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Part 1 General

1.01 GENERAL CONTEXT & DESCRIPTION OF THE WORK

- .1 The General Contractor shall have expertise or hire a sub contractor with expertise in both the civil and electrical aspects of roads/pathways electrical systems.

The General Contractor shall supply, install, test and commission the equipment, and services including but not limited to the following:

- Remove all identified equipment and materials by Tender Documents.
- Procure all new replacement materials and equipment identified in the tender documents.
- Install all new replacement materials and equipment identified in the tender documents.
- To subcontract all related mechanical and/or civil work required.
- To perform start-up and commissioning of the upgraded system and provide all warranties.
- Provide as built-drawings.
- Provide O&M manuals and Training/demonstration to NCC maintenance contractor/staff as required.

1.02 QUALITY CONTROL

- .1 The objective of this specification is that the specialized contractor provides a complete and functional electrical system, to meet the requirements of this project. An electrician licensed in the Province of Ontario shall complete the electrical portion of the works outlined herein. Installation shall be in accordance with all applicable federal, provincial and municipal codes and by-laws, and installed by workmen skilled in that particular portion of the contract. Do complete the installation in accordance with CSA C22.1-2012.

1.03 CONFORMANCE

- .1 At the end of the works, the Contractor shall confirm in writing to NCC that the works have been completed as per plans and specifications.

1.04 TIME OF START AND COMPLETION

- .1 Begin on-site work upon receipt of notification to commence work. Achieve Total Completion of the work by November 30, 2014.

1.05 CASH FLOW REQUIREMENT

- .1 None required.

1.06 ADDENDA

- .1 Answers to questions directed to the NCC Representative and all amendments to the drawings or specifications during the tender period shall be issued in the form of Addenda to all those who have received the Contract Documents from NCC Procurement Services.
- .2 Addenda form part of the Contract Documents.

1.07 CONTRACT METHOD

- .1 Construct the Work under a single stipulated sum construction contract.

Part 2 Contract Administration

2.01 CONTRACT DOCUMENTS

- .1 All contract documents are complementary. Items indicated in one and not in the other are deemed to be included in the contract work.
- .2 Drawings are intended to convey the scope of work and to indicate general arrangements. Obtain NCC Representative's approval of exact locations before installation.
- .3 Obtain direction from NCC Representative before proceeding if a possible obstacle or interference with an indicated installation is identified.
- .4 When the Contractor encounters an obstacle or interference that could have been reasonably foreseen and the Contractor failed to obtain direction from the NCC Representative in the matter, the NCC Representative may require that the work of the Contractor be modified in whole or part in response to the obstacle or interference. The Contractor shall assume the costs of additional work arising from such work.

2.02 TAXES

- .1 Pay all applicable federal, provincial and municipal taxes.

2.03 FEES, PERMITS, CERTIFICATES AND BY-LAWS

- .1 Provide all authorities having jurisdiction with information appropriate to the exercise of their authority to review, approve and inspect. Assume cost of such submissions.
- .2 Pay all applicable fees and obtain all applicable permits and certificates. Including City road cut permit, and ESA permit.
- .3 Obtain and pay for the municipal building permit.
- .4 Upon request by the NCC Representative, provide inspection certificates to evidence that work conforms to requirements of the authorities having jurisdiction.

2.04 SUBMITTALS

- .1 Administrative
 - .1 Submit to NCC Representative submittals listed for review. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the Work.
 - .2 Work affected by submittal shall not proceed until review is complete.
 - .3 Review submittals and stamp all submittals with Contractor's shop drawing stamp prior to submission to NCC Representative. This review

- represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of the Work and Contract Documents.
- .4 Verify field measurements and affected adjacent Work are coordinated.
- .2 Shop drawings and product data
 - .1 "Shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data that are to be provided by Contractor to illustrate details of a portion of the Work.
 - .2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connection, explanatory notes and other information necessary for completion of Work.
 - .3 Adjustments made on shop drawings by NCC Representative are not intended to change Contract Price.
 - .4 Make changes in shop drawings as NCC Representative may require.
 - .5 Submit four (4) copies, unless indicated otherwise, of shop drawings for each requirement requested in specifications and as NCC Representative may reasonably request.
 - .6 Submit four (4) copies, unless indicated otherwise, of product data sheets or brochures for requirements requested in Specification Sections and as NCC Representative may reasonably request where shop drawings will not be prepared due to standardized manufacture of product.
- .3 Samples
 - .1 Submit for review, samples as requested in respective Specification Sections and as indicated on the drawings.
 - .2 Deliver samples prepaid to NCC Representative's business address.

2.05 SCHEDULE

- .1 Submit a schedule of work for approval, in MS Project or in a form acceptable to NCC Representative, within five (5) days of award of contract. Show in schedule dates for:
 - .1 Shop drawing, material lists and samples submissions;
 - .2 Equipment and material delivery;
 - .3 Work commencement and completion for each trade as corresponds to each trade section of the Specification;
 - .4 Substantial and final completion date within time period required by Contract Documents.
- .2 Submit updated schedules at each progress meeting and as reasonably requested by the NCC Representative.

2.06 COST BREAKDOWN

- .1 Submit to NCC Representative breakdown of Contract price in detail as directed by NCC Representative. Obtain NCC Representative's approval of same prior to first progress claim submission.

- .2 Approved cost breakdown will be used as basis for progress claim payments.

