



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada

CONTRACT SPECIFICATIONS

Wye Marsh Wildlife Centre – Watermain Replacement & Parking Lot Resurfacing

at

**16160 Highway 12 East
Midland, Ontario
L4R 4K6**

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DRAWINGS

- 1.1 The Drawings forming part of the Contract Documents are listed below and bound separately

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CIVIL

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General Conditions

1. SUMMARY OF WORK

1. The Contractor shall provide all necessary labor, materials, and equipment, required to complete the watermain replacement and parking lot resurfacing located at Environment and Climate Change Canada's Wye Marsh Wildlife Centre, 16160 Highway 12 East, Midland, ON, as per drawings and specifications. This includes, but is not limited to:

- Watermain replacement: erosion and sediment control measures, decommissioning of existing watermain, installation of new watermain and all fixtures and fittings, commissioning of new watermain including pressure testing and chlorination;
- Parking lot resurfacing: erosion and sediment control measures, remove existing asphalt and Granular A material and replace with new asphalt and Granular A.

Project progress meetings are required at regular intervals with the designated representative and the contractor, the specifics intervals will be determined in more detail at the "start-up" meeting.

The work is to be scheduled and coordinated with the Facility in order to minimize the impact to the programming when the temporary decommissioning and reconnection of the watermain is undertaken.

The General Contractor is responsible for the coordination and implementation of the Commissioning of all Sub-Contractor work, equipment and installations.

The Contractor is responsible for the instructions and training on equipment shall be given to Departmental Representative and Operating Personnel. Further details are contained in the project plans, and specifications as well as General Conditions.

2. HOURS OF WORK

1. Hours of operation

Regular hours of the Facility – 7 days a week – 09:00 AM to 5:00 PM hours

- Work may be performed outside of these hours as approved by the Facility Manager.

2. Work requiring power shutdown and/or utility shut down, bypassing, or isolating any initiating device or zone on the fire alarm system or the fire sprinkler system shall be undertaken as evening work (off hours) Monday through Sunday from 5:00PM to 07:00AM.

3. Provide an implementation strategy in writing three (3) weeks prior to the first shutdown which clearly lists which activities require after hours work, the sequence of shutdowns, and the maximum length of each shutdown, to insure the owner can organize the shutdown of lab equipment.

4. The Contractor shall not permit his personnel to work alone on this project when the following activities are undertaken;

1. Work assessment determines that the potential health & safety risk is high;
2. Work requiring entry into or work within a Confined Space;
3. Work requiring Lock-Out and Tag-Out;

4. Work requiring use of fall arrest equipment;
5. Work on scaffolding;
6. Work requiring supplied air respirators or similar equipment;
7. Hot Work and/or Hot Tap activities;
8. Work involving cranes or hoisting;
9. Work or work situations identified by the Departmental Representative.

5. Staff training and demonstrations for the new equipment and installations shall be scheduled during regular business hours Monday to Friday. The Contractor shall obtain approvals from the Departmental Representative on the training schedules prior to the scheduled training date and time.

3. SCHEDULING

1. Within one week of contract award, submit a bar chart construction schedule for the work, indicating anticipated progress stages within time of completion. Minimum stages include mobilization, shop drawing submittal, order and delivery of major components and equipment, major approvals stages, interim and final inspection times, commissioning timeframes, final deficiency corrections and demobilization. When schedule has been reviewed and approved by the Departmental Representative take necessary measures to complete work within scheduled times. Do not change schedule without written approvals from the Departmental Representative.

4. CONTRACT DOCUMENTS

1. Drawings and specifications are complementary, items shown or mentioned in one and not in the other are deemed to be included in the contract work.
2. Any questions that arise in relation to the design shall be brought to the attention of the Departmental Representative. Failure to comply with this procedure may necessitate amendments and other layout modifications as required to complete the Work, costs of which shall be solely the responsibility of the Contractor.
3. Study all documents, which describe, or are related to any operation before commencement of that operation. Report discrepancies discovered between existing conditions and documentation. Obtain ruling on required interpretation before commencing work.
4. Any changes to the scope of work are to be confirmed in writing by the Departmental Representative and Contract value changes approved, prior to start of said work.

5. CONTRACTOR'S USE OF SITE

1. Do not unreasonably encumber site, with material or equipment.
2. Execute the work with the least possible interference or disturbance to the normal use of the exiting premises. Make arrangements with the Departmental Representative to facilitate the work as stated.

3. Maintain existing services to the building and provide for personnel and vehicle access.
4. Where security is reduced by the work, provide temporary means to maintain security.
5. Contractor shall utilize assigned washroom facilities and shall maintain them neat and tidy.
6. Contractor shall be responsible to supply their own accommodations. No storage space will be provided within the building. Accommodation will be made for limited on-site storage at the discretion of the Departmental Representative in area designated by the Departmental Representative.

6.CONTRACTOR PROJECT SUPERINTENDENT

1. The Contractor shall, upon award of contract, designate a Project Superintendent. The Contractor shall provide the name, cellular phone number to the Departmental Representative at the pre-construction meeting. The Project Superintendent shall have full responsibility for the project and shall be authorized to accept and act upon any notice or direction provided by the Departmental Representative. Project Superintendent shall be available on site at all times that work is being performed under this contract.
2. Supervise and direct all person engaged in the work, including all tradesmen and suppliers. Become familiar with the requirements of each trade. Coordinate delivery and work operations. Examine the work of all trades during work operations to ensure compliance with the contract requirements. Expedite all work to maintain the contract schedule.
3. Cooperate with all other contractors working on site in parallel or related projects.
4. Attend coordination and project meetings at the direction of the Departmental Representative.

7. CONTRACTOR and SUB CONTRACTORS

1. The Contractor agrees to employ those sub-contractors proposed by him in writing as listed in the Contractor's tender submission.
2. Do not change or substitute approved sub-contractors without prior authorization from the Departmental Representative.
3. Contractor and sub-contractor personnel shall be qualified as per definitions under the Ontario Trades Qualification and Apprenticeship Acts and as required by regulatory agencies in Ontario.
4. If applicable, electrical work shall be carried out by qualified and licensed electrical contractors as per Ontario regulations.
5. If applicable, fire alarm work shall be carried out by qualified and accredited personnel as per Ontario regulations.

8. WORKMANSHIP

1. Workmanship shall be the best quality, executed by workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Departmental Representative, if required, if work is such as to make it impractical to produce required results.
2. Do not employ any person unfit or unskilled in their required duties. The Departmental Representative reserves the right to require the dismissal from the site, workers deemed incompetent, careless, insubordinate or otherwise objectionable.
3. The Work as covered by the tender documents is intended to comply exactly with the latest rules and regulations of the inspection authorities, and these rules are to be considered an integral part of the tender documents. In case of conflict, any ruling by the Inspection Authority shall be final. All changes and alterations to the Contractor's work required by an authorized inspector or any authority having jurisdiction shall be carried out at the expense of the Contractor.
4. Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with the Departmental Representative, whose decision is final.

9. RECORD DRAWINGS

1. As work progresses, maintain accurate records to show deviations from the contract drawings. Just prior to completion of work, supply to the Departmental Representative one set of white prints with all deviations neatly inked in. Contractor to show actual layouts for underground services including elevations, all mechanical piping and ductwork and all electrical wiring diagrams, locations and sizes of electrical conduits, pull boxes and wiring, circuits etc. (if applicable). The contractor will deliver the "as-built" records to the Departmental Representative, and will then provide 2 copies on digital CD's of the "Final Record Drawings" in PDF, and AutoCad formats for the owners records.

10. SHOP DRAWINGS

1. Provide four (4) copies of the shop drawings as listed in the specifications and/or drawings to the Departmental Representative prior to ordering materials. Shop drawings to illustrate details of portion of work specific to the project requirements. Information to clearly indicate the items to be reviewed. Generic drawings are not acceptable. Shop drawings shall be forwarded electronically to the Departmental Representative.
2. Allow two (2) working weeks for the Departmental Representative to review of each shop drawing submission.

11. CODES AND STANDARDS

1. The following codes and Standards are in place for work under this contract. The latest edition applicable at the time to be utilized.

