

.4 Provide minimum 5 m wide temporary roadway for traffic in one-way sections through Work and on detours.

.5 At a minimum, provide gravelled detours or temporary roads to facilitate passage of traffic around restricted construction area.

.6 Provide and maintain road access and egress to property fronting along the Work under the Contract and in other areas as required, unless other means of road access exist that meet the approval of the City of Iqaluit.

.7 The Contractor shall maintain continuous, safe, and accessible pedestrian pathways around or through the Work zone in accordance with the latest version of Ontario Traffic Manual Book 7, Temporary Conditions. All temporary detours, walkways, and ramps shall feature non-slip surfaces, continuous handrails where hazards exist, and gentle gradients suitable for mobility devices. Unauthorized closure or obstruction of pedestrian routes shall be subject to immediate correction at the Contractor's expense.

1.8 Informational and Warning Devices

.1 Provide and maintain signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.

.2 Supply and erect signs, delineators, barricades, and miscellaneous warning devices as specified in the MUTCDC.

.3 Place signs and other devices in locations recommended in the MUTCDC.

.4 Meet with the City of Iqaluit prior to commencement of Work to prepare a list of signs and other devices required for the Project. If situations on Site change, revise list to the approval of the City of Iqaluit.

.5 Continually maintain traffic control devices in use by:

.1 Checking signs daily for legibility, damage, suitability, and location. Clean, repair, or replace to ensure clarity and reflectance.

.2 Removing or covering signs which do not apply to conditions existing from day to day.

.6 The Contractor shall provide notice letters to local residents advising of playground closures, pathway closures, and pathway detours. Notice letters shall include the anticipated effective dates for closures and detours.

1.9 Control of Public Traffic

.1 Provide competent flagpersons, trained in accordance with, and properly equipped as specified in, the MUTCDC in the following situations:

.1 When public traffic is required to pass working vehicles or equipment which block all or part of the travelled roadway.

.2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high, and traffic signal system is not in use.

.3 When work crews or equipment are employed on travelled way over brow of hills, around sharp curves, or at other locations where oncoming traffic would not otherwise have adequate warning.

.4 Where temporary protection is required while other traffic control devices are being erected or taken down.

.5 For emergency protection when other traffic control devices are not readily available.

.6 In situations where complete protection for workers, working equipment, and public traffic is not provided by other traffic control devices.

.7 Delays to public traffic due to Contractor's operations: maximum 15 min.

.2 Where roadway, carrying two-way traffic, is to be restricted to one lane, for 24 hours each day, provide portable traffic signal system. Adjust, as necessary, and

regularly maintain system during period of restriction. Submit timing signal pattern for the City of Iqaluit's review and approval.

1.10 Emergency Service Access and Notification

.1 The Contractor shall maintain continuous, unobstructed 24/7 access for all emergency response vehicles—including fire, police, and ambulance services—to all properties, structures, and public roadways throughout the duration of the Work.

.2 The Contractor shall ensure that active travel lanes maintain a minimum clear width suitable for standard emergency response vehicles at all times, unless an alternative emergency routing plan has been approved in writing by the City of Iqaluit and local emergency response agencies.

.3 Where construction operations necessitate temporary access disruptions, single-lane closures, or road width reductions below standard emergency response widths, the Contractor shall provide written notification to the City of Iqaluit, Fire Chief, ambulance authority and police a minimum of twenty-four (24) hours in advance of each occurrence.

.4 Daily written notifications shall detail the specific locations, start and end times, clear lane widths, and proposed detour routes. No road closure or width reduction shall take place without prior confirmation of receipt from all emergency service agencies.

1.11 Operational Requirements

.1 Maintain existing conditions for traffic throughout period of Contract except that, when required for construction under Contract and when measures have been taken as specified herein and approved by the City of Iqaluit to protect and control public traffic, existing conditions for traffic to be restricted as follows:

.1 Construction zone speed limit of 30 km/h at all times.

.2 Maintain existing conditions for traffic crossing right-of-way except when required for construction.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

.1 Not used.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 Installation and Removal

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from Site all such work after use.

1.2 Hoarding

.1 Erect hoarding around entire perimeter of Site within reasonable distance from buildings as required to facilitate construction and to protect the public, workers, and public and private property from injury or damage and to the approval of the authority having jurisdiction. Ensure hoarding does not interfere with other construction activities on Site.

.2 Locate all construction trailers, garbage bins, equipment, tools and the like, within the confines of the exterior hoarding.

.3 Remove barriers prior to completion and final acceptance. Patch and repair surfaces damaged by erection of barriers to original condition.

.4 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.3 Trenching

.1 All open trenches shall be protected through the use of barricades, such as jersey barriers at a minimum, when the Contractor is not on Site.

1.4 Guard Rails and Barricades

.1 Provide secure, rigid guard rails and barricades around open edges of floors and roofs.

.2 Provide as required by governing authorities.

1.5 Weather Enclosures

.1 Provide weather tight closures to unfinished door and window openings, tops of shafts, and other openings in floors and roofs.

.2 Close off floor areas where walls are not finished, seal off other openings, enclose building interior work for temporary heat.

.3 Design enclosures to withstand wind pressure and snow loading.

1.6 Dust Tight Screens

.1 Provide dust tight screens or insulated partitions to localize dust generating activities and for protection of workers, finished areas of the Work, and the public.

.2 Maintain and relocate protection until such Work is complete.

1.7 Access to Site

.1 Provide and maintain access roads as may be required for access to the Work.

1.8 Public Traffic Flow

.1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform the Work and protect the public.

1.9 Fire Routes

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.10 Protection for Off-Site and Public Property

.1 Protect adjacent private and public property from damage during performance of the Work.

.2 Be responsible for damages incurred.

1.11 Protection of Building Finishes

.1 Provide protection for finished and partially finished building finishes and equipment during performance of the Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with the City of Iqaluit the locations and installation schedule three (3) days prior to installation.

.4 Be responsible for damages incurred due to lack of or improper protection.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

.1 Not used.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 Reference Standards

.1 Within each specifications Section, reference may be made to reference standards.

.2 Conform to these reference standards, in whole or in part, as specifically requested in the specifications.

.3 If there is question as to whether products or systems are in conformance with applicable standards, the City of Iqaluit reserves the right to have such products or systems tested to prove or disprove conformance.

.4 Cost for such testing shall be borne by the City of Iqaluit in event of conformance with Contract Documents or by the Contractor in the event of non-conformance.

1.2 Quality

.1 Products, materials, equipment, and articles incorporated in the Work shall be new, not damaged or defective, and of the best quality for the purpose intended. If requested, furnish evidence as to type, source, and quality of products provided.

.2 Defective products, whenever identified prior to completion of the Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Should disputes arise as to quality or fitness of products, decision rests strictly with the City of Iqaluit based upon the requirements of the Contract Documents.

.4 Unless otherwise indicated in the specifications, maintain uniformity of manufacture for any particular or like item throughout the Work.

.5 Permanent labels, trademarks, and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 Availability

.1 Immediately upon signing the Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify the City of Iqaluit of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of the Work.

.2 In the event of failure to notify the City of Iqaluit at commencement of the Work, and should it subsequently appear that the Work may be delayed for such reason, the City of Iqaluit reserves the right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 Storage, Handling, and Protection

.1 Handle and store products in a manner to prevent damage, adulteration, deterioration, and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in the Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from Site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of the City of Iqaluit.

.9 Touch-up damaged factory finished surfaces to the City of Iqaluit's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.5 Transportation

.1 Pay costs of transportation of products required in performance of the Work.

1.6 Manufacturer's Instructions

.1 Unless otherwise indicated in the specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify the City of Iqaluit in writing, of conflicts between specifications and manufacturer's instructions, so that the City of Iqaluit can establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes the City of Iqaluit to require removal and reinstallation at no increase in Contract Price or Contract Time.

1.7 Quality of Work

.1 Ensure the Quality of Work is of the highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify the City of Iqaluit if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. The City of Iqaluit reserves the right to require dismissal from Site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with the City of Iqaluit, whose decision is final.

1.8 Coordination

.1 Ensure cooperation of workers in laying out the Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves, and accessories.

1.9 Concealment

.1 In finished areas, conceal pipes, ducts, and wiring in floors, walls, and ceilings, except where indicated otherwise.

.2 Before installation, inform the City of Iqaluit if there is interference.

1.10 Remedial Work

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of the Work.

1.11 Location of Fixtures

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform the City of Iqaluit of conflicting installation. Install as directed.

1.12 Fastenings

.1 Provide metal fastenings and accessories in same texture, colour, and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive, hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Use No. 304 stainless steel fasteners for interior Work.

.5 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material, plugs are not acceptable.

.6 Keep exposed fastenings to a minimum, space evenly, and install neatly.

.7 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.13 Fastenings – Equipment

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished, unless otherwise specified. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal, and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.14 Protection of Work In-Progress

.1 Prevent overloading of parts of building. Do not cut, drill, or sleeve load bearing structural member, unless specifically indicated without written approval of the City of Iqaluit.

1.15 Existing Utilities

.1 When breaking into or connecting to existing services or utilities, execute the Work at times directed by local governing authorities, with minimum disturbance to the Work, pedestrians, and vehicular traffic.

.2 Protect, relocate, or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

.1 Not used.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

.1 This specification covers the requirements for geotextiles for soil stabilization.

PART 2 PRODUCTS

.1 All unprocessed materials shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works (OPS), Volume 7, OPSS.MUNI.517 and associated OPS drawings, as published by the Ministry of Ontario.

PART 3 EXECUTION

.1 Execution shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works (OPS), Volume 7, OPSS.MUNI.517, and associated OPS drawings, as published by the Ministry of Ontario.

PART 4 BASIS FOR PAYMENT

.1 Measurement and payment shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works (OPS), Volume 7, OPSS.MUNI.517, and associated OPS drawings, as published by the Ministry of Ontario.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 74 19 - Construction/Demolition Waste Management and Disposal

.2 Section 01 78 00 – Closeout Submittals

1.2 Project Cleanliness

.1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

.2 Maintain the Work in a tidy condition, free from accumulation of waste products and debris, other than that caused by the City of Iqaluit or other Contractors.

.3 Remove waste materials from the Site at daily regularly scheduled times or dispose of as directed by the City of Iqaluit. Do not burn waste materials on Site, unless approved by the City of Iqaluit.

.4 Clear snow and ice from access to building; bank/pile snow in designated areas only.

.5 Make arrangements with, and obtain permits from, authorities having jurisdiction for disposal of waste and debris.

.6 Provide on-site containers for collection of waste materials and debris.

.7 Provide and use marked separate bins for recycling. Refer to Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

.8 Dispose of waste materials and debris off Site.

.9 Clean interior areas prior to start of finishing Work and maintain areas free of dust and other contaminants during finishing operations.

.10 Store volatile waste in covered metal containers and remove from premises at end of each working day.

.11 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.12 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.13 Schedule cleaning operations so that resulting dust, debris, and other contaminants will not fall on wet, newly painted surfaces, nor contaminate building systems.

1.3 Final Cleaning

.1 When Work is Substantially Performed, remove surplus products, tools, construction machinery, and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others and leave the Work clean and suitable for occupancy.

.3 Prior to final inspection, remove surplus products, tools, construction machinery, and equipment.

.4 Remove waste products and debris other than that caused by the City of Iqaluit or other Contractors.

.5 Remove waste materials from Site at regularly scheduled times or dispose of as directed by the City of Iqaluit. Do not burn waste materials on Site, unless approved by the City of Iqaluit.

.6 Make arrangements with, and obtain permits from, authorities having jurisdiction for disposal of waste and debris.

.7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched, or disfigured glass.

.8 Remove stains, spots, marks, and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.

.9 Clean lighting reflectors, lenses, and other lighting surfaces.

.10 Vacuum clean and dust building interiors, behind grilles, louvres, and screens.

.11 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.

.12 Inspect finishes, fitments, and equipment and ensure specified workmanship and operation.

.13 Broom clean and wash exterior walks, steps, and surfaces; rake clean other surfaces of grounds.

.14 Remove dirt and other disfiguration from exterior surfaces.

.15 Clean and sweep roofs, gutters, areaways, and sunken wells.

.16 Sweep and wash clean paved areas.

.17 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.

.18 Clean roofs, downspouts, and drainage systems.

.19 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.20 Remove snow and ice from access to building.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

.1 Not used.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 74 11 – Cleaning

.2 Section 01 78 00 – Closeout Submittals

1.2 Waste Processing Sites

.1 Identify appropriate waste processing sites, based on Municipal requirements, as required.

1.3 Storage, Handling, and Protection

.1 Store materials to be reused, recycled, and salvaged in locations as directed by the City of Iqaluit.

.2 Unless specified otherwise, materials for removal become the Contractor's property.

.3 Protect, stockpile, store, and catalogue salvaged items.

.4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.5 Protect structural components not removed for demolition from movement or damage.

.6 Support affected structures. If safety of building is endangered, cease operations, and immediately notify the City of Iqaluit.

.7 Protect surface drainage, mechanical, and electrical from damage and blockage.

.8 Separate and store materials produced during dismantling of structures in designated areas.

.9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.

.1 On-site source separation is recommended.

.2 Remove co-mingled materials to off-site processing facility for separation.

.3 Provide waybills for separated materials.

1.4 Disposal of Wastes

.1 Do not bury rubbish or waste materials on Site.

.2 Do not dispose of waste, volatile materials, mineral spirits, oil, paint thinner, or excavation material into waterways, storm sewers, or sanitary sewers.

.3 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

.4 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.

.5 Dispose of waste in accordance with Municipal and Territorial regulations.

1.5 Use of Site and Facilities

.1 Execute the Work with the least possible interference or disturbance to normal use of premises.

.2 Maintain security measures established by existing facility and provide temporary security measures approved by the City of Iqaluit as required.

1.6 Scheduling

.1 Coordinate the Work with other activities at the Site to ensure timely and orderly progress of the Work.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

3.1 Application

.1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 Cleaning

.1 Remove tools and waste materials on completion of the Work and leave the work area in a clean and orderly condition.

.2 Clean-up work area as Work progresses.

.3 Source separate materials to be reused/recycled into specified stockpiles.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section unless noted as a pay item in the Unit Price Schedule. Include costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 74 11 – Cleaning

.2 Section 01 74 19 - Construction/Demolition Waste Management and Disposal

.3 Section 01 78 23 – Operation and Maintenance Manuals

.4 Section 01 78 39 – Project Record Drawings

1.2 Administrative Requirements

.1 Acceptance of Work Procedures:

.1 Contractor's Inspection:

.1 The Contractor shall conduct an inspection of the Work, identify deficiencies and defects, and repair as required to conform to the Contract Documents.

.1 Notify the City of Iqaluit in writing of satisfactory completion of the Contractor's inspection and submit verification that corrections have been made.

.2 Request the City of Iqaluit inspection.

.2 City of Iqaluit Inspection:

.1 The City of Iqaluit and Contractor shall inspect the Work and identify defects and deficiencies.

.2 The Contractor shall correct the Work as directed.

.3 Completion Tasks: submit written certificates that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with the Contract Documents.

.2 Defects: corrected and deficiencies rectified.

.3 Equipment and systems: tested, balanced, adjusted, and fully operational.

.4 Certificates required by Utility companies: submitted.

.5 Operation of systems: demonstrated to the City of Iqaluit's personnel.

.6 Commissioning of mechanical systems: completed in accordance with Section 01 91 13 – Start-up, Testing, and Trial Operation and copies of final Commissioning Report submitted to the City of Iqaluit.

.7 Work: complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of the Work by the City of Iqaluit and the Contractor.

.2 When the Work is deemed to be incomplete according to the City of Iqaluit, complete outstanding items and request re-inspection.

.5 Declaration of Substantial Performance: when the City of Iqaluit considers deficiencies and defects corrected and the requirements of the Contract substantially performed, make application for Certificate of Substantial Performance.

.6 Commencement of Lien and Warranty Periods: the date of the City of Iqaluit's acceptance of submitted declaration of Substantial Performance to be the date for commencement of the Warranty Period and commencement of the lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment:

.1 When the City of Iqaluit considers final deficiencies and defects corrected and the requirements of the Contract met, make application for final payment.

.2 When the Work is deemed to be incomplete by the City of Iqaluit, complete outstanding items and request re-inspection.

.8 Payment of Holdback: after issuance of the Certificate of Substantial Performance of the Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.3 Operation and Maintenance Data

.1 Closeout submittals for Operation and Maintenance Data shall be in accordance with Section 01 78 23 – Operation and Maintenance Manuals.

1.4 Project Record Drawings

.1 Closeout submittals for Project Record Drawings shall be in accordance with Section 01 78 39 – Project Record Drawings.

1.5 Final Cleaning

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

.1 Remove surplus materials, excess materials, rubbish, tools, and equipment.

.2 Waste Management: separate waste materials for recycling and reuse in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

.1 Not used.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 78 00 – Closeout Submittals

1.2 Record Drawings

.1 Maintain project "As-Built" Record Drawings and record accurately, the vertical and horizontal position of all installed infrastructure, and deviations from the Contract Documents caused by site conditions and changes ordered by the City of Iqaluit.

.2 The Contractor shall utilize GNSS or total station survey equipment to record the as-built top of pipe horizontal and vertical position for:

.1 Watermains, sewer mains, culverts and lateral services every 10 m, as measured along the centre of the pipe.

.2 Water and sewer vaults, including the elevation of the clean-out flow line, the vault inverts, vault floor, and vault top.

.3 Water / wastewater tanks.

.4 Flanged connections, couplings, and fusion points for water mains, sewer mains and lateral services.

.5 Roadway edges, roadway centerlines, parking lot edges, ditches, guiderails, power poles, buildings and structures.

.6 Curbs and sidewalks.

.3 For the purposes of this specification, a deviation from the Contract Documents is defined as a change in a material or product, any change to the original Work scope, a vertical change from the Design Drawings greater than 20 mm and a horizontal change from the Design Drawings greater than 100 mm.

.4 Mark "As-Built" changes in red coloured ink on one set of prints.

.5 Record the following deviations:

.1 Depths of various elements of foundation in relation to floor level.

.2 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.

.3 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.

.4 Field changes of dimension and detail.

.5 Changes made by Change Order or Field Order.

.6 Other significant deviations which are concealed in construction and cannot be identified by visual inspection.

.6 At completion of Project, and prior to final inspection, neatly transfer "As-Built" notations to second set of whiteprints using red ink. Neatly print lettering and number in size to match original. Lines may be drawn free hand but shall be neat and accurate. Add at each Drawing Title Block Note: "AS-BUILT RECORD". Also circle on List of Drawings each title and number of Drawing marked with "As-Built" records.

.7 Submit required information for "As-Built" Record Drawings to the City of Iqaluit no more than three weeks following Substantial Completion.

.8 Provide the City of Iqaluit with digital survey point files for as-built infrastructure. Survey data shall be collected with total station equipment or survey grade GNSS survey equipment and shall be georeferenced to the same mapping projection as used to prepare the Design Drawings.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

.1 Not used.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 Description

.1 This Section specifies requirements for testing, start up, commissioning, and trial operations of the Work. The Contractor shall coordinate this Work with the City of Iqaluit and the equipment manufacturers.

1.2 Definitions

.1 Testing: Testing shall consist of hydrostatic, pressure, pumping, or other tests as described in the Specifications. Testing shall also include all instrumentation and controls for the operation of the facility. Coordinate such Work with the equipment manufacturer. Test results shall be documented.

.2 Start-up: Start-up for each individual piece of equipment shall consist of the manufacturer's representative inspecting the installation, starting, and running the equipment, and making any adjustments. Start-up for each piece of equipment shall be considered complete when the City of Iqaluit is notified, in writing, by the manufacturer's representative that the equipment is installed, checked, and in working order, and is ready to be put into continuous operation.

.3 Commissioning: Commissioning shall consist of placing individual pieces of equipment and/or process subsystems into continuous operation. During commissioning, equipment shall be verified for mechanical, electrical, and control conformance with the Specifications. Commissioning shall be deemed complete when the City of Iqaluit receives notification that the system is ready for trial operation.

.4 Trial operation: Trial operation shall consist of placing all of the various systems of the Work into continuous operation. Once all systems are online and working as a complete unit, the system shall be operated continuously for 7 days. Trial operation shall be deemed complete after the Work has been operating continuously for 7 days and all process, mechanical, electrical, and instrumentation and controls equipment is free of vibration, overloading, and overheating, and is functioning in accordance with specified rates, methods, and performance.

.5 Special equipment performance test requirements may exceed commissioning and trial operations as outlined above.

1.3 Submittals

.1 The Contractor shall submit to the City of Iqaluit, in writing, a start-up report indicating, at a minimum, the following:

.1 Manufacturers requirements,

.2 Approval of successful start-up by the manufacturer and the supplier, and

.3 Dates of all tests and results indicating flows, loads, pressures, currents, temperatures, etc.

.2 The Contractor shall provide a detailed written description of the procedures they plan to follow for the start-up of each system, including methods of calibration, flow routes, tests, and personnel involved. This procedure shall be submitted to the City of Iqaluit at least four weeks prior to start-up of the systems.

.3 The Contractor and the City of Iqaluit shall, together, prepare a written procedure for commissioning and trial operations of the Work. The Contractor shall accept the direction and coordination assistance of the City of Iqaluit for both commissioning and trial operation.

.4 Start-up, commissioning, and trial operations shall not commence until the procedure has been approved by the City of Iqaluit.

.5 Fifteen (15) business days advance notice shall be given to the City of Iqaluit before the testing and start-up of each system.

1.4 Responsibility

.1 The Contractor shall be responsible for testing, start-up, commissioning, and trial operation. The City of Iqaluit shall witness testing and start-up, as required. The Contractor shall coordinate Equipment Supplier's Representatives for this Work and operator training.

.2 The operating authority shall be responsible for system operation and monitoring during Trial Operations. The Contractor shall be expected to respond to calls from the City of Iqaluit when system faults, alarms, or problems are identified during the trial operation. The Trial operation period shall be restarted once all identified issues have been addressed.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

3.1 Testing and Start-up

.1 When equipment installation has been completed by the Contractor to the standards indicated by the Specifications and instructions by the Equipment Manufacturers, the Contractor shall arrange for the services of the Equipment Manufacturer's Technical Representative.

.2 The Equipment Manufacturer's Technical Representative shall inspect the installation to ensure that the equipment has been installed in accordance with the manufacturer's requirements. If the installation is not in order, the Contractor shall make adjustments in accordance with instructions of the Equipment Manufacturer's Technical Representative. The equipment shall be started and run, and adjustments made at this time.

.3 Calibrate, test, and operate the Work for trial operation. Following satisfactory start-up, the Manufacturer's Technical Representative shall advise the City of Iqaluit, in writing, that the installation has been installed, checked, and is in working order.

3.2 Commissioning and Trial Operations

.1 The City of Iqaluit shall request that the equipment be operated to demonstrate that it performs as specified. If the City of Iqaluit notes deficiencies, the deficiencies shall be corrected immediately by the Contractor. The Contractor shall advise the City of Iqaluit, in writing, when the deficiencies have been corrected.

.2 Deficiencies of a serious nature, as determined by the City of Iqaluit, shall be corrected by the Manufacturer's Representative.

.3 The Contractor and City of Iqaluit shall jointly commission the Work in accordance with the written procedure for commissioning. The Contractor shall provide sufficient labour for the duration of the commissioning period. The Contractor shall make necessary adjustments during commissioning to put the Work into continuous operation.

.4 The following subsystems shall be individually tested by the Contractor:

.1 Temporary Bypass Piping.

.2 Temporary Service Piping.

.3 Vault Components.

.4 Water Distribution Piping.

.5 Lateral Service Shut-off Valves.

.5 During the trial operation period, the Contractor shall provide the labour necessary to respond to calls from the City of Iqaluit to maintain the Work in operation outside normal working hours to ensure continuous operation of the Work.

.6 The Contractor shall demonstrate and simulate failures and ensure all alarms and safety features perform to the expectations.

.7 The Work shall be considered Substantially Complete and ready for use at the end of the Trial Operation Period provided the 7-day running test has been satisfactorily completed and all other requirements of the Construction Lien Act have been met.

3.3 Construction Completion Certificate

.1 The Contractor shall be required to prepare and use a Construction Completion Certificate (CCC) for each system of the Work.

.2 The CCC shall include the following:

.1 Description of system,

.2 Test results including areas for the City of Iqaluit's and the Contractor's signatures,

.3 Test deficiencies,

.4 Start-up results including areas for the City of Iqaluit's and the Contractor's signatures,

.5 Start-up deficiencies, and

.6 Instrument Calibration Sheets (as commissioned).

.3 The CCC shall include, as attachments, records such as Suppliers' Representatives' Reports, Alignment Reports, instrumentation loop checks, as well as any other relevant information.

3.4 Operator Training

.1 Provide operator training on equipment operation and maintenance.

.2 The training can be combined with start-up and trial operation.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 35 30 – Health and Safety Requirements.

1.2 Reference Standards

.1 Canadian Standards Associations (CSA Group)

.1 CSA S350, Code of Practice for Safety in Demolition of Structures.

1.3 Existing Conditions

.1 Structures to be demolished to be based on their condition on date that tender is accepted.

.2 Items to be salvaged, as identified by the City of Iqaluit, to be carefully removed, protected, and delivered to the City of Iqaluit.

1.4 Demolition Drawings

.1 Where required by authorities having jurisdiction, submit for approval drawings, diagrams, or details showing sequence of demolition Work and supporting structures and underpinning.

1.5 Protection of Existing Structures, Infrastructure, and Surface Features

.1 Prevent movement, settlement, and damage of adjacent structures, services, and parts of existing building to remain. Provide bracing, shoring, and underpinning as required. Make good any damage caused by demolition.

.2 Take precautions to support affected structures and, if safety of building being demolished or adjacent structures or services appears to be endangered, cease operations, and notify the City of Iqaluit.

.3 Prevent debris from blocking surface drainage systems, process equipment, mechanical systems, and electrical systems which must remain in operation.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

3.1 Preparation

.1 Disconnect and re-route electrical and other service lines entering areas to be demolished in accordance with authorities having jurisdiction. Post warning signs on electrical lines and equipment which must remain energized to serve other equipment during period of demolition.

.2 Piping, equipment, instruments: remove and relocate as shown.

.3 Do not disrupt active or energized utilities designated to remain undisturbed.

3.2 Safety Code

.1 Unless otherwise specified, carry out demolition work in accordance with Section 01 35 30 – Health and Safety Requirements.

.2 Blasting operations for structure demolition is not permitted.

3.3 Demolition

.1 Demolish and remove existing piping, valves, and any other items identified to be removed on Drawings.

.2 At end of each day's work, leave Work in safe condition so that no part is in danger of toppling or falling. Protect interiors of parts to be demolished from exterior elements at all times.

.3 Demolish to minimize dust generation.

.4 Do not sell or burn materials on-Site.

.5 Remove and dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.

3.4 Environmental Protection

.1 Remove contaminated or dangerous materials as defined by authorities having jurisdiction, relating to environmental protection, from Site and dispose of in safe manner to minimize danger at Site or during disposal.

.2 Make good all surfaces remaining after demolition.

3.5 Salvage

.1 Items to be salvaged: As directed by the City of Iqaluit.

.2 Carefully dismantle items containing materials for salvage and stockpile salvaged materials on-Site.

.3 The Contractor shall provide the City of Iqaluit with the opportunity to take possession of salvaged access vaults and access vault components. If desired by the City of Iqaluit, removed steel access vaults and associated valves, fittings, hydrants, etc. are to be salvaged and provided to City of Iqaluit. Location to be determined. For concrete access vaults, hydrants are to be salvaged and provided to the City of Iqaluit.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

.1 This specification covers the requirements for geotextiles for soil stabilization.

PART 2 PRODUCTS

.1 All unprocessed materials shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works (OPS), Volume 8, OPSS.MUNI.2001 and associated OPS drawings, as published by the Ministry of Ontario.

PART 3 EXECUTION

.1 Execution shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works (OPS), Volume 8, OPSS.MUNI.2001 and associated OPS drawings, as published by the Ministry of Ontario.

PART 4 BASIS FOR PAYMENT

.1 Measurement and payment shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works (OPS), Volume 8, OPSS.MUNI.2001 and associated OPS drawings, as published by the Ministry of Ontario.

END OF SECTION

PART 1 GENERAL

1.1 Work Included

.1 The Work covered by this Section shall include the supply of all labour, material, and equipment to generate aggregates material as specified and stockpile materials for use by others as specified.

1.2 Related Sections

.1 Section 31 23 33.01 - Trenching and Backfilling

.2 Section 32 11 23 - Roadway Grading

.3 Section 33 05 14.03 - Access Vaults

.4 Section 33 14 16.13 - Water Distribution Pipe

.5 Section 33 31 11 - Sanitary Sewer Pipe

1.3 Source Approval

.1 Source of materials to be incorporated into Work or stockpiled requires approval. A municipal Quarry Permit is required to remove any granular material. The Nunavut Impact Review Board must review the development of new quarries prior to issuing any Quarry Permits for these areas.

.2 The Contractor shall not strip, excavate, or otherwise remove granular material for sale or for use from a lot or other parcel of land unless the land is specifically designated for use as a quarry.

.3 Where, in connection with the construction of a building or structure, there is an excess of granular material other than that required for grading and landscaping on a lot, such excess may be removed for sale or use.

.4 Inform the City of Iqaluit of the proposed source of aggregates and provide testing results by third party at least two weeks prior to commencing production.

.5 If the materials from the proposed source do not meet or cannot reasonably be processed to meet specified requirements in the opinion of the City of Iqaluit, the contractor shall locate an alternative source.

.6 Should a change of material source be proposed during the Work, advise the City of Iqaluit immediately and provide test results for new source materials.

.7 Acceptance of a material at source does not preclude future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified, or if its field performance is found to be unsatisfactory.

1.4 Product Sampling

.1 Aggregate will be subject to continual sampling by a third party at the Contractor's expense during production.

.2 At the City of Iqaluit's request, provide the third party with ready access to source and processed material for purpose of sampling and testing at the Contractor's expense.

.3 The Contractor shall bear the cost of sampling and testing of aggregates which fail to meet the specified requirements.

1.5 Reference Standards

.1 ASTM International (ASTM):

.1 ASTM C88/C88M, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

.2 ASTM C117, Standard Test Method for Materials Finer Than 75 µm (No. 200) Sieve in Mineral Aggregates by Washing.

.3 ASTM C131/C131M, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.4 ASTM C136/C136M, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.5 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

.6 ASTM D6938, Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods.

.7 ASTM D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

.8 ASTM D1883, Standard Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils.

.9 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.10 ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.11 ASTM E11, Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves.

PART 2 PRODUCTS

2.1 Materials

.1 Aggregate quality:

.1 Sound, hard, durable material free from soft, thin, elongated particles, laminated particles, organic material, clay lumps, minerals, adherent coatings, injurious amounts of disintegrated pieces, and other deleterious substances.

.2 Flat and elongated particles are those whose greatest dimension exceeds five times their least dimension.

.2 Fine aggregates satisfying requirements of applicable Section shall be one, or a blend, of the following:

.1 Natural sand.

.2 Manufactured sand.

.3 Screenings produced in crushing of quarried rock, boulders, gravel, or slag.

.3 Coarse aggregates satisfying requirements of the applicable Section shall be one, or a blend, of the following:

.1 Crushed rock or slag.

.2 Gravel composed of naturally formed particles of stone.

.4 Aggregates shall conform to the following gradations / classifications:

ASTM Sieve Designation	Percent Passing					
	Granular A (25mm Base)	Granular B (75mm Sub-Base)	Granular C (Sand)	Select Subgrade	Riprap	6" Minus
200 mm	-	-	-	100	100	-
150 mm	-	-	-	-	-	100
100 mm	-	-	-	-	0-10	70-100
75 mm	-	100	-	-	-	-
37.5 mm	-	-	-	-	-	50-90
25 mm	100	50-100	-	50-100	0-5	30-70
19 mm	75-100	-	-	-	-	25-60
9.5 mm	50-85	-	100	-	0-2	-
4.75 mm	35-65	20-55	60-100	20-70	-	10-35
2 mm	25-50	-	30-85	-	-	-
0.425 mm	15-30	5-35	-	5-45	-	-
0.30 mm	-	-	10-50	-	-	-
0.15 mm	-	-	-	-	-	-
0.075 mm	5-8	0-8	0-10	0-10	0-1	0-10

.5 Gradations to be within the limits specified when tested to ASTM C136/C136M and ASTM C117 and are to have a smooth curve without any sharp breaks when plotted on a semi-log grading chart.

.6 Granular A shall be crushed stone or crushed gravel having the following properties:

.1 Minimum percent crushed: 60%

.2 Plasticity Index (ASTM D4318), Maximum: 0

.3 Los Angeles Abrasion (ASTM C131/C131M), Gradation "A"

Maximum percent loss by weight: 60%

.7 Granular B shall be crushed stone or crushed gravel having the following properties:

.1 Plasticity Index (ASTM D4318), Maximum: 0

.2 Los Angeles Abrasion (ASTM C131/C131M), Gradation "A"

Maximum % loss by weight: 50%

.8 Granular C shall be crushed stone or gravel or screened stone or gravel having the following properties:

.1 Plasticity Index (ASTM D4318), Maximum: 0

.2 Los Angeles Abrasion (ASTM C131/C131M), Gradation "A"

Maximum % loss by weight: 50%

2.2 Pipe and Culvert Bedding

.1 Pipe and culverts shall be bedded using Granular A or Granular C designations.

2.3 Rip-Rap

.1 Hard, with specified gravity no less than 2.65, durable quarry stone, free from seams, cracks, and other structural defects, to meet the following size distribution for use intended.

.1 Size of individual stones:150 minimum and 300mm maximum.

.2 Supply rock spalls or cobbles to fill open joints.

.3 Rip rap stones shall be of an angular shape and uniform gradation. The greatest dimension of any stone shall not exceed two (2.0) times the least dimension.

2.4 Armour Stone

.1 Armour stone shall be rock that is clean, hard, sound, durable, resistant to weathering and degradation in water, free of overburden, spoil, shale, and organic material, and having a density of not less than 2.6 tonnes per cubic metre. The rock material, if subjected to the Los Angeles Abrasion Test (ASTM C131/C131M), shall have a loss of not greater than 35%.

.2 When tested for soundness, five cycles of magnesium sulphate (ASTM C88/C88M), the rock material shall have a loss of not greater than 15%.

.3 Armour stones shall be of an angular shape and uniform gradation. The greatest dimension of any stone shall not exceed two (2.0) times the least dimension.

.4 Rock with visible planes of weakness and/or subject to marked deterioration by water or weather will not be accepted.

.5 Unless otherwise stated, the minimum armour stone dimension in any given direction shall not be less than 0.75 m.

.6 The acceptability of the rock shall be determined by the City of Iqaluit and/or by laboratory and/or field-testing procedures carried out by qualified personnel.

.7 The approval of some rock fragments does not convey the City of Iqaluit's approval of all rock fragments to be obtained at that quarry.

PART 3 EXECUTION

3.1 Source Approval

.1 Source of materials to be incorporated into work or stockpiled requires approval of the Engineer ten (10) business days prior to commencing work.

.2 Provide gradation analysis and other laboratory testing results as directed by the Engineer.

.3 If, in opinion of the Engineer, materials from the proposed source do not meet, or cannot reasonably be processed to meet specified requirements, procure an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.

.4 Should a change of material source be proposed during work, advise the Engineer ten (10) business days sufficiently in advance of such change to allow sampling and testing.

.5 Acceptance of a material at source does not preclude future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified, or if its field performance is found to be unsatisfactory.

.6 Aggregate will be subject to continual sampling during production. Provide the Engineer with ready access to source and processed material for purpose of sampling and testing.

3.2 Processing

.1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as directed by the Engineer.

.2 Clear, grub and strip an area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.

.3 Process aggregates uniformly using methods that prevent contamination, segregation, and degradation.

.4 Blend aggregates, if required, to obtain gradation requirements as specified. Use approved methods and equipment.

.5 Blending to increase percentage of crushed particles or decrease percentage of flat and elongated particles is permitted.

.6 Wash aggregates, if required, to meet specifications. Use only equipment approved by the City of Iqaluit.

.7 Provide silt fence or other means to prevent contamination of existing watercourse or natural wetland features.

3.3 Handling

.1 Handle and transport aggregates to avoid segregation, contamination, and degradation.

3.4 Stockpiling

.1 Stockpile aggregates on Site in locations as indicated or as designated. Do not stockpile on completed pavement surfaces where damage to pavement may result.

.2 Stockpiling sites shall 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 the aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into the Work.

.4 Separate different aggregates by substantial dividers 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 the City of Iqaluit within 24 hours of rejection.

.6 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.

.7 Coning of piles or spilling of material over edges of pile will not be permitted.

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

.9 Stockpiles shall not have vertical or near vertical slopes. Slopes shall be knocked down for safety.

3.5 Quarry and Stockpile Clean-up

.1 Leave aggregate stockpiles and quarry sites in tidy, well drained condition, free of standing surface water.

.2 When excavation is completed at a quarry site, dress sides of excavation to a nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water.

.3 Leave any unused aggregates in neat, compact stockpiles.

.4 On completion of the Project, remove excess aggregates from the Site.

PART 4 BASIS FOR PAYMENT

.1 Separate payment shall not be made for items in this Section. Included costs in related items.

END OF SECTION

PART 1 GENERAL

.1 This specification covers the requirements for earthworks site grading.

PART 2 PRODUCTS

.1 All unprocessed materials shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works, Volume 7, OPSS.MUNI.206 as published by the Ministry of Ontario.

.2 Processed aggregate materials shall be in accordance with City of Iqaluit Specification 31 05 16 Aggregates.

PART 3 EXECUTION

.1 Execution shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works, Volume 7, OPSS.MUNI.206 as published by the Ministry of Ontario.

PART 4 BASIS FOR PAYMENT

.1 Measurement and payment shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works, Volume 7, OPSS.MUNI.206 as published by the Ministry of Ontario.

END OF SECTION

PART 1 GENERAL

1.1 Work Included

.1 This specification covers the requirements for rock removal by blasting or hydraulic breaking.

1.2 Related Sections

.1 Section 31 05 16 – Aggregates.

.2 Section 31 22 13 - Rough Grading

.3 Section 31 23 33.01 – Trenching and Backfilling.

PART 2 PRODUCTS

2.1 Products

.1 All products shall be in accordance with industry standards and the Government of Canada Explosives Act.

PART 3 EXECUTION

3.1 Submission Requirements

.1 A minimum of 15 business days prior to beginning the Work, a comprehensive blasting plan shall be submitted to the City. The blasting plan shall include:

.1 Confirmation that a pre-blast inspection has taken place.

.2 Specifics on the drill patterns, hole depths, and the type of explosives to be used.

.3 An instrumentation plan outlining where seismographs will be placed to monitor Peak Particle Velocity (PPV) and ensure vibrations stay within safe limits.

.4 The methods used to cover or "mat" the blast area to contain flying rock and suppress dust.

.5 Safety procedures including signage content and signage locations, site-specific communication and rescue procedures.

.6 Community notification procedures.

.7 Proof of the blaster's licenses, insurance, and compliance with local municipal bylaws.

.8 A written statement showing that the person in control of the blasting operation has had at least 5 years of related work experience and has taken all appropriate safety training shall be submitted to the City.

3.2 Controlled Blasting

.1 Co-ordinate this Section with Section 01 35 30 – Health and Safety Requirements.

.1 Remove rock to alignments, profiles, and cross sections as indicated.

.2 Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize over-break, and to avoid damage to adjacent structures.

.3 Excavate trenches to lines and grades to minimum of fifty (50) millimetres below pipe invert indicated.

.4 Cut trenches to widths as indicated.

.5 Use pre-shearing, cushion blasting or other smooth wall drilling and blasting techniques or directed by the Consultant.

.6 Remove boulders and fragments which may slide or roll into excavated areas.

.7 Correct unauthorized rock removal at no extra cost, in accordance with

.8 Section 31 23 33.01 – Trenching and Backfilling.

3.3 Scaling

.1 Scaling shall consist of the complete removal of all loose and partially-detached rock at the locations and heights specified in the Contract Documents.

.2 Scaling shall begin at the top of the rock cut and progress to lower elevations as the work proceeds. As the scaling progresses, care shall be taken to avoid undercutting the upper sections of the scaled rock cut.

.3 The scaling crew shall be in continuous full-time radio contact with the foreman to permit direct and immediate control.

.4 Each day, the scaling crew shall inspect the rock cut:

.1 Prior to the start of work and remove any identified loose or visually unstable rock that may endanger workers.

.2 Prior to shutdown and remove any identified loose or visually unstable rock that may endanger the traveling public.

3.4 Rock Re-Use / Disposal

.1 Do not dispose removed rock into landfill. Send material to appropriate location as approved by the Engineer.

.2 Rock that will be reused on site shall be stockpiled in a safe manor. Slope loose, unconsolidated blasted rock to its natural angle of repose. Do not allow the working face to be over-steepened or undercut to prevent slumping and collapse.

3.5 Protection

.1 Prevent damage to surroundings and injury to persons in accordance with Section 01 56 00 – Temporary Barriers and Enclosures. Erect fencing, post guards, install blast mats, sound warnings and display signs when blasting to take place.

.2 Three days prior to commencing blasting activities, erect notice signage on local roadways to alert the public of the work. Signage shall be bi-lingual and shall include the expected date range for blasting activities.

.3 Notify City engineering and operations staff three days prior to commencing any blasting activities.

.4 Conduct all blasting operations in a manner that minimizes ground vibration, air overpressure, flyrock, and damage to adjacent structures, utilities, services, and the remaining rock mass.

.5 Prior to commencing production blasting, carry out trial blasts to establish blasting parameters, including charge weights, delay intervals, burden, spacing, and sequencing necessary to maintain ground vibration and air overpressure within the specified limits. Trial blasting shall be conducted to the satisfaction of the City.

.6 During trial blasting, monitor blast-induced vibrations and air overpressure using calibrated seismographs. Submit the results of the trial blasting, together with the proposed production blasting parameters, to the Engineer for review and acceptance prior to proceeding with production blasting.

.7 Maintain a minimum of three (3) calibrated, self-triggering seismographs on site throughout the blasting operations. Locate monitoring equipment at positions representative of the nearest sensitive receptors and as directed by the Engineer.

.8 Record and monitor all blasting operations. Additional monitoring shall be undertaken whenever required by the Contractor for protection of their interests or when directed by the Engineer.

.9 Submit vibration and air overpressure monitoring records to the Engineer within 24 hours following each blast, or at such other intervals as directed by the Engineer.

.10 Peak particle velocity (PPV) resulting from blasting operations shall not exceed 50 mm/s when measured at the nearest point of any residential, commercial, institutional, or other occupied structure.

.11 Air overpressure resulting from blasting operations shall not exceed 128 dBL (linear peak) at the nearest point of any residential, commercial, institutional, or other occupied structure.

.12 Where monitoring indicates that specified vibration or air overpressure limits may be exceeded, immediately modify the blasting procedures, charge weights, delay patterns, or other blasting parameters as necessary to achieve compliance.

.13 Exceedance of the specified vibration or air overpressure limits shall be considered non-conforming work. The Contractor shall modify blasting methods, sequence, equipment, and/or production rates as required to achieve compliance.

.14 Compliance with the specified peak particle velocity and air overpressure limits shall not relieve the Contractor of the responsibility to minimize disturbance to the Community. Where repeated complaints are received or where blasting impacts are determined by the Engineer to be excessive, the Contractor shall modify blasting procedures to further reduce vibration and air overpressure.

.15 The Contractor shall retain all blast monitoring records and make them available to the City upon request.

PART 4 BASIS FOR PAYMENT

.1 Unit of Measurement: Cubic metre.

.2 Method of Measurement: Volume of rock removed, as measured by survey. The bank cubic metre volume (rock in its undisturbed, natural state before removal) shall be used for payment.

.3 Item includes: Blasting plan preparation and revisions, community notifications, signage, drilling, timing setup and detonation cord layout, approvals, explosives management and safe storage, fly-rock mitigation (including blast mats), explosive loading and backfilling, scaling, excavation, breaking, hauling, stockpiling, and modifications to execution to limit impact to the community.

.4 There shall be no additional compensation for blasting outside the design dimensions of the wok area.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 31 05 16 – Aggregates.

.2 Section 32 11 23 – Roadway Grading.

.3 Section 33 05 14.03 – Access Vaults.

.4 Section 33 14 16.13 – Water Distribution Pipe.

.5 Section 33 31 11 – Sanitary Sewer Pipe.

1.2 Reference Standards

.1 ASTM International (ASTM)

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

.2 ASTM D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

.3 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.4 ASTM D6938, Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 Work Included

.1 The Work covered by this Section shall include excavation, trenching, backfilling, and disposal of excess materials, as required to complete the Work covered elsewhere in the Contract Documents.

.2 The Contractor shall provide all labour, equipment, and materials to complete the Work covered by this Section.

1.4 Classification of Material

.1 Earth Excavation

.1 Includes the excavation of all materials except rock excavation classified hereinafter.

.2 Rock Excavation

.1 Includes the excavation of all boulders greater than 0.75 m^3 in volume, or solid ledge rock of concrete foundations which, in the opinion of the Owner's Representative, requires its removal, drilling, wedging, sledging, or barring. No soft or disintegrated rock which can be removed with a pick, or loose, shaken, or previously blasted rock will be measured or allowed. Frozen materials shall not be classified as rock, nor will extra payment be allowed for excavating same.

.3 Backfill

.1 Material excavated from the trench from which all boulders, roots, stumps, and other debris which would prevent consolidation of the material have been removed.

.4 Surplus Material

.1 Excavated material which is not required for the completion of the Work.

.5 Suitable Backfill Material

.1 Material from excavation which, in the opinion of the Owner's Representative, is suitable for use as backfill or for other processes.

.6 Unsuitable Material

.1 Material from excavation which, in the opinion of the Owner's Representative, is not suitable for use as backfill or other processes.

1.5 Occupational Health and Safety Act

.1 All excavations shall conform strictly to the requirements of the latest Occupational Health and Safety Act adopted by Nunavut.

1.6 Safety Measures

.1 Suitable warning signs, lights, and barricades shall be erected for the protection of vehicles and pedestrians during construction. Watchpersons or flagpersons, when required, shall be supplied by the Contractor at their own expense.

.2 Temporary traffic control devices, including signage and barricades, shall be implemented in accordance with Section 01 55 26 – Traffic Control.

.3 All open trenches shall be protected through the use of barricades, such as jersey barriers at a minimum, when the Contractor is not on Site.

.4 The Contractor shall comply with the instructions of a safety inspector appointed or recognized by Nunavut whose duty is to enforce Territorial acts governing the excavation of trenches and the protection of same.

.5 The Contractor shall inform the Municipality's safety inspector of their intention to excavate at least 24 hours before commencing Work.

.6 Trench safety, including bracing and shoring, is the sole responsibility of the Contractor. Open-cut trenches shall be sheeted and braced as required by the Workers' Safety and Compensation Commission and Municipal ordinances, and as may be necessary to protect life, property, and Work.

.7 Trenches shall not be left open while unattended.

.8 If the trench is adjacent to motorized traffic, precast concrete barriers shall be used to separate traffic from the trench. The provision of temporary concrete barriers shall be in accordance with the latest edition of the Manual of Uniform Traffic Control Devices for Canada (MUTCDC), by the Transportation Association of Canada (TAC).

1.7 Caution in Excavation

.1 The Contractor shall exercise proper caution in excavating and shall repair and make good at their own expense any and all damage done to buried infrastructure. Where necessary, the Contractor shall make necessary explorations to discover location of existing pipes, conduits, services, etc.

1.8 Inconvenience to Adjacent Property Owners

.1 Construction of the Work shall be carried out in such a manner that a minimum of inconvenience is caused to the owners and occupants of property adjacent to the Work.

1.9 Working Restrictions

.1 The Contractor shall be responsible for maintaining adequate surface drainage during construction. The Contractor shall provide all necessary measures to ensure that natural drainage is not impeded to the detriment of the local municipal authority, private landowners, or the public. Water pumped out or removed from a trench shall not be discharged into the existing sewers unless permission in writing has been obtained from the authority having jurisdiction.

.2 Steel-tracked equipment will not be allowed on the pavement at any time, unless the pavement is protected by planks, pads, or other devices.

PART 2 PRODUCTS

2.1 Materials

.1 Granular Material

.1 Granulars A, B, C, and sand shall meet the requirements set out in Section 31 05 16 – Aggregates.

.2 Granular Backfill

.1 Backfill material shall be selected from materials taken from the excavation if, in the opinion of the Owner's Representative, they are suitable.

PART 3 EXECUTION

3.1 Preparation of the Work

.1 The Contractor, at their own expense, shall clear the surface or road as may be necessary for the full width and length of the proposed trenches or structures and shall dispose of all refuse in a manner satisfactory to the Owner's Representative. The unit prices for the Work shall include all costs incurred in removing material of whatever nature from the surface of the ground or road.

3.2 Alignment and Grade

.1 Trenches shall be dug to the alignment and grade required from vault location to vault location unless the Contractor has a dedicated crew actively working on additional segments.

.2 The bottom of the pipe trench shall be excavated to a flat surface for the bedding material. Earth, boulders, and rock shall be removed or excavated to provide a clearance of at least 200 mm below the insulation of pipe and the excavation for bedding of the pipe shall be refilled with thoroughly compacted material as specified herein.

3.3 Drainage

.1 The Contractor shall keep all portions of the Work properly and efficiently drained during construction and until completion. They shall be held responsible for all damage that may be caused as the result of water backing up or flowing over, though, from, or along any part of the Work or surrounding properties due to their operation.

.2 All costs associated with providing drainage for the Work as required, shall be included in the unit prices for the installation of mains and access vaults.

3.4 Excavation and Preparation of Trench

.1 Excavation shall be taken to mean the removal from the trench of all materials of whatever kind encountered, for the subsequent installation of all pressure mains, sewer mains, pre-fabricated access vaults, and appurtenances. All excavation shall be made exactly to line and grade, as shown on the Drawings, or as established by the Owner's Representative. The length of the trench which has not been backfilled shall not extend beyond one access vault to the rear of the working area. Excavation, pipe laying, and backfilling shall proceed at such a pace as to prevent permafrost degradation. It shall be braced and drained in a manner to ensure that Work may proceed safely and efficiently therein.

.2 The trench shall be excavated to the depth shown on the Drawings so as to provide a firm foundation for the pipe on solid and undisturbed ground. Any part of the bottom of the trench excavated below the specified grade shall be corrected with approved backfill, thoroughly compacted as directed by the Owner's Representative, with no extra cost to the Owner.

.3 Rigid board insulation shall be installed per the Specification Figures to reduce vertical pipe movement by limiting thaw within the active layer beneath the pipe.

.4 Rigid board pipe insulation shall not be required where solid rock is encountered within 200 mm beneath the design pipe invert elevation.

.5 Large rocks and boulders shall be removed to provide a clearance of at least 150 mm below and on each side of all insulation, pipe, access vaults, and appurtenances. This is the minimum clear distance which shall be permitted between any part of the pipe and appurtenances being laid and any part, projection, or point of such rocks, boulders, or stones. The subgrade shall be made by backfilling with an approved sand or gravel in 150 mm layers.

.6 These layers shall be thoroughly tamped as directed by the Owner's Representative so as to provide a uniform and continuous bearing and support for the pipe bedding.

.7 Prior to trenching, the Contractor shall excavate test pits at 15 m intervals along the trench alignment, to a depth of 450 mm below the new pipe grade. The Contractor shall check for the presence of finer-grained/saturated soils in the

test pits. If unsuitable material is present below the pipe grade, the Contractor shall excavate and dispose of the silty material to 450 mm below the pipe grade and shall backfill up to the pipe bedding zone using Granular B material, compacted to 95% standard proctor density.

.8 Where the bottom of the trench at subgrade is found to be unstable due to material which, in the judgement of the Owner's Representative, should be removed, the Contractor shall excavate and remove such unsuitable material to the depth determined by the Owner's Representative.

.9 Ice rich soils shall be removed completely or to a maximum depth of 450 mm measured below the insulation of pipes.

.10 The cost of such additional excavation of unstable subgrade due to the presence of unsuitable materials, and backfill, ordered by the Owner's Representative shall be paid for at the tendered unit price.

.11 No extra payment shall be made for additional excavation and backfill that has become necessary due to subgrade that has become unstable due to water from melting snow and ice that has entered the trench. The trench shall be kept dry.

.12 The Contractor shall prepare and submit a Trenching, Bracing, and Shoring Plan that complies with all applicable safety legislation.

3.5 Rock Excavation

.1 Any boulders greater than 0.75 m^3 in volume will be paid for as rock. Volume of individual boulders will be determined by measuring three mutually perpendicular dimensions. When rock is encountered, the Owner's Representative shall be notified at once, so that measurements can be made.

.2 Measurements for rock volume shall be taken from the top of the rock strata to the bottom of the strata. If the rock strata extends below the elevation of the invert of the pipe, then an allowance of 200 mm below the bottom of the pipe insulation will be used in calculating the volume of rock.

.3 Soft shale, soft sandstone, or other rock that can, in the opinion of the Owner's Representative, be successfully excavated with a 0.5 m^3 backhoe or equivalent without blasting and without unusual wear and tear to the machine will not be classified as "rock excavation". Hardpan will not be classified as "rock excavation". Frozen subgrade material or permafrost will not be classified as "rock excavation".

3.6 Bracing and Shoring

.1 When close sheeting is required, it shall be so driven as to prevent adjacent soil from entering the trench either below or through such sheeting. The Owner's Representative reserves the right to order the sheeting driven to the full depth of the trench or to such additional depths as may be required for the protection of the Work.

.2 Where the soil in the lower limits of the trench has the necessary stability, the Owner's Representative, at their discretion, may permit the Contractor to stop the driving of sheeting at some designated elevation above the trench bottom. The granting of permission by the Owner's Representative; however, shall not relieve the Contractor in any degree from the Contractor's full responsibility under the Contract.

.3 Sheeting and bracing, which have been ordered left in place, shall be cut off and removed for a depth of 1 m below the established road grade or the existing surface of the road, whichever is lower. Trench bracing, except that which must be left in place, may be removed as the backfilling proceeds. Backfilling and withdrawal of sheeting shall proceed together; no voids shall be left in the trench by the withdrawal of sheeting. Sheeting shall not be driven any further below the bottom of the trench than is necessary to ensure proper support for the sheeting.

.4 The cost of furnishing, placing, and removing the sheeting and bracing shall be included in the price bid for the Work. When sheeting and bracing have been ordered left in place by the Owner's Representative, the payment for such material shall be as an extra at cost of the material, plus 20%, and shall include the upper 1 m of "cut-off" section of the sheeting.

.5 The Contractor shall identify areas where bracing or relocation of power poles is required and shall plan and coordinate associated Work with the power corporation accordingly.

3.7 Blasting

.1 Blasting is not permitted within the Work area unless written approval is provided from the Municipality. The Contractor must submit a blasting permit application and engineered blasting plan in order to obtain approval for blasting.

3.8 Trenching by Hand

.1 In any location where the use of trench digging machinery might cause property or utility damage, the Contractor shall carry out the trenching by hand at no extra cost to the Owner.

3.9 Tunnelling

.1 Tunnelling may be done with the approval of the Owner's Representative and all shoring or grading necessary for the tunnel shall be left in place at the Contractor's expense. Before approval will be granted, the Owner's Representative may require the Contractor to submit a statement and drawings indicating exactly the method of tunnelling which will be used. Backfilling shall be carried out with approved materials and tamped with great care so as to leave the tunnel free of voids.

3.10 Excavated Material

.1 All excavated material shall be piled into three piles:

.1 Suitable material that can be used for backfill,

.2 Unsuitable material that cannot be used for backfilling or other processes, and

.3 Frozen material. If upon inspection by the Owner's Representative, the thawed material is deemed suitable for use as backfill, this material can be classified as suitable, otherwise the material will be classified as unsuitable.

.2 Unsuitable material shall be considered surplus material.

.3 Remove soil contaminated with calcium chloride, toxic materials, or petroleum products and legally dispose of at a location accepted by the Owner's Representative.

.4 All excavated material shall be piled in a manner that will not endanger the Work and that will avoid obstructing roadways and driveways. Hydrants under pressure, access vaults, and other utility controls shall be left unobstructed and accessible. Gutters and swales shall be kept clear or other satisfactory provisions made for roadway drainage, and natural watercourses shall not be obstructed.

.5 The earth taken from the trench shall be neatly deposited at the sides in such a manner as to obstruct the road and driveways as little as possible. When it is impractical, in the opinion of the Owner's Representative, to place the earth at

the side of the trench, it shall be removed and deposited as designated by the Owner's Representative. In either case, a clear space shall be left on one side of the trench to accommodate survey stakes.

.6 Permafrost excavated from the trench shall not be stockpiled on top of material to be used as backfill. Material which is unsatisfactory after permafrost has been stockpiled on top of it shall be considered contaminated and removed from the Site by the Contractor.

.7 Extra backfill material required because of the disposal of material contaminated by permafrost shall be supplied, placed, and compacted by the Contractor at their expense and shall be in accordance with the requirements of this Section.

3.11 Locate Marker System

.1 Refer to Water Distribution Pipe and Sanitary Sewer Pipe specifications.

3.12 Ownership of Excavated Material

.1 Surplus earth and other excavated materials will remain the property of the Owner.

.2 All surplus or other material of any kind arising from, or during, the construction of the Work, or any portion thereof, which belongs to the Owner shall not be sold, thrown away, dumped, wasted, or otherwise disposed of, except as directed by the Owner's Representative. If so, disposed of by the Contractor, the Owner's Representative shall ascertain, as nearly as they can, the quantity and value thereof, and shall direct the Contractor or their sureties to pay unto the Owner the amount thus found, or the Owner may deduct it from any subsequent progress claim.

3.13 Cleaning Up and Disposal of Surplus Excavated Material

.1 All surplus and excess materials that arise out of the construction of the Work shall be removed and neatly piled, evenly spread, or deposited as directed by the Owner's Representative. The entire expense of loading, hauling, unloading, piling, spreading, or otherwise dealing with said waste material shall be borne by the Contractor. If any material is dropped or spilled it shall be promptly removed to the satisfaction of the Owner's Representative.

3.14 Water in Excavation

.1 Water entering the excavation shall be collected and removed by the Contractor as required to ensure the pipe bedding and backfill materials can be installed

atop a well-drained subgrade. All water pumped or drained from the Work shall be disposed of in a suitable manner satisfactory to the Owner's Representative, without damage to the Work, or other property, structures, or persons.

.2 The expense of removing the water, regardless of origin, is the responsibility of the Contractor. The Contractor shall be wholly responsible for any damage that may occur due to groundwater or stormwater entering the trench during the period of construction.

.3 No extra payment shall be made for additional excavation and backfill that is required due to subgrade that has become unstable due to water from any source.

3.15 Backfilling

.1 Trench excavations shall be backfilled with materials taken from the excavations if, in the opinion of the Owner's Representative, they are suitable for use as compacted backfill. Otherwise Granular B or backfill approved by the Owner's Representative shall be supplied by the Contractor as backfill.

.2 All backfill shall be mechanically compacted in even layers not exceeding 150 mm in thickness so that there is no subsequent subsidence in the trench. The backfill shall be compacted to a density of 95% of the maximum density at optimum moisture content as determined by the Standard Proctor Test as per ASTM D698 and as field measured using the ASTM D6938 (nuclear methods) standard. Material testing shall be performed on a continuous basis by an accredited third party and certified by a Professional Engineer. The Contractor shall provide daily compaction test results to the Owner's Representative with a report indicating any deficiencies and remediation measures.

.3 Edges of existing pavement shall be cut square with an asphalt saw or compressor and all irregularities removed. Prior to placing asphalt, the edges of the existing pavement shall be swept clean. Pavement shall be replaced for the full damaged or removed width. Paved areas shall be replaced with asphalt unless asphalt is unavailable. If asphalt is unavailable, the paving shall be postponed to the subsequent year.