2.07 PROJECT MEETINGS

- .1 Administrative
 - .1 NCC Representative will schedule and administer regular progress meetings throughout the progress of work, at times, frequency and locations set by the NCC Representative.
 - .2 The NCC Representative will distribute written notice of each meeting in advance of meeting date to Contractor, Consultant, and all other affected parties.
 - .3 The Contractor shall attend.
 - .4 The Contractor shall ensure affected Subcontractors attend.
 - .5 The Contractor shall provide physical space, table and seating for the meetings.
 - .6 The NCC Representative will record minutes and include significant proceedings and decisions and identify 'action by' parties.
 - .7 The NCC Representative will reproduce and distribute copies of minutes to meeting participants and affected parties not in attendance.

2.08 AS-BUILT DRAWINGS

- .1 NCC Representative will provide two sets of white prints for record drawing purposes.
- .2 Maintain project record drawings and record accurately all deviations from Contract documents as project progresses. Maintain on-going as-built records on site, ready for inspection during the course of the construction.
- .3 Update these drawings daily.
- .4 Record changes in red. Mark on one set of prints and at completion of project and prior to final inspection, neatly transfer notations to second set and submit both sets to NCC Representative.
- .5 Record the following information:
 - .1 Field changes of dimension and detail.
 - .2 Changes made by Addendum and Change Order.
 - .3 Final location of all devices and equipment.
 - .4 Location of conduit/cable runs, junction and pull boxes.
 - .5 Location of underground services.
 - .6 Provide a cost for the As-Built Drawings in the Contractor cost breakdown.

2.09 DOCUMENTS REQUIRED ON-SITE

- .1 Maintain at job site, one copy each of following:
 - .1 Contract drawings,
 - .2 Specifications,
 - .3 Addenda,
 - .4 Change orders,

- .5 Other modifications to Contract,
- .6 Approved work schedule,
- .7 Permits,
- .8 Field test reports,
- .9 Reviewed shop drawings.
- .10 As-built drawings.

2.10 QUALITY OF EQUIPEMENT, MATERIALS AND WORKMANSHIP

- .1 Use only new materials, unless indicated otherwise.
- .2 Exceed or meet the minimum requirements of standards referenced in the specifications, such as the Canadian Standards Association (CSA), and the National Building Code of Canada (current edition), and of all applicable federal, provincial, and municipal codes. In the case of conflict or discrepancy between these requirements, the most stringent applies.
- .3 Workmanship
 - .1 Workmanship shall be best quality, executed by workers experienced and skilled in respective duties for which they are employed.
 - .2 Employ persons fit for and skilled in their required duties.
 - .3 Assume the costs of redoing work that, in the NCC Representative's opinion, does not meet the specified quality of workmanship.
- .4 Alternatives
 - .1 The NCC Representative will only consider Alternatives
 - .1 for materials, products or processes specified with the term “and/or approved equivalent” applied and;
 - .2 submitted in accordance with the “General Instructions for Tendering”.
 - .2 The NCC Representative will approve alternatives that are in his opinion equal in material content, workmanship and quality to the materials, products or processes identified and at least conformant to the standards specified.
 - .3 Assume the cost of additional work or modifications to the design due to the use of NCC Representative approved alternatives.

2.11 SITE SECURITY

- .1 Site may be subject to vandalism and theft. Provide site security as Contractor deems necessary to ensure protection of Contractor's, materials, equipment, and building.
- .2 Maintain site security for duration of project and until final completion.

2.12 SECURITY AND CONFIDENTIALITY

- .1 Exercise utmost care to ensure the security of any material prepared or received in handling this project.
- .2 Without the prior written permission of the NCC Representative, do not distribute, publish, display or reproduce any documents, photographs, site plans, maps or information related to the project (or collected during the project), in any medium, including the internet.
- .3 Without the prior written permission of the NCC Representative, do not disclose any documents, photographs, site plans, maps or information related to the project unless such disclosure:
 - .1 Is reasonably required to obtain necessary permits and approvals to perform the work;
 - .2 Is reasonably required to facilitate the contracting and performance of subcontractors, consultants and other parties involved in completing the contracted work;
 - .3 Is required by law.
 - .4 When requested by the NCC, return to the NCC all copies of all site photographs and construction documents, site plans and maps related to the project.
 - .5 All the above restrictions apply to all sub-contracts for work and services related to the project.

2.13 RELICS AND ANTIQUITIES

- .1 Protect relics and antiquities, items of historical or scientific interest and similar objects found during the course of work.
- .2 Immediately notify NCC Representative of any findings and await NCC Representative's written instructions before proceeding with work adjacent to findings.
- .3 If any vestiges of early human occupancy of the land are uncovered during construction, suspend construction activity and notify the NCC Representative.
- .4 Relics, antiquities and items of historical or scientific interest shall remain the property of the Crown.

2.14 ENVIRONMENTAL PROTECTION

- .1 Fires
 - .1 Fires and burning of rubbish on site not permitted.
- .2 Disposal of Wastes
 - .1 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.
- .3 Drainage
 - .1 Do not pump water containing suspended materials into waterways, sewer or drainage system.

- .4 Tree and Plant Protection
 - .1 Protect trees and plants on site.
- .5 Pollution Control
 - .1 Control emissions from equipment and plant to local authorities' emission requirements.
 - .2 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.
- .6 Spills Reporting
 - .1 Prepare an environmental emergency measure plan and post at the place of work indicating:
 - .1 The site's refuelling area.
 - .2 The NCC Environmental Emergency Service telephone number (613) 239-5678 x 5353. Call immediately in the event of accidental spill of fuel or other pollutant.
 - .2 Assume financial responsibility to clean up effects of spill.