- .1 The National Building Code of Canada
- .2 The National Fire Code of Canada
- .3 The Ontario Electrical Safety Code (if applicable)
- .4 Ontario Plumbing Code
- .5 Ontario Occupational Health and Safety Act and Regulations for Construction Projects
- .6 Canada Labor Code Part II and Federal Occupational Health and Safety Policies

12. FEES AND CERTIFICATES

1. Submit a completed Notice of Project Form to the Ontario Ministry of Labour as required by the notification requirements under the Regulations for Construction Projects made pursuant to the Ontario Occupational Health and Safety Act. Provide copy to the Departmental Representative.
2. If applicable, submit to the Electrical Inspection Authority the necessary number of working drawings and specifications for examination and approval prior to commencement of work and pay all associated fees.
 1. Obtain and pay for all electrical inspection fees.
 2. On completion of the work provide copies of the Electrical Inspection Authority inspection approval certificates.

13. CONSTRUCTION SAFETY MEASURES

1. Observe and enforce construction safety measures required by Ontario Occupational Health and Safety Acts and Regulations for Construction Projects, Canada Labor Code Part II, Occupational Health and Safety, Workers' Compensation Board and municipal statutes and authorities and site specific Health and Safety Policies and Directives
2. In the event of conflict between any provisions of above authorities, the most stringent will apply.
3. Provide and maintain guardrails, fences, barricades, lights, signs and other devices required for protection of workmen and public in accordance with the requirements of the Canada Labour Code Part II, Occupational Health and Safety, Ontario Occupational Health and Safety Act and Regulations for Construction Projects and Local by-laws. All signs shall be bilingual or CSA universal pictograms.
4. Ensure the safety of building personnel at all times when performing work.
5. Refer to Specifications Section 01 35 30 Health and Safety for additional Requirements

14. FIRE SAFETY REQUIREMENTS

1. Comply with the National Building Code of Canada for fire safety in construction and the National Fire Code of Canada for fire prevention, firefighting and life safety in building in use.
2. Comply with Human Resources Development Canada (HRDC), Fire Commissioner of Canada (FCC) Standards;
 - .1 No. 301: Standard for Construction Operations
 - .2 No. 302: Standard for Welding and Cutting
 - .3 No. 374: Fire Protection Standard for General Storage (Indoor and Outdoor) available from Fire protection Engineering Services, Labor program, HRDC or following internet site:
<http://info.load-otea.hrdc-drhc.gc.ca/~fireweb/standards/fccen.htm>
 - .4 Retain all fire safety documents on site.
3. Refer to Section 01 35 30 of this document for further information on Health and Safety

15. WORKPLACE SAFETY AND INSURANCE BOARD

1. Prior to commencing the work, throughout the total performance of the work when requesting payments and prior to receiving final payment, the Contractor shall provide evidence of good standing with Workplace Safety and Insurance Board of Ontario.

16. UTILITIES

1. Water supply is available on site and will be provided for construction usage at no cost. Departmental Representative reserves the right to limit volume of water utilized.
2. Existing electrical services to a maximum of 15 KVA required for the work may be used by the Contractor without charge. Ensure capacity is adequate prior to connecting and imposing additional loads. Connect and disconnect at own expense and responsibility.

17. PROTECTION

1. Protect finished work against damage until take-over.
2. Protect the work and all surrounding equipment, landscape, structures, floors, ceilings, walls, etc., from damage.
3. Make good, at no cost to the Owner, any damage caused.
4. Protect any services, which are uncovered during work.
5. Protect all areas adjacent to the construction areas from dust and debris produced during construction. Use hoarding, solid walls, drop cloths, sealed dust screens and tarps and clean up and vacuum up all debris daily.

18. PRODUCT HANDLING AND STORAGE

1. Deliver materials in original and unopened containers or wrappings with Manufacturers' seals and labels intact and legible.
2. Deliver materials in sufficient quantity to allow continuity of the work. Do not encumber site with unnecessary materials.
3. All unused materials at the end of any working day shall be properly protected from damage.
4. All materials, equipment, etc. to be handled and stored as not to interfere with the operation of the building.
5. All material and equipment to be new unless specified otherwise.
6. Contractors who use controlled products must ensure that their workers are properly trained in the safe use and handling of such products in compliance with the Workplace Hazardous Materials Information System (WHMIS).
7. Comply with all requirements with respect to Controlled products labeling and Material Safety Data Sheets (MSDSs) according to the requirements of WHMIS and the Hazardous Products Act.

19. PRODUCT AVAILABILITY

1. Upon award of contract immediately review product delivery requirements and advise the Departmental Representative of any foreseeable delays.
2. In the event of failure to notify the Departmental Representative at commencement of the work, the Departmental Representative reserves the right to require the supply of substitute products of equivalent quality at no increase in contract price to ensure adherence to project schedule.

20. MATERIALS STANDARDS

1. Materials shall be new, and work shall conform to the minimum applicable standards of the Canadian General Standards Board, the Canadian Standards Association, the National Building Code of Canada and all applicable Provincial and Municipal codes. In the case of conflict or discrepancy the most stringent requirements shall apply.
2. Products (materials, equipment and articles) incorporated in work shall be new, not damaged or defective and of best quality compatible with specifications for purpose intended. If requested by Departmental Representative, furnish evidence as type, source, and quality of product.
3. Defective products will be rejected, regardless of previous inspections. Inspection does not relieve responsibility but is a precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

4. Should any dispute arise as to the quality of fitness of products, the decision shall rest with the Departmental Representative based upon requirements of Contract Documents. Departmental Representative decisions shall be final.

5. Ensure that materials, equipment, services and labour are brought to site in sufficient quantity and in accordance with requirements of the work schedule.

21. MATERIALS OTHER THAN SPECIFIED

1. Secure in writing, permission from the Departmental Representative to use any materials other than those specified.

22. HAZARDOUS MATERIALS

1. Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials: and regarding labeling and the provision of Material Safety Data Sheets (MSDS) acceptable to Human Resources Development Canada, Labour Program.

23. REMOVED MATERIALS

1. Unless otherwise specified, materials for removal become the Contractor's property and shall be taken from the site.

24. PROJECT CLEANLINESS

1. Remove waste materials and debris from the site at the end of each day. Leave the work area unencumbered upon completion of each work shift. Store materials and equipment.

2. Ensure site is clean, orderly and neat at all times during the work shift. Provide additional cleaning as requested by the Departmental Representative.

3. Clean areas affected under contract, to a condition at least equal to that previously existing and to satisfaction of the Departmental Representative.

25. WASTE MANAGEMENT

1. Comply with the Environmental Protection Act, Ontario Regulations O.Reg. 102/94 and O. Reg. 103/94 for waste management programs on construction and demolition projects.

26. EXISTING SERVICES

1. Where work involves breaking into or connecting to existing services, Carry out work at times directed by the Departmental Representative. Connection to existing services shall be after hours and/or on weekends.
2. Before commencing Work, establish location and extent of service lines in area of Work and notify the Departmental Representative of findings.
3. Submit schedule to and obtain approval from the Departmental Representative for any shutdown or closure of active service or Facility. Adhere to approved schedule and provide notice to affected parties. Do not alter schedule without prior written consent of the Departmental Representative.
4. Give the Departmental Representative 96 hours' notice related to each necessary interruption of any mechanical or electrical service throughout the course of the work. Obtain written authorization from the Departmental Representative prior to any interruption. Keep duration of those interruptions to a minimum.
5. Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
6. Fire alarm shutdowns, re-activation shall be the responsibility of the Contractor. Shutdown, bypassing or isolating any initiating device or zone on the fire alarm system or the sprinkler system shall be undertaken after hours Monday to Friday from 18:00hrs to 06:00hrs or on weekends from 07:00hrs to 18:00hrs. All shutdowns, bypassing or isolation activities on the fire alarm system or the fire sprinkler system must be authorized in writing by the Property Management District 1 Senior Operations Technician prior to initiating work. Approvals for shutdowns, bypassing or isolation activities require a minimum of 96 hours. Contractors shall schedule their request submittals through the Departmental Representative.

27. CUTTING, PATCHING AND MAKING GOOD

1. Cut existing surfaces as required to accommodate new work. Openings shall be neatly cut and dimensioned to fit electrical conduits, mechanical pipes and/or ductwork passing through the surfaces. Obtain the Departmental Representative approval before cutting into structure. Cutting torches shall not be permitted.
2. Patch and make good cut on both sides of surfaces, damaged or disturbed to match or better existing conditions to the satisfaction of the Departmental Representative. Note: The Contractor shall patch and make good existing openings when Contractor utilizes the existing openings for his work.
3. Fill voids left around all electrical conduits, mechanical pipes and/or ductwork with appropriate fire-proofing material to maintain fire stop integrity. Finish patching with finishing compounds to the satisfaction of the Departmental Representative.

28. DEMOLITION

1. Except if expressly stated otherwise, materials indicated for removal, become the Contractor's property and shall be promptly taken from the site.