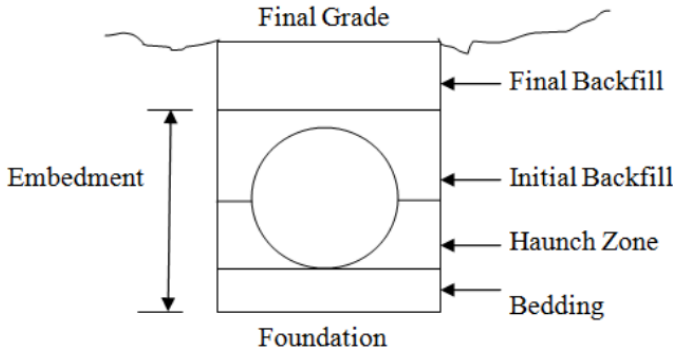
.4 In open field areas, upon completion of all trenching and backfill, the entire disturbed area shall be bladed level.

3.16 Pipe & Culvert Bedding

.1 Pipe and culvert bedding aggregate shall be per Section 31 05 16 Aggregates.

.2 Bedding material shall be installed to 300mm over top of the pipe.

.3 Bedding material in the haunch zone, and the initial backfill zone shall be compacted to 98% SPD (ASTM D698) using nuclear testing methods (ASTM D6938).



PART 4 BASIS FOR PAYMENT

4.1 Trenching & Backfill

.1 Unit of Measurement: Lineal Metres

.2 Method of Measurement:

.1 Single Pipe Trench (Water or Sewer Main): Lineal metres of pipe installed, as measured along the pipe centreline, from centre of access vault to centre of access vault or from centre of access vault to tie-in to existing main as applicable.

.2 Double Pipe Trench (Water and Sewer Main): Lineal metres of pipe installed, as measured along the centreline at the midpoint between the two pipes installed, from centre of access vault to centre of access vault or from centre of access vault to tie-in to existing main as applicable. For the purpose of measurement, a double pipe trench is defined as any run of double pipe in a common trench where the distance between pipes is equal to or less than 1.60 m on centre.

.3 Triple Pipe Trench (Water Supply/Return and Sewer Main): Lineal metres of pipe installed, as measured along the pipe centreline, from centre of access vault to centre of access vault or from centre of access vault to tie-in to existing main as applicable. For the purpose of measurement, a triple pipe trench is defined as any run of three pipes in a common trench

where the distance between pipes is equal to or less than 1.60 m on centre.

.3 Item Includes: Excavation, stockpiling or windrowing, supply, placement, and compaction of bedding and backfill materials, compaction testing, drainage ditch restoration, off Site disposal of excess material including any tipping fees, as-built survey every 10 lineal metres and at bends, road and driveway restoration with Granular A and Granular B (unless included as a separate pay item), surface restoration, and all material, equipment, tools, labour, and incidentals necessary to complete the Work.

.4 Additional payment shall not be made for adjustments to the depth of installation of watermains, sanitary sewer mains, or access vaults unless the Contractor can provide evidence, satisfactory to the Owner's Representative, that the increase in trench depth exceeds 0.5 m.

4.2 Lateral Services Excavation & Backfill

.1 Unit of Measurement: Lineal metres

.2 Method of Measurement:

.1 Separate Trench (Water or Sewer): Lineal metres of service pipe installed, as measured along the pipe centreline, from centre of main to end.

.2 Common Trench (Water and Sewer): Lineal metres of service pipe installed, as measured along the centreline at the midpoint between the two pipes installed, from centre of main to end.

.3 Item Includes: Excavation, stockpiling or windrowing, supply, placement, and compaction of bedding and backfill materials, compaction testing, driveway reinstatement with Granular A, off Site disposal of excess material including any tipping fees, as-built survey every 10 lineal metres and at bends, surface restoration, and all material, equipment, tools, labour, and incidentals necessary to complete the Work.

4.3 Sub Excavation of Unsuitable Trench c/w Granular A Backfill

.1 Unit of Measurement: Cubic metres

.2 Method of Measurement: The number of cubic metres of unsuitable material removed from the trench area to facilitate water and sewer piping and vault installation. The quantity shall be agreed upon by the Contractor and the Owner's Representative in the field by measuring the approximate length, width,

and depth of the void left by the excavation. The Contractor shall measure the excavation area prior to and after removal for record keeping and quantity verification.

.3 Items Included: Excavation of unsuitable material, the supply, placement, and compaction of Granular A material, disposal of unsuitable material as directed including any tipping fees, and all material, equipment, tools, labour, and incidentals necessary to complete the Work.

4.4 Rock Excavation

.1 Unit of Measurement: Cubic metres

.2 Method of Measurement: Cubic metres of rock material removed as confirmed by survey. Acceptable survey methods are via total station equipment or survey grade GNSS equipment only. Drone surveys will not be acceptable. Survey data shall be provided to the Owner's Representative for quantity verification.

Measurements for rock volume shall be taken from the top of the rock strata to the bottom of the strata.

.3 Item Includes: Mechanical hammering, mucking, excavating, stockpiling, loading, hauling, and disposal as directed including any tipping fees (if disposal is off Site).

4.5 Sub Excavation of Unsuitable Trench c/w Granular 'B' Backfill

.1 Unit of Measurement: Cubic Metres, Provisional

.2 Method of Measurement: The number of cubic metres of unsuitable material removed from the trench area to facilitate water and sewer piping and vault installation. The measurement shall be agreed upon by the Contractor and the City of Iqaluit in the field by measuring the approximate length, width and depth of the void left by the excavation. The Contractor shall measure the excavation area prior to and after removal for record keeping and quantity verification.

.3 Item Includes: Equipment, labour, and incidentals necessary to complete the work as intended by the contract documents, including excavation, disposal as directed (on site or off site), Granular B backfill, trucking, and stockpiling.

4.6 Power Pole Bracing and Relocation

.1 Unit of Measurement: Lump Sum.

.2 Method of Measurement: No measurement will be made for this item. Payment shall be made based on the following:

.1 75% of lump sum price shall be made after confirmation that all bracing has been completed.

.2 25% of lump sum price shall be made at Substantial Completion.

.3 Items Included: Power company coordination and approvals, temporary pole bracing as required by the power company (may include drilling or excavating adjacent to the pole to facilitate installation of pole support), pole relocation, and all material, labour, tools, equipment, and incidentals necessary to complete the Work.

END OF SECTION

PART 1 GENERAL

.1 This specification covers the requirements for geotextiles for soil stabilization.

PART 2 PRODUCTS

.1 All unprocessed materials shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works (OPS), Volume 7, OPSS.MUNI.1860 and associated OPS drawings, as published by the Ministry of Ontario.

PART 3 EXECUTION

.1 Execution shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works (OPS), Volume 7, OPSS.MUNI.1860, and associated OPS drawings, as published by the Ministry of Ontario.

PART 4 BASIS FOR PAYMENT

.1 Measurement and payment shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works (OPS), Volume 7, OPSS.MUNI.1860, and associated OPS drawings, as published by the Ministry of Ontario.

END OF SECTION

PART 1 GENERAL

.1 This specification covers the requirements for gabion boxes and gabion matresses.

PART 2 PRODUCTS

.1 All unprocessed materials shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works (OPS), Volume 7, OPSS.MUNI.1430, and associated OPS drawings, as published by the Ministry of Ontario.

PART 3 EXECUTION

.1 Execution shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works (OPS), Volume 7, OPSS.MUNI.1430, and associated OPS drawings, as published by the Ministry of Ontario.

PART 4 BASIS FOR PAYMENT

.1 Measurement and payment shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works (OPS), Volume 7, OPSS.MUNI.1430, and associated OPS drawings, as published by the Ministry of Ontario.

END OF SECTION

PART 1 GENERAL

1.1 Work Included

.1 The Work covered by this Section includes placement of rip-rap stone as required.

1.2 Related Sections

.1 Section 31 05 16 – Aggregates.

.2 Section 31 23 33.01 – Trenching and Backfilling.

.3 Section 33 42 13 – Pipe Culverts.

PART 2 PRODUCTS

2.1 Stone

.1 Rip-rap stone to shall be in accordance with Section 31 05 16 – Aggregates.

PART 3 EXECUTION

3.1 Placement

.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 rip-rap to thickness and details as indicated.

.4 Place stones in a manner approved by the City of Iqaluit to secure surface and create a stable mass. Place larger stones at bottom of slopes.

.5 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 even, free of large openings, and neat in appearance.

.6 Where required, install a geotextile filter fabric on a firm, compacted bed as recommended by the manufacturer. Place rip-rap in such a manner as to avoid damage to geotextile filter fabric.

PART 4 BASIS FOR PAYMENT

4.1 Rip-Rap

.1 Unit of Measurement: Square Metres

.2 Method of Measurement: The number of square metres of rip-rap supplied and placed.

.3 Item Includes: Supply, processing, handling, and placement of the rip-rap and geotextile, excavation and backfill of key trench, and fine grading as specified, and all materials, equipment, tools, labour, and incidentals necessary to complete the Work.

END OF SECTION

PART 1 GENERAL

1.1 General

.1 This specification shall be read in conjunction with the Drawings and all other Sections of the Contract Documents.

1.2 Related Sections

.1 Section 01 29 83 – Testing and Laboratory Services.

.2 Section 01 33 00 – Shop Drawings and Submittals.

.3 Section 01 35 30 – Health and Safety Requirements.

.4 Section 01 45 00 – Quality Control.

.5 Section 31 05 16 – Aggregates.

.6 Section 31 23 33.01 –Trenching and Backfilling.

.7 Section 33 05 14.03 – Access Vaults.

.8 Section 33 14 16.13 – Water Distribution Pipe.

.9 Section 33 31 11 – Sanitary Sewer Pipe.

.10 Section 33 42 13 – Pipe Culverts.

1.3 Work Included

.1 The Work under this Section shall include the supply and placement of all equipment, labour, and materials necessary to reinstate existing roadways including excavation to subgrade, subgrade preparation, supply, placement, and compaction of granular A, B, or C base course.

1.4 Reference Standards

.1 ASTM International (ASTM)

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

.2 ASTM D6938, Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.5 Definitions

.1 Surface Course

.1 The surface course shall be the top layer of material which will be exposed to vehicle traffic.

.2 Base Course

.1 The base course shall be the layer of material directly below the surface course.

.3 Subbase

.1 The subbase shall be the layer of material below the base course.

.4 Subgrade

.1 The subgrade shall be the material which the road structure is founded upon. This may be the existing ground, the prepared base of an excavation, or the top of an embankment of engineered fill.

.5 Embankment

.1 Fill material outside the road subgrade.

.6 Rock

.1 As defined in Section 31 23 33.01 – Trenching and Backfilling.

.7 Unsuitable Material

.1 As defined in Section 31 23 33.01 – Trenching and Backfilling.

.8 Surplus Material

.1 Excess material for which there is no need for on Site.

.9 Borrow

.1 Embankment or subgrade material imported from an off-Site source.

PART 2 PRODUCTS

2.1 Materials

.1 Granular A

.1 Granular A shall conform to the requirements listed in Section 31 05 16 - Aggregates.

.2 Granular B

.1 Granular B shall conform to the requirements listed in Section 31 05 16 - Aggregates.

.3 Granular C

.1 Granular C shall conform to the requirements listed in Section 31 05 16 - Aggregates.

.4 Sand

.1 Sand shall conform to the requirements listed in Section 31 05 16 - Aggregates.

PART 3 EXECUTION

3.1 Stripping Organic Material

.1 Unless specifically directed, there shall be no stripping of the organic layer of material for road construction.

.2 Stripping of the organic material shall only occur in areas requiring excavation to prepare the subgrade at the design elevation.

3.2 Excavation and Subgrade Preparation

.1 This Work shall include all excavation necessary to prepare the subgrade in areas requiring new construction or reconstruction and shall include all hauling, spreading, and levelling of excavated material.

.2 The excavated material shall be hauled to the location as directed of the City of Iqaluit. It shall be spread, graded, and compacted as directed by the City of Iqaluit.

.3 The Contractor shall not excavate below the subgrade level unless directed by the City of Iqaluit.

.4 The bottom of the excavation shall provide a flat, uniform, dry surface for the construction of the subbase.

.5 Upon completion of the excavation to the subgrade elevation, the bottom of the excavation shall be inspected and approved by the City of Iqaluit prior to the placement of any material for the construction of the subbase.

.6 If the bottom of the excavation is unsuitable for the placement of granular material, the Contractor shall notify the City of Iqaluit.

.7 Remove and dispose of unsuitable or surplus material as directed. The Contractor shall source an appropriate disposal site. It is the Contractor's responsibility to acquire permits as required by the Municipality or Territory.

3.3 Subgrade or Embankment Filling

.1 In all areas requiring subgrade or embankment fill, the Contractor shall be responsible to supply, haul, place, and compact suitable material to the elevations as indicated on the Drawings. No organic or other unsuitable materials shall be acceptable. The material shall be placed to provide a width sufficient to allow for the driving surface specified, shoulders, side slope specified, base course, and subbase. Material used to fill to subbase shall have a 3 horizontal to 1 vertical (3H:1V) side slope unless otherwise specified.

.2 Filling to subgrade shall be accomplished with Granular C unless an alternative has been otherwise specified and/or approved by the City of Iqaluit.

3.4 Use of Mechanically Removed Rock for Road Construction

.1 Where mechanically removed rock is used for road construction, sand shall be added to the remaining rock to fill the voids at the direction of the City of Iqaluit.

3.5 Construction of Roadway Granular Courses

.1 The granular courses and surface materials shall be kept free from clay and other types of deleterious materials. The Contractors shall ensure that their operations do not disturb underlying Work.

.2 The granular courses shall be placed without segregation in uniform layers.

.3 Each layer shall be bladed to a smooth surface conforming to the required cross-section.

.4 Prior to closing down operations for each working day, the granular material shall be bladed and compacted and, if necessary, covered with sufficient base material to carry traffic.

.5 In no case shall a layer of granular material be laid and compacted on frozen layer of granular. The Contractor shall be responsible for making good any section of the road which the City of Iqaluit considers to be below standard because granular material was laid on a frozen granular surface. All costs associated with this Work will be borne by the Contractor.

.6 The granular courses shall be maintained to the tolerances in grade and cross-section and to the specified density until the Project is accepted.

.7 The City of Iqaluit may direct that soft or otherwise defective areas be cut out and backfilled with granular material. This Work is to include the excavation, removal, and disposal offsite of contaminated material, and the supply, placement, and compaction of Granular A material.

.8 Should, in the City of Iqaluit's opinion, the failure of the granular course has been caused by the Contractor's negligence, the full reinstatement shall be carried out and the City of Iqaluit's word shall be final and binding upon this matter.

3.6 Surface Tolerance

.1 The surface of the uppermost layer of granular material shall be bladed, shaped, and compacted to produce the required surface contour.

.2 The finished granular courses shall not deviate more than 30 mm from the specified grade and cross-section and the surface shall not deviate more than 15 mm at any place on a 3-metre template.

.3 The finished granular courses shall not deviate more than the amount specified below from the specified grade and cross-section, shall not be consistently high or low, and the surface shall not deviate more than 15 mm at any place on a 3-metre template.

.1	Surface Course	+15 mm to -15 mm
.2	Base Course	+15 mm to -25 mm
.3	Subgrade	+25 mm to -50 mm

3.7 Compaction

.1 The maximum rate of placing material shall be as specified or as instructed by the City of Iqaluit. The maximum rate will be determined by the adequacy of the compaction obtained.

.2 Each layer of material shall be compacted to 95% Standard Proctor Dry Density (per ASTM D698) unless otherwise specified before the next layer is placed.

.3 Nuclear methods (ASTM D6938) shall be used for field density testing.

PART 4 BASIS FOR PAYMENT

4.1 Granular Material

.1 Unit of Measurement: Square metres, cubic metres, or tonnes, as indicated in the Unit Price Schedule.

.2 Method of Measurement:

.1 For Square Metres: Square metres of granular material installed, for the thickness and material types specified in the Unit Price Schedule, as measured at the finished grade edges.

.2 For Cubic Metres: Cubic metres of granular material, for the material types specified in the Unit Price Schedule, as confirmed by survey. Acceptable survey methods are via total station equipment or survey grade GNSS equipment only. Drone surveys will not be acceptable. Survey data shall be provided to the City of Iqaluit for quantity verification.

.3 For Tonnage: Tonnage of granular material delivered and installed, for the material types specified in the Unit Price Schedule, as confirmed by scale tickets. Scale tickets shall be provided to the City of Iqaluit daily.

.3 Item Includes: Supply, installation, compaction, removal, fine grading, material testing, compaction testing, and all labour, equipment, material, tools, and incidentals necessary to complete the Work.

4.2 Stripping

.1 Unit of Measurement: Cubic metres

.2 Method of Measurement: Cubic metres of material removed, as confirmed by survey. Acceptable survey methods are via total station equipment or survey grade GNSS equipment only. Drone surveys will not be acceptable. Survey data shall be provided to the City of Iqaluit for quantity verification.

.3 Item Includes: Excavating, stockpiling, loading, hauling, disposal including any tipping fees, and all material, equipment, tools, labour, and incidentals necessary to complete the Work.

4.3 Roadway Excavation (Subgrade or Embankment Construction)

.1 Unit of Measurement: Cubic metres

.2 Method of Measurement: Cubic metres of material removed, as confirmed by survey. Acceptable survey methods are via total station equipment or survey grade GNSS equipment only. Drone surveys will not be acceptable. Survey data shall be provided to the City of Iqaluit for quantity verification.

.3 Item Includes: Excavating, stockpiling, loading, hauling, dumping, spreading, fine grading, compaction, and all labour, equipment, material, tools, and incidentals necessary to complete the Work.

4.4 Roadway Excavation (Unsuitable or Surplus)

.1 Unit of Measurement: Cubic metres

.2 Method of Measurement: Cubic metres of material removed and disposed, as confirmed by survey. Acceptable survey methods are via total station equipment or survey grade GNSS equipment only. Drone surveys will not be acceptable. Survey data shall be provided to the City of Iqaluit for quantity verification.

.3 Item Includes: Excavating, stockpiling, loading, hauling, disposal off Site including any tipping fees, and all labour, equipment, material, tools, and incidentals necessary to complete the Work.

4.5 Borrow

.1 Unit of Measurement: Cubic metres

.2 Method of Measurement: Cubic metres of material delivered to Site and compacted in place, as confirmed by survey. Acceptable survey methods are via total station equipment or survey grade GNSS equipment only. Drone surveys will not be acceptable. Survey data shall be provided to the City of Iqaluit for quantity verification.

.3 Item Includes: Permits, sourcing, processing, excavating, stockpiling, loading, hauling, placement, fine grading, compaction, and all labour, equipment, material, tools, and incidentals necessary to complete the Work.

4.6 Ditching

.1 Unit of Measurement: Lineal Metres

.2 Method of Measurement: Lineal metres of drainage ditches re-graded and restored, for the depths and dimensions indicated on the Unit Price Schedule.

.3 Item Includes: Excavation, shaping, compaction, surface restoration, waste disposal including any tipping fees, and all labour, material, equipment, tools, and incidentals necessary to complete the Work.

END OF SECTION

PART 1 GENERAL

.1 This specification covers the requirements for the installation of hot mix asphaltic concrete pavement.

PART 2 PRODUCTS

.1 All materials shall be in accordance with the most current revision of Division 6, Bitumous Materials, Section 2 Asphalt Concrete Pavement within the Standard Specifications for Highway Construction as published by the Government of Northwest Territories Department of Infrastructure.

.2 A Geotechnical Engineer registered with NAPEG shall provide a recommendation for the appropriate mix design.

.3 Mix designs other than those listed in the Standard Specifications for Highway Construction may be accepted at the discretion of the City.

PART 3 EXECUTION

.1 Execution shall be in accordance with the most current revision of Division 6, Bitumous Materials, Section 2 Asphalt Concrete Pavement within the Standard Specifications for Highway Construction as published by the Government of Northwest Territories Department of Infrastructure.

PART 4 WARRANTY

.1 The Contractor shall guarantee that all asphaltic pavement works will remain in an acceptable condition for a period of one year from the date of acceptance or issuance of the Substantial Completion Certificate.

.2 Any defects determined by the City which occur in the finished surface of any pavement course during the warranty period, resulting from poor workmanship or faulty materials, shall be repaired by the Contractor at no additional cost to the City. Such defects include, but are not necessarily limited to: cracking, shoving, rutting, ravelling, segregation, surface irregularities, and failures of prior repairs. The Contractor's proposed method of repair must be approved by the Engineer prior to execution and must be performed according to the original contract specifications.

.3 The Owner shall notify the Contractor in writing of any warranty claims based on the results of an inspection. For general asphalt repairs, the Contractor must

respond within 30 days of notification with an acceptable schedule to complete the repairs. For crack sealing failures, the Contractor shall make good on any imperfections within 14 days of receiving written notice.

PART 5 BASIS FOR PAYMENT

.1 Measurement and payment shall be in accordance with the most current revision of Division 6, Bitumous Materials, Section 2 Asphalt Concrete Pavement within the Standard Specifications for Highway Construction as published by the Government of Northwest Territories Department of Infrastructure.

.2 Segregation shall be defined in accordance with the Alberta Transportation Segregation Rating Manual, 2017 (or newest version thereof), unless otherwise directed by the Engineer.

END OF SECTION

PART 1 GENERAL

.1 This Specification refers to the supply and production of Portland cement concrete for Roadway Concrete such as curbs, gutters, sidewalks, medians and traffic islands.

PART 2 PRODUCTS

2.1 General

.1 Unless otherwise specified, the Contractor shall be responsible for the supply and delivery of all Portland cement, coarse aggregate, fine aggregate, water, and admixtures where required.

2.2 Portland Cement

.1 Portland cements and all cementitious materials shall conform to CSA A3001.

.2 Unless otherwise specified, Type GU (General Use) Portland cement shall be used in all concrete.

.3 The blending proportions of the supplementary cementitious materials shall not qualify the concrete mix design as a concrete made with high-volume supplementary cementing materials (HVSCM) as defined by CSA A23.1, clause 8.7. Use of HVSCM concrete shall be subject to the prior approval of the City Engineer.

2.3 Water

.1 Water used for producing and curing shall conform to the requirements of the latest version of CSA A23.1/ A23.2.

.2 Water deemed not potable shall be subject to the prior approval of the City Engineer. The testing shall be performed by an organization certified by the Standard Council Canada.

2.4 Aggregates

.1 All aggregates used in the production of Portland cement concrete shall conform to the requirements of the latest version of CSA Standard CSA A23.1, Concrete Materials and Methods of Concrete Construction. All aggregates shall be subject to the prior approval of the City Engineer.

.2 Aggregates are suitable for most concrete applications if the aggregates comply with Clauses 4.2.3.1 to 4.2.3.7 and Tables 10 to 12 of the latest version of CSA A23.1.

.3 Additionally, the maximum Petrographic Number (PN) of coarse aggregate shall not exceed 125 for concrete pavements and shall not exceed 140 for Structures, Sidewalk, Curb and Gutter, and Concrete Base, and shall be determined in accordance with CSA A23.2-15A. The petrographic analysis report shall be signed and sealed by a Professional City Engineer or a Professional Geologist.

.4 Fine aggregates shall have no more than 45% passing any sieve and retained on the next consecutive sieve. The fineness modulus shall be a minimum of 2.3 and a maximum of 3.1.

.5 All aggregates shall be subject to the prior approval of the City Engineer. All required supporting test data shall be less than 12 months old at the time the concrete mix design is submitted.

2.5 Admixtures

.1 All admixtures shall be in liquid form and non-chloride base. The admixtures shall be stored and handled in accordance with the requirements of the manufacturer. All admixtures shall be supplied by one manufacturer.

.1 Air Entraining Agent:

Air entraining admixtures shall conform to the requirements of the latest version of CSA A23.1 and ASTM C260. Air-entraining admixtures shall be subject to the prior approval of the City Engineer.

.2 Water-Reducing Admixture:

Water-reducing admixture shall meet the requirements of ASTM C494, Type A, B, or D. High-range water reducing admixtures (superplasticizers) shall meet the requirements of ASTM C494, Type A and F or ASTM C1017.

.3 Other Admixtures:

Where the use of other admixtures is approved by the City Engineer, the admixtures shall conform to the requirements of the latest versions of CSAA23.1 and ASTM C494.

PART 3 EXECUTION

3.1 Storage

.1 The Contractor shall provide, at their expense and to the satisfaction of the City Engineer, cement storage facilities of sufficient capacity to store all cement ordered to the job site and, notwithstanding the foregoing, shall provide, at least, sufficient cement storage capacity to store the cement required for one full day of production. Cement storage facilities shall be capable of protecting the materials from the weather.

.2 When more than one type of cementitious material is specified, separate storage shall be provided for each type.

.3 Cement and cementitious materials shall be stored and handled in such a way as to prevent any damage or contamination.

3.2 Protection

.1 No cement type shall be mixed with a different type or with any other material without the specific approval of the City Engineer.

.2 The Contractor shall take all necessary precautions to prevent contamination of the cement by cement of another type or by any deleterious material. Any cement contaminated, or damaged for any reason whatsoever, shall be replaced by the Contractor at their own expense.

.3 The Contractor shall take all necessary precautions to prevent the segregation, damage and contamination of all aggregates used in the production of Portland cement concrete. Any segregated, damaged or contaminated aggregate shall be replaced by the Contractor at their own expense.

3.3 Production

.1 The Contractor is responsible for the proper operation and maintenance of all equipment necessary for handling materials, producing and delivering of the concrete and performing all parts of the Work to meet this Specification.

.2 Concrete shall be supplied from a facility that is certified in accordance with a recognized independent concrete organization which operates a formal facility certification program. Certification shall conform to a recognized standard (e.g., ASTM C94 and/or ASTM C685), be completed by a Professional Engineer registered with NAPEG, and shall include periodic documentation that demonstrates compliance with the applicable certification standard.

.3 Scales or other mass-measuring devices shall be accurate to ±0.4% of the total capacity of the device when static-load-tested. A certificate of accuracy not more than 180 days old shall be provided for the scales or measuring devices by a company using weights traceable to national standards. Where there is reasonable doubt concerning the accuracy of the scales or measuring devices, the Department may require calibration before or during progress of Work.

3.4 Mix Design

.1 The concrete shall be produced in accordance with CSA A23.1, Table 5, Alternative Number 1, Performance Approach. The Contractor is responsible for the preparation and submission of a mix design for the production of Portland cement concrete to be used in the Contract. The concrete mix shall be designed to provide adequate strength and durability for the intended use and to meet the requirements specified in the Contract.

.2 The Contractor shall use professional engineering services and a qualified testing laboratory licensed to practice in the Northwest Territories to carry out the design of the concrete mixture.

.3 A complete mix design submission (e.g., the Sample Concrete Mix Submittal Form in CSA A23.1- Annex J), shall be submitted to the Engineer for approval a minimum of seven days prior to the production of concrete. The Contractor shall not produce concrete until the mix design has been approved by the Engineer.

.4 If, during the progress of the Work, it is determined that the concrete does not meet the requirements of the Specification, the Contractor shall provide a new mix design for the Engineer's approval, in accordance with the foregoing requirements.

.5 All concrete shall be produced in accordance with the approved mix design.

3.5 Class of Concrete and Properties

.1 The CSA Class of Exposure of the concrete and its corresponding properties (i.e., maximum water-to-cementing materials ratio, minimum specified compressive strength, air content category, curing type and chloride penetrability requirement) and any additional/special performance requirements of the Portland cement concrete at 28 days shall be specified in the Contract.

.2 Unless otherwise specified, the concrete for concrete roadway structures such as curbs, gutters, sidewalks, medians and traffic islands shall be CSA Class of Exposure of C-2 concrete with a minimum 28-day compressive strength of 32

MPa and shall have a nominal maximum aggregate size of 19 mm. The air content of plastic concrete shall be 5.0% to 8.0% (6.5 ± 1.5%) at the time of placement.

3.6 Air Content

.1 The air content of the plastic concrete shall be in accordance with the requirements of the latest version of CSA A23.1, Table 4 based on the nominal maximum size of the coarse aggregate and air content category.

3.7 Slump

.1 The minimum permissible slump shall be that which allows the concrete to be placed efficiently and provide a homogenous mass. The maximum permissible slump shall be 80 mm, ± 30 mm, unless otherwise specified in the contract documents.

.2 When superplasticizer is approved by the Engineer, the Contractor shall identify target slump for the concrete after the addition of superplasticizer. The tolerance on measurement of concrete slump after addition of superplasticizer shall be ± 30 mm and the maximum slump including tolerance shall not exceed 230 mm. Slump of concrete shall be measured before and after the addition of superplasticizer.

.3 Re-tempering concrete by adding water will not be permitted.

3.8 Concrete Temperature

.1 The concrete temperature at the time of placement shall be according to the requirements of the latest version CSA A23.1, Table 14 based on the thickness of the section.

3.9 Sampling & Testing

.1 Quality control testing and inspections are the sole responsibility of the Contractor. The Contractor shall outline in the QC Plan the quality control planned for Portland cement concrete.

.2 Quality assurance sampling, testing and inspections may be performed by the Engineer and/or their representative on all cement and concrete materials.

.3 The Contractor shall cooperate with the Engineer and/or their representatives in obtaining the samples required, and shall provide safe, convenient access, acceptable to the Engineer for inspection and sampling of materials used to supply the Portland cement concrete.

.4 Field sampling and test procedures shall be carried out in accordance with the requirements of CSA A23.2 by personnel certified under an industry-recognized program such as: CSA A283 or ISO 9001 with equivalent scope to CSA A283; CCIL Certified Concrete Testing Technician; or ACI Concrete Field Testing Technician Grade 1.

.5 All sampling and testing shall be in accordance with the requirements of the latest version of CSA A23.1 and CSA A23.2 by personnel certified under an industry-recognized program. Temperature shall be measured according to CSA A23.2-17C. Slump shall be measured according to CSA A23.2-5C. Air content shall be measured according to CSA A23.2-4C. Compressive strength shall be measured according to CSA A23.2-9C. Copies of calibration certificates shall be available for review.

.6 Samples for determining acceptance of concrete for slump and air shall be collected according to CSA A23.2-1C after approximately 10% of the load has been discharged. The discharge shall be stopped until found acceptable. If the test results indicate that the concrete does not meet the specified requirements and adjustments permitted in the Acceptance and Field Adjustments of Plastic Concrete clause cannot produce acceptable concrete, the remainder of the load shall be rejected.

.7 Slump, air content, and temperature shall be measured on each load of concrete until satisfactory control is established. It is established when five consecutive concrete loads are within the specified requirements without field adjustments as described in the Acceptance and Field Adjustments of Plastic Concrete clause. After satisfactory control has been established, quality control testing shall be carried out on every third load.

.8 If testing indicates that a load does not meet the requirements, quality control testing shall resume on each load until satisfactory control is established.

.9 Not less than one compressive strength test shall be made from samples from each 50 m3 of concrete placed, and in no case shall there be less than one test from each day's production. Concrete test cylinders for compressive strength testing for acceptance, and for referee testing purposes where required, shall be cast, cured and transported according to CSA A23.2-3C. One set of cylinders for concrete made with aggregate of nominal maximum size larger than 19.0 mm shall consist of three 150 mm diameter x 300 mm long cylinders. For all other concrete, a set of cylinders shall consist of four 100 mm diameter x 200 mm long

cylinders. Additional samples may be cast, at the discretion of the Engineer or Contractor.

.10 When any individual strength test result falls below the specified minimum strength at the corresponding testing age by more than 3.5 MPa or when the average strength test result falls below the specified minimum strength, the Engineer may require the Contractor to extract and test concrete cores in accordance with CSA- A23.2-14C by an independent CSA certified testing laboratory. The compressive strength of the concrete in the area of the structure represented by the core tests shall be considered adequate when satisfies the requirements of clause 4.4.6.6.2.2 of the CSA A23.1. Unacceptable concrete shall be subject to removal and replacement.

.11 The Contractor shall supply temperature-controlled storage boxes (e.g., cooler box), as specified in Subsection

.12 8.3.2.1 of CSA A23.2-3C, to store the samples for a period of not less than 24 hours or until removed from the site. The Contractor shall place a max-min thermometer in each storage box and record site curing temperatures. Further protection from adverse weather conditions may be required.

.13 Slump, temperature of plastic concrete, air content shall be determined in conjunction with each strength test. The Contractor is responsible to deliver the test cylinders to an independent CCIL certified testing laboratory.

3.10 Acceptance and Field Adjustments of Plastic Concrete

.1 Slump of concrete shall be measured before and after the addition of superplasticizer (if allowed by the City Engineer). Air content shall be measured after any addition of superplasticizer. No field adjustment for air content or temperature shall be permitted.

.2 The following actions may be allowed prior to acceptance of the load when the measured slump is high:

.1 Concrete before addition of superplasticizer or concrete without superplasticizer: When the measured slump is higher than that specified, the Contractor shall be permitted to immediately measure the slump again when there is time available within the discharge time limit specified. When the measured slump is higher than that specified, the plastic concrete shall be rejected.

.2 Concrete containing superplasticizer: When superplasticizer is added on site and the measured slump prior to addition of superplasticizer is within specified limits but exceeds the upper limit after the addition of superplasticizer and there is time available within the discharge time limit specified, the Contractor shall be permitted to wait and measure the slump again. If the measured slump is higher than that specified, the plastic concrete shall be rejected.

.3 The following field adjustments may be carried out prior to acceptance of the load when the measured slump is low:

.1 For site-added superplasticizer:

.1 Water may be added before superplasticizer is added at the site. Water additions may be done before discharge of concrete from the truck has started or when the measured slump of concrete is lower than the maximum targeted range provided the extra water does not exceed the maximum specified water-to-cementing ratio of the mixture.

.2 No water shall be added after the addition of a superplasticizer. Only one dosage of the superplasticizer is allowed.

.2 For plant-added superplasticizer:

.1 No water shall be added at the site.

.2 Only one dosage of the superplasticizer may be added.

.4 To ensure that the concrete is uniformly mixed, the load of concrete shall be mixed for 30 revolutions or more at the designated mixing speed after the field adjustment. The load shall be tested for acceptance for slump, air content and temperature.

3.11 Discharge Time

.1 When concrete is transported to the site by means of agitating or mixing equipment, discharge of the concrete shall be completed within 120 minutes after introduction of the mixing water to the cement and aggregates, except when the air temperature exceeds 28°C, the concrete shall be discharged within one hour after the introduction of the mixing water.

.2 Exceptions to the maximum time limit, if required, shall be approved by the City Engineer prior to placement of the concrete.

3.12 Delivery Ticket

.1 A delivery ticket shall be issued for each load. The following information shall be printed on each delivery ticket:

.1 Contract number;

.2 Date and time of batching concrete;

.3 Address of the batching plant;

.4 Truck number;

.5 Any adjustments at the site;

.6 Concrete Mix Design number; and

.7 Specified minimum compressive strength of concrete at the corresponding testing age.

3.13 Submission of Plastic Concrete Test Results

.1 After each day's work, the Contractor shall submit to the City Engineer a copy of the delivery ticket for each load of concrete and a daily summary report summarizing air contents, slumps before and after any modifications, concrete temperature, and all adjustments made to each load of concrete and shall identify rejected material.

3.14 Submission of Hardened Concrete Test Results

.1 The test results on the hardened properties of the concrete along with the properties of the fresh concrete and recorded max-min temperatures during the first 24 hours shall be provided to the City Engineer once they become available. One cylinder shall be tested at seven days. Three cylinders shall be tested at 28 days. Three cylinders shall be tested at 56 days (when required).

.2 The compressive strength of concrete shall be considered satisfactory if: the averages of all sets of three consecutive strength tests equal or exceed the specified strength with no individual strength test result below the specified minimum strength by more than 3.5 MPa.

PART 4 BASIS FOR PAYMENT

.1 Supply and Production of Portland Cement Concrete will not be measured separately for payment but shall be measured and paid for in accordance with the applicable Specifications for the respective structure for which the concrete is being used.

END OF SECTION

PART 1 GENERAL

.1 This Specification refers to concrete roadway structures, such as curbs, gutters, sidewalks, medians and traffic islands.

.2 These structures shall consist of air entrained Portland cement concrete with or without reinforcing steel, prepared in accordance with the Specifications and to the lines, grades and typical cross-sections as shown in the Drawings or as designated by the City Engineer.

PART 2 PRODUCTS

.1 Concrete shall be produced in accordance with Section 32 16 00.01 Portland Cement Concrete.

.2 Concrete for Curb and Sidewalk shall meet the following minimum properties:

Parameter	Minimum
Strength (after 28 days curing time)	32 MPa
Nominal Maximum Aggregate Size	19.0 mm
Air Content	5% – 8%
Exposure Class (for protection against chlorides)	C-2
Maximum Water – Cement Ratio	0.45

.3 The Class of Exposure shall be according to the most recent version of CSA A23.1, Table 1. Coarse aggregate for the concrete shall have a nominal maximum size of 19.0 mm.

.4 Bedding and/or level course aggregate shall be Granular A, 25mm crushed granular base course.

.5 Joint filler shall conform to the requirements in the most recent version of ASTM D1751 and shall be of adequate dimensions to fill the joint fully and continuously throughout its entire depth.

.6 Curing compound shall conform to the most recent version of ASTM C309, Type 2 (white pigmented), Class B (must be a resin).

.7 Reinforcing bars shall conform to the most recent version of CSA G30 Grade 400W and shall be deformed bar unless indicated otherwise on the Drawings. Welded steel wire fabric shall conform to the most recent version of ASTM A1064.

PART 3 EXECUTION

3.1 Construction Conditions

.1 Concrete shall not be placed during heavy rain, snow, freezing temperatures or other unsuitable conditions. Concrete shall not be placed upon a frozen, wet, muddy or rutted base unless otherwise directed by the City Engineer.

.2 Concrete shall not be placed when it appears likely that the temperature will fall below 5 degrees Celsius within the next twenty-four hours, unless special precautions approved by the City Engineer are taken.

3.2 Level Course

.1 Level course shall be placed and compacted to a maximum depth of 50 mm as required to adjust the subgrade to the design grades and cross-sections.

3.3 Dimensions

.1 Concrete roadway structures shall be constructed to the dimensions shown in the Drawings, or as designated by the City Engineer.

3.4 Construction Forms

.1 Forms may be either steel or wood but shall produce a true line without irregularities in the alignment. Flexible forms shall be used for all structures having a radius less than 40 m.

.2 Forms shall be cleaned of hardened concrete or other foreign matter and shall be smooth and free from warps and holes and shall be constructed and maintained to be mortar tight.

.3 Any form which has lost its shape or has become dented or rough shall not be used.

.4 Enough forms shall be placed and checked before concrete is poured to ensure true line and grade.

.5 The forms shall be well-stayed and braced or otherwise held rigidly to the established line and grade.

.6 Any form which has lost its shape or has become dented or rough shall not be used.

3.5 Placing Concrete

.1 Concrete shall be placed only after the forms have been inspected and approved by the City Engineer.

.2 Concrete shall be placed only on base which is sufficiently moist to prevent absorption of water from the freshly placed concrete. Where necessary, the base be sprinkled with water to raise the moisture content to the desired level.

.3 All forms shall be thoroughly moistened or oiled prior to placing concrete. Chemicals shall not be used to remove ice or hardened loss of the ingredients.

.4 Concrete shall be handled from the mixer to the place of use as rapidly as possible by methods which will prevent the separation or loss of the ingredients. Concrete shall be deposited in the forms as close as possible to its ultimate location to reduce rehandling or flowing.

.5 Under no circumstances shall concrete that has partially hardened or exceeded the specified delivery time be used.

.6 A mechanical vibrator shall be used during the concrete placing operation as required to eliminate air pockets and honeycombing. To secure uniform dense surfaces, vibration shall be supplemented by hand spading.

.7 Pours shall start and stop at expansion joint and surplus material shall be wasted.

3.6 Stripping Forms

.1 The face of curb form shall be removed within two hours after the initial set to permit proper finishing of the concrete.

.2 Adequate care shall be taken to avoid damage to the concrete surface when removing the forms.

.3 Any patching that is necessary shall be done immediately after the forms have been removed.

3.7 Sidewalk Joints

.1 Sidewalk joints in concrete prevent cracking in unwanted locations, by creating points / areas that allow expansion and contraction (e.g., expansion joints), or by creating points / areas to break (e.g., dummy joints), as preferred.

3.8 Expansion Joints

.1 Expansion joints allow subsequent sidewalk panels, structures, and objects to move completely independent of each other. Expansion joints shall be constructed to the full depth of the slab. Expansion joints shall be filled with approved non-extruding expansion joint material (e.g., premoulded fiberboard / felt) and shall be clean and dry at the time of construction. This joint shall be placed in the following locations:

.1 At 6.0 m intervals along sidewalks.

.2 Adjacent to any rigid structures (i.e., poles, walls, hydrants, and other objects).

.3 At the beginning and end of every curved sidewalk section.

.4 At both edges of every driveway.

.5 At the midspan of every driveway wider than 6.0 m.

.6 At changes in direction.

3.9 Contraction Joints

.1 Unlike expansion joints, contraction joints (or ‘dummy’ joints) do not completely isolate the sidewalk slab from subsequent objects. Instead, this joint will create a weak point in the concrete, so that if a crack develops, it will occur at the contraction joint.

.2 This joint is constructed by troweling an indentation into the concrete at the location of the joint, at a depth of one quarter the thickness of the sidewalk (e.g., a minimum depth of 25 mm), and shall be hand formed using a 5 mm radius joint tool.

.3 Contraction joints may also be sawcut to the required minimum depth, that is one quarter the thickness of the sidewalk. When sawcutting is used, sawcutting shall be carried out as soon as the joint can be sawcut, without ravelling the joint or damaging the concrete surface, and prior to any cracks developing. Sawcut joints shall be cleaned to remove all sawcut slurry, grinding and grooving

effluent, if applicable, and any other debris from the joint. Cleaning of joints shall consist of flushing the joints with water in one direction to remove slurry, effluent, and debris.

.4 Contraction joints shall be placed at 1.5 m intervals along the sidewalk between expansion joints. Contraction joints are required in driveways at intervals of 1.5 m, but in no case, less than 1.0 m.

.5 Additional expansion and contraction joint details are depicted on the Specification figures.

3.10 Construction Joints

.1 If the end of a concrete pour does not terminate at an expansion joint, a construction joint is to be placed at the end to strengthen a cold joint.

.2 This joint is constructed by forming a groove at the edge of the concrete slab to create and interlocking edge as shown below.

3.11 Longitudinal Joints

.1 Longitudinal joints are located parallel to the running surface of sidewalks, for sidewalks that are over 2.5 m wide. Longitudinal contraction joints shall be constructed with equal spacing between joints and from joints to the sidewalk edges. If the joint is constructed by completing two separate concrete pours, 600 mm long 10M steel rebar can be placed perpendicular to longitudinal joints, at 500 mm intervals between expansion and contraction joints, to provide additional strength.

.2 Sidewalk joint spacing is summarized in the table below.

Joint Intervals	Interval
Expansion	6.0 m
Contraction	1.5 m
Construction Joints	At the end of each pour
Longitudinal Joint	Mid-span for sidewalks wider than 2.5 m

.3 Additional longitudinal joint details are depicted the Specification figures.

3.12 Finishing

.1 Finishing treatments must be completed prior to the curing of concrete to provide slip resistance and increased durability.

.2 Curb & Gutter

.1 The top of the gutter and the top and face of the curb shall be troweled to a smooth finish and the edges neatly rounded by use of a 5 mm radius edging tool. Excessive troweling shall be avoided. The final finish shall be lengthwise brushing with a soft bristle brush as approved by the City Engineer. Neat cement or water shall not be used in the finishing process. Any surface grooves produced shall be a maximum of 3 mm deep.

.3 Sidewalks & Medians

.1 Sidewalks shall be troweled to a smooth, uniform finish. Excessive troweling shall be avoided. The final finish shall be a transverse brushing with a soft bristle brush approved by the City Engineer. The edges shall be neatly rounded by use of a 5 mm radius edging tool. Neat cement or water shall not be used in the finishing process. Any surface grooves produced shall be a maximum of 3 mm deep.

.4 The concrete formwork is to be removed 24 to 48 hours after the placement of the concrete. Exposed surfaces are required to be thoroughly sprayed with water and a membrane curing compound over the entire surface area.

.5 Where temperatures are less than 7 degrees Celsius, concrete must be protected from freezing for 72 hours using a heated blanket approved by the City, to completely cover the concrete.

.6 Pedestrians and animals must not be permitted to walk on the sidewalk until fully cured. All vehicles must remain off the sidewalks for 3 days.

.7 Concrete should be allowed to cure for 30 days before de-icing salts are applied to allow it to reach its maximum strength.

.8 Surface cavities larger than 50 mm and any honeycombed areas occurring along the formed surfaces shall be filled with mortar composed of one part Portland cement and two parts sand with 12% of entrained air. The location of repair areas shall be reported to the City Engineer.

3.13 Protection of Sidewalk

.1 Vehicular traffic shall be restricted from crossing the sidewalk after the concrete has been placed for a minimum period of 3 days or until the concrete has reached 75% of the specified 28-day compressive strength.

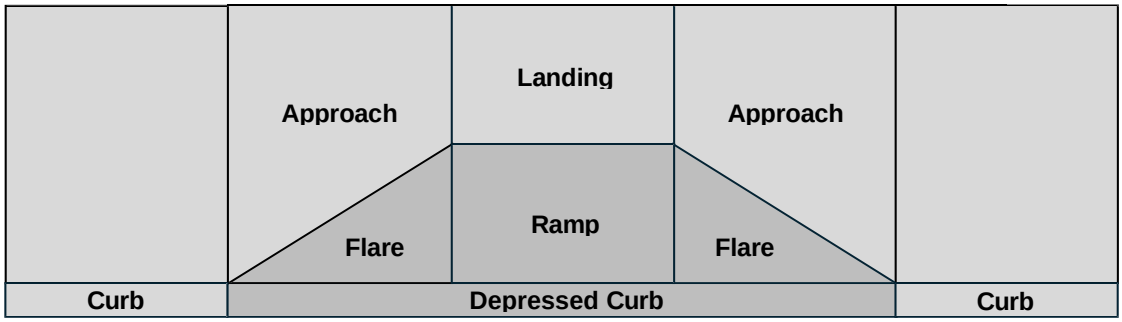
3.14 Pedestrian Crossings

.1 Crosswalks are locations where the pedestrians cross a travelled vehicular path. At these crossings, sidewalks must be depressed to enable pedestrians to cross, who may require an assistive mobility device (e.g., walker, wheelchair, stroller, etc.).

.2 Tactile Walking Surface Indicators are to be placed at every crossing location to support / guide the visually impaired.

3.15 Sidewalk Ramps

.1 At each pedestrian crossing, a sidewalk ramp is required to provide a grade transition. Sidewalk ramps are to be implemented at mid-block crossings, intersection pedestrian crossings, and driveways. A sidewalk ramp is composed of multiple segments as depicted below.



.2 The properties of sidewalk ramps are summarized below.

Sidewalk Element	Length	Approach Grades	Thickness
Ramp	1.5 m	5% running, 2% cross	150 mm
Landing	1.2 m	2%	150 mm
Flares	-	8%	150 mm

.3 Additional ramp details are depicted on the Specification figures.

3.16 Tactile Surfaces

.1 Tactile walking surface indicators (TWSI's) are rectangular plates with a contrasting colour tone that are inserted into the sidewalk to provide a physical warning to the visually impaired. TWSI's provide a slip-resistant raised tactile profiles that protrude from the sidewalk surface.

.2 Tactile plates are required at all pedestrian crossings and can be either a bright yellow polymer coated plate, or a cast iron plate. The polymer coated TWSI plates are more susceptible to damage from snow removal equipment; however, they provide higher contrasting colour tone for the visually impaired. Polymer coated TWSI plates can be affixed to a backplate, which allows for easy replacement, if damaged. Cast iron TWSI plates are significantly more durable and can be permanently secured in place by installing in wet concrete; however, the patina colour of cast iron TWSI's provide limited colour contrast for the visually impaired.

.3 Additional TWSI details are depicted on the Specification figures.

3.17 Standard & Commercial Driveway Crossings

.1 Unlike at mid-block or road crossings, sidewalks should be continuous through minor driveways. Sidewalks are depressed approaching the driveway from both directions, while maintaining previously established slope requirements.

.2 The sidewalk will start tapering down to driveway elevation at a distance of 1.5 m from the driveway. The segment of driveway sloped toward the roadway should have a maximum slope of 8%.

.3 Sidewalk thicknesses are noted in the table below and wire mesh placed within the concrete, consisting of 152 mm x 152 mm MV 13.3 / MV 13.3 welded wire is required at all driveways to provide additional strength, to support heavy vehicles.

Parameter	Minimum
Thickness at Residential Crossing	150 mm
Thickness at Commercial Crossing	200 mm

.4 Wire mesh reinforcement, when specified, shall be properly placed and held in the correct position during the placement of concrete using chairs or other means approved by the City Engineer. Joints in the wire mesh shall be overlapped 100 mm. Wire mesh reinforcement shall terminate a minimum of 50 mm from any expansion or construction joint.

3.18 Identification Stamp

.1 The Contractor shall mark the concrete structure with a marking tool showing the initials of the Contractor and the year of construction. These marks shall be made at the ends of each block and at the termination points if the construction is terminated within the middle of a block.

.2 All sections containing reinforcing steel shall be marked at their extreme limits with a marking tool showing the letter "R".

3.19 Curing

.1 The surface of the concrete shall be protected from the sun and wind by an approved curing compound. This protection shall be accomplished by coating the entire exposed surface of the concrete with a curing compound immediately after the concrete has received its finish treatment. The curing compound shall be approved by the City Engineer prior to application. When the front and the back forms are removed, the exposed concrete surfaces shall immediately be coated with the approved material.

.2 The curing compound shall be applied uniformly at the manufacturer's recommended rate of application by means of a pressure spray distributor. The curing compound shall be so applied that the concrete surface is completely coated. A second application of curing compound shall be applied within 30 to

60 minutes after the first application. The surface shall be maintained in this condition for a minimum period of seven days.

.3 Under no circumstances shall any material be added to the curing compound as delivered by the manufacturer.

3.20 Cold Weather Requirements

.1 When there is a probability of the air temperature falling below 5°C within 24 hours of placing (as forecast by the nearest official meteorological office), all materials and equipment needed for adequate protection and curing shall be on hand and ready for use before concrete placement is started as per the most recent version of CSA A23.1, clause 7.1.2. All reinforcing materials, forms, and ground with which the concrete is to come in contact shall be defrosted by means of live steam, or as approved by the City Engineer. Calcium chloride or other de-icing salts shall not be used.

.2 During cold weather, as defined above, adequate protection of the concrete by means of heated enclosures, coverings, insulation or a combination of these methods shall be provided that will maintain the concrete temperature at a minimum of 10°C for the duration of the required curing period. The protective measures shall be modified as necessary.

.3 Protective coverings used to conserve heat shall be kept clear of the concrete to permit free circulation of air.

.4 Straw or similar materials for protection against frost shall not be allowed to come in contact with fresh concrete.

.5 Concrete showing evidence of freezing shall be replaced and removed from the job at the Contractor's expense.

3.21 Hot Weather Requirements

.1 When the ambient air temperature is at or above 27°C, or when there is a probability of the temperature rising above to 27°C during the placing period (as forecast by the nearest official meteorological office), facilities shall be provided for protection of the concrete in place from the effects of hot and/or drying weather conditions in accordance with the most recent version of CSA A23.1, clause 7.1.1.

.2 Concrete shall be protected from excessive loss of moisture during periods or hot or windy weather.

.3 Placing operations shall be discontinued if surface cracking due to excessive drying is evident.

3.22 Backfilling Structures

.1 The boulevard area behind the concrete structures, medians or traffic islands shall be cleared of construction debris prior to backfilling to the design cross section with the specified material.

.2 Backfill shall be placed as shown on the Drawings or as staked by the City Engineer.

.3 Placing of the backfill shall be done promptly after the forms have been stripped to avoid any possible damage to the concrete structure.

.4 The Contractor shall leave all backfill areas in a trimmed, neat condition.

3.23 Finished Grades

.1 Surface

.1 All exposed concrete surfaces shall be checked by the Contractor with a 3 m straightedge, and any water pockets or deviations in line or grade exceeding 5 mm shall be corrected immediately, at the Contractor's expense.

.2 Elevation

.1 Differences in elevation at any given point from that specified shall not exceed ± 25 mm and the variation over 10 m intervals shall not be greater than 25 mm. Any deviations greater than those specified shall be corrected immediately at the Contractor's expense.

3.24 Drainage Considerations

.1 Sidewalks will be designed and constructed such that no ponding will remain on the surface of the sidewalk, recorded 24 hours after a precipitation event.

.2 All sidewalks must slope toward the roadway or ditching. Sidewalks must be flush / at grade with the surrounding boulevards and adjacent lands to ensure proper drainage.

3.25 Signage

.1 Signage should not block walking paths along sidewalks or at crossing locations.

.2 Traffic control signs shall be manufactured and installed in accordance with the latest edition of “Uniform Traffic Control Devices for Canada”.

3.26 Safety Considerations

.1 If the running slope of a sidewalk is greater than 5% at any point, it may be treated as a ramp with the installation of handrails along the steep sections of sidewalk, and proper landings at intersections should also be considered, all to minimize slip and fall injuries. The City may consider treating steep sidewalks as ramps in areas with high pedestrian activity or areas where pedestrians require an assistive mobility device (e.g., walker, wheelchair, stroller, etc.).

.2 Tactile walking surface indicators (TWSI’s) are required at all pedestrian crossings, including midblock and intersection crossings. TWSI panels must be flush with the sidewalk surface to mitigate tripping hazards.

.3 Deterioration of the sidewalks should be monitored by the City to ensure there are no cracks or divots that would cause tripping hazards.

3.27 Test Methods

.1 Sampling and testing shall be performed in accordance with Section 32 16 00.01 Portland Cement Concrete.

.2 Unless otherwise specified, the most recent versions of the following test methods shall be used to determine the material characteristics.

Test Description	Method No.
Slump	CSA A23.2-5C
Plastic Air Content	CSA A23.2-7C
Concrete Temperature	CSA A23.2-17C
Compressive Strength	CSA A23.2-9C
Hardened Air Void System	ASTM C457
Rapid Chloride Permeability	CSA A23.2-23C

3.28 Inspection During Construction:

.1 The City inspector will confirm the following prior to the pouring of the concrete:

.1 Concrete testing must be carried out in accordance with the latest edition of CAN/CSA 23.1/CSA 23.2 "Concrete materials and methods of concrete construction/Test Methods and Standard Practices for concrete"

.2 The concrete supplier must stamp a submittal to confirm the concrete design meets the City's requirements.

.3 Curing membrane and heated concrete blankets are to be used, as required.

.4 Granular thickness and review compaction records. The contractor will retain a geotechnical firm licensed by the Northwest Territories and Nunavut Association of Professional Engineers and Professional Geoscientists (NAPEG) to conduct compaction testing.

.5 The placement of formwork with the tender drawing package, is to be checked for alignment, spacing, and sizing.

.6 The height of the forms and the thickness of granular material at the edges and center are to be checked to ensure the minimum concrete thickness is met.

.7 The use of rebar or welded wire mesh is to be confirmed at all commercial driveways and / or longitudinal joints.

.8 Sidewalk slopes and horizontal clearance to be confirmed City requirements are met.

.2 The City inspector will confirm the following after the pouring of the concrete, but prior to the concrete curing:

.1 The joints and finishing meet City requirements.

.2 The finishing is not too deep and that there are no jagged sections or tripping hazards.

.3 TWSI's are installed, in accordance with these guidelines and City requirements.

.4 That curing membrane and heated concrete blankets are used, as required.

.3 The City inspector will confirm the following prior to the substantial completion of the project:

.1 The placement of signage from the sidewalk.

.2 Review the pooling of water on any sidewalks 24 hours after rain.

.3 If any deficiencies have occurred. Deficiencies may include cracking, settlement, heaving, vertical displacement, reverse crossfall, missing corners and spalling.

.4 The City inspector will confirm the following prior to end of the maintenance period:

.1 If any deficiencies have occurred. Deficiencies may include cracking, settlement, heaving, vertical displacement, reverse crossfall, missing corners and spalling.

3.29 Requirements for Acceptance

.1 Completed concrete work will not be accepted unless the following requirements have been met:

.2 Strength

.1 If the concrete strength requirements specified herein are not met, the construction represented by the low tests is not acceptable and shall be removed and replaced.

.2 Removing and replacing of rejected concrete construction shall be done at the Contractor's expense.

.3 Air Content

.1 If the measured air content falls outside the limits specified herein, a check test shall be made immediately on another portion of the same sample. In the event of a second failure, the load or batch of concrete shall be rejected. No field adjustment for air content will be allowed.

.2 Replacement of the rejected material shall be done at the Contractor's expense.

.4 Slump

.1 If the measured slump falls outside the limits specified herin, a check test shall be made immediately on another portion of the same sample If the second test results indicate that the concrete does not meet the specified requirements and adjustments permitted in the Acceptance and Field Adjustments of Plastic Concrete clause cannot produce acceptable concrete the load or batch of concrete shall be rejected.

.2 Replacement of the rejected material shall be done at the Contractor's expense.

.5 Other

.1 Any work found to be defective or damaged by weather, traffic or other causes, shall be repaired or removed and replaced, as directed by the City Engineer, at the Contractor's expense.

PART 4 BASIS OF PAYMENT

4.1 General

.1 The quantities, determined as specified, will be paid for at the applicable Contract unit prices which shall be compensation in full for permits, royalties, aggregate purchase, excavating, crushing, blending, screening, elimination of fines, drying, storing, loading and stockpiling of aggregates; purchasing, transporting, storing and handling of cement; preparation of mix design, base preparation, levelling course, forming, concrete mixing and transporting, placing, vibrating, jointing, reinforcing, finishing, curing, backfilling, construction of crossings, and the supply of all materials, equipment, plants, labour, tools and incidentals necessary to complete the Work in accordance with the Specifications.

4.2 Concrete Structures

.1 Curbs, Gutters, Combination Curb and Gutter sections, Sidewalks, Monolithic Sidewalk Curb and Gutter Sections, concrete Barriers, and Swales or combinations thereof.

.2 The following structures will be measured in linear metres to the nearest 0.1 m and payment will be made at the applicable contract unit price for the item:

.1 Curbs, measured along the length of the curb, with separate payment for each type of curb.

.2 Gutters, and outlet gutters, measured along the length of the gutter.

.3 Combination curb and gutter, measured along the length of the curb face.

.4 Separate sidewalk, measured along the length, with separate payment for each specified width.

.5 Monolithic sidewalk curb and gutter, measured along the length, with separate payment for each specified width.

.6 Swales, measured along the flow line.

.7 Concrete barriers, measured along the length.

.3 Sidewalk Tie-in

.1 Payment for sidewalk Tie-ins shall be at the all-inclusive Contract unit price per tie-in. Payment will be based on the actual number of sidewalk tie-ins completed.

.4 Solid Concrete Medians and Islands

.1 Solid concrete medians and islands will be measured in square metres of completed top surface area and payment will be made at the applicable Contract unit price per square metre.

.2 The unit prices for solid concrete medians and islands will include the cost of any curbing or curb and gutter forming part of the solid concrete median or island.

4.3 Median and Island Fill

.1 Granular fill material for solid concrete medians or islands will be measured in tonnes and payment will be made under the applicable Contract unit price per tonne for the specified granular fill.

4.4 Median Surfacing

.1 Median asphalt concrete surfacing will be measured in tonnes and payment will be made at the Contract unit price per tonne for Asphalt Concrete Pavement.

.2 Median Portland cement concrete surfacing will be measured in square metres based on the width excluding the curbs and will be paid for at the Contract unit price per square metre for Median Concrete Surfacing. Separate payment will be made for the curb or curb and gutter section forming the perimeter of the median.

END OF SECTION

PART 1 GENERAL

.1 This specification covers the requirements for chain link fencing.

PART 2 PRODUCTS

.1 All unprocessed materials shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works (OPS), Volume 7, OPSS.MUNI.772, and associated OPS drawings, as published by the Ministry of Ontario.

PART 3 EXECUTION

.1 Execution shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works (OPS), Volume 7, OPSS.MUNI.772, and associated OPS drawings, as published by the Ministry of Ontario.