2.15 WASTE DISPOSAL

- .1 Unless otherwise indicated or specified, materials indicated for removal become the Contractor's property and shall be taken from site.
 - .1 Dispose of waste materials in accordance with requirements of authorities having jurisdiction and as described in the Contract Documents.
 - .2 Retain and submit to the NCC Representative, the dump slips and receipts that indicate the date, the nature and the destination of the materials.

2.16 OPERATION DATA AND MAINTENANCE MANUALS

- .1 Submit to NCC Representative, three (3) copies of approved Operations Data and Maintenance Manuals in both Official Languages, compiled as follows:
 - .1 Bind Data in vinyl hard cover, loose leaf binders for 215mm x 278mm size paper. Binders shall not exceed 75mm thick or be more than 2/3 full.
 - .2 Enclose title sheet labelled "Operation Data and Maintenance Manual", project name, date and list of contents. Project name shall appear of binder face.
 - .3 Organize contents into applicable sections of work to parallel project specification breakdown. Mark each section with labelled tabs and hard paper dividing sheets.
- .2 Include the following information:
 - .1 Maintenance instructions for finished surfaces and materials.
 - .2 Maintenance requirements for all products and systems.
 - .3 Warranties showing:
 - .1 Name and address of project.
 - .2 Warranty commencement date
 - .3 Duration of warranty

- .4 Clear indication of what is being warranted and what remedial action will be taken under the warranty.
- .5 Signature and seal of Warrantor.
- .4 List of spare parts
- .5 One complete set of final shop drawings, indicating corrections and changes made during fabrication and installation.

Part 3 On-Site Activities

3.01 SIGNS

- .1 Site boards and other advertising are prohibited on this project.
- .2 Post site safety signs in both official languages at logical points along site hoarding and at entrance points to the work and at locations directed by NCC Representative.
 - .1 Safety signs shall state that work area is a construction site and that appropriate personal safety equipment shall be worn. Signs shall be fabricated on 16mm painted plywood backboard with mechanically produced block lettering of a contrasting colour to the background. Size sign and provide written and graphic content to the satisfaction of the NCC Representative and authorities having jurisdiction.
- .3 Post site way-finding signs for the public in both official languages at logical points directed by NCC Representative. Assume 4 signs (2 in French and 2 in English) approximately 900mmx1200mm are required.
 - .1 Way-finding signs shall state that due to construction work, the Public is asked to travel around the construction fencing. Signs shall incorporate a highly visible arrow and words keep left or keep right. The NCC Representative shall provide a drawing of graphic content. Signs shall be fabricated on 16mm painted plywood backboard with mechanically produced block lettering of a contrasting colour to the background. Provide two 89x89mm wood posts for each sign and install posts a minimum of 600mm into ground. Assume posts are 2440mm lengths.

3.02 OWNER OCCUPANCY

- .1 The owner will not occupy or use the site in immediate proximity to the existing building during construction period.
- .2 The adjacent recreational pathways, recreational areas, buildings and structures and parking adjacent to the building site will be used by the NCC and the Public. Cooperate with the NCC in scheduling operations to minimize conflict and disturbance and to facilitate usage of nearby areas by the Public and NCC. Do not prevent the public from having access to and through nearby areas
- .3 Provide signage, barricades and other measures needed to ensure the safety of the public.

3.03 CONTRACTOR'S USE OF SITE AND FACILITIES

- .1 NCC Representative will arrange with the Contractor a work schedule and procedures for work entry permit to property. Do not commence work until these requirements have been confirmed and approved by NCC Representative.
- .2 Do not unreasonably encumber exterior of site with materials or equipment.

- .3 Execute the work with least possible disturbance to the normal use of the site.
- .4 Protect grass, trees and other surfaces on the ground from damage in areas not directly affected by the work. Refer to the "DAMAGES" article below.
- .5 Move stored products or equipment as directed by NCC Representative to ensure public pedestrian access around property.
- .6 Provide for personnel and vehicle access. Maintain safe exiting routes from the site and building at all times.
- .7 Provide 48 hours notice to and obtain requisite permissions from the NCC Representative and utility companies of any intended interruption of services. Keep duration of these interruptions to a minimum.
- .8 Park in area designated for Contractor's use unless NCC Representative specifically authorizes other parking arrangements.

3.04 HOURS OF WORK / WORK WEEK

- .1 Hours of work / work week: As required by the Contractor to achieve total completion date defined in the contract documents and within prescribed limits set by authorities having jurisdiction. Coordinate work hours with NCC Representative.

3.05 PROJECT COORDINATION

- .1 Coordinate progress of the Work, progress schedules, submittals, use of the site, temporary utilities and construction facilities and controls.

3.06 SETTING-OUT OF WORK

- .1 Provide devices needed to lay out and carry out the work. Supply such devices as required to facilitate NCC Representative's inspection of work.

3.07 FIRE SAFETY

- .1 Provide fire extinguishers to protect the work in progress.
- .2 Advise NCC Representative of any work that would impede fire apparatus and/or personnel response.
- .3 Know the location of nearest fire alarm box and telephone, including the emergency phone number.
- .4 Observe at all times smoking regulations. There is no-smoking in or near the Work. The NCC Representative will designate a smoking area.