29. EQUIPMENT

1. Provide and maintain equipment such as temporary stairs, ladders, ramps, scaffolds, swing stages, runways, chutes and the like, as required for execution of work.
2. Maintain conveying equipment such as cranes, hoists, derricks and the like, as required for execution of work.
3. Assume complete responsibility for construction strength, placing, anchoring and operation of derricks, cranes, hoists and other mechanical contrivances used for work; and ensure that loads carried thereon can be safely supported and be free from accidents to all persons.
4. Have hoist capacities, with regard to anticipated loads, verified by a Professional Engineer registered in the Province of Ontario.
5. Comply with all governing safety regulations in force at the time of construction.
6. Remove immediately such equipment when not required for work.
7. Provide and maintain, on site, suitable fire extinguishers in sufficient quantities, as required by the Safety Code.

30. LOADING

1. Not Applicable

31. HOISTING

1. Not Applicable

32. POWDER ACTUATED GUNS

1. Not Applicable

33. TAXES

1. Pay all taxes properly levied by law (including Federal, Provincial and Municipal)
2. The Harmonized Sales Tax (HST) is NOT to be considered an applicable tax for the purposes of this bid. The bidder shall therefore include separately any amount in his bid price for the said HST. In the event the HST does apply, the successful Contractor will indicate on each application for

payment as a separate amount the appropriate HST the Owner is legally obliged to pay. The Contractor's HST registration number must be shown on all invoices. This amount will be paid to the Contractor in addition to the amount certified for payment under the contract and will therefore not affect the contract price.

34. SIGNS – ADVERTISING

1. No advertising and/or posting of company signs shall be permitted.
2. Provide common-use signs as related to traffic control, information, instruction, health and safety, use of equipment, public safety devices, in both official languages or by the use of commonly understood graphic symbols to the Departmental Representative approval.

35. BUILDING SMOKING ENVIRONMENT

1. Smoking is prohibited in the building and on the roofs. Obey smoking restrictions on building property as directed by the Departmental Representative.

36. TRAINING AND DEMONSTRATION

1. Not Applicable

37. OPERATIONS and MAINTENANCE MANUALS

1. Not Applicable

38. Shipping and Receiving

1. **Contractor must be on site to receive all shipments.**
2. **Contractor is responsible to unload all shipments.**
3. **Deliveries maybe turned away if the contractor is not on site.**
4. **Contractor materials are not to be left on site without the authorization of the Facility.**

END OF SECTION

HEALTH AND SAFETY

PART 1 – GENERAL

1.1 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 REFERENCES

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .3 Province of Ontario
 - .1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. [1990 June2002].

1.3 SUBMITTALS

- .1 Make submittals to Departmental Representative for review.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation.
- .3 Submit 5 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly.
- .4 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.
- .5 Submit copies of incident and accident report.
- .6 Departmental Representative will review Contractor's site specified Health and Safety Plan and provide comments to Contractor. Revise plan as appropriate and resubmit plan to Departmental Representative within 7 days after receipt of comments from Departmental Representative.
- .7 Departmental Representative'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.

- .8 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 Departmental Representative.
- .9 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 Provincial authorities prior to beginning of Work

1.5 SAFETY ASSESSMENT

- .1 Perform site specified safety hazard assessment related to project

1.6 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of project and prior to each outage.

1.7 REGULATORY REQUIREMENTS

- .1 The Contractor shall comply with the specified standards and regulations to ensure safe operations. The latest editions are applicable.
 - .1 Canada Labour Code Part II.
 - .2 Canada Occupational Safety and Health Regulations.
 - .3 National Building Code Part 8 – Safety Measures at Construction & Demolition Sites.
 - .4 National Fire Code Part 4 – Flammable and Combustible Liquids.
 - .5 National Fire Code Part 5 – Hazardous Processes and Operations.
 - .6 Ontario Occupational Health and Safety Act and Regulations including;
 - .1 Construction Projects (O.Reg.213/91).
 - .2 Occupational Health and Safety Act.
 - .3 Workplace Hazardous Materials Information System (WHMIS).
 - .4 Ontario Trades Qualification and Apprenticeship Act.
 - .5 Ontario Electrical Safety Code (Reg.10/91).

1.8 GENERAL
REQUIREMENTS

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.9 RESPONSIBILITY .1

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

1.10 COMPLIANCE
REQUIREMENTS

- .1 Comply with Ontario Health and Safety Act and Regulations for Construction Projects, R.S.O..

1.11 UNFORSEEN
HAZARDS

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of the Province of Ontario and advise Departmental Representative verbally and in writing.

1.12 POSTING OF
DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of the Province of Ontario, and in consultation with Departmental Representative.

1.13 CORRECTION OF
NON-COMPLIANCE

- .1 The Contractor shall immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if work is deemed to be life threatening and non-compliance of health and safety regulations is not corrected.

1.14 DISCIPLINARY ACTION

- .1 The Contractor's disregard and/or lack of compliance to health and safety measures, procedures and policies may lead to disciplinary action by the Departmental Representative.

1.15 BLASTING

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

1.16 CONTRACTOR ACCIDENT AND INCIDENT REPORT

- .1 The Contractor shall advise the Departmental Representative of any accident, injury, near-miss incident, fire, explosion or chemical spill occurring at the Work site and any visit to the site by a governmental enforcement official.

1.17 WORK STOPPAGE

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

1.18 SITE HEALTH AND SAFETY POLICIES AND DIRECTIVES

- .1 Where applicable the Contractor shall comply and follow all prescribed site Health and Safety Policies and Directives including but not limited to the following;
 - .1 Worker Profile Sheet: The Contractor shall submit to the Departmental Representative a completed Worker Profile Sheet c/w all attachments including copies of licenses, certificates and permits for supporting qualifications to perform required work for a given project for each individual worker requiring access to the site. The completed Worker Profile Sheets are required for each individual worker prior to working on site. Live work is not permitted.
 - .2 Not Applicable

- .3 Emergency and Fire Evacuation Route: The Contractor shall obtain training on procedures of evacuating the site under emergency and/or fire situations. Contractor training and sign-off is required prior to initiating site work.
- .4 Ontario Trades Qualifications and Apprenticeship Act: The Contractor shall sign-off confirming that the Trades Qualifications and Apprenticeship Act shall be observed and followed. Contractor sign-off is required prior to initiating site work.
- .5 Not Applicable

1.19 WORKPLACE
SAFETY AND
INSURANCE BOARD

- .1 Prior to commencing the work, throughout the total performance of the work when requesting payments and prior to receiving final payment, the Contractor shall provide evidence of good standing with Workplace Safety and Insurance Board of Ontario.

1.20 CONSTRUCTION
SAFETY MEASURES

- .1 Observe and enforce construction safety measures required by Ontario Occupational Health and Safety Acts and Regulations for Construction Projects, Canada Labour Code Part II, Occupational Health and Safety, Workers' Compensation Board and municipal statutes and authorities and site specific Health and Safety Policies and Directives.
- .2 In the event of conflict between any provisions of above authorities, the most stringent will apply.
- .3 Provide and maintain guardrails, fences, barricades, lights, signs and other devices required for protection of workmen and public in accordance with the requirements of the Canada Labour Code Part II, Occupational Health and Safety, Ontario Occupational Health and Safety Act and Regulations for Construction Projects and Local by-laws. All signs shall be bilingual or CSA universal pictograms.
- .4 Ensure the safety of building personnel at all times when performing work.
- .5 the contractors are to comply with the provincial directions and also to address COVID-19 in their SSSP, as any other hazard. Please make sure this is included in the SPEC for submittals.

PART 2 – PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 – EXECUTION

3.1 NOT USED .1 Not Used.

CONSTRUCTION FACILITIES

1 Maintenance

- 1.1 Use all means necessary to maintain construction facilities and controls in proper and safe condition throughout progress of the Work.
- 1.2 In the event of loss or damage, immediately make all repairs and replacements necessary to Designated Representative approval and at no additional cost.

2 Parking

- 2.1 Parking spaces are available on site. Spaces shall be used at the discretion and as directed by the Facility.
- 2.2 Do not be nuisance to public traffic any time. Manage construction traffic by using designated roads and by providing trained flag persons to direct public traffic as appropriate

3 Contractor's Storage

- 3.3 Provide in approved locations as required, lockable weather tight storage sheds with floors raised above ground, for storage of materials, tools, equipment, which may be damaged by weather. Provide separate shed located where directed for paints and volatile materials. Provide fire extinguisher in each location and do not store combustible or hazardous materials in Building.

4 Dust Tight Screens

- 4.1 Not Applicable
- 4.2 Maintain and relocate protection until such work is complete.