PART 4 BASIS FOR PAYMENT

.1 Measurement and payment shall be in accordance with the most current revision of Ontario Provincial Standards for Roads and Public Works (OPS), Volume 7, OPSS.MUNI.772, and associated OPS drawings, as published by the Ministry of Ontario.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Section 01 33 00 – Shop Drawings and Submittals.

.2 Section 01 78 00 – Closeout Submittals.

.3 Section 01 78 23 – Operation and Maintenance Manuals.

.4 Section 01 78 39 – Project Record Drawings.

.5 Section 31 05 16 – Aggregates.

.6 Section 31 23 33.01 –Trenching and Backfilling.

.7 Section 32 11 23 – Roadway Grading.

1.2 Description

.1 This Section specifies the supply, delivery, and installation of access vaults and fire hydrants, excavation, bedding, backfilling, compaction, and all associated Work.

.2 All materials supplied and workmanship performed shall meet the requirements of the specification and be guaranteed for the conditions of service applied to the Project.

1.3 Handling and Storage of Materials

.1 The Contractor shall assume complete responsibility for the safe delivery to the Site of all equipment specified herein.

.2 Inspect equipment for damage in transit before installation in the Work.

.3 Exercise particular care to avoid structure damage during installation of materials inside the access vaults.

.4 The City of Iqaluit reserves the right to reject access vault appurtenances.

1.4 Reference Standards

.1 Have equipment comply with the latest edition of the applicable codes and regulations including, but not limited to, the following:

.1 Canadian Standards Association Group (CSA).

.2 American Society for Testing and Materials International (ASTM).

.3 Steel Structures Painting Council (SSPC).

.4 American Water Works Association (AWWA).

.2 In case of any conflict between these specifications and any of the above standards, the most stringent standard shall have precedence.

1.5 Delivery to Site

.1 The Contractor shall provide machinery and labour to unload and store the equipment in accordance with manufacturer's requirements.

PART 2 PRODUCTS

2.1 Access Vaults

.1 6 mm carbon steel shall be used for vault construction. Steel shall meet the requirements of CSA G40.20/G40.21, Type 300W.

.2 Access vaults shall be of continuous (fully) welded construction and shall be fabricated completely prior to epoxy coating.

.3 Provide pipe entry spool pieces, ladder mounting studs, and all other access vault parts, etc. as required, pre-welded in place prior to sandblasting and epoxy coating.

.4 Welding shall be completed in accordance with CSA W59, Welded Steel Construction.

.5 Except for the access vault top plate, access hatch, ladder, and ladder extension which shall be hot dipped galvanized after fabrication, the steel access vault shall be sand blasted, and epoxy coated inside and outside after fabrication in accordance with the following:

.1 Surface Preparation

.1 In accordance with the Steel Structures Paint Council SSPC #10 near white blast cleaning. All surfaces shall be dry before any paint is applied.

.2 Paint

.1 Two coats epoxy paint, each coat achieving 8 mm dry film thickness, Interior colour shall be Off White and exterior colour shall be grey. Indurall Ruff Stuff 3300 or Sherwin Williams Macropoxy 646-100, or approved equivalent.

.3 Galvanizing

.1 Shall conform to CSA G164 (minimum 610 g/m^2).

.6 The access vault top plate shall have the words “Confined Space, Entry by Permit Only” stencilled on the exterior cover in red epoxy paint.

.7 All nuts, bolts, washers, screws, etc. shall be zinc plated or cadmium plated.

.8 Prior to fabrication, the Contractor shall verify that the vault diameters, as shown on Design Drawings, are large enough to house the intended vault contents, and shall verify that there is sufficient space available in the vault to allow operations and maintenance staff to complete routine maintenance activities.

.9 Vaults shall be fabricated using standard sizes unless authorized otherwise by the City of Iqaluit. Standard dimensions for access vaults shall be as follows:

Inside Diameter (mm)	Outside Diameter (mm)
1524	1774
1830	2080
2250	2500

2.2 Pipe and Pipe Fittings

.1 Water and sewer pipe shall be Schedule 40 grade 304 Stainless Steel.

.2 Bleeder pipe and fittings inside the vaults shall be Schedule 40 grade 304 Stainless Steel.

.3 Joints shall be made using a grooved pipe system compatible with the pipe, fitting, or appurtenance being installed. The groove system shall be in compliant with the fitting / appurtenance manufacturer’s specifications.

.4 Provide eccentric reducers in horizontal lines with the flat side on top, unless indicated otherwise. Provide concentric reducers in vertical lines unless indicated otherwise.

.5 Watermain couplings shall be Victaulic Style 807N (or approved interchangeable equivalent) with blue coating and with stainless steel nuts and bolts. Gaskets shall be UL classified in accordance with NSF/ANSI 61 for cold potable water.

.6 Sewer main couplings shall be Victaulic Style 489, (or approved interchangeable equivalent) with stainless steel nuts and bolts, with nitrile gaskets. Victaulic Style 807N may also be used.

.7 Watermain flange adaptors for grooved pipe joint of similar materials shall be Victaulic Style 841 (or approved interchangeable equivalent) with blue coating. Gaskets shall be UL classified in accordance with NSF/ANSI 61 for cold potable water.

.8 Watermain connections for grooved pipe joint of dissimilar materials shall be made as follows:

.1 Victaulic Style 841 (with blue coating) on the stainless steel pipe.

.2 Victaulic Style 741 in a hot dipped galvanized housing on the hot dipped galvanized pipe.

.3 Mate the two flange adapters listed above together with a non-metallic washer and bolt isolation kit compatible with potable water.

.9 Screwed pipe and fittings shall be Stainless Steel Class 125 psi (860 kPa).

.10 Paddle blinds shall be 304 Schedule 40 Stainless Steel.

.11 Backflow preventors at bleeder pipes shall be the dual check type. Standard of acceptance is Watts Series LF7R.

2.3 Pipe Supports

.1 Provide piping supports, whether indicated on the Drawings or not, where necessary, to the satisfaction of the City of Iqaluit.

.2 Unless otherwise shown on the Drawings, pipe supports are required under hydrants, sewer clean-outs, pipe deflections, and at tees and crosses.

.3 Pipe supports and fastening hardware shall be manufactured from 304 stainless steel.

.4 Pipe supports shall include a neoprene liner to isolate the pipe from the support saddle.

.5 The pipe support shall, at minimum, cradle the bottom half of the pipe.

.6 Design hangers and supports to provide sufficient support to retain the piping system without exerting undo strain on the pipe, the attached equipment, or the supporting structure. Design hangers and supports to the National Building Code of Canada (NBCC) and ASME B31.3 at pipe pressure rating.

.7 The systems are to allow for pipe movement related to thermal expansion. Sagging or excessive movement from system operation is not acceptable.

.8 Provide details of the proposed support system sealed by a Professional Engineer registered, and in good standing, with the Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists (NAPEG) to the City of Iqaluit. The City of Iqaluit's review of the proposed support system does not relieve the Contractor from overall responsibility of the system integrity under design operating conditions.

.9 Support systems are to allow for the partial dismantling of the piping system especially around equipment or fittings without having to provide supplementary supports. Specific supplementary supports of fittings such as valves are to be provided in addition to piping supports using the support provisions of the fitting.

2.4 Resilient Seat Butterfly Valves

.1 This specification covers Resilient Seated Butterfly Valves in sizes >50 mm.

.2 Body: ASTM A351/A351M grade CF8M suitable for potable water immersion (NSF/ANSI 61 Rated). Drilling shall be as per ASME B16.1, Class 125.

.3 Disc: disc material to be stainless steel conforming to ASTM A351 Grade CF8 or CF8M.

.4 Valve seal shall be UL classified in accordance with NSF/ANSI 61 for cold potable water.

.5 Shaft: high-strength 304 Stainless Steel. The disc shall be attached to the shaft without using pins.

.6 Bearings: all shaft bearings shall be of the self-lubricating, corrosion resistant, sleeve type. Standard of acceptance shall be heavy-duty acetal.

.7 Packing: all valves shall have self-adjusting packing. Packing shall be suitable for the temperature and service conditions.

.8 Pressure: 1,210 kPa, maximum temperature range: 4ºC to 60ºC for water service.

.9 Where valve access ports are included at the top of the vault, the operator nut shall be compatible with the City's standard valve key. If access ports are not practical for the installation (at the discretion of the City), the operator shall be a manual gear operator with handwheel.

.10 Grooved-style valves shall be installed with Victaulic Style 807N (or approved interchangeable equivalent) rigid couplings where required.

.11 Lug-style valves shall be installed with Vic-flange Adapter Style 841 (or approved interchangeable equivalent) for grooved pipe connections.

.12 Valves shall be NSF/ANSI 61 certified and shall be lead free.

.13 Acceptable Manufacturers:

.1 Victaulic Vic-300 Series 861 (Grooved-style)

.2 Approved interchangeable equal.

2.5 Hydrants

.1 Hydrants shall be manufactured in accordance with AWWA 502, latest version.

.2 Hydrants shall be certified by UL in accordance with the NSF/ANSI 61 and NSF/ANSI 372 standards.

.3 Hydrant shall be designed for 1,724 kPa (250 psi) working pressure and tested to 3,447 kPa (500 psi) hydrostatic pressure.

.4 Hydrant shall be a compression type, dry barrel design with centre operating stem construction.

.5 Hydrants shall include two 65 mm CSA 5 threads/inch hose outlets and 114 mm National Standard thread pumper nozzle and cap with extension piece mounted to hydrant body flange and on-line type valve chamber mounted under extension piece for installation on 200 mm - 1,030 kPa standard flanged steel inlet connection.

.6 The hydrant shall have a two-piece operating stem and "break-away “safety flange. The hydrant shall be supplied with insulating gaskets and insulating bolt sleeves and washers.

.7 Direction of opening shall be standard left, with square operating nut.

.8 Approved products:

.1 McAvity No. M67B by Clow Canada.

.9 The Contractor shall confirm the operating nut shape, nozzle type and size, and thread style with the Municipality prior to shipping.

.10 Colour shall be red and shall be applied per AWWA C502 / AWWA C550.

.11 Supply two operating wrenches.

.12 All bolts, nuts, and washers shall be hot dipped galvanized.

2.6 Hydrant Protrusion Seal

.1 Link-Seal LS-500-C or approved equivalent modular seal.

2.7 Miscellaneous Fabricated Steel Work

.1 Ladders, ladder extensions, and top plates shall be hot dipped galvanized after fabrication.

.2 Sewer clean-outs and clean-out covers shall be 304 stainless steel. Typical clean-out covers are bolted down. Alternative cover fastening systems, such as those with a hinged arm and latch, may be approved at the discretion of the City.

.3 All bolts, nuts, and washers shall be cadmium plated.

2.8 Rigid Styrofoam Board Insulation

.1 Rigid insulation shall meet or exceed the following properties:

Manufacturing Process	Closed cell, extruded
Compressive Strength ASTM D1621	276 kPa (40 psi)
Water Absorption, % by volume ASTM D2842 (96 hour immersion)	0.60% Max
Water Vapour Permeance, ng/Pa•s•m^2 (perm), max., ASTM E96/E96M	57.2 (1.0)
Thermal resistance per 25mm at 24ºC, ASTM C518	0.88 m2·ºC/W
Flexural Strength, ASTM C203	480 kPa

.2 Standard for acceptance: Highload40 by Dupont.

.3 Flange insulation and vault base insulation shall be supplied as part of the access vault.

2.9 Formed In Place Insulation

.1 Formed in-place insulation shall meet or exceed the following properties:

Density, In Place ASTM D1622	40 kg/m^3
Compressive Strength ASTM D1621	219 kPa

Thermal Resistance (R ft^2.hr. ^{0}F/BTU) at 60 Days, ASTM C518	6.2
Water Absorption, % by volume ASTM D2842	1.15%
Dimensional Stability (7 days, -25ºC, ambient H.R), ASTM D2126	+0.33%

.2 Standard for acceptance: Genyk B-1022 by Genyk Polyurethane.

2.10 Spray Applied Foam Insulation

.1 Spray-applied foam insulation shall meet or exceed the following properties:

Density, In Place ASTM D1622	35 kg/m^3
Compressive Strength ASTM D1621	223 kPa
Tensile Strength ASTM D1623	221 kPa
Thermal Resistance, 75 mm Thickness (RSI) CAN/ULC-S770	3.09
Dimensional Stability (28 days, -20ºC, ambient H.R), ASTM D2126	0.30%
Surface Burning Characteristics (FSR) CAN/ULC S102	246
Water Absorption, % by volume ASTM D2842	0.50%

.2 Standard of acceptance: Enverge 1860 Polyurethane Foam.

2.11 Aggregates

.1 Aggregates shall meet the requirements listed in Section 31 05 16 - Aggregates.

2.12 Bollards

.1 Install bollards around each access vault for protection.

.2 Bollards shall be of a size, material, and colour as detailed on the Contract Drawings.

2.13 Flexible Restraint Couplings

.1 Contractor shall install flexible restraint couplings, certified for use with potable water, at each pipe connection, on the exterior of the vault.

.2 Acceptable products:

.1 Georg Fischer Multi/Joint 3007 Plus (two per pipe connection).

.2 Victaulic Dynamic Movement Joints (min. 75 mm allowable deflection).

.3 Other equivalent products may be accepted at the discretion of the City of Iqaluit. Products must allow pipe deflection up to 8 degrees in all directions.

.4 Where Georg Fischer Multi/Joint 3007 Plus restraint couplings are used at HDPE pipe connections, a stainless-steel pipe stiffener insert shall be installed inside each HDPE pipe end, at the connection.

PART 3 EXECUTION

3.1 Vault Fabrication

.1 Steel access vaults shall be fully fabricated complete with piping and accessories, finished, tested, and inspected within the fabrication shop prior to shipment to the Site.

.2 Welding shall be completed in accordance with CSA W59, Welded Steel Construction.

.3 The manufacturer shall maintain a quality control system for weld inspection and testing. The manufacturer shall provide the City of Iqaluit with a copy of the welding quality control reports for access vaults upon request. Welding inspectors shall hold certification meeting the requirements of CSA W178.2 (Level 2 minimum).

.4 The Contractor's quality control process shall include a non-destructive process for weld examination. Approved weld examination techniques are:

.1 Radiographic examination of weldments using industrial X-RAY film (ASTM E1032 or ISO 5579).

.2 Liquid penetration testing per the Standard Practice for Liquid Penetrant Testing for General Industry (ASTM E165).

.3 Ultrasonic testing per the Standard Practice for Contact Ultrasonic Testing of Weldments (ASTM E164).

.5 The Contractor shall maintain quality control records for all welds and shall supply the City with the records prior to shipping the vaults.

.6 Other non-destructive weld examination techniques may be approved at the discretion of the City of Iqaluit.

.7 The Contractor shall supply the City of Iqaluit with photography showing the vault build at various stages throughout the manufacturing process.

.8 The Contractor's manufacturing facility shall be available to the City of Iqaluit during normal business hours, to facilitate in-person inspections of vaults.

.9 The pipe and fittings shall be set horizontally and vertically as shown in the access vault Drawings. Pipes shall be deflected vertically outside of the access vault to adjust to the grades as indicated on the Drawings.

.10 A minimum clearance of 400 mm shall be provided between the access vault interior floor and the bottom of any vault piping or appurtenance.

.11 A 400 mm diameter sump shall be included in the vault floor. A frost plug shall be included in the sump.

.12 The bottom cavity shall be a minimum of 285 mm high and shall be filled with rigid insulation.

.13 The wall cavity shall be a minimum of 125 mm wide. The wall cavity shall be filled with formed in place polyurethane insulation. Formed in place insulation shall be injected from above so as to prevent any inclusion of voids and/spacer pieces.

.14 The cavity around each pipe protrusion shall be insulated with foam insulation.

.15 Each access hatch shall include a ladder extension mounted to the top of the vault, positioned to aid workers in entering vaults. Extension ladder tubing shall be 35 mm diameter, hot dip galvanized.

.16 The access hatch must be able to rest in the open position under its own weight. The access hatch must be able to be opened to a minimum angle of 120 degrees without obstruction, as measured from the closed position.

.17 Water distribution access vaults shall include insulated valve access ports at the vault top. Valve access ports shall align vertically with the corresponding valve. A reducer fitting shall be installed over the operating nut of the valve to guide the operating rod.

.18 Vaults shall be tested for leaks and weld function prior to shipping as follows. The Contractor shall document the results of each test, signed by the manufacturer, and rectify any observed issues prior to access vault delivery. Tests shall be redone until no issues exist.

.1 All access vaults shall be filled with water. A mark shall be placed at the water level. The water shall remain in the vault for a period of at least 4

hours. The vault shall be checked for signs of leakage or noticeable drops in water level.

.2 All sanitary access vaults' piping shall be sealed and filled with water. A mark shall be placed at the water level. The water shall remain in the piping for a period of at least 4 hours. The piping shall be checked for signs of leakage or noticeable drops in water level.

.3 All water access vaults' piping shall be pressurized to 150 psi for at least 1 hour and observed for pressure drops.

3.2 Shop Drawings & Submittals

.1 Submit Shop Drawings in accordance with Section 01 33 00 – Shop Drawings and Submittals.

.2 Shop drawings for vaults shall include a plan view of the piping assembly and a section view showing the vault height.

.3 Shop drawings for vaults shall be submitted to the City prior to fabrication and at minimum, 8 weeks prior to shipping the vaults.

.4 Shop drawings shall be metric, and drawn to scale.

.5 Vault shop drawings shall include:

- Pipe penetration details
- Cleanout with dimensions
- Bleeder details
- Hatch details
- Valve access and valve operator guide details
- Bleeder pipe angles
- Internal piping with diameter notes
- Pipe angle dimensions (referenced to north)
- Pipe drain locations
- Pipe thaw / flush ports
- Valves
- Couplings

- Hydrants
- Tees and bends
- Reducers
- Pipe support locations and detail
- Diameter dimension
- Pipe invert elevations
- Top of vault elevation
- Floor elevation
- Overall height dimension (floor to top)
- Description of materials (including vault and pipe support steel, pipes, hatch & ladder)

3.3 Product Data Sheet Submittals

.1 Product data sheets for vault fittings and appurtenances shall be submitted to the City prior to fabrication and at minimum, 8 weeks prior to shipping the vaults.

.2 Data sheets shall be in metric units.

.3 Data sheets required for submittal:

- Rigid insulation
- Poured insulation
- Foam insulation
- Water pipe couplers
- Sewer pipe couplers
- Bleeder check valve
- Bleeder ball valve
- Hydrant product data sheet (with confirmation of nut style and confirmation that drain plugs are to be omitted)
- Hydrant protrusion seal product data sheet
- Butterfly valve

- Slip-on flange product
- Gaskets
- Coatings
- Fitting to transition from HDPE to SS at bleeders inside vault
- Paint for bollards
- Pipe gaskets
- Flexible restraint couplings

3.4 Dual Chamber Rectangular Access Vault Manufacturing

.1 Dual chamber rectangular vaults may be used to isolate water and sewer systems. A single steel plate may be used to create two isolated chambers. Insulation is not a requirement for the partition wall. Dual chamber vaults may only be used in instances where water and sewer pipes do not cross each other.

.2 Rectangular shared utility, partition wall vaults shall include a steel partition, for the full internal height, separating the water and sewer piping / components. The partition wall shall be sand-blasted and epoxy coated on both sides.

.3 Where bleeder lines are required (as a freeze prevention measure) inside partition style vaults, the gap around the bleed line pipe shall be sealed. The partition wall shall form a water-tight separation between water and sewer components.

.4 Partition wall vaults shall include two ladders, two access hatches, and two sumps.

.5 The inside dimensions of vaults as shown on the Design Drawing are suggestions. The Contractor and the vault manufacturer shall evaluate whether the size as shown is appropriate for the pipe configurations required. Ample room shall be provided to facilitate maintenance.

.6 The manufacturer shall develop the structural design for the exterior vault walls, partition wall, floor, and top to ensure the components can withstand the forces acting on the components. The structural design shall include bracing to prevent deflection. The structural design shall be designed by a Professional Engineer registered, and in good standing, with NAPEG. Shop drawings shall be sealed by the design Engineer.

.7 The articles included in this specification for round access vaults shall also apply to rectangular vaults.

3.5 Shipping

.1 Prior to shipping, all external piping connections shall be protected from shipping damage. Screwed connections shall be protected using steel pipe caps. Flanged connections shall be protected using 19 mm plywood covers secured by a minimum of 4 bolts.

.2 Hydrant Link-Seal shall be shipped separately (inside access vault).

3.6 Storage

.1 Prior to the installation, the piping, valves, fittings, and accessories shall be protected and stored indoors in a dry area, elevated from the ground, in accordance with the Manufacturer's recommendations.

3.7 Vault Installation – General

.1 A 300 mm level layer of sand shall be placed as bedding for the base, and a 38 mm thick styrofoam insulation base (450 mm larger than the base plate) shall be placed on top of the bedding layer. Compact the sand bedding to 98% Standard Proctor Density.

.2 Backfill within 300 mm of the insulation and the access vault exterior shall be sand.

.3 Steel access vaults shall be carefully placed on the styrofoam insulation base. A 38 mm thick piece of styrofoam complete with a 10 mm thick filler piece at the flange edge shall also be placed on top of the base flange on each of the four sides nearest the edge of the styrofoam base for each access vault. Any damage to the exterior epoxy finish shall be repaired by repainting damaged areas with epoxy. Coating repairs for below grade portion may be performed using a 0.8 mm field coat of bitumen emulsion (Shell Flintkote No. 3 or approved equivalent) prior to backfill.

.4 All access vaults shall be laid and maintained to the required lines and grades, with fittings, valves, hydrants, etc., at the proper locations, and with all hydrant stems plumb.

.5 Install vault appurtenances where shown on the Drawings and in strict accordance with the manufacturer's instructions.

.6 Backfill around the access vault (above the sand layer) using Granular B, to a minimum of 1 m outside the vault walls.

.7 Provide appurtenances, fittings, connecting piping, framing, accessories, anchor bolts, concrete, and grout not herein or elsewhere specifically mentioned or included but necessary for the installation, operation, or testing of the equipment, without additional payment.

.8 After the equipment has been installed and prior to the final acceptance, protect structure from damage. Ensure that protection measures are to the satisfaction of the City of Iqaluit.

.9 Bollards shall be installed at each vault prior to opening roads to public traffic. Bollards shall be spaced at no more than 1.2m around the vault.

.10 Fill bollards with non-shrink grout (63 MPa) or concrete (30 MPa).

.11 Bollard tops shall be trowelled to a smooth convex finish.

3.8 Drainage

.1 The Contractor shall keep all portions of the Work properly and efficiently drained during construction and until construction completion. The Contractor shall be held responsible for all damage that may be caused as the result of water backing up or flowing over, though, from, or along any part of the Work or surrounding properties due to their operation.

.2 All costs associated with providing drainage for the Work as required, shall be included in the unit prices for each vault.

3.9 Site Restrictions

.1 When planning the Work, the Contractor shall make due allowance for the presence of the existing structures, access, utilities, and the operation of others on the Site.

3.10 Cleaning and Disinfecting

.1 The surfaces of the walls and floor shall be cleaned thoroughly using a high-pressure water jet, sweeping, scrubbing, or equally effective means. All water, dirt, and foreign material accumulated in this cleaning operation shall be discharged from the access vault or otherwise removed.

.2 A solution of 200 mg/L available chlorine shall be applied directly to the surfaces of all parts of the access vault. The chlorine solution may be applied with suitable

brushes or spray equipment. The solution shall thoroughly coat all surfaces to be treated.

.3 The disinfected surfaces shall remain in contact with the strong chlorine solution for at least 30 minutes, after which potable water shall be used to flush the chlorine solution. All chlorine solution and flushing water shall be removed from the access vault and discharged in accordance with Local and Territorial regulations.

3.11 Field Inspection

.1 All material is subject to inspection and testing for soundness and suitability at the discretion of the City of Iqaluit. The Contractor shall notify the City of Iqaluit following the placement of access vaults in their proposed locations prior to backfilling.

.2 All Work shall be undertaken in strict adherence to the manufacturer's instructions, which are considered as being part of these Specifications. As each section of the Work is completed, it shall be tested in the manner specified, and in the presence of, and as approved by, the City of Iqaluit.

.3 All material found, during the progress of the Work, to have cracks, flaws, or other defects, or to be of doubtful quality will be rejected by the City of Iqaluit. All rejected materials shall be promptly removed from the Site of the Work by the Contractor, and all costs associated borne by the Contractor.

3.12 Leakage Testing

.1 Hydrostatic testing shall be completed on all vault piping. If any leaks are present, the Contractor shall repair leaks and retest piping until no leaks are present.

.2 All sanitary access vaults' piping shall be sealed and filled with water. A mark shall be placed at the water level. The water shall remain in the piping for a period of at least 4 hours. The piping shall be checked for signs of leakage or noticeable drops in water level.

.3 All water distribution access vaults' piping shall be pressurized to 150 psi for at least 1 hour and observed for pressure drops.

.4 All access vaults shall be filled with water. A mark shall be placed at the water level. The water shall remain in the vault for a period of at least 4 hours. The vault shall be checked for signs of leakage or noticeable drops in water level.

.5 The Contractor shall be responsible for the cost of additional round trips for the City of Iqaluit if the witnessed leakage tests fail and a revisit is required.

.6 Documentation showing the results of testing, including photography, shall be supplied to the City prior to shipping.

3.13 Bolt Torque

.1 The Contractor shall keep a record of the torque applied to bolts inside each vault.

.2 Documentation showing the bolt torque values shall be supplied to the City prior to shipping.

.3 During field installation, the Contractor shall record torque values for bolts inside the vault. Documentation showing the bolt torque values recorded in the field during installation shall be supplied to the City prior to Substantial Completion.

3.14 Hydrant Flow Testing

.1 Prior to Substantial Completion, the Contractor shall arrange to have new hydrants flow tested to determine performance while maintaining a minimum residual system pressure of 140 kPa (20 psi).

.2 The City of Iqaluit shall be informed of the scheduled testing and shall be provided with 3 business day's notice.

.3 Testing shall be performed by persons trained and certified in hydrant testing. The Contractor shall provide proof that personnel conducting hydrant flow testing have completed an AWWA or NFPA approved hydrant flow testing course. The Contractor's testing personnel or testing organization shall be pre-approved by the City of Iqaluit.

.4 Flow testing shall conform to AWWA M17 Fire Hydrants: Installation, Field Testing, and Maintenance.

.5 Flow testing shall be completed during periods of peak demand between 7:30 AM and 8:30 AM and at temperatures above 0^0C.

.6 The Contractor shall supply the City of Iqaluit with the results of each flow test. Flow test results shall be included on City-approved forms.

.7 Discharged water shall be controlled and shall not cause erosion or sedimentation or ice buildup on road surfaces and private properties. Damage caused by discharged water shall be the responsibility of the Contractor.

3.15 Supervision of Installation and Commissioning

.1 At the completion of satisfactory installation, each valve shall be tested by the Contractor with cooperation of the operating staff. All controls shall be checked and tested to ensure proper control and equipment protection.

.2 Modify or replace equipment or materials failing required tests.

.3 Perform additional testing required due to changes of materials and/or failure of materials or construction to meet specifications at no extra cost to the City of Iqaluit.

3.16 Maintenance

.1 Provide maintenance information for Supplier's equipment.

3.17 Shop Testing

.1 Test AWWA valves in the shop in accordance with AWWA requirements. A certified test report shall be submitted.

3.18 Certificates

.1 On completion of installation and testing, submit the manufacturer's certification of the correctness of the installation to the City of Iqaluit.

3.19 Access Vault Identification

.1 Identification signage shall be included at each vault.

PART 4 BASIS FOR PAYMENT

4.1 Supply and Delivery of Access Vaults

.1 Unit of Measurement: Each

.2 Method of Measurement: Number of access vaults supplied and delivered, for each type of access vault indicated on the Unit Price Schedule.

.3 Item Includes: Supply, shipping, all interior piping (couplings, valves, hydrants, cleanouts, reducers, bends, bleeders, pipe supports, etc.), appurtenances, insulation, steel, hatch, and ladder as specified in the specifications, quality assurance testing, hydrant flow testing, as well as supply of all material, equipment, labour, tools, and incidentals necessary to complete the Work.

.4 Unless otherwise noted in the bid documents, the supply of access vaults shall also include the development of shop drawings, including necessary revisions.

4.2 Installation of Access Vaults

.1 Unit of Measurement: Each

.2 Method of Measurement: Number of access vaults installed.

.3 Item Includes: Shop drawings (with revisions as necessary), excavation, supply, placement, and compaction of bedding and backfill material, connection to water and sewer mains, material testing, compaction testing, as-built survey (top of access vault in the centre of the access vault, pipe elevations), access vault identification tag/signage, granular fill, supply/installation of board insulation, cleaning, hydrant flow testing, road and driveway restoration as indicated, and the supply of all material, equipment, labour, tools, and incidentals necessary to complete the Work.

.4 The removal / salvage of existing vaults as necessary to install new vaults is included in this item.

4.3 Access Vault Spare Parts

.1 Unit of Measurement: Lump Sum

.2 Method of Measurement: No Measurement will be made for this item. Payment shall be made after delivery of each item or group of items to the City, to the satisfaction of the City of Iqaluit.

.3 Item Includes: Supply and delivery of spare parts and miscellaneous hardware, as itemized in the unit price schedule item description, in clearly labelled original manufacturer packaging. Include manufacturer name, vendor contact, part number, description of intended use, size, and installation instructions, affixed to packaging.

.4 For coupling gaskets, indicate whether or not the gasket is suitable for potable water applications.

.5 For ‘Misc. Hardware’, the lump sum price shall include: Coupling bolts/nuts/washers (set of 10) and sewer cleanout bolts/nuts/washers (set of 10).

4.4 Flexible Restraint Couplings

.1 Unit of Measurement: Each

.2 Method of Measurement: The number of connection couplings installed, for the sizes indicated on the Unit Price Schedule.

.3 Item Includes: Supply and installation of flexible restraint couplings and stainless steel pipe inserts, and all labour, materials, equipment, tools, and incidentals necessary to complete the Work.

4.5 Remove and Dispose of Existing Access Vaults

.1 Unit of Measurement: Each

.2 Method of Measurement: Number of access vaults removed.

.3 Item Includes: Complete removal and disposal of existing steel or concrete access vaults, appurtenances, and bollards, including any tipping fees, cutting off pipes prior to vault removal, supply, placement, and compaction of backfill material, surface restoration, and all material, equipment, labour, tools, and incidentals necessary to complete the Work.

4.6 Bollards

.1 Unit of Measurement: Each

.2 Method of Measurement: Number of bollards installed.

.3 Item Includes: Supply, shipping, handling, and installation of the bollards, concrete fill, steel pipe, ID signage, corrosion protection, and appurtenances as indicated on the Drawings. All common excavation, supply, placement, and compaction of bedding and backfill material, and all material, equipment, tools, labour, and incidentals necessary to complete the Work.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 29 83 – Testing and Laboratory Services.

.2 Section 01 33 00 – Shop Drawings and Submittals.

.3 Section 01 35 30 – Health and Safety Requirements.

.4 Section 01 35 43 – Environmental Procedures.

.5 Section 01 45 00 – Quality Control.

.6 Section 01 61 00 – Common Product Requirements.

.7 Section 01 74 19 – Construction/Demolition Waste Management and Disposal.

.8 Section 01 78 00 – Closeout Submittals.

.9 Section 01 78 23 – Operation and Maintenance Manuals.

.10 Section 01 78 39 – Project Record Drawings.

.11 Section 31 05 16 – Aggregates.

.12 Section 31 23 33.01 – Trenching and Backfilling.

.13 Section 32 11 23 – Roadway Grading.

.14 Section 33 05 14.03 – Access Vaults.

1.2 Reference Standards

.1 American Water Works Association (AWWA)

.1 AWWA B300, Hypochlorites.

.2 AWWA B301, Liquid Chlorine.

.3 AWWA B303, Sodium Chlorite.

.4 AWWA C219, Bolted Sleeve-Type Couplings for Plain-End Pipe

.5 AWWA C500, Metal-Seated Gate Valves for Water Supply Service.

.6 AWWA C504, Rubber-Seated Butterfly Valves.

.7 AWWA C651, Disinfecting Water Mains.

.8 AWWA C800, Underground Service Line Valves and Fittings.

.9 AWWA C901, Polyethylene (PE) Pressure Pipe and Tubing, ¾ in. (19 mm) Through 3 in. (76 mm), for Water Service.

.10 AWWA C906, Polyethylene (PE) Pressure Pipe and Fittings, 4 in. Through 65 in. (100 mm Through 1,650 mm), for Water Works.

.11 AWWA M17, Fire Hydrants: Installation, Field Testing, and Maintenance.

.2 ASTM International (ASTM)

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

.2 ASTM F714, Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter.

.3 ASTM F3124, Standard Practice for Data Recording the Procedure used to Produce Heat Butt Fusion Joints in Plastic Piping Systems or Fittings.

.3 Canadian Standards Association (CSA Group)

.1 CSA B137.1, Polyethylene (PE) Pipe, Tubing, and Fittings for Cold-Water Pressure Services [Part of B137, PE and PVC Piping Systems for Water Package]

.4 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC S520, Standard for Fire Hydrants.

.5 NSF International

.1 NSF/ANSI 61, Drinking Water System Components – Health Effects

1.3 Work Included

.1 The Work to be done under this Section consists of furnishing all equipment, materials, and labour necessary for the installation of watermains and water services in accordance with the terms of this Contract. All materials supplied are workmanship performed shall meet the requirement of the specifications and be guaranteed for the conditions of service applied to the Project.

.2 Specifically, the Work shall include:

.1 The installation of the watermains as specified in this Section or shown on the Contract Drawings, including any connections to access vaults or existing watermains.

.2 Pressure and leakage testing on all new Work.

.3 Chlorination and commissioning of new watermains.

1.4 Action and Informational Submittals

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature, and data sheets for distribution piping materials and appurtenances. Include product characteristics, performance criteria, physical size, finish, and limitations.

.2 Distribution piping materials include, but are not limited to:

.1 Pipe and Insulation

.2 Fittings

.3 Valves

.4 Fire hydrants

.5 Mechanical restraints

.6 All materials used for the distribution system.

.2 As-built data:

.1 Submit data to produce record drawings, including directions for operating valves, list of equipment required to operate valves, details of pipe material, and hydrant details.

.1 Include top of pipe, horizontal location, and vertical elevation of fittings, valves, valve boxes, and hydrants, and the type of each fitting.

.2 Include the location of all butt-fusion joints.

.2 Submit operation and maintenance data for pipe, valves, valve boxes, and hydrants.

.3 Record top of pipe GPS data and elevations for watermain and water services every 10 m and send to the City of Iqaluit for approval prior to backfilling pipe. If pipe is backfilled and pipe elevations are found to be unacceptable, the Contractor shall excavate buried pipe and realign in accordance with Contract Drawings or alignment deemed acceptable by the City of Iqaluit.

.4 Record GPS data and elevations for all flanged connections, couplings, and fusion points and send to the City of Iqaluit for approval prior to backfilling. If backfilling is completed and elevations are found to be unacceptable, the Contractor shall excavate and realign in accordance with Contract Drawings or alignment deemed acceptable by the City of Iqaluit.

1.5 Recirculation Line

.1 All references to watermains within these specifications shall also apply to the installation of recirculation lines.

PART 2 PRODUCTS

2.1 Materials

.1 General

.1 All products that will have contact with potable water shall be compliant with NSF/ANSI 61.

.2 Polyethylene Pipe

.1 Watermains shall be HDPE DR9 (PE 4710 Resin, Series 250, 1724 kPa, IPS dimensional standard) with 50 mm urethane insulation encased in a 1.27 mm polyethylene black jacket.

.2 Lateral service pipe (supply and return) shall be HDPE DR9 (PE 4710 Resin, Series 250, 1724 kPa, CTS dimensional standard for coil stock with a diameter of 38 mm and less).

.3 Carrier pipe for lateral services shall be HDPE DR17 (PE 4710 Resin, Series 125, 860 kPa, IPS dimensional standard) with 50 mm urethane insulation encased in a 1.27 mm polyethylene black jacket.

.4 All polyethylene pipe, fittings, stub-ends, etc., shall be of the same manufacturer's series, wall thickness, and grade of polyethylene.

.5 Fittings, 100 mm or larger, shall be compliant with AWWA C906.

.6 No joints shall be allowed in piping covered with shop applied insulation.

.7 Bend fittings shall not be permitted along watermains, unless pre-approved by the City of Iqaluit.

.8 Aside from a long-radius bend required at the carrier pipe to daylight the service piping at the building, bend fittings shall not be permitted along servicing piping, unless pre-approved by the City of Iqaluit.

.9 HDPE stub ends shall be fitted with a restraint coupling, followed by a butt-fused HDPE end cap. A concrete thrust block shall be provided at the end cap.

.10 All jacketed pipe shall have permanent factory applied markings, including:

.1 Nominal size.

.2 Standard material code designation (e.g., PE 4710).

.3 On pipe, the dimension ratio and diameter base (e.g., DR 9).

.4 On tubing, the word “Tubing” and dimension ratio.

.5 Pressure class (e.g., PC 250).

.6 Standard designation (e.g., AWWA C906).

.7 Manufacturer’s name or trademark.

.8 Production record code.

.3 HDPE Pipe Couplings for Plain-End Pipe

.1 Shall be compliant with AWWA C219, Bolted Sleeve-Type Couplings for Plain-End Pipe.

.2 Shall be “Restraint” type.

.3 Shall include stainless steel pipe stiffeners at pipe ends. Stiffeners are required to be used with all plain-end pipe couplings.

.4 Acceptable plain-end pipe couplings include:

.1 Hymax Grip

.2 Arpol Fix Pro

.3 Robar 1900RSCHH

.4 EBAA Iron Mega-Coupling Series 3800

.5 Romac Alpha

.6 Romac Armor Lock

.7 GF Multi/Joint 3000 Plus

.1 Victaulic Style 905 Coupling (stiffener insert required)

.5 Other products may be approved at the sole discretion of the City of Iqaluit.

.4 Valves

.1 In accordance with Section 33 05 14.03 - Access Vaults.

.5 Hydrants

.1 In accordance with Section 33 05 14.03 - Access Vaults.

.6 Factory Applied Urethane Insulation

.1 Insulation for pipe, fittings, etc., shall be rigid closed cell polyurethane insulation to the thickness shown on the Drawings. Properties of all urethane insulation shall meet or exceed the following:

Density ASTM D1622	35 kg/m^3
Compressive Strength (excluding jacket) ASTM D1621	200 kPa
Thermal Conductivity (W/m°C @ 25°C) ASTM C518	0.02
Operating temperature range Cyrogenic to +	93°C
Closed Cell Content ASTM D6226	> 90%
Water absorption, % by volume ASTM D2842	< 4%

.2 Insulation Jacket Material (Buried Applications):

.1 Polyethylene UV inhibited.

.2 Minimum density, 940 kg/m^3.

.3 Adhesive Sealant to be Modified Butyl Rubber.

.4 Jacket thickness 1.27 mm.

.5 Maximum elongation to ASTM D638, 400% 6-month test.

.6 Service temperature range -34°C to +82°C.

.7 Water vapour transmission rate to ASTM D570, 3 g/m²/24 hrs.

.8 Tensile strength to ASTM D638, 9.8 kg/cm.

.9 Impact resistance 1.36 N-m.

.3 Insulation Outer Jacket (Above Ground Applications):

.1 Factory applied galvanized lock seam, spiral steel outer jacket; Urecon Insulated Piping (U.I.P.) Spiwrap (or approved equivalent), 18-26 gauge.

.2 U.I.P. Spiwrap (or approved equivalent), locked seam aluminum O-Pipe jacket, 18 gauge.

.7 Insulation Kits for Buried Fittings

.1 Material: rigid urethane foam with polymer protective coating on all exterior surfaces including ends. Kits to be supplied complete with silicone caulking for seams, stainless steel attachment straps and clips, and heat shrink sleeves to seal between pipe and insulation cover.

.2 Rigid Urethane Foam Insulation: Meeting or exceeding the properties of factory applied insulation.

.3 Thickness to match factory applied pipe insulation.

.4 Polymer coating

.1 Two component high density polyurethane coating, black in color.

.2 Density: 1,170 kg/m^3.

.3 Tensile strength: 11,100 kPa.

.4 Tear strength 26.5 N/mm minimum.

.5 Insulation Adhesive

.1 Modified butyl rubber.

.8 Detectable Warning / Marker Tape

.1 6 Mil PE film with radio frequency path markers at 2.4 m intervals.

.2 Radio frequency technology shall not require an electrically continuous path to provide detection.

.3 Watermain marking: Blue in colour, marked “Water Line”.

.4 Lateral service marking for common water/sewer service trench: Blue in colour, marked “Water Line”.

.5 Approved product: 3M Electronic Marking System (EMS) 7900 Series Warning Tape.

.6 Product substitutions will not be permitted.

.9 Field Joint Sleeves

.1 Wrapped sleeves for field fusion joints and for flanged connections to vaults shall be black polyethylene tape with a modified butyl rubber adhesive or 2.6 mm thick CanusaWrapWLS (or approved equivalent). Joint sleeves shall be as recommended by the insulation manufacturer. Each wrap will conform to the manufacturer’s recommended width and length for each size of pipe.

.10 Half Shells

.1 Half shells shall be made of urethane insulation with the properties as described in Section 2.1.6, and shall have a thickness equivalent to the urethan insulation on the pipe.

.11 Heat Shrink Tape

.1 Heat shrink tape shall be 150 mm wide. Product shall be per insulation supplier’s recommendation. Product literature shall be provided to the City of Iqaluit prior to construction.

.12 Field Applied Urethane

.1 Field applied urethane shall be DuPont Froth-Pak Insulation 210 or approved equivalent.

.13 Pipe Bedding

.1 Pipe bedding shall be in accordance with Section 31 23 33.01 – Trenching and Backfilling.

.14 Water Service Saddle

.1 Water service saddles shall be bronze Robar No. 2706 with double stainless steel straps (or approved equivalent).

.15 Water Service Insulation Forms

.1 22-gauge hot dip galvanized sheet metal.

.2 Stainless steel gear clamps.

.16 Rigid Board Insulation

.1 Extruded polystyrene (closed cell foam).

.2 Thermal resistance at 24ºC (CAN/ULC-S770): 0.88 m2·ºC/W

.3 Compressive strength (ASTM D1621): 276 kPa (40 psi)

.4 Water absorption (ASTM D2842): 0.60% by volume, max.

.17 Corporation Stops

.1 Bronze, ball style conforming to AWWA C800.

.2 CTS dimensional standard for tubing less than or equal to 38 mm in diameter.

.3 Shall include stainless steel pipe inserts for HDPE compression joints.

.4 Rated for 2,068 kPa (300 psi).

.18 Curb Stops

.1 Bronze, ball style conforming to AWWA C800.

.2 CTS dimensional standard for tubing less than or equal to 38 mm in diameter.

.3 Shall include stainless steel pipe inserts for HDPE compression joints.

.4 Rated for 2,068 kPa (300 psi).

.5 Shall include a thermal break between the curb stop and the operating rod. Service Box Frost Insulator by WD Valve Boxes Ltd. or approved equivalent.

.6 Operating rod shall be cut to suit depth of bury.

.7 A 600 mm diameter galvanized corrugated steel pipe (CSP) shall be installed vertically above the curb stop assembly for protection and access.

.8 A steel lid shall be fitted to the CSP pipe using 2.7 mm hot-dip galvanized steel. The steel lid shall be 300 mm above the finished ground elevation, unless the curb stop assembly will be within a driving surface.

.9 A 600 mm x 600 mm x 6 mm steel plate shall be included over top of the vertical CSP (300 mm bury depth) if the curb stop assembly will be within or adjacent to any driving surface.

.19 Shut-off Valve Inside Building

.1 Bronze, ball style conforming to AWWA C800.

.2 CTS dimensional standard for tubing less than or equal to 38 mm in diameter.

.3 Shall include stainless steel pipe inserts for HDPE compression joints.

PART 3 EXECUTION

3.1 Boundary Valves

.1 A boundary valve is defined as a valve that is used to isolate the in-service potable water system from newly installed water distribution pipes which have not been fully flushed and disinfected per AWWA C651.

.2 15 days prior to watermain installation Work, the Contractor shall make a written request to the City of Iqaluit to have each boundary valve at the perimeter of the Work Site operated and checked by the Public Works department. The intent is to check the integrity of the valve. If notified that a valve is not holding, the Contractor shall coordinate with the Municipality to check alternative valves which may serve as boundary valves.

.3 The Contractor shall not operate boundary valves unless written approval is provided by the Public Works department in charge of overseeing the potable water distribution system.

.4 When requesting boundary valve operation, provide 24 hours notice to the Public Works department.

.5 The Contractor shall keep a daily log of boundary valves that have been opened or closed. The log shall include the location of the valve, the date in which the valve was operated, and the name of the person who operated the valve.

.6 A plan showing boundary valves shall be provided to the City of Iqaluit and to the municipal official in charge of overseeing the potable water distribution system.

.7 Any boundary valve that is closed shall be flagged with red survey ribbon tied to the operating rod or wheel.

3.2 Boil Water Advisories

.1 The Contractor shall, without delay, advise the City of Iqaluit, the Public Works department, and the Health Department via telephone and in writing if water sampling and testing detects higher than accepted amounts of coliforms (bacteria) or if there are deficiencies with regard to chlorination.

.2 The Municipality may, at its discretion, issue a Boil Water Advisory (BWA) to the community.

.3 Seven calendar days notice shall be provided to the community in advance of any planned BWA.

.4 The Contractor's advance BWA notice shall include a figure showing the affected areas and shall include the anticipated duration for the BWA.

.5 A boil water advisory shall not be lifted until two consecutive sets of bacteriological testing, collected a minimum of 24 hours apart, produce acceptable results.

.6 Bacteriological testing of all newly installed or replaced water mains shall be conducted in accordance with AWWA Standard C651. The new main must be isolated until bacteriological tests are satisfactorily completed. The issuance of a boil water advisory by the Municipality shall not relieve the Contractor of the obligation to perform such bacteriological testing, nor shall it be construed as a waiver of this requirement.

3.3 Temporary Shutdowns

.1 The Contractor must obtain approval from the City of Iqaluit prior to any shutdown of systems. The Contractor shall provide adequate notice to the City of Iqaluit in advance of any request to shut down systems. System shutdowns shall be during low demand periods and for a maximum of 4 hours, or as allowed by operators.

3.4 Drainage

.1 The Contractor shall keep all portions of the Work properly and efficiently drained during construction and until construction completion. The Contractor shall be held responsible for all damage that may be caused as the result of water backing up or flowing over, through, from, or along any part of the Work or surrounding properties due to their operation.

.2 All costs associated with providing drainage for the Work as required, shall be included in the unit prices for the installation of each associated item.

3.5 Site Restrictions

.1 When planning the Work, the Contractor shall make due allowance for the presence of the existing structures, access, utilities, and the operation of others on the Site.

.2 Supports, adequate protection, and maintenance of all existing underground and surface utility structures, drains, sewers, ducts, conduits, power poles, and other obstructions encountered during the progress of the Work, shall be provided by the Contractor at their own expense, unless there is a unit price schedule item included for said Work.

3.6 Service Connections

.1 Excavation, bedding, backfilling, urethane insulation, piping insulation system, and styrofoam used in the installation of service connections shall conform to the same requirements as for main line installation.

.2 The water service duct shall be of a size and material as illustrated on the Contract Drawings.

.3 Pipe connections in the water service pipe shall be butt fused.

.4 The Water Service Information Sheet, or equivalent, provided by the Public Works Department shall be filled in and submitted for each service.

.5 Drill and tap mains with main under operating pressure after main has been pressure tested, flushed, and chlorinated, with a tapping machine capable of inserting corporation stops into main or saddle. Alternatively, the Contractor may dry tap the service connections provided flushing, pressure testing, and chlorination of the services occurs with the main as one system.

.6 Tap main at 3:00 o'clock or 9:00 o'clock position. Service tapping shall be a minimum of 450 mm apart or from any fused connection in the mains. Install saddle using a torque wrench as per manufacturer's instructions. Including re-torquing after set time.

.7 Construct service connections as shown on Drawings.

.8 All exposed surfaces, including factory coated surfaces of polyurethane, are to be coated with mastic.

.9 Flush each service line for a minimum of 5 minutes.

.10 Pressure test the services in accordance with this Section. Initial pressure test on service is not required.

.11 Joints must be left exposed during pressure test to allow visual inspection.

.12 If water service is not to be connected immediately to house, then water lines shall be plugged with a watertight plug on the end and ball valve shut off at the main. In these cases, the 100 mm carrier pipe will be installed to 1.0 m into the property for future connection. Sufficient water service pipe (both lines) to reach the centre of the lot plus (5) metres will be installed. The length of service pipe that exceeds the carrier pipe shall be rolled up and wrapped in plastic. The end of the 100 mm carrier pipe shall be covered with an end cap to prevent debris from entering. Drill holes in the water carrier end cap to allow the 25 mm water service pipe through.

.13 Install a 38 mm x 89 mm marker stake, painted blue, at the end of unconnected / inactive services.

.14 Any brass or metallic fitting that will be encased in spray foam or poured in place foam shall be lightly coated with an approved separating agent. After being coated, the brass or metallic fitting shall be wrapped in a petroleum wax tape (Denso LT), 10 mil vinyl tape (3M Scotchrap 50) or self-fusing silicone tape.

3.7 Inspection

.1 All water installations shall be subject to inspections by the City of Iqaluit prior to backfilling and prior to issuance of the Substantial Certificate of Completion and Final Certificate of Completion. Visual inspections of all lines are required prior to backfilling and prior to issuance of the Substantial Certificate of Completion. Any deflections, sags, obstructions, and other defects affecting the performance of the line shall be corrected and the line re-inspected prior to issuance of the Substantial Certificate of Completion.

.2 All material testing (backfill densities and concrete testing) shall be performed by an accredited agency and certified by a Professional Engineer registered, and in good standing, with the Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists (NAPEG). All test results shall be submitted to the City Engineering Department and the City of Iqaluit with a report indicating any deficiencies and remediation.

.3 All material is subject to inspection and testing for soundness and suitability at the discretion of the City of Iqaluit.

.4 All Work shall be undertaken in strict adherence to the manufacturer's instructions, which are considered as being part of these Specifications. As each section of the Work is completed, it shall be tested in the manner specified, and in the presence of, and as approved by, the City of Iqaluit.

.5 All material found during the progress of the Work to have cracks, flaws, or other defects, or to be of doubtful quality, will be rejected by the City of Iqaluit. All rejected materials shall be promptly removed from the Site of the Work by the Contractor and all costs associated with the removal and replacement of rejected material shall be borne by the Contractor.

3.8 Handling of Material

.1 The material shall be delivered and distributed at the Site by the Contractor. All pipe and accessories shall be loaded and unloaded by lifting manually or with hoists so as to avoid shock or damage. Under no circumstances shall such materials be dropped. Insulated pipe shall not be skidded on the ground or against pipe already on the ground.

.2 In distributing the polyethylene pipe at the Site of the Work, each piece shall be unloaded opposite or near the place where it is to be installed.

.3 Pipe shall be handled so the exterior and interior surfaces, prefabricated joints, insulation, etc., will not be damaged. If, however, any part of any surface, coating, or lining is damaged, the repair shall be made by the Contractor at their own expense, in a manner satisfactory to the City of Iqaluit.

3.9 Alignment and Grade

.1 All pipe sections shall be laid and maintained to the required lines and grades, with fittings, valves, hydrants, access vaults, etc., at the project locations; with joints centred.

.2 No deviation from authorized lines and grades shall be made without the written approval of the City of Iqaluit. If, in the opinion of the City of Iqaluit, the Contractor's method of setting grades is inaccurate or insufficient, the City of Iqaluit may direct that more suitable equipment and methods be used to ensure that proper grades are established.

3.10 Rigid Board Insulation

.1 Rigid board insulation shall be installed per the Specification Figures to reduce vertical pipe movement by limiting thaw within the active layer beneath the pipe.

.2 Rigid board pipe insulation shall not be required where solid rock is encountered within 200 mm beneath the design pipe invert elevation.

.3 Rigid board insulation is not required at lateral service connections.

3.11 Water in Excavation

.1 Work shall be carried out in a dry trench. Water shall not be allowed to run over the invert, reach the joints, or run through the pipe sections during construction.

.2 All water pumped or drained from the Work shall be disposed of in a suitable manner satisfactory to the City of Iqaluit, without damage to the construction Work or other property, structures, or persons.

3.12 Pipe Bedding

.1 Insulated piping shall be bedded in sand with a minimum of 200 mm below the insulation, 250 mm on both sides, and 300 mm above the insulation of the piping. Mechanical tamping of the pipe bedding shall be carried out in 150 mm loose layers. Granular A material may be used for bedding instead of sand if soil conditions warrant, subject exclusively to approval by the City of Iqaluit.

.2 The pipe bedding shall be compacted to 95% Standard Procter Dry Density as per ASTM D698. Compaction in a wet trench will be not acceptable. The Contractor shall provide daily compaction test results to the City of Iqaluit.

.3 Bedding shall be deemed unsatisfactory if, in the opinion of the City of Iqaluit, compaction cannot be obtained because of the presence of water.

.4 No extra payment shall be made for the replacement of bedding that has become unsatisfactory due to water from any source.

3.13 Detectable Warning Tape

.1 Buried water mains shall include 3M Electronic Marking System (EMS) tape and 3M locate marker balls to facilitate future locating of mains. 3M EMS tape shall be installed no deeper than 1.2m below grade. 3M marker balls shall be installed at all main stops, curb stops and direct buried appurtenances.

.2 Installation shall be per the manufacturer's instructions.

3.14 Field Applied Urethane

.1 Field spraying of urethane at lateral service connections shall be carried out by experienced operators only. Exposed urethane shall be coated with modified butyl rubber adhesive and heat shrink sleeves. Where geometry does not permit the use of heat shrink sleeves, two layers of heat shrink tape, 150 mm wide with 50% overlap shall be used.

3.15 Pipe Laying

.1 Lengths of polyethylene pipe watermains to be laid between flanged fittings on access vaults shall be assembled on dry ground by butt-fusion, complete with flanged ends. The pipe shall be pressure tested and installation of urethane half shells shall be completed prior to laying the pipe in the trench. To prevent the entry of rubbish, blind flanges shall be installed on the ends of mains prior to installation in the trench and shall only be removed immediately prior to connection to the access vault.

.2 The watermains shall be laid to the alignment and grades shown on the Drawings.

.3 It is prohibited to drag pipe over the ground which would damage the black jacket or insulation. If the pipe or fused sections of the pipe are to be moved, they must be supported on rollers or completely suspended.

.4 Slings used to lower the insulated pipe into the trench shall support the pipe without causing damage to the jacketing insulation.

.5 Where conditions dictate that the pipe must be buried at depths less than the minimums shown on the Drawings (as directed by the City of Iqaluit), the absolute minimum depth of cover in roadways shall be 1.0 m to prevent deformation from traffic loading. If the pipe is buried with 1.0 m of cover, the backfill material shall be Granular A or Granular B above the pipe embedment zone.

3.16 Field Pipe Bending

.1 Swing the pipe to add sweeping curves to pipes as indicated on Drawings. Temporary restraints may be required to bend the pipe and to maintain the bend while placing the pipe in the trench and placing initial backfill.

.2 The minimum radius for field bending (“pipe roping”) of HDPE pipe shall be:

.1 50 x Pipe Diameter (OD).

3.17 Bend Fittings

.1 Bend fittings shall not be used unless written approval is provided by the City of Iqaluit.

3.18 Pipe Joints

.1 Thermal butt-fusion shall be completed in accordance with ASTM F2620.

.2 The fusion machine shall include a datalogger to record information about how each heat butt fusion joint was made (heater temperature, pressures and times for the heating, fusion and cooling steps) and other important information about the process, job, and equipment used. The data recording procedure shall be in accordance with ASTM F3124.

.3 Thermal butt-Fusion definition: This technique consists of heating the squared ends of two pipes, a pipe and fitting, or two fittings by holding them against a heated plate, removing the plate when the proper melt is obtained, promptly bringing the ends together and allowing the joint to cool while maintaining the appropriate applied force.

.4 Prior to construction, the Contractor shall provide the City of Iqaluit with the qualifications of personnel that will be performing butt-fusion on HDPE pipes. Personnel overseeing butt-fusion operations on Site shall be qualified as per the requirements of the pipe manufacturer, shall be a certified butt-fusion technician, and shall have a minimum of 5 years experience joining HDPE pipe.

.5 Prior to the start of construction, the Contractor shall coordinate with the City of Iqaluit and the Public Works department to conduct a demonstration of their butt-fusion equipment and technique. The City of Iqaluit reserves the right to require replacement of personnel or equipment if the equipment or technique is not in keeping with ASTM F2620 and the requirements of the pipe manufacturer.

.6 The insulation shall be cut back 190 mm to allow for the field joining of the pipe. Care shall be taken, when cutting away insulation from the pipe, not to cut the pipe beneath the insulation. Cut pipe shall be rejected from the Work. Field cut insulation shall be treated with mastic.

.7 When joining the sections of pipe, it is the fusion equipment that must be moved from joint to joint.

.8 Should it become necessary, and only upon authorization by the City of Iqaluit, polyethylene spacer blocks, properly machined, and of the same material as the main, may be used when required to connect the mains to the access vaults. The

spacer blocks shall be installed between the flanges. Only one spacer block is permitted for each connection.

.9 Back up flanges for flange connections shall be ductile iron. Bolts shall be galvanized or cadmium plated. All required bolts and gaskets shall be provided by the Contractor.

.10 Where the Drawings call for the use of heat shrink tape or where the geometry of bends and fittings prevents the installation of heat shrink sleeves over the insulation, then two wrappings of heat shrink tape in 150 mm widths shall be applied. The first complete wrapping shall be applied and shrunk down before the second wrapping is applied. The tape shall overlap 50% as it is wrapped around the pipe or fitting. These methods shall be used to repair all damage to insulation jacketing.

3.19 Initial Pressure Testing of Polyethylene Pipe

.1 A pressure test shall be performed on each section of watermain before the insulation of the joints or installation in the trench. A section of watermain shall be considered to consist of a length of pipe between two flanged fittings.

.2 The purpose of the pressure test is to verify all joint and pipe integrity.

.3 The Contractor shall provide all necessary labour, materials, and equipment for the test including a suitable pump and measuring tank, pressure hoses, connection plugs, caps, gauges, and all other apparatus necessary for filling the piping, applying the required test pressure, and recording the pressure losses.

.4 Water shall be used for testing. The Contractor shall provide temporary heating and additional insulation as required to keep the water in the pipe from freezing.

.5 Payment for the cost of testing shall be included in the unit price tendered for installation of the watermain.

.6 The ends of the pipe to be tested shall be sealed off using blind flanges and gaskets. The flange on the lower end of the pipe shall be tapped to receive the test pump discharge line. The flange on the high end of the pipe shall be tapped to receive a vent cock to discharge air from the line during the filling process. The pipe shall be laid to a continuously rising grade to the vent cock.

.7 The pipe shall be filled with water at a gauge pressure of 1.5 times the normal operating pressure of the pipe (1103 kPa / 160 psi minimum). No pressure drop will be allowed during this period and maintained for one hour. The City of Iqaluit must witness the test. All leaks or defective material shall be repaired to

the City of Iqaluit's requirements or replaced. Any section requiring repair shall be retested.

.8 The Contractor shall supply the City of Iqaluit with a completed 'Hydrostatic Pressure Test' form (see Standard Forms section) which shall include;

.1 The date and time of the test.

.2 A figure showing the location of test and the pipe run that was tested.

.3 Start / end pressure.

.4 Contractor representative overseeing the test, name, and signature.

.5 Witness name and signature.

3.20 Flushing & Disinfecting

.1 Disinfecting shall proceed immediately after cleaning, flushing, and hydrostatic testing. The Contractor shall be responsible for making arrangements with the local municipal authority to use local municipal water for flushing and disinfection.

.2 Notify the City of Iqaluit and the Department of Health in writing at least four days in advance prior to commencement of disinfection.