3.08 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS (IF APPLICABLE)

- .1 Installation/Removal

- .1 Provide construction facilities and temporary controls in order to execute work efficiently.
- .2 Remove from site all such work after use.
- .2 Hoarding
 - .1 Provide safety/security hoarding continuously around the entire area of work to protect owner, the public, workers and property from injury, damage, vandalism and theft.
 - .2 Provide hoarding consisting of pre-manufactured self supporting sectional metal fencing, 2440mm high. Securely interlock sections together. Provide an operable and securable gate that allows access through hoarding for tradesmen and equipment. Coordinate location and size of gate with the NCC Representative. The hoarding perimeter / area shall be as required to facilitate the work and shall be around the entire area of work.
 - .3 At completion of the Work remove the hoarding.
- .3 Weather Enclosures
 - .1 Provide weathertight closures at openings in floors and roofs where required to protect building components as the work proceeds.
 - .2 Design enclosures to withstand wind pressure.
- .4 Dust Tight Screens
 - .1 Provide dust tight screens or partitions to localize dust generating activities, and for protection of workers and public passersby.
 - .2 Maintain and relocate protection until such Work is complete.
- .5 Dewatering
 - .1 Provide temporary drainage and pumping facilities to keep excavations, building and site free from water.
- .6 Site Storage/Loading
 - .1 Confine the Work and operations of employees to limits indicated by Contract Documents and as directed by the NCC Representative. Do not unreasonably encumber premises with Products.
 - .2 Do not load or permit to be loaded any part of the Work with a weight or force that will endanger the Work.
- .7 Sanitary Facilities
 - .1 Provide portable sanitary facilities for Contractor use. Locate as directed by NCC Representative.
 - .2 Provide all necessary supplies and maintain in clean condition.
 - .3 At completion of the Work remove from the site.
- .8 Ventilation
 - .1 Provide ventilation to prevent accumulation of dust, fumes, mists, vapours, or gases in areas of Work.
 - .2 Provide ventilation through portable fan(s) exhausted to the out of doors to prevent migration of dust and debris within the building.

- .3 Dispose of exhaust materials in manner that does not contaminate adjacent areas.
- .4 Continue operation of ventilation and exhaust systems for sufficient time after cessation of operations to ensure removal of pollutants.
- .9 Temporary Telephone
 - .1 Provide and pay for temporary telephone necessary for own use.
- .10 Electricity and Water
 - .1 Existing Electrical service required for the work may be used by the Contractor without charge. Ensure capacity is adequate prior to imposing loads. Connect, use, and disconnect at own expense and responsibility. Coordinate with NCC Representative.
 - .2 Provide and pay for temporary service where existing services are unsuitable. Connect, use, and disconnect at own expense and responsibility. Coordinate with NCC Representative.
 - .3 Water service is shut down for the winter season and is not available for use. Provide and pay for water supply required for the work.
- .11 Access Equipment
 - .1 Provide all scaffolding, ladders and lifting equipment required for the work.
- .12 Signage
 - .1 Meet with NCC Representative prior to commencement of work to prepare list of signs and other devices required for the project. Signs and notices for safety and instruction shall be in both official languages. Do not post any sign without prior permission of the NCC Representative.
- .13 Temporary Heating
 - .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
 - .2 Site electrical supply may be used. Ensure capacity is adequate prior to imposing loads. Connect, use and disconnect at own expense and responsibility. Coordinate with NCC Representative. Owner will pay for Electrical Utility usage costs.

3.09 POWER/EXPLOSIVE ACTUATED FASTENING DEVICES

- .1 Do not employ power guns using explosives without prior written permission of NCC Representative.

3.10 PROTECTION OF WORK AND SITE

- .1 Protect finished work against damage until take-over.
- .2 Protect hard and soft landscaping adjacent to the work form damage unless indicated or described otherwise.
- .3 Use only rubber-tired vehicles and equipment for the Work.

3.11 CUTTING AND PATCHING

- .1 Do cutting and patching as indicated and as specified.
- .2 In the absence of explicit indication or specification, and as directed by the NCC Representative, do cutting and patching as follows:
 - .1 Perform cutting, fitting, and patching to complete the Work.
 - .2 Remove and replace defective and non-conforming work that is to form the base or substrate for new work.
 - .3 Perform work to avoid damage to other work.
 - .4 Prepare surfaces to receive patching and finishing.
 - .5 Refinish surfaces to match adjacent finishes; for continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit, unless indicated otherwise.
 - .6 Make cuts with clean, true, smooth edges.

3.12 LOCATION OF EQUIPMENT AND FIXTURES

- .1 Location of equipment, fixtures, outlets and distribution systems indicated or specified are to be considered as approximate.
- .2 Locate equipment, fixtures, outlets and distribution systems to minimize interference between systems, to allow access for maintenance and to maximize the usable space.
- .3 Inform the NCC Representative of a conflicting installation. Install as directed
- .4 Inform NCC Representative of impending installation and obtain approval for actual location

3.13 EXISTING SERVICES

- .1 Where work involves disruption of existing services:
 - .1 Execute work at times directed by NCC Representative,
 - .2 Submit schedule to and obtain approval from NCC Representative for any shutdown or closure of active services,
 - .3 Notify NCC Representative at least 48 h before service disruption,
 - .4 Adhere to approved schedule.
- .2 Immediately advise NCC Representative when unknown services encountered.

3.14 DAMAGES

- .1 Restore or replace to their original condition existing plant material, landscaping, roadways, pathways, structures, finishes, and public utilities which are intended to remain but are damaged during the execution of the work of this contract, or make adequate compensation to affected parties.
- .2 The terms “restore” and “replace” include labour, equipment and material costs.

