
| | | |
|----------------------|---------------|------------------|
| Jetty Rehabilitation | SPECIFICATION | Section 00 00 00 |
| Erieau, Ontario | TITLE SHEET | Page 1 |
| Project No. 723269 | | 2020-09-10 |

PROJECT TITLE Erieau, Ontario
 Jetty #5 Rehabilitation,
 Timber Pile Removal and
 New Steel Fender Piles

PROJECT NUMBER 723269

PROJECT DATE 2020-09-10

| | | |
|----------------------|------------|------------------|
| Jetty Rehabilitation | SEALS PAGE | Section 00 01 07 |
| Erieau, Ontario | | Page 1 |
| Project No. 723269 | | 2020-09-10 |

DESIGN ENGINEER: Brian Riggs P.Eng., Riggs Engineering Ltd.

| <u>Section</u> | <u>Title</u> | <u>Pages</u> |
|---|---|--------------|
| <u>Division 00 - Procurement and Contracting Requirements</u> | | |
| 00 00 00 | SPECIFICATION TITLE SHEET | 1 |
| 00 01 07 | SEALS PAGE | 1 |
| <u>Division 01 - General Requirements</u> | | |
| 01 11 02 | GENERAL INSTRUCTIONS CIVIL | 7 |
| 01 33 00 | SUBMITTAL PROCEDURES | 6 |
| 01 35 29 | HEALTH AND SAFETY REQUIREMENTS | 6 |
| 01 35 43 | ENVIRONMENTAL PROCEDURES | 6 |
| 01 52 00 | CONSTRUCTION FACILITIES | 4 |
| 01 61 00 | COMMON PRODUCT REQUIREMENTS | 7 |
| 01 74 11 | CLEANING | 2 |
| 01 74 20 | CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL | 2 |
| <u>Division 02 - Existing Conditions</u> | | |
| 02 41 16 | STRUCTURE DEMOLITION - SHORT FORM | 4 |
| <u>Division 03 - Concrete</u> | | |
| 03 30 00 | CAST-IN-PLACE CONCRETE SHORT FORM | 8 |
| <u>Division 05 - Metals</u> | | |
| 05 12 33 | STRUCTURAL STEEL | 7 |
| 05 12 35 | WELDING | 4 |
| 05 50 00 | METAL FABRICATIONS | 5 |
| <u>Division 09 - Finishes</u> | | |
| 09 97 19 | PAINTING EXTERIOR METAL SURFACES | 7 |
| <u>Division 26 - Electrical</u> | | |
| 26 05 00 | COMMON WORK RESULTS FOR ELECTRICAL | 4 |
| 26 05 09 | ELECTRICAL WORK TESTING | 1 |
| 26 05 21 | WIRES AND CABLES (0-1000 V) | 1 |
| <u>Division 31 - Earthwork</u> | | |
| 31 61 13 | PILE FOUNDATIONS, GENERAL REQUIREMENTS | 6 |
| 31 62 16 | FILLED TUBULAR STEEL PILES | 5 |
| <u>Division 35 - Waterway and Marine Construction</u> | | |
| 35 49 25 | TURBIDITY CURTAIN | 4 |
| 35 59 13 | RUBBER MARINE FENDERS | 2 |

PART 1 - GENERAL

1.1 MINIMUM
STANDARDS

- .1 Execute work to meet or exceed:
 - .1 National Building Code of Canada 2015, National Fire Code of Canada 2015, Ontario Building Code 2012 and any other code of provincial or local application, including all amendments up to project date, provided that in any case of conflict or discrepancy, the more stringent requirements shall apply as directed by the Departmental Representative.
 - .2 Rules and regulations of authorities having jurisdiction.
 - .3 Treasury Board of Canada Secretariat, Fire Protection Standard, April 1, 2010.
 - .4 Observe and enforce construction safety measures required by National Building Code 2010, Part 8 Safety Measures at Construction and Demolition Sites, Occupational Health and Safety Act and Regulations for Construction Projects, Revised Statutes of Ontario 1990, Chapter O.1 as amended, O. Reg. 213/91 as amended by O. Reg. 631/94, O. Reg. 143/99, O. Reg. 571/99, O. Reg. 145/00, O. Reg. 527/00, R.R.O. 1990, Reg. 834, O. Reg. 278/05 (Asbestos), Workplace Safety and Insurance Board and municipal statutes and authorities.
 - .5 Environmental Protection Act, O. Reg. 102/94 and O. Reg. 103/94.
 - .6 Ontario Regulation 634/86 for Diving Operations.

1.2 TAXES

- .1 Pay applicable Federal, Provincial and Municipal taxes.

1.3 FEES, PERMITS
AND CERTIFICATES

- .1 Provide authorities having jurisdiction with information requested.
 - .2 Pay fees and obtain certificates and permits required.
 - .3 Furnish certificates and permits when requested.
-

1.4 EXAMINATION

- .1 Before submitting tender, examine existing conditions and determine conditions affecting work.
- .2 Obtain all information which may be necessary for proper execution of Contract.

1.5 SITE

- .1 Confine work, including temporary structures, plant, equipment and materials to established limits of site.
- .2 Locate temporary buildings, roads, walks, drainage facilities, services as directed and maintain in clean and orderly manner.

1.6 CONSTRUCTION &
STORAGE AREA

- .1 The limits of the Construction and Storage Area will be designated by the Departmental Representative prior to commencement of work unless otherwise shown on the Drawings.
- .2 Two sea containers are located in the southwest corner of the fenced compound, which will remain in their present location during construction.
- .3 The segments of the existing HSS curb and electrical pedestals salvaged from Jetty #5 are stored in the northwest corner of the fenced compound.

1.7 DOCUMENTS

- .1 Keep on site one copy of contract documents and reviewed shop drawings.

1.8 MEASUREMENT
PROCEDURES

- .1 Items measured for payment are in metric (SI) units.
 - .2 Submit requests for payment in metric units corresponding with items on the Unit Price Table.
 - .3 Submit supporting documents in metric units. Perform all necessary conversions required.
-

- 1.9 COST BREAKDOWN
- .1 Within one week of notification of acceptance of tender furnish a cost breakdown aggregating the Lump Sum Arrangement.
 - .2 Submit breakdown in metric (SI) units.
- 1.10 PROGRESS MEETINGS
- .1 During course of Work and 2 weeks prior to project completion, schedule progress meetings monthly.
 - .2 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance at progress meetings.
 - .3 Notify parties involved a minimum 2 days prior to each progress meetings.
 - .4 Departmental Representative to chair and record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.
 - .5 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revision to construction schedule.
 - .8 Progress schedule, during succeeding work period.
 - .9 Review submittal schedules: expedite as required.
 - .10 Maintenance of quality standards.
 - .11 Review proposed changes for affect on construction schedule and on completion date.
 - .12 Other business.
- 1.11 AS-BUILT RECORD DRAWINGS
- .1 As work progresses, neatly record significant deviations from the Contract drawings using fine, red marker on full size white prints.
-

1.11 AS-BUILT
RECORD DRAWINGS
(Cont'd)

- .2 Neatly print lettering and numbers in size to match original. Lines may be drawn free-hand but shall be neat and accurate. Add at each title block note: "AS BUILT RECORD".
- .3 Record following significant deviations:
 - .1 Depths of various elements and foundations.
 - .2 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvement.
 - .3 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.
 - .4 Field changes of dimension and elevations.
 - .5 Other significant deviations which are concealed in construction and can not be identified by visual inspection.
- .4 Turn one set of As-Built Record Drawings over to Departmental Representative on completion of work.
- .5 If project is completed without significant deviations from contract drawings declare this in writing and submit to Departmental Representative in lieu of As-Built Record Drawings.

1.12 ADDITIONAL
DRAWINGS

- .1 Departmental Representative may furnish additional drawings to clarify work.
- .2 Such drawings become part of Contract Documents.

1.13 LAYOUT OF WORK

- .1 Immediately upon entering site for purpose of beginning work on this project, locate all general reference points and take proper action necessary to prevent their disturbance. Include marine access points.
 - .2 Supply stakes and other survey markers required for this work. Employ competent personnel to lay out work in accordance with lines and grades provided.
-

- 1.13 LAYOUT OF WORK (Cont'd)
- .3 Maintain all reference points and markers for duration of contract.
 - .4 Establish the centreline of Jetty #5, prior to commencing removals and demolition. Project the centreline shore-ward and establish two fixed control points on land to re-establish the centreline for reconstruction of the Jetty #5.
 - .5 A Temporary Bench Mark is established on the inner northwest corner of Jetty #2, with an elevation of 1.78 m above Chart Datum for Lake Erie
- 1.14 CO-OPERATION & PROTECTION
- .1 Execute work with minimum disturbance to normal use of site work area. Make arrangements with Departmental Representative to facilitate execution of work.
 - .2 Commercial fishing including access to the site and berthage of fish tugs on the jetties is to be accommodated by the contractor until November 30, 2018, after which unobstructed access to the whole site may be anticipated.
 - .3 Construction is to commence on Jetty #5 until unobstructed access to the site is obtained or advance permission is granted by the Departmental Representative.
 - .4 Maintain access and exits.
 - .5 Provide necessary barriers, warning lights and signs. Protect work from damage. Replace damaged existing work with material and finish to match original.
 - .6 Use equipment and procedures that prevent damage to the existing structures.
- 1.15 EXISTING UTILITIES
- .1 Establish location, protect and maintain existing utility lines.
 - .2 Connect to existing utilities with minimum disturbance to pedestrian and vehicular traffic.
-

- 1.15 EXISTING UTILITIES (Cont'd)
- .3 Temporary power is to be maintained to the electrical pedestals on Jetty #3, and Jetty #4 for the duration of the contract or until permanent power is restored.
- 1.16 MATERIAL AND EQUIPMENT
- .1 Use new products unless otherwise specified.
- .2 Deliver and store material and equipment to manufacturer's instructions with manufacturer's labels and seals intact.
- .3 When material or equipment is specified by standard or performance specifications, upon request of Departmental Representative, obtain from manufacturer an independent testing laboratory report, stating that material or equipment meets or exceeds specified requirements.
- 1.17 INSPECTION AND TESTING
- .1 The Departmental Representative may employ an Inspection and Testing company to ensure work conforms with Contract Documents.
- .2 When initial tests and inspections reveal work not to contract requirements, pay for tests and inspections required by Departmental Representative on corrected work.
- .3 Pay for inspection costs specified in other section of the specification for quality control.
- 1.18 SCHEDULING OF WORK
- .1 On award of contract submit bar chart construction schedule for work, indicating anticipated progress stages within time of completion.
- .2 When schedule has been reviewed by the Departmental Representative take necessary measures to complete work within scheduled time. Do not change schedule without notifying Departmental Representative.
-

1.19 FIRES AND
TEMPORARY HEATERS

- .1 Burning of rubbish on site not permitted.
- .2 Only fires for temporary heaters are permitted on site.
- .3 Maintain temperature required to prevent frost damage to work.

1.20 PROGRESS
PHOTOGRAPHS

- .1 As soon as work commences, take daily digital progress photographs from multiple location(s) and send at end of each work day to the Departmental Representative.
- .2 View points, which will best illustrate progress of work, will be selected by Departmental Representative.
- .3 Forward digital photographs by email or file transfer protocol to Departmental Representative each day. Provide a written description and date for each photograph forwarded.

1.21 DATUM

- .1 Elevations and soundings shown on Drawings are expressed in metres relative to Chart Datum Lake Erie IGLD 1985.
- .2 Real time water levels for Erieau may be obtained at <http://waterlevels.gc.ca/eng/station/Month?sid=12250&tz=EST&pres=2&type=1>

1.22 CONSTRUCTION
PARKING

- .1 Parking will be permitted on site provided it does not disrupt performance of Work and normal use of the site.
- .2 Provide and maintain adequate access to project site.

1.23 DEMOBILIZATION

- .1 Complete demobilization of equipment no later than one week after receiving Departmental Representative's written release from work. Do not leave equipment on job site.