.3 Submit to the City of Iqaluit and the Department of Health, in writing, a schedule and description of the intended methods of flushing and disinfection. The method for flushing, disinfection, and bacteriological testing shall be as approved by the City of Iqaluit and the Department of Health.

.4 Perform cleaning and disinfection of all permanent and temporary watermain piping in accordance with AWWA C651.

.5 The continuous feed method shall be used unless directed otherwise. Following the required contact time, the system shall be flushed. Chlorinated water shall be neutralized using an appropriate chemical such as sodium thiosulphate.

.6 The City of Iqaluit may permit or require flushing, hydrostatic testing, and disinfection to be carried out in stages as sections of the system are completed. Flushed and disinfected sections shall be protected against contamination.

.7 All pipes intended for potable water shall be thoroughly flushed and shall exhibit a free chlorine residual equal to the free chlorine residual present in the source water prior to connecting to properties and placing into service.

.8 Samples for bacteriological testing shall be collected, by the City, a minimum of 24 hours after flushing is completed, in accordance with AWWA C651.

.9 Supply all disinfecting agents, labour, and equipment for disinfection.

.10 Watermains shall not be put in operation until water samples have been tested and approved by the City of Iqaluit.

.11 Tested samples shall be free of Total Coliforms and E. Coli prior to acceptance. If bacteria are detected, the disinfection process is to be repeated until satisfactory results are obtained.

.12 Testing shall be completed by laboratory accredited by either the Canadian Association for Laboratory Accreditation (CALA) or the Standard Council of Canada (SCC). Laboratories shall be recognized by the Territory of Nunavut Health Department.

.13 Potable water shall have a chlorine residual between 1.5 mg/L and 2.2 mg/L and shall have and turbidity of less than 2.0 NTU.

.14 The Contractor will not be reimbursed for any down time associated with awaiting test results.

.15 Release of all dechlorinated flushing and disinfection water shall be in accordance with Federal, Territorial, and Local regulations.

.16 Ensure no offensive odour exists due to high chlorine residual in watermains.

.17 On completion of the chlorination of the mains, the Contractor shall set the system in operation and supply the necessary labour for the opening or closing of all valves as required or drain the system and pump all mains and services dry, as directed by the City of Iqaluit.

.18 The cost of disinfection and putting the mains into service or pumping the mains and services dry shall be included in the unit price for the mains.

.19 Potable water will be available from the municipal supply.

3.21 Pressure Test of Water System After Vault Connections

.1 After the water main system, complete with fittings, valves and hydrants, has been installed, but before making connection to the existing mains, the system shall be pressure tested. The pressure test shall be performed on each section of water main. A section of water main shall be considered to consist of a length of pipe between two (2) valves.

.2 The purpose of the pressure test is to verify the integrity of all joints, pipes and valves.

.3 The Contractor shall provide all necessary labour, materials and equipment for the test including a suitable pump and measuring tank, pressure hoses, connection plugs, caps, gauges and all other apparatus necessary for filling the pipe, applying the required test pressure, and record the pressure losses.

.4 Water shall be used for testing. The Contractor shall provide temporary heating and additional insulation as required to keep the water in the pipe from freezing.

.5 The valves at each end of a section of pipe shall be closed and the pipe shall be filled with water at a gauge pressure of 1.5 times the normal operating pressure of the pipe (minimum 1103 kpa (160 psi)). The test pressure shall be maintained for an initial period of 4 hours and then reduced by 70 kPa (10 psi), then held at the reduced pressure for a second period of 2 hours duration. During the second period of the test, the joints on water main fittings, valves, hydrants, etc., in access vaults shall be inspected.

.6 The 70 kPa reduction in pipe pressure after 4 hours of pressurizing compensates for pipe stretch. No water loss allowance shall be made in the second period of the test for pipe stretch.

.7 When testing sections of the pipe, the pressure difference is to be maintained across the valve to test the valve. Therefore, two adjacent sections of pipe cannot be testing simultaneously.

.8 Upon completion of the pressure test, the flanged connection on the exterior of the access vault shall be retightened and the access vault backfilled.

.9 Certificates indicating satisfactory pressure testing must be provided with progress claims.

.10 Submit the pressure test results on the City's standard Hydrostatic Pressure Test form (see Standard Forms section).

3.22 Test for Obstructions

.1 Upon completion of backfilling, watermains shall be tested for obstructions. The Contractor shall provide and pay for all labour, tools, rope, pigs, lights, and other equipment required to examine all Work as required by the City of Iqaluit. The cost of this testing shall be included in the unit prices tendered for the installation of watermains.

.2 The pipes shall be deemed unobstructed if a manufactured pipeline pig having a diameter 19 mm less than the inside diameter of the pipe can be readily pulled through the line. This test shall be performed prior to flushing and chlorination.

3.23 Joint Testing

.1 The City of Iqaluit reserves the right to visually inspect and test fusion joints using non-destructive methods.

3.24 Hydrant Flow Testing

.1 In accordance with Section 33 05 14.03 – Access Vaults.

3.25 Inspection Certificates

.1 Written inspection certificates shall be issued to the Contractor / Developer for various phases of the Work after the Work has been inspected by the City of Iqaluit, and after the Work has been found to comply with the Drawings and Specifications. Inspection certificates are required for Work that is to be covered by other Work or backfill.

.2 The Contractor / Developer shall request inspections. Two business days notice is required.

.3 Payment shall not be made for Work requiring an inspection certificate until the certificate has been issued to the City of Iqaluit. The City of Iqaluit shall issue an inspection certificate immediately after approval of a phase of the Work.

.4 The issuance of an inspection certificate shall not relieve the Contractor / Developer from their obligation to maintain the Work or replace Work subsequently found to be faulty.

.5 The temporary absence of the City of Iqaluit from the Site shall not relieve the Contractor / Developer from their obligation to obtain inspection certificates.

3.26 Fusion Data Logging Reports

.1 The Contractor shall supply the City with the datalogger reports for each fusion joint. Datalogger reports shall be in accordance with ASTM F3124.

3.27 Relocation of Mains

.1 The City of Iqaluit has the right to require relocation of mains throughout the Project and they will advise the Contractor well in advance of the Work if any such Work is contemplated.

PART 4 BASIS FOR PAYMENT

4.1 Watermains

.1 Unit of Measurement: Lineal Metres

.2 Method of Measurement: The number of lineal meters of pipe supplied and installed, as measured from end to end along the centreline of the pipe, including the length of fittings and appurtenances, for the pipe sizes indicated on the Unit Price Schedule.

.3 Item Includes: Supply, shipping, handling, and installation of the pipe, insulation, insulation field kits, pressure testing, flushing, disinfection, detectable warning/marker tape, fittings, bends, and couplings, and all material, equipment, labour, tools, and incidentals necessary to complete the Work. Reducers are excluded.

.4 Where applicable, this item includes removal and disposal of existing mains as encountered during the installation of new mains.

4.2 Lateral Service Connections

.1 Unit of Measurement: Lineal Metres

.2 Method of Measurement: The number of lineal meters of service pipe supplied and installed, as measured from end to end along the centreline of the pipe, including the length of the fittings and appurtenances, for the pipe sizes indicated on the Unit Price Schedule.

.3 Item Includes: Supply, shipping, handling, and installation of the service saddle, corporation stop, curb stop assembly, pipe, insulation, service insulation form, foam insulation, CSP pipe, CSP lid, steel plate, insulation field kits, testing, flushing, disinfection, detectable warning/marker tape, marker stake, fittings, bends, and couplings, and all material, equipment, labour, tools, and incidentals necessary to complete the Work. The unit price bid is inclusive of the carrier pipe, supply pipe, and return pipe.

.4 Where applicable, this item includes removal and disposal of existing services as encountered during the installation of new services.

4.3 Rigid Board Insulation

.1 Unit of Measurement: Square Metres

.2 Method of Measurement: The number of square meters of insulation installed.

.3 Item Includes: Supply, shipping, handling, installation and all material, equipment, labour, tools, and incidentals necessary to complete the Work.

.4 Remove/Decommission Existing Mains/Services/Culverts

.1 Unit of Measurement: Lump Sum

.2 Method of Measurement: No Measurement will be made for his item. Payment shall be made based on the percentage of the Work completed, as determined by the City of Iqaluit.

.3 Item Includes: Decommissioning of the existing watermains, sanitary sewer mains, services, and culverts as indicated on the Drawings. This item includes removal and disposal or abandonment in place of existing pipes as indicated on the Drawings, the supply of waterproof plugs and end caps, the installation of blind flanges at vaults which are to remain, and all labour, materials, equipment, tools, and incidentals necessary to complete the Work.

4.4 Remove/Decommission Existing Mains/Services

.1 Unit of Measurement: Lump Sum

.2 Method of Measurement: No Measurement will be made for his item. Payment shall be made based on the percentage of the Work completed, as determined by the City of Iqaluit.

.3 Item Includes: Decommissioning of the existing watermains, sanitary sewer mains, services, and culverts as indicated on the Drawings. This item includes removal and disposal or abandonment in place of existing pipes as indicated on the Drawings, the supply of waterproof plugs and end caps, the installation of blind flanges at vaults which are to remain, and all labour, materials, equipment, tools, and incidentals necessary to complete the Work.

4.5 Tie to Existing Main

.1 Unit of Measurement: Each

.2 Method of Measurement: The number of completed connections to existing mains.

.3 Item Includes: Supply and installation of restraint coupling and stainless steel pipe stiffener inserts, pipe preparation, cutting, fusion, and all

labour, materials, equipment, tools, and incidentals necessary to complete the Work.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 29 83 – Testing and Laboratory Services.

.2 Section 01 33 00 – Shop Drawings and Submittals.

.3 Section 01 35 30 – Health and Safety Requirements.

.4 Section 01 35 43 – Environmental Procedures.

.5 Section 01 45 00 – Quality Control.

.6 Section 01 51 00 – Temporary Utilities.

.7 Section 01 61 00 – Common Product Requirements.

.8 Section 01 74 19 – Construction/Demolition Waste Management and Disposal.

.9 Section 01 78 00 – Closeout Submittals.

.10 Section 01 78 23 – Operation and Maintenance Manuals.

.11 Section 01 78 39 – Project Record Drawings.

.12 Section 31 05 16 – Aggregates.

.13 Section 31 23 33.01 – Trenching and Backfilling.

.14 Section 32 11 23 – Roadway Grading.

.15 Section 33 05 14.03 – Access Vaults.

.16 Section 33 14 16 – Water Distribution Pipe.

1.2 Reference Standards

.1 ASTM International (ASTM)

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

.2 ASTM F714, Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter.

.3 ASTM F3124, Standard Practice for Data Recording the Procedure used to Produce Heat Butt Fusion Joints in Plastic Piping Systems or Fittings.

.2 Canadian Standards Association (CSA Group)

.1 CSA B137.1, Polyethylene (PE) Pipe, Tubing, and Fittings for Cold-Water Pressure Services [Part of B137, PE and PVC Piping Systems for Water Package]

.3 American Water Works Association (AWWA).

.1 AWWA C219, Bolted Sleeve-Type Couplings for Plain-End Pipe

1.3 Work Included

.1 The Work covered by this Section shall include the supply and installation of sanitary sewer gravity mains, forcemains, and sanitary sewer services. All materials supplied and workmanship performed shall meet the requirement of the specifications and be guaranteed for the conditions of service applied to the Project.

1.4 Action and Informational Submittals

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature, and data sheets for piping materials and include product characteristics, performance criteria, physical size, finish, and limitations.

.2 Piping materials include, but are not limited to:

.1 Pipe.

.2 Fittings.

.3 Pipe certification to be on pipe.

.2 As-built data:

.1 Submit data to produce record drawings, including details of pipe material.

.1 Include top of pipe, horizontal location, and vertical elevation.

.2 Include the location of all butt-fusion joints.

.2 Submit operation and maintenance data for pipe, forcemain valves, and forcemain valve boxes.

.3 Record top of pipe GPS data elevations for sewer mains and services every 10 m and send to the City of Iqaluit for approval prior to backfilling pipe. If pipe is backfilled and pipe elevations are found to be unacceptable, the Contractor shall excavate buried pipe and realign in

accordance with Contract Drawings or alignment deemed acceptable by the City of Iqaluit.

.4 Record GPS data and elevations for all flanged connections, couplings, and fusion points and send to the City of Iqaluit for approval prior to backfilling. If backfilling is completed and elevations are found to be unacceptable, the Contractor shall excavate and realign in accordance with Contract Drawings or alignment deemed acceptable by the City of Iqaluit.

PART 2 PRODUCTS

2.1 Materials

.1 Polyethylene Pipe

.1 Sewer mains and forcemains shall be HDPE DR9 (PE 4710 Resin, Series 250, 1724 kPa, IPS dimensional standard) with 50 mm urethane insulation encased in a 1.27 mm polyethylene black jacket.

.2 Sewer services shall be HDPE DR17 (PE 4710 Resin, Series 125, 862 kPa, IPS dimensional standard) with 50 mm urethane insulation encased in a 1.27 mm polyethylene black jacket. For 100mm services, DR17 shall not be substituted with thicker walled pipe as thicker walled pipe has a smaller inside diameter.

.3 All polyethylene pipe, fittings, stub-ends, etc., shall be of the same manufacturer's series, wall thickness, and grade of polyethylene.

.4 No joints shall be allowed in piping covered with factory applied insulation.

.5 Bend fittings shall not be permitted along sewer mains or services, unless pre-approved by the City of Iqaluit.

.6 HDPE stub ends shall be fitted with a restraint coupling, followed by a butt-fused HDPE end-cap.

.7 All jacketed pipe shall have permanent factory applied markings, including:

.1 Nominal size.

.2 Standard material code designation (e.g., PE 4710).

.3 On pipe, the dimension ratio and diameter base (e.g., DR9).

.4 Pressure class (e.g., PC 250).

.5 Standard designation.

.6 Manufacturer's name or trademark.

.7 Production record code.

.2 HDPE Pipe Couplings for Plain-End Pipe

.1 Shall be compliant with AWWA C219, Bolted Sleeve-Type Couplings for Plain-End Pipe.

.2 Shall be "Restraint" type.

.3 Shall include stainless steel pipe stiffeners at pipe ends. Stiffeners are required to be used with all plain-end pipe couplings.

.4 Acceptable plain-end pipe couplings include:

.1 Hymax Grip

.2 Arpol Fix Pro

.3 Robar 1900RSCHH

.4 EBAA Iron Mega-Coupling Series 3800

.5 Romac Alpha

.6 Romac Armor Lock

.7 GF Multi/Joint 3000 Plus

.8 Victaulic Style 905 Coupling (stiffener insert required)

.5 Other products may be approved at the sole discretion of the City of Iqaluit.

.3 Urethane Insulation

.1 In accordance with Section 33 14 16.13 - Water Distribution Pipe.

.4 Detectable Warning / Marker Tape

.1 In accordance with Section 33 14 16.13 - Water Distribution Pipe.

.2 Sewer main marking: Red in colour, marked "Sewer Line".

.3 Lateral service marking for common water/sewer service trench: Red in colour, marked "Sewer Line".

.5 Field Joint Sleeves

.1 In accordance with Section 33 14 16.13 - Water Distribution Pipe.

.6 Heat Shrink Tape

.1 In accordance with Section 33 14 16.13 - Water Distribution Pipe.

.7 Half Shells

.1 In accordance with Section 33 14 16.13 - Water Distribution Pipe.

.8 Field Applied Urethane

.1 In accordance with Section 33 14 16.13 - Water Distribution Pipe.

.9 Pipe Bedding

.1 Pipe bedding shall be in accordance with Section 31 23 33.01 – Trenching and Backfilling.

.10 Rigid Board Insulation

.1 In accordance with Section 33 14 16.13 - Water Distribution Pipe.

.11 Sanitary Service Saddle

.1 Sanitary sewer service saddles shall be stainless steel, Robar Industries 6626 Outlet Sleeve with rubber gaskets and couplings (or approved equivalent).

.12 Water Service Insulation Forms

.1 22-gauge hot dipped galvanized sheet metal.

.2 Stainless steel gear clamps.

PART 3 EXECUTION

3.1 Drainage

.1 The Contractor shall keep all portions of the Work properly and efficiently drained during construction and until construction completion. The Contractor shall be held responsible for all damage that may be caused as the result of water backing up or flowing over, through, from, or along any part of the Work or surrounding properties due to their operation.

.2 Work shall be carried out in a dry trench. In no case shall water be allowed to run over the invert, reach the joints, or run through the pipe or culvert sections during construction.

3.2 Site Restrictions

.1 When planning the Work, the Contractor shall make due allowance for the presence of the existing structures, access, utilities, and the operation of others on the Site.

.2 Supports, adequate protection, and maintenance of all existing underground and surface utility structures, drains, sewers, ducts, conduits, power poles, and other obstructions encountered during the progress of Work, shall be provided by the Contractor at their own expense, unless there is a unit price schedule item included for said work.

3.3 Relocation of Mains

.1 The City of Iqaluit has the right to relocate the mains throughout the Project and they will advise the Contractor well in advance of the Work if any such move is contemplated.

3.4 Service Connections

.1 Excavation, bedding, backfilling, urethane insulation, piping insulation system, and styrofoam used in the installation of service connections shall conform to the same requirements as for main line installation.

.2 A clean-out shall be included on the sanitary service if the service length is more than 30.0m.

.3 The corresponding Sections of the Specifications are to be read in conjunction with this Section.

3.5 Inspection

.1 All material is subject to inspection and testing for soundness and suitability at the discretion of the City of Iqaluit. The Contractor shall notify the City of Iqaluit following the placement of access vaults in their proposed locations prior to backfilling.

.2 All Work shall be undertaken in strict adherence to the manufacturer's instructions, which are considered as being part of the Specifications. As each section of the Work is completed, it shall be tested in the manner specified, and in the presence of, and as approved by, the City of Iqaluit.

.3 All material found, during the progress of the Work, to have cracks, flaws, or other defects, or to be of doubtful quality will be rejected by the City of Iqaluit. All rejected materials shall be promptly removed from the Site of the Work by

the Contractor and all costs associated with the removal and replacement of rejected material shall be borne by the Contractor.

3.6 Handling of Material

.1 All material shall be delivered and distributed at the Site by the Contractor. All pipe and accessories shall be loaded and unloaded by lifting manually or with hoists so as to avoid shock or damage. Under no circumstances shall such materials be dropped.

.2 In distributing the polyethylene pipe at the Site of the Work, each piece shall be unloaded opposite or near the place where it is to be installed.

.3 Pipe shall be handled so the exterior and interior surfaces, prefabricated joints, insulation, etc., will not be damaged. If, however, any part of any surface, coating, or lining is damaged, the repair shall be made by the Contractor at their own expense, in a manner satisfactory to the City of Iqaluit.

3.7 Alignment, Depth, and Grade

.1 All pipe sections shall be laid and maintained to the required lines and grades, with fittings, valves, access vaults, etc., at the proper locations and grade with joints centered.

.2 No deviation from the authorized lines and grades shall be made without the written approval of the City of Iqaluit. If, in the opinion of the City of Iqaluit, the Contractor's method of setting grades is inaccurate or insufficient, the City of Iqaluit may direct that more suitable equipment and methods be used to ensure that proper grades are established.

.3 For new construction, the minimum depth of bury for sanitary sewer mains shall be 3.5 m unless otherwise authorized by the City of Iqaluit.

.4 Forcemains shall be graded without high points that could potentially trap air.

.5 The minimum grade for lateral building services shall be 2%.

.6 The maximum grade for lateral building services shall be 6%. If the service grade will be in excess of 6%, as calculated between the building riser and the main, the Contractor shall install a riser pipe (using the same diameter of pipe) at the sewer main (between a long radius vertical bend and the sewer main). The riser pipe is used to flatten the slope of the pipe run to achieve a pipe grade of 2 – 6%. The riser pipe shall be installed at 45 – 70 degrees.

3.8 Rigid Board Insulation

.1 Rigid board insulation shall be installed per the Specification Figures to reduce vertical pipe movement by limiting thaw within the active layer beneath the pipe.

.1 Rigid board pipe insulation shall not be required where solid rock is encountered within 200 mm beneath the design pipe invert elevation.

.2 Rigid board insulation is not required at lateral service connections.

3.9 Water in Excavation

.1 Work shall be carried out in a dry trench. In no case shall water be allowed to run over the invert, reach the joints, or run through the pipe during construction.

.2 The expense of removing the water, regardless of origin, is the responsibility of the Contractor. The Contractor shall be wholly responsible for any damage that may occur due to groundwater or stormwater entering the trench during the period of construction.

3.10 Pipe Bedding

.1 In accordance with Section 33 14 16.13 – Water Distribution Pipe.

3.11 Detectable Warning Tape

.1 In accordance with Section 33 14 16.13 – Water Distribution Pipe.

3.12 Field Applied Urethane

.1 Field spraying of urethane at lateral service connections shall be carried out by experienced operators only. Exposed urethane shall be coated with 1 mm of Shell Flintkote No. 3 and heat shrink sleeves. Where geometry does not permit the use of heat shrink sleeves, two layers of heat shrink tape, 150 mm wide tape with 50% overlap shall be used.

3.13 Pipe Laying

.1 Lengths of polyethylene pipe sanitary sewer mains to be laid between flanged fittings on access vaults shall be assembled on dry ground by butt-fusion, complete with flanged ends. The pipe shall be pressure tested and installation of urethane half shells shall be installed on the ends of mains prior to installation in the trench and shall only be removed immediately prior to connection to the access vault.

.2 The sanitary sewer mains shall be laid to the alignment and the grades shown on the Drawings.

.3 It is prohibited to drag pipe over the ground which would damage the black jacket or insulation. If the pipe or fused sections of pipe are to be moved, they must be supported on rollers or completely suspended.

.4 Slings used to lower the insulated pipe into the trench shall support the pipe without causing damage to the jacketing insulation.

.5 Where conditions dictate that the pipe must be buried at depths less than the minimums shown on the Drawings (as directed by the City of Iqaluit), the absolute minimum depth of cover in roadways shall be 1.0 m to prevent deformation from traffic loading. If the pipe is buried with 1.0 m of cover, the backfill material shall be Granular A or Granular B above the pipe embedment zone.

3.14 Field Pipe Bending

.1 Swing the pipe to add sweeping curves to pipes as indicated on Drawings. Temporary restraints may be required to bend the pipe, and to maintain the bend while placing the pipe in the trench and placing initial backfill.

.2 The minimum radius for field bending ("pipe roping") of HDPE pipe shall be:

.1 50 x Pipe Diameter (OD).

3.15 Bend Fittings

.1 Bend fittings shall not be used unless written approval is provided by the City of Iqaluit.

3.16 Pipe Joints

.1 In accordance with Section 33 14 16.13 – Water Distribution Pipe.

3.17 Pressure Testing of Polyethylene Pipe

.1 In accordance with Section 33 14 16.13 – Water Distribution Pipe.

3.18 Testing for Obstructions

.1 Upon completion of backfilling, sewer mains shall be tested for obstructions. The Contractor shall provide and pay for all labour, tools, rope, pigs, lights, and other equipment required to examine all Work as required by the City of Iqaluit. The cost of this testing shall be included in the unit prices tendered for the installation of sewer mains.

.2 The pipes shall be deemed unobstructed if a manufactured pipeline pig having a diameter 19 mm less than the inside diameter of the pipe can be readily pulled through the line.

3.19 CCTV Inspection of Sewer Mains

.1 The City of Iqaluit reserves the right to have a camera inspection completed after the installation of sewer mains. Unless there is cause to believe that an obstruction may be present in the main, the cost of such camera inspection shall be borne by the City of Iqaluit. Deficiencies noted by means of the camera inspection shall be rectified by the Contractor at their own expense.

.2 Camera inspections shall be performed by a qualified firm.

.3 Camera inspection deliverables shall be clear and of high quality, free of video artifacts and fogging. The City of Iqaluit reserves the right to reject poor quality video.

.4 The video inspection system shall include the linear position of the camera relative to the starting point.

.5 Videos shall be supplied in MPEG-4 digital format and shall be accompanied by a written report summarizing findings.

3.20 Flushing

.1 Sewer mains shall be flushed with a minimum flow of 1.5 m/s within the pipe for a duration of 10 minutes or until all foreign materials have been removed and flushed water is clear.

.2 Flushing operations shall be performed under the direction of the City of Iqaluit. Provide 48 hours notice prior to the start of flushing operations.

3.21 Joint Testing

.1 The City of Iqaluit reserves the right to visually inspect and test fusion joints using non-destructive methods and visual inspection.

3.22 Inspection Certificates

.1 Written inspection certificates shall be issued to the Contractor / Developer for various phases of the Work after the Work has been inspected by the City of Iqaluit, and after the Work has been found to comply with the Drawings and Specifications. Inspection certificates are required for Work that is to be covered by other Work or backfill.

.2 The Contractor / Developer shall request inspections. Two business days notice is required.

.3 Payment shall not be made for Work requiring an inspection certificate until the certificate has been issued to the City of Iqaluit. The City of Iqaluit shall issue an inspection certificate immediately after approval of a phase of the Work.

.4 The issuance of an inspection certificate shall not relieve the Contractor / Developer from their obligation to maintain the Work or replace Work subsequently found to be faulty.

.5 The temporary absence of the City of Iqaluit from the Site shall not relieve the Contractor / Developer from their obligation to obtain inspection certificates.

3.23 Fusion Data Logging Reports

.1 The Contractor shall supply the City with the datalogger reports for each fusion joint. Datalogger reports shall be in accordance with ASTM F3124.

3.24 Backflow Prevention

.1 Backflow preventers shall be installed within any building connected to the municipal sewage collection system.

.2 Backflow preventer type and installation shall be per the National Plumbing Code of Canada.

PART 4 BASIS FOR PAYMENT

4.1 Gravity Mains & Forcemains

.1 Unit of Measurement: Lineal Metres

.2 Method of Measurement: The number of lineal metres of pipe supplied and installed, as measured from end to end along the centreline of the pipe, including the length of fittings and appurtenances, for the pipe sizes indicated on the Unit Price Schedule.

.3 Item Includes: Supply, shipping, handling, and installation of pipe, insulation, insulation field kits, pressure testing, obstruction testing, flushing, detectable warning/marker tape, fittings, bends, and couplings, and all material, equipment, labour, tools, and incidentals necessary to complete the Work.

.4 Where applicable, this item includes removal and disposal of existing mains as encountered during the installation of new mains.

4.2 Lateral Service Connections

.1 Unit of Measurement: Lineal Metres

.2 Method of Measurement: The number of lineal meters of service pipe supplied and installed, as measured from end to end along the centreline of the pipe, including the length of fittings and appurtenances, for the pipe sizes indicated on the Unit Price Schedule.

.3 Item Includes: Supply, shipping, handling, and installation of service saddles, pipe, insulation, service insulation form, foam insulation, insulation field kits, testing, flushing, detectable warning/marker tape, marker stake, fittings, bends, and couplings, riser pipe, and all material, equipment, labour, tools, and incidentals necessary to complete the Work.

.4 Where applicable, this item includes removal and disposal of existing services as encountered during the installation of new services.

4.3 Service Cleanout

.1 Unit of Measurement: Each

.2 Method of Measurement: The number of cleanouts installed.

.3 Item Includes: Supply, shipping, handling, and installation of wye, bends, riser pipe, HDPE cap, blind flange, insulation, CSP, steel cap, marker stake, concrete, hardware and all material, equipment, labour, tools, and incidentals necessary to complete the Work.

4.4 Camera Inspections

.1 Unit of Measurement: Lump Sum

.2 Method of Measurement: No Measurement will be made for this item. Payment shall be made only after receipt of the video and report deliverable, and after confirmation that the deliverable is of an acceptable quality.

.3 Item Includes: All equipment, labour, tools, materials, and incidentals necessary to conduct the CCTV inspections and prepare the deliverables.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Materials and installation for pipe culverts.

1.2 Related Sections

.1 Section 01 33 00 – Shop Drawings and Submittals.

.2 Section 01 61 00 - Common Product Requirements.

.3 Section 31 05 16 - Aggregates.

.4 Section 31 23 33.01 - Trenching and Backfilling.

.5 Section 31 37 00 – Rip-Rap.

.6 Section 32 11 23 – Roadway Grading.

1.3 Reference Standards

.1 ASTM International (ASTM)

.1 D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

.2 F405, Corrugated Polyethylene (PE) Pipe and Fittings

.3 F667, 3 Through 24 in. Corrugated Polyethylene Pipe and Fittings

.4 F714, Polyethylene Plastic Pipe Based on Outside Diameter

.5 F894, Polyethylene Large Diameter Profile Wall Sewer and Drain Pipe

.2 Canadian Standards Association (CSA Group)

.1 CSA B182.6, Profile Polyethylene (PE) Sewer Pipe and Fittings for Leak-Proof Sewer Applications [Part of B1800, Thermoplastic Nonpressure Piping Compendium].

.2 CSA B182.8, Profile Polyethylene (PE) Storm Sewer and Drainage Pipe and Fittings [Part of B1800, Thermoplastic Nonpressure Piping Compendium].

.3 CSA G401, Corrugated Steel Pipe and Buried Structures.

.3 American Association of State Highway and Transportation Officials (AASHTO)

.1 M294, Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter.

.2 M306, Standard Specification for Drainage, Sewer, Utility, and Related Castings.

.3 M252-09, Corrugated Polyethylene Drainage Pipe

1.4 Submittals

.1 Certification to be marked on pipe.

1.5 Delivery, Storage, and Handling

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

PART 2 PRODUCTS

2.1 Corrugated Steel Pipe

.1 Corrugated steel pipe shall conform to the requirements of CSA G401; pipe stiffness as per AASHTO M306.

.2 Galvanized.

.3 Minimum wall thickness of 1.6 mm or as specified.

.4 Watertight cut-off collars: as indicated.

.5 Prefabricated end sections: as indicated.

.6 Annular Corrugated Couplers.

2.2 HDPE Corrugated Pipe

.1 HDPE corrugated pipe shall include a smooth inner wall.

.2 HDPE corrugated pipe shall be dual wall.

.3 The moulding and extrusion material shall be polyethylene plastic according to:

.1 ASTM F 405, ASTM F 667, or BNQ 3624-115 for corrugated sub-drainage tubing.

.2 AASHTO M252 for corrugated interior flexible culvert pipe.

.3 CSA B182.6, CSA B182.8, or AASHTO M294 Type S for open profile sewer and drainage pipe.

.4 ASTM F 714 or ASTM F 894 for closed profile sewer and drainage pipe.

.4 Polyethylene plastic pipe products shall be produced according to the following:

.1 ASTM F 405, ASTM F 667, or BNQ 3624-115 for corrugated sub-drainage tubing and fittings.

.2 AASHTO M252 for corrugated interior flexible culvert pipe.

.3 CSA B182.6, CSA B182.8, or AASHTO M294 Type S for open profile sewer and drainage pipe and fittings.

.4 ASTM F 714 or ASTM F 894 for closed profile sewer and drainage pipe.

.5 All polyethylene plastic pipe products used on the Contract for sewers and culverts shall be certified and supplied from a manufacturer that produces the polyethylene plastic pipe products according to CSA B182.6, CSA B182.8, AASHTO M294 Type S, ASTM F 894 or ASTM F 714.

.6 When the delivered quality of certified polyethylene plastic pipe products is deemed to be unacceptable by the Contract Administrator, the products shall be rejected.

.7 Markings for certified polyethylene plastic pipe products shall be according to CSA B182.6, CSA B182.8, AASHTO M294 Type S, ASTM F 894, or ASTM F 714 as applicable.

2.3 Granular Bedding and Backfill

.1 In accordance with Section 31 05 16 – Aggregates.

PART 3 EXECUTION

3.1 Trenching

.1 Do trenching Work in accordance with Section 31 23 33.01 - Trenching and Backfilling.

.2 Obtain the City of Iqaluit's approval of trench line and depth prior to placing bedding material or pipe.

3.2 Bedding

.1 Do bedding Work in accordance with Section 31 23 33.01 – Trenching and Backfilling.

3.3 Corrugated Steel Pipe Culverts Installation

.1 Confirm inverts prior to commencement of construction.

.2 Commence pipe placing at downstream end and proceed in an upstream direction with outside circumferential laps facing upstream and longitudinal laps or seam at side or quarter points.

.3 Lay and join pipes in accordance with CSA G401 and the manufacturer's recommendations.

.4 Handle pipe by approved methods. 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, with pipe invert smooth and free of sags and high points. Do not lay pipe on frozen bedding.

.6 Ensure barrel of each pipe is in contact with shaped bed throughout its full length. Take up and replace defective pipe. Correct pipe which is not true to alignment and grade and pipe which shows differential settlement after installation.

.7 Position and join pipes with suitable equipment and methods. Do not use excavating equipment to force pipe sections together.

.8 Cut pipes in an approved manner, as recommended by the pipe manufacturer, without damaging the pipe and to leave a smooth end at right angles to axis of pipe.

.9 Do not allow water to flow through pipes during construction.

.10 Install end treatment as specified on the Drawings, in accordance with the manufacturer's recommendations.

.11 The culvert grade shall not be less than the ditch grades at the inlet and outlet.

.12 Culverts shall have a sufficient amount of cover to protect against damage from the expected traffic loading. Minimum cover shall be 300mm or one-half the diameter of the culvert, whichever is greater as measured from the finished shoulder grade tot he top of the culvert.

.13 Where multiple culverts are needed at a single location, the upstream inverts shall be designed to reduce the risk of icing of the culverts. To reduce the risk of culvert icing, the culverts can be placed at slightly different elevations to prevent blockage of all the culverts at the same time.

.14 All culvert ends, regardless of material, shall include a marker post. Marker Posts shall:

.1 Be minimum 1.5m long.

.2 Be red or Orange colour.

.3 Include reflective tape at the top end.

.4 Be fastened to the culvert using a bracket system, two bolts, and oversized washers.

.15 Care shall be taken to avoid damage to permafrost during the installation of culverts. Where disturbance to the permafrost is unavoidable, designs shall incorporate a means to re-establish and reinsulate the permafrost.

.16 Culvert inlets should be placed at the same elevation of the natural stream bed to facilitate the passage of fish. Where culverts are to allow for the passage of fish, designs shall take into account the requirements of the authority having jurisdiction.

.17 Where there is a risk of drainage overflow causing washout of critical infrastructure such as a roadway, the drainage system design shall include a means to prevent overflow of the system (e.g., overflow culverts).

.18 Culvert ends shall be protected using rip-rap. Rip-rap shall be installed per the following:

.1 The rip-rap apron size shall extend beyond the culvert end by 2 x the pipe diameter.

.2 The rip-rap apron width shall be 3 x the pipe diameter and shall be centred with the pipe.

.3 The rip-rap apron shall be placed over top of the pipe to a height of 0.5 x the pipe diameter.

.4 Non-woven geotextile shall be installed under the entire rip-rap apron.

.5 Excavate the rip-rap apron area ahead of placement and hand-place the geotextile and rip-rap so the finished elevation of the rip-rap matches the finished grade of the ditch.

3.4 Joints:

.1 Corrugated Steel Pipe:

.1 Steel pipe culvert sections shall be joined by means of steel couplers. The couplers shall be installed to lap approximately equal portions of the pipe culvert being connected so that the corrugations or projections of the coupler properly engage the pipe culvert corrugations. As the coupler is being tightened, it shall be tapped with a mallet to take up the slack.

.2 Align pipes carefully before jointing.

.3 Match corrugations or indentations of coupling with pipe sections before tightening.

.4 Tap couplings firmly as they are being tightened to take up slack and ensure a snug fit. Insert and tighten bolts.

.5 Repair spots where damage has occurred to spelter coating by applying two coats of zinc rich epoxy paint.

.6 Complete each joint before laying the next length of pipe.

.7 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes in accordance with Section 31 23 33.01 – Trenching and Backfilling.

.2 Structural Plate:

.1 Erect in final position by connecting plates with bolts at longitudinal and circumferential seams.

.2 Drift pins may be used to facilitate matching of holes.

.3 Place plates in sequence recommended by manufacturer with joints staggered so that not more than three plates come together at any one point.

.4 Draw bolts up tight, without overstress, before beginning to backfill.

.5 Repair spots where damage has occurred to spelter coating by applying two coats of zinc rich epoxy paint approved by the City of Iqaluit.

.6 Structural plate pipe culverts may be assembled in the trench or beside the excavation. If the assembled structure must be moved to its final position, it shall be moved so that no damage or distortion is caused to the structure.

.7 When the structural plate pipe culvert has been placed to the alignment and grade specified in the Contract Documents, all assembly bolts shall be tightened so that the torque on the bolts prior to backfilling is between 200 and 340 Nm.

.8 Before backfilling, at least 5% of the bolts used in each circumferential and longitudinal connection shall be tested after assembly.

.3 HDPE Corrugated Dual Wall Pipe

.1 Polyethylene pipe culvert shall be jointed by one of the following methods, as recommended by the pipe manufacturer:

.1 Bell and Spigot.

.2 Screw-on Coupler.

.3 Split Coupler.

.4 Mechanical Restrained Joint with Gasket.

PART 4 BASIS FOR PAYMENT

4.1 Culvert

.1 Unit of Measurement: Lineal Metres

.2 Method of Measurement: The number of lineal metres of culvert installed, for the pipe sizes and materials indicated on the Unit Price Schedule, as measured from end to end along the centreline of the pipe, including the length of fittings.

.3 Item Includes: Supply, shipping, handling, and installation of the pipe, fittings, hardware, and end treatment, excavation, bedding, and backfilling as specified on the Drawings.

.4 Unless noted as a separate pay item, the removal and disposal of existing culverts within 2.0 m of the new culvert shall be included in the culvert pay item.

.5 Prior to the installation of a drainage structure, the City may, at its sole discretion, require the Contractor to raise or lower the invert of a pipe culvert by 150 mm or less, at no additional cost. Bedding elevations shall be adjusted accordingly.

.6 A change in invert elevation exceeding 150 mm shall be administered as a Change in the Work.

END OF SECTION

PART 1 GENERAL

.1 This specification covers the requirements for the installation of steel beam guide rail systems.

PART 2 PRODUCTS

.1 All products shall be in accordance with the most current revision of the Ontario Provincial Standard Specification (OPSS) 721 'Construction Specification for Steel Beam Guide Rail Systems", as published by the Ministry of Ontario (MTO), and associated Specification figures.

.1 The following supersedes the information in the Construction Specification for Steel Beam Guide Rail Systems", as published by MTO:

.1 Turn-down ends are not accepted in the City of Iqaluit.

PART 3 EXECUTION

.1 Execution shall be in accordance with Ontario Provincial Standard Specification (OPSS) 721 'Construction Specification for Steel Beam Guide Rail and Cable Guide Rail", as published by the Ministry of Ontario (MTO), and associated Specification figures.

.1 The following supersedes the information in the Construction Specification for Steel Beam Guide Rail Systems", as published by MTO:

.1 Turn-down ends are not accepted in the City of Iqaluit.

PART 4 BASIS FOR PAYMENT

4.1 Guide Rail

.1 Unit of Measurement: Lineal Metres

.2 Method of Measurement: The number of lineal meters of guiderail supplied and installed, as measured from end to end along the centreline of the beam, including the length of end treatments.

.3 Item Includes: Supply, shipping, handling, and installation of the guiderail, posts, blocking, and hardware, and all material, equipment, labour, tools, and incidentals necessary to complete the Work.

.4 Where applicable, this item includes removal and disposal of existing guiderail as encountered during the installation of new guiderail.

4.2 End Treatments

.1 Unit of Measurement: Each

.2 Method of Measurement: The number of guiderail end treatments supplied and installed, per type of end treatment as indicated in the Schedule of Quantities.

.3 Item Includes: Supply, shipping, handling, and installation of the specified guiderail end treatment type, and all material, equipment, labour, tools, and incidentals necessary to complete the Work.

.4 Unless noted as a separate pay item, the removal and disposal of existing guiderail systems within 2.0 m of the proposed alignment shall be incidental to the installation of new guiderail systems.

END OF SECTION

PART 1 GENERAL

1.1 Description

.1 This Section specifies requirements for temporary potable water supply and sewage bypass pumping as required during the construction of new water distribution and sanitary sewer collection systems or during improvements to existing systems.

.2 Included in temporary servicing: supplying and installing pipes and fittings, connecting to existing pipelines or building connections, installing thrust restraint where required, hydrostatic testing, cleaning, flushing and disinfecting pipelines, water used for testing, restoring, and cleaning up the Site, and all other Work necessary to complete temporary servicing as specified.

1.2 Related Sections

.1 Section 01 33 00 – Shop Drawings and Submittals.

.2 Section 33 05 14.03 – Access Vaults.

.3 Section 33 14 16.13 – Water Distribution Pipe.

.4 Section 33 31 11 – Sanitary Sewer Pipe.

1.3 Reference Standards

.1 American Water Works Association (AWWA)

.1 AWWA B300, Hypochlorites.

.2 AWWA B301, Liquid Chlorine.

.3 AWWA B303, Sodium Chlorite.

.4 AWWA C511, Reduced-Pressure Principle Backflow Prevention Assembly.

.5 AWWA C651, Disinfecting Water Mains.

.2 ASTM International (ASTM)

.1 ASTM D2241, Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).

.3 American Society of Mechanical Engineers (ASME)

.1 ASME B1.20.1, Pipe Threads, General Purpose, Inch.

.4 NSF International

.1 NSF/ANSI 61, Drinking Water System Components – Health Effects.

1.4 Definitions

.1 Utilidor temporary bypass: Above ground temporary potable water supply line (minimum 150 mm diameter) used to maintain water service in uni-directional systems.

.2 Temporary watermain supply: Above ground temporary potable water supply line (minimum diameter 50 mm).

.3 Temporary water service supply: Small diameter temporary above ground potable service hose and property connection. Typically, 19 mm for single detached dwellings.

1.5 Scheduling of Work

.1 Schedule Work to minimize interruption to services.

.2 Maintain existing flow during construction.

.3 Submit schedule of expected interruptions for approval and adhere to approved schedule.

.4 Notify Fire Department of any planned interruption of water supply.

.5 Coordinate with property owners and tenants in advance of the Work.

1.6 Protection of Existing Services/Structures and Temporary Works

.1 In the event of damage to the existing utilities and structures or temporary works, the Contractor shall make such repairs or replacements or rebuild such affected parts of the work as the City of Iqaluit may deem necessary, at the Contractor's expense.

.2 The Contractor shall ensure that all underground infrastructure is located in the field prior to start of construction. Cost of repairing damaged infrastructure shall be the responsibility of the Contractor.

.3 In addition to protection of existing and other structures and systems during construction, the Contractor shall use due care when working around existing utility poles, underground conduits, and direct-buried cables.

.4 The Contractor shall confirm with appropriate agencies the location of all existing underground utilities within the areas of Work.

.5 Protection of utility systems shall not be measured for separate payment but shall be considered incidental to the Work.

1.7 Submittals

.1 The Contractor shall submit to the City of Iqaluit a detailed temporary servicing plan (text and map). The plan shall be submitted to the City of Iqaluit, the local Fire Chief, and to the Department of Health for approval no less than 21 calendar days before installation of the temporary piping commences. The plan shall include the following:

.1 The locations of the temporary water source(s).

.2 The method by which the Contractor will connect the temporary service to each building.

.3 The diameter of each temporary service (multifamily buildings or businesses may require larger services).

.4 Map showing pipe and hose route(s).

.5 Map showing location of backflow preventors.

.6 Map showing buildings and civic addresses requiring temporary service (will require field verification of boundary valves).

.7 Map showing location of street and driveway crossings with description of how road and driveway crossings will be completed.

.8 Map showing location of boundary valves (will require field verification of boundary valves).

.9 Map showing location of flushing / sampling points.

.10 Map showing location of out-of-service hydrants.

.11 Map showing by-pass pumping alignments.

.12 Plan for the disposal of super-chlorinated water.

.13 Detailed work schedule.

.14 Copy of the typical notice letter that is to be provided to building owners.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications, and data sheets in accordance with Section 01 33 00 – Shop Drawings and Submittals.

.2 Shop drawings required for, but not limited to:

.1 Temporary pipe and valve materials.

.2 Disinfection procedure.

.3 Temporary potable water supply / sewer bypass plan.

1.8 Inspection of Site

.1 The Contractor shall visit the Site of the Work and become thoroughly familiar with the extent and nature of the Work and conditions affecting the Work before commencing.

1.9 Cold Weather

.1 Take necessary steps to become fully familiar with potential inclement weather and conditions in this area.

.2 Protect all Work from freezing.

.3 The use of temporary overland services shall not be permitted from November 1 to May 30 unless written authorization from the City is provided.

PART 2 PRODUCTS

2.1 Temporary Watermains

.1 Temporary watermains shall be rigid PVC with a minimum 75 mm diameter for main temporary services. Branch connections shall be a minimum 50 mm diameter.

.2 Utilidor bypass temporary watermains shall be rigid PVC with a minimum diameter of 150 mm as per Contract Drawings.

.3 Rigid pipe shall conform to the latest CSA, AWWA, NSF 61 and National Plumbing Code of Canada standards.

.4 Temporary pipe shall be impact and UV resistant, rigid PVC. Joints shall be either permanent, solvent-cemented, or splined as per manufacturer's specifications.

.1 Acceptable products and manufacturers:

.1 Aquamine series 2900 by Victaulic.

.2 Yelomine Certa-Lok by Certainteed Milwaukee.

2.2 Temporary Service Hose

.1 Temporary service hose shall be flexible, UV resistant, and NSF/ANSI 61 compliant. Hose shall be blue in colour and a minimum diameter of 19 mm.

.2 Fittings shall be suitable for and compatible with the pipe material and class with which they are used.

.3 All materials in contact with potable water shall be NSF/ANSI 61 compliant and, if being reused, shall have been used exclusively for potable water service in the past.

.4 All materials shall be capable of withstanding a minimum pressure of 1,034 kPa (150 psi) and all other conditions of use per manufacturer's recommendations.

.1 Acceptable products and manufacturers:

.1 Nexbraid PW series 128 by Parker Canada.

.2 Series K6136 Potable Water Hose by Kuri Tec.

2.3 Backflow Preventer Valves

.1 This specification covers Reduce Pressure Type Backflow Preventer Valves in sizes 25 mm to 250 mm. The backflow preventers shall conform to the latest edition of AWWA C511.

.2 Pressure-temperature rating: 1,200 kPa @ 40ºC.

.3 Body:

.1 Bronze body for 50 mm and smaller.

.2 FDA approved epoxy cast iron for 75 mm to 250 mm.

.4 Internal parts: replaceable 316 stainless steel.

.5 Isolation valves: provide inlet and outlet valves.

.1 Bronze body ball valves for 50 mm and smaller.

.2 OS&Y rising stem cast iron gate valves with resilient wedges.

.6 Strainer:

.1 Bronze body strainer with stainless steel screen for 50 mm and smaller.

.2 Cast iron body strainer with stainless steel screen for 75 mm and larger.

.7 Valve shall be sized to vent air when filling the pipeline on pump start and to allow air to re-enter the pipeline on pump shutdown.

.8 End connection:

.1 Threaded to ASME B1.20.1 for 50 mm and smaller.

.2 Flanged to ASME B16.1 for 75 mm and larger.

.9 Tag numbers and description/service on all valves.

.10 Acceptable products: Watts Series 909 or approved equivalent.

2.4 Stainless Steel Ball Valve

.1 This Specification covers three-piece body stainless steel ball valves.

.2 Pressure: 6,900 kPa maximum.

.3 Body and trim: type 316 Stainless Steel.

.4 Ball: type 316 Stainless Steel, full port.

.5 Seats and packing: PTFE.

.6 All manufacturers' internal components must be USDA, FDA, and NSF/ANSI 61 approved for potable water applications.

.7 Valve body shall be of the bolted three-piece design.

.8 End Connection:

.1 Threaded to ASME B1.20.1.

.2 Socket Welded.

.9 Actuators: Manual leaver handle and nut shall be 304 Stainless steel. The handles shall be plastic covered and provided with latch-lock device with provisions for padlock.

.10 Acceptable products: one of the following or approved equivalent.

.1 M.A. Stewart Series G3 & G3-ED

.2 Watts No. S-FBV-1

.3 Worcester Series 59.

2.5 Brass Ball Valve

.1 This Specification covers two-piece body full port brass ball valves.

.2 Pressure: 1,034 kPa minimum.

.3 Body and trim: brass.

.4 Ball: chrome plated brass or 316 stainless steel.

.5 Seats and packing: PTFE.

.6 Valve body shall be of the two-piece design.

.7 All manufacturers' internal components must be USDA, FDA, and NSF/ANSI 61 approved for potable water applications.

.8 End connection:

.1 Threaded to ASME B1.20.1.

.2 Soldered Sweet End.

.9 Actuators:

.1 Manual leaver handle and nut shall be 304 stainless steel. The handles shall be plastic covered and provided with latch-lock device with provisions for padlock.

.10 Acceptable products: One of the following, or approved equivalent:

.1 M.A. Stewart Series B3

.2 Worcester Series 44

.3 Watts No. FBV-3-SS or FBVS-3-SS.

2.6 Hose Bibs

.1 The Contractor may choose to coordinate with building owners to provide temporary water servicing via an exterior hose bib. If hose bibs are to be installed for temporary servicing, the hose bib shall be installed to remain after the completion of the Work. If hose bibs are not the 'frost-free' type, a notice letter to the resident shall be provided clearly noting that the building owner will be required to drain the fitting prior to freezing conditions, annually. The Contractor shall request that the building owner sign a copy of the letter for the Contractor's records.

.2 If a hose bib connection is not feasible, or not desired by the building owner, the Contractor shall coordinate with the building owner to provide temporary servicing via other means.

.3 Materials and installation shall be compliant to the latest edition of the National Plumbing Code of Canada.

.4 Installation shall be completed by a certified plumber licensed in the Territory of Nunavut.

.5 An isolation valve shall be installed inside the property upstream from the hose bib for maintenance purposes.

.6 Acceptable manufacturers:

.1 Aqua-Dynamic

.2 Watts

.3 Or approved equivalent

PART 3 EXECUTION

3.1 Temporary Potable Water – General

.1 Temporary water services shall be installed and maintained by the Contractor where a planned water service interruption is to be greater than 10 hours. The Contractor is required to provide written notice to the City of Iqaluit 14 calendar days in advance of any planned water service interruption. Follow-up notification shall be provided to the City of Iqaluit 7 calendar days and 2 calendar days prior to any disruption of water service. The Contractor will notify impacted customers.

.2 Install all valves in strict accordance with the manufacturer's instructions and as specified.

.3 Temporary water services shall be connected to the temporary watermain for each customer in the affected area. The Contractor shall coordinate with the building owner to connect to the private plumbing system via a wye at an outside tap (hose bib) if available. If a tap connection is not available, the Contractor shall arrange to provide temporary serving by other means. This may include tying the temporary main to the existing service (with recirculation to be shut-off). Coordination with the City of Iqaluit, property owner, and/or occupant will be required.

.4 Installation of temporary water service shall be performed in such a way as to minimize disturbance to public and private property. Street crossings shall be installed below the existing grade to a minimum depth of 300 mm, backfilled, and compacted in accordance with Section 31 23 33.01 – Trenching and Backfilling. Driveway crossings, when necessary, shall be ramped with wood. Ramps and crossings shall be clearly marked with signs when requested by the

City of Iqaluit. The Municipality may have a preference of excavated crossing over mounded crossings or vice versa. The Contractor shall coordinate with the Municipality.

.5 Maintenance of all crossings, ramps, and signs are the responsibility of the Contractor and will need to be maintained during all hours of the week. All damage to public or private property shall be repaired at the Contractor's expense.

.6 The connection of single residential units in series is not permitted. Each temporary water service shall have its own valved connection to the temporary watermain.

.7 All temporary water sources shall be fitted with an approved reduced pressure (RP) backflow device. Backflow devices shall be supplied by the Contractor and shall be certified by a backflow tester licensed in the Territory of Nunavut. The City of Iqaluit must be provided a copy of the backflow report which shall be reviewed and approved by the plumbing inspector prior to the temporary water service being disinfected. Backflow devices must be certified each time they are installed or relocated. All costs associated with certification are the responsibility of the Contractor.

.8 Care shall be exercised during the installation of temporary treated water supply services to avoid contamination of other services.

.9 No Work shall be done during freezing weather. No temporary watermains or temporary water services shall be installed or opened during freezing weather. Pipes already in use shall be removed or drained and existing services restored in advance of freezing weather.

.10 The Contractor shall meet with each property owner to obtain permission to access their property for the purpose of placing temporary pipe and connection of the temporary hose to the building.

.11 Watermain must be in service during the construction period with full flow capabilities.

.12 The Contractor shall ensure that a suitable means of egress and entrance is maintained to all businesses, residences, and places of business for the duration of the Work.

3.2 Temporary Watermain

.1 The Contractor is responsible to ensure that the diameter of temporary service is sufficient. A maximum of 20 dwellings shall be serviced from a 50 mm branch and the maximum length of a 50 mm branch shall be 150 m.

.2 At any connection of a temporary watermain to the water supply and distribution system (e.g., at hydrants) a double check valve backflow preventer shall be installed.

.3 Each branch of temporary piping shall be fitted with an isolation valve, 25 mm injection port for disinfection, and a 50 mm drain for flushing. All disinfection, sampling, and flushing locations shall be safely accessible to operational staff.

.4 Valves shall be installed at each branch of a temporary watermain.

.5 Before permanently shutting down the existing watermain, the valves on the temporary water system shall be tested to ensure that they are in proper working order.

3.3 Temporary Water Service

.1 Temporary water supply services for single residential units shall be a minimum of 19 mm inside diameter. The Contractor is responsible to ensure that the diameter of temporary service is sufficient.

.2 The temporary water supply service connections shall be valved near the point of connection to the temporary watermain and also valved near the point of connection to a private plumbing system so that both the temporary watermain and the temporary potable water supply services may be disinfected.

.3 Temporary supply hoses shall not be connected to the temporary main until disinfection, flushing, and sampling is complete and all necessary bacteriological tests have passed.

3.4 Hydrants

.1 The hydrants that are out of service during construction operations shall be bagged and clearly marked with a “HYDRANT OUT OF SERVICE” tag. When a fire hydrant is taken out of service, the Contractor shall notify the City of Iqaluit.

.2 All temporary potable water supply service attachments to fire hydrants shall be easily removable for fire-fighting purposes.

.3 Prior to taking the first hydrant out of service, the Contractor shall coordinate with the Municipality's Fire Chief to provide a hands-on demonstration for the removal of temporary potable water supply service attachments.

3.5 Bypass Sewer Pumping

.1 Provide the City of Iqaluit with a spill response plan for bypass pumping.

.2 The temporary sewer bypass system must be monitored at all times by the Contractor.

.3 The Contractor shall perform a leak test on the temporary hose using clean water prior to pumping sewage.

.4 Keep the bypass piping within the limits of the Work area and away from roadways.

3.6 Protection

.1 The Contractor shall provide protection of the temporary water supply services at locations such as road crossings, sidewalks, driveways, and walkways.

.2 When temporary watermains cross over the roadway, they shall be buried. When temporary watermains or temporary water supply services cross a driveway or a sidewalk, gravel shall be mounded over the pipe. In general, the temporary water supply service pipe shall be laid where it causes the least obstruction and is least likely to be damaged.

.3 The Contractor shall protect the temporary water supply services installed across all road crossings, sidewalks, driveways, and walkways during the extent of the construction schedule. This shall include earth excavation, backfill, reinstatement, and ramping materials.

.4 All above ground temporary piping shall be protected from damage by placing cover material over the exposed piping along its entire length except where temporary water service connections exist. The Contractor is required to maintaining all covering while in service.

3.7 Jointing - General

.1 Per the manufacturer's specifications.

3.8 Surface Restoration

.1 Re-establish existing roads and all ground surfaces. Place sufficient backfill material over constructed outside services, to provide protection until final grading and finishes are completed.

3.9 Thrust Restraint

.1 Protect all connections, caps, and bends that are liable to "draw" or blow-off by means of tie rods or restrained joints, as specified, and as recommended by the pipe manufacturer. The Contractor shall provide proposed restraint details and locations for approval.

3.10 Connections to Existing Pipelines

.1 Make all connections to existing pipelines under the supervision of the City of Iqaluit, including all required couplings and restraints.

3.11 Pipe Inspection and Testing

.1 Provide all necessary equipment and perform all Work required in connection with the tests.

.2 Bear the cost of all testing, location, and remedying of leaks and any necessary re-testing and realignment.

.3 All tests shall be documented on applicable forms provided by the City of Iqaluit.

.4 All pipes shall be thoroughly flushed prior to pressure testing.

.5 Temporary overland piping shall receive a hydrostatic leakage test. The test duration shall be a minimum 1 hour, at normal operating pressure.

.6 Before commencing the test and only after a visual inspection by the City of Iqaluit, backfill the trench enough to prevent movement of the pipeline, with joints, valves, and fittings exposed. Take care to strut and brace all caps, bends, tees, and hydrants to prevent movement when pressure is applied and vent all high points of the line, as required.

.7 Conduct hydrostatic pressure tests on all pressure piping under supervision of the City of Iqaluit upon completion of construction.

3.12 Flushing and Disinfection (Potable Water)

.1 All temporary service pipes shall be flushed and disinfected.

.2 All flushing and disinfection activities shall be in accordance with Section 33 14 16.13 – Water Distribution Pipe.

3.13 Removal

.1 Once the use of the permanent water supply is approved, the temporary water piping shall be promptly removed. Dismantling and removal shall be the responsibility of the Contractor.

PART 4 BASIS FOR PAYMENT

4.1 Temporary Utilities/Bypass

.1 Unit of Measurement: Lump Sum

.2 Method of Measurement: No Measurement will be made for this item. Payment shall be made based on the percentage of the Work completed, as determined by the City of Iqaluit.

.3 Item Includes: Preparation of a detailed temporary utilities/bypass plan, completed to the satisfaction of the City of Iqaluit, with regular updates based on field requirements. Flushing, testing, chlorination, disinfection, documentation, and submittals for temporary water services. Supply, installation, and maintenance as specified in the Contract Documents to ensure temporary water and sewer are provided to all residences and businesses impacted by construction during the construction period and removal of temporary water and sewer servicing infrastructure after the new water and sewer infrastructure has been commissioned and put into service. All labour, equipment, tools, and materials necessary to complete the Work.

.4 Where the Unit Price Item for Temporary Utilities indicates that tie-ins to existing buried water services is included in the Lump Sum price, the price shall include connection of the overland system to buried water services as required, fittings, shut-off of return water, disconnection after new services are installed, excavation, and backfill. Connection to existing buried water services is anticipated at industrial-use buildings.

.5 Where there is a separate line item for ‘Temporary Connection to Existing Buried Water Service (Provisional)’, the unit price per connection shall include connection of the overland system to the buried water service, fittings, shut-off of return water, disconnection after new services are installed, excavation, and

backfill. This provisional item is to be used if it is not possible or practical to make an overland connection at the building.