5 Hoarding, Guard Rails and Barricades

- 5.1 Provide secure, rigid guard railings and barricades around deep excavations.
- 5.2 Not Applicable.
- 5.3 Provide as required by governing authorities.

6 Scaffolding

- 6.1 Not Applicable

7 Hoisting

- 7.1 Provide, operate and maintain hoists and cranes required for moving of workers,

materials and equipment. Make financial arrangements with Subcontractors for use thereof.

7.2 Hoists and cranes shall be operated by qualified operator.

8 Site Storage/Loading

8.1 Provide and maintain storage sheds and workshops if required by the work throughout the construction period. Remove temporary buildings upon completion of the Work.

8.2 Confine the Work and the operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the premises with products.

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

9 Sanitary Facilities

9.1 Existing toilet facilities where available and approved by the Facility may be used provided they are kept in clean condition.

10 Water Supply

10.1 The Facility shall provide a continuous supply of potable water for construction use.

11 Temporary Heating

11.1 Not Applicable

11.2 Not Applicable

12 Temporary Power and Light

12.1 The Facility will pay for temporary power required during construction for temporary lighting and the operating of power tools.

13 Protection for Off-Site & Public Property

13.1 Protect surrounding private and public property from damage during performance of Work.

13.2 Be responsible for damage incurred.

13.3 Be responsible for damage incurred by Work Force where property has been damaged from vehicular traffic or parking on private or Facility's Property.

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- 14 **Fire Protection**
- 14.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.
- 14.2 Open fires and burning of rubbish are not permitted on the site.
- 15 **Protection of Building Finishes & Equipment**
- 15.1 Provide adequate protection of the existing building to prevent migration of dust and other contaminants.
- 15.2 Not Applicable
- 15.3 Provide necessary screens, covers, hoardings as required to protect new and existing work.
- 15.4 Be responsible for damage incurred and cleaning due to lack of or improper protection.
- 15.5 Should the work be suspended for any cause, the Contractor must assume all responsibility for the protection during the period of suspension.
- 16 **Project Cleanliness**
- 16.1 Maintain the Work in tidy condition, free from the accumulation of waste products and debris, other than that caused by the Facility or other Contractors.
- 16.2 Remove waste material and debris from the site at the end of each working day.
- 16.3 Not Applicable
- 16.4 Not Applicable
- 17 **First Aid**
- 17.1 Provide, at the work site, such equipment and medical facilities as required by Workmen's Compensation Act, to supply first-aid service to anyone who may be injured on the work site. In case of serious injury or death, report the accident immediately, to the proper authorities and to the Designated Representative.
- 18 **Removal of Construction Facilities**
- 18.1 Remove all temporary facilities from site when directed by Designated Representative.

*****END*****

MATERIAL AND EQUIPMENT

1 Requirements Included

- .1 Reference standards.
- .2 Product quality, availability, storage, handling, protection, transportation.
- .3 Manufacturer's instructions.
- .4 Workmanship, co-ordination, cutting, fastenings.
- .5 Existing facilities.

2 Reference Standards

2.1 Within the text of the specifications, reference may be made to the following standards:

ACI - American Concrete Institute
AISC - American Institute of Steel Construction
ANSI - American National Standards Institute
ASTM - American Society of Testing and Materials
CEC - Canadian Electrical Code (published by CSA)
CEMA - Canadian Electrical Manufacturer's Association
CGSB - Canadian General Standards Board
CISC - Canadian Institute of Steel Construction
CLA - Canadian Lumberman's Association
CPCA - Canadian Painting Contractors' Association
CPCI - Canadian Prestressed Concrete Institute
CRCA - Canadian Roofing Construction Association
CSA - Canadian Standards Association
FM - Factory Mutual Engineering Corporation
IEEE - Institute of Electrical and Electronic Engineers
IPCEA - Insulated Power Cable Engineers Association
NAAMM - National Association of Architectural Metal Manufacturers
NBC - National Building Code
NEMA - National Electrical Manufacturers' Association
TTMAC - Terrazzo, Tile and Marble Association of Canada
ULC - Underwriters' Laboratories of Canada

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

2.2 Conform to latest date of issue of reference standards and amendments effect on date of submission of bids except where a specific date or issue is specifically noted.

2.3 Where Drawings and/or specifications exceed code or standard requirements, provide such additional requirements.

2.4 Where codes or standards or this specification does not provide all information necessary for complete installation of an item, then strictly comply with the

manufacturer's instructions for first quality workmanship. In cases of discrepancies consult the Departmental Representative for clarification.

- 2.5 In the event of conflict between any provisions of relevant codes and standards, the requirement of authority having jurisdiction shall apply.

3 **Products and Materials**

3.1 Quality

- 3.1.1 Products, materials, equipment and articles (referred to as Products throughout the specifications) incorporated in the Work shall be new, not damaged or defective, and of the best quality (compatible with specifications) for the purpose intended. If requested, furnish evidence as to type, source and quality of Products provided.

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

- 3.1.3 Should any dispute arise as to the quality or fitness of Products, the decision rests strictly with the Designated Representative based upon the requirements of the Contract Documents.

- 3.1.4 Unless otherwise indicated in the specifications, maintain uniformity of manufacture for any particular or like item throughout the building.

- 3.1.5 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.

3.2 Availability

- 3.2.1 Immediately upon signing Contract, review Product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of Products are foreseeable, notify the Designated Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

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

3.2.3 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 seals 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, ie. lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in a 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 the satisfaction of the Designated Representative.

4 **Manufacturer's Instructions**

- 4.1 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.
- 4.2 Notify the Designated Representative, in writing, of conflicts between the specifications and manufacturer's instructions, so that the Designated Representative may establish the course of action.
- 4.3 Improper installation or erection of Products, due to failure in complying with these requirements, authorizes the Designated Representative to require removal and re-installation at no increase in Contract Price.

5 **Workmanship**

5.1 **General**

- 5.1.1 Workmanship shall be the best quality, executed by workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Designated Representative if required Work is such as to make it impractical to produce required results.

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- 5.1.2 Do not employ any unfit person or anyone unskilled in their required duties. Where required by code or other by-laws and regulations, trades people shall be licensed in their trade. The Designated Representative reserves the right to require the dismissal from the site, workers deemed incompetent, careless, insubordinate or otherwise objectionable.
- 5.1.3 Any work not acceptable to the Designated Representative or local authorities shall be removed and replaced when and as directed by them. The cost of reexecuting such work shall be borne by the Contractor.
- 5.1.4 Where not otherwise specified or shown, all work must conform to the local governing codes and by-laws and to the Ontario and National Building Codes. All codes, standards, regulations and by-laws shall be of the latest date or amendment prior to tender issue.
- 5.2 Co-ordination
- 5.2.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- 5.2.2 Be responsible for co-ordination and placement of openings, sleeves and accessories.
- 5.3 Concealment
- 5.3.1 Not Applicable
- 5.3.2 Not Applicable.
- 5.3.3 Not Applicable.
- 5.3.4 Not Applicable
- 5.4 Cutting and Remedial Work
- 5.4.1 Perform cutting and remedial work required to make the parts of the Work come together. Co-ordinate the Work to ensure this requirement is maintained.
- 5.4.2 Should work performed outside this contract necessitate cutting and/or remedial work to be performed, the cost of such work will be valued by the Designated Representative.
- 5.4.3 Perform cutting and remedial work by specialists familiar with the materials affected. Perform in a manner to neither damage nor endanger any portion of Work.
- 5.5 Location of Equipment & Fixtures

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- 5.5.1 Obtain manufacturer's literature for roughing-in and hook-up of equipment, fixtures and appliances.
 - 5.5.2 Submit field drawings to indicate relative position of various services and equipment when required by Designated Representative.
 - 5.6 Fastenings
 - 5.6.1 Not Applicable
 - 5.6.2 Prevent electrolytic action between dissimilar metals and materials.
 - 5.6.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in the affected specification Section.
 - 5.6.4 Not Applicable
 - 5.6.5 Keep exposed fastenings to a minimum, space evenly and install neatly.
 - 5.6.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.
 - 5.7 Protection of Work in Progress
 - 5.7.1 Adequately protect Work completed or in progress. Work damaged or defaced due to failure in providing such protection is to be removed and replaced, or repaired, as directed by the Designated Representative, at no increase in Contract Price.
 - 5.7.2 Adequately protect troweled concrete floors and finished flooring from damage. Take special measures when moving heavy loads or equipment on them.
 - 5.7.3 Prevent overloading of any part of the building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Designated Representative.
 - 6 **Protection of Existing Utilities and Services**
 - 6.1 Where work involves breaking into or connecting to existing utilities and services, carry out work at times directed by the Designated Representative, with minimum of disturbance to occupants.
 - 6.2 Before commencing work, and during work, establish location and extent of existing utilities and service lines in area of Work and notify Designated Representative of findings. In particular take care and hand dig around existing utilities and service lines to establish levels affected by new work and relocation.