PART 1 - GENERAL

1.1 ADMINISTRATIVE

- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
 - .2 Do not proceed with Work affected by submittal until review is complete.
 - .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
 - .4 Where items or information is not produced in SI Metric units converted values are acceptable.
 - .5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
 - .6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
 - .7 Verify field measurements and affected adjacent Work are co-ordinated.
 - .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
 - .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
-

1.1 ADMINISTRATIVE
(Cont'd)

- .10 Keep one reviewed copy of each submission on site.
- .11 Submit number of hard copies specified for each type and format of submittal and also submit in electronic format as pdf files. Forward pdf, NMS-Edit Professional spp, MS Word, MS Excel, MS Project and Autocad dwg files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

1.2 SHOP DRAWINGS
AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
 - .2 When requested submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario of Canada.
 - .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
 - .4 Allow 5 working days for Departmental Representative's review of each submission.
 - .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
-

1.2 SHOP DRAWINGS
AND PRODUCT DATA
(Cont'd)

- .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
 - .7 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
 - .8 Submissions shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
 - .9 After Departmental Representative's review, distribute copies.
 - .10 Submit one electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
-

1.2 SHOP DRAWINGS
AND PRODUCT DATA
(Cont'd)

- .11 Submit one electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
 - .12 Submit one electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
 - .13 Submit one electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
 - .14 Submit one electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
 - .15 Submit three hard copies and one electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
-

1.2 SHOP DRAWINGS
AND PRODUCT DATA
(Cont'd)

- .17 Submit one electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .18 Delete information not applicable to project.
- .19 Supplement standard information to provide details applicable to project.
- .20 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, electronic copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted electronic copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .21 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
 - .2 Deliver samples prepaid to Departmental Representative's business address.
-

1.3 SAMPLES
(Cont'd)

- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Departmental Representative are not intended to change Contract Amount Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 FEES, PERMITS
AND CERTIFICATES

- .1 Provide authorities having jurisdiction with information requested.
- .2 Pay fees and obtain certificates and permits required.
- .3 Furnish certificates and permits.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 Canadian Standards Association (CSA): Canada
 - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
 - .2 National Building Code 2015 (NBC):
 - .1 NBC 2015, Division B, Part 8 Safety Measures at Construction and Demolition Sites.
 - .3 National Fire Code 2015 (NFC):
 - .1 NFC 2015, Division B, Part 5 Hazardous Processes and Operations, subsection 5.6.1.3 Fire Safety Plan.
 - .4 Province of Ontario:
 - .1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.
 - .2 O. Reg. 490/09, Designated Substances.
 - .3 Workplace Safety and Insurance Act, 1997.
 - .4 Municipal statutes and authorities.
 - .5 Treasury Board of Canada Secretariat (TBS):
 - .1 Treasury Board, Fire Protection Standard April 1, 2010
www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=17316§ion=text.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit in accordance with Section 01 33 00.
 - .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 found in work plan.
 - .3 Measures and controls to be implemented to address identified safety hazards and risks.
-

1.2 ACTION AND
INFORMATIONAL
SUBMITTALS
(Cont'd)

- .3 Provide a Fire Safety Plan, specific to the work location, in accordance with NBC, Division B, Article 8.1.1.3 prior to commencement of work. The plan shall be coordinated with, and integrated into, the existing Emergency Procedures and Evacuation Plan in place at the site. Departmental Representative will provide Emergency Procedures and Evacuation Plan. Deliver two copies of the Fire Safety Plan to the Departmental Representative not later than 14 days before commencing work.
 - .4 Contractor's and Sub-contractor's Safety Communication Plan.
 - .5 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. Coordinate plan with existing Emergency Response requirements and procedures provided by Departmental Representative.
 - .6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 3 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 Submit names of personnel and alternates responsible for site safety and health.
 - .9 Submit records of Contractor's Health and Safety meetings when requested.
 - .10 Submit 1 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly.
-

- 1.2 ACTION AND INFORMATIONAL SUBMITTALS
(Cont'd)
- .11 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.
 - .12 Submit copies of incident and accident reports.
 - .13 Submit Material Safety Data Sheets (MSDS).
 - .14 Submit Workplace Safety and Insurance Board (WSIB)- Experience Rating Report.
- 1.3 FILING OF NOTICE
- .1 File Notice of Project with Provincial authorities prior to commencement of Work.
- 1.4 WORK PERMIT
- .1 Obtain building permits related to project prior to commencement of Work.
- 1.5 SAFETY ASSESSMENT
- .1 Perform site specific safety hazard assessment related to project.
- 1.6 MEETINGS
- .1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.
- 1.7 REGULATORY REQUIREMENTS
- .1 Comply with the Acts and regulations of the Province of Ontario.
 - .2 Comply with specified standards and regulations to ensure safe operations at site.
- 1.8 NON-REGULATORY REQUIREMENTS
- .1 Follow guidelines as posted by the Province of Ontario with respect to protection of workers during the COVID 19 pandemic and the prevention of transmission of COVID 19 on the job site.
- 1.8 PROJECT/SITE CONDITIONS
- .1 Work at site will involve contact with:
 - .1 Silica in concrete.
-

- 1.8 PROJECT/SITE CONDITIONS (Cont'd)
- .1 (Cont'd)
 - .2 Guano in on jetty deck surfaces.
 - .3 Work at or near water.
 - .4 Mould on timbers.
- 1.9 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 either accepting or requesting improvements.
 - .3 Relief from or substitution for any portion or provision of minimum Health and Safety standards specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing.
- 1.10 COMPLIANCE REQUIREMENTS
- .1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990 Chapter 0.1, as amended.
- 1.11 RESPONSIBILITY
- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
 - .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
-

- 1.11 RESPONSIBILITY (Cont'd) .3 Where applicable the Contractor shall be designated "Constructor", as defined by Occupational Health and Safety Act and Regulations for Construction Projects for the Province of Ontario.
- 1.12 UNFORESEEN HAZARDS .1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing.
- .2 Follow procedures in place for Employees Right to Refuse Work as specified in the Occupational Health and Safety Act for the Province of Ontario.
- 1.13 POSTING OF DOCUMENTS .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with Departmental Representative.
- .1 Contractor's Safety Policy.
- .2 Constructor's Name.
- .3 Notice of Project.
- .4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).
- .5 Ministry of Labour Orders and reports.
- .6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.
- .7 Address and phone number of nearest Ministry of Labour office.
- .8 Material Safety Data Sheets.
- .9 Written Emergency Response Plan.
- .10 Site Specific Safety Plan.
- .11 Valid certificate of first aider on duty.
- .12 WSIB "In Case of Injury At Work" poster.
- .13 Location of toilet and cleanup facilities.
- 1.14 CORRECTION OF NON-COMPLIANCE .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
-

- 1.14 CORRECTION OF
NON-COMPLIANCE
(Cont'd)
- .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 non-compliance of health and safety regulations is not corrected.

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

- 1.16 POWDER
ACTUATED DEVICES
- .1 Use powder actuated devices only after receipt of written permission from Departmental Representative.

- 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 for Work.
 - .2 Assign responsibility and obligation to Competent Supervisor to stop or start Work when, at Competent Supervisor's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.

PART 2 - PRODUCTS

- 2.1 NOT USED
- .1 Not used.

PART 3 - EXECUTION

- 3.1 NOT USED
- .1 Not used.

PART 1 - GENERAL

- 1.1 DEFINITIONS
- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
 - .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit in accordance with Section 01 33 00.
 - .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets upon request and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 1 digital copy of WHMIS MSDS.
 - .3 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review by Departmental Representative.
 - .4 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.
 - .5 Address topics at level of detail commensurate with environmental issue and required construction tasks.
 - .6 Include in Environmental Protection Plan:
 - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
 - .3 Names and qualifications of persons responsible for training site personnel.
-

1.2 ACTION AND
INFORMATIONAL
SUBMITTALS
(Cont'd)

- .6 (Cont'd)
- .4 Descriptions of environmental protection personnel training program.
 - .5 Drawings indicating locations of proposed material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
 - .6 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.
 - .1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.
 - .7 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.
 - .1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.
 - .8 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
 - .9 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
 - .10 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.
 - .11 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
 - .12 Waste Water Management Plan identifying methods and procedures for management and or discharge of waste waters which are directly derived from construction activities, such as concrete curing water and clean-up water.

1.3 FIRES

- .1 Fires and burning of rubbish on site is not permitted.
-

1.4 WORK ADJACENT
TO WATERWAYS

- .1 Construction equipment to be operated on land only.
- .2 Use waterway beds for borrow material only after written receipt of approval from Departmental Representative.
- .3 Waterways to be kept free of excavated fill, waste material, debris and other deleterious substances.

1.5 IN WATER WORK

- .1 No in water work is permitted between March 15 and July 15.

1.6 POLLUTION
CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
 - .2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.
 - .3 Prevent sandblasting and extraneous materials from contaminating air and waterways beyond application area by providing temporary enclosures.
 - .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
 - .5 Abide by local noise by-laws.
 - .6 Spills of deleterious substances:
 - .1 Immediately contain, limit the spread and clean up in accordance with provincial regulatory requirements.
 - .2 Report immediately to the Ontario Spill
 - .3 Further information on dangerous goods emergency cleanup and precautions including a list of companies performing
 - .7 Re-fuelling of machinery must take place at a safe distance from the waterway as designated by the Departmental Representative.
 - .8 Machinery to arrive on site in a clean, washed condition and maintained free of leaks.
-

1.7 CONCRETE
OPERATIONS
(Cont'd)

- .9 Monitor the pH levels frequently in the waterway immediately downstream of isolated work site until completion of work. Emergency measures shall be taken if pH change more than 1.0 pH unit, measured to an accuracy of 0.2 pH units from the background level or is recorded to be below 6.0 or above 9.0 pH units.
- .10 The pH levels are to be maintained within the range of 6.5-8.5 as per Provincial Water Quality Objectives (PWQO).
- .11 Keep a carbon dioxide (CO2) tank with regulator, hose and gas diffuser readily available during concrete work. Use it to release carbon dioxide gas into the affected area to neutralize pH levels should a spill occur. Train workers to use the tank.

1.8 NOTIFICATION

- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
 - .1 Take action only after receipt of written approval by Departmental Representative.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.
-

PART 3 - EXECUTION

- 3.1 CLEANING
- .1 Progress Cleaning: clean in accordance with Section 01 74 11.
 - .1 Leave Work area clean at end of each day.
 - .2 Bury rubbish and waste materials on site where directed after receipt of written approval from Departmental Representative.
 - .3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.
 - .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.
 - .5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

PART 1 - GENERAL

- 1.1 REFERENCES .1 Canadian Standards Association (CSA International)
.1 CSA Z797-09(R2014), Code of practice for Access Scaffold.
- 1.2 SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00.
- 1.3 INSTALLATION AND REMOVAL .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
.2 Indicate use of supplemental or other staging area.
.3 Provide construction facilities in order to execute work expeditiously.
.4 Remove from site all such work after use.
- 1.4 SCAFFOLDING .1 Scaffolding in accordance with CSA Z797.
.2 Provide and maintain scaffolding ramps ladders and platforms.
- 1.5 HOISTING .1 Provide, operate and maintain hoists/cranes required for moving materials and equipment. Make financial arrangements with Subcontractors for use thereof.
.2 Hoists/cranes shall be operated by qualified operator.
-

1.6 SITE
STORAGE/LOADING

- .1 Confine work and operations of employees to work areas defined by Contract areas defined by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

1.7 CONSTRUCTION
PARKING

- .1 Parking will be permitted on site provided it does not disrupt performance of Work and normal use of the site.
- .2 Provide and maintain adequate access to project site.
- .3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.8 OFFICES

- .1 Provide office heated to 22°C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide a clearly marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors may provide their own offices as necessary. Direct location of these offices.

1.9 EQUIPMENT, TOOL
AND MATERIALS
STORAGE

- .1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.

1.10 SANITARY
FACILITIES

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

1.10 SANITARY
FACILITIES
(Cont'd)

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

1.11 PROTECTION AND
MAINTENANCE OF
TRAFFIC

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
- .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
- .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .4 Protect travelling public from damage to person and property.
- .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
- .7 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .8 Dust control: adequate to ensure safe operation at all times.
- .9 Provide snow removal during period of Work.

1.12 CLEAN-UP

- .1 Remove construction debris, waste materials, packaging material from work site daily.
 - .2 Clean dirt or mud tracked onto paved or surfaced roadways.
-

- | | | |
|---|----|--|
| <u>1.12 CLEAN-UP</u> <u>(Cont'd)</u> | .3 | Store materials resulting from demolition activities that are salvageable. |
| | .4 | Stack stored new or salvaged material. |

PART 2 - PRODUCTS

- | | | |
|---------------------|----|-----------|
| <u>2.1 NOT USED</u> | .1 | Not Used. |
|---------------------|----|-----------|

PART 3 - EXECUTION

- | | | |
|---------------------|----|----------|
| <u>3.1 NOT USED</u> | .1 | Not Used |
|---------------------|----|----------|

PART 1 - GENERAL

1.1 SECTION
INCLUDES

- .1 Product quality, availability, storage, handling, protection, and transportation.
- .2 Manufacturer's instructions.
- .3 Quality of Work, coordination and fastenings.
- .4 Existing facilities.

1.2 RELATED
SECTIONS

- .1 Section 01 45 00 - Quality Control.