END OF SECTION

ᐃᖃᓗᐃᑦ

Iqaluit

City of Iqaluit

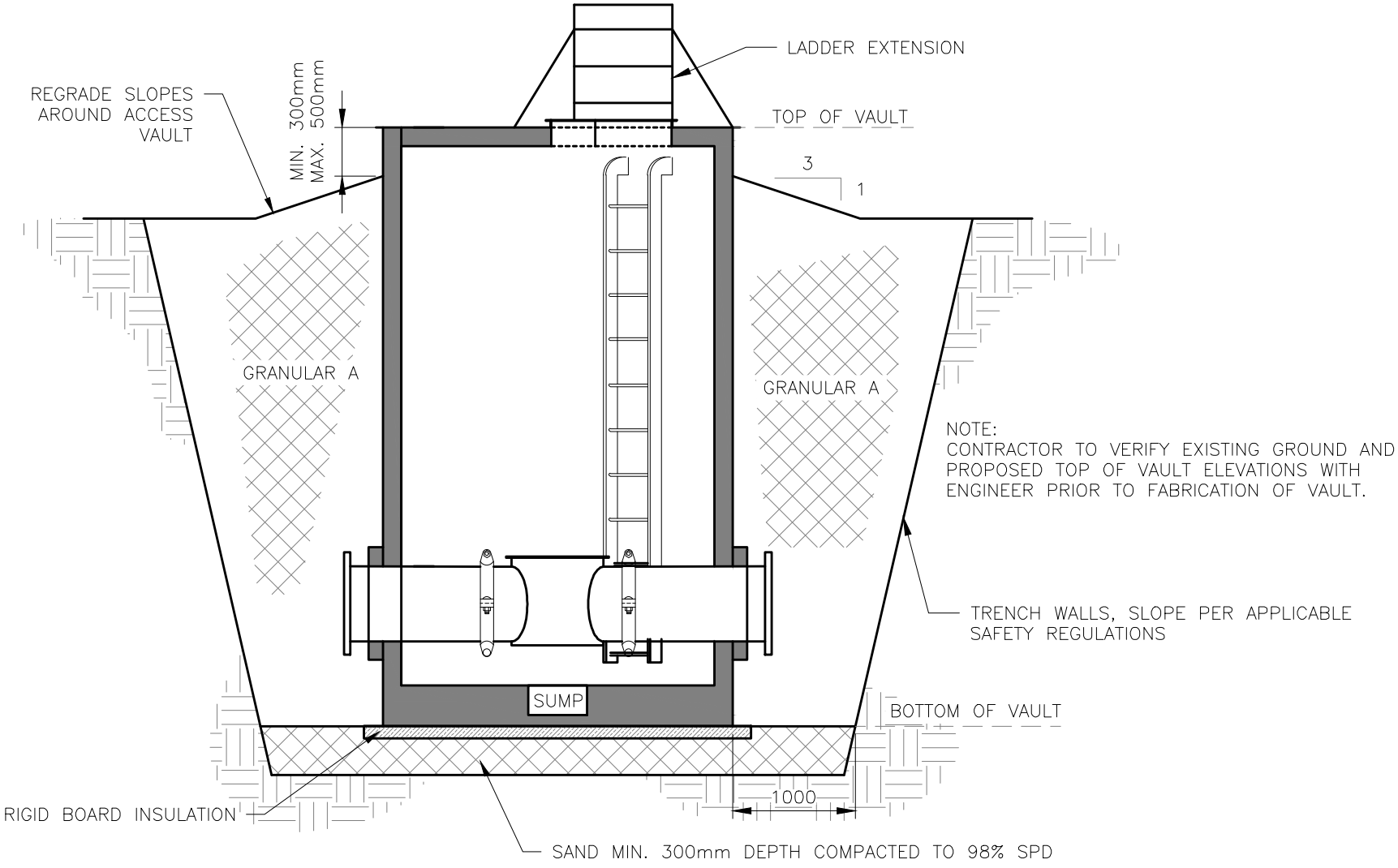
Standard Specifications

Standard Specification Figures

Figure Number	Figure Title
SS-001	Access Vault Excavation
SS-002	Access Vault Detail
SS-003	Bumper Post & Pipe Support Detail
SS-004	Access Vault Wall Penetration Water Mains
SS-005	25mm & 50mm Wall Penetration Details
SS-006	Access Vault Wall Penetration Sewer Mains
SS-007	Sanitary Vault Cleanout Type 1 - Tee
SS-008	Sanitary Vault Cleanout Type 2 - Wye
SS-009	Sanitary Vault Cleanout Type 3
SS-010	Sanitary Sewer Flush Port
SS-011	Water Main Latrolet & Drain
SS-012	Ladder & Miscellaneous Access Vault Details
SS-013	Bleeder Detail
SS-014	Access Vault Cover Details
SS-015	Access Vault Cover Details
SS-016	Vault Ladder Details
SS-017	Fire Hydrant Details
SS-018	Water And Sewer Main Trenching, Backfill & Insulation
SS-019	Residential Service Trench Detail
SS-020	Joint Detail Sanitary Sewer or Water Main
SS-021	Water Service Pipe
SS-022	Water Service Connection at Main
SS-023	Water Service Details
SS-024	Sanitary Service Connection at Main

Figure Number	Figure Title
SS-025	Sanitary Service Insulation Form
SS-026	Water Service Riser at House
SS-027	Sanitary Service Riser (Civil Contractor)
SS-028	Sanitary Service House Connection Detail (Building Contractor)
SS-029	Typical Residential Service Connection & Sewer Service Cleanout
SS-030	Water Meter & Recirculation Pump Schematic
SS-031	Water Main Pipe Termination
SS-032	Sanitary Sewer Main / Service Pipe Termination
SS-033	Temporary Water Supply Piping Details
SS-034	Water Service Abandonment
SS-035	Typical Roadway Construction
SS-036	Standard Sign
SS-037	Typical Ditching Detail
SS-038	Typical Culvert Details
SS-039	Culvert Marker
SS-040	Sidewalk in Boulevard
SS-041	Sidewalk Construction Joints
SS-042	Pedestrian Curb Ramp with Boulevard
SS-043	Concrete Sidewalk Ramp at Signalized Intersections
SS-044	Tactile Walking Surface Indicator Details
SS-045	Curb Return Entrances - Uncontrolled
SS-046	Curb Return Entrances - Controlled
SS-047	Traditional Vehicle Crossing & Transitions
SS-048	Monolithic Concrete Sidewalk

Figure Number	Figure Title
SS-049	Pedestrian Curb Ramp without Boulevard
SS-050	Concrete Barrier Curb
SS-051	Concrete Mountable Curb with Wide Gutter
SS-052	Concrete Mountable Curb with Narrow Gutter
SS-053	Concrete Barrier Curb with Standard Gutter



REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P. Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

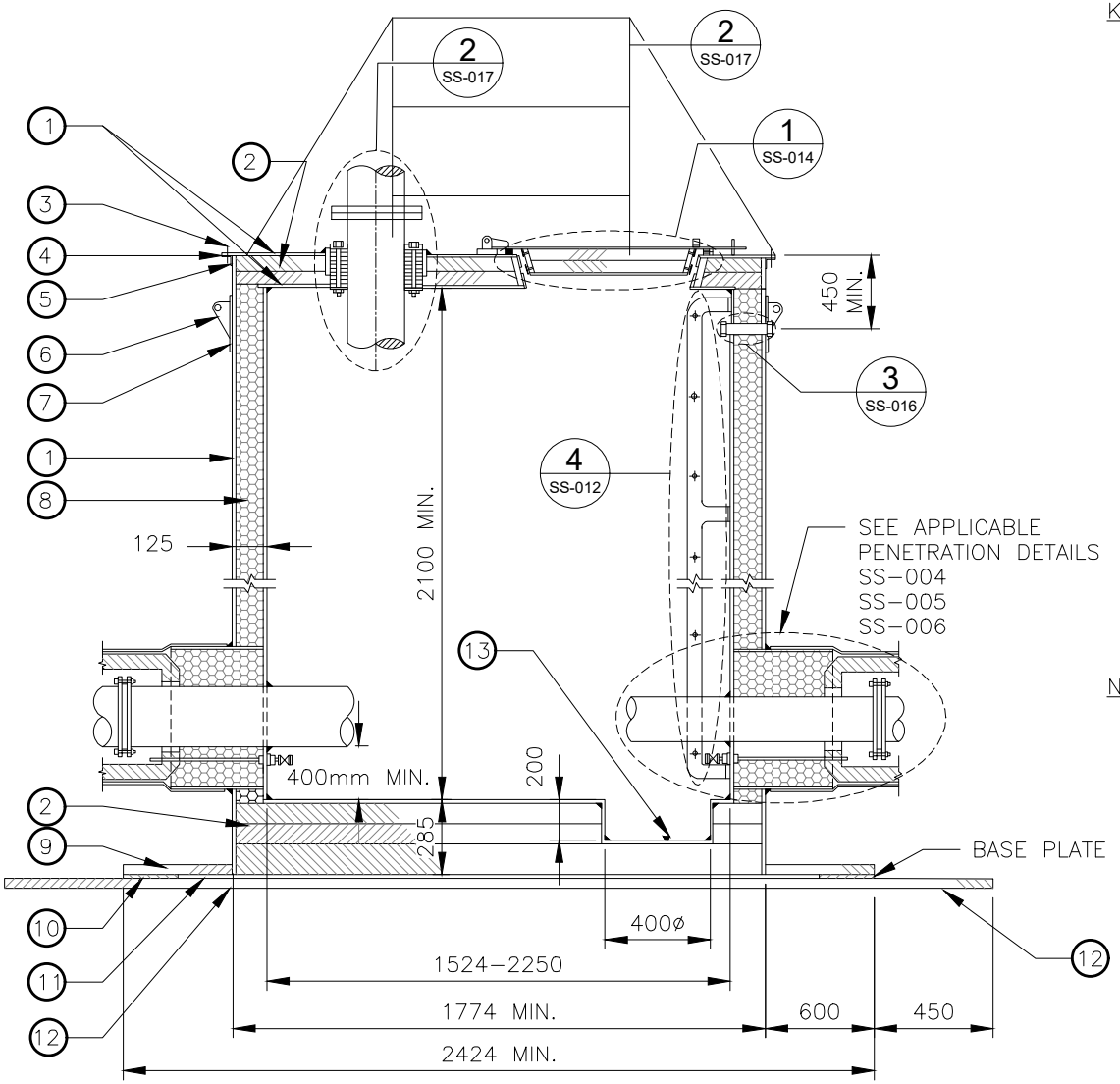
Iqaluit

TITLE
ACCESS VAULT EXCAVATION

DWG NO.
SS-001

DATE
AUGUST, 2026

SCALE
N.T.S



KEY TO NUMBERED PARTS:

1. STEEL PLATE ACCESS VAULT CONSTRUCTION
2. CLOSED CELL RIGID INSULATION CUT TO SIZE
3. 12mm CAD. PLATED STEEL BOLT, NUT, WASHER 32mm MIN. SPACE EQUALLY
4. 3x5mm COMPRESSIBLE NEOPRENE RUBBER GASKET
5. 10mm THICK 50x50mm MIN. ANGLE WELDED FULL LENGTH
6. LIFTING LUGS – 2 PER ACCESS VAULT, 150x75x12mm THICK WITH 38mmø LIFTING EYE
7. REINFORCING PLATE 200x200x12mm CURVED TO EXTERIOR WALL RADIUS
8. FORMED IN PLACE INSULATION
9. 38mm THICK RIGID BOARD INSULATION CUT TO MATCH EXTERIOR WALL RADIUS
10. FILLER PIECE – 10mm THICK INSULATION
11. 38mm THICK STEEL BASE PLATE
12. 38mm THICK RIGID BOARD INSULATION UNDER BASE PLATE
13. FROST PLUG (SEE DETAIL 2/SS-012)

NOTES:

1. MINIMUM HEIGHT FROM VAULT FLOOR TO LOWEST PIPE INVERT SHALL BE 400mm
2. SEE CITY DESIGN GUIDELINES FOR TYPICAL VAULT DIAMETER DIMENSIONS

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

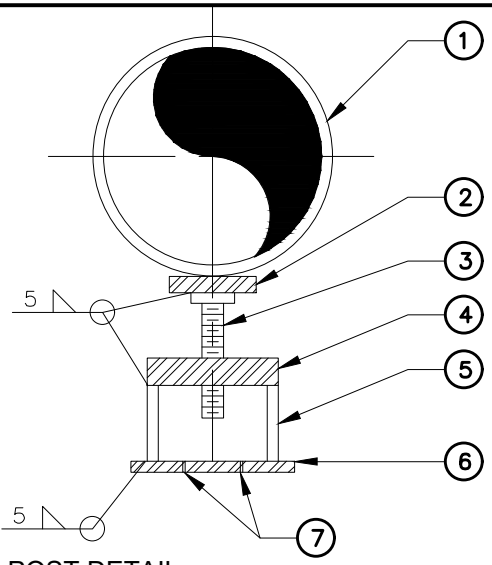
Iqaluit

TITLE
ACCESS VAULT DETAIL

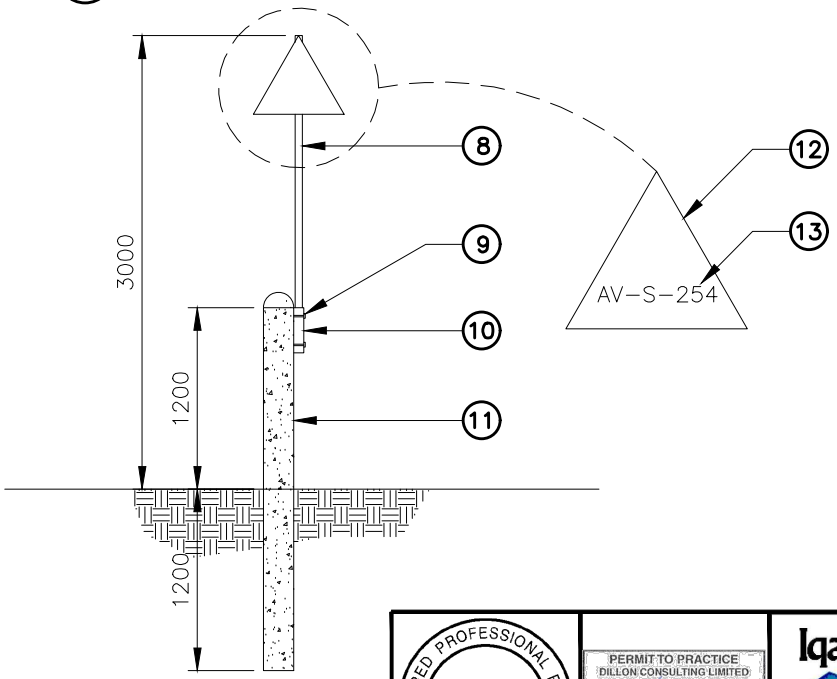
DWG NO.
SS-002

DATE
AUGUST, 2026

SCALE
N.T.S



1 SS-003 PIPE POST DETAIL



2 SS-003 BOLLARD DETAIL

KEY TO NUMBERED PARTS:

1. WATER MAIN
2. 75mm ø x 12mm THICK STAINLESS STEEL PLATE
3. 20mm x 15 'O' BOLT, STAINLESS STEEL
4. 20mm THICK STAINLESS STEEL PLATE DRILLED AND TAPPED
5. 100mm ø SCHEDULE 40 STAINLESS STEEL PIPE
6. 150 x 150 x 12mm THICK STAINLESS STEEL PLATE
7. 2–15mm ø HOLES
8. 50mm ø GALV. STEEL PIPE MAST – 4 – 11mm ø BOLT HOLES
9. 2–9mm ø x 89mm LONG GALV. BOLTS THROUGH SLEEVE AND MAST
10. 65mm ø GALV. STEEL SLEEVE WELDED TO POST; C/W 2 11mm ø DRILLED HOLES
11. 200mm ø STAINLESS STEEL PIPE POST, EPOXY COATED AND FILLED WITH NON–SHRINK GROUT (63 MPa) OR CONCRETE (30MPa).
12. 3mm THICK STEEL PLATE SIGN PAINTED RED C/W 2– 11mm ø DRILLED BOLT HOLES. SIGN SECURED TO MAST WITH 2–9mm ø x 76mm LONG GALV. BOLTS
13. WHITE LETTERING, 100mm HIGH. LETTERING TO MATCH ACCESS VAULT IDENTIFICATION NUMBER. FONT TO BE APPROVED PRIOR TO FABRICATION

NOTES:

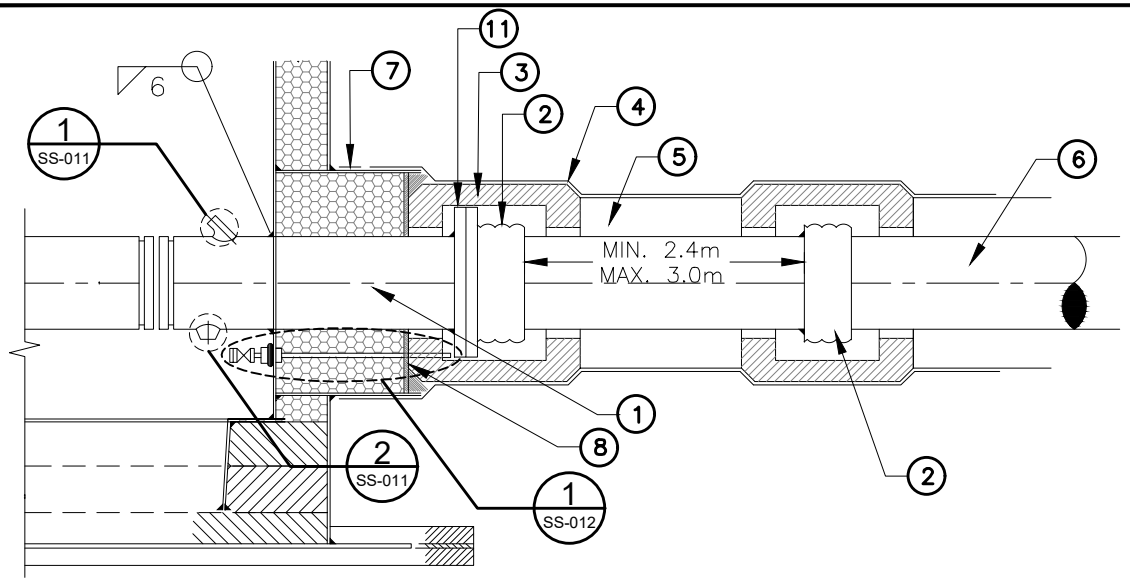
1. POST, SLEEVE AND MAST TO BE PAINTED RED AFTER FABRICATION
2. MAX. SPACING BETWEEN BOLLARDS AROUND A VAULT SHALL BE 1.2m. ONE BOLLARD PER ACCESS VAULT TO INCLUDE MAST AND SIGN.
3. VAULT IDENTIFICATION NUMBERING SHALL HAVE PREFIXES "AV–W–"### FOR WATER VAULTS AND "AV–S–"### FOR SANITARY VAULTS.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

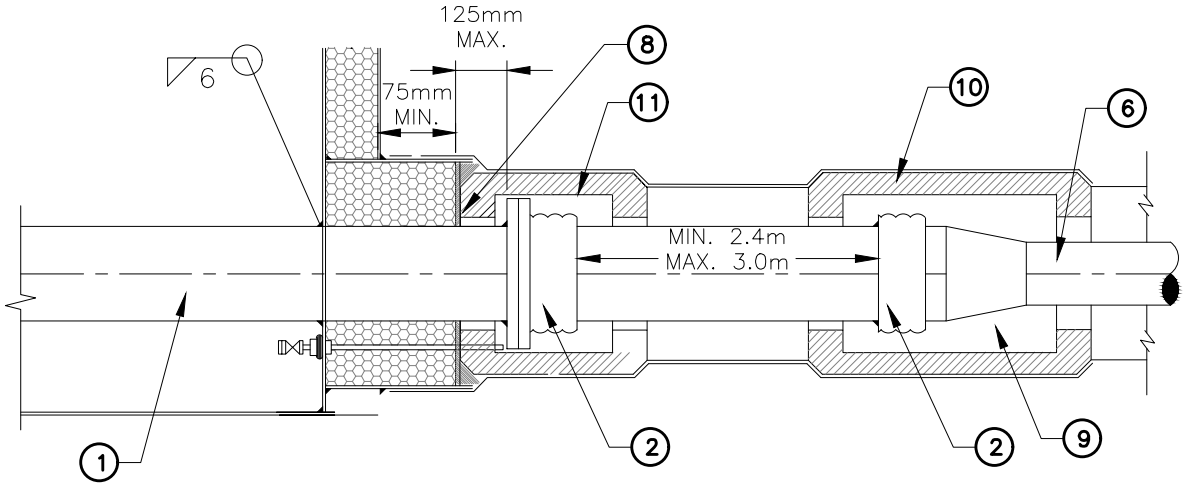
PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

Iqaluit

TITLE	DWG NO.
BUMPER POST AND PIPE SUPPORT DETAIL	SS-003
DATE: AUGUST, 2026	SCALE: N.T.S



1 SS-004 TYPICAL WALL PENETRATION



2 SS-004 WALL PENETRATION WITH REDUCER

KEY TO NUMBERED PARTS:

1. WATER MAIN ENTRY. STAINLESS STEEL PIPE
2. FLEXIBLE RESTRAINT COUPLING. COMPLETE WITH STAINLESS STEEL PIPE STIFFENER INSERTS. THE COUPLING CLOSEST TO THE VAULT SHALL HAVE A FLANGE CONNECTION ON THE VAULT SIDE.
3. INSULATION KIT FOR FLANGE & FLEXIBLE RESTRAINT COUPLING (COAT INNER SURFACES WITH MODIFIED BUTYL RUBBER ADHESIVE) AND FRP COATING
4. HEAT SHRINK TAPE, 2 LAYER, MIN. 50% OVERLAP EACH WRAP
5. PIPE INSULATION
6. HDPE WATER MAIN
7. STEEL RING SECTION WELDED TO ACCESS VAULT OUTER WALL. RING DIAMETER SHALL BE LARGER THAN THE DIAMETER OF THE COUPLING INSULATION KIT.
8. 6mm STEEL PLATE CONTINUOUSLY WELDED TO BOTH RING SECTION AND PIPE SECTION. 6mm FILLET WELD.
9. CONCENTRIC INCREASER/REDUCER TO MATCH EXTERIOR PIPE SIZE
10. INSULATION KIT FOR FLANGE, CONCENTRIC REDUCER AND FLEXIBLE RESTRAINT COUPLING, (COAT INNER SURFACES WITH MODIFIED BUTYL RUBBER ADHESIVE) AND FRP COATING
11. STAINLESS STEEL RAISED FACE SLIP–ON FLANGE (WELD)

NOTES:

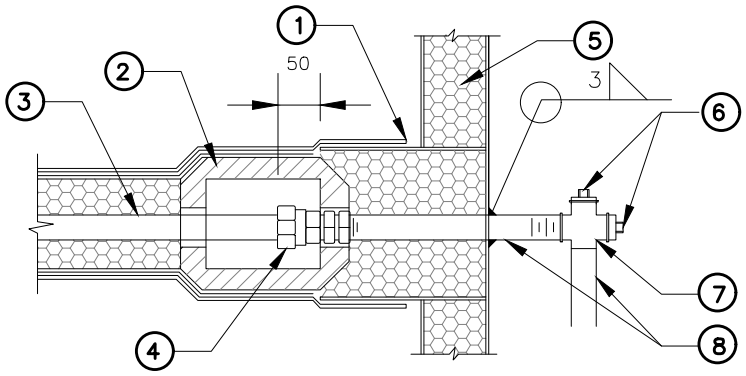
1. APPLY SILICONE CAULKING AT ALL PIPE ENTRY LOCATIONS AFTER INSTALLING DRAINS.
2. TEST VALVE ASSEMBLY PRIOR TO INSTALLING FLANGE INSULATION
3. A SINGLE RESTRAINT COUPLING IS REQUIRED FOR PENETRATIONS WITH DIAMETER OF 100mm AND LESS.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

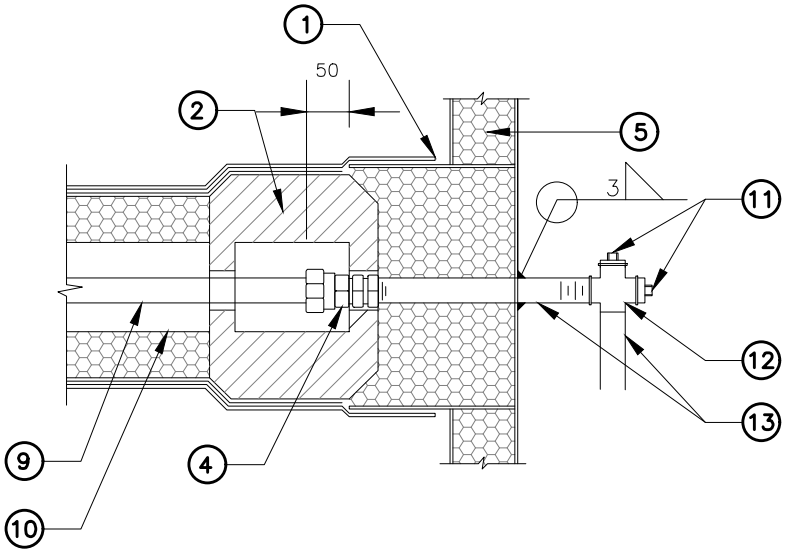
PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

Iqaluit

TITLE: ACCESS VAULT WALL PENETRATION WATER MAINS		DWG NO. SS-004
DATE: AUGUST, 2026	SCALE: N.T.S	



1 SS-005 50mm WALL PENETRATION



2 SS-005 25mm WALL PENETRATION

KEY TO NUMBERED PARTS:

1. STEEL RING SECTION WELDED TO ACCESS VAULT INNER WALL – 6mm THICK x 300mm O.D. FOR 50mm ø; 275mm O.D. FOR 25mm ø.
2. INSULATED HALF SHELLS
3. 50mm ø HDPE DR9 PIPE, C/W INSULATION
4. COMPRESSION FITTING C/W SLEEVE AND INSERT – 2 REQUIRED – SIZED TO FIT
5. ACCESS VAULT WALL
6. 50mm ø N.P.T. STAINLESS STEEL PLUG
7. 50x50x50x50mm STAINLESS STEEL CROSS
8. 50mm ø SCHEDULE 40 STAINLESS STEEL
9. 25mm ø HDPE DR9 SERIES 200 TUBING, C/W INSULATION
10. 100mm ø HDPE , C/W INSULATION
11. 25mm ø N.P.T. STAINLESS STEEL PLUG
12. 25x25x25x25mm STAINLESS STEEL CROSS
13. 25mm ø SCHEDULE 40 STAINLESS STEEL

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

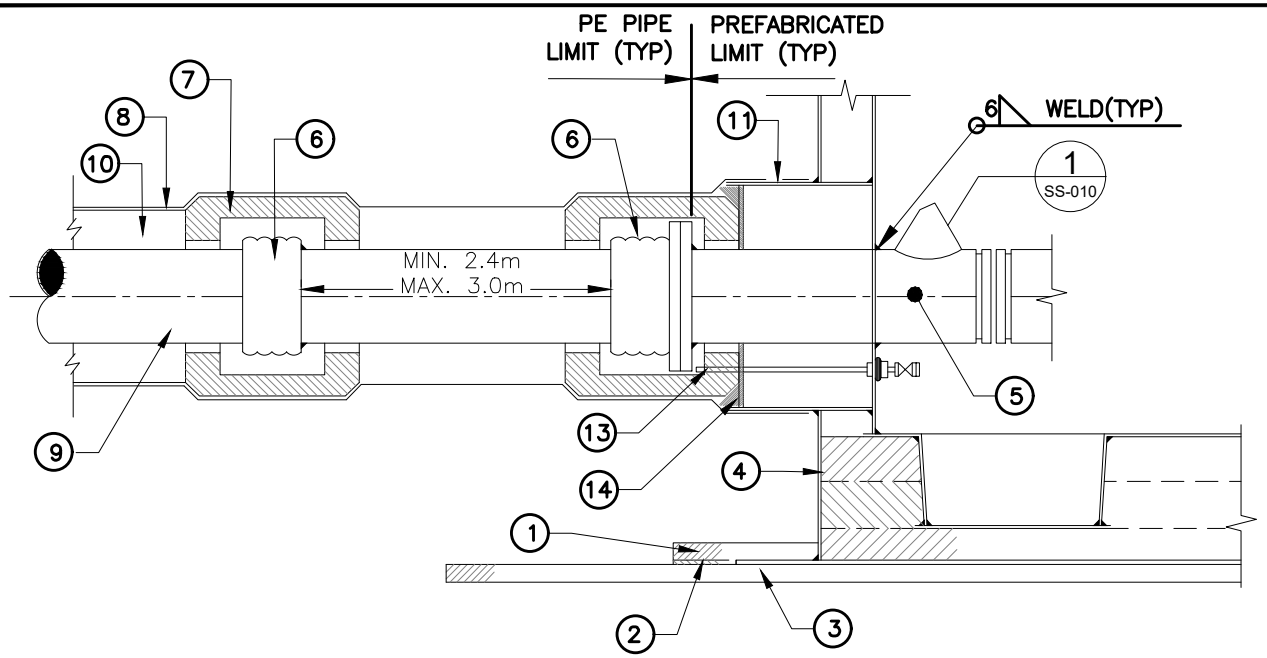
Iqaluit

TITLE
25mm & 50mm WALL PENETRATION DETAILS

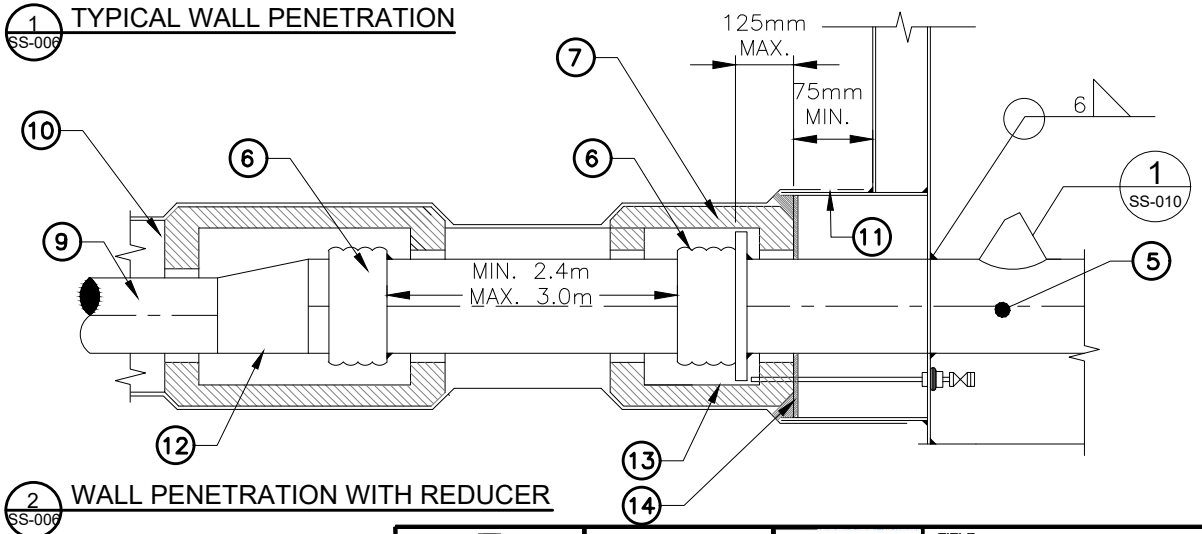
DATE
AUGUST, 2026

SCALE
N.T.S

DWG NO.
SS-005



1 SS-006 TYPICAL WALL PENETRATION



2 SS-006 WALL PENETRATION WITH REDUCER

KEY TO NUMBERED PARTS:

1. 38mm THICK RIGID BOARD INSULATION, 4 PCS, OUTER EDGE TO MATCH VAULT BOTTOM FLANGE
2. FILLER PIECE. 10mm THICK RIGID BOARD INSULATION
3. 38mm THICK RIGID BOARD INSULATION
4. STEEL PLATE ACCESS VAULT CONSTRUCTION
5. SANITARY SEWER ENTRY. SCHEDULE 40 304 STAINLESS STEEL.
6. FLEXIBLE RESTRAINT COUPLING. COMES WITH STAINLESS STEEL PIPE STIFFENER INSERTS. THE COUPLING CLOSEST TO THE VAULT SHALL HAVE A FLANGE CONNECTION ON THE VAULT SIDE.
7. INSULATION KIT (COAT INNER SURFACES WITH MODIFIED BUTYL RUBBER ADHESIVE) AND FRP COATING.
8. HEAT SHRINK TAPE, 2 LAYER, MIN. 50% OVERLAP EACH WRAP
9. HDPE SEWER MAIN
10. PIPE INSULATION
11. STEEL RING SECTION WELDED TO ACCESS VAULT OUTER WALL. RING DIAMETER SHALL BE LARGER THAN THE DIAMETER OF THE COUPLING INSULATION KIT.
12. HDPE ECCENTRIC INCREASER/REDUCER TO MATCH EXTERIOR PIPE SIZE
13. STAINLESS STEEL RAISED FACE SLIP ON FLANGE (WELD BOTH SIDES)
14. 6mm STEEL PLATE CONTINUOUSLY WELDED TO STEEL RING AND STAINLESS STEEL PIPE. 6mm FILLET WELD.

NOTES:

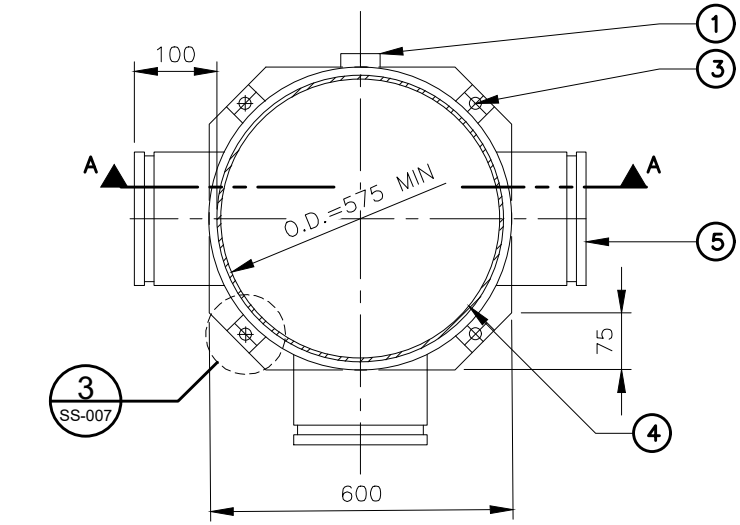
1. AFTER INSTALLING DRAINS, TEST VALVE ASSEMBLY PRIOR TO INSTALLING FLANGE INSULATION
2. APPLY SILICONE CAULKING AT ALL PIPE ENTRY LOCATIONS
3. A SINGLE RESTRAINT COUPLING IS REQUIRED FOR PENETRATIONS WITH DIAMETER OF 100mm AND LESS.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

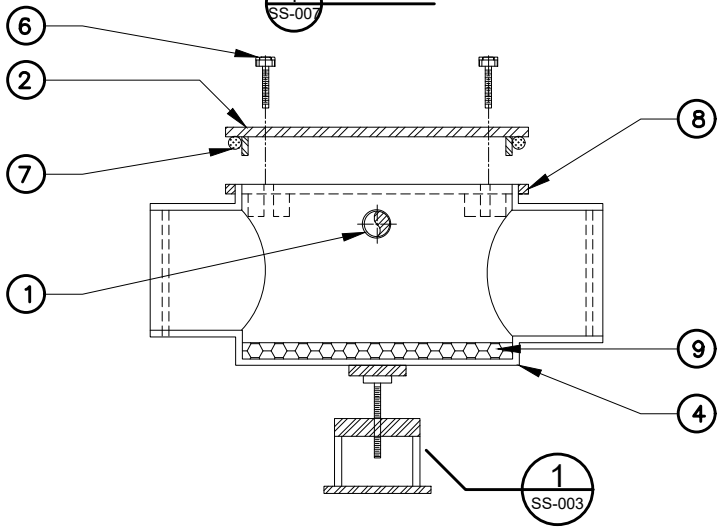
PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

Iqaluit

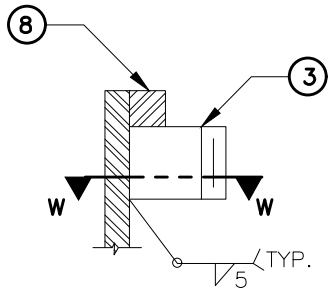
TITLE	DWG NO.
ACCESS VAULT WALL PENETRATION SEWER MAINS	SS-006
DATE: AUGUST, 2026	SCALE: N.T.S



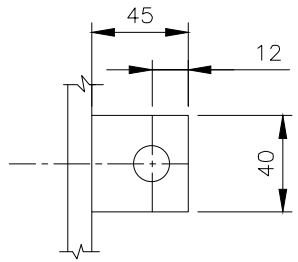
1 SS-007 PLAN



2 SS-007 SECTION A-A



3 SS-007 BOLT LUG DETAIL



SECTION W-W

KEY TO NUMBERED PARTS:

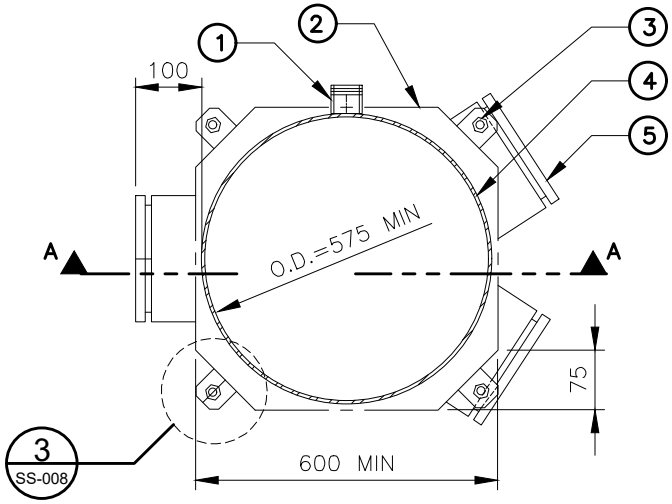
1. 25mm N.P.T. HALF COUPLING AND PLUG
2. FABRICATED CLEANOUT COVER FROM 6mm THICK 304 STAINLESS STEEL PLATE CONTINUOUS BUTT WELDED
3. BOLT LUGS TAPPED 12 NC
4. FABRICATED CLEANOUT BODY FROM 6mm THICK 304 STAINLESS STEEL PLATE CONTINUOUS BUTT WELDED
5. 304 STAINLESS STEEL PIPE, GROOVED (SIZED TO MATCH SEWER MAIN SIZE)
6. 12 NC x 73mm LONG CAD PLATED HEX HEAD SCREW AND WASHER
7. ONE–PIECE SOFT RUBBER GASKET O–RING STRETCH TO FIT COVER
8. 12mm SQUARE ROD RIM (304 STAINLESS STEEL)
9. CEMENT MORTAR BENCHING SUPPLIED AND INSTALLED BY INSTALLING CONTRACTOR

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

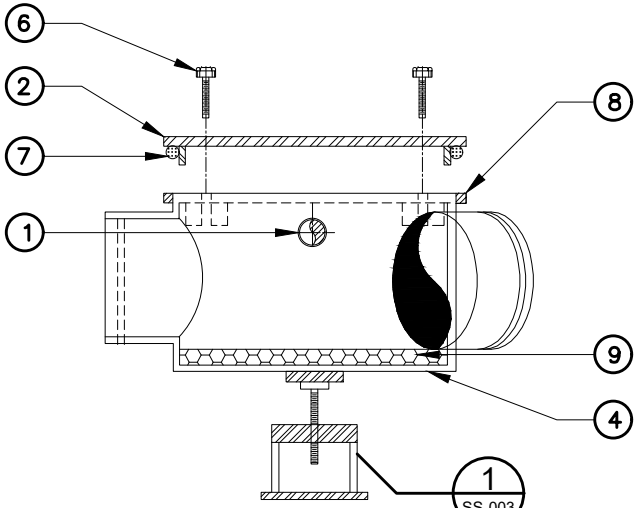
PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

Iqaluit

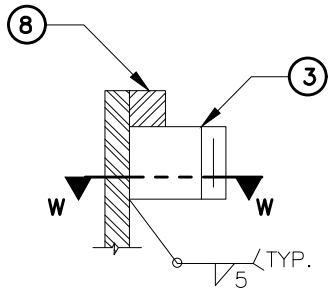
TITLE: SANITARY VAULT CLEANOUT TYPE 1 - TEE		DWG NO. SS-007
DATE: AUGUST, 2026	SCALE: N.T.S	



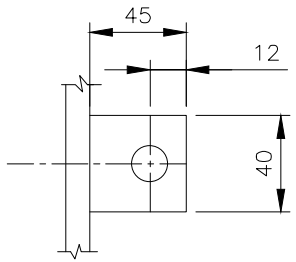
1 SS-008 PLAN



2 SS-008 SECTION A-A



3 SS-008 BOLT LUG DETAIL



SECTION W-W

KEY TO NUMBERED PARTS:

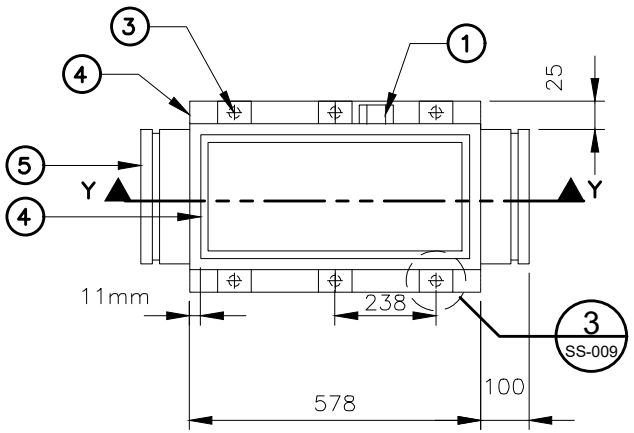
1. 25mm N.P.T. HALF COUPLING AND PLUG
2. FABRICATED CLEANOUT COVER FROM 6mm THICK 304 STAINLESS STEEL PLATE CONTINUOUS BUTT WELDED
3. BOLT LUGS TAPPED 12 NC
4. FABRICATED CLEANOUT BODY FROM 6mm THICK 304 STAINLESS STEEL PLATE CONTINUOUS BUTT WELDED
5. 304 STAINLESS STEEL PIPE, GROOVED (SIZED TO MATCH SEWER MAIN SIZE)
6. 12 NC x 73mm LONG CADMIUM PLATED HEX HEAD SCREW AND WASHER
7. ONE–PIECE SOFT RUBBER GASKET O–RING STRETCH TO FIT COVER
8. 12mm SQUARE ROD RIM (304 STAINLESS STEEL)
9. CEMENT MORTAR BENCHING SUPPLIED AND INSTALLED BY INSTALLING CONTRACTOR

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

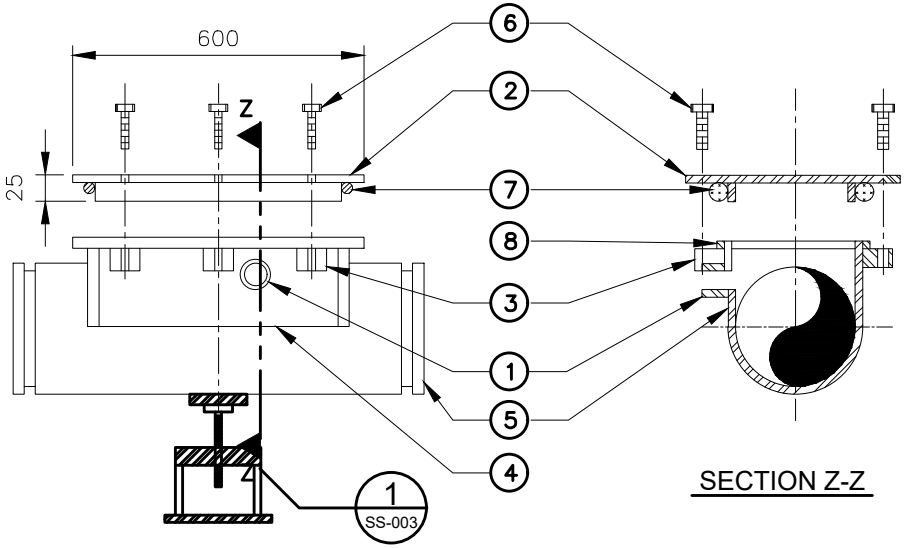
Iqaluit

TITLE	DWG NO.
SANITARY VAULT CLEANOUT TYPE 2 - WYE	SS-008
DATE: AUGUST, 2026	SCALE: N.T.S



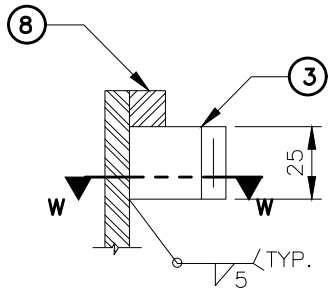
PLAN

1 SS-009 PLAN

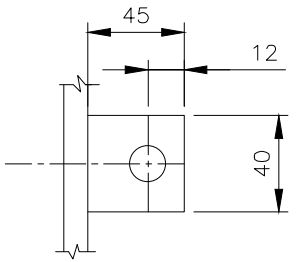


SECTION Z-Z

2 SS-009 SECTION Y-Y



3 SS-009 BOLT LUG DETAIL



SECTION W-W

KEY TO NUMBERED PARTS:

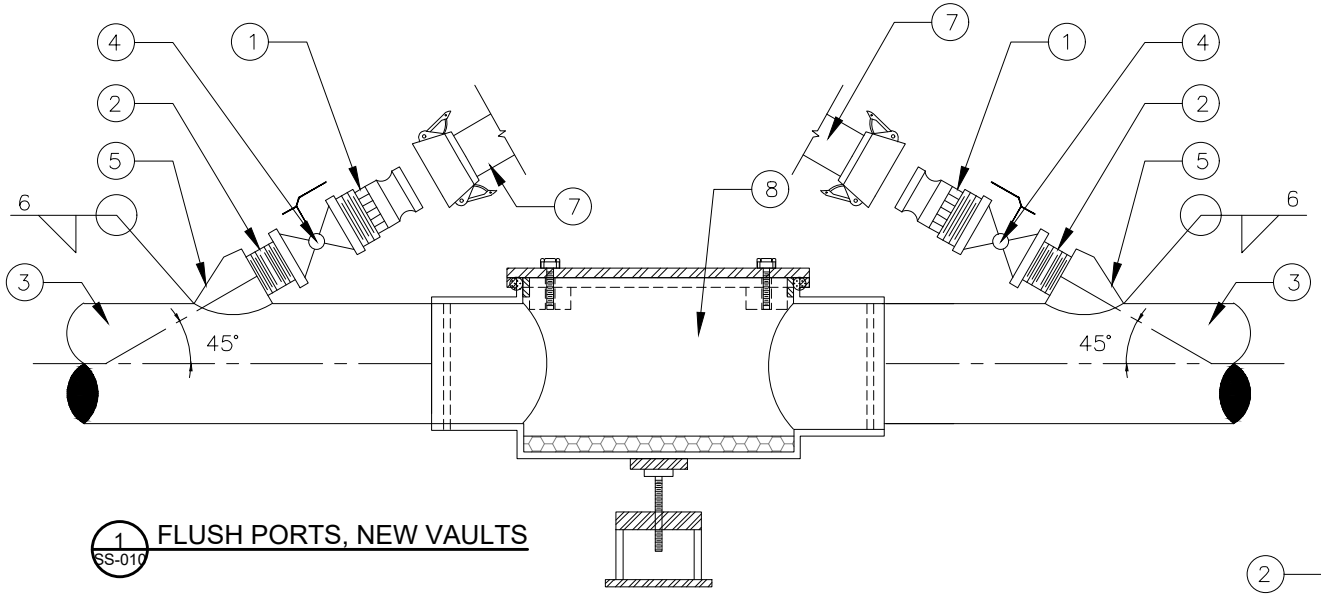
1. 25mm N.P.T. HALF COUPLING AND PLUG
2. FABRICATED CLEANOUT COVER FROM 6mm THICK 304 STAINLESS STEEL PLATE CONTINUOUS BUTT WELDED
3. BOLT LUGS TAPPED 12 NC
4. FABRICATED CLEANOUT BODY FROM 6mm THICK 304 STAINLESS STEEL PLATE CONTINUOUS BUTT WELDED
5. 304 STAINLESS STEEL PIPE, GROOVED (SIZED TO MATCH SEWER MAIN SIZE)
6. 12 NC x 73mm LONG CAD PLATED HEX HEAD SCREW AND WASHER
7. ONE–PIECE SOFT RUBBER GASKET O–RING STRETCH TO FIT COVER
8. 12mm SQUARE ROD RIM (304 STAINLESS STEEL)

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

Iqaluit

TITLE	DWG NO.
SANITARY VAULT CLEANOUT TYPE 3	SS-009
DATE: AUGUST, 2026	SCALE: N.T.S



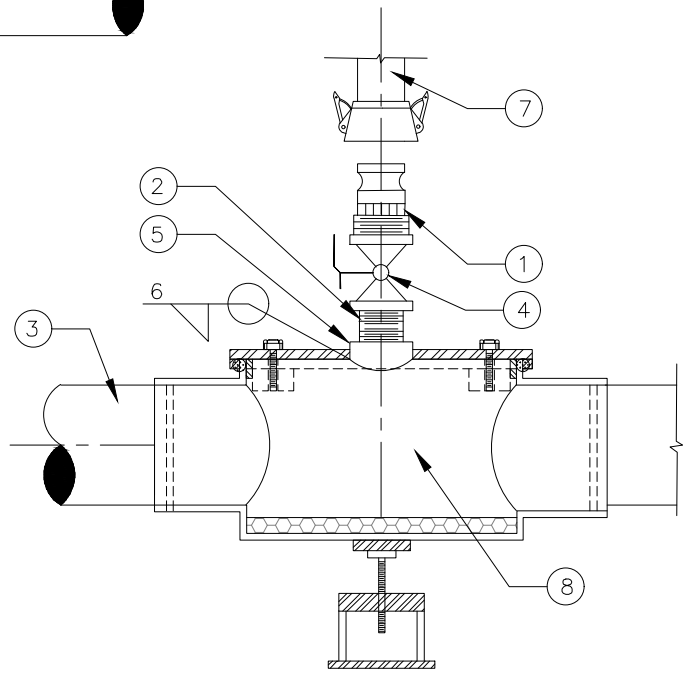
1 SS-010 FLUSH PORTS, NEW VAULTS

KEY TO NUMBERED PARTS:

1. 75mm ø STAINLESS STEEL MALE CAMLOCK W/ N.P.T. THREADS
2. 75mm ø N.P.T. STAINLESS STEEL OR ALUMINUM NIPPLE
3. SANITARY SEWER MAIN
4. 75mm ø STAINLESS STEEL OR ALUMINUM BALL VALVE
5. 75mm ø STAINLESS STEEL LATROLET WITH N.P.T THREADS
6. WELDED CONNECTION
7. FEMALE CAMLOCK CONNECTION FROM MUNICIPALITY FLUSHING TRUCK
8. CLEAN OUT

NOTE:

1. ONE FLUSH PORT REQUIRED FOR EACH SEWER APERTURE WITHIN NEW VAULTS
2. SEE CLEANOUT DETAILS.
3. FLUSH PORTS SHALL NOT INTERFERE WITH REMOVAL OF THE CLEAN–OUT COVER



2 SS-010 RETROFIT FLUSH PORT

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

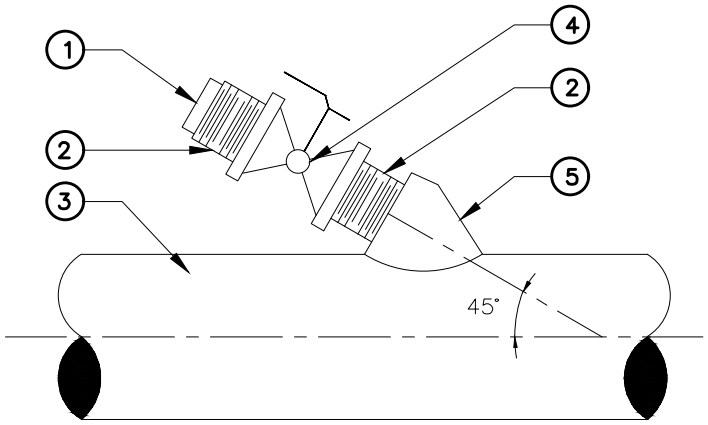
Iqaluit

TITLE: SANITARY SEWER FLUSH PORT

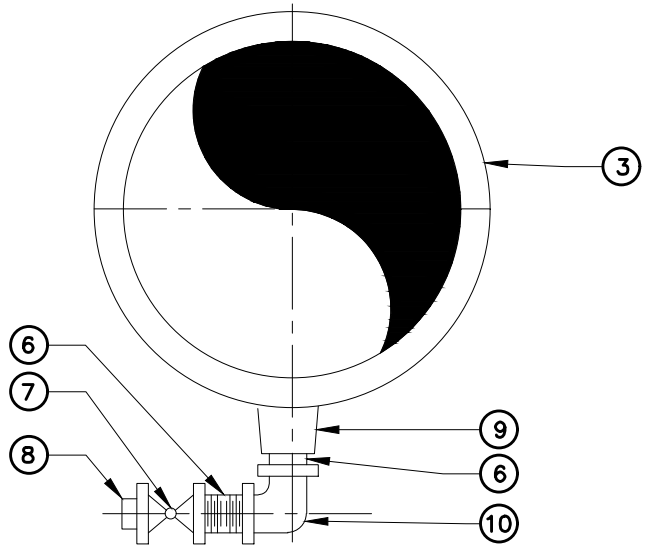
DATE: AUGUST, 2026

SCALE: N.T.S

DWG NO.: SS-010



1 SS-011 LATROLET CONNECTION



2 SS-011 WATER MAIN DRAIN

KEY TO NUMBERED PARTS:

1. 50mm ø N.P.T. STAINLESS STEEL PLUG
2. 50mm ø N.P.T. STAINLESS STEEL NIPPLE
3. WATER MAIN
4. 50mm ø STAINLESS STEEL BALL VALVE
5. 50mm ø LATROLET
6. 25mm ø STAINLESS STEEL N.P.T. SHORT NIPPLE
7. 25mm ø STAINLESS STEEL BALL VALVE
8. 25mm ø STAINLESS STEEL N.P.T. PLUG
9. 25mm ø N.P.T. THEODOLET
10. 25mm ø 90 DEG STAINLESS STEEL ELBOW N.P.T. FEMALE

NOTE:

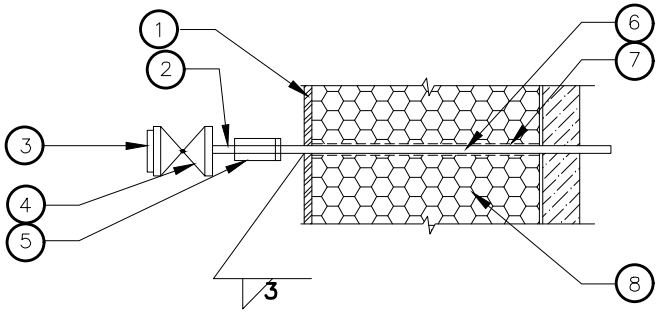
1. ONE LATROLET CONNECTION REQUIRED FOR EACH WATER MAIN BRANCH INSIDE VAULT
2. ONE WATER MAIN DRAIN REQUIRED PER VAULT

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

Iqaluit

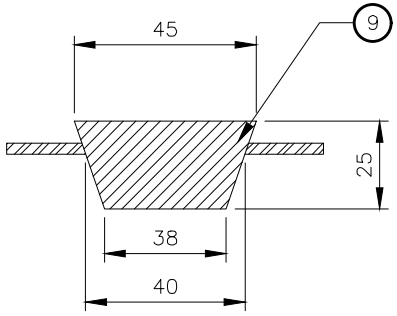
TITLE: WATER MAIN LATROLET & DRAIN		DWG NO. SS-011
DATE: AUGUST, 2026	SCALE: N.T.S	



1 SS-012 TEST/DRAIN VALVE DETAIL

KEY TO NUMBERED PARTS:

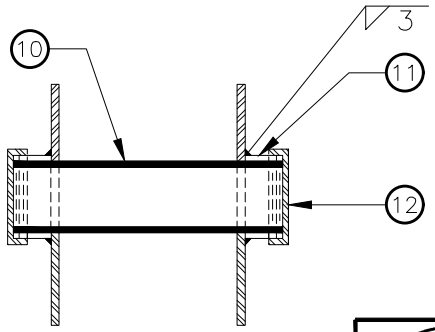
1. ACCESS VAULT WALL
2. 12mm ø STAINLESS STEEL NIPPLE
3. 12mm ø STAINLESS STEEL PLUG
4. 12mm ø STAINLESS STEEL SCREWED BALL VALVE
5. 12mm ø STAINLESS STEEL COUPLING
6. 12mm ø STAINLESS STEEL PIPE
7. DRILL THROUGH SHOP CAST POLYURETHANE INSULATION
8. SHOP CAST POLYURETHANE INSULATION
9. FROST PLUG TO BE MADE FROM SOLID BLACK RUBBER, DRIVEN TIGHTLY INTO HOLE
10. 37mm ø RIGID PVC – OIL COAT SURFACE PRIOR TO INSTALLING
11. 50mm ø SCHEDULE 40 NIPPLE
12. 50mm ø CAP



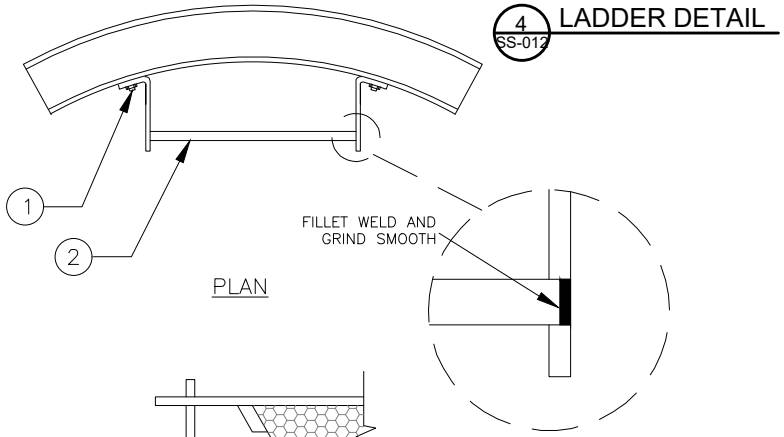
2 SS-012 FROST PLUG DETAIL

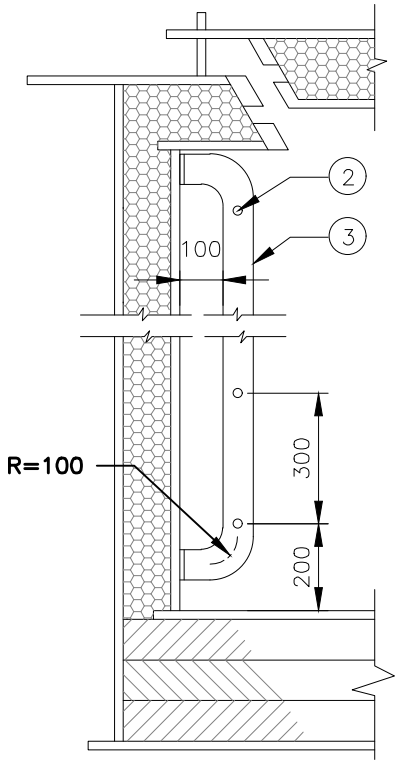
NOTES:

1. PROVIDE FROST PLUG IN SUMP HOLE
2. PLUG TO HAVE 10mm PROJECTION ABOVE FLOOR AFTER BEING PLACED TIGHTLY INTO HOLE
3. ONE WALL SLEEVE REQUIRED PER ACCESS VAULT



3 SS-012 WALL SLEEVE DETAIL





ELEVATION

4 SS-012 LADDER DETAIL

KEY TO NUMBERED PARTS:

1. 12mm ø STUD WELDED TO INNER WALL C/W FASTENING NUTS
2. 20mm ø TEXTURED RUNGS INSERTED HALFWAY THROUGH HOLES IN STRINGER, FILLET WELD REMAINDER OF HOLE AND GRIND SMOOTH – SEE DETAIL PLAN VIEW
3. 63.5X9.5mm FLAT BAR STRINGER, BENT TO MAKE SUPPORTS AND DRILLED THROUGH FOR RUNGS

NOTES:

1. LADDER TO BE HOT DIPPED GALV. AFTER FABRICATION
2. APPLY MASTIC ON UNDERSIDE OF BOLT PLATES PRIOR TO INSTALLATION
3. MAX 500mm FROM FIRST RUNG INSIDE VAULT TO FIRST RUNG OF LADDER EXTENSION