6.3 Record locations of maintained, re-routed and abandoned utilities and service
 lines.

*****END*****

EXCAVATING, TRENCHING AND BACKFILLING

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 32 12 16 Asphalt Paving.

1.2 REFERENCE STANDARDS

- .1 OPSS 1010, April 2013 – Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material

1.3 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock: solid material in excess of 1.00 m³ and which cannot be removed by means of heavy duty mechanical excavating equipment. Frozen material not classified as rock.
 - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Topsoil:
 - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
 - .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.

1.4 EXISTING CONDITIONS

- .1 Examine soil report provided .
- .2 Buried services:
 - .1 Before commencing work establish location of buried services on and adjacent to site.
 - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
 - .3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.
 - .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
 - .5 Prior to beginning excavation Work, notify applicable authorities having jurisdiction and establish location and state of use of buried utilities and structures, and to clearly mark such locations to prevent disturbance during Work.

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- .6 Confirm locations of buried utilities by careful soil hydrovac methods and test excavations .
 - .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
 - .8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative and advise utility company to remove or re-route the existing lines in area of excavation. Costs for such Work to be paid by Owner.
 - .9 Record location of maintained, re-routed and abandoned underground lines.
 - .10 Confirm locations of recent excavations adjacent to area of excavation.
 - .3 Existing buildings and surface features:
 - .1 Conduct, with Departmental Representative , condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
 - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.
 - .3 Where required for excavation, cut roots or branches as directed by Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Type 1 fill: Granular 'A' conforming to OPSS 1010.
- .2 Type 2 fill: Granular 'B' conforming to OPSS 1010
- .3 Type 3 fill: selected material from excavation or other sources, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.
- .4 Type 4 fill: Clean, washed, coarse bank or river sand free from clay, shale and organic matter.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, and requirements of authorities having jurisdiction.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 SITE PREPARATION

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

3.3 PREPARATION/PROTECTION

- .1 Protect existing features in accordance with applicable local regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval.
- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .5 Protect buried services that are required to remain undisturbed.

3.4 STRIPPING OF TOPSOIL

- .1 Begin topsoil stripping of areas as directed by Departmental Representative after area has been cleared of weeds, grasses, and brush and removed from site.
- .2 Strip topsoil to depths as directed by Departmental Representative.
 - .1 Do not mix topsoil with subsoil.
- .3 Stockpile in locations as directed by Departmental Representative.
 - .1 Stockpile height not to exceed 2 m and should be protected from erosion.
- .4 Dispose of unused topsoil as directed by Departmental Representative.

3.5 STOCKPILING

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

3.6 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Health and Safety Act for the Province of Ontario.
- .2 Obtain permit from authority having jurisdiction for temporary diversion of water course.
- .3 During backfill operation:
 - .1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.

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

3.7 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
 - .1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .3 Protect open excavations against flooding and damage due to surface run-off.
- .4 Dispose of water in a manner not detrimental to public and private property, or portion of Work completed or under construction.
 - .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

3.8 EXCAVATION

- .1 Advise Departmental Representative at least 7 days in advance of excavation operations.
- .2 Excavate to lines, grades, elevations and dimensions as indicated and as directed by Departmental Representative.
- .3 Remove masonry, concrete, paving, demolished foundations and rubble and other obstructions encountered during excavation.
- .4 Excavation must not interfere with bearing capacity of adjacent foundations.
- .5 Do not disturb soil within branch spread of trees or shrubs that are to remain.
 - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .6 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
- .7 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.
- .8 Restrict vehicle operations directly adjacent to open trenches.
- .9 Dispose of surplus and unsuitable excavated material in approved location off site.
- .10 Do not obstruct flow of surface drainage or natural watercourses.

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- .11 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
 - .12 Notify Departmental Representative when bottom of excavation is reached.
 - .13 Obtain Departmental Representative approval of completed excavation.
 - .14 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
 - .15 Correct unauthorized over-excavation as follows:
 - .1 Fill under bearing surfaces and footings with Type 2 fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density
 - .2 Fill under other areas with Type [2] fill compacted to not less than [95] % of corrected Standard Proctor maximum dry density .
 - .16 Hand trim, make firm and remove loose material and debris from excavations.
 - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
 - .2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.

3.9 **FILL TYPES AND COMPACTION**

- .1 Use fill of types as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698-78 or ASTM D1557-78. Ensure equipment and workmanship provides uniform density of entire thickness of layer. Compact each layer to density specified before placing another layer of loose material. In confined spaces, where heavy compacting equipment cannot be utilized, use power actuated compactors or other suitable equipment to achieve required density.
 - .1 Exterior side of perimeter walls: use Type 2 fill to subgrade level. Compact to 95% of corrected maximum dry density.

3.10 **BEDDING AND SURROUND OF UNDERGROUND SERVICES**

- .1 Place and compact granular material for bedding and surround of underground services [as indicated] [Section 33 41 00- Storm Utility Drainage Piping] [as specified in [Section 23 11 26- Facility Liquid Petroleum Gas Piping</options ><options>>Section 33 11 16- Site Water Utility Distribution Piping] [Section 33 34 00- Sanitary Utility Sewerage Force Mains] [Section 33 31 13- Public Sanitary Utility Sewerage Piping]] .
- .2 Dimensions specified in following paragraphs are minimum dimensions of fill after compaction, unless otherwise specified, compaction densities are Minimum Standard Proctor Density.
 - .1 Exterior side of perimeter walls and within perimeter of demolished structures: Use Type 2 fill to subgrade level and to underside of sub-base or base course levels. Compact to 95%.
 - .2 Underground Services:
 - .1 Sanitary and storm sewer pipe and conduit protective cover: cradle half diameter of pipe or conduit using Type 4 fill. After pipe or conduit is in

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- place, cover with 300 mm depth of Type 1 fill. Cover pipe or conduit with 450 mm of type 1 fill, then fill remainder of trench with Type 3 fill to subgrade level compacted to 85% density.
 - .2 Cable and cable duct bedding and immediate protective cover: cover bottom of trench with 150 mm of Type 1 fill. After cables and ducts are in place, side fill ducts with sand up to top of ducts. Tamp around ducts with hand tampers and cover with 150 mm of same material.
 - .3 Fill above protective cover: in areas where paving and walks occur, fill remainder of trench with Type 1 fill, compacted to 95% density. In other areas, cover pipe or conduit with 450 mm of Type 1 fill.
 - .4 Compaction: compact bedding and immediate protective cover to 85% minimum density. In areas within buildings and where paving and walks occur, compact remainder of fill to at least 95% density. In other areas compact remainder of fill to at least 85% density.
 - .5 Notify Departmental Representative prior to backfilling of trenches for electrical services.

3.11 BACKFILLING

- .1 In the context of this Section, reference to backfilling includes bedding.
- .2 Do not proceed with backfilling operations until completion of following:
 - .1 Departmental Representative has inspected and approved installations.
 - .2 Departmental Representative has inspected and approved of construction below finish grade.
 - .3 Inspection, testing, approval, and recording location of underground utilities.
 - .4 Removal of concrete formwork.
 - .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .3 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .4 Do not use backfill material which is frozen or contains ice, snow or debris.
- .5 Place backfill material in uniform layers not exceeding 150 mm compacted thickness. Compact each layer before placing succeeding layer.
- .6 Backfilling around installations:
 - .1 Place bedding and surround material as specified elsewhere.
 - .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
 - .3 Place layers simultaneously on both sides of installed Work to equalize loading.
 - .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
 - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative:

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

3.12 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Replace topsoil as directed by Departmental Representative.
- .3 Reinstall lawns to elevation which existed before excavation.
- .4 Reinstall pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .5 Clean and reinstall areas affected by Work as directed by Departmental Representative.
- .6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.
- .7 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

ASPHALT PAVING - SHORT FORM

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 31 23 10 – Excavation, Trenching & Backfilling

1.2 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

1.3 REFERENCE STANDARDS

- .1 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 302-2012 , Construction Specification for Primary Granular Base.
 - .2 OPSS 310-2012 , Construction Specification for Hot Mixed Asphalt.
 - .3 OPSS 314-2004 , Construction Specification for Untreated Granular, Subbase, Base, Surface Shoulder and Stockpiling.
 - .4 SP 110S13-2011 , Amendment to OPSS 1010, Material Specification for Aggregates, Granular A, B, M and Select Subgrade Material.
 - .5 OPSS 1103-2012 , Material Specification for Emulsified Asphalt.
 - .6 OPSS 1150-2010 , Material Specification for Hot Mixed Asphalt.