1.3 REFERENCES

- .1 Within text of specifications, reference may be made to reference standards.
 - .2 Conform to these standards, in whole or in part as specifically requested in specifications.
 - .3 If there is question as to whether any product or system is in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
 - .4 The cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.
 - .5 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.
 - .6 OPSS Ontario Provincial Standard Specifications and OPSD Ontario Provincial Standard Drawings quoted in these specifications are available online at <http://www.raqsa.mto.gov.on.ca/techpubs/ops.nsf/OPSHomepage>.
-

1.4 QUALITY

- .1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of Products provided.
- .2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.5 AVAILABILITY

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

- 1.5 AVAILABILITY
(Cont'd)
- .2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Amount or Contract Time.
- 1.6 METRIC SIZED
MATERIALS
- .1 SI metric units of measurement are used exclusively on the drawings and in the specifications for this project.
- .2 The Contractor is required to provide metric products in the sizes called for in the Contract Documents except where a valid claim can be made that a particular product is not available on the Canadian market.
- .3 Claims for exemptions from use of metric sized products shall be in writing and fully substantiated with supportive documentation. Promptly submit application to Departmental Representative for consideration and ruling. Non-metric sized products may not be used unless Contractor's application has been approved in writing by the Departmental Representative.
- .4 Difficulties caused by the Contractor's lack of planning and effort to obtain modular metric sized products which are available on the Canadian market will not be considered sufficient reasons for claiming that they cannot be provided.
- .5 Claims for additional costs due to provision of specified modular metric sized products will not be considered.
- 1.7 STORAGE,
HANDLING AND
PROTECTION
- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
-

1.7 STORAGE,
HANDLING AND
PROTECTION
(Cont'd)

- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials, lumber, structural steel, pipe piles on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.8 TRANSPORTATION

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

1.9 MANUFACTURER'S
INSTRUCTIONS

- .1 Unless otherwise indicated in 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.
-

- 1.9 MANUFACTURER'S INSTRUCTIONS
(Cont'd)
- .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative may establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Amount or Contract Time.
- 1.10 QUALITY OF WORK
- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.
- 1.11 CO-ORDINATION
- .1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.
- 1.12 CONCEALMENT
- .1 Before installation, inform Departmental Representative if there is interference. Install as directed by Departmental Representative.
-

- 1.13 REMEDIAL WORK .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

- 1.14 LOCATION OF FIXTURES .1 Consider location electrical pedestals and electrical items indicated as approximate.
- .2 Inform Departmental Representative of conflicting installation. Install as directed.

- 1.15 PROTECTION OF WORK IN PROGRESS .1 Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

- 1.16 EXISTING UTILITIES .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or occupants.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

PART 2 - PRODUCTS

- 2.1 NOT USED .1 Not Used.
-

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

1.1 SECTION
INCLUDES

- .1 Progressive cleaning.
- .2 Final cleaning.

1.2 PROJECT
CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner or other Contractors.
- .2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .3 Clear snow and ice from site bank/pile snow in designated areas only remove from site.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Provide and use clearly marked separate bins for recycling. Refer to Section 01 74 20.
- .7 Remove waste material and debris from site and deposit in waste container at end of each working day.

1.3 FINAL CLEANING

- .1 When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
 - .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
 - .3 Prior to final review, remove surplus products, tools, construction machinery and equipment.
-

- 1.3 FINAL CLEANING
(Cont'd)
- .4 Remove waste products and debris other than that caused by normal use of the site or other Contractors.
 - .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
 - .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
 - .7 Sweep clean paved areas.

PART 2 - PRODUCTS

- 2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

- 3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

1.1 CONSTRUCTION &
DEMOLITION WASTE

- .1 Carefully deconstruct and source separate materials and divert, from D&C waste destined for landfill to maximum extent possible. Reuse, recycle, compost, anaerobic digest or sell material for reuse except where indicated otherwise. On site sales are not permitted.
- .2 Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.
 - .1 Provide facilities for collection, handling and storage of source separated wastes.
 - .2 Source separate the following waste:
 - .1 Portland cement concrete.
 - .2 Corrugated cardboard.
 - .3 Wood, not including painted or treated wood or laminated wood.
 - .4 Steel.
- .3 Submit a waste reduction workplan indicating the materials and quantities of material that will be recycled and diverted from landfill.
 - .1 Indicate how material being removed from the site will be reused, recycled, composted or anaerobically digested.
- .4 Submit proof that all waste is being disposed of at a licensed land fill site or waste transfer site. A copy of the disposal/waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.

1.2 WASTE
PROCESSING SITES

- .1 Province of: Ontario.
 - .1 Ministry of Environment and Energy, 135 St. Clair Avenue West, Toronto, ON, M4V 1P5.
 - .2 Telephone: 800-565-4923 or 416-323-4321.
 - .3 Fax: 416-323-4682.
 - .2 Recycling Council of Ontario: 215 Spadina Avenue, #225, Toronto, ON, M5T 2C7.
-

1.2 WASTE PROCESSING SITES (Cont'd)

.2 (Cont'd)

.1 Telephone: 416-657-2797 or 1-888-501-9637.

.2 Fax: 416-960-8053.

.3 Email: rco@rco.on.ca.

.4 Internet: http://www.rco.on.ca/.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 CANADIAN GOVERNMENTAL .1 Government Chief Responsibility for the Environment.

| Address | General | Fax |
|---------|-----------|-----|
| | Inquiries | |

Province

| | | | |
|---------|---|----------------------------------|----------------|
| Ontario | Ministry of Environment and Energy 135 St Clair Avenue West Toronto, ON M4V 1P5 | (416) 323-4321 (800) 565-4923 | (416) 323-4682 |
| | Environment Canada Toronto, ON | (416) 734-4494 | |

PART 1 - GENERAL

- 1.1 REFERENCES .1 Canadian Standards Association (CSA International)
.1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
- 1.2 MEASUREMENT PROCEDURES .1 Timber fender pile removal shall be measured by each pile removed and disposed and shall include all labour, materials and equipment necessary to complete the work.
.2 Steel fender pile removal shall be measured by each pile removed and disposed and shall include all labour, materials and equipment necessary to complete the work.
.3 Demolition and removal of Jetty #5, and salvaging of rubber fenders including all labour, materials and equipment necessary to complete the work shall be included in the Lump Sum arrangement and not measured separately for payment.
- 1.3 SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00.
.2 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 20 and indicate:
.1 Descriptions of and anticipated quantities in percentages of materials to be salvaged reused, recycled and landfilled.
.2 Schedule of selective demolition.
.3 Number and location of dumpsters.
.4 Anticipated frequency of tippage.
.5 Name and address of waste facilities.
- 1.4 DELIVERY, STORAGE AND HANDLING .1 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.
-

1.5 SITE CONDITIONS .1 Notify Departmental Representative before disrupting services.

PART 2 - PRODUCTS

2.1 EQUIPMENT .1 Leave equipment and machinery running only while in use, except where extreme temperatures prohibit shutting down.

.2 Demonstrate that tools and machinery are being used in manner which allows for salvage of materials in best condition possible.

PART 3 - EXECUTION

3.1 PREPARATION .1 Do Work in accordance with Section 01 35 29.

.2 Protection:

.1 Prevent movement, settlement, or damage to adjacent structures, utilities, to remain in place. Provide bracing and shoring required.

.2 Keep noise, dust, and inconvenience to normal use of site to minimum.

.3 Protect services and equipment.

.4 Provide temporary dust screens, covers, railings, supports and other protection as required.

.3 Protect disconnected electrical service lines. Post warning signs on electrical lines and equipment which must remain energized to serve others during period of demolition.

.4 Locate and protect utility lines. Do not disrupt active or energized utilities traversing premises designated to remain undisturbed.

3.2 DEMOLITION
SALVAGE AND
DISPOSAL .1 Remove parts of existing Jetty #5 as indicated to permit new construction. Sort materials into appropriate piles for reuse and recycling or disposal.

- 3.2 DEMOLITION
SALVAGE AND
DISPOSAL
(Cont'd)
- .2 Supporting piles under the existing Jetty #5 consist of concentric pipes corrugated steel pipe with concrete fill and corrugated polyethylene pipe with grout fill around the original timber piles. The Contractor may choose to cut off these piles at the indicated elevation or remove and dispose the timber piles completely with encasements.
 - .3 Rubber fenders on Jetty #5 are to be removed and salvaged for reused on the reconstructed Jetty #5.
 - .4 Storage and Handling Requirements of Salvaged Rubber Fenders:
 - .1 Store fenders off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect fenders from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged fenders resulting from Contractors actions with new.
- 3.3 TIMBER FENDER
PILES
- 1 Remove indicated timber fender pile.
- 3.4 STEEL FENDER
PILES
- .1 Remove indicated steel fender piles.
- 3.5 STOCKPILING
- .1 Label stockpiles, indicating material type and quantity.
 - .2 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.
-

- 3.6 REMOVAL FROM SITE
- .1 Transport material designated for alternate disposal to approved facilities listed in waste reduction workplan and in accordance with applicable regulations. Do not deviate from facilities listed in waste reduction workplan without prior written authorization from Departmental Representative.
 - .2 Dispose of materials not designated for alternate disposal in accordance with applicable regulations. Disposal facilities must be approved of and listed in waste reduction workplan. Do not deviate from disposal facilities listed in waste reduction workplan without prior written authorization from Departmental Representative.
- 3.7 CLEANING AND RESTORATION
- .1 Keep site clean and organized throughout demolition procedure.
 - .2 Upon completion of project, reinstate areas, affected by Work to condition which existed prior to beginning of Work match condition of adjacent, undisturbed areas.

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 05 12 35 - Welding.
- .2 Section 05 50 00 - Metal Fabrication

1.2 MEASUREMENT PROCEDURES

- .1 Cast in place concrete deck slab including installation of reinforcing steel, permanent steel forms, steel decking and welding shall be measured by the square metre of deck slab area and shall include all labour, materials and equipment necessary to complete the work including the quality control plan and cold weather protection. Saw cutting and/or forming of transverse control joints, placement of backer rod and joint sealer shall be considered included in the deck slab and will not be measured separately for payment.
- .2 Cast in place approach slab including, saw cutting and removal of the existing asphalt pavement, excavation and compaction of sub-base, installation of reinforcing steel, cutting of the existing steel sheet piles, permanent steel forms, and welding shall be measured by the square metre deck slab area and shall include all labour, materials and equipment necessary to complete the work including the quality control plan and cold weather protection.

1.3 REFERENCES

- .1 ASTM International
 - .1 ASTM C260/C260M-10a(2016), Standard Specification for Air-Entraining Admixtures for Concrete.
 - .2 ASTM C309-19, Standard Specification for Liquid Membrane-Forming Compound for Curing Concrete.
 - .3 ASTM C494/C494M-19, Standard Specification for Chemical Admixtures for Concrete.
 - .4 ASTM C920-18, Standard Specification for Elastomeric Joint Sealants.
 - .5 ASTM C1016-14, Standard Test Method for Determination of Water Absorption of Sealant Backing (Joint Filler) Material.
-

- 1.3 REFERENCES (Cont'd)
- .1 (Cont'd)
 - .6 ASTM D624-00(2020) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
 - .7 ASTM D698-12e2, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
 - .8 ASTM D1622-20, Standard Test Method for Apparent Density of Rigid Cellular Plastics.
 - .9 ASTM D1623-17, Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
 - .10 ASTM D2240-15e1, Standard Test Method for Rubber Property-Durometer Hardness.
 - .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-19.24-M90, Multicomponent, Chemical-Curing Sealing Compound.
 - .3 CSA International
 - .1 CSA A23.1-19/A23.2-19, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA-A3000-18, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .3 CSA G30.18-09(R2019), Carbon Steel Bars for Concrete Reinforcement.
- 1.4 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Provide submittals in accordance with Section 01 33 00.
 - .2 At least 4 weeks prior to beginning Work, inform Departmental Representative of source of fly ash.
 - .1 Do not change source of fly ash without written approval of Departmental Representative.
 - .3 At least 4 weeks prior to beginning Work, submit to Departmental Representative samples of following materials proposed for use: curing compound, joint sealants and cold weather protection.
 - .4 Provide mix design for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.
-

1.6 DELIVERY,
STORAGE AND
HANDLING
(Cont'd) .3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA .1 Alternative 1 - Performance: to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

2.2 PERFORMANCE
CRITERIA .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

2.3 MATERIALS .1 Cement: to CAN/CSA-A3001, Type GU.
.2 Supplementary cementing materials: with maximum 20% Type F fly ash replacement or GGBFS, by mass of total cementitious materials to CAN/CSA-A3001.
.3 Water: to CSA A23.1/A23.2.
.4 Reinforcing bars: to CSA G30.18, Grade 400W.
.5 Admixtures:
.1 Air entraining admixture: to ASTM C260/C260M.
.2 Chemical admixture: to ASTM C494/C494M. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
.6 Curing compound: to CSA A23.1/A23.2 and ASTM C309, Type 1-D, Class B resin based.
.7 Joint sealant: two component, premium grade polyurethane based elastomeric sealant, self levelling:
.1 to ASTM C920 Type M, Grade NS, Use T and I.