3.15 CLEAN-UP

- .1 Provide on-site waste containers for collection of waste materials and debris and locate as directed by NCC Representative. Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .2 At the end of each work period, and more often if directed by the NCC Representative, remove debris from site, neatly stack material for use, and clean up generally. Conduct disposal operations to comply with municipal and site ordinances, anti-pollution laws and as required by the Contract Documents.
- .3 Upon completion, remove temporary protections installed under this contract and remove surplus materials. Make good defects noted at this stage.
- .4 Cleaning during construction
 - .1 Clean-up work area as the work progresses in order to prevent migration of dust and debris.
 - .2 Clean as directed by the NCC Representative.
- .5 Final clean-up
 - .1 For site, broom clean hard landscaped surfaces. Rake clean other landscaped areas. Hose down with water and wash hard landscaped surfaces as directed by NCC Representative.
 - .2 Broom clean all interiors before inspection process.
 - .3 Clean as directed by the NCC Representative.

3.16 CLOSEOUT

- .1 Systems Demonstration
 - .1 Prior to final inspection, demonstrate operation of each system to NCC Representative.
- .2 Prior to final inspection, instruct personnel in operation, adjustment, and maintenance of equipment and systems.
- .3 Prior to final inspection turn over maintenance materials indicated or described to the NCC Representative.
- .4 Prior to final inspection, turn over Operations Data and Maintenance Manuals to the NCC Representative.
- .5 Prior to final inspection, turn over As-Built Drawings.

1 General

1.1 RELATED WORK

- .1 Section 01 00 10 General Instructions

1.2 REFERENCES

- .1 Ontario Traffic Manual, Temporary Conditions Book 7.
- .2 Manual of Uniform Traffic Control Devices (latest version), MUTDC.

1.3 SHOP DRAWINGS

- .1 Shop drawings indicating proposed temporary traffic signing layout shall be submitted to the Engineer for review and approval. Submission is to be made a minimum of two (2) weeks prior to installation.
- .2 Submit shop drawings in accordance with Section 01 00 10 General Instructions.
- .3 All submissions to be signed and sealed by Engineer licenced in Ontario for traffic control in Ontario.

2 Products

2.1 MATERIALS

- .1 Supply traffic signs and barricades as per Ontario Traffic Manual, Temporary Conditions Book 7 on Ontario side.
- .2 Provide and install all bilingual signage, and maintain them during construction duration..
- .3 Overlap traffic control signage and devices applicable in both provinces to acceptable industry standards and Engineers approval.

3 Execution

3.1 PROTECTION OF PUBLIC TRAFFIC

- .1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out work or haul materials or equipment.
- .2 When working on travelled way:
 - .1 Place equipment in position to present minimum of interference and hazard to travelling public.
 - .2 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.
 - .3 Do not leave equipment on travelled way overnight.

- .3 Do not close any lanes of road without approval of Engineer. Before re-routing traffic erect signs and devices in accordance with instructions contained in Ontario Traffic Manual, Temporary Conditions Book 7.

3.2 INFORMATIONAL AND WARNING DEVICES

- .1 Provide and maintain signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from project work which requires road user response.
- .2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in Ontario Traffic Manual, Temporary Conditions Book 7.
- .3 Place signs and other devices in locations as per Ontario Traffic Manual, Temporary Conditions Book 7.
- .4 Meet with Engineer prior to commencement of work to prepare list of signs and other devices required for project. If situation on site changes, revise list to approval of Engineer.
- .5 Continually maintain traffic control devices in use by:
 - .1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.
 - .2 Removing or covering signs which do not apply to conditions existing from day to day.
 - .3 Contractor shall maintain daily diary (including weekends and weekdays) of traffic control signs and devices noting the following information:
 - .1 Schematic indicating type and location of each sign, pavement markings and traffic control devices.
 - .2 Traffic accidents including time of inspection, location of incident and photographs.
 - .3 Time of daily sign inspection.

3.3 CONTROL OF PUBLIC TRAFFIC

- .1 Provide flag persons, trained in accordance with, and properly equipped for the following situations:
 - .1 When public traffic is required to pass working vehicles or equipment that block all or part of travelled roadway.
 - .2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.
 - .3 When workmen or equipment are employed on travelled way, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.
 - .4 Where temporary protection is required while other traffic control devices are being erected or taken down.
 - .5 For emergency protection when other traffic control devices are not readily available.
 - .6 In situations where complete protection for workmen, working equipment and public traffic is not provided by other traffic control devices.

3.4 TRAFFIC DETOUR, LANE CLOSURES , PERMITS AND OTHER RESTRICTIONS

- .1 Allow uninterrupted flow of traffic on any City of Ottawa or NCC owned roadway.

- .2 Contractor shall request working land access permits from NCC before any work commencement.

END OF SECTION

1 **GENERAL**

1.1 **RELATED SECTIONS**

- .1 Section 01 00 01 – General Instructions

1.2 **REFERENCES**

- .1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series
.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric

.2 Canadian Standards Association (CSA)
.1 CAN/CSA-A3000-98-A5-98, Portland Cement
.2 CAN/CSA-A23.1-00, Concrete Materials and Methods of Concrete Construction

1.3 **PROTECTION OF EXISTING FEATURES**

- .1 Protect existing features in accordance with Section 01 00 01 – sub Section 2.14
.2 Confirm locations of buried utilities by careful test excavations.
.3 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.
.4 Record location of maintained, re-routed and abandoned underground lines.
.5 Confirm locations of recent excavations adjacent to area of excavation.
.6 Where required for excavation, cut roots or branches as approved by Engineer.

2 **PRODUCTS – Not applicable**

3 **EXECUTION**

3.1 **SITE PREPARATION**

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

3.2 **STOCKPILING**

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

3.3 **DEWATERING AND HEAVE PREVENTION**

- .1 Keep excavations free of water while Work is in progress.