1.4 Protection

- .1 Take measure to prevent damage to buildings, landscaping, curbs, sidewalks, trees, and adjacent property. Make good any damages.
- .2 Keep vehicular traffic off newly paved areas until paving surface temperature has cooled below 38°C. Do not permit stationary loads on pavement until 24 h after placement.
- .3 Provide access to buildings as required. Arrange paving schedule so as not to interfere with normal use of premises.

Part 2 Products

2.1 MATERIALS

- .1 Granular sub-base (Granular 'B'):
 - Crushed or uncrushed bank or pit gravel or stone obtained from an approved source and conforming to requirements OPSS 1010 for Granular 'B' aggregate.
- .2 Granular base (Granular 'A'):
 - Crushed gravel or stone, obtained from an approved source and conforming to requirements OPSS 1010 for Granular 'A' aggregate.
- .3 Hot mix asphalt:

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- .1 Super Pave 12.5 top course

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for asphalt paving in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Check adjacent grades to ensure that final grades will be achieved with new graded subgrade surface.
- .3 Proof roll new graded subgrade surface with weight and type of roller approved by Departmental Representative and:
- .1 Check for unstable areas.
- .2 Check for areas requiring additional compaction.
- .3 Notify Departmental Representative of unsatisfactory conditions.
- .4 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

- .1 Remove ice, snow and water from surfaces before doing any work on such surfaces. Ensure sub-grades are not frozen.
- .2 Fine grade and maintain existing gravelled surfaces until asphalt paving is placed.
- .3 Fine grade new subgrade surfaces in areas to be paved to within 12 mm of specified grade and cross section, but not uniformly high or low, and maintain surface at required grade and compaction until sub-base course is placed.

3.3 FOUNDATIONS

- .1 Foundations for roadways comprise:
- .1 150 mm compacted thickness of granular base A.
- .2 Foundations for parking lots to comprise:
- .1 150 mm compacted thickness of granular base A.
- .3 Construction of granular foundations: OPSS 314.
- .4 Compaction: compact each lift of granular material to 100% maximum density to ASTM D698. Maximum lift thickness: 150mm.

3.4 PAVEMENT THICKNESS

- .1 Pavements for roadways:
- .1 Wear course: 60 mm SP12.5.
- .2 Pavements for parking lots:

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- .1 Wear course: 60 mm SP12.5.
 - .3 Unless otherwise specified, place hot mix asphaltic concrete paving in accordance with OPSS 310.
 - .4 Do not place asphalt paving during winter months or during wet weather nor if base is water saturated. Remove loose and foreign material from surfaces to be paved. Do not place any asphaltic mixture, unless air temperature is minimum 7 deg. C and rising.
 - .5 Place compacted asphaltic concrete paving in two layers of thickness indicated, in layers not exceeding 50 mm.
 - .6 Spread asphalt mixture over base evenly and to correct thickness so that, after first passage of roller, a minimum amount of back patching will be required.
 - .7 Minimum 120 deg C mix temperature required when spreading.
 - .8 Maximum 150 deg C mix temperature permitted at any time.
 - .9 Place mixture as continuously as possible. Compact each course with roller as soon as it can support roller weight without undue cracking or displacement.
 - .10 Roller shall be power driven, minimum mass of 4.5 T, minimum wheel width 600 mm.
 - .11 Roll until roller marks are eliminated. Compact to 95% Marshall Density ASTM D1559-82.
 - .12 Keep roller speed slow enough to avoid mix displacement and do not stop roller on fresh pavement.
 - .13 Moisten roller wheels with water to prevent mix adhesion.
 - .14 Compact mix with hot tampers or other approved equipment in areas inaccessible to roller. Effectively seal joints between paving and structures so that joints are completely watertight.
 - .15 The finished paving shall have average thickness specified and shall not vary more than 6 mm from specified thickness at any point.
 - .16 Finish surface smooth, true to grade to within 6 mm in 3 m.

3.5 TRAFFIC MARKINGS

- .1 Paint parking space divisions and other pavement markings in accordance with manufacturers recommendations and as indicated.
- .2 Use paint thinner in accordance with manufacturer's requirements.

3.6 CLEANING

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

END OF SECTION

PAVEMENT MARKINGS

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Not Applicable

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM E1360 90 [2000] e1, Standard Practice for Specifying Color by Using the Optical Society of America Uniform Color Scales System.
 - .2 ASTM D4797 88[2004] Standard Test Methods for Chemical and Gravimetric Analysis of White and Yellow Thermoplastic Traffic Marking Containing Lead Chromate and Titanium Dioxide.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect specified materials from nicks, scratches, and blemishes .
 - .3 Replace defective or damaged materials with new.

1.4 SITE CONDITIONS

- .1 Sustainable Design Provisions:
 - .1 Seasonal restriction for high VOC content traffic marking coatings.
 - .1 Traffic marking coating application between May 1st and October 15th subject to seasonal use restriction and have VOC concentration maximum 150 g/L.

Part 2 Products

2.1 MATERIALS

- .1 Alkyd Traffic Paint and Markings:
 - .1 To MPI #32, Alkyd traffic marking meeting requirements of ASTM D4797.
 - .2 Traffic Marking Coatings: maximum VOC limit 450 g/L
 - .3 Colour: to ASTM E1360, white, blue, and yellow in accordance with MPI Architectural Painting Specification Manual.
- .2 Latex traffic Paint and Markings:
 - .1 To MPI #97, Latex traffic marking meeting requirements of ASTM D4797.
 - .2 Traffic Marking Coatings: maximum VOC limit 450 g/L.
 - .3 Colour: to ASTM E1360 yellow, blue, white in accordance with MPI Architectural Painting Specification Manual.
- .3 Thinner: to MPI listed manufacturer.
- .4 Glass reflective beads: type suitable for application to wet paint surface for light reflectance.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates and surfaces to receive pavement markings acceptable for product installation in accordance with MPI instructions prior to pavement markings application.
 - .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Pavement surface: dry, free from water, frost, ice, dust, oil, grease and other deleterious materials.
- .3 Proceed with Work only after unacceptable conditions rectified.

3.2 EQUIPMENT REQUIREMENTS

- .1 Paint applicator: approved pressure type mobile with positive shut-off distributor capable of applying paint in single, double and dashed lines and capable of applying marking components uniformly, at rates specified, and to dimensions as indicated.
- .2 Distributor: capable of applying reflective glass beads as overlay on freshly applied paint.

3.3 APPLICATION

- .1 Pavement markings: laid out by lay out pavement markings.
- .2 Unless otherwise approved by Departmental Representative, apply paint when air temperature minimum 10 degrees C, wind speed maximum 60 km/h and no rain forecast within next 4 hours.

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- .3 Apply traffic paint evenly at rate of 3 m²/L to form minimum 8 mil dry film thickness, in accordance with MPI Architectural Painting Specification Manual "Preparation of Surfaces" and "Application" for "Approved Product" listing.
 - .4 Do not thin paint unless approved by Departmental Representative.
 - .5 Symbols and letters to dimensions indicated.
 - .6 Paint lines of uniform colour and density with sharp edges.
 - .7 Thoroughly clean distributor tank before refilling with paint of different colour.
 - .8 Apply glass beads at rate of 0.5 kg/L of painted area immediately after application of paint.

3.4 TOLERANCE

- .1 Paint markings: within plus or minus 12 mm of dimensions indicated.
- .2 Remove incorrect markings.

3.5 CLEANING

- .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
 - .1 Remove insulation material spilled during installation and leave work area ready for application of wall board.

3.6 PROTECTION

- .1 Protect pavement markings until dry.
- .2 Repair damage to adjacent materials caused by pavement marking application.