- 2.3 MATERIALS (Cont'd)
- .7 (Cont'd)
 - .2 to ASTM D2240, Shore A Hardness 40±5.
 - .3 to ASTM D624, tear strength 17.5 N/mm.
 - .8 Backer rod: closed cell, low density polyethylene, chemically inert and resistant to oil, gasoline and most solvents.
 - .1 to ASTM D1622, density 32 kg/m³.
 - .2 to ASTM D1623, tensile strength 345 kPa.
 - .3 to ASTM C1016, water absorption 0.03gm/cc.
 - .9 Plates, shapes and bars: to Section 05 50 00.
 - .10 Welding: to Section 05 12 35.
- 2.4 MIXES
- .1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.
 - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as described in PART 3 - VERIFICATION.
 - .2 Provide concrete mix to meet following hard state requirements:
 - .1 Durability and class of exposure: C-1.
 - .2 Compressive strength at 28 days: 35 MPa minimum.
 - .3 Intended application: cast in place deck slab and bonded topping on existing hollow core slabs.
 - .4 Aggregate size 19 mm maximum.
 - .5 Surface texture: coarse broom finish.
 - .6 Pre-qualification: yes.
 - .3 Concrete supplier's certification.
 - .4 Provide quality management plan to ensure verification of concrete quality to specified performance.

PART 3 - EXECUTION

- 3.1 PREPARATION
- .1 Provide Departmental Representative 24 hours notice before each concrete pour.
-

- 3.1 PREPARATION
(Cont'd)
- .2 During concreting operations:
 - .1 Development of cold joints not allowed.
 - .2 Ensure concrete delivery and handling facilitates placing with minimum of rehandling, and without damage to existing structure or Work.
 - .3 Protect previous Work from staining.
 - .4 Clean and remove stains prior to application of concrete finishes.
- 3.2 FORMWORK
- .1 Erect formwork to CAN/CSA-A23.1-04/A23.2-04.
 - .2 Install steel decking and permanent steel forms to indicated details. Provide closures along the troughs of the steel decking at each pile cap.
 - .3 Do welding to Section 05 12 35.
- 3.3 APPROACH SLAB
- .1 Saw cut full depth existing asphalt pavement along the limits of the approach ramp.
 - .2 Excavate the existing granular sub-base to the depth of the approach slab. Grade the sub-base and compact to ASTM D698, 98% Standard Proctor.
 - .3 Cut off the existing steel sheet pile within the north and south limits of the approach ramp.
 - .4 Fabricate and install the permanent steel
 - .5 complete welding to Section 05 12 35.
- 3.4 PLACING REINFORCEMENT
- .1 Accurately place reinforcing steel, plates and bars in the positions and to elevations indicated on the drawings and hold firmly during the placing, compacting and setting of concrete.
-

- 3.4 PLACING REINFORCEMENT
(Cont'd)
- .2 Reinforcement and bars must be in place and inspected by the Departmental Representative 24 hours minimum before concrete is placed. Provide timely notice to Departmental Representative in advance of a concrete pour.
- 3.5 INSTALLATION/APPLICATION
- .1 Do cast-in-place concrete work in accordance with CSA A23.1/A23.2.
- .2 Complete work to the following tolerances to CSA A23.1/A23.2:
- .1 Straight to 1:500.
 - .2 Thickness to 6 mm.
- .3 Sleeves and inserts:
- .1 Cast in reinforcement and other inserts required to be built-in.
- 3.6 FINISHES
- .1 Cast in place concrete slab:
- .1 Screed to plane surfaces and use magnesium floats.
 - .2 Slope concrete surface to indicated grade.
 - .3 Provide rounded edges at joints and visible edges using standard tools.
 - .4 Trowel smooth to provide coarse brushed non-slip finish.
- 3.7 CONTROL JOINTS
- .1 Cut and/or form 12 mm wide transverse control joints in deck slab at the centreline of each pile bent and install sealer specified for complete with backer rod. Depth to be sufficient to accommodate backer rod and sealant in accordance with manufacturer's recommendations for the joint width.
- 3.8 COLD WEATHER PROTECTION
- .1 Provide cold weather protection in accordance with CSA A23.1/A23.2.
- .2 Provide details of cold weather protection showing compliance with CSA A23.1/A23.2.
-

- 3.9 CURING .1 Use curing compounds compatible with applied finish on concrete surfaces free of bonding agents and to CSA A23.1/A23.2.
- 3.10 FIELD QUALITY CONTROL .1 Concrete testing: to CSA A23.1/A23.2 and CSA A283-06 testing laboratory with CCIL certified field concrete technician designated and paid for by the Contractor.
- 3.11 CLEANING .1 Clean in accordance with Section 01 74 11.
- .2 Use trigger operated spray nozzles for water hoses.
- .3 Designate cleaning area for tools to limit water use and runoff.
- .4 Cleaning of concrete equipment to be done in accordance with Section 01 35 43.
- .5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
- .1 Divert unused concrete materials from landfill to local quarry or facility after receipt of written approval from Departmental Representative.
- .2 Provide appropriate area on job site where concrete trucks and be safely washed.
- .3 Divert admixtures and additive materials from landfill to approved official hazardous material collections site after receipt of written approval from Departmental Representative.
- .4 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 03 30 00 - Cast in Place Concrete Short Form.
- 1.2 MEASUREMENT PROCEDURES
- .1 Stringer beams including channels to support the steel deck, angles, hooks, nuts, bolts and washers shall be measured by the beam and shall include all labour, materials and equipment necessary to complete the work.
- .2 Pile caps shall be measured by the pile cap fabricated and installed and shall include all labour, materials and equipment necessary to complete the work.
- 1.3 REFERENCES
- .1 American Association for State Highway and Transportation Officials (AASHTO)
.1 AASHTO HB-17 Standard Specifications for Highway Bridges-17th Edition 2002.
- .2 ASTM International (ASTM)
.1 ASTM A307, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
- .3 CSA International (CSA)
.1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CSA S6-19, Canadian Highway Bridge Design Code.
.3 CSA S269.1-16, Falsework and Formwork.
.4 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.
.5 CSA W59-18, Welded Steel Construction, (Metal Arc Welding).
- 1.4 ADMINISTRATIVE REQUIREMENTS
- .1 Pre-Installation Meetings:
.1 Convene pre-installation meeting two weeks prior to beginning work of this Section, with Contractor's Representative and Departmental Representative to:
-

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Structural steel: to CSA G40.20/G40.21, grade 350W, minimum 25% recycled content.
 - .2 Bolts, nuts and washers: to ASTM A307, galvanized.
 - .3 Pipe: to Section 31 62 16
 - .4 Welding electrodes: to CSA W48 series.
 - .5 Hooks: Concrete reinforcing bar to CSA G30.18, Grade 400W(weldable).

- 2.2 SOURCE QUALITY CONTROL
- .1 Steel producer qualifications: certified in accordance with CSA G40.20/G40.21.

- 2.3 FABRICATION
- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
 - .2 Where possible, fit and shop assemble work, ready for erection.
 - .3 Complete welding to Section 15 12 35.

PART 3 - EXECUTION

- 3.1 EXAMINATION
- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections are acceptable for pile cap and structural steel installation in accordance with details indicated.
 - .1 Inform Departmental Representative of unacceptable conditions including out of tolerance work, immediately upon discovery.
 - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.
-

- 3.1 EXAMINATION
(Cont'd)
- .1 (Cont'd)
.3 Examination shall include field measurements taken after installation of piles.
- 3.2 PREPARATION
- .1 Clean steel surfaces as directed by Departmental Representative when staining or defacing occurs.
- .2 Verify location of substructure units, elevations and location of anchor bolts before erection of structural steel; report discrepancies to Departmental Representative.
- .3 Restrict drifting during assembly to minimum required to bring parts into position without enlarging or distorting holes, and without distorting, kinking or sharply bending metal of any unit.
.1 Enlarge holes if necessary by reaming only after receipt of written approval from Departmental Representative.
.2 Ensure reamed holes are 2 mm maximum larger than bolt size used.
- 3.3 INSTALLATION
- .1 Do falsework in accordance to CSA S269.1.
- .2 Do fabrication and erection of structural steel in accordance with CSA S6.
- .3 Do welding in accordance with CSA W59, except where specified otherwise.
.1 Do welding in shop unless otherwise permitted by Departmental Representative.
.2 Weld only at locations indicated.
- .4 Bolting: in accordance with CSA S6 Use 'turn-of-nut' tightening method.
- .5 Finish: members true to line, free from twists, bends, open joints, sharp corners and sharp edges.
- .6 Allowable tolerance for bolt holes:
.1 Matching holes for bolts to line up so that dowel 2 mm less in diameter than hole passes freely through assembled members at right angles to such members.
-

- 3.3 INSTALLATION (Cont'd) .6 (Cont'd)
- .2 Finish holes not more than 2 mm in diameter larger than diameter of bolt unless otherwise specified by Departmental Representative.
 - .3 Centre-to-centre distance between any two holes of group to vary by not more than 1 mm from dimensioned distance between such holes.
 - .4 Centre-to-centre distance between any two groups of holes to vary not more than maximum of the plus or minus 1 mm.
 - .5 Correct mispunched or misdrilled members only as directed by Departmental Representative.
- .7 Span length tolerances:
- .1 Beams: plus or minus 6 mm
- 3.4 FIELD QUALITY CONTROL .1 Manufacturer's Field Services:
- .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing and protecting of steel.
 - .2 Submit manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- 3.5 PILE CAPS .1 Fabricate and install pile caps to details indicated.
- .2 Perform welding in accordance with Section 05 12 35.
- 3.6 CLEANING .1 Progress Cleaning: clean in accordance with Section 01 74 11.
- .1 Leave Work area clean at end of each day.
 - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.
 - .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
-

3.6 CLEANING .3 (Cont'd)
(Cont'd) .1 Remove recycling containers and bins from
site and dispose of materials at appropriate
facility.

PART 1 - GENERAL

- 1.1 REFERENCES .1 Canadian Standards Association (CSA International):
.1 CSA W47.1-19, Certification of Companies for Fusion Welding of Steel.
.2 CSA W59-18, Welded Steel Construction (Metal Arc Welding).
.3 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.
- 1.2 WELDER QUALIFICATIONS .1 Use only welders qualified under CSA W47.1.
.2 Make available to Departmental Representative currently valid Canadian Welding Bureau Qualification Certificate for each welder employed on the work.
- 1.3 MEASUREMENT PROCEDURES .1 Welding will not be measured separately for payment but is considered included in the paid items where required.

PART 2 - PRODUCTS

- 2.1 MATERIALS .1 Welding materials to CSA W59 and CSA W48.

PART 3 - EXECUTION

- 3.1 WELDING GENERAL .1 Welding: to CSA W59.
.2 Do not deviate the size, length and location of welds from the design or from details shown on reviewed shop drawings without approval of Departmental Representative.
.3 Grind flush all butt welds.
-

3.2 PREPARATION

- .1 Surfaces to be welded shall be smooth, uniform and free from fins, tears and other defects which would adversely affect the quality of the weld.
- .2 Ensure areas within 50 mm of the weld are free from loose scale, slag, rust, grease, moisture, paint or other matter which would impair the quality of the weld.
- .3 Remove slag before welding over previously deposited metal and brush clean weld and adjacent base. This requirement applies to successive layers, successive beads and to crater area when welding is resumed after any interruption.
- .4 Before welding is started from the second side remove to sound metal the root of the initial weld of all butt welds except when produced with the aid of backing. Thoroughly fuse the weld metal with the backing in all butt welds made with the use of backing of the same material as the base metal.

3.3 ASSEMBLY

- .1 Bring members to be welded into correct alignment and hold securely in position until the joint has been welded.
- .2 Carefully align abutting parts joined by butt welds.
- .3 Weld in a sequence that will balance the effects of applied heat of welding on various sides as the welding progresses.

3.4 WELD QUALITY

- .1 Weld metal to be sound throughout with no porosity or cracks on the surface of any weld or weld pass.
 - .2 Ensure complete fusion between the weld metal and the base metal and between successive passes throughout the joint.
 - .3 Welds shall be free from overlap and the base metal free from undercutting.
-

3.4 WELD QUALITY
(Cont'd)

- .4 Fill all craters to the full cross section of the welds.
- .5 Fill and grind to profile any craters at the extreme ends of fillet welds.

3.5 TESTING

- .1 Give Departmental Representative 48 hours notice of when work is ready for inspection.
- .2 All welds will be subject to visual inspection requirements of CSA W59 and CSA W59.2.
- .3 Welds which fail the visual inspection will be subject to further nondestructive testing. This testing may be either radiographic or ultrasonic. The full length of the weld will be examined.
- .4 If more than 50% of the welds fail the visual inspection requirements all welds will be tested by nondestructive testing methods.
- .5 Pay all costs for nondestructive testing resulting from visual inspection failure.
- .6 Departmental Representative will not approve any weld until all required inspection is completed, found acceptable and marked as such.

3.6 ACCEPTANCE
REQUIREMENTS

- .1 Welds subject to nondestructive testing unacceptable if:
 - .1 There is any imperfection within 25 mm from the beginning or end of a butt weld.
 - .2 There is any type of crack, tear, zone of incomplete fusion or incomplete penetration regardless of size and location.
 - .3 Inclusion:
 - .1 Occurs in any 25 mm of a welded joint containing two or more inclusions where the sum of the greatest dimensions of those inclusions exceed 5 mm;
 - .2 Is greater than one-third the joint thickness but in no case larger than 19 mm.