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

Iqaluit

TITLE
LADDER & MISCELLANEOUS ACCESS VAULT DETAILS

DATE
AUGUST, 2026

SCALE
N.T.S

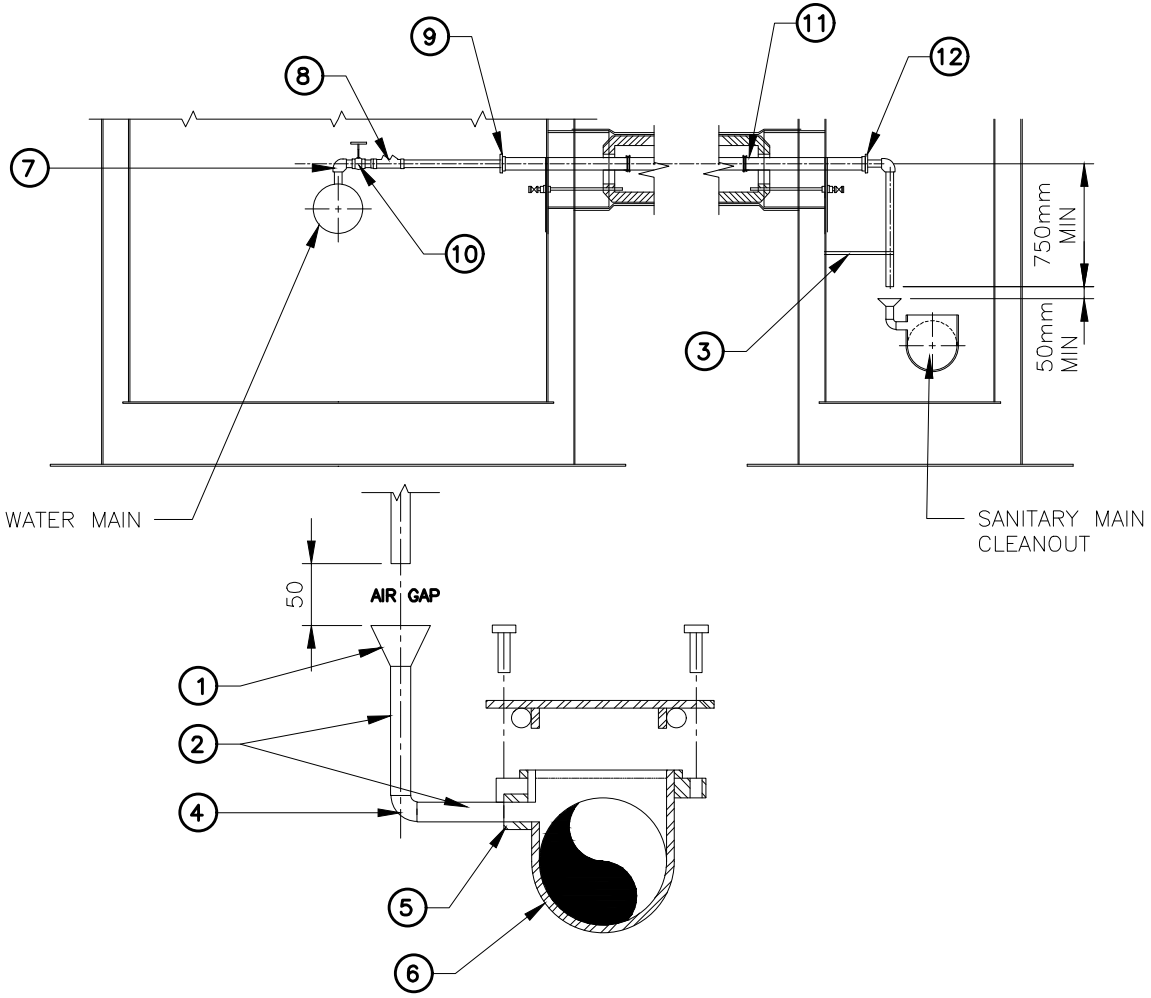
DWG NO.
SS-012

KEY TO NUMBERED PARTS:

1. 25x75mm STAINLESS STEEL REDUCER COUPLING
2. 25mmø SCHEDULE 40 STAINLESS STEEL PIPE
3. STAINLESS STEEL STRAPPING OR PIPE SUPPORT AS REQUIRED
4. 25mmø 90° STAINLESS STEEL BEND
5. 25mm NPT HALF COUPLING AND PLUG
6. SANITARY CLEANOUT
7. 25mmø STAINLESS STEEL THREADED ELBOW
8. 25mmø DUAL CHECK BACKFLOW PREVENTER WATTS SERIES LF7R
9. 25mmø SCHEDULE 40 STAINLESS STEEL, INCREASING TO 100mmø HDPE
10. 25mmø STAINLESS STEEL GLOBE VALVE
11. VAULT PENETRATION SEE SHEET SS–005.
12. 100mmø HDPE REDUCING TO 25mmø SCHEDULE 40 STAINLESS STEEL PIPE, COMES WITH ADAPTER FITTING (THREADED SIDE FOR STAINLESS STEEL, COMPRESSION SIDE FOR HDPE). STAINLESS STEEL INSERT REQUIRED AT COMPRESSION SIDE

NOTES:

1. FLEXIBLE RESTRAINT JOINTS SHALL BE INSTALLED AT BLEEDER PIPE PENETRATIONS



REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

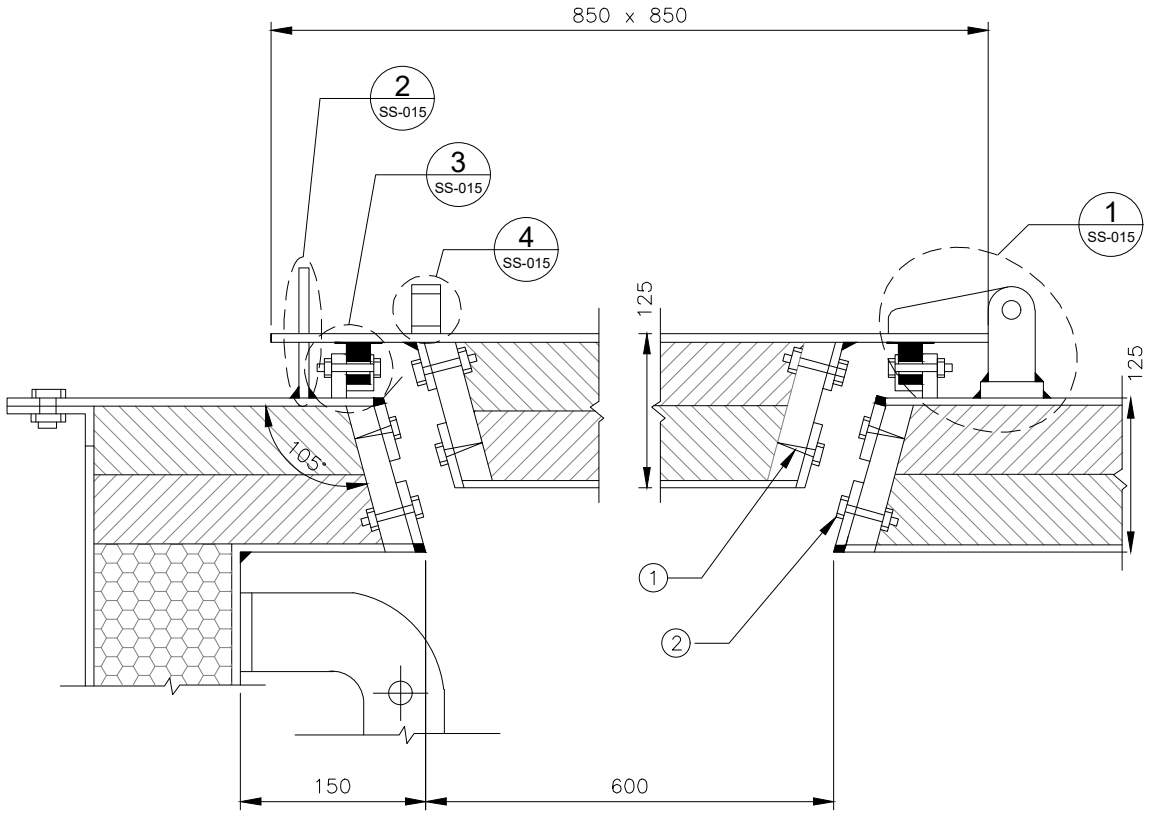
Iqaluit

TITLE
BLEEDER DETAIL

DATE
AUGUST, 2026

SCALE
N.T.S

DWG NO.
SS-013



KEY TO NUMBERED PARTS:

1. #12–30 PAN HEAD SHEET METAL SCREWS AT 100mm SPACING
2. 6mm GALV. BOLTS, NUTS AND WASHERS AT 100mm SPACING

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

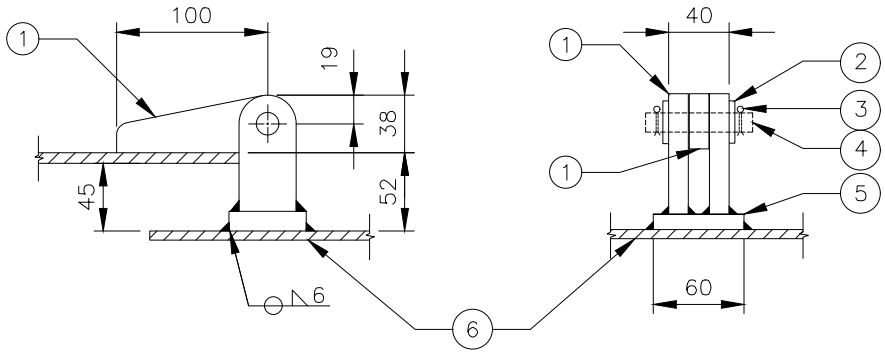
Iqaluit
ᐃᖃᓗᐃᑦ

TITLE
ACCESS VAULT COVER DETAILS

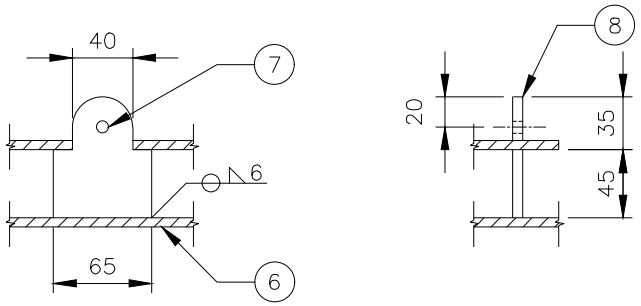
DWG NO.
SS-014

DATE
AUGUST, 2026

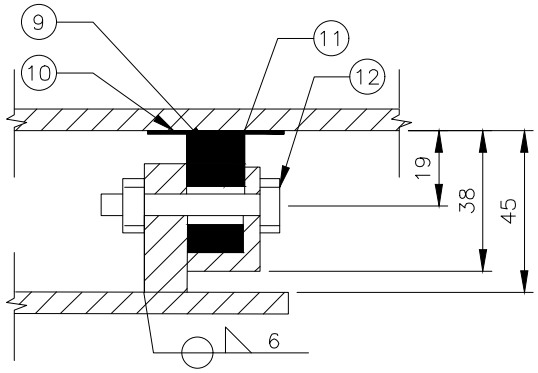
SCALE
N.T.S



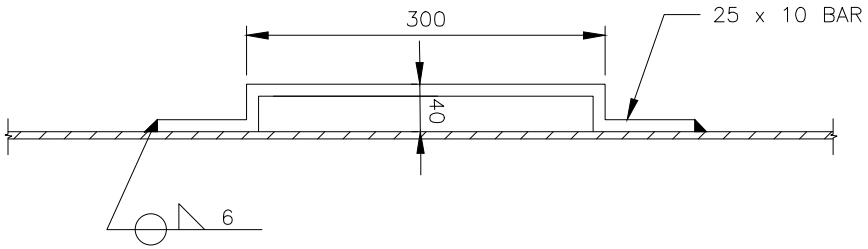
1 SS-015 COVER HINGE DETAIL



2 SS-015 LOCK HASP DETAIL



3 SS-015 COVER SEAL DETAIL



4 SS-015 COVER HANDLE DETAIL

KEY TO NUMBERED PARTS:

1. 13mm HOT DIPPED GALV. STEEL PLATE
2. CADMIUM PLATED WASHER (TYP.)
3. COTTER PIN (TYP.)
4. 12.7mm ø CADMIUM PLATED PIN
5. 12mm THICK STEEL BAR UNDER HINGES
6. 6mm THICK STEEL PLATE ACCESS VAULT CONSTRUCTION
7. 8mm ø HOLE DRILLED FOR PAD LOCK
8. 6mm THICK GALV. STEEL STAPLE

KEY TO NUMBERED PARTS:

9. 37mm ø METKA IND. TG-155 GASKET
10. 25mm WIDE TEFLON TAPE APPLIED TO DOOR
11. 6.5x17mm SPACER
12. 6x31mm CADMIUM PLATED STEEL BOLT 150mm SPACING

NOTES:

1. TWO HINGES ARE REQUIRED PER COVER
2. HINGES TO BE SPACED AT 400mm APART

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

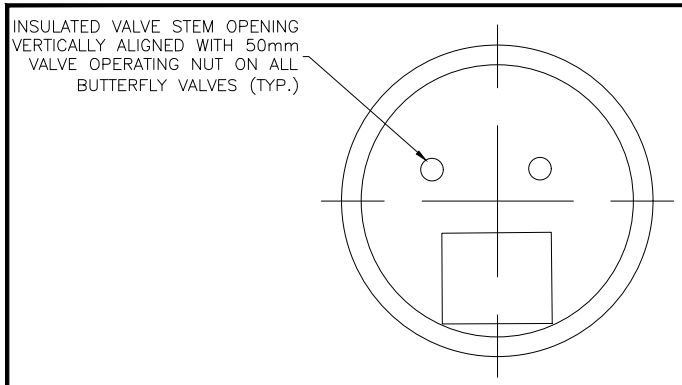
Iqaluit

TITLE
ACCESS VAULT COVER DETAILS

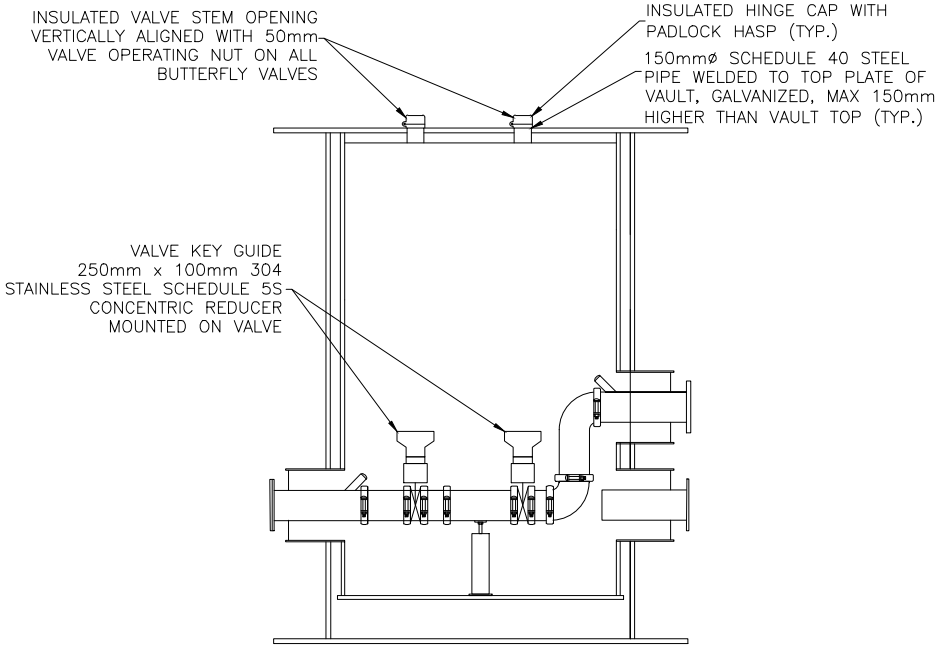
DWG NO.
SS-015

DATE
AUGUST, 2026

SCALE
N.T.S

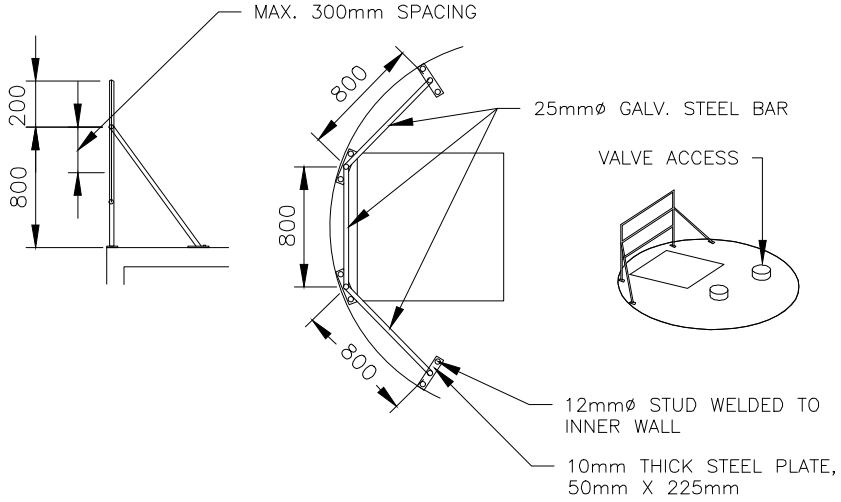


ACCESS VAULT PLAN VIEW



ACCESS VAULT SECTION VIEW

1 SS-016 VALVE STEM AND VALVE ACCESS



2 SS-016 LADDER EXTENSION

KEY TO NUMBERED PARTS:

1. 12mm ø STUD WELDED TO INNER WALL C/W FASTENING NUTS
2. 20mm ø TEXTURED RUNGS INSERTED HALFWAY THROUGH HOLES IN STRINGER, FILLET WELD REMAINDER OF HOLE AND GRIND SMOOTH – SEE DETAIL PLAN VIEW
3. 63.5X9.5mm FLAT BAR STRINGER, BENT TO MAKE SUPPORTS AND DRILLED THROUGH FOR RUNGS

NOTES:

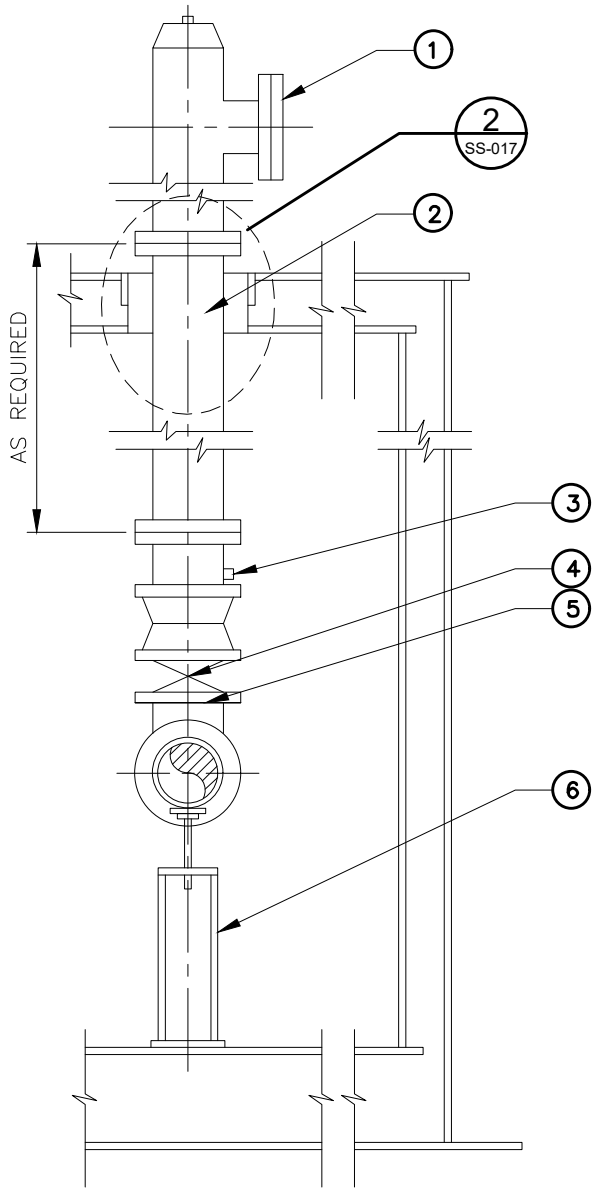
1. LADDER TO BE HOT DIPPED GALV. AFTER FABRICATION
2. APPLY MASTIC ON UNDERSIDE OF BOLT PLATES PRIOR TO INSTALLATION
3. MAX 500mm FROM FIRST RUNG INSIDE VAULT TO FIRST RUNG OF LADDER EXTENSION

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

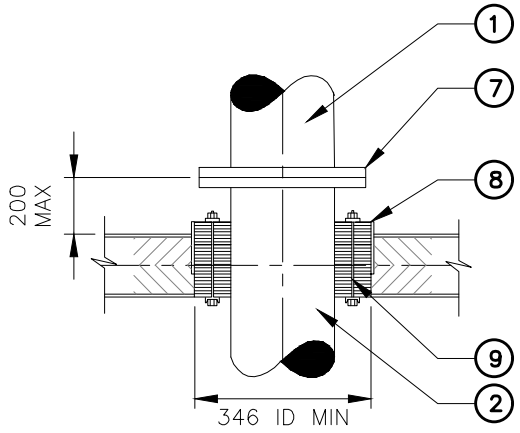
PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

Iqaluit

TITLE	DWG NO.
VAULT VALVE ACCESS AND LADDER EXTENSION	SS-016
DATE: AUGUST, 2026	SCALE: N.T.S



1 SS-017 FIRE HYDRANT DETAIL



2 SS-017 HYDRANT PENETRATION DETAIL

KEY TO NUMBERED PARTS:

1. 200mm CRANE MCAVITY M-67 "IN-LINE" FIRE HYDRANT
2. FIRE HYDRANT BARREL
3. VALVE AND CAP TO MATCH HYDRANT DRAIN PORT
4. 200mm LUG TYPE BUTTERFLY VALVE COMPLETE WITH OPERATOR
5. FLANGE TEE 1080KPA, DIAMETER TO MATCH MAIN AND HYDRANT SIZE
6. PIPE SUPPORT SEE DWG SS-003
7. HYDRANT FLANGE
8. 350mm ø SCHEDULE 10 (364 I.D.) STEEL PIPE X 100mm LONG WELDED TO ACCESS VAULT TOP PLATE
9. THUNDER-LINE CORP LINK-SEAL MODEL LS-500-C (200X350mm) OR APPROVED ALTERNATE

NOTES:

1. HYDRANT SHALL NOT INTERFERE WITH ACCESS HATCH
2. HYDRANT PUMPER NOZZLE SHALL FACE ADJACENT ROADWAY
3. HYDRANT TO BE FREE DRAINING (UNPLUGGED)

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

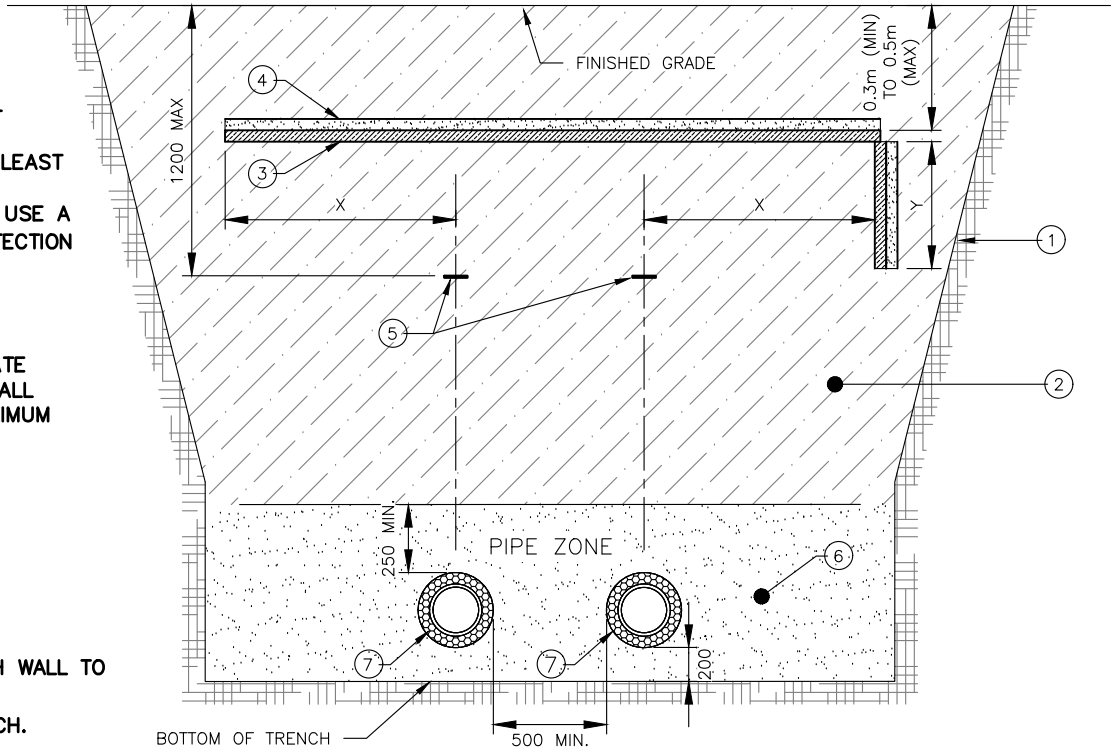
PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

Iqaluit

TITLE: FIRE HYDRANT DETAILS		DWG NO. SS-017
DATE: AUGUST, 2026	SCALE: N.T.S	

KEY TO NUMBERED PARTS:

1. TRENCH WALLS, SLOPE PER APPLICABLE HEALTH AND SAFETY REGULATIONS
2. SELECT NATIVE BACKFILL MATERIAL, OR ENGINEERED BACKFILL WHERE DIRECTED BY ENGINEER
3. HORIZONTAL LAYER OF RIGID BOARD INSULATION BURIED AT LEAST 0.3m AND NO MORE THAN 0.5m BELOW FINISHED GRADE. IF DIMENSION 'X' IS UNACHIEVABLE DUE TO SITE CONSTRAINTS, USE A VERTICAL PROTECTION BOARD 'Y' AS SHOWN. VERTICAL PROTECTION CAN BE USED ON ONE OR BOTH SIDES OF THE TRENCH.
4. SAND PROTECTIVE LAYER (50mm MIN.) OVER RIGID BOARD INSULATION.
5. 3M ELECTRONIC MARKING SYSTEM (EMS) TAPE AND 3M LOCATE MARKER BALLS. 3M EMS TAPE SHALL BE INSTALLED ABOVE ALL WATER AND SEWER MAINS AND LATERAL SERVICES. THE MAXIMUM DEPTH OF BURY FOR THE EMS IS 1.2m
6. APPROVED MATERIAL FOR INITIAL BACKFILL.
7. WATER / SEWER MAIN C/W URETHANE INSULATION.



NOTES:

1. PIPES TO BE SPACED 400mm, OR GREATER, FROM TRENCH WALL TO ALLOW COMPACTION
2. SILT MATERIAL SHALL BE FULLY REMOVED FROM THE TRENCH.
3. IF SILT IS ENCOUNTERED BELOW THE PIPE INVERT, SUB-EXCAVATE TO A MIN. DEPTH OF 450mm BELOW PIPE INVERT AND BACKFILL WITH GRANULAR B COMPACTED TO 95% STANDARD PROCTOR.
4. PIPES TO BE SPACED 500mm OR GREATER VERTICALLY & HORIZONTALLY FROM OTHER PIPES, AS MEASURED FROM THE OUTSIDE OF THE PIPE INSULATION FOR EACH PIPE.
5. PIPE INSULATION IS NOT REQUIRED WHERE SOLID ROCK IS ENCOUNTERED WITHIN 200mm BENEATH THE DESIGN PIPE INVERT ELEVATION.
6. MINIMUM HORIZONTAL INSULATION PROJECTION 'X' BEYOND CENTER-OF-PIPE OF 0.6m.
7. MAXIMUM VERTICAL INSULATION PROJECTION 'Y' OF 0.8m.
8. THE PURPOSE OF THE RIGID BOARD INSULATION IS TO MINIMIZE THAWING OF THE ACTIVE LAYER BELOW THE PIPE.

HORIZONTAL INSULATION REQUIREMENTS		
PIPE COVER	INSULATION LAYER EXTENSION (X or X+Y)	MIN. INSULATION THICKNESS
0 – 0.75m	DEPTH NOT APPROVED	N/A
0.75m – 1.5m	2.60m	150mm
1.5m – 2.0m	2.20m	100mm
2.0m – 3.0m	1.80m	50mm
3.0m & DEEPER	NOT REQUIRED	NOT REQUIRED

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
C.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

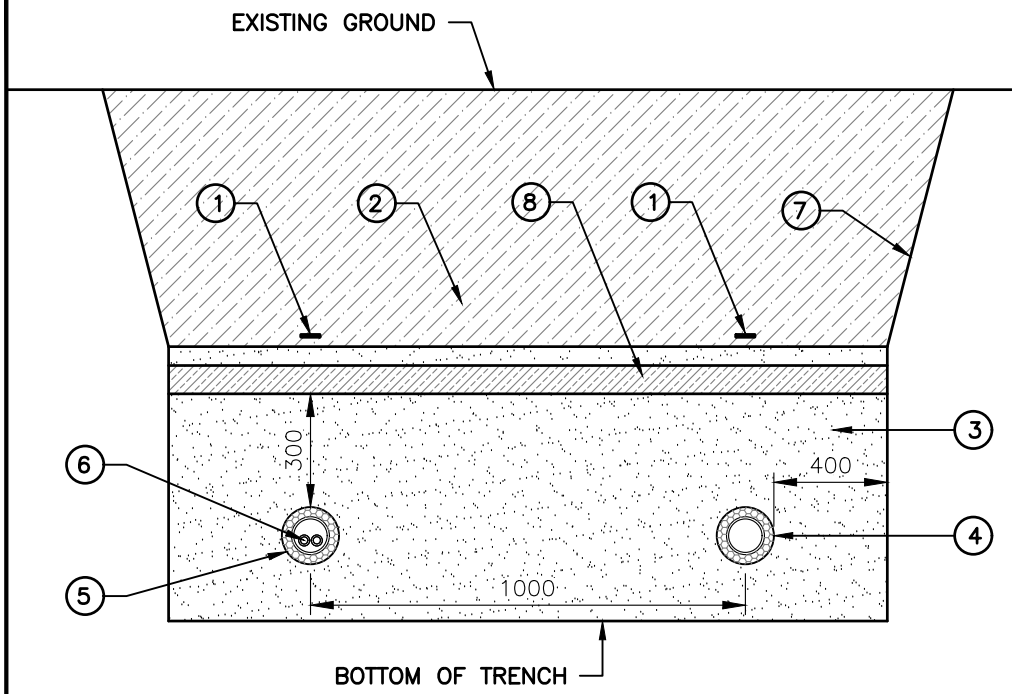
Iqaluit

TITLE
TRENCHING, BACKFILL AND INSULATION

DATE
JULY, 2026

SCALE
N.T.S

DWG NO.
SS-018



KEY TO NUMBERED PARTS:

1. 3M ELECTRONIC MARKING SYSTEM (EMS) TAPE AND 3M LOCATE MARKER BALLS. 3M EMS TAPE SHALL BE INSTALLED ABOVE ALL WATER AND SEWER MAINS AND LATERAL SERVICES. THE MAXIMUM DEPTH OF BURY FOR THE EMS IS 1.2m
2. SELECT NATIVE BACKFILL MATERIAL OR ENGINEERED BACKFILL WHERE DIRECTED BY ENGINEER
3. SAND BACKFILL, MIN. 300mm COVER OVER PIPE INSULATION; 200mm BELOW PIPE INSULATION.
4. SANITARY SERVICE C/W INSULATION
5. CARRIER PIPE – C/W INSULATION
6. SUPPLY AND RETURN WATER SERVICE
7. TRENCH WALLS, SLOPE PER APPLICABLE HEALTH AND SAFETY REGULATIONS.
8. SEE TRENCHING, BACKFILL AND INSULATION DETAIL (SS–018) FOR INSULATING REQUIREMENTS.

NOTES:

1. PIPES TO BE 300mm, OR GREATER, FROM TRENCH WALL TO ALLOW FOR COMPACTION.
2. SERVICE PIPES TO HAVE A MINIMUM OF 600mm OF COVER FROM FINISHED GRADE TO TOP OF PIPE INSULATION.
3. SANITARY SERVICES SHALL HAVE A CONSISTENT GRADE FROM THE BUILDING TO THE MAIN. MINIMUM GRADE FOR SANITARY SEWERS IS 2.0%. MAX. GRADE IS 6%. INSTALL RISER FROM SADDLE TO ACHIEVE 2–6% GRADE AT SERVICE, AS REQUIRED.
4. WATER & SEWER SERVICES SHALL BE SPACED AT A 1000mm MINIMUM (INSULATION JACKET TO INSULATION JACKET) IN A COMMON TRENCH
5. INSULATION SEAMS SHALL BE STAGGERED AND TAPED.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P. Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

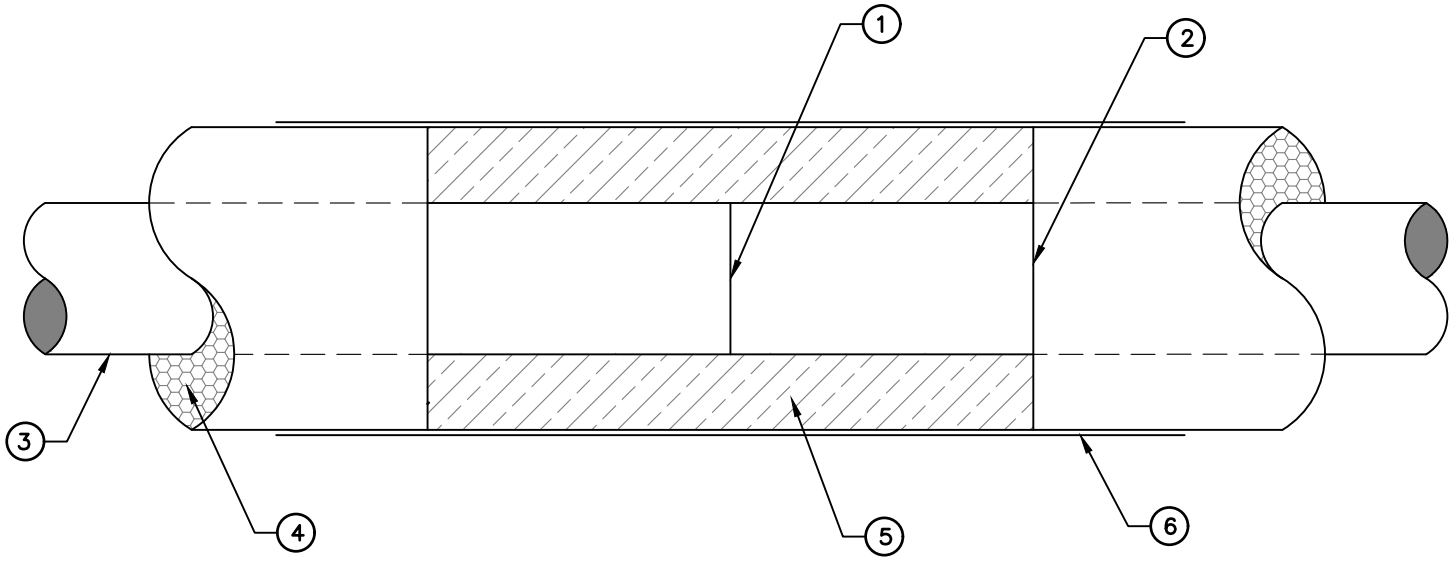
Iqaluit

TITLE
RESIDENTIAL SERVICE TRENCH DETAIL

DATE
AUGUST, 2026

SCALE
N.T.S

DWG NO.
SS-019



KEY TO NUMBERED PARTS:

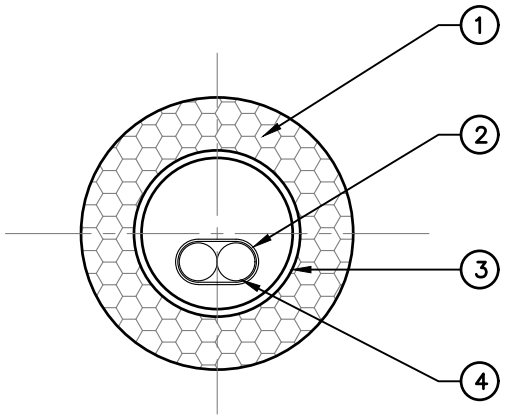
1. FIELD BUTT FUSION JOINT MADE BY QUALIFIED AND LICENSED TECHNICIAN
2. FIELD COAT ALL EXPOSED POLYURETHANE WITH MODIFIED BUTYL RUBBER ADHESIVE
3. HDPE WATER OR SANITARY SEWER MAIN
4. 50mm NOMINAL THICKNESS FACTORY APPLIED POLYURETHANE INSULATION C/W BLACK JACKET
5. POLYURETHANE HALF–SHELLS CUT TO FIT
6. HEAT SHRINK TAPE (BLACK POLYETHYLENE TAPE WITH MODIFIED BUTYL RUBBER ADHESIVE, OR CANUSAWRAP WLS) – 100mm OVERLAP ON SHELLS AND PIPE JACKET

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
C.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

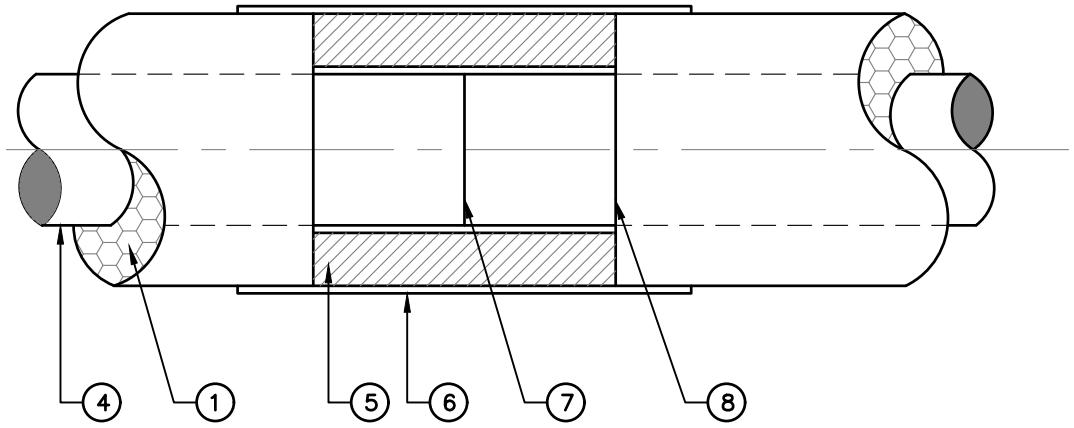
Iqaluit
ᐃᖃᓗᐃᑦ

TITLE: JOINT DETAIL SANITARY SEWER OR WATER MAIN		DWG NO. SS-020
DATE: AUGUST, 2026	SCALE: N.T.S	



KEY TO NUMBERED PARTS:

1. 50mm THICKNESS FACTORY APPLIED POLYURETHANE INSULATION AND BLACK JACKET.
2. TWO FULL TURNS OF POLYESTER PACKAGING TAPE.
3. 100mm OR 150mm Ø HDPE DR 17 CARRIER PIPE, BUTT FUSED.
4. FIELD INSTALLED 25 mm OR 38 mm HDPE DR 9 SUPPLY & RETURN WATER SERVICE PIPE.
5. POLYURETHANE HALF SHELL CUT TO LENGTH AND COATED WITH ASPHALT MODIFIED BUTYL RUBBER.
6. HEAT SHRINK SLEEVE TO SUIT.
7. BUTT FUSION JOINT MADE BY A QUALIFIED AND LICENSED JOINING TECHNICIAN.
8. FIELD COAT ALL EXPOSED POLYURETHANE WITH MODIFIED BUTYL RUBBER.



REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

Iqaluit
ᐃᖃᓗᐃᑦ

TITLE
WATER SERVICE PIPE

DATE
AUGUST, 2026

SCALE
N.T.S

DWG NO.
SS-021

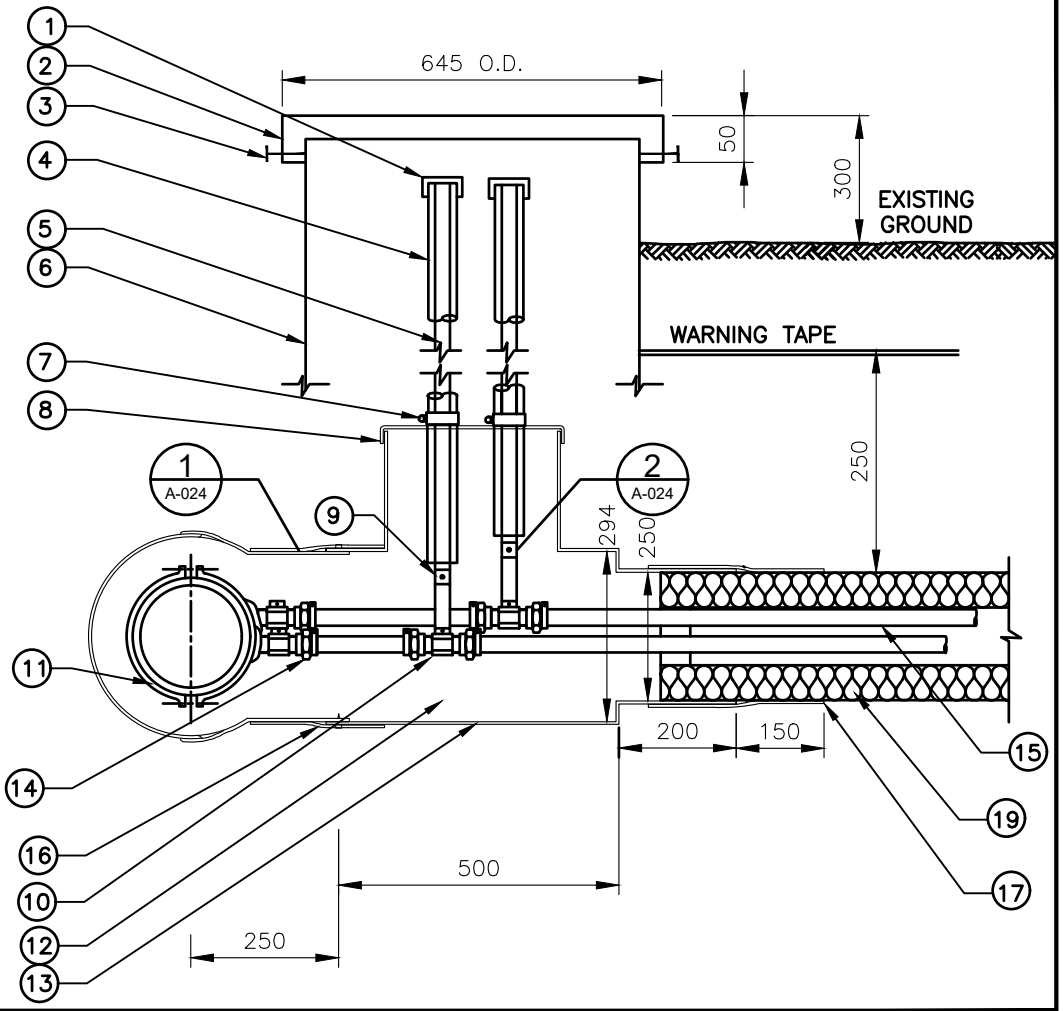
KEY TO NUMBERED PARTS:

1. SNUG FITTING PLASTIC CAP
2. STEEL LID MADE FROM 2.7mm THICK STEEL GALVANIZED AFTER FABRICATION
3. 120mm DIA. SCREW BOLT WITH WELDED NUT, GALVANIZED (FOUR PER LID)
4. 50 ø DR 9 HDPE PIPE VALVE EXTENSION FIELD CUT TO LENGTH AND FILLED WITH SEMI–SYNTHETIC ALL WEATHER GREASE (NLGI GRADE 1.5, VISCOSITY INDEX 150)
5. VALVE OPERATING ROD. CONNECT USING BRASS COTTER PIN
6. 600 ø 68 X 13 X 1.6mm THICK GALVANIZED STEEL PIPE
7. STAINLESS STEEL WORM GEAR HOSE CLAMP TO PREVENT MOVEMENT OF VALVE EXTENSION PIPE CAULK WITH SILICON ALL AROUND
8. 296mm INSIDE DIA. REMOVABLE GALVANIZED SHEET METAL CAP WITH FIELD CUT HOLES
9. FROST INSULATOR SERVICE BOX WITH STAINLESS STEEL COTTER PINS. SEE DETAIL 2 ON DWG. A–024
10. CURB STOPS WITH PACK JOINT FOR HDPE INCLUDING INSERT STIFFENER.
11. WATER MAIN WITH 50mm POLYURETHANE INSULATION WITH REBAR AND TAPPING SADDLES.
12. POLYURETHANE INSULATION FROM PORTABLE FOAM PACK TO FILL VOID
13. BOTTOM INSULATION FORM OF GALVANIZED SHEET STEEL
14. MAIN STOP WITH PACK JOINT AND SEAMLESS INSERT STIFFENER FOR HDPE PIPE
15. HDPE DR 11 SUPPLY AND RECIRCULATION PIPE– FIELD INSTALLED CONTINUOUS LENGTH FROM COIL STOCK
16. NO. 8X13mm CADMIUM PLATED SHEET METAL SCREWS
17. HEAT SHRINK TAPE TO BE MIN. 100mm LAP ON BLACK JACKET AFTER SHRINKAGE
18. POLYURETHANE OR FIBRE REINFORCED PLASTIC (FRP) FOAM PLUG. (MINIMUM 50mm THICK)
19. SHOP CAST 50mm THICK POLYURETHANE INSULATION WITH BLACK JACKET PROTECTIVE COATING.

NOTE:

1. ANY BRASS OR METALLIC FITTING THAT WILL BE ENCASED UN SPRAY FOAM OR POURED IN PLACE FOAM SHALL BE LIGHTLY COATED WITH AN APPROVED SEPARATING AGENT. AFTER BEING COATED, THE BRASS OR METALLIC FITTING SHALL BE WRAPPED IN A PETROLEUM WAX TAPE (DENSE LT). 10 MIL VINYL TAPE (3M SCOTCHRAP 50) OR SELF–FUSING SILICONE TAPE.

NOTE; WHERE CONDITIONS DICTATE THAT THE INSULATION FORM LID BE BURIED, THE INSULATION FORM LID SHALL BE BURIED TO A DEPTH OF 600mm AND A STEEL PLATE (600mm X 600mm X 6mm THICKNESS) SHALL BE BURIED OVER TOP OF THE INSULATION FORM LID TO A DEPTH OF 300mm.



REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

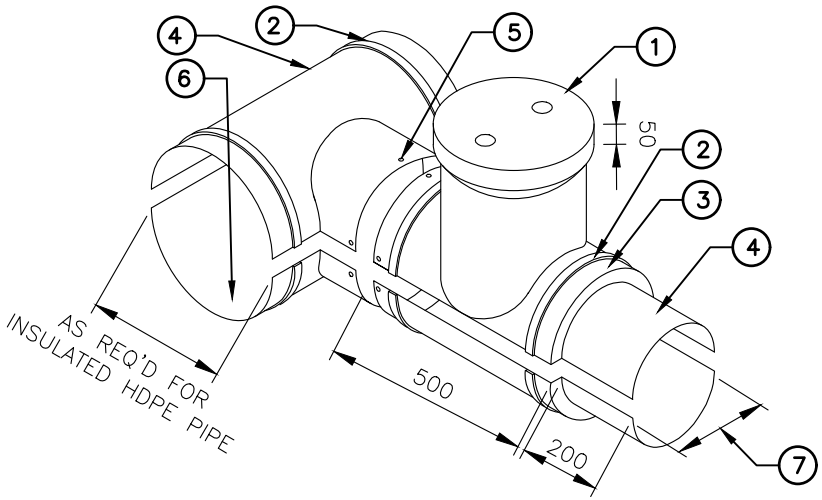
Iqaluit

TITLE
WATER SERVICE CONNECTION AT MAIN

DATE
AUGUST, 2026

SCALE
N.T.S

DWG NO.
SS-022

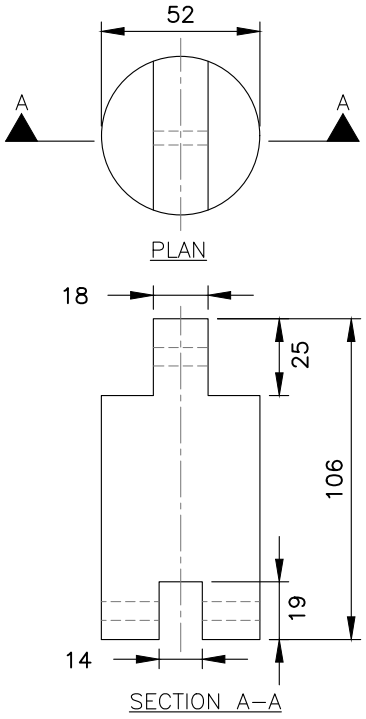


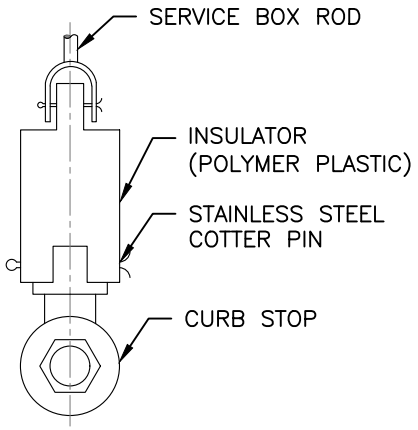
KEY TO NUMBERED PARTS:

1. 296mm INSIDE ø REMOVABLE GALVANIZED SHEET METAL CAP WITH FIELD CUT HOLES
2. STAINLESS STEEL BAND–IT CLIPS #M211
3. 50mm LONG
4. 600mm LONG, ø TO SUIT INSULATED PIPE
5. HOLES FOR FOAM INJECTION – TO BE FILLED WITH MODIFIED BUTYL RUBBER ADHESIVE COATED AFTER FOAM INJECTION
6. BOTTOM INSULATION FORM – GALVANIZED SHEET STEEL
7. ø TO SUIT INSULATED SERVICE PIPE

NOTE:
IF CURB STOP IS OFFSET FROM THE MAIN, THE INSULATION FORM SHALL BE DIVIDED INTO TWO ASSEMBLIES (ONE ASSEMBLY FOR THE MAIN STOP, AND ONE ASSEMBLY FOR THE CURB STOP).

1 SS-023 SERVICE INSULATION FORM DETAIL





NOTE:
1. SERVICE ROD WILL BE TYPE 304 STAINLESS STEEL.
2. ROD SHALL BE SUFFICIENT LENGTH TO EXTEND FROM THERMAL BREAK TO TOP OF HDPE CASING PIPE BUT SHALL NOT EXTEND ABOVE EXISTING GROUND SURFACE.
3. TOP SECTION OF ROD TO BE 32mm LONG X 19mm WIDE X 6mm THICK WITH 5mm LONG TOP BEVEL.

2 SS-023 SERVICE BOX FROST INSULATOR DETAIL

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

Iqaluit

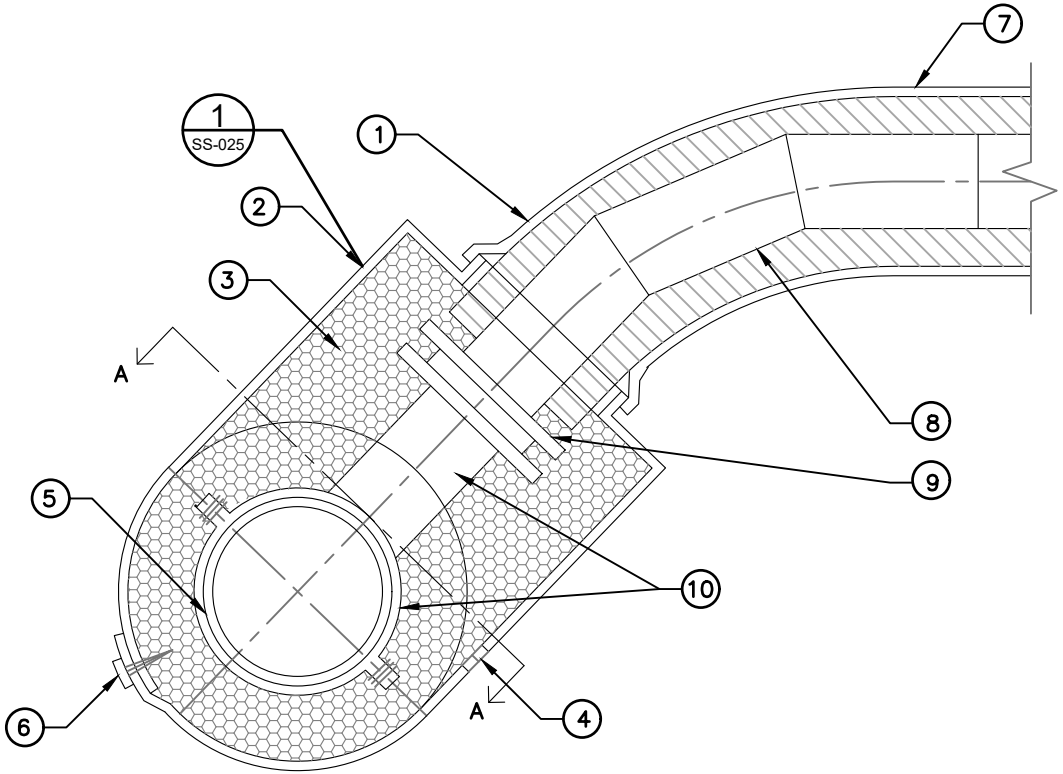
TITLE: WATER SERVICE DETAILS			DWG NO. SS-023
DATE: AUGUST, 2026	SCALE: N.T.S		

KEY TO NUMBERED PARTS:

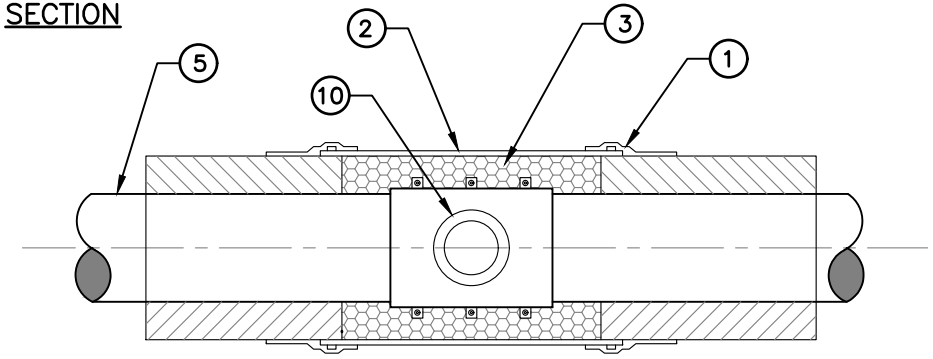
1. HEAT SHRINK SLEEVE, MIN. 100mm LAP ON BLACK JACKET
2. INSULATION FORM, SIZED TO FIT SEWER MAIN O.D. AND SERVICE LATERAL O.D., 25mm LAP REQUIRED ON EACH SIDE
3. FIELD POURED POLYURETHANE INSULATION FOAM
4. HOLES FOR FOAM INJECTION – TO BE FILLED WITH MODIFIED BUTYL RUBBER ADHESIVE COATED AFTER FOAM INJECTION
5. SANITARY SEWER – HDPE PIPE C/W INSULATION AND FRP JACKET
6. GALV. SHEET METAL SCREWS
7. HDPE PIPE C/W INSULATION, FRP JACKET AND MODIFIED BUTYL RUBBER ADHESIVE COATED ENDS
8. FACTORY FABRICATED HDPE 45° BEND C/W INSULATION, FRP JACKET AND MODIFIED BUTYL RUBBER ADHESIVE COATED ENDS
9. FLANGE STUB END, C/W BACKUP RING, BUTT FUSED TO END OF SERVICE LATERAL
10. SLEEVE SADDLE – SIZED TO FIT MAIN AND SERVICE LATERAL

NOTES:

1. ALL EXPOSED SURFACES OF POLYURETHANE TO BE FIELD COATED WITH MODIFIED BUTYL RUBBER ADHESIVE
2. METAL SURFACES IN CONTACT WITH FIELD POURED POLYURETHANE INSULATION SHALL BE COATED WITH OIL SEPARATING AGENT.
3. SANITARY SERVICES SHALL HAVE A CONSISTENT GRADE FROM THE BUILDING TO THE MAIN. MINIMUM GRADE FOR SANITARY SEWER SERVICES IS 2.0%. MAXIMUM GRADE IS 6%. INSTALL RISER FROM SADDLE TO ACHIEVE 2–6% GRADE AT SERVICE, AS REQUIRED.