END OF SECTION

SITE WATER UTILITY DISTRIBUTION PIPING

Part 1 General

1.1 REFERENCE STANDARDS

- .1 American National Standards Institute/American Water Works Association (ANSI/AWWA)
 - .1 ANSI/AWWA B300-[10] , Standard for Hypochlorites.
 - .2 ANSI/AWWA B301-[10] , Standard for Liquid Chlorine.
 - .3 ANSI/AWWA B303-[10] , Standard for Sodium Chlorite.
 - .4 ANSI/AWWA C104/A21.4-[08] , Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
 - .5 ANSI/AWWA C105/A21.5-[10] , Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
 - .6 ANSI/AWWA C111/A21.11-[07] , American National Standard for Rubber-Gasket Joints for Ductile-Iron and Fittings.
 - .7 ANSI/AWWA C110/A21.10-[08] , American National Standard for Ductile-Iron and Grey Iron Fittings for Water.
 - .8 ANSI/AWWA C153/A21.53-[11] , Standard for Ductile-Iron Compact Fittings.
 - .9 ANSI/AWWA C504-[10] , Standard for Rubber-Seated Butterfly Valves.
 - .10 ANSI/AWWA C600-[10] , Standard for Installation of Ductile-Iron Water Mains, and Their Appurtenances.
 - .11 ANSI/AWWA C602-[11] , Standard for Cement-Mortar Lining of Water Pipelines - 4 Inch (100 mm) and Larger.
 - .12 ANSI/AWWA C651-[05] , Standard for Disinfecting Water Mains.
 - .13 ANSI/AWWA C800-[05] , Standard for Underground Service Line Valves and Fittings.
 - .14 ANSI/AWWA C900-[07] , Standard for Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 Inch through 12 Inch (100 mm - 300 mm), for Water Transmission and Distribution.
- .2 CSA Group (CSA)
 - .1 CAN/CSA-B137 Series-[09] , Thermoplastic Pressure Piping Compendium. (Consists of B137.0, B137.1, B137.2, B137.3, B137.4, B137.4.1, B137.5, B137.6, B137.8, B137.9, B137.10, B137.11 and B137.12).
 - .1 CAN/CSA-B137.1-[09] , Polyethylene Pipe, Tubing, and Fittings for Cold-Water Pressure Services.
 - .2 CAN/CSA-B137.3-[09] , Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications.

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect water distribution piping from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.3 SCHEDULING OF WORK

- .1 Schedule Work to minimize interruptions to existing services.
- .2 Submit schedule of expected interruptions for approval and adhere to interruption schedule as approved by Departmental Representative.
- .3 Notify Departmental Representative minimum of 24 hours in advance of interruption in service.
- .4 Do not interrupt water service for more than 3 hours and confine this period between 16:00 to 20:00 hours local time unless otherwise authorized.
- .5 Notify fire department of planned or accidental interruption of water supply to hydrants.
- .6 Provide and post "Out of Service" sign on hydrant not in use.
- .7 Advise local police department of anticipated interference with movement of traffic.

Part 2 Products

2.1 PIPE, JOINTS AND FITTINGS

- .1 Polyvinyl chloride pressure pipe: to ANSI/AWWA C900 and CSA B137.3, pressure class 150, DR 18.
 - .1 CAN/CSA-B137.3, PVC series 160, 1.1 MPa elastomeric gasket coupling.
 - .2 Composite epoxy impregnated fibreglass PVC pipe to ASTM D2996 , class H. Unplasticized PVC core over wrapped with bonded fibreglass reinforced epoxy resin. Pressure class 300, 2.4 MPa with cast iron outside diameter and integral bell gasketed joints to ANSI/ASTM D2992 . Material to ASTM D2310 , classification RTRP-11HZ-5001-PVC-13223.
 - .3 Cast iron fittings: to ANSI/AWWA C110/A21.10 , and for pipe diameters larger than NPS 4 cement mortar lined to ANSI/AWWA C104/A21.4.
- .2 Polyethylene pressure pipe:
 - .1 NPS 1/2 to NPS 6: to CAN/CSA-B137.1 type 160 DR 11.
 - .2 Polyethylene to polyethylene joints: to be thermal butt fusion joined, to ASTM D2657 flanged with steel backing flanges.

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- .3 Cast iron fittings with flanged ends: to ANSI/AWWA C110/A21.10 for pipe size above NPS 4, Cement mortar lined to ANSI/AWWA C104/A21.4.
 - .4 Polyethylene fittings: to CAN/CSA-B137.1, for pipe sizes NPS 4 and less.

2.2 VALVES AND VALVE BOXES

- .1 Valves to open counter clockwise.
- .2 Gate valves: to ANSI/AWWA C500.
- .3 Butterfly valves: to ANSI/AWWA C504.
- .4 Underground type indicator valve where indicated. Indicator post to accurately indicate valve open or closed.
- .5 Air and vacuum release valves: heavy duty combination air release valves employing direct acting kinetic principle.
 - .1 Fabricate valves of cast iron body and cover, with bronze trim, stainless steel floats with shock-proof synthetic seat suitable for 2 MPa working pressure.
 - .2 Valves to expel air at high rate during filling, at low rate during operation, and to admit air while line is being drained.
 - .3 Valve complete with surge check unit.
 - .4 Ends to be flanged to ANSI/AWWA C110/A21.10.
- .6 Cast iron valve boxes: adjustable over minimum of 450 mm complete with valve operating extension rod, 150 mm below cover.
 - .1 Base to be large round type with minimum diameter of 300 mm.
 - .2 Top of box to be marked "WATER"/"EAU".

2.3 SERVICE CONNECTIONS

- .1 Copper tubing: to ASTM B88M type K, annealed.
- .2 Polyethylene pressure pipe:
 - .1 To ASTM F714, Type PE, series DR 11 to CAN/CSA-B137.1, type PE, series 160.
- .3 Copper tubing joints: compression type suitable for 1 MPa working pressure.
- .4 Polyethylene pipe joints: plastic insert type serrated sleeves with four stainless steel screws and band-type clamps per joint thermal butt fusion welded.
- .5 Brass inverted key-type curb stops: red brass to ASTM B62 , compression type.
 - .1 Curb stops to have adjustable bituminous coated cast iron service box with stem to suit depth of bury.
 - .2 Top of cast iron box marked "WATER"/"EAU".
- .6 Polyethylene tapping tees or multi-saddle tees: for Polyethylene pipe. Tees to be socket fused to pipe.

2.4 HYDRANTS

- .1 Post type hydrants: compression type hydrant, to CAN/ULC-S520.
 - .1 Hydrants to open counter clockwise, threads to local standard, fittings to be internal lug quick-connect to CAN/ULC-S543. Provide metal caps and chains.
 - .2 Provide key operated gate valve located 1 m from hydrant.
 - .3 Depth of bury 1.8m.
- .2 Hydrant paint: exterior enamel to MPI #96.

2.5 PIPE BEDDING AND SURROUND MATERIAL

- .1 Granular material to: Section 31 23 33 and following requirements:
 - .1 Crushed or screened stone, gravel or sand.
 - .2 Gradations to be within limits specified when tested to ASTM C117 and ASTM C136. Sieve sizes to CAN/CGSB-8.2 and CAN/CGSB-8.1.

2.6 BACKFILL MATERIAL

- .1 As indicated: And as per Section 31 23 33.01- Excavating, Trenching and Backfilling.

2.7 PIPE DISINFECTION

- .1 Liquid chlorine to ANSI/AWWA B301, ANSI/AWWA B300, ANSI/AWWA B303 to disinfect water mains.
- .2 Disinfect water mains in accordance with ANSI/AWWA C651.

Part 3 Execution

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 TRENCHING

- .1 Do trenching work in accordance with Section 31 23 33.01- Excavating, Trenching and Backfilling.
- .2 Ensure trench depth allows coverage over pipe as indicated.
- .3 Trench alignment and depth require Departmental Representative's approval prior to placing bedding material and pipe.

3.4 GRANULAR BEDDING

- .1 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.
- .2 Do not place material in frozen condition.
- .3 Shape bed true to grade to provide continuous uniform bearing surface for pipe.
- .4 Shape transverse depressions in bedding as required to suit joints.
- .5 Compact each layer full width of bed to 95 % maximum density to ASTM D698.
- .6 Fill authorized or unauthorized excavation below design elevation of bottom of specified bedding in accordance with Section 31 23 33.01- Excavating, Trenching and Backfilling with compacted bedding material.

3.5 PIPE INSTALLATION

- .1 Terminate building water service 1 m outside building wall opposite point of connection to main.
 - .1 Install coupling necessary for connection to building plumbing.
 - .2 If plumbing is already installed, make connection; otherwise cap or seal end of pipe and place temporary marker to locate pipe end.
- .2 Lay pipes to manufacturer's standard instructions and specifications.
 - .1 Do not use blocks except as specified.
- .3 Join pipes in accordance with manufacturer's recommendations.
- .4 Bevel or taper ends of PVC pipe to match fittings.
- .5 Handle pipe by methods recommended by pipe manufacturer. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends.
- .6 Lay pipes on prepared bed, true to line and grade.
 - .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
 - .2 Take up and replace defective pipe.
 - .3 Correct pipe which is not in true alignment or grade or pipe which shows differential settlement after installation greater than 10 mm in 3 m.
- .7 Face socket ends of pipe in direction of laying. For mains on grade of 2 % or greater, face socket ends up-grade.
- .8 Do not exceed permissible deflection at joints as recommended by pipe manufacturer.