- 3.6 ACCEPTANCE
REQUIREMENTS
(Cont'd)
- .1 (Cont'd)
 - .3 (Cont'd)
 - .2 Repair defective welds by chipping, air-arc gouging or grinding out from one side or both sides. Remove all traces of defects before rewelding. Remove all traces of oxidation after air-arc gouging.
 - .3 Resubmit all repaired welds to nondestructive testing.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 05 12 35 - Welding.
 - .2 Section 09 97 19 - Painting Exterior Metal Surfaces.
- 1.2 MEASUREMENT PROCEDURES
- .1 Ladders will be measured by each ladder installed and shall include all labour, materials and equipment necessary to fabricate and install including painting.
 - .2 Painting, welding and reinstallation of HSS(hollow structural section) curbs complete with electrical pedestals, outlet box modifications and curb extensions shall be measured by each jetty.
- 1.3 REFERENCES
- .1 ASTM International
 - .1 ASTM A307-14e1, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
 - .2 ASTM F593-17, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
 - .2 CSA International
 - .1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding.
 - .3 CSA W59-13, Welded Steel Construction (Metal Arc Welding).
 - .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- 1.4 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit in accordance with Section 01 33 00.
-

1.5 QUALITY
ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 DELIVERY,
STORAGE AND
HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- .4 Develop Waste Reduction Workplan related to Work of this Section and in accordance with Section 01 74 20.

1.7 WELDER
QUALIFICATIONS

- .1 To Section 05 12 35.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel sections and plates: to CSA G40.20/ G40.21, Grade 350W, minimum 30% recycled content.
 - .2 Welding materials: to CSA W59.
 - .3 Welding electrodes: to CSA W48 Series.
-

2.1 MATERIALS
(Cont'd)

- .4 Bolts and anchor bolts: to ASTM A307, galvanized.
- .5 Paint materials: to Section 09 97 19.
- .6 Epoxy Adhesive: 2 component, solvent free, high modulus, moisture insensitive, for placement underwater or water filled holes, high strength structural epoxy and capable at a minimum embedment depth of 170 mm to develop a ultimate tensile bond of 150 kN minimum for a 19 mm diameter ASTM 307 bolt in 28 MPa concrete.

2.2 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Where possible, fit and shop assemble work, ready for erection.
- .3 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 ACCESS LADDERS

- .1 Fabricate access ladders to details indicated.
- .2 Paint in accordance with requirements of Section 09 97 19.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications 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.
-

- 3.1 EXAMINATION .1 (Cont'd)
(Cont'd)
- 3.2 PROTECTION .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by metal fabrications installation.
- 3.3 FIELD METALWORK .1 Do welding work in accordance with Section 05 12 35
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Field cutting or altering steel members: to approval of Departmental Representative.
- .4 Make field connections with welds to CSA W59.
- 3.4 ACCESS LADDERS .1 Install access ladders in locations as indicated.
- 3.5 HSS CURB AND ELECTRICAL PEDESTALS .1 Modify electrical pedestals, complete with new weather proof doors to fit size of new receptacles. HSS curbs as indicated and paint
- .2 Add new extension to existing salvaged curb to match the length of the new Jetty #5.
- .3 Paint to Section 09 97 19
- .4 Secure to new concrete deck with anchors as indicated with epoxy adhesive as specified and indicated
- .5 Butt weld each section of curb on the three exposed faces and grind weld smooth. Do welding to Section 05 12 35.
-

3.5 HSS CURB AND ELECTRICAL PEDESTALS
(Cont'd)

.6 Field touch up paint Section 09 97 19.

3.6 CLEANING

- .1 Progress Cleaning:
.1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by metal fabrication.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 05 50 00 - Metal Fabrication
- 1.2 MEASUREMENT PROCEDURES
- .1 Painting HSS curbs and electrical pedestals will be measured by the jetty and shall include all labour, materials and equipment necessary to complete the work.
- .2 Painting of ladders will not be measured separately for payment but shall be considered included under Section 05 50 00.
- 1.3 REFERENCES
- .1 The Master Painters Institute (MPI)
- .1 Exterior Structural Steel and Metal Fabrications, 07.
- .1 EXT 5.1G, Polyurethane, Pigmented (over epoxy zinc rich primer and high build epoxy).
- .2 The Society for Protective Coatings (SSPC)
- .1 SSPC-SP 10/NACE No.2, Near-White Metal Blast Cleaning.
- .2 SSPC-Vis-1-89, Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs) Editorial Changes September 1, 2000 (Steel Structures Painting Manual, Chapter 2 - Surface Preparation Specs.).
- .3 SSPC-PA 204, Measurement of Dry Coat Thickness with Magnetic Gauges.
- 1.4 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit in accordance with Section 01 33 00.
- .2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for painting exterior metal surfaces and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS.
-

1.4 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd) .2 (Cont'd)
.3 Paints that do not appear on MPI Approved Products List must be approved by Departmental Representative before use on project.

1.5 QUALITY ASSURANCE .1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 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.

PART 2 - PRODUCTS

2.1 MATERIALS .1 Paint:
.1 Primer: MPI EXT 5.1G, zinc rich epoxy primer. Maximum MPI E2 rating on VOC.
.2 Epoxy: MPI EXT 5.1G, high build epoxy. Maximum MPI E2 rating on VOC.
.3 Polyurethane: MPI EXT 5.1G, aliphatic polyurethane. Maximum MPI E2 rating on VOC. Colour traffic yellow.
.4 Sand for sandblasting: to SSPC (Steel Structures Painting Council).

PART 3 - EXECUTION

3.1 PREPARATION .1 New and existing metal surfaces:
.1 Clean surfaces of metal to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease, old paint and foreign substances in accordance with the following:
.1 Commercial blast cleaning: to SSPC-SP 10.

- 3.1 PREPARATION
(Cont'd)
- .1 (Cont'd)
 - .1 (Cont'd)
 - .2 Compressed air to be free of water and oil before reaching nozzle.
 - .3 Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes, by blowing with clean dry compressed air, or by vacuum cleaning.
 - .4 Apply paint after prepared surfaces have been accepted by Departmental Representative.
 - .5 Mixing paint:
 - .1 Do not dilute or thin paint for brush application.
 - .2 Mix ingredients in container before and during use and ensure breaking up of lumps, complete dispersion of settled pigment, and uniform composition.
 - .3 Do not mix or keep paint in suspension by means of air bubbling through paint.
 - .4 Thin paint for spraying according to manufacturer's written instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.
 - .6 Number of paint coats: 3.
 - .1 New and existing metal surfaces.
 - .1 Shop: 1 primer coat to minimum dry film thickness of 75 microns per coat.
 - .2 Shop: 1 epoxy coat to minimum dry film thickness of 125 microns per coat.
 - .3 Shop: 1 polyurethane coat to minimum dry film thickness of 75 microns per coat.
- 3.2 APPLICATION
- .1 Manufacturer's Instructions: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
 - .2 Apply paint by spraying, brushing, or combination of both. Use sheepskins or daubers when no other method is practical in places of difficult access. Prime surfaces only with 75 mm either side of any field weld.
-

3.2 APPLICATION
(Cont'd)

- .3 Use dipping or roller coating method of application when specifically authorized by Departmental Representative in writing.
 - .4 Caulk open seams at contact surfaces of built up members with material approved by Departmental Representative, before second undercoat of primer is applied.
 - .5 Where surface to be painted is not under cover, do not apply paint when:
 - .1 Air temperature is below 5°C or when temperature is expected to drop to 0°C before paint has dried.
 - .2 Temperature of surface is over 50°C unless paint is specifically formulated for application at high temperatures.
 - .3 Fog or mist occur at site; it is raining or snowing; there is danger of rain or snow; relative humidity is above 85%.
 - .4 Surface to be painted is wet, damp or frosted.
 - .5 Previous coat is not dry.
 - .6 Supply cover when paint must be applied in damp or cold weather. Supply, shelter, or heat surface and surrounding air to comply with temperature and humidity conditions specified. Protect until paint is dry or until weather conditions are suitable.
 - .7 Apply each coat of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
 - .8 Brush application:
 - .1 Work paint into cracks, crevices and corners and paint surfaces not accessible to brushes by spray, daubers or sheepskins.
 - .2 Brush out runs and sags.
 - .3 Remove runs, sags and brush marks from finished work and repaint.
 - .9 Spray application:
 - .1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
-

3.2 APPLICATION
(Cont'd)

- .9 (Cont'd)
- .2 Provide traps or separators to remove oil and water from compressed air and drain periodically during operations.
 - .3 Keep paint ingredients properly mixed in spray pots or containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
 - .4 Apply paint in uniform layer, with overlapping at edges of spray pattern.
 - .5 Brush out immediately runs and sags.
 - .6 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray. In areas not accessible to spray gun, use brushes, daubers or sheepskins.
 - .7 Remove runs, sags and brush marks from finished work and repaint.
- .10 Shop painting:
- .1 Do shop painting after fabrication and before damage to surface occurs from weather or other exposure.
 - .2 Spray paint contact surfaces of field assembled, bolted, friction type joints with primer coat only. Do not brush primer after spraying.
 - .3 Do not paint metal surfaces which are to be embedded in concrete.
 - .4 Paint metal surfaces to be in contact with wood with either full paint coats specified or three shop coats of specified primer.
 - .5 Do not paint metal within 50 mm of edge to be welded. Give unprotected steel one coat of boiled linseed oil or other approved primer protective coating after shop fabrication is completed.
 - .6 Remove weld spatter before painting. Remove weld slag and flux by methods as specified in paragraph 3.1.3 Metal Surfaces to be Repainted.
 - .7 Protect machine finished or similar surfaces that are not to be painted but that do require protection, with coating of rust inhibitive petroleum, molybdenum disulphide, or other coating approved by Departmental Representative.
 - .8 Copy previous erection marks and weight marks on areas that have been shop painted.
- .11 Field painting:
-

- 3.2 APPLICATION
(Cont'd)
- .11 (Cont'd)
- .1 Paint steel structures as soon as practical after erection.
- .2 Touch up metal which has been shop coated with same type of paint and to same thickness as shop coat. This touch-up to include cleaning and painting of field connections, welds, rivets, nuts, washers, bolts, and damaged or defective paint and rusted areas.
- .3 Where painting does not meet with requirements of specifications, and when so directed by Departmental Representative, remove defective paint, thoroughly clean affected surfaces and repaint in accordance with these specifications.
- .12 Handling painted metal:
- .1 Handle painted metal after paint has dried, or when necessary for handling for painting or stacking for drying.
- .2 Scrape off and touch up paint which is damaged in handling, with same number of coats and kinds of paint as were previously applied to metal.
- 3.3 FIELD QUALITY CONTROL
- .1 Site Tests, Inspections:
- .1 Upon completion of the painting procedures test for dry film reading and evaluate the results as per SSPC-PA 2.
- 3.4 CLEANING
- .1 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- 3.5 PROTECTION
- .1 Protect painted surfaces from damage during construction.
- .2 Protection of surfaces:
- .1 Protect surfaces not to receive paint.
-

3.5 PROTECTION
(Cont'd)

.2 (Cont'd)

.2 Prevent contamination of cleaned surfaces by salts, acids, alkalis, corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats of paint. Remove contaminants from surface and apply paint immediately.

.3 Protect cleaned and freshly painted surfaces from dust to approval of Departmental Representative.

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 Definitions:
 - .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.
 - .2 Reference Standards:
 - .1 CSA Group
 - .1 CSA C22.1-18, Canadian Electrical Code, Part 1 (23rd Edition), Safety Standard for Electrical Installations.
 - .2 CSA C22.2.
 - .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
 - .4 The Ontario Electrical Safety Code 2018, and all bulletins (Ontario).
 - .5 Electrical Safety Authority (ESA) requirements and local applicable codes and regulations.
- 1.2 ACTION AND INFORMATIONAL AND SUBMITTALS
- .1 Submit in accordance with Section 01 33 00.
 - .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for receptacles and include product characteristics, performance criteria, physical size, finish and limitations.
 - .3 Certificates:
 - .1 Provide CSA certified equipment and material.
 - .2 Where CSA certified equipment and material is not available, submit such equipment and material to authority having jurisdiction for special approval before delivery to site.
 - .3 Permits and fees: in accordance with General Conditions of contract. Pay associated fees. Departmental Representative will provide drawings and specifications required by Electrical Inspection Department and Supply Authority at no cost.
-

- 1.2 ACTION AND INFORMATIONAL AND SUBMITTALS
(Cont'd)
- .3 (Cont'd)
.4 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.
- 1.3 MEASUREMENT PROCEDURES
- .1 Salvaged Teck Cables including removal and salvaging of the existing Teck cables, temporary power and reinstallation of cables shall be measured by the Jetty and shall include all labour, materials and equipment necessary to complete the work including excavation, backfilling and restoration of the asphalt pavement to match the existing condition.
- .2 Receptacles including removal and disposal of the existing receptacles and receptacle housings and covers complete replacement with new including weather proof housings shall be measured by the pedestal and shall include all labour, materials and equipment necessary to complete the work.
- 1.4 CLOSEOUT SUBMITTALS
- .1 Submit "AS BUILT RECORD" and ESA certificate.
- 1.5 QUALITY ASSURANCE
- .1 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices as per the conditions of Provincial Act respecting manpower vocational training and qualification.
.1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
.2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.
- .2 Site Meetings:
.1 In accordance with Section 01 11 02.
-

1.5 QUALITY ASSURANCE (Cont'd) .3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and 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 from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 DESIGN REQUIREMENTS .1 Refer to drawing MA-04 for location electrical pedestals on re-installed curb with pedestals.