3.4 EXCAVATION

- .1 Advise Engineer at least 7 days in advance of excavation operations for initial cross sections to be taken.
- .2 Remove concrete masonry and other obstructions encountered during excavation in accordance with Section 01 00 01 – Sub Section 2.15.
- .3 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .4 Do not obstruct flow of surface drainage or natural watercourses.
- .5 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

3.5 BACKFILLING

- .1 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .2 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.

3.6 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris , trim slopes, and correct defects as directed by Construction Manager.
- .2 Replace topsoil as indicated.
- .3 Reinstate lawns to elevation which existed before excavation.
- .4 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .5 Clean and reinstate areas affected by Work as directed by Construction Manager.

END OF SECTION

1 **GENERAL – Not applicable**

2 **PRODUCTS**

2.1 **PVC DUCTS AND FITTINGS**

- .1 Rigid PVC duct: to CSA C22.2 No. 211.0 and CSA C22.2 No. 211.2 with moulded fittings, for direct burial expanded flange ends. Nominal length: 6.0 m plus or minus 12 mm.
- .2 Rigid PVC bends, couplings, reducers, bell end fittings, plugs, caps, adaptors same product material as duct, to make complete installation.
- .3 Rigid PVC 90° and 45° bends.
- .4 Rigid PVC 5° angle couplings.
- .5 Expansion joints as required.

2.2 **SOLVENT WELD COMPOUND**

- .1 Solvent cement for PVC duct joints.

2.3 **CABLE PULLING EQUIPMENT**

- .1 6 mm stranded nylon pull rope tensile strength 5 kN.

2.4 **MARKERS**

- .1 Concrete type cable markers: as indicated, with words: "Cable", "Joint" or "Conduit" impressed in top surface, with arrows to indicate change in direction of duct runs.