SECTION



PENETRATION VIEW A–A

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

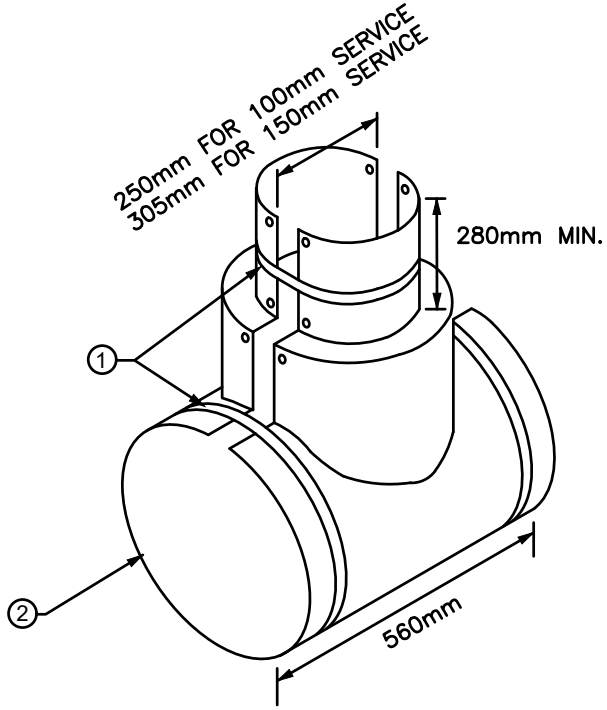
Iqaluit
ᐃᖃᓗᐃᑦ

TITLE
SANITARY SERVICE CONNECTION AT MAIN

DATE
AUGUST, 2026

SCALE
N.T.S

DWG NO.
SS-024



1 SS-025 SANITARY SERVICE INSULATION FORM

KEY TO NUMBERED PARTS:

1. STAINLESS STEEL PIPE CLAMP (BAND–IT M211)
2. 22 GAUGE GALVANIZED SHEET STEEL. FORM DIA. TO SUIT O.D. OF INSULATED MAIN PLUS 25mm LAP ON EACH SIDE

NOTES:

1. FORM TO FIT OVER PRE–INSULATED MAIN AND SERVICE PIPING.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

Iqaluit
ᐃᖃᓗᐃᑦ

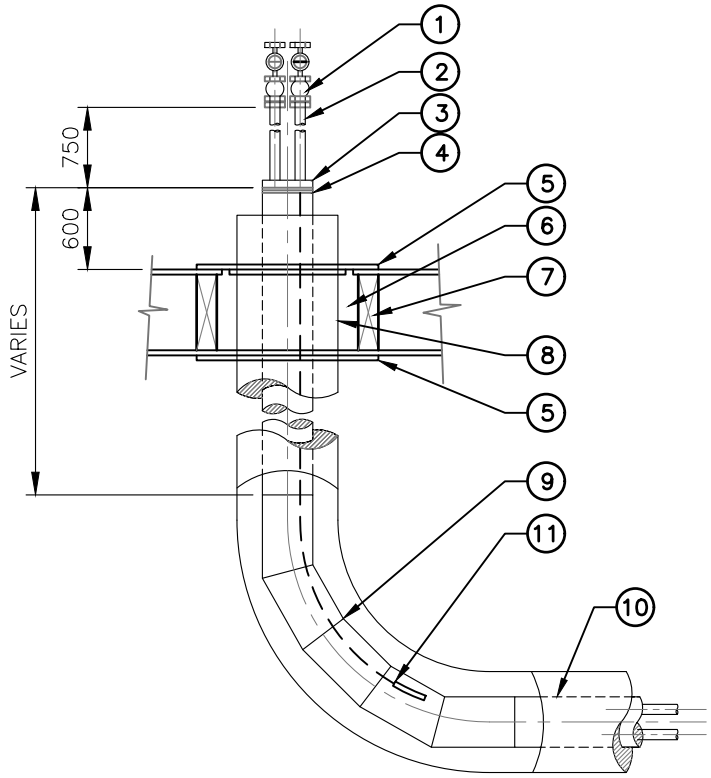
TITLE: SANITARY SERVICE INSULATION FORM			DWG NO. SS-025
DATE: AUGUST, 2026	SCALE: N.T.S		

KEY TO NUMBERED PARTS:

1. 25mm BALL VALVES, COMPRESSION WITH SEAMLESS STAINLESS STEEL INSERT – MUELLER H–15219 OR EQUAL
2. FIELD INSTALLED 25mm OR 38mm HDPE SUPPLY AND RETURN WATER SERVICE PIPE – CONTINUOUS LENGTH FROM COIL STOCK
3. SECURITY CAP
4. STAINLESS STEEL GEAR CLAMP HOLDING SECURITY CAP IN PLACE
5. 20mm PLYWOOD GLUED AND SCREWED TO JOIST/STUDS AND HEADERS, CAULK WITH SILICON ALL AROUND
6. POLYURETHANE INSULATION FROM PORTABLE FOAM PACK TO FILL VOID.
7. FLOOR JOIST
8. FIBERGLASS REINFORCED PLASTIC THIMBLE
9. LONG RADIUS 90° BEND – HDPE C/W INSULATION
10. 100mm OR 150mm CARRIER PIPE – HDPE C/W INSULATION
11. THERMOSTAT BULB

NOTES:

1. ALL EXPOSED SURFACES OF POLYURETHANE TO BE FIELD COATED WITH MODIFIED BUTYL RUBBER ADHESIVE
2. METAL SURFACES IN CONTACT WITH FIELD POURED POLYURETHANE INSULATION SHALL BE COATED WITH OIL SEPARATING AGENT



REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

Iqaluit

TITLE
WATER SERVICE RISER AT HOUSE

DATE
AUGUST, 2026

SCALE
N.T.S

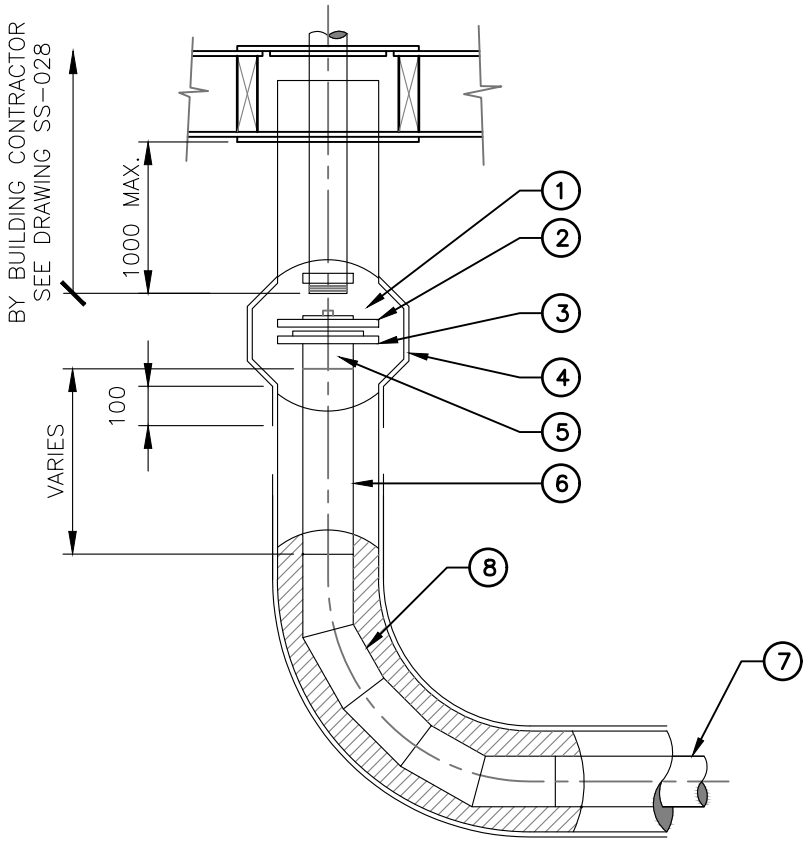
DWG NO.
SS-026

KEY TO NUMBERED PARTS:

1. INSULATION KIT FOR FLANGE ASSEMBLY
2. COMPANION FLANGE (SIZED TO FIT PIPE ø), WITH RUBBER GASKET AND BOLTS DRILLED AND TAPPED, C/W PVC TEMP. PLUG (SIZED TO FIT)
3. BACKUP RING FOR FLANGE ASSEMBLY
4. HEAT SHRINK TO FIT OVER FLANGE ASSEMBLY
5. HEAT SHRINK TO FIT OVER INSULATION KIT
6. HDPE STUB END FUSED TO SANITARY SERVICE PIPE (SIZED TO FIT)
7. SANITARY SERVICE PIPE, HDPE C/W FACTORY APPLIED POLYURETHANE INSULATION, FRP JACKET AND MODIFIED BUTYL RUBBER ADHESIVE COATED ENDS
8. FACTORY FABRICATED HDPE 45° BEND C/W INSULATION, FRP JACKET AND MODIFIED BUTYL RUBBER ADHESIVE COATED ENDS

NOTES:

1. ALL EXPOSED SURFACES OF POLYURETHANE TO BE FIELD COATED WITH MODIFIED BUTYL RUBBER ADHESIVE
2. METAL SURFACES IN CONTACT WITH FIELD POURED POLYURETHANE INSULATION SHALL BE COATED WITH OIL SEPARATING AGENT
3. INSULATION FORMS AND METAL COVER PARTS TO BE 1.6mm THICK STEEL CONTINUOUS WELDED SEAMS, HOT DIPPED GALV. AFTER FABRICATION



REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P. Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

Iqaluit

TITLE
SANITARY SERVICE RISER (CIVIL CONTRACTOR)

DWG NO.
SS-027

DATE
AUGUST, 2026

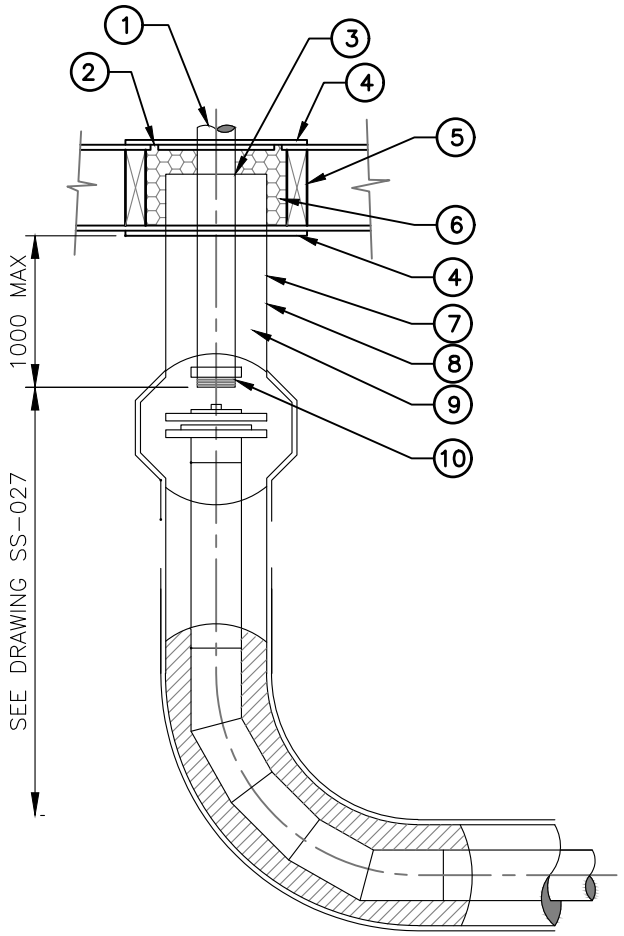
SCALE
N.T.S

KEY TO NUMBERED PARTS:

1. 75mm ø PVC OR ABS PIPE
2. 200mm CHIMNEY CLEANOUT PLUG. CUT HOLE TO FIT O.D. OF PIPE
3. SILICON SEALER APPLIED TO THIS SECTION BEFORE INSERTING INSULATED PIPE INTO OPENING
4. 20mm PLYWOOD – GLUED AND SCREWED TO JOISTS/STUDS AND HEADER
5. FLOOR JOIST
6. FIELD APPLIED POLYURETHANE INSULATION TO FILL VOID
7. 290mm GALV. THIMBLE, 22 GA. TOP AND BOTTOM SCREWED TO PLYWOOD
8. HEAT SHRINK – TO SUIT
9. POLYURETHANE HALF SHELLS, CUT TO LENGTH AND COATED WITH FIELD APPLIED MODIFIED BUTYL RUBBER ADHESIVE
10. ADAPTER SOCKET (SIZED TO FIT) x MPT TO SUIT BUILDING PLUMBING MATERIALS

NOTES:

1. ALL EXPOSED SURFACES OF POLYURETHANE TO BE FIELD COATED WITH MODIFIED BUTYL RUBBER ADHESIVE
2. METAL SURFACES IN CONTACT WITH FIELD POURED POLYURETHANE INSULATION SHALL BE COATED WITH OIL SEPARATING AGENT
3. INSULATION FORMS AND METAL COVER PARTS TO BE 1.6mm THICK STEEL CONTINUOUS WELDED SEAMS, HOT DIPPED GALV. AFTER FABRICATION



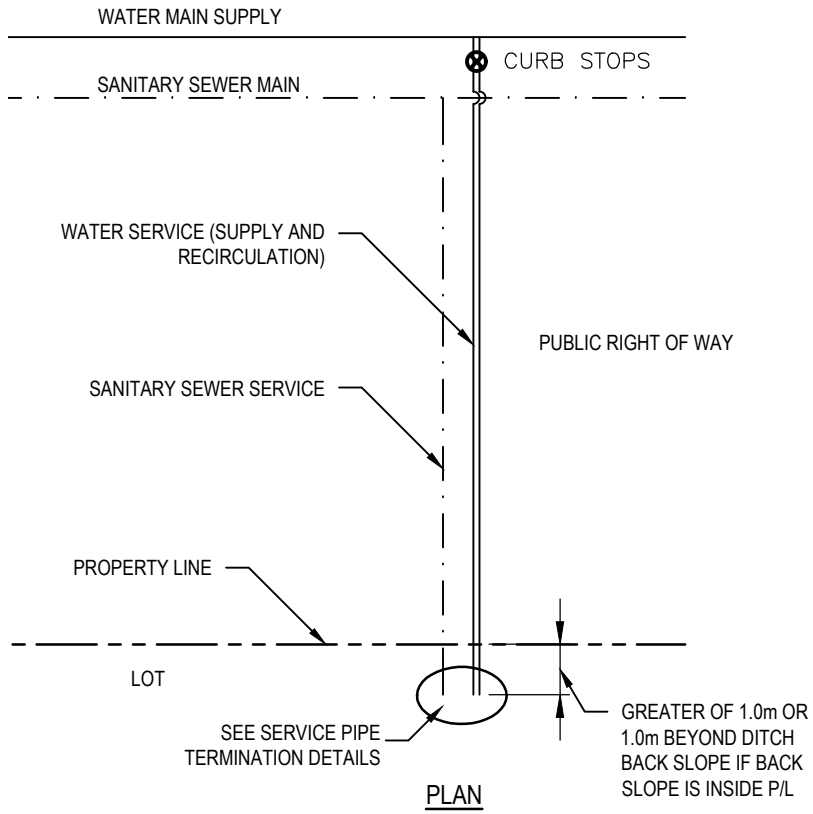
REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P. Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

Iqaluit
ᐃᖃᓗᐃᑦ

TITLE: SANITARY SERVICE HOUSE CONNECTION DETAIL (BUILDING CONTRACTOR)		DWG NO. SS-028
DATE: AUGUST, 2026	SCALE: N.T.S	

TYPICAL RESIDENTIAL SERVICE

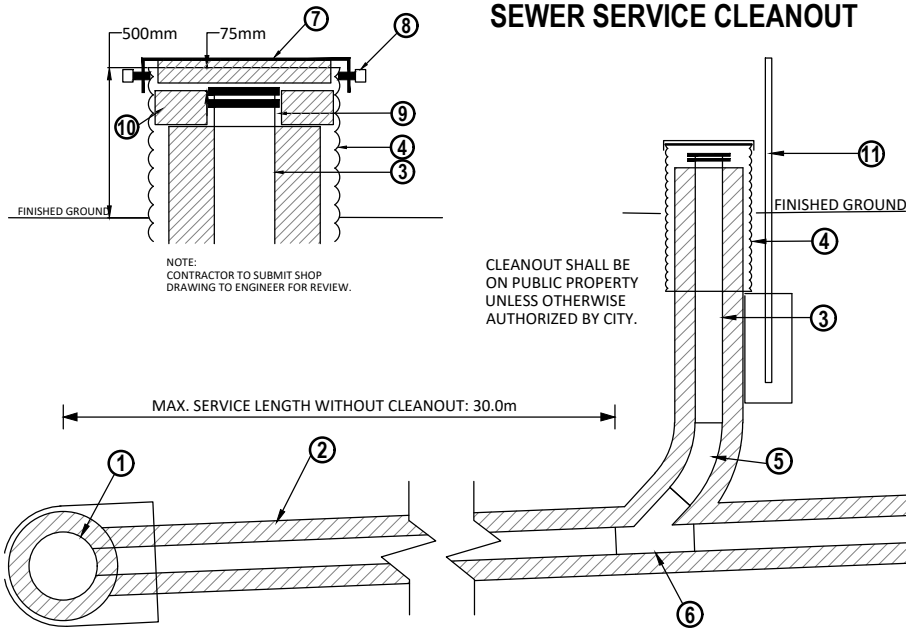


PLAN

NOTES:

1. MINIMUM SLOPE OF SANITARY SERVICE TO BE 2%. MAXIMUM SLOPE IS 6%.
2. CAP ENDS OF SERVICE CONNECTION FOR FUTURE TIE-IN BY LOT OWNER.
3. MARK END OF SERVICE WITH 100mm x 100mm WOODEN STAKE, FROM PIPE INVERT TO A MINIMUM OF 500mm ABOVE THE GROUND. EXPOSED STAGE TO BE PAINTED RED AND MARKED TO INDICATE EITHER WATER OR SEWER
4. SERVICES SHALL NOT BE INSTALLED WITHIN DRIVEWAYS
5. WHERE CONDITIONS DICTATE THAT THE INSULATION FORM LID BE BURIED, THE INSULATION FORM LID SHALL BE BURIED TO A DEPTH OF 600mm AND A STEEL PLATE (600mm X 600mm X 6mm THICKNESS) SHALL BE BURIED OVER TOP OF THE INSULATION FORM LID TO A DEPTH OF 300mm.

SEWER SERVICE CLEANOUT



KEY TO NUMBERED PARTS:

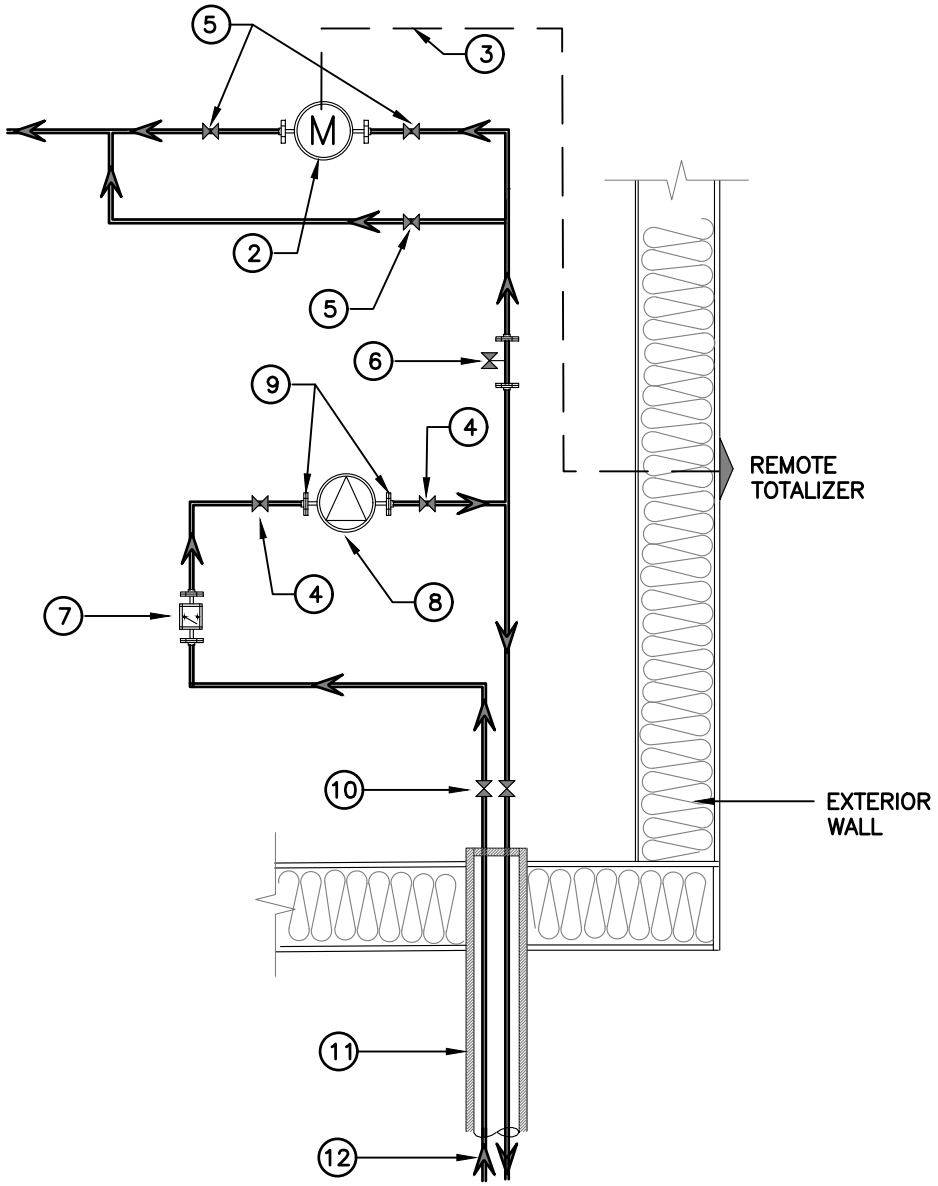
1. HDPE SEWER MAIN (FACTORY INSULATED) & SERVICE INSULATION FORM.
2. HDPE SEWER SERVICE PIPE, FACTORY INSULATED.
3. VERTICAL CLEAN-OUT RISER; HDPE DR17 100mm WITH FACTORY APPLIED OR FIELD KIT INSULATION.
4. 300mm CORRUGATED STEEL PIPE (MIN. 500mm BURY, 500mm ABOVE GROUND).
5. 45° LONG RADIUS SWEEP BEND, HDPE WITH FACTORY APPLIED OR FIELD KIT INSULATION.
6. DR17 HDPE 100mm WYE FITTING WITH FACTORY APPLIED OR FIELD KIT INSULATION. COAT ENDS WITH MODIFIED BUTYL RUBBER.
7. STEEL LID MADE FROM 6mm THICK SHEET STEEL, GALVANIZED AFTER FABRICATION, COMES WITH 50mm RIGID INSULATION AFFIXED TO LID UNDERSIDE USING MODIFIED BUTYL RUBBER. INSULATION SIZED TO FIT INSIDE CORRUGATED STEEL PIPE.
8. 12mm DIA. SCREW BOLT WITH WELDED NUT, GALVANIZED (FOUR PER LID).
9. HDPE BLIND FLANGE BOLTED CONNECTION.
10. RIGID INSULATION FILLER PIECES, CUT TO SUIT VOID SHAPE.
11. 50mm SCHEDULE 40 STEEL MARKER POST WITH WELDED TOP CAP, GAVANIZED, C/W 100mm WIDE REFLECTORIZED TAPE (MIN. 1000mm BURY, 1500mm ABOVE GROUND). SET POST IN CONCRETE (600mm EMBEDMENT, 300mm DIA. HOLE). BOLT TO CSP.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P. Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date AUGUST 18, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

Iqaluit

TITLE	DWG NO.
TYPICAL RESIDENTIAL SERVICE CONNECTION & SEWER SERVICE CLEANOUT	SS-029
DATE: AUGUST, 2026	SCALE: N.T.S



KEY TO NUMBERED PARTS:

1. BYPASS REQUIRED FOR ALL METERS 19MM AND LARGER
2. METER SIZES/SPOOL PIECE SPACING

   10mm – 191mm

   19mm – 191mm

   25mm – 273mm

   38mm – 330mm

   51mm – 431mm

   64mm – 489mm

   76mm – 489mm

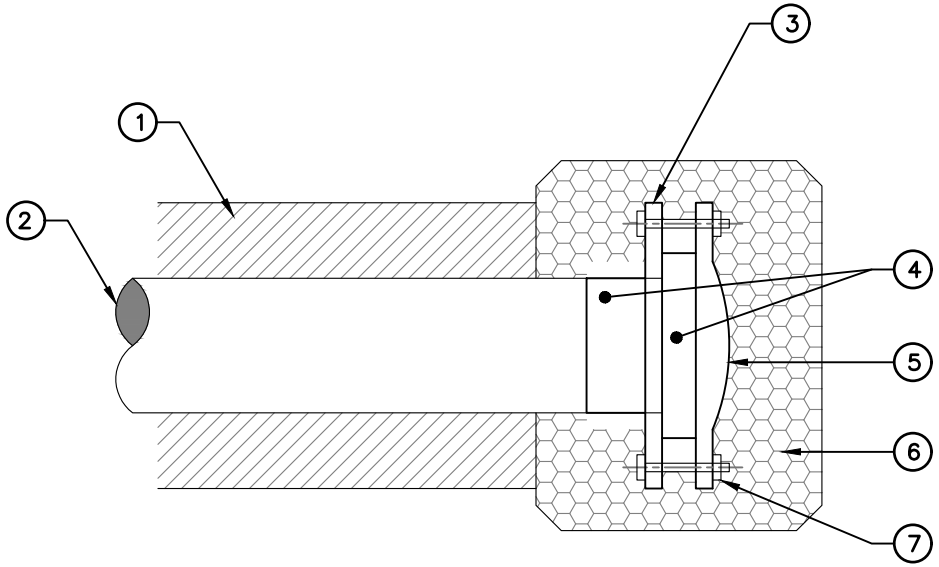
   METERS TO BE LOCATED 90–120mm FROM THE FLOOR IN A HORIZONTAL POSITION
3. REMOTE 2–PAIR WIRE FROM WATER METER TO 150mm LEFT OR RIGHT OF ELECTRICAL METER ON EXTERIOR OF BUILDING WATER METER AND REMOTE INSTALLED BY MUNICIPALITY AND BILLED TO APPLICATION
4. ISOLATION GATE VALVES
5. SEALABLE ISOLATION GATE VALVES – SEALED BY MUNICIPALITY
6. PRESSURE REDUCING VALVE
7. FLOW SWITCH – ACTIVATE FLOW ALARM
8. CIRCULATION PUMP
9. UNION FITTING ON BOTH SIDES OF THE SERVICEABLE EQUIPMENT
10. SYSTEM MAIN VALVE MIN 300mm FROM FLOOR – BRONZE BALL CURB STOP – COMPRESSION FITTING AND SEAMLESS STAINLESS STEEL INSERT MUELLER H–15216 OR EQUAL
11. WATER SERVICE CARRIER PIPE, HDPE WITH INSULATION.
12. FIELD INSTALLED HDPE WATER SUPPLY AND RETURN. CONTINUOUS LENGTH COIL STOCK FROM MAIN TO INTERIOR OF BUILDING

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

Iqaluit
ᐃᖃᓗᐃᑦ

TITLE	DWG NO.
WATER METER AND RECIRCULATION PUMP SCHEMATIC	SS-030
DATE: AUGUST, 2026	SCALE: N.T.S



KEY TO NUMBERED PARTS:

1. FACTORY APPLIED POLYURETHANE INSULATION, FRP JACKET AND BUTYL RUBBER COATED ENDS
2. HDPE PIPE
3. SLIP ON BACKING FLANGE
4. BUTT FUSION HDPE FLANGE ADAPTER
5. HDPE BLIND FLANGE WITH GASKET APPLIED FOR POTABLE WATER
6. FLANGE INSULATION KIT
7. STAINLESS STEEL HARDWARE

NOTE:

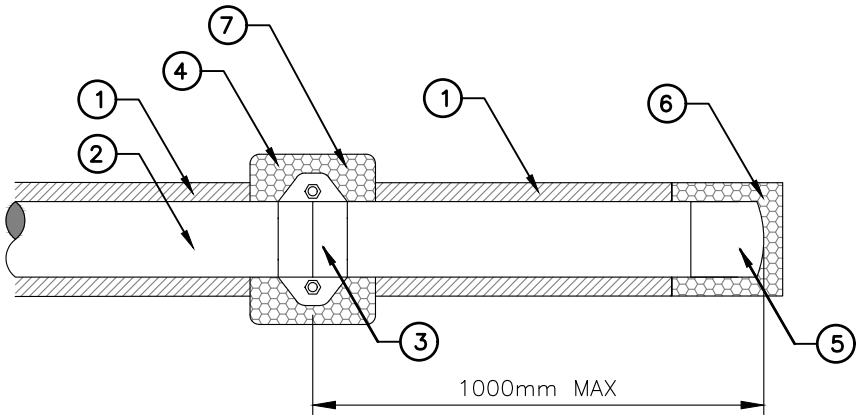
1. STUBS FOR FUTURE SHALL INCLUDE A VALVE IN THE NEAREST VAULT. VALVE TO REMAIN CLOSED UNTIL FUTURE CONNECTION MADE.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

Iqaluit
ᐃᖃᓗᐃᑦ

TITLE	DWG NO.
WATER MAIN PIPE TERMINATION	SS-031
DATE: AUGUST, 2026	SCALE: N.T.S



KEY TO NUMBERED PARTS:

1. FACTORY APPLIED POLYURETHANE INSULATION, FRP JACKET AND MODIFIED BUTYL RUBBER ADHESIVE COATED ENDS
2. HDPE SEWER MAIN
3. CITY APPROVED HDPE PIPE RESTRAINT COUPLING WITH STAINLESS STEEL INSERTS
4. COUPLING INSULATION KIT
5. BUTT FUSION END CAP
6. END CAP INSULATION KIT
7. FUTURE CONNECTION POINT. COUPLING TO REMAIN AS PART OF FUTURE CONNECTION. FIELD INSULATION KIT AT COUPLING TO BE REPLACED AFTER CONNECTION.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

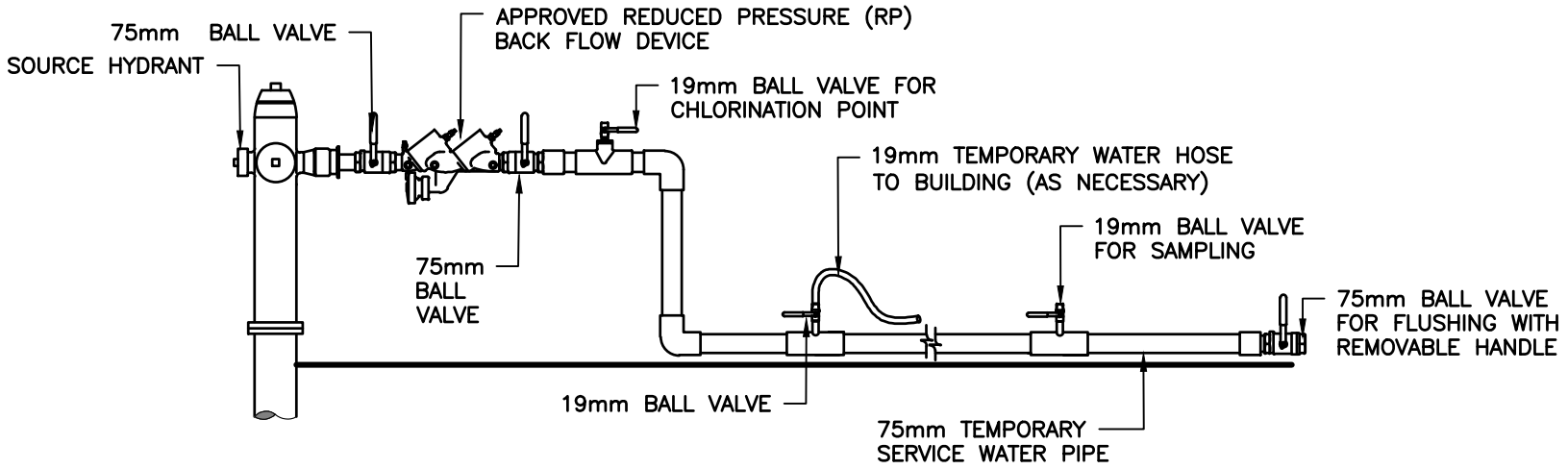
Iqaluit

TITLE
SANITARY SEWER MAIN / SERVICE PIPE TERMINATION

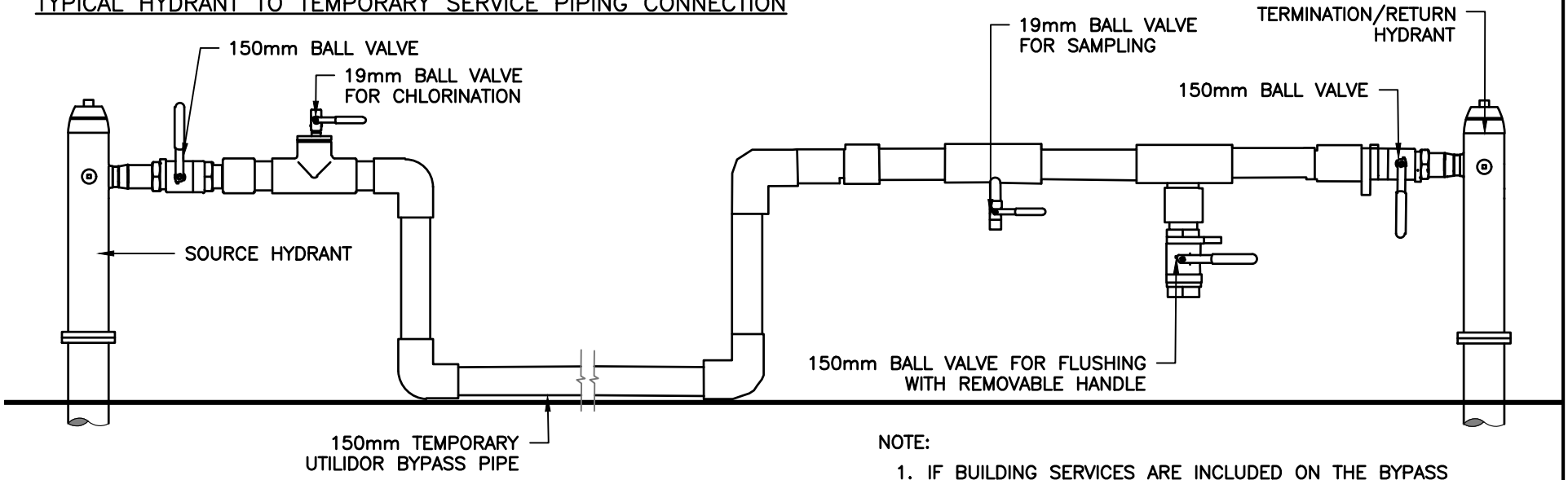
DATE
AUGUST, 2026

SCALE
N.T.S

DWG NO.
SS-032



TYPICAL HYDRANT TO TEMPORARY SERVICE PIPING CONNECTION



TYPICAL HYDRANT TO HYDRANT BYPASS PIPING CONNECTION

NOTE:

1. IF BUILDING SERVICES ARE INCLUDED ON THE BYPASS PIPING, AN APPROVED REDUCED PRESSURE BACK FLOW DEVICE SHALL ALSO BE INCLUDED.

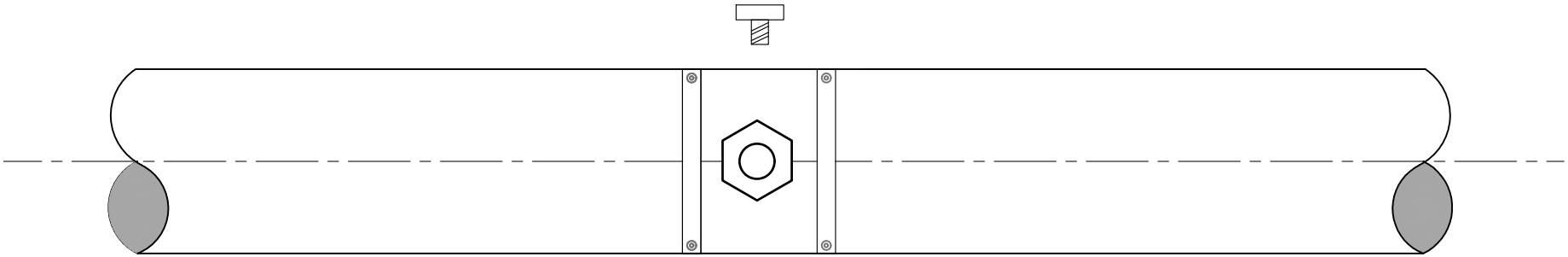
REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P. Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

Iqaluit

TITLE	DWG NO.
TEMPORARY WATER SUPPLY PIPING DETAILS	SS-033
DATE: AUGUST, 2026	SCALE: N.T.S

SERVICE 19mm TO 50mm



PROCEDURE:

1. DEPRESSURIZE WATER MAIN PRIOR TO WORK
2. REMOVE MAIN STOP FROM SADDLE
3. CHECK THAT THE SADDLE IS SECURE ON THE PIPE
4. INSERT A THREADED PLUG INTO THE SADDLE. INCLUDE TEFLON TAPE
5. SLOWLY PRESSURIZE THE WATER MAIN & CHECK FOR LEAKS
6. REPLACE INSULATION AS REQUIRED

NOTE:

1. FOR SERVICES LARGER THAN 50mm, THE SECTION OF PIPE WITH THE CONNECTION SHALL BE CUT & REMOVED. A NEW PIECE OF PIPE SHALL BE INSTALLED USING APPROVED RESTRAINT COUPLINGS. DISINFECTION SHALL BE AS PER AWWA C651

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

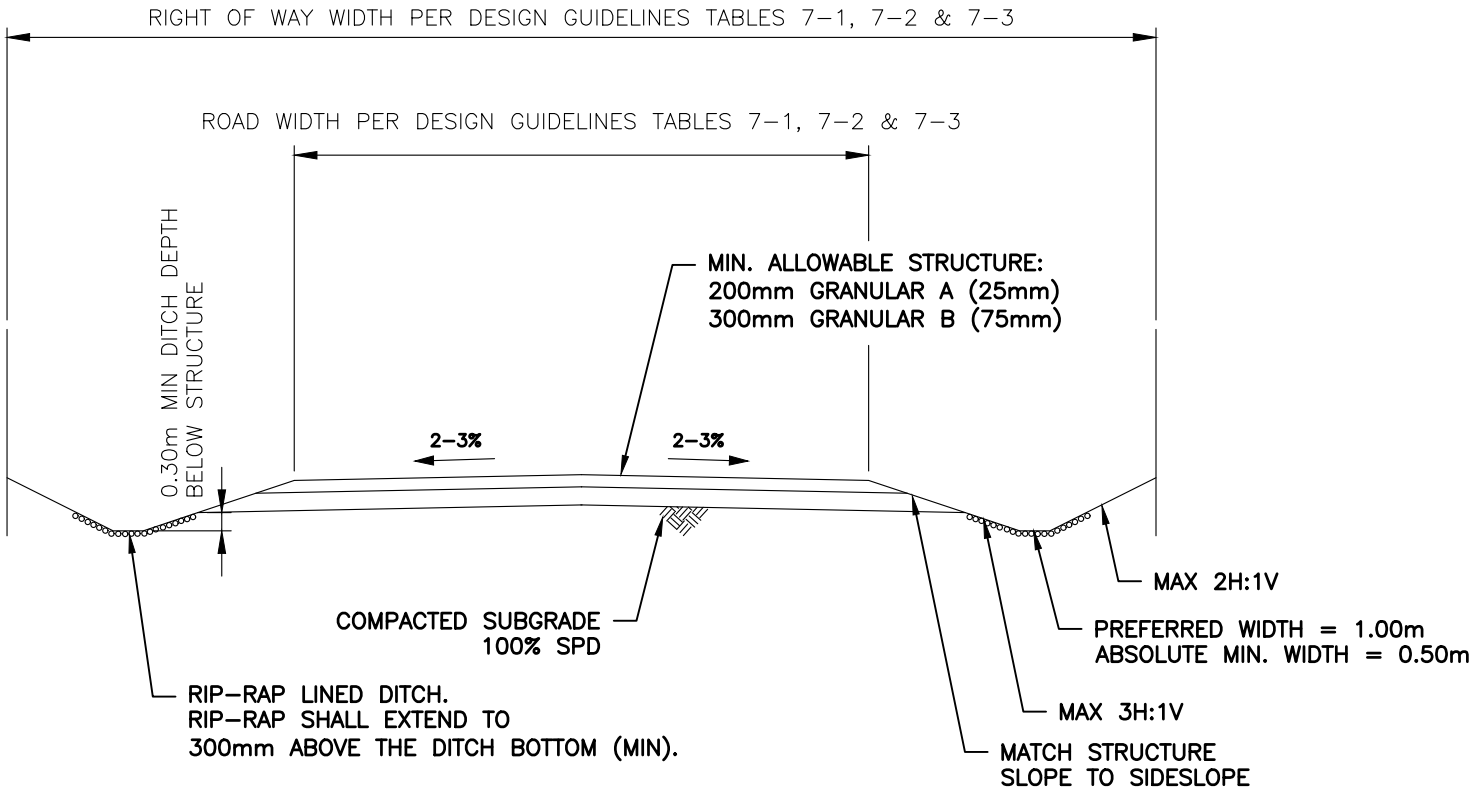
Iqaluit
ᐃᖃᓗᐃᑦ

TITLE
WATER SERVICE ABANDONMENT

DATE
AUGUST, 2026

SCALE
N.T.S

DWG NO.
SS-034



NOTES:

1. THE CONSTRUCTION DIRECTIVES ILLUSTRATED / NOTED ON THIS FIGURE ARE APPLICABLE TO ALL ROADWAYS.
2. A SITE–SPECIFIC GEOTECHNICAL INVESTIGATION SHALL BE COMPLETED TO DETERMINE THE APPROPRIATE AGGREGATE AND ASPHALT LAYER THICKNESSES FOR ROADWAYS. THE GEOTECHNICAL ENGINEER OF RECORD SHALL CONSIDER THE FUTURE VEHICULAR LOADING AND THE SUBGRADE CONDITIONS AS PART OF THE ANALYSIS.
3. THE MINIMUM FINISHED THICKNESS FOR ASPHALTIC PAVEMENT (WHERE REQUIRED) SHALL BE 80mm.
4. SEE DESIGN GUIDELINES FOR LANE & RIGHT OF WAY WIDTHS.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

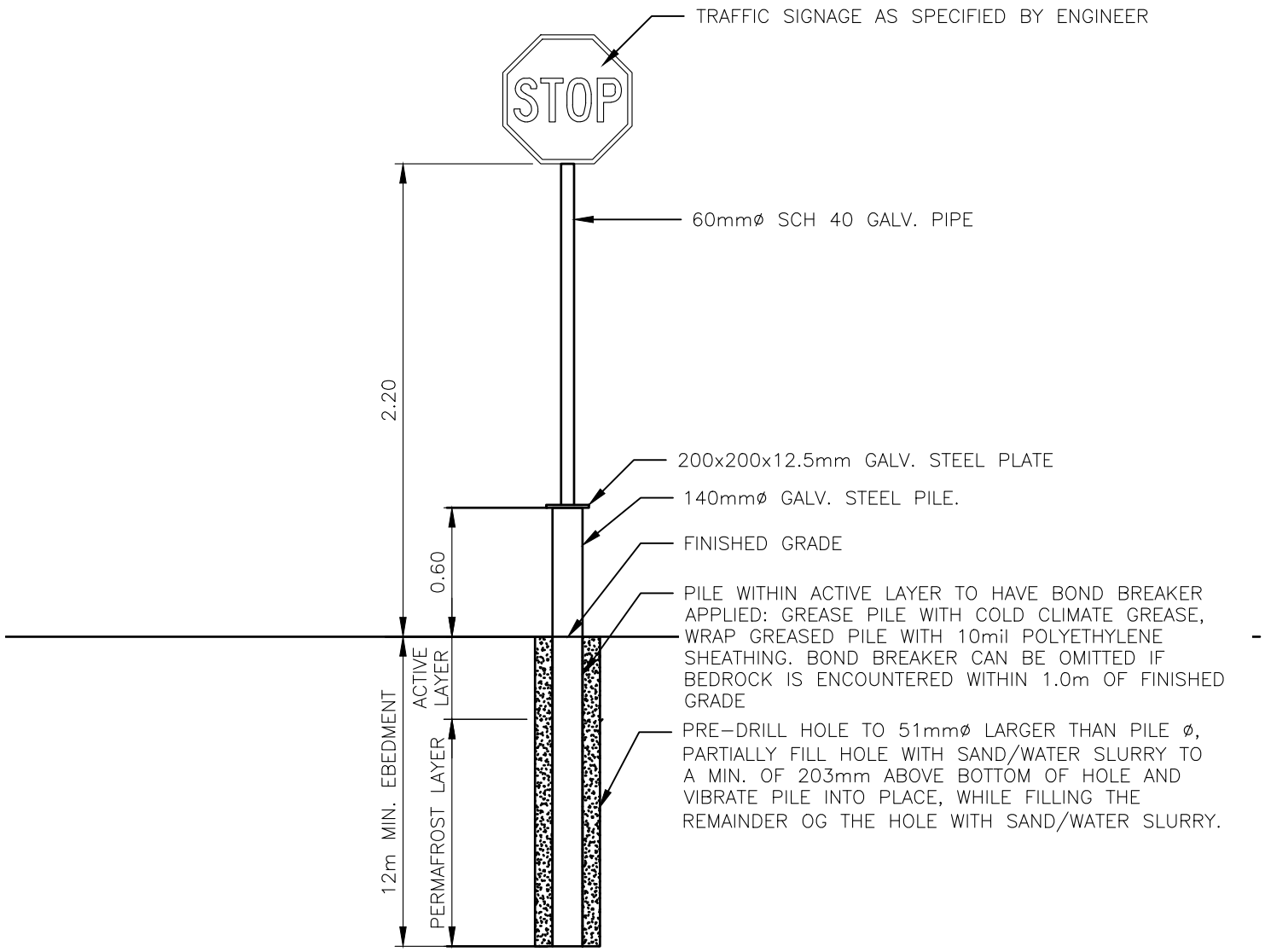
Iqaluit
ᐃᖃᓗᐃᑦ

TITLE
TYPICAL ROADWAY CONSTRUCTION

DATE
AUGUST, 2026

SCALE
1:125

DWG NO.
SS-035

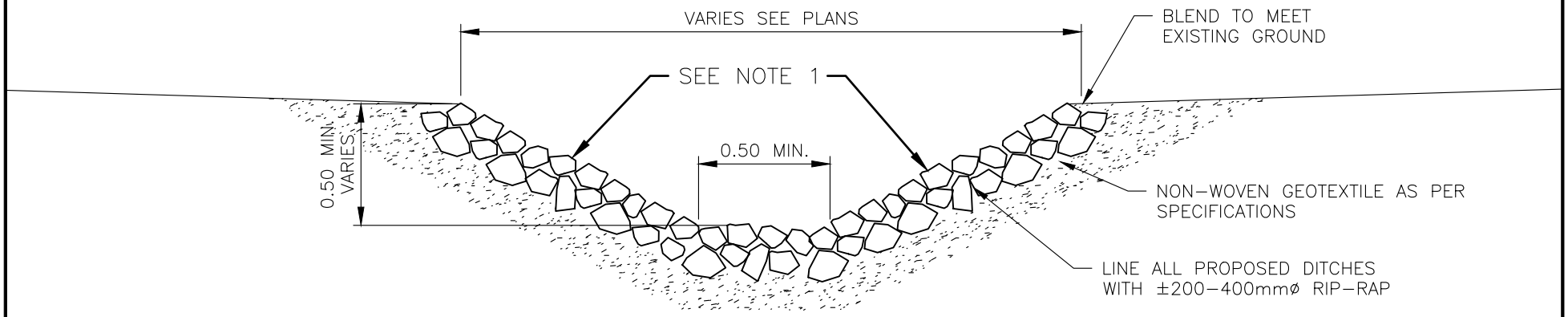


REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

Iqaluit
ᐃᖃᓗᐃᑦ

TITLE: **STANDARD SIGN**			DWG NO. **SS-036**
DATE: **AUGUST, 2026**	SCALE: **N.T.S**		



NOTE:

1. DITCHING SIDE SLOPES TO BE:
   - MAX. 3H:1V FOR ROADSIDE SIDE SLOPES
   - MAX 2H:1V FOR ROADSIDE BACKSLOPE
2. DITCH BOTTOM SHALL BE MIN. 300mm BELOW BOTTOM OF ROAD STRUCTURE.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

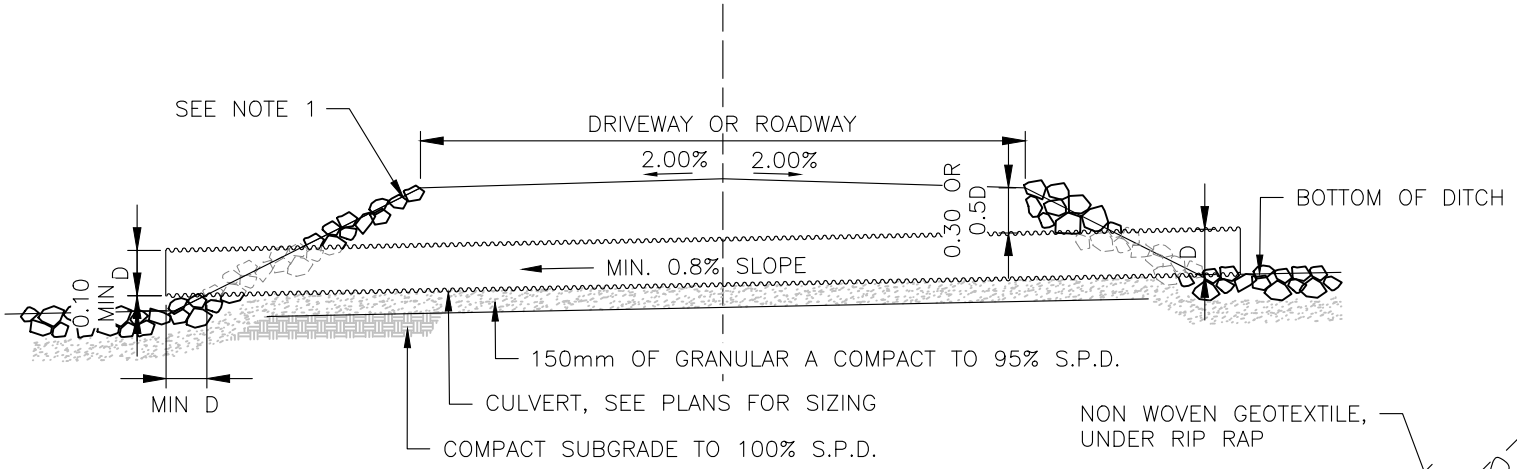
Iqaluit
ᐃᖃᓗᐃᑦ

TITLE
TYPICAL DITCHING DETAIL

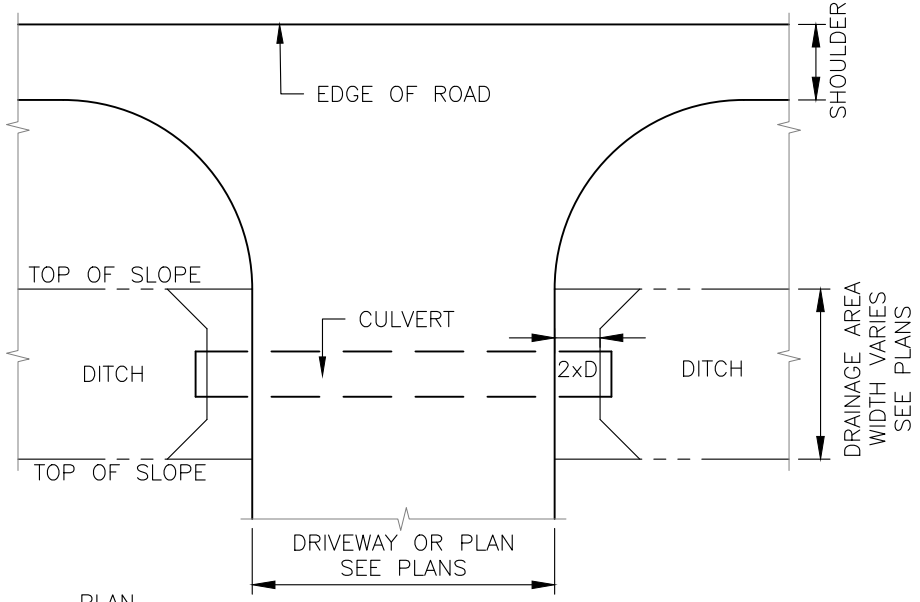
DATE
AUGUST, 2026

SCALE
N.T.S

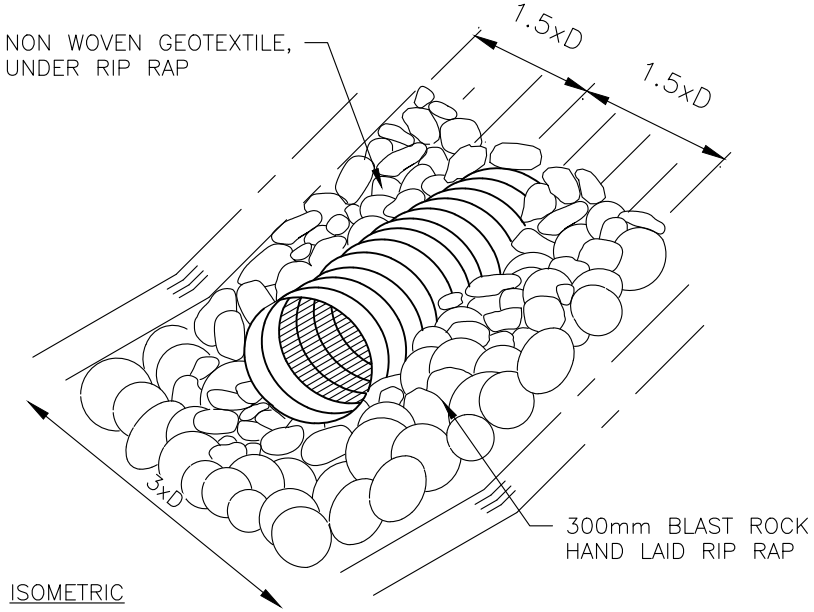
DWG NO.
SS-037



SECTION



PLAN



ISOMETRIC

NOTE:

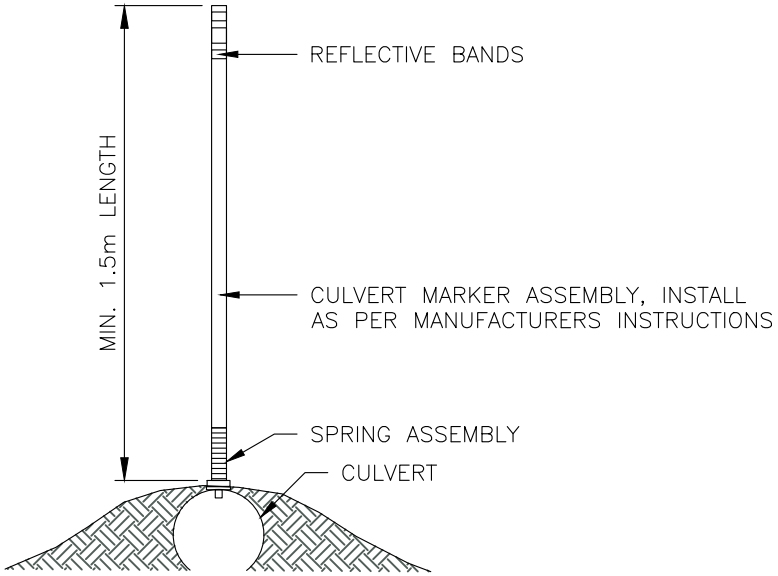
1. RIP RAP THICKNESS: 300mm FOR CULVERTS 300–1400mmø.
2. MINIMUM CULVERT DIAMETER (D) 600mm
3. 100mm DROP FROM BOTTOM OF CULVERT TO RIP RAP IS FOR OUTLET END ONLY.
4. PLAN VIEW – CULVERT TO BE PLACED CENTERED WITHIN THE DRAINAGE DITCH.

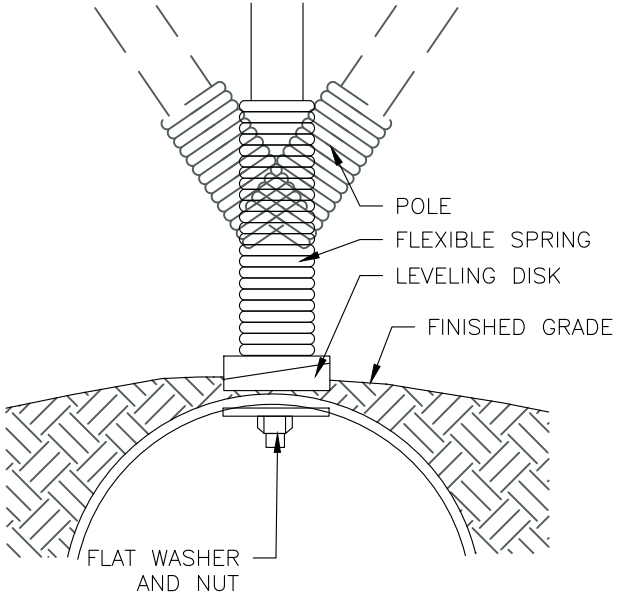
REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

Iqaluit

TITLE	DWG NO.
TYPICAL CULVERT DETAILS	SS-038
DATE: AUGUST, 2026	SCALE: N.T.S





NOTE:
1. INSTALL CULVERT MARKER AT EACH END OF CULVERTS, MIN 150mm FROM ENDS OR BEHIND HEADWALLS.
2. CULVERT MARKERS ARE REQUIRED FOR ALL CULVERTS, REGARDLESS OF SIZE, LOCATION OR MATERIAL.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

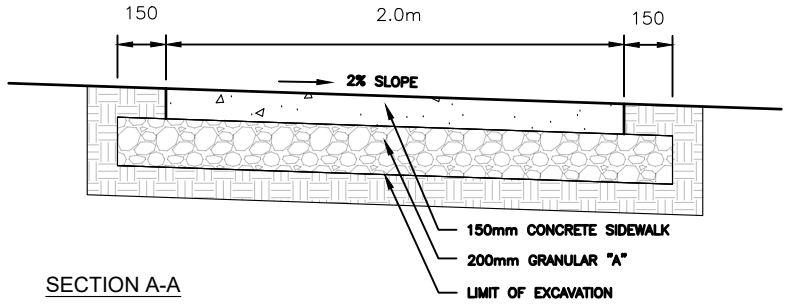
PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
(NT/NU Association of Professional Engineers and Geoscientists)

Iqaluit

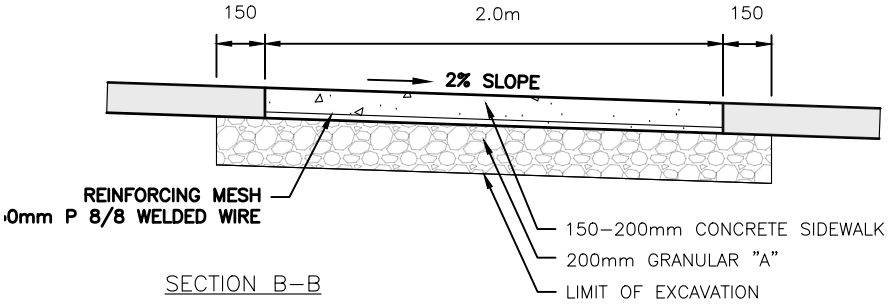
TITLE: CULVERT MARKER		DWG NO. SS-039
DATE: AUGUST, 2026	SCALE: N.T.S	

NOTES:

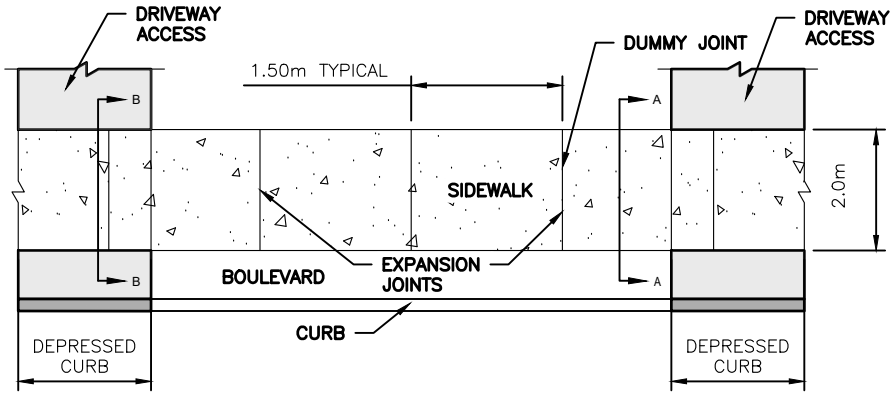
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
2. MINIMUM SLOPE OF 2% MAXIMUM SLOPE OF 5%.
3. ALL MATERIAL ADJACENT TO SIDEWALK AND CURB SHALL BE REINSTATED.
4. DRIVEWAY ACCESS SHALL HAVE A MINIMUM DEPTH OF 200mm AND 150x150mm P 8/8 WELDED WIRE IS TO BE PLACED MID DEPTH.
5. TRANSVERSE EXPANSION JOINTS ARE REQUIRED AT THE ENDS, MIDPOINT, AND INTERVALS OF 4m MAXIMUM, AND TO ISOLATE OBSTRUCTIONS FROM SIDEWALK, HYDRANTS, POLES, BUILDINGS, ETC.
6. IF THE SIDEWALK WIDTH IS GREATER THAN 2.5m A LONGITUDINAL CONSTRUCTION JOINTS SHALL BE CREATED IN THE MIDPOINT.
7. A 75mm EDGING TOOL SHALL BE USED TO FINISH ALL EDGES AND JOINTS.
8. ALL CONCRETE SIDEWALKS ARE TO HAVE A BROOM FINISH UNLESS OTHERWISE SPECIFIED.
9. ALL JOINTS SHALL HAVE A MAXIMUM SPACING OF 1.5m, DUMMY TRANSVERSE JOINTS SHALL BE INSTALLED AS REQUIRED.