2.2 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 61 00.

.2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from inspection authorities before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.3 New outlet housing to be rated to NEMA 4X and to enclose new to match existing SS2-50R. receptacles. Receptacle covers to be same rating as housing.

.4 Connectors:
.1 Watertight, approved for TECK cable.

- 2.3 WIRING TERMINATIONS .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

PART 3 - EXECUTION

- 3.1 EXAMINATION .1 Verification of Conditions: verify that conditions are acceptable for installation in accordance with manufacturer's written instructions.
.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

- 3.2 TEMPORARY POWER .1 Temporary power is to be maintained during construction period for the tugs winter berthed along Jetties #3, #4 and #5. This includes two receptacles on Jetty #3, four receptacles on Jetty #4 and two receptacles on Jetty #5.

- 3.3 CLEANING .1 Progress Cleaning:
.1 Leave Work area clean at end of each day.
.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

PART 1 - GENERAL

- 1.1 SUBMITTALS
- .1 Test Reports: Submit signed test reports for all testing work specified.
 - .2 Approval Certificates: Submit Certificates of Approval as issued by governing authorities

PART 2 - PRODUCTS

- 2.1 NOT USED
- .1 Not Used.

PART 3 - EXECUTION

- 3.1 GENERAL
ELECTRICAL WORK
TESTING
REQUIREMENTS
- .1 Satisfactorily perform all testing required by governing authorities, Codes, Regulation and the Specification, including general testing specified below. Prepare and sign test reports to confirm satisfactory completion of testing and submit as specified in Part 1 of this Section.
 - .2 Perform testing to suit phasing of the work, as applicable.
 - .3 Perform a meggar test of the existing cables that will be reused. The test shall be performed before connecting the receptacles and the results tabulated in a report to be submitted to the Departmental Representative for review.
 - .4 Leaks, Grounds, and Crosses: After the receptacles have been installed, test the work to ensure that there are no leaks, grounds, or crosses.
- 3.2 GROUNDING AND
BONDING SYSTEM
- .1 Provide visual and mechanical inspection of the grounding and bonding system and verify that the system is in compliance with all requirements.

PART 1 - GENERAL

- 1.1 STORAGE AND HANDLING .1 Existing cables designate for re-use on jetty #5 are to be protected from damage during the reconstruction of Jetty #5.

PART 2 - PRODUCTS

- 2.1 TECK 90 CABLE .1 Cable: Cables are existing and to be re-used.

PART 3 - EXECUTION

- 3.1 FIELD QUALITY CONTROL .1 Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.
- .2 Perform tests before energizing electrical system.
- 3.2 GENERAL CABLE INSTALLATION .1 Lay cable in cable trays in accordance with Section 26 05 00.
- .2 Terminate cables in accordance with Section 26 05 00.
- .3 Conductor length for parallel feeders to be identical.
- .4 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.
- 3.3 INSTALLATION OF TECK 90 CABLE (0-1000 V) .1 Group cables wherever possible on channels.
- .2 Install cable exposed securely supported by straps hangers.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS .1 Section 31 62 16 - Filled Tubular Steel Piles
- 1.2 MEASUREMENT PROCEDURES .1 No measurement for payment shall be made under this section. Include all costs related to pile supply and installation under Section 31 62 16.
- 1.3 DELIVERY, STORAGE AND HANDLING .1 Protect piles from damage due to excessive bending stresses, impact, abrasion or other causes during delivery, storage and handling.
- .2 Replace damaged piles as directed by Departmental Representative.
- 1.4 WASTE MANAGEMENT AND DISPOSAL .1 Separate and recycle waste materials in accordance with Section 01 74 20.
- .2 Collect and separate plastic, paper packaging, corrugated cardboard in accordance with Waste Management Plan.
- .3 Divert unused, or cut off concrete materials from landfill to local quarry facility as approved by Departmental Representative.
- 1.5 EXISTING CONDITIONS .1 Sub-surface boreholes are bound into specification following Section 35 59 13.
- .2 Notify Departmental Representative in writing if subsurface conditions at site differ from those indicated on the boreholes and await further instructions from Departmental Representative.
-

- 1.6 SCHEDULING .1 Submit schedule of planned sequence of driving to Departmental Representative for review, not less than two weeks prior to commencement of pile driving.

PART 2 - PRODUCTS

- 2.1 MATERIALS .1 Material requirements for piles are specified in Section 31 62 16.
- .2 Provide equipment to handle full length piles.

PART 3 - EXECUTION

- 3.1 EQUIPMENT .1 Prior to pile installation, submit to Departmental Representative for review, details of equipment for installation of piles.
- .1 Impact hammers: provide manufacturer's name, type, rated energy per blow at normal working rate, mass of striking parts of hammer, mass of driving cap and type and elastic properties of hammer and pile cushions.
- .2 Non-impact methods of installation such vibratory hammers: provide full details of characteristics necessary to evaluate performance.
- .2 Hammer:
- .1 Hammers to be approved on basis of driveability analysis performed by Departmental Representative's Geotechnical Consultant as specified in paragraph 3.3.
- .2 Driveability analysis shall include, but not be limited to, following: hammer, cushion, and cap block details; static soil parameters; quake and damping factors, total soil resistance, blow count, pile stresses and energy throughput at representative penetrations.
- .3 Driveability analysis shall be used by the Departmental Representative for approval of hammers.
-

- 3.1 EQUIPMENT
(Cont'd)
- .2 (Cont'd)
- .4 When required criteria can not be achieved with the proposed hammer, use of a larger hammer and other measures shall be as required by the Contractor.
- .3 Leads:
- .1 Construct pile driver leads to provide free movement of hammer. Hold leads in position at top and bottom, with guys, stiff braces, or other means reviewed by Departmental Representative, to ensure support to pile while being driven.
- .2 Length: except for piles driven through water, provide sufficient length of leads to ensure that use of follower is unnecessary.
- .4 Followers:
- .1 Obtain approval from Departmental Representative prior to using followers. Provide followers of such size, shape, length and mass to permit driving pile in desired location to required depth and resistance. Provide followers with socket or hood carefully fitted to top of pile to minimize loss of energy and prevent damage to pile.
- 3.2 PREPARATION
- .1 When driving operation is from land ensure that ground conditions at pile locations are adequate to support pile driving operation. Make provision for access and support of piling equipment during performance of Work.
- 3.3 PILE DRIVING ANALYSIS
- .1 Departmental Representative shall engage the services of a Geotechnical Consultant to perform a pile driving analysis.
- .1 Analysis shall initially confirm that the pile driving equipment is able to achieve the depth of pile indicated and the required geotechnical resistance of 460 kN.
- .2 Submit for review to Departmental Representative for Geotechnical Consultant review of the intended pile driving equipment before mobilization of pile driving equipment to the site. Allow one week for the review.
-

- 3.3 PILE DRIVING ANALYSIS
(Cont'd)
- .1 (Cont'd)
- .3 A dynamic pile driving analysis shall be on site by the Geotechnical Consultant using a Pile Driving Analyzer on the initial piles driven to determine that adequate geotechnical resistance is achieved. No additional compensation to provide adequate pile driving equipment shall be considered should the pile driving equipment perform inadequately to achieve the indicated depth.
- .4 Should additional depth of pile be required beyond the specified pile length, a negotiated change to the contract will be undertaken in accordance with the General Conditions of the Contract.
- 3.4 FIELD MEASUREMENT
MEASUREMENT
- .1 Maintain accurate records of driving for each pile, including:
- .1 Type and make of hammer, stroke or related energy.
- .2 Other driving equipment driving cap, and cushion.
- .3 Pile size and length, location of pile in each jetty.
- .4 Sequence of driving piles in jetty.
- .5 Number of blows per metre for entire length of pile and number of blows per 100 mm for last 1000 mm.
- .6 Final tip and cut-off elevations.
- .7 Other pertinent information such as interruption of continuous driving, pile damage.
- .8 Record elevation taken on adjacent piles before and after driving of each pile.
- .2 Provide Departmental Representative with three copies of records on a daily basis.
- 3.5 DRIVING
DRIVING
- .1 Use driving caps and cushions to protect piles. Reinforce pile heads as required by Departmental Representative. Piles with damaged heads as determined by Departmental Representative will be rejected.
- .2 Hold piles securely and accurately in position while driving.
-

3.5 DRIVING
(Cont'd)

- .3 Deliver hammer blows along axis of pile.
- .4 Do not drive piles within 22 m of concrete which has been in place less than 7 days.
- .5 Ensure no contact between pile and structure takes place when driving batter piles adjacent to existing structures.
- .6 Restrike already driven piles lifted during driving of adjacent piles to assure set.
- .7 Cut off piles neatly and squarely at elevations as indicated to tolerance of plus or minus 5 mm. Provide sufficient length above cut-off elevation so that part damaged during driving is cut off.
- .8 Remove cut-off lengths from site on completion of work.

3.6 DESIGN LOAD
CAPACITY

- .1 Factored vertical design load of each pile is 184kN.
 - .2 Installation of each pile will be subject to approval of Departmental Representative.
 - .1 Departmental Representative will be sole judge of acceptability of each pile with respect to final driving resistance, depth of penetration or other criteria used to determine load capacity.
 - .2 Departmental Representative to approve final driving of all piles prior to removal of pile driving equipment from the site.
 - .3 Drive each pile to final depth as determined from pile driving analysis.
 - .1 Required driving resistance shall be from pile driving analysis as directed by Departmental Representative.
 - .2 Prior to final set drive piles without interruption for a sufficient interval to break or prevent development of freeze..
 - .4 Drive each pile to pile tip elevation as indicated or deeper as determined by the pile driving analysis.
-

- 3.7 DRIVING TOLERANCES
- .1 Pile heads to be within 6 mm of locations as indicated.
 - .2 Piles not to be more than 0.5% of length out of vertical alignment.
 - .3 Provide a driving frame to accurately drive within the specified tolerances four piles at a time, before advancing the driving frame to the next set up of four piles.
 - .4 The driving frame shall be sighted and aligned on the re-established centreline of the new jetty.
- 3.8 OBSTRUCTIONS
- .1 Where obstruction is encountered that causes sudden unexpected change in penetration resistance or deviation from specified tolerances, remove obstruction.
- 3.9 REPAIR/ RESTORATION
- .1 Pull out rejected piles and replace with new piles.
 - .2 Remove rejected pile and replace with a new, and if necessary, a longer pile.
 - .3 Remove rejected pile and fill hole as directed by Departmental Representative.
 - .4 No extra compensation will be made for removing and replacing or other work made necessary through rejection of defective piles.
- 3.10 PROTECTION
- .1 Protect adjacent structures, services and work of other sections from hazards due to pile driving operations.
 - .2 Arrange sequencing of pile driving operations and methods to avoid damages to adjacent existing structures. When damages occur, remedy damaged items to restore to original or better condition at own expense.

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast in Place Concrete Short Form.
- .2 Section 05 50 00 - Metal Fabrication.
- .3 Section 09 97 19 - Painting Exterior Metal Surfaces.
- .4 Section 31 61 13 - Pile Foundations, General.

1.2 MEASUREMENT PROCEDURES

- .1 Supply of vertical steel pipe piles in metres delivered to site, in full lengths, shall be measured by the linear metre and shall include all labour, materials and equipment necessary to supply and deliver to the site.
- .2 Vertical Steel pipe pile installation shall be measured in linear metre of pile acceptably driven as measured from pile tip elevation to the cut-off elevation and shall include all labour, materials and equipment necessary to complete the work.
- .3 Supply of fender steel pipe piles delivered to site, in lengths required shall be measured by each pile and shall include all labour, materials and equipment necessary to supply and deliver to the site.
- .4 Fender steel pipe pile installation shall be measured by each pile acceptably driven to the indicated elevation and shall include all labour, materials and equipment necessary to complete the work.
- .5 Concrete fill, reinforcing dowels, cross bars shall be considered incidental to installation of piles and shall not be measured separately for payment.