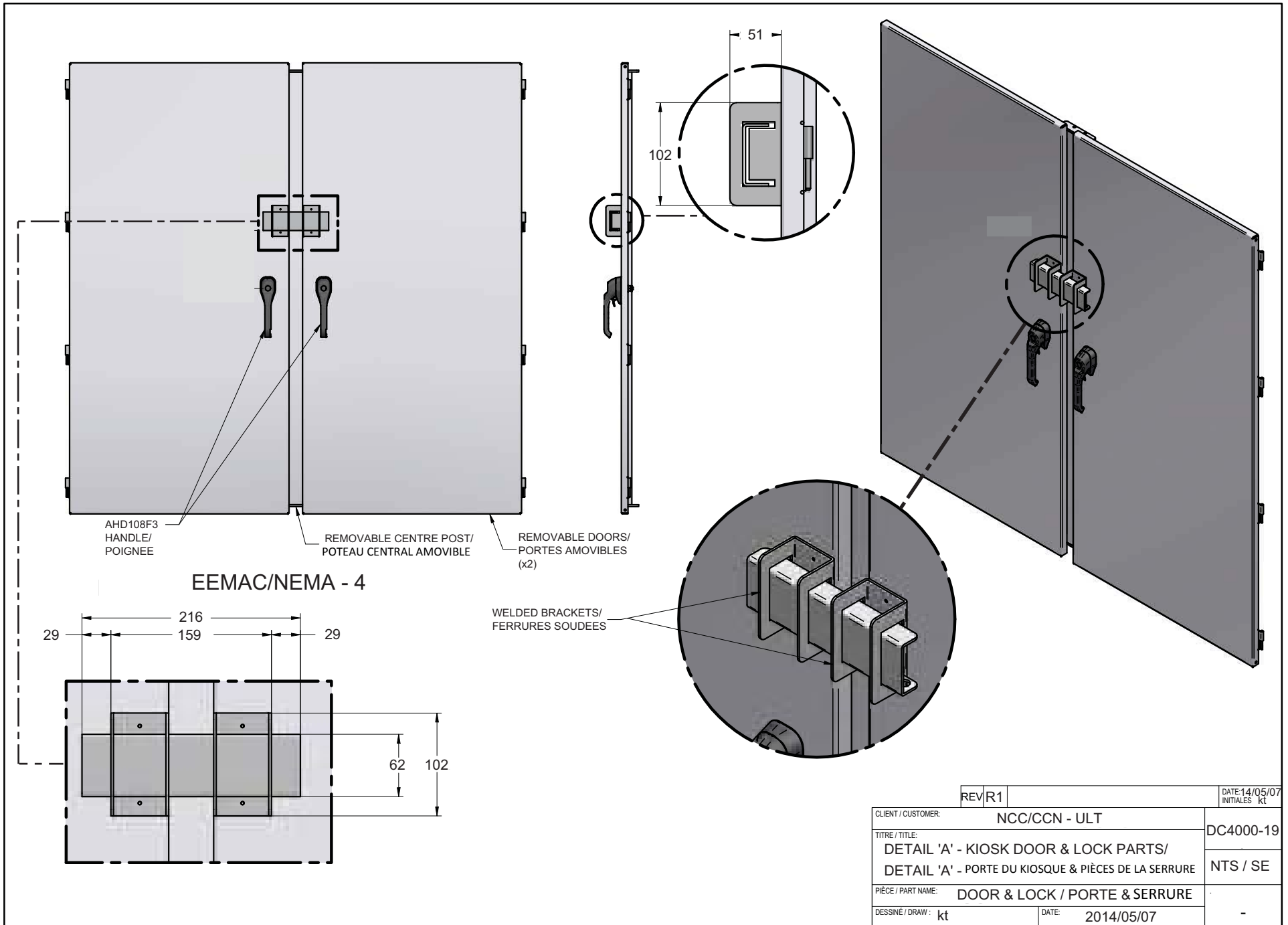
3 **EXECUTION**

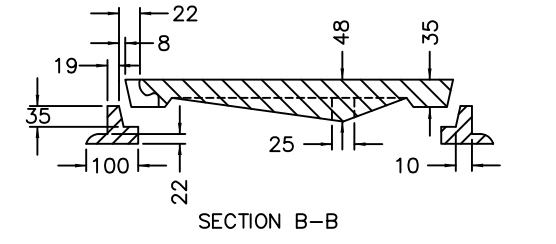
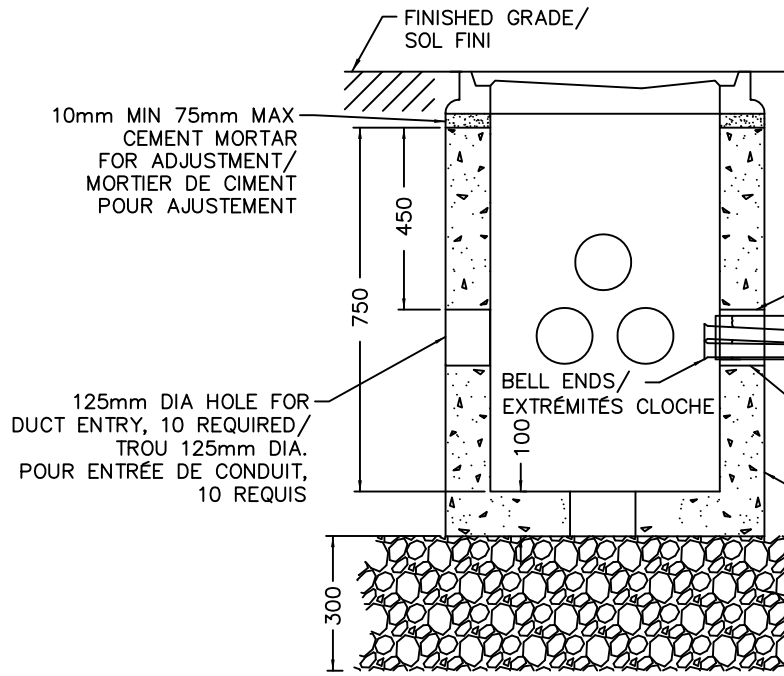
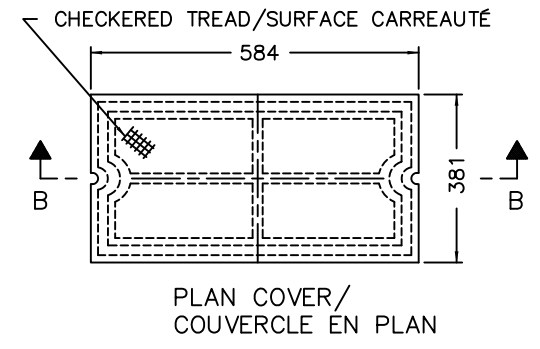
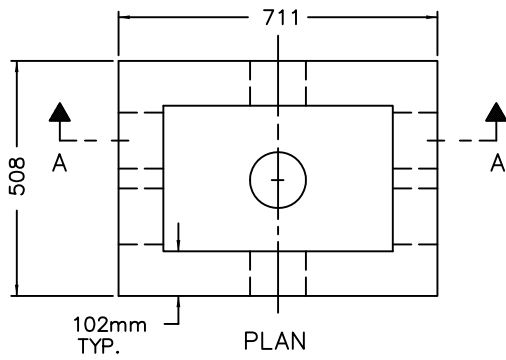
3.1 **INSTALLATION**

- .1 Install duct in accordance with manufacturer's instructions.
- .2 Clean inside of ducts before laying.
- .3 Ensure full, even support every 1.5 m throughout duct length.
- .4 Slope ducts with 1 to 400 minimum slope.
- .5 During construction, cap ends of ducts to prevent entrance of foreign materials.
- .6 Pull through each duct steelmandrel not less than 300 mm long and of diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Pull stiff bristle brush through each duct immediately before pulling-in cables.
- .7 In each duct install pull rope continuous throughout each duct run with 3.0 m spare rope at each end.

- .8 Install markers as required.

END OF SECTION





10mm MIN 75mm MAX
CEMENT MORTAR
FOR ADJUSTMENT/
MORTIER DE CIMENT
POUR AJUSTEMENT

125mm DIA HOLE FOR
DUCT ENTRY, 10 REQUIRED/
TROU 125mm DIA.
POUR ENTRÉE DE CONDUIT,
10 REQUIS

DETAIL NOTE 2

STEEL PIPE ENCASUREMENT/CONDUIT EN ACIER

RIGID PVC DUCTS SIZE AND QUANTITY AS
INDICATED/
CONDUITS RIGIDES EN PVC, TAILLE ET LA
QUANTITÉ TELQU' INDIQUÉE

DETAIL NOTE 1

PRECAST CONCRETE HANDHOLE/
TRAPPE D'ACCÈS PRÉFABRIQUÉ

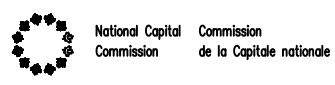
300mm OF COMPACTED GRANULAR 'A' MATERIAL
EXTEND 150mm ALL AROUND/
300mm DE MATÉRIEL GRANULAIRE 'A' COMPACTÉ
PROLONGER 150mm TOUT AUTOUR

DETAIL NOTES:

- 1- GROUT TO BE PLACED FULL DEPTH, FLUSH WITH BOTH WALLS/
LE COULIS DOIT ÊTRE PLEINE PROFONDEUR ET DROIT AVEC CHACUN DES MURS
- 2- GROUT TO BE PLACED WITHIN STEEL PIPE, AROUND ALL DUCTS, TO A MIN.
DEPTH OF 75mm/
LE COULIS DOIT ÊTRE PLACÉ À L'INTÉRIEURE DU CONDUIT EN ACIER, TOUT AUTOUR
LES CONDUITS ET À UN PROFONDEUR MIN. DE 75mm

GENERAL NOTES:

- 1- STANDARDS/ NORMES: OPSD-2112.05; CITY OF OTTAWA/ VILLE D' OTTAWA: LID0008
- 2- MANUFACTURER/ FABRICANT: UTILITY STRUCTURES INC. (USI) E-27 (NCC CUSTOM) WITH/AVEC F4 COVER/CO
OR APPROVED EQUIVALENT/ OU EQUIVALENT APPROVÉ



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projet

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ELECTRICAL INFRASTRUCTURE—HAND HOLE
INFRASTRUCTURE ELECT.—TROU DE MAIN

designed by
conçu par FT / KT

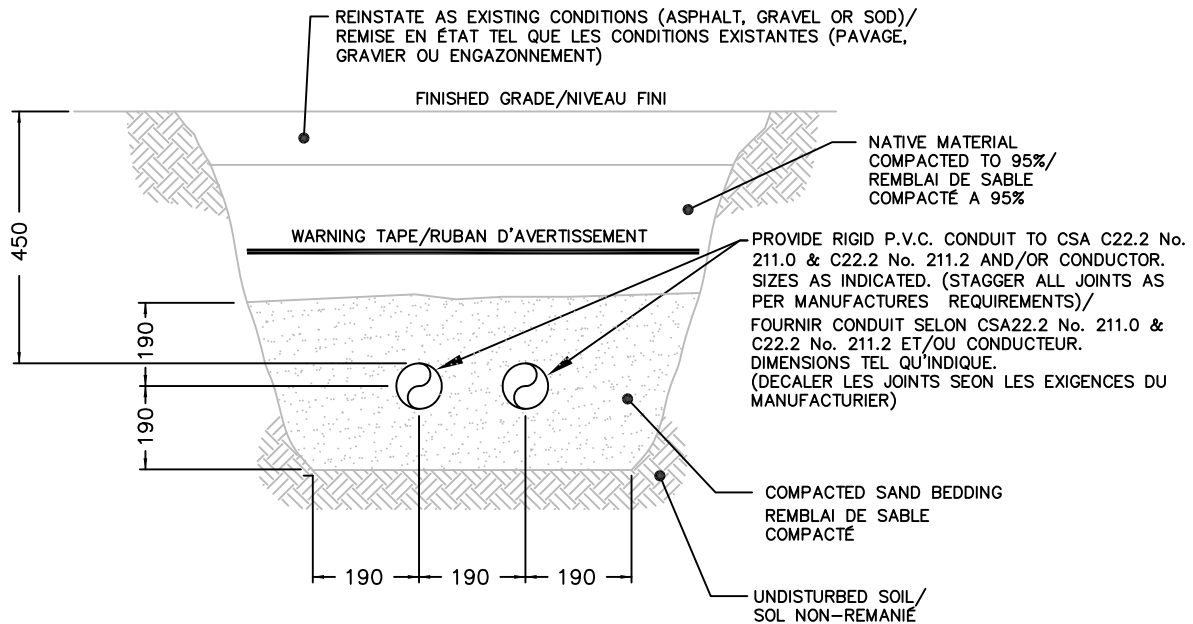
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échelle NTS / SE

date MAY/MAI 2014

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no. de la feuille



NOTES:

- 1- CLEAR DUCTS WITH MANDREL AND PROVIDE 1/4" POLYPROPYLENE PULL ROPE IF DUCT IS EMPTY / NETTOYER LES CONDUITS AVEC UN MANDRIN ET FOURNIR UNE CORDE DE TIRAGE EN POLYPROPYLENE DE 1/4" SI LE CONDUIT EST VIDE.
- 2- IF COVER IS LESS THAN 450MM, THEN PROVIDE 35MPA, 50MM THICK POURED CONCRETE ENCASEMENT WITH CONCRETE WIDTH 150MM GREATER THEN DUCT DIMENSIONAL WIDTH / SI LA PROFONDEUR EST DE MOINS DE 450MM, INSTALLER UN MASSIF EN BÉTON DE 50MM D'ÉPAISSEUR, 35MPA, D'UNE LARGEUR DE 150MM DE PLUS QUE LA LARGEUR DES CONDUITS.
- 3- USE BELL ENDS WHEN TERMINATING DUCT IN HAND HOLE OR MANHOLE / LES EXTRÉMITÉS DES CONDUITS DANS LES REGARDS SERONT DE TYPE ÉVASÉ.
- 4- DUCTS AND TRENCHES MUST BE INSPECTED BY THE NCC PRIOR TO BACKFILL OR CONCRETE POUR / LES CONDUITS ET LES TRANCHÉES DEVRONT ÊTRES INSPECTER PAR LA CCN AVANT DE REMBLAYER OU DE COULER LE BÉTON.



National Capital Commission
Commission de la Capitale nationale

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projet

drawing UNDERGROUND ELECTRICAL-DUCT (1)
dessin SOUTERRAIN ÉLECTRIQUE-TROU DE MAIN

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conçu par FT / KT

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revu par ENGINEERING/
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no. de la feuille