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- .9 Keep jointing materials and installed pipe free of dirt and water and other foreign materials.
 - .1 Whenever work is stopped, install a removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
 - .10 Position and join pipes with equipment and methods approved by Departmental Representative.
 - .11 Cut pipes in approved manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
 - .12 Align pipes before jointing.
 - .13 Install gaskets to manufacturer's recommendations. Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
 - .14 Avoid displacing gasket or contaminating with dirt or other foreign material.
 - .1 Remove disturbed or contaminated gaskets.
 - .2 Clean, lubricate and replace before jointing is attempted again.
 - .15 Complete each joint before laying next length of pipe.
 - .16 Minimize deflection after joint has been made.
 - .17 Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations.
 - .18 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes or as otherwise approved by Departmental Representative.
 - .19 When stoppage of work occurs, block pipes in an approved manner to prevent creep during down time.
 - .20 Recheck plastic pipe joints assembled above ground after placing in trench to ensure that no movement of joint has taken place.
 - .21 Do not lay pipe on frozen bedding.
 - .22 Do hydrostatic and leakage test and have results approved by Departmental Representative before surrounding and covering joints and fittings with granular material.
 - .23 Backfill remainder of trench.

3.6 VALVE INSTALLATION

- .1 Install valves to manufacturer's recommendations at locations as indicated.
- .2 Support valves located in valve boxes or valve chambers by means of concrete located between valve and solid ground. Valves not to be supported by pipe.
- .3 Install underground post-type indicator valves as indicated.

3.7 SERVICE CONNECTIONS

- .1 Terminate building water service 1 m outside building wall opposite point of connection to main.

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- .1 Install coupling necessary for connection to building plumbing.
 - .2 If plumbing is already installed, make connection, otherwise cap or seal end of pipe and place temporary marker to locate pipe end.
 - .2 Do not install service connections until satisfactory completion of hydrostatic and leakage tests of water main.
 - .3 Construct service connections at right angles to water main unless otherwise directed. Locate curb stops 300 mm inside right-of-way.

3.8 HYDRANTS

- .1 Install hydrants at locations as indicated.
- .2 Install hydrants in accordance with AWWA M17.
- .3 Set hydrants plumb, with hose outlets parallel with edge of pavement or curb line, with pumper connection facing roadway and with body flange set at elevation of 50 mm above final grade.
- .4 Place concrete thrust blocks as indicated and specified ensuring that drain holes are unobstructed.
- .5 To provide proper draining for each hydrant, excavate pit measuring not less than 1 x 1 x 0.5 m deep and backfill with coarse gravel or crushed stone to level 150 mm above drain holes.
- .6 Place appropriate sign on installed hydrants indicating whether or not they are in service during construction.

3.9 THRUST BLOCKS AND RESTRAINED JOINTS

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

3.10 HYDROSTATIC AND LEAKAGE TESTING

- .1 Do tests in accordance with ANSI/AWWA C600.
- .2 Provide labour, equipment and materials required to perform hydrostatic and leakage tests hereinafter described.
- .3 Notify Departmental Representative at least 24 hours in advance of proposed tests.
 - .1 Perform tests in presence of Departmental Representative.
- .4 Where section of system is provided with concrete thrust blocks, conduct tests at least 5 days after placing concrete or 2 days if high early strength concrete is used.
- .5 Test pipeline in sections not exceeding 365 m in length, unless otherwise authorized by Departmental Representative.

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- .6 Upon completion of pipe laying and after Departmental Representative has inspected Work in place, surround and cover pipes between joints with approved granular material placed to dimensions indicated as directed by Departmental Representative.
 - .7 Leave hydrants, valves, joints and fittings exposed.
 - .8 When testing is done during freezing weather, protect hydrants, valves, joints and fittings from freezing.
 - .9 Strut and brace caps, bends, tees, and valves, to prevent movement when test pressure is applied.
 - .10 Open valves.
 - .11 Expel air from main by slowly filling main with potable water.
 - .1 Install corporation stops at high points in main where no air-vacuum release valves are installed.
 - .2 Remove stops after satisfactory completion of test and seal holes with plugs.
 - .12 Thoroughly examine exposed parts and correct for leakage as necessary.
 - .13 Apply hydrostatic test pressure.
 - .14 Examine exposed pipe, joints, fittings and appurtenances while system is under pressure.
 - .15 Remove joints, fittings and appurtenances found defective and replace with new sound material and make watertight.
 - .16 Repeat hydrostatic test until defects have been corrected.
 - .17 Apply leakage test pressure of 150 psi for a minimum of 2 hours.
 - .18 Define leakage as amount of water supplied from water metre in order to maintain test pressure for 2 hours.
 - .19 Do not exceed allowable leakage of 0.082 L/mm of pipe diameter/km.
 - .20 Locate and repair defects if leakage is greater than amount specified.
 - .21 Repeat test until leakage is within specified allowance for full length of water main.

3.11 PIPE SURROUND

- .1 Upon completion of pipe laying and after Departmental Representative has inspected Work in place, surround and cover pipes as indicated.
- .2 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.
- .3 Place layers uniformly and simultaneously on each side of pipe.
- .4 Do not place material in frozen condition.
- .5 Compact each layer from pipe invert to mid height of pipe to at least 95 % maximum density to ASTM D698.
- .6 Compact each layer from mid height of pipe to underside of backfill to at least 90 % of corrected maximum dry density.

3.12 BACKFILL

- .1 Place backfill material, above pipe surround, in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.
- .2 Do not place backfill in frozen condition.
- .3 Under paving and walks, compact backfill to at least 95% maximum density to ASTM D698.
 - .1 In other areas, compact to at least 90% corrected maximum dry density.

3.13 HYDRANT FLOW TESTS

- .1 Conduct flow tests on every hydrant to determine fire flows prior to painting hydrant caps and ports.

3.14 PAINTING OF HYDRANTS

- .1 After installation, paint hydrants red or yellow.
- .2 After hydrant flow tests, paint caps and ports to meet colour selections approved by authority having jurisdiction.

3.15 FLUSHING AND DISINFECTING

- .1 Flushing and disinfecting operations: carried out by specialist contractor under direct control of DCC Representative.
 - .1 Notify Departmental Representative at least 4 days in advance of proposed date when disinfecting operations will begin.
- .2 Flush water mains through available outlets with a sufficient flow of potable water to produce velocity of 1.5 m/s, within pipe for minimum 10 minutes, or until foreign materials have been removed and flushed water is clear.
- .3 Flushing flows as follows:

Pipe Size NPS	Flow (L/s) Minimum
6 and below	38
8	75
10	115
12	150

- .4 Provide connections and pumps for flushing as required.
- .5 Open and close valves, hydrants and service connections to ensure thorough flushing.
- .6 When flushing has been completed to DCC Representative approval, introduce strong solution of chlorine as approved by Departmental Representative into water main and ensure that it is distributed throughout entire system] .
- .7 Disinfect water mains to the requirements of local authority.

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- .8 Rate of chlorine application to be proportional to rate of water entering pipe.
 - .9 Chlorine application to be close to point of filling water main and to occur at same time.
 - .10 Operate valves, hydrants and appurtenances while main contains chlorine solution.
 - .11 Flush line to remove chlorine solution after 24 hours.
 - .12 Measure chlorine residuals at extreme end of pipe-line being tested.
 - .13 Perform bacteriological tests on water main, after chlorine solution has been flushed out.
 - .1 Take samples daily for minimum of 2 days.
 - .2 Should contamination remain or recur during this period, repeat disinfecting procedure.
 - .3 Specialist contractor to submit certified copy of test results.
 - .14 Take water samples at hydrants and service connections, in suitable sequence, to test for chlorine residual.
 - .15 After adequate chlorine residual not less than 50 ppm has been obtained leave system charged with chlorine solution for 24 hours.
 - .1 After 24 hours, take further samples to ensure that there is still not less than 10 ppm of chlorine residual remaining throughout system.

3.16 SURFACE RESTORATION

- .1 After installing and backfilling over water mains, restore surface to original condition as directed by Departmental Representative.

3.17 CLEANING

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

END OF SECTION