1.3 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
-

- 1.3 REFERENCES (Cont'd)
- .1 (Cont'd)
 - .1 ASTM A252-19, Standard Specification for Welded and Seamless Steel Pipe Piles.
 - .2 Canadian Standards Association (CSA International)
 - .1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W47.1-19, Certification of Companies for Fusion Welding of Steel Structures.
 - .3 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.
 - .4 CSA W59-18, Welded Steel Construction (Metal Arc Welding).
- 1.4 SUBMITTALS
- .1 Provide submittals in accordance with Section 01 33 00.
 - .2 Product data: submit manufacturer's printed product literature, specifications and datasheet.
 - .3 Submit shop drawings and indicate: pile closure plates and splice details.
 - .1 Each drawing stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .4 Quality Assurance: test reports:
 - .1 Prior to fabrication, and, if requested, provide Departmental Representative with two copies of steel producer's certificates in accordance with ASTM A252.
 - .2 One Charpy V-notch test required per heat and results reported to Departmental Representative by manufacturer.
 - .3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .5 Submit details of pile stock material to be used, as described in PART 3 - FABRICATION, for review by Departmental Representative.
-

- 1.5 DELIVERY,
STORAGE, AND
HANDLING
- .1 Deliver, store and handle in accordance with Section 01 61 00.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .3 Deliver new, undamaged materials to site, accompanied by certified test reports, with manufacturer's logo and mill identification mark provided on pipe piling.
 - .4 Storage and Protection:
 - .1 Store and handle pipe piling in accordance with manufacturer's written instructions to prevent permanent deflection, distortion or damage to interlocks.
 - .2 Support pipe piling on level blocks or racks spaced not more than 3 m apart and not more than 0.60 m from ends.
 - .3 Store pipe piling to facilitate required inspection activities and prevent damage to coatings and corrosion prior to installation.
 - .5 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.
 - .2 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
 - .3 Divert unused concrete materials from landfill to local quarry facility as approved by Departmental Representative.
 - .4 Unused paint or coating material must be disposed of at an official hazardous material collections site as approved by Departmental Representative.
 - .5 Unused paint material must not be disposed of into sewer system, into streams, lakes, onto ground or in any other location where it will pose a health or environmental hazard.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Steel pipe: seamless, straight seam of sizes and wall thicknesses indicated.
-

- 2.1 MATERIALS
(Cont'd)
- .2 Pipe material to have following minimum properties:
 - .1 Yield strength: 310 MPa.
 - .2 Tensile strength: 455 MPa.
 - .3 Elongation at rupture: 20% in 50.8 mm.
 - .4 Weldable steel: to ASTM A106/A106M carbon equivalent less than 0.55%.
 - .3 Pipe chemical composition: to ASTM A252 Grade 3.
 - .4 Pipe allowable tolerances:
 - .1 Deviation from straight line, specified diameter, wall thickness and out-of-roundness on body of pipe and at pipe ends to conform to ASTM A252.
 - .2 Pipe to be checked for deviations before leaving mill.
 - .3 Pile length: full length plus or minus 0.3 m.
 - .5 Reinforcement Bars and Concrete: to Section 03 30 00.
 - .6 Steel Cross Bars: to Section 05 50 00.

PART 3 - EXECUTION

- 3.1 MANUFACTURER'S INSTRUCTIONS
- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

- 3.2 FABRICATION
- .1 Supply full length piles to eliminate splicing during installation.
 - .2 Allowable tolerance on axial alignment to be 0.1% as measured by 3 m straight edge.
 - .3 Allowable deviation from straight line over total length of fabricated pile to be 20 mm.
 - .4 Cut-off vertical piles to the indicated elevation and accurately cut slot to receive pile cap cross bars. Slot to be marked and cut to depth indicated.
-

- 3.3 INSTALLATION
- .1 Install piling in accordance with Section 31 61 13.
 - .2 Install concrete and steel reinforcement dowels in accordance with Section 03 30 00.
 - .3 Fill vertical steel pipe pile with concrete after placement of the pile caps using methods to limit free fall and to prevent segregation. Ensure adequate vibration to completely fill cross section of pipe.
 - .4 Set reinforcing dowels in concrete in accordance with details as indicated.
 - .1 Secure until concrete is set.
- 3.4 WELDING
- .1 Weld cross bars for fender piles to CSA W59.
 - .2 Welding certification of companies: to CSA W47.1.
- 3.5 PAINTING
- .1 Paint fender piles from Elevation +2.6 m to Elevation -0.6 m, prior to supply and installation of fender pile.
 - .2 Complete painting to Section 09 97 19. Intermediate and top coats to be black.

PART 1 - GENERAL

- 1.1 REFERENCES .1 American Society for Testing and Materials (ASTM)
- .1 ASTM D751-06(2011), Standard Test Methods for Coated Fabrics.
 - .2 ASTM D2261-13, Standard Test Method for Tearing Strength of Fabrics by the Tongue (Single Rip) Procedure (Constant-Rate-of-Extension Tensile Testing Machine).
 - .3 ASTM D5034-09(2013), Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test).
- 1.2 SUBMITTALS .1 Submit details of the temporary turbidity curtain system to the Departmental Representative prior to the start of the Work.
- .2 Submit to Departmental Representative details of geotextile material and seam at least 2 weeks prior to commencing work.
- 1.3 DELIVERY AND STORAGE .1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

PART 2 - PRODUCTS

- 2.1 MATERIAL .1 Turbidity Curtain:
- .1 Flotation Properties:
 - .1 Size: 150 mm x 150 mm.
 - .2 Curtain Depth: 3 m.
 - .3 Buoyancy: 20 Kg/m.
 - .2 Curtain Body Properties:
 - .1 Nylon Vinyl Reinforced: 5492 g/m².
 - .2 Grab Tensile: to ASTM D5034, 1779 N.
 - .3 Tear: to ASTM D2261, 444 N..
 - .4 Hydrostatic Resistance: to ASTM D751, 4136 kPa.
 - .5 Seam strength: Heat Sealed.
 - .6 Fabric: Impermeable.
-

- 2.1 MATERIAL
(Cont'd)
- .1 (Cont'd)
 - .2 (Cont'd)
 - .7 Ballast Chain: 6 mm.
 - .2 Seams: sewn in accordance with manufacturer's
 - .3 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

PART 3 - EXECUTION

- 3.1 GENERAL
- .1 Supply, install, maintain turbidity curtain around each jetty at the commencement of work on jetty and until work is complete. Remove turbidity curtain only when authorization is obtained from the Departmental Representative.
 - .2 Monitoring of water turbidity outside the turbidity curtain will be done by the Departmental Representative. Turbidity shall not exceed 8 NTU above background conditions.

- 3.2 INSTALLATION
- .1 Turbidity curtains shall consist of turbidity curtain geosynthetic, load line, flotation, ballast, anchors, mooring buoys, mooring lines, adjustment lines, and tie-downs.
 - .2 Design to conform to US Army Corps of Engineers EP 1110-1-16 Appendix C, BMP 27 Type 1.
 - .3 Turbidity curtains shall be constructed as follows:
 - .1 The flotation shall provide support along the length of the turbidity curtain.
 - .2 A sleeve shall be formed and heat-sealed or sewn along the entire bottom edge of the turbidity curtain geosynthetic, to contain the ballast in the sleeve. Breaks may be made in the sleeve to facilitate pulling, provided they are a minimum 100 mm in size and spaced at minimum 3 m intervals.
-

3.2 INSTALLATION
(Cont'd)

- .3 (Cont'd)
- .3 Where turbidity curtain geosynthetic is joined to provide a continuous run, the sections shall be connected to provide a continuous seal and prevent the escape of turbid water between the sections.
- .4 The turbidity curtain, as prepared for installation, shall be of sufficient width to account for water depth and wave action.
- .5 The turbidity curtain shall be of sufficient length to permit work inside the area enclosed by the curtain without restricting equipment operations, and personnel from working.
- .6 Seal the ends of the turbidity curtain where it is terminates at the existing structure face.

3.3 OPERATION AND
MAINTENANCE

- .1 Turbidity curtains shall be installed to prevent sediment and debris passage, from the area enclosed by the curtain, to the remaining water body. Turbidity curtains shall be installed and maintained in a manner that avoids entry of equipment, other than hand-held equipment or boats, to the remaining water body.
- .2 Equipment is permitted in the work area enclosed by the turbidity curtain.
- .3 Turbidity curtains shall be operated and maintained in the specified location, with the entire top edge above the water surface.
- .4 The turbidity curtain shall be free of tears and gaps, and the bottom edge of the curtain is to be continuously in contact with the water course bed so that sediment passage from the area enclosed is prevented.
- .5 Any folds in the turbidity curtain which form next to the flotation collar shall be regularly monitored and freed of collected sediment.
- .6 Monitor and maintain the silt curtains booms both during and outside normal working shifts as required. Provide all personnel, materials and equipment necessary to maintain, repair or relocate the turbidity curtain system.
-

3.3 OPERATION AND
MAINTENANCE
(Cont'd)

- .7 Carry out construction operations to minimize impact on fish habitat from both disturbed sediments and fill materials.
- .8 Replace damaged or deteriorated fabric to approval of Departmental Representative.
- .9 Remove turbidity curtain when authorized by the Departmental representative after completion of the work.

PART 1 - GENERAL

- 1.1 MEASUREMENT PROCEDURES
- .1 Salvaged Rubber fenders including all mounting hardware and epoxy shall be measured by the metre of fender supplied and installed and shall include all labour, materials and equipment necessary to complete the work.
 - .2 Supply and installation of tires shall be measured by each tire and shall include all labour, materials and equipment to complete the work. Tires indicated to be removed shall be considered included and will not be measured separately for payment.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit in accordance with Section 01 33 00.
- 1.3 DELIVERY, STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 and 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 Packaging Waste Management: in accordance with Section 01 74 20.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Square-shaped rubber fender: Salvaged
 - .1 Galvanized steel shapes and plates: to CSA G40.20/G40.21, Grade 350W.
 - .2 Galvanized, threaded rods, anchor bolts, nuts and washers: to ASTM A307.
-

2.1 MATERIALS
(Cont'd)

- .1 (Cont'd)
 - .3 Epoxy: 2 component, solvent free, high modulus, moisture insensitive, for placement underwater or water filled holes, high strength structural epoxy and capable at a minimum embedment depth of 170 mm to develop a ultimate tensile bond of 150 kN minimum for a 19 mm diameter bolt and 28 MPa concrete.
- .2 Used Tires: multiply tread, rim diameter 380 mm +/-, side wall height 170 mm +/- . Tires shall be free from rips, tears and punctures.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install in accordance with manufacturer's instructions and as indicated.
- .2 Accurately drill and epoxy threaded rods to concrete to details indicated.

3.2 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

BOREHOLES



**C.T. SOIL & MATERIALS
TESTING INC.**
WINDSOR ONTARIO

Client: **Riggs Engineering Ltd.**

Project: **Jetty 1, 2, 3, 6 & 7 - Option 3
Reconstruction**

Location: **Fisherman's Basin, Erieau, ON**

EQUIPMENT DATA

Machine: **Diedrich D50 Truck**
Method: **83 mm I.D. H/S Auger**
Size: **165 mm O.D.**
Date: **2018-02-16 TO 2018-02-16**