SECTION A-A



SECTION B–B



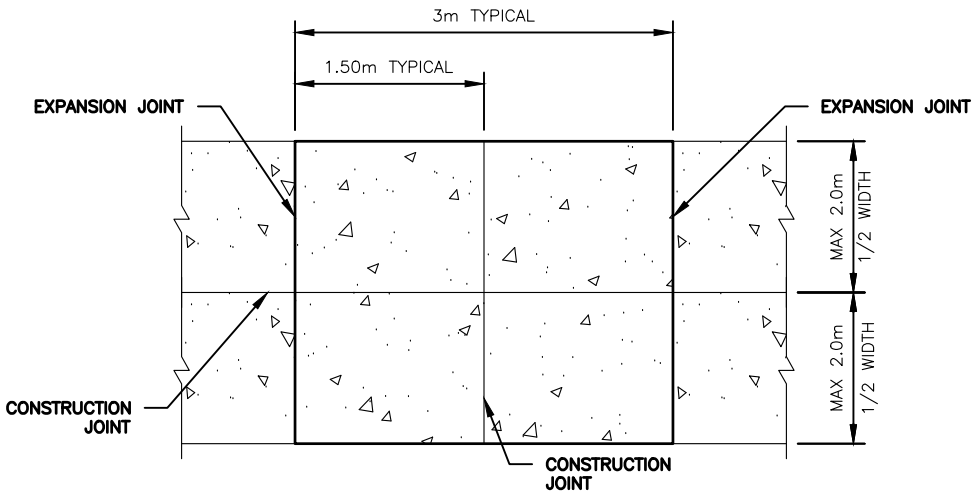
PLAN

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

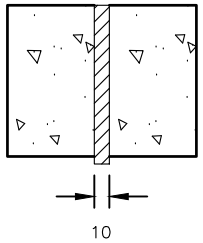
PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

Iqaluit
ᐃᖃᓗᐃᑦ

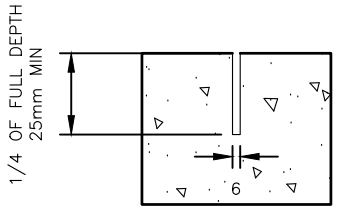
TITLE	DWG NO.
SIDEWALK IN BOULEVARD	SS-040
DATE: AUGUST, 2026	SCALE: N.T.S



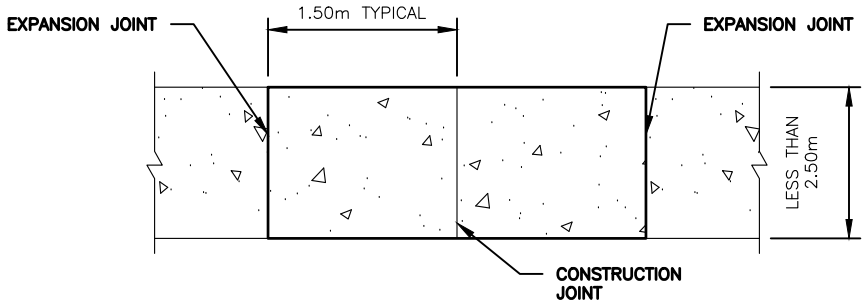
PLAN: SIDEWALK 2.5m WIDE AND OVER



EXPANSION JOINT PROFILE



JOINT PROFILE



PLAN: SIDEWALK LESS THAN 2.5m

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
2. EXPANSION JOINTS IN SIDEWALK SHALL BE IN LINE WITH EXPANSION JOINTS IN CURB.
3. TRANSVERSE EXPANSION JOINTS ARE REQUIRED AT THE ENDS, THE MIDPOINT, AT INTERVALS OF 6m MAXIMUM AND ALSO TO ISOLATE OBSTRUCTIONS FROM SIDEWALK, HYDRANTS, POLES, BUILDINGS ETC.
4. A 75mm EDGING TOOL SHALL BE USED TO FINISH ALL EDGES AND JOINTS.
5. ALL CONCRETE SIDEWALKS ARE TO HAVE BROOM FINISH UNLESS OTHERWISE SPECIFIED.
6. ALL JOINTS SHALL HAVE A MAXIMUM SPACING OF 1.5m, DUMMY TRANSVERSE JOINTS SHALL BE INSTALLED AS REQUIRED.
7. ALL CONSTRUCTION JOINTS ARE TO BE SAWCUT WITH A HANDTOOL OR OTHER APPROVED METHOD.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P. Eng.
NT/NU

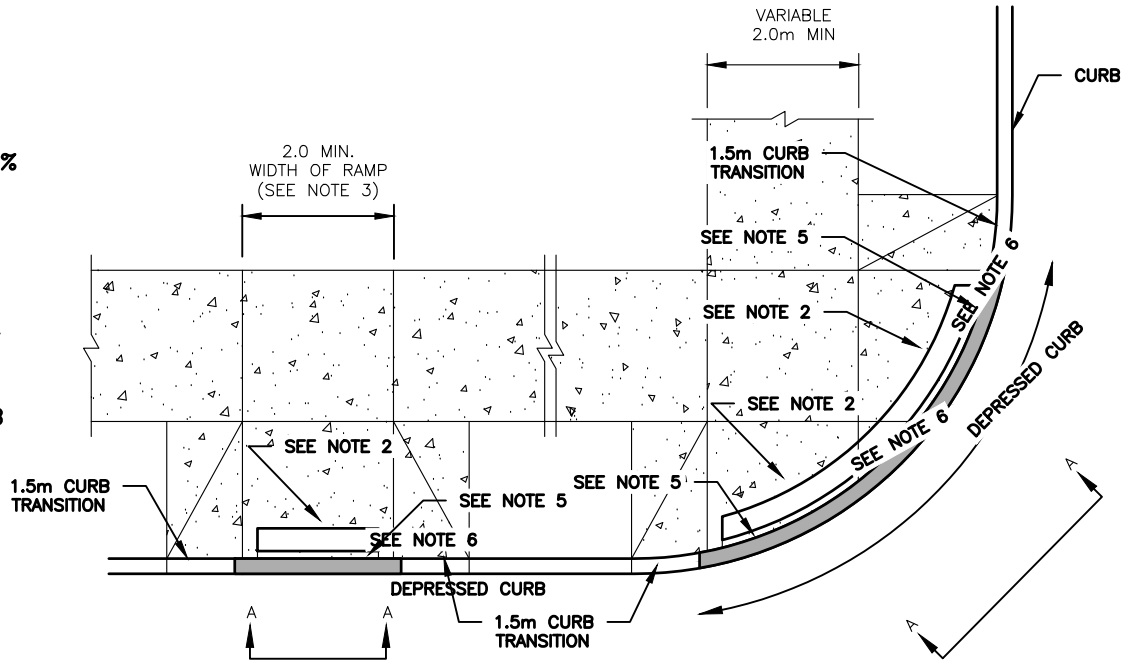
PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

Iqaluit

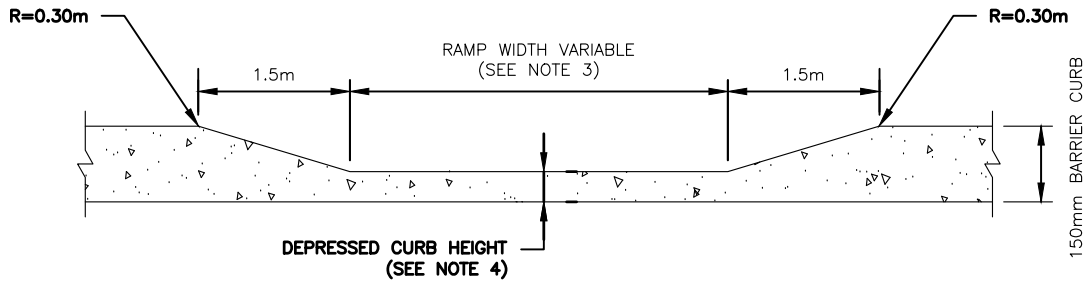
TITLE: SIDEWALK CONSTRUCTION JOINTS		DWG NO. SS-041
DATE: AUGUST, 2026	SCALE: N.T.S	

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
2. CURB RAMPS SHALL HAVE A SLOPE BETWEEN 2% TO 5% WITH MAXIMUM 8% FLARES.
3. CURB RAMPS SHOULD BE A MINIMUM OF 2.0m WIDE OR MATCH SIDEWALK WIDTH.
4. DEPRESSED CURB HEIGHT FOR PEDESTRIAN CURB RAMPS SHALL BE 0 TO 6mm AND 0 TO 13mm FOR PRIVATE DRIVEWAY ACCESSES.
5. TWSI's SHALL BE 150mm BACK FROM EDGE OF ROAD OR CURB.
6. TWSI SHALL BE 610mm BY WIDTH OF CURB RAMP AND RADIUS OF TWSI SHALL MATCH CURB RADIUS. TOP OF TWSI SHALL BE ALIGNED AND LEVEL WITH ADJACENT SURFACE.



PLAN



SECTION A - A

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

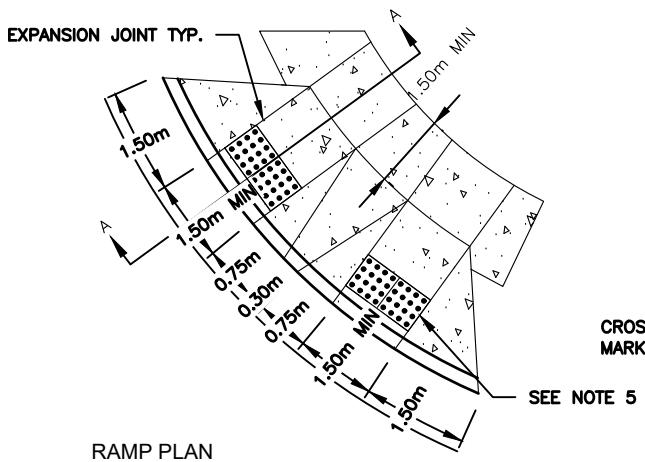
Iqaluit

TITLE
PEDESTRAIN CURB RAMP WITH BOULEVARD

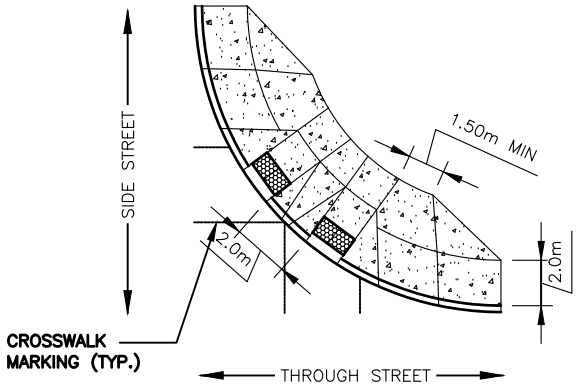
DATE
AUGUST, 2026

SCALE
N.T.S

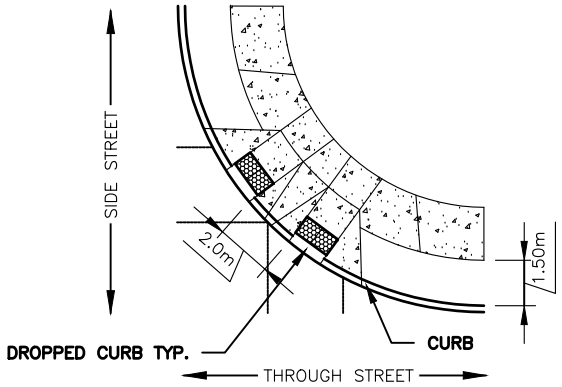
DWG NO.
SS-042



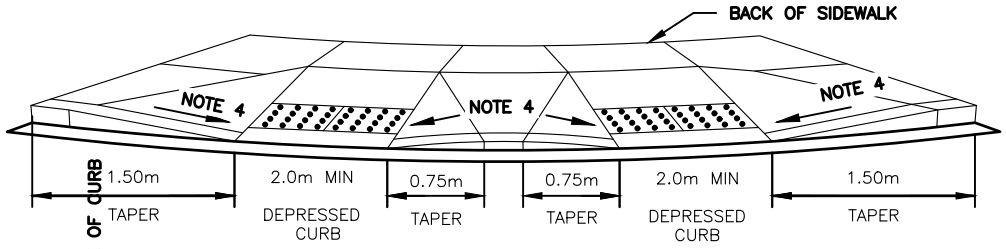
RAMP PLAN



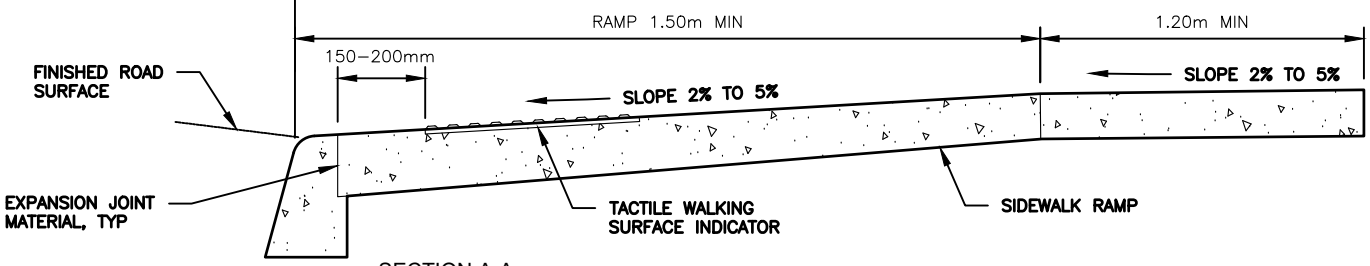
DOUBLE RAMP WITHOUT BOULEVARD



DOUBLE RAMP WITH BOULEVARD



RAMP ELEVATION



SECTION A-A

NOTES:

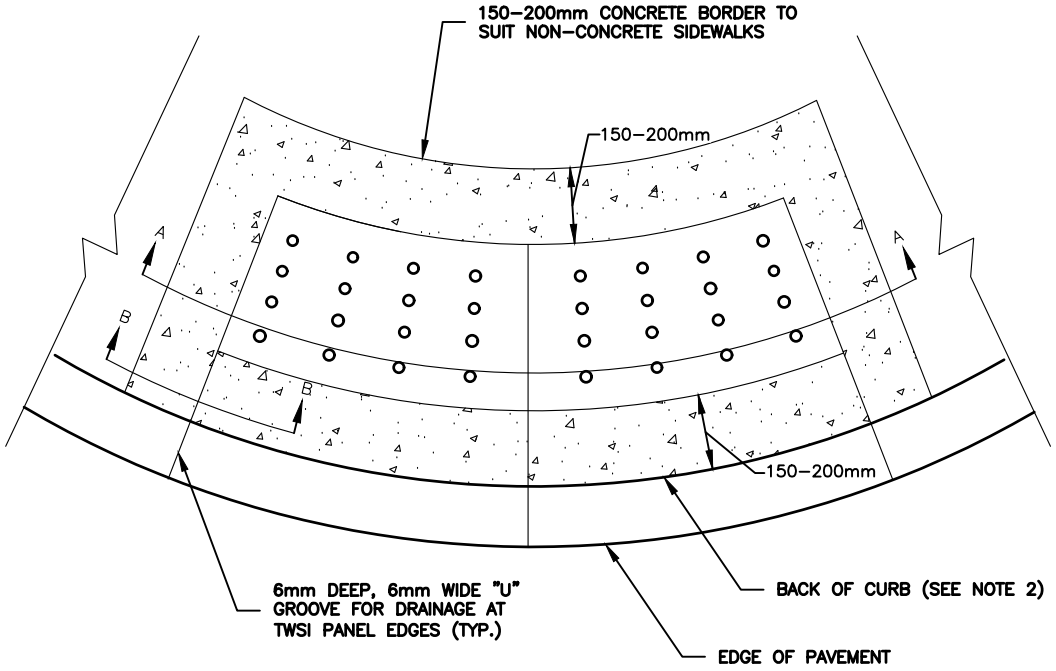
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
2. CURB RAMPS SHALL HAVE A SLOPE BETWEEN 2% TO 5% WITH MAXIMUM 8% FLARES.
3. RAMP CROSS SLOPES TO BE MINIMUM 2%.
4. CROSS SLOPE OF FLARES SHALL NOT EXCEED 8%.
5. TWSI SHALL BE 610mm BY WIDTH OF CURB RAMP AND RADIUS OF TWSI SHALL MATCH CURB RADIUS.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P. Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

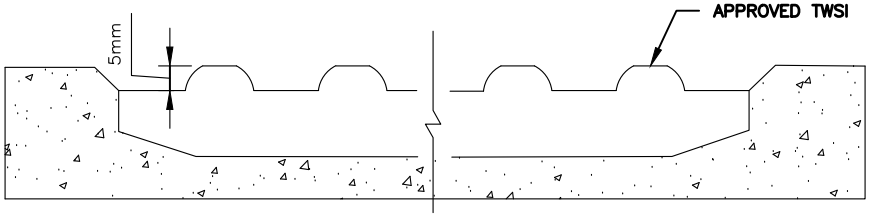
Iqaluit

TITLE	DWG NO.
CONCRETE SIDEWALK RAMPS AT SIGNALIZED INTERSECTIONS	SS-043
DATE: AUGUST, 2026	SCALE: N.T.S

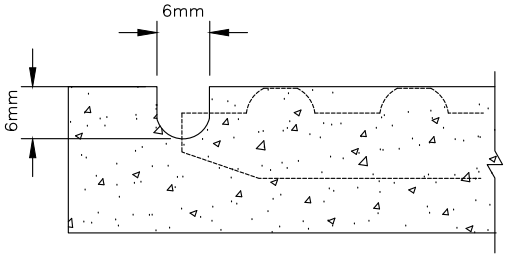


NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
2. TWSI SHALL BE PLACED 300 TO 350mm FROM FACE OF CURB.
3. THE TOPS OF THE TACTILE WALKING SURFACE INDICATOR (TWSI) SHALL BE INSTALLED IN WET CONCRETE TO PERMANENTLY SECURE IT IN PLACE. TWSIs ARE TO BE FLUSH AND LEVEL WITH TOP OF SIDEWALK.



SECTION A - A



SECTION B - B

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

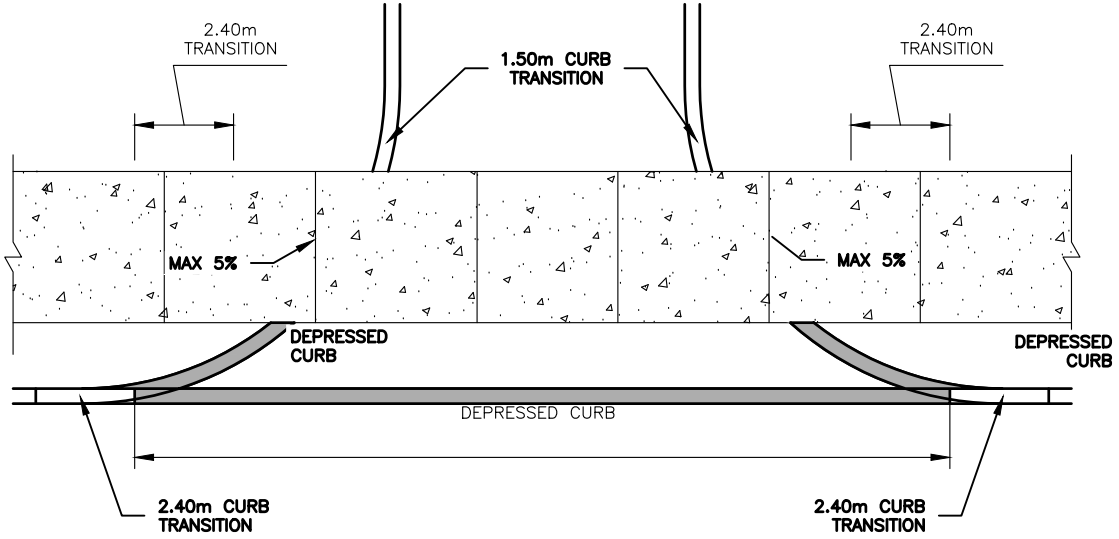
Iqaluit
ᐃᖃᓗᐃᑦ

TITLE: TACTILE WALKING SURFACE INDICATOR DETAILS

DATE: AUGUST, 2026

SCALE: N.T.S

DWG NO. SS-044



CURB RETURN AT A PRIVATE OR COMMERCIAL ENTRANCE
WITH BOULEVARD - UNCONTROLLED INTERSECTION

NOTES:

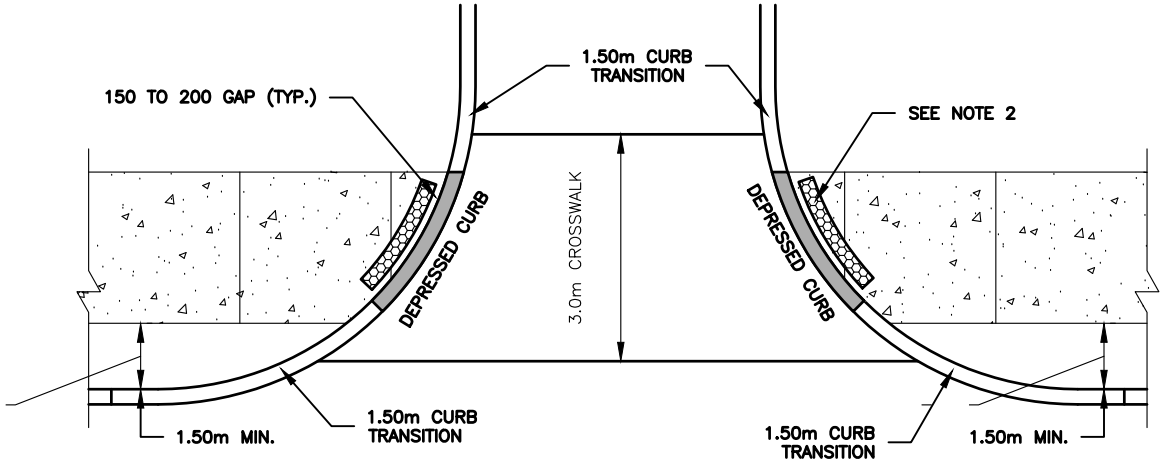
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

Iqaluit
ᐃᖃᓗᐃᑦ

TITLE: CURB RETURN ENTRANCES - UNCONTROLLED		DWG NO. SS-045
DATE: AUGUST, 2026	SCALE: N.T.S	



CURB RETURN AT A PRIVATE OR COMMERCIAL ENTRANCE
WITH BOULEVARD - CONTROLLED INTERSECTION

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
2. TWSI SHALL BE 610mm BY WIDTH OF CURB RAMP AND RADIUS OF TWSI SHALL MATCH CRUB RADIUS.
3. CROSSWALKS ARE TO BE CENTERED ALONG THE CURB RAMP.
4. CURB RAMPS SHALL HAVE A SLOPE BETWEEN 2% TO 5% WITH MAXIMUM 8% FLARES.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P. Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

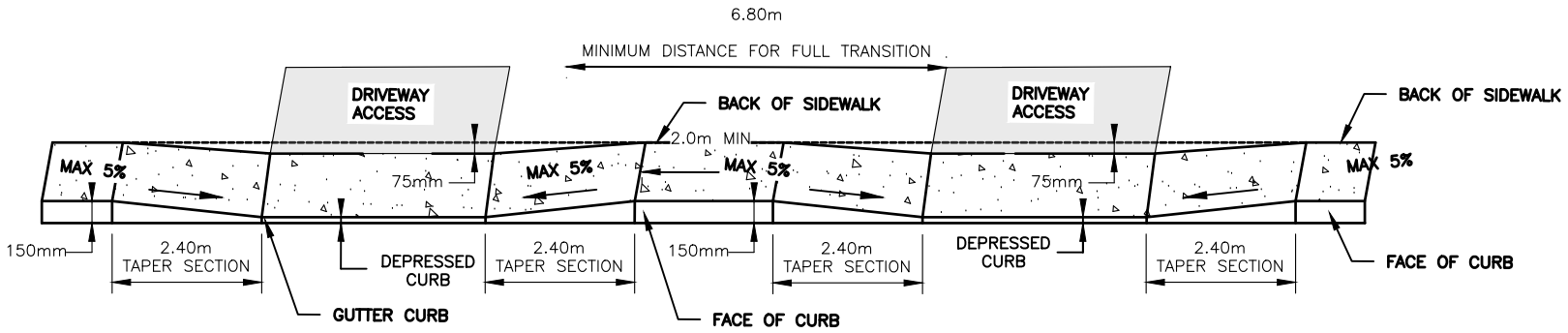
Iqaluit

TITLE
CURB RETURN ENTRANCES - CONTROLLED

DWG NO.
SS-046

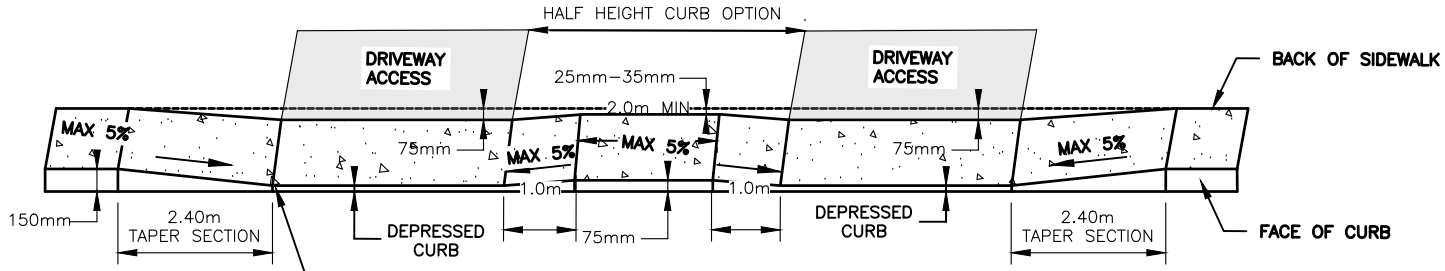
DATE
AUGUST, 2026

SCALE
N.T.S



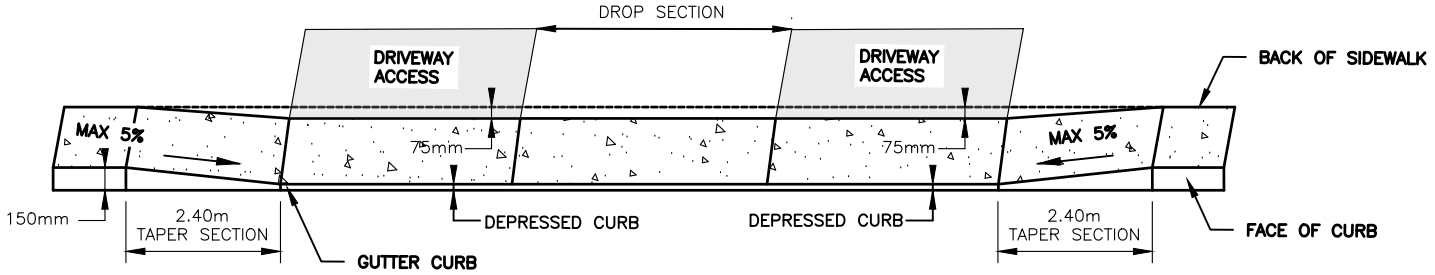
DISTANCE BETWEEN ACCESSES < 6.8m

4.0m TO 5.70m



DISTANCE 4.0m TO 6.70m

0m TO 3.90m



DISTANCE < 3.90m

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P. Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

Iqaluit

TITLE
VEHICLE ACCESS CROSSING & TRANSITIONS

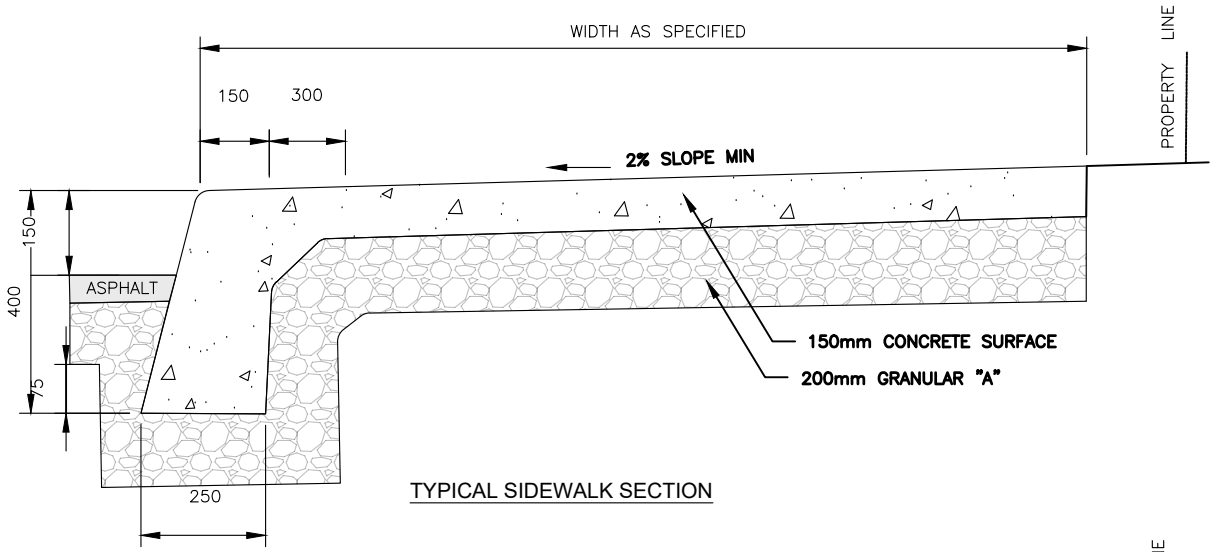
DWG NO.
SS-047

DATE
AUGUST, 2026

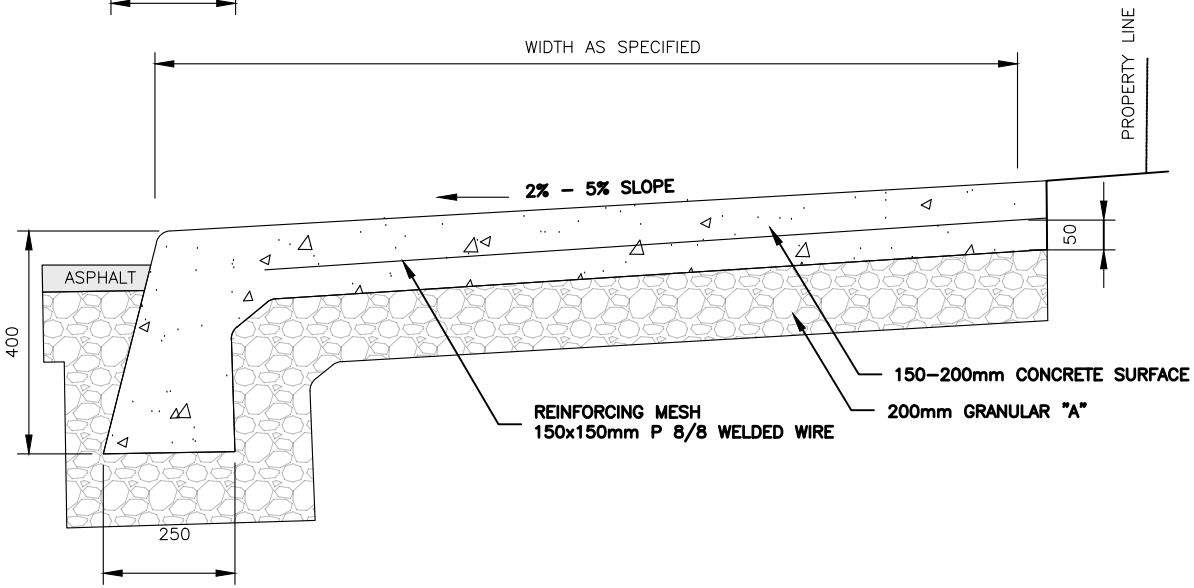
SCALE
N.T.S

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
2. MAXIMUM CROSS SLOPE OF 2%.
3. CURB RAMPS SHALL HAVE A SLOPE BETWEEN SLOPE OF 2% TO 5%, WITH MAXIMUM 8% FLARES.
4. ALL MATERIAL ADJACENT TO SIDEWALK AND CURB SHALL BE REINSTATED.
5. SIDEWALK THICKNESS AT RESIDENTIAL DRIVEWAYS SHALL BE 150mm AND AT COMMERCIAL DRIVEWAYS SHALL BE 200mm.
6. DEPRESSED CURB HEIGHT FOR PEDESTRIAN CURB RAMPS SHALL BE 0 TO 6mm AND 0 TO 13mm FOR PRIVATE DRIVEWAY ACCESSES.



TYPICAL SIDEWALK SECTION



REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

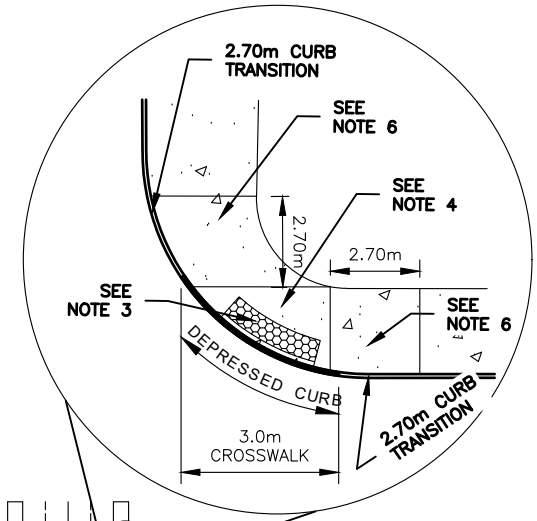
Iqaluit

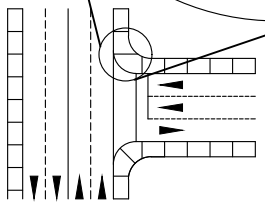
TITLE
MONOLITHIC CONCRETE CURB AND SIDEWALK

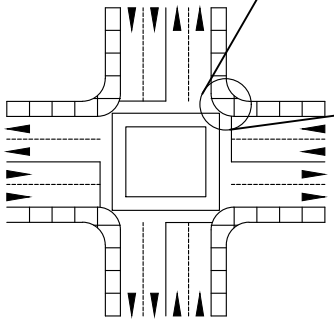
DWG NO.
SS-048

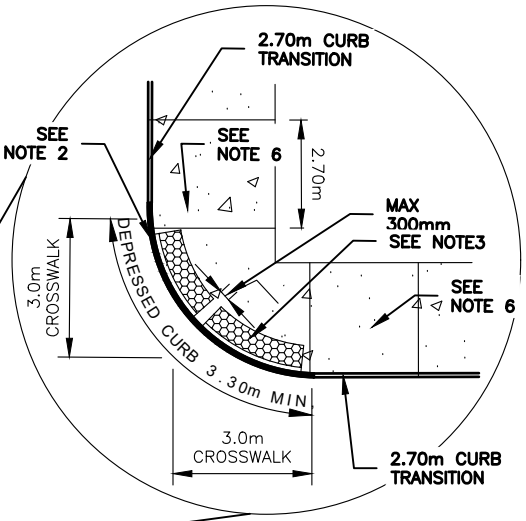
DATE
AUGUST, 2026

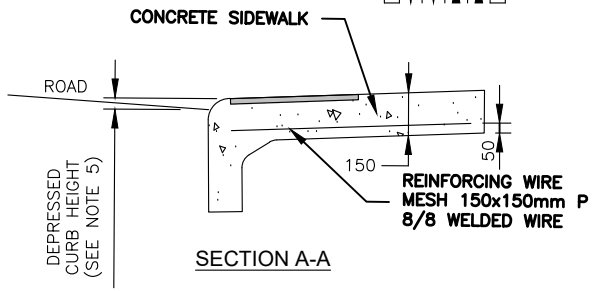
SCALE
N.T.S



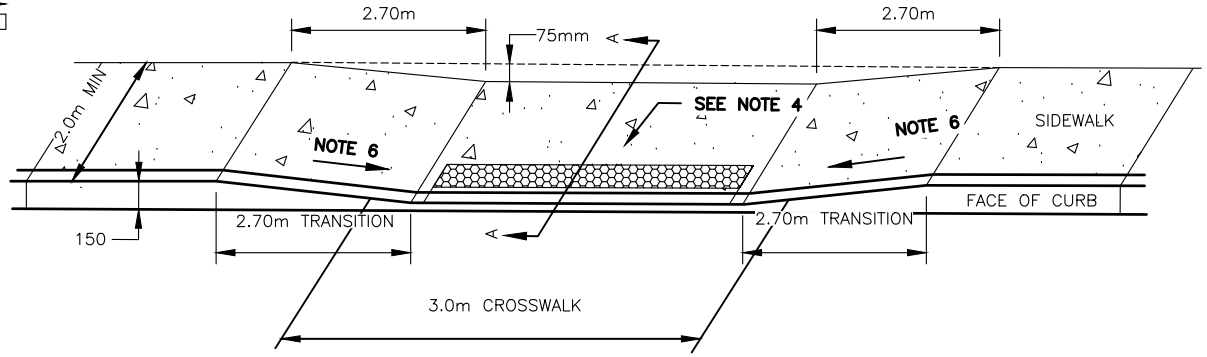








SECTION A-A



MID BLOCK CROSSING AND PARALLEL CURB RAMPS

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
2. WHERE THERE IS DOUBLE SIDEWALK RAMPS, THE WIDTH OF THE RAMP SHALL MATCH THE SIDEWALK WIDTH, AND PERMIT WHEELCHAIRS TO ENTER CROSSING AT RIGHT ANGLES.
3. TWSI SHALL BE 610mm BY WIDTH OF CURB RAMP AND RADIUS OF TWSI SHALL MATCH CURB RADIUS.
4. FOR TRANSITIONS, MAXIMUM SLOPE 2%.
5. DEPRESSED CURB HEIGHT FOR PEDESTRIAN CURB RAMPS SHALL BE 0 TO 6mmABD 0 TO 13mm FOR PRIVATE DRIVEWAY ACCESS.
6. CURB RAMPS SHALL HAVE A SLOPE BETWEEN 2% TO 5% WITH MAXIMUM 8% FLARES.
7. TWSI SHALL BE 300 TO 350mm BACK FROM CURB FACE.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

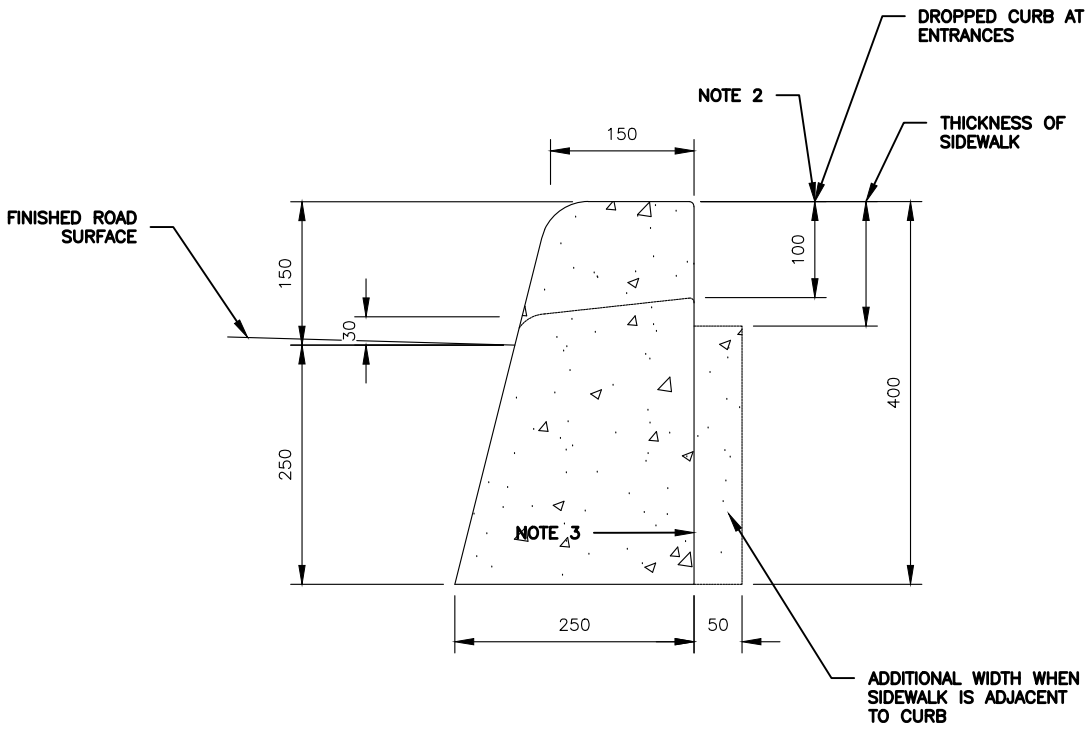
Iqaluit

TITLE
PEDESTRIAN CURB RAMP WITHOUT BOULEVARD

DWG NO.
SS-049

DATE
AUGUST, 2026

SCALE
N.T.S



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
2. WHEN A SIDEWALK IS CONTINUOUSLY ADJACENT, THE DROPPED CURB AT ENTRANCES SHALL BE REDUCED TO 75mm.
3. FOR SLIPFORMING PROCEDURE A 5% BATTER IS ACCEPTABLE.
4. THE TRANSTION FROM ONE CURB TYPE TO ANOTHER SHALL BE A MINIMUM LENGTH OF 3.0m.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

Iqaluit
ᐃᖃᓗᐃᑦ

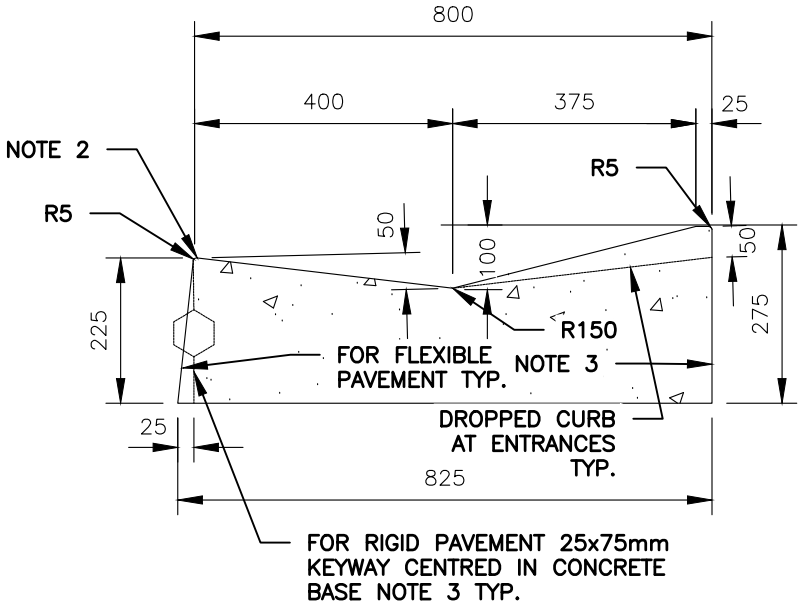
TITLE	DWG NO.
CONCRETE BARRIER CURB	SS-050
DATE: AUGUST, 2026	SCALE: N.T.S

LEGEND:

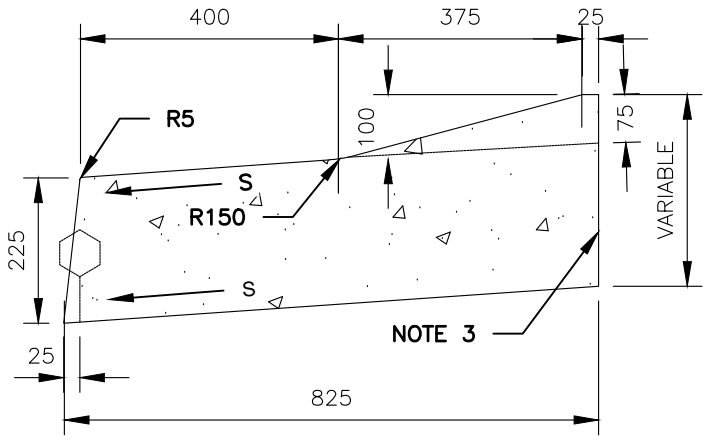
S – RATE OF PAVEMENT SUPERELEVATION IN PERCENT, %.

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
2. FLEXIBLE AND COMPOSITE PAVEMENT SHALL BE PLACED 5mm ABOVE THE ADJACENT EDGE OF GUTTER.
3. FOR SLIPFORMING PROCEDURE A 5% BATTER IS ACCEPTABLE.
4. THE TRANSITION FROM ONE CURB TYPE TO ANOTHER SHALL BE MINIMUM LENGTH OF 3.0m.



TANGENT



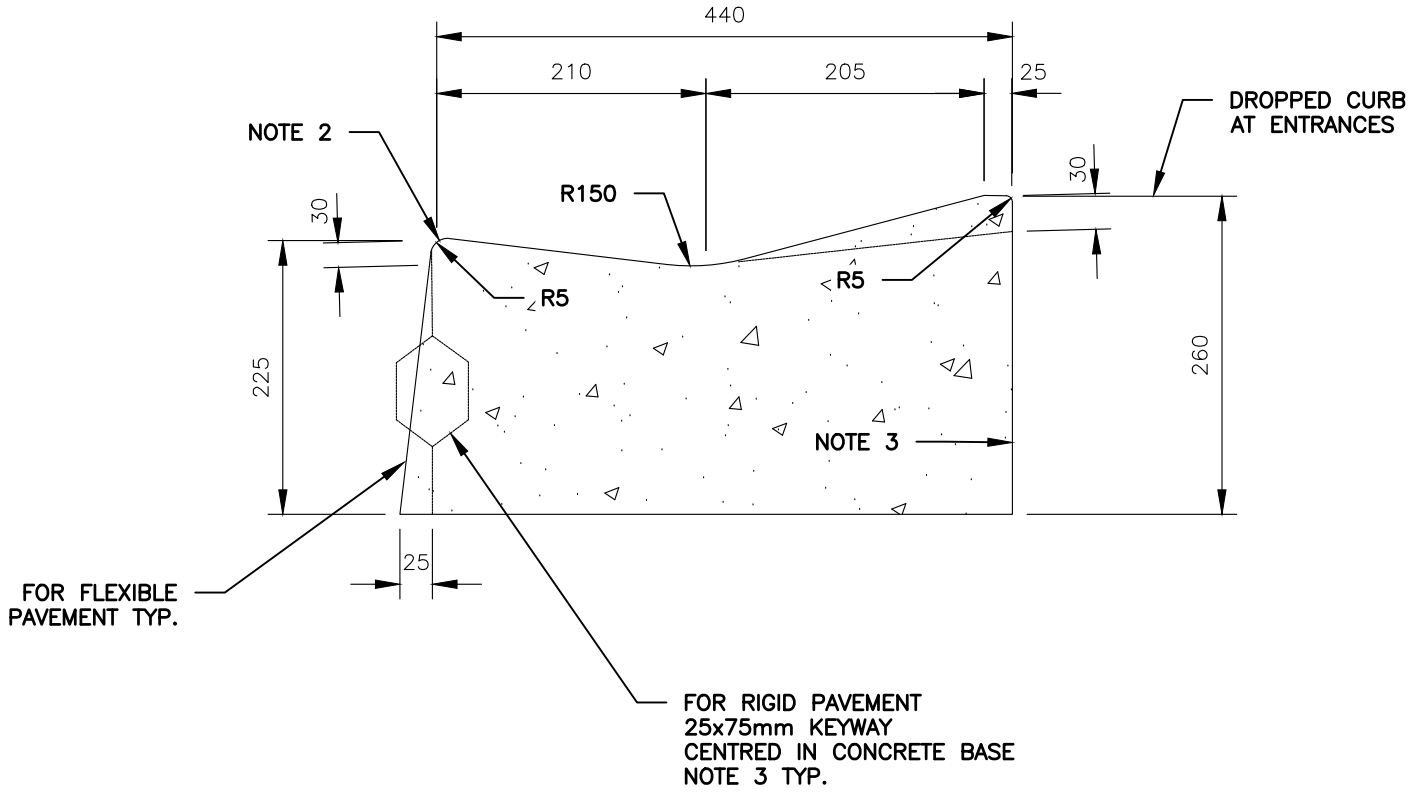
SUPERELEVATED

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

Iqaluit

TITLE	CONCRETE MOUNTABLE CURB WITH WIDE GUTTER	DWG NO. SS-051
DATE	AUGUST, 2026	SCALE N.T.S



NOTES:

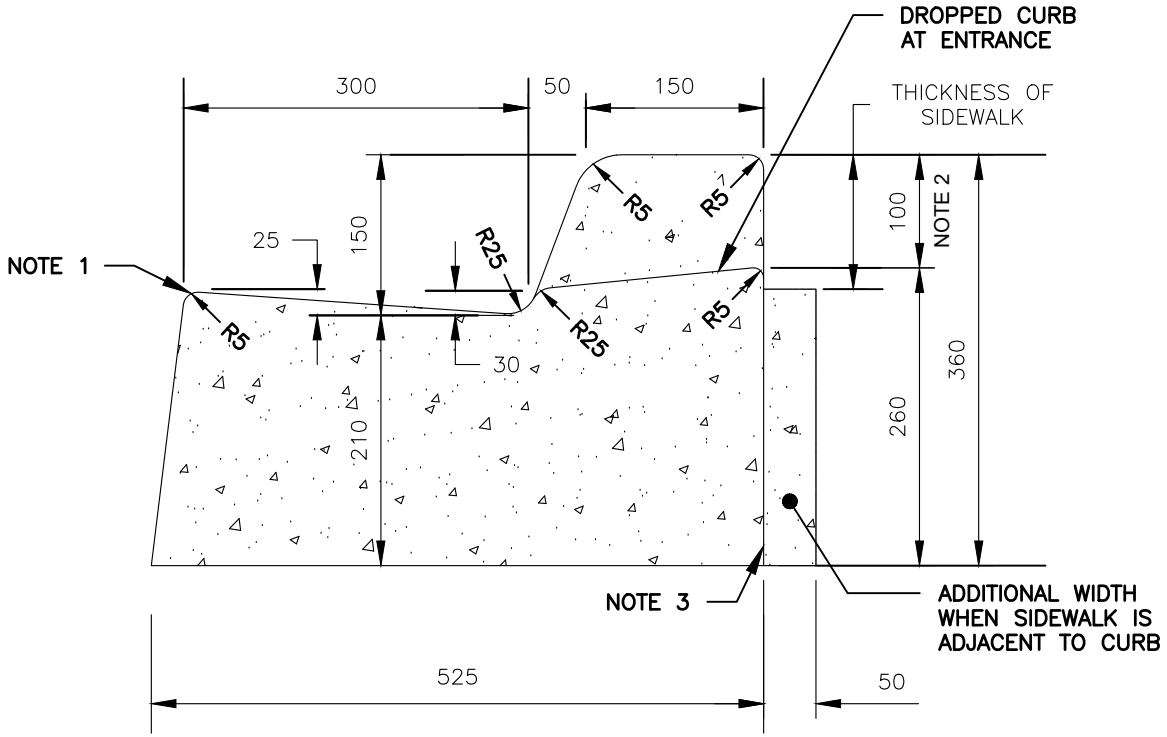
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
2. FLEXIBLE AND COMPOSITE PAVEMENT SHALL BE PLACED 5mm ABOVE THE ADJACENT EDGE OF GUTTER.
3. FOR SLIPFORMING PROCEDURE A 5% BATTER IS ACCEPTABLE.
4. THE TRANSITION FROM ONE CURB TYPE TO ANOTHER SHALL BE MINIMUM LENGTH OF 3.0m.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P.Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

Iqaluit
ᐃᖃᓗᐃᑦ

TITLE	DWG NO.
CONCRETE MOUNTABLE CURB WITH NARROW GUTTER	SS-052
DATE: AUGUST, 2026	SCALE: N.T.S



NOTES:

1. FLEXIBLE AND COMPOSITE PAVEMENT SHALL BE PLACED 5MM ABOVE THE ADJACENT EDGE OF GUTTER.
2. WHEN SIDEWALK IS CONTINUOUSLY ADJACENT, THE DROPPED CURB AT ENTRANCES SHALL BE REDUCED TO 75mm.
3. FOR SLIPFORMING PROCEDURE A 5% BATTER IS ACCEPTABLE.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.

REGISTERED PROFESSIONAL ENGINEER
AUGUST 18, 2026
K.E. JACKMAN
P. Eng.
NT/NU

PERMIT TO PRACTICE
DILLON CONSULTING LIMITED
Signature
Date July 31, 2026
PERMIT NUMBER: P 010
NT/NU Association of Professional Engineers and Geoscientists

Iqaluit

TITLE
CONCRETE BARRIER CURB WITH STANDARD GUTTER

DWG NO.
SS-053

DATE
AUGUST, 2026

SCALE
N.T.S

ᐃᖃᓗᐃᑦ

Iqaluit

City of Iqaluit

Standard Specifications

Standard Forms

HYDRANT FLOW TEST REPORT

Contractor Field Submission – AWWA M17 Field Testing

PROJECT / TEST INFORMATION

Project Name		**Project No.**	
Prime Contractor		**Test Date**	
Testing Company		**Tester Name**	
Tester Contact Phone			

TEST ARRANGEMENT

Pressure / Residual Hydrant ID		**Flow Hydrant ID(s)**	
Distance Between Hydrants (m)		**Elevation Difference**	

FIELD MEASUREMENTS

Measurement	Units	Static / Before Flow	Residual / During Flow	Notes
Pressure at Test Hydrant	kPa or psi			
Pitot Pressure	kPa or psi	N/A		
Measured Flow	L/s or GPM	N/A		
Water Temperature	°C			

FLOW TEST CALCULATION RESULTS

Static Pressure		kPa	psi
Residual Pressure		kPa	psi
Pressure Drop		kPa	psi
Measured Flow		L/s	GPM
Target Residual Pressure		kPa	psi
Calculated Flow @ Target Residual		L/s	GPM
Pressure Drop Check		kPa	psi

TEST OBSERVATIONS / CHECKLIST

☐	Hydrant fully opened during test
☐	Hydrant operating normally
☐	Water discharged safely without causing property damage
☐	Water was clear / no abnormal sediment observed
☐	No abnormal pressure fluctuation observed
Comments / Observations	

CONTRACTOR CERTIFICATION

I certify that the hydrant flow test was conducted in accordance with the applicable requirements of AWWA M17 and the contract/municipal requirements, using the equipment identified above, and that the information recorded on this form is accurate to the best of my knowledge.

Tester Signature		**Date**	
Witness Signature		**Witness Name**	

CITY OF IQALUIT REVIEW

City of Iqaluit Reviewer		**Review Date**	
Reviewer Comments			

Reference: AWWA M17-2016, Fire Hydrants: Installation, Field Testing, and Maintenance, Fifth Edition. Verify project-specific requirements with the Municipality.

HDPE PIPELINE HYDROSTATIC PRESSURE TEST REPORT

PROJECT & CONTRACTOR INFORMATION

Date of Test: _____ **Contractor Name:** _____

Project Name / Contract #: _____ **Tester Name & Title:** _____

Location: _____ **Contact Phone:** _____

PIPELINE & TEST SPECIFICATIONS

Pipe Nominal Diameter (mm/in): _____ **Normal Operating Pressure (kPa):** _____

Test Section Length (m): _____ **Min. Required Pressure (1.5x / Min 1103):** _____

Vault ID Start: _____ **Vault ID End:** _____

PHASE 1: INITIAL TEST (PRIOR TO VAULT CONNECTION):
1 HOUR DURATION AT 1.5x OPERATING PRESSURE OR 1103 kPA MIN., NO WATER ADDITION PERMITTED, ZERO LOSS ALLOWED

Interval	Clock Time	Target Min. Pressure (kPa)	Observed Pressure (kPa)	Pressure Drop (kPa)	Remarks
Start (0:00)					
Hour 1:00					

PHASE 2: FINAL TEST (VALVE TO VALVE):
4 HOUR INITIAL PERIOD AT 1.5x OPERATING PRESSURE OR 1103 kPA MIN (MAKE-UP WATER PERMITTED),
2 HOURS OBSERVATION PERIOD (REDUCE PRESSURE BY 70 kPa, NO WATER ADDITION PERMITTED, ZERO LOSS ALLOWED)

Interval	Clock Time	Target Min. Pressure (kPa)	Observed Pressure (kPa)	Pressure Drop (kPa)	Remarks
Start (0:00)					
Hour 1:00					
Hour 2:00 (Final)					

INCLUDE A FIGURE HIGHLIGHTING LOCATION OF PIPE RUN TESTED WITH THIS FORM

CERTIFICATION / SIGN-OFF

Contractor Certification: I hereby certify that this test was conducted in accordance with the City of Iqaluit Specifications.

Tested By (Contractor): _____ Signature: _____ **Date:** _____

Witnessed By: _____ Signature: _____ **Date:** _____

CONTRACTOR APPLICATION FOR SUBSTANTIAL COMPLETION

Iqaluit

GENERAL PROJECT & CONTRACT INFORMATION

Project Name:		**Contract / Tender #:**	
Prime Contractor Name:		**Application Date:**	
Consultant / Engineer:		**Contract Commencement Date:**	
Project Location / Limits:		**Contract Target Completion Date:**	

FINANCIAL & CONTRACT VALUE SUMMARY

Original Contract Value ($):		**Total Work Completed to Date ($):**	
Approved Change Orders ($):		**Estimated Value of Outstanding Work ($):**	
Revised Contract Value ($):		**% Work Completed (by Value):**	

MANDATORY PREREQUISITES & VERIFICATION CHECKLIST

Requirement Description	Submitted / Completed?	Consultant Verified (Y/N)	Remarks
Hydrostatic Pressure, Hydrant Flow, Bacteriological Test Results			
Pipe CCTV (if required by City)			
Vault Weld QC Reports			
Asphalt / Concrete / Aggregate Test Results			
As-Built Survey & Redline Drawings submitted to Consultant			
Operation & Maintenance (O&M) Manuals (if required)			
Statutory Declaration			
WSCC Clearance Certificate			
Site Cleanup Complete			

SUMMARY OF OUTSTANDING DEFICIENCIES

The Consultant shall append a Deficiency List to this Application. Include location, rectification value of each deficiency.
Include a Figure highlighting the location of each deficiency with this form.

Deficiency List Appended? Yes | No | Not Applicable

Value of Deficiencies ($):

CONTRACTOR APPLICATION SIGNATURE & ENGINEER CERTIFICATION

Contractor Declaration: The Contractor hereby applies for a Certificate of Substantial Completion in accordance with the Contract Documents. We confirm that the work is substantially complete, fit for its intended purpose, and all major systems have passed quality testing.

Contractor Representative: **Signature:** **Date:**

Engineer of Record Seal:

As the Engineer of Record, I certify that I have reviewed the Work and verified all submitted test certificates, as-builts, and QA/QC documentation. To the best of my professional knowledge, the project is substantially complete, safe for operation, and complies with City specifications. I recommend the issuance of the Certificate of Substantial Completion.

Engineer of Record: **Effective Date:**

City Rejection: **Signature:** **Date REJECTED:**

Cause for Rejection:

City Acceptance: **Signature:** **Date ACCEPTED:**

CONTRACTOR APPLICATION FOR SEASONAL COMPLETION

GENERAL PROJECT & CONTRACT INFORMATION

Project Name: _____ **Contract / Tender #:** _____

Prime Contractor Name: _____ **Application Date:** _____

Consultant / Engineer: _____ **Contract Commencement Date:** _____

Project Location / Limits: _____ **Contract Target Completion Date:** _____

FINANCIAL & CONTRACT VALUE SUMMARY

Original Contract Value ($): _____ **Total Work Completed to Date ($):** _____

Approved Change Orders ($): _____ **Estimated Value of Outstanding Work ($):** _____

Revised Contract Value ($): _____ **% Work Completed (by Value):** _____

SUMMARY OF OUTSTANDING DEFICIENCIES

The Consultant shall append a Deficiency List to this Application. Include location, rectification value of each deficiency.
Include a Figure highlighting the location of each deficiency with this form.

Deficiency List Appended? Yes | No | Not Applicable

Value of Deficiencies ($): _____

CONTRACTOR APPLICATION SIGNATURE & ENGINEER CERTIFICATION

Contractor Declaration: The Contractor hereby applies for a Certificate of Seasonal Completion in accordance with the Contract Documents. We confirm that all mandatory winterization, dewatering, thermal protection, backfilling, and freeze-protection measures have been satisfactorily executed to ensure the infrastructure remains stable, safe, and undamaged throughout the winter shutdown period.

Contractor Representative: _____ **Signature:** _____ **Date:** _____

Engineer of Record Seal:

As the Engineer of Record, I certify that the portion of the Work executed to date is substantially complete for the current season in general accordance with the Contract Documents. To the best of my knowledge, all site cleanup, winterization, dewatering, thermal protection, backfilling, and freeze-protection measures have been satisfactorily executed. The attached schedule accurately reflects the remaining carry-over work deferred to the next construction season.

I recommend the release of the statutory holdback withheld to date, less the value of the noted deficiencies.

Engineer of Record: _____ **Effective Date:** _____

City Rejection: _____ **Signature:** _____ **Date REJECTED:** _____

Cause for Rejection: _____

City Acceptance: _____ **Signature:** _____ **Date ACCEPTED:** _____