| SOIL LITHOLOGY | | SAMPLE | | | SHEAR STR.(kPa) | | BULK UNIT WGHT (kN/m ³) | WATER CONTENT (%) | | | WELL DATA | ELEV. (m) | REMARKS |
|----------------|--|--------------|--------|---------|-----------------|---------|---|--|----|----------|--------------|-----------|----------------------------|
| EL./DPT (m) | DESCRIPTION <i>DMT</i> | DEPTH (m) | SYMBOL | SAMP ID | TYPE | N-VALUE | | DILATOMETER: Su M (bars) ▼ FIELD VANE: Peak X Rem. ⊗ LAB TEST: Unc. ■ P.P. □ ⊕ | Wp | W | | | |
| | Ground Elev: 175.23 m | | | | | | PENETR. RESISTANCE <i>DMT</i> Phi (♦) ◆ STANDARD ● DYN. CONE ○ | | | | | | |
| | TOP OF SHEET PILE WALL | | | | | | | | | | | 175 | |
| 0.57 174.66 | WATER | 0.5 | | | | | | | | | | 174 | Lake Level 2018-02-20 |
| | | 1.0 | | | | | | | | | | 174 | |
| | | 1.5 | | | | | | | | | | 173 | |
| | | 2.0 | | | | | | | | | | 173 | |
| | | 2.5 | | | | | | | | | | 172 | |
| | | 3.0 | | | | | | | | | | 172 | |
| 3.50 171.73 | dredge line SAND, SILT AND ORGANICS - fine to medium grained | 3.5 | | | | | | | | 93.007 | | 172 | 300 mm weight of hammer |
| | grey-black very loose | 4.0 | | | | | | | | | | 171 | 450 mm weight of hammer |
| | | 4.5 | | | | | | | | 75.80645 | | 171 | |
| 4.70 170.53 | PEAT - black, amorphous | 5.0 | | | | | | | | | | 170 | |
| | | 5.5 | | | | | | | | | | 170 | |
| | | 6.0 | | | | | | | | | | 169 | |
| | | 6.5 | | | | | | | | | | 169 | |
| 6.55 168.68 | SAND (SM) - fine grained, silty | 6.5 | | | | | | | | | | 169 | |
| | | 7.0 | | | | | | | | | | 169 | |
| | | 7.5 | | | | | | | | | | 169 | |
| | | 8.0 | | | | | | | | | | 169 | |
| | | 8.5 | | | | | | | | | | 169 | |
| | | 9.0 | | | | | | | | | | 169 | |
| | | 9.5 | | | | | | | | | | 169 | |
| | | 10.0 | | | | | | | | | | 169 | |
| | | 10.5 | | | | | | | | | | 169 | |
| | | 11.0 | | | | | | | | | | 169 | |
| | | 11.5 | | | | | | | | | | 169 | |
| | | 12.0 | | | | | | | | | | 169 | |
| | | 12.5 | | | | | | | | | | 169 | |
| | | 13.0 | | | | | | | | | | 169 | |
| | | 13.5 | | | | | | | | | | 169 | |
| | | 14.0 | | | | | | | | | | 169 | |
| | | 14.5 | | | | | | | | | | 169 | |
| | | 15.0 | | | | | | | | | | 169 | |
| | | 15.5 | | | | | | | | | | 169 | |
| | | 16.0 | | | | | | | | | | 169 | |
| | | 16.5 | | | | | | | | | | 169 | |
| | | 17.0 | | | | | | | | | | 169 | |
| | | 17.5 | | | | | | | | | | 169 | |
| | | 18.0 | | | | | | | | | | 169 | |
| | | 18.5 | | | | | | | | | | 169 | |
| | | 19.0 | | | | | | | | | | 169 | |
| | | 19.5 | | | | | | | | | | 169 | |
| | | 20.0 | | | | | | | | | | 169 | |
| | | 20.5 | | | | | | | | | | 169 | |
| | | 21.0 | | | | | | | | | | 169 | |
| | | 21.5 | | | | | | | | | | 169 | |
| | | 22.0 | | | | | | | | | | 169 | |
| | | 22.5 | | | | | | | | | | 169 | |
| | | 23.0 | | | | | | | | | | 169 | |
| | | 23.5 | | | | | | | | | | 169 | |
| | | 24.0 | | | | | | | | | | 169 | |
| | | 24.5 | | | | | | | | | | 169 | |
| | | 25.0 | | | | | | | | | | 169 | |
| | | 25.5 | | | | | | | | | | 169 | |
| | | 26.0 | | | | | | | | | | 169 | |
| | | 26.5 | | | | | | | | | | 169 | |
| | | 27.0 | | | | | | | | | | 169 | |
| | | 27.5 | | | | | | | | | | 169 | |
| | | 28.0 | | | | | | | | | | 169 | |
| | | 28.5 | | | | | | | | | | 169 | |
| | | 29.0 | | | | | | | | | | 169 | |
| | | 29.5 | | | | | | | | | | 169 | |
| | | 30.0 | | | | | | | | | | 169 | |
| | | 30.5 | | | | | | | | | | 169 | |
| | | 31.0 | | | | | | | | | | 169 | |
| | | 31.5 | | | | | | | | | | 169 | |
| | | 32.0 | | | | | | | | | | 169 | |
| | | 32.5 | | | | | | | | | | 169 | |
| | | 33.0 | | | | | | | | | | 169 | |
| | | 33.5 | | | | | | | | | | 169 | |
| | | 34.0 | | | | | | | | | | 169 | |
| | | 34.5 | | | | | | | | | | 169 | |
| | | 35.0 | | | | | | | | | | 169 | |
| | | 35.5 | | | | | | | | | | 169 | |
| | | 36.0 | | | | | | | | | | 169 | |
| | | 36.5 | | | | | | | | | | 169 | |
| | | 37.0 | | | | | | | | | | 169 | |
| | | 37.5 | | | | | | | | | | 169 | |
| | | 38.0 | | | | | | | | | | 169 | |
| | | 38.5 | | | | | | | | | | 169 | |
| | | 39.0 | | | | | | | | | | 169 | |
| | | 39.5 | | | | | | | | | | 169 | |
| | | 40.0 | | | | | | | | | | 169 | |
| | | 40.5 | | | | | | | | | | 169 | |
| | | 41.0 | | | | | | | | | | 169 | |
| | | 41.5 | | | | | | | | | | 169 | |
| | | 42.0 | | | | | | | | | | 169 | |
| | | 42.5 | | | | | | | | | | 169 | |
| | | 43.0 | | | | | | | | | | 169 | |
| | | 43.5 | | | | | | | | | | 169 | |
| | | 44.0 | | | | | | | | | | 169 | |
| | | 44.5 | | | | | | | | | | 169 | |
| | | 45.0 | | | | | | | | | | 169 | |
| | | 45.5 | | | | | | | | | | 169 | |
| | | 46.0 | | | | | | | | | | 169 | |
| | | 46.5 | | | | | | | | | | 169 | |
| | | 47.0 | | | | | | | | | | 169 | |
| | | 47.5 | | | | | | | | | | 169 | |
| | | 48.0 | | | | | | | | | | 169 | |
| | | 48.5 | | | | | | | | | | 169 | |
| | | 49.0 | | | | | | | | | | 169 | |
| | | 49.5 | | | | | | | | | | 169 | |
| | | 50.0 | | | | | | | | | | 169 | |
| | | 50.5 | | | | | | | | | | 169 | |
| | | 51.0 | | | | | | | | | | 169 | |
| | | 51.5 | | | | | | | | | | 169 | |
| | | 52.0 | | | | | | | | | | 169 | |
| | | 52.5 | | | | | | | | | | 169 | |
| | | 53.0 | | | | | | | | | | 169 | |
| | | 53.5 | | | | | | | | | | 169 | |
| | | 54.0 | | | | | | | | | | 169 | |
| | | 54.5 | | | | | | | | | | 169 | |
| | | 55.0 | | | | | | | | | | 169 | |
| | | 55.5 | | | | | | | | | | 169 | |
| | | 56.0 | | | | | | | | | | 169 | |
| | | 56.5 | | | | | | | | | | 169 | |
| | | 57.0 | | | | | | | | | | 169 | |
| | | 57.5 | | | | | | | | | | 169 | |
| | | 58.0 | | | | | | | | | | 169 | |
| | | 58.5 | | | | | | | | | | 169 | |
| | | 59.0 | | | | | | | | | | 169 | |
| | | 59.5 | | | | | | | | | | 169 | |
| | | 60.0 | | | | | | | | | | 169 | |
| | | 60.5 | | | | | | | | | | 169 | |
| | | 61.0 | | | | | | | | | | 169 | |
| | | 61.5 | | | | | | | | | | 169 | |
| | | 62.0 | | | | | | | | | | 169 | |
| | | 62.5 | | | | | | | | | | 169 | |
| | | 63.0 | | | | | | | | | | 169 | |
| | | 63.5 | | | | | | | | | | 169 | |
| | | 64.0 | | | | | | | | | | 169 | |
| | | 64 | | | | | | | | | | | |



C.T. SOIL & MATERIALS
TESTING INC.
WINDSOR ONTARIO

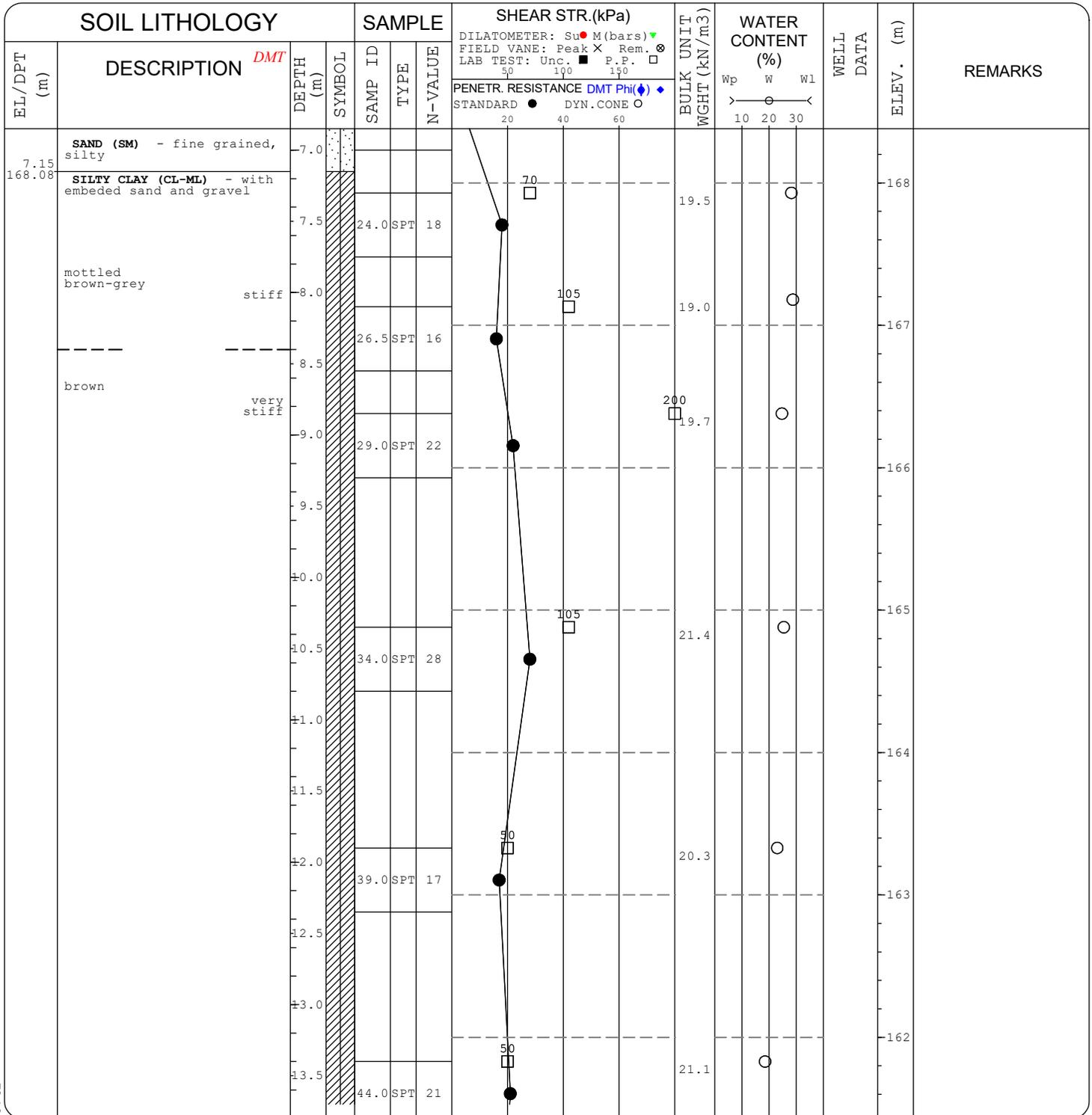
Client: Riggs Engineering Ltd.

Project: Jetty 1, 2, 3, 6 & 7 - Option 3
Reconstruction

Location: Fisherman's Basin, Erieau, ON

EQUIPMENT DATA

Machine: Diedrich D50 Truck
Method: 83 mm I.D. H/S Auger
Size: 165 mm O.D.
Date: 2018-02-16 TO 2018-02-16



CTMET 18G008.GPJ 18-04-02

REVIEWING PROFESSIONAL:
T. O'Dwyer, P.Eng., P.E.
Soil & Materials
Engineering Inc.

C.T. SOIL & MATERIALS
TESTING INC.
2000 Legacy Park Drive
WINDSOR, ONTARIO, N8W 5S6
ph. (519) 966-8863, fx. (519) 966-8870
email ctsoil @ ctsoil.com





**C.T. SOIL & MATERIALS
TESTING INC.**
WINDSOR ONTARIO

Client: **Riggs Engineering Ltd.**

Project: **Jetty 1, 2, 3, 6 & 7 - Option 3
Reconstruction**

Location: **Fisherman's Basin, Eriau, ON**

EQUIPMENT DATA

Machine: **Diedrich D50 Truck**
Method: **83 mm I.D. H/S Auger**
Size: **165 mm O.D.**
Date: **2018-02-16 TO 2018-02-16**

| SOIL LITHOLOGY | | | SAMPLE | | | SHEAR STR.(kPa) | | | BULK UNIT WGHT (kN/m ³) | WATER CONTENT (%) | | | WELL DATA | ELEV. (m) | REMARKS |
|-----------------|--|--------------|--------|---------|------|-----------------|------------------------------------|---------------------------|--|-------------------------|------|----|-------------------|-----------|---------|
| EL/DPT (m) | DESCRIPTION <i>DMT</i> | DEPTH (m) | SYMBOL | SAMP ID | TYPE | N-VALUE | DILATOMETER: Su M (bars) ▼ | FIELD VANE: Peak X Rem. ⊗ | | Wp | W | Wl | | | |
| | | | | | | | PENETR. RESISTANCE DMT Phi (♦) ◆ | | | | | | > ○ < 10 20 30 | | |
| | | | | | | | STANDARD ● DYN. CONE ○ 20 40 60 | | | | | | | | |
| 15.35 159.88 | SILTY CLAY (CL-ML) - with embedded sand and gravel brown very stiff | ±4.0 | | | | | 50 | 50 | 21.5 | 21.5 | 21.5 | | | 161 | |
| | | ±4.5 | | | | | | | | | | | | | |
| | End of Testhole | ±5.0 | | | | | | | | | | | | 160 | |
| | | ±5.5 | | | | | | | | | | | | 159 | |
| | | ±6.0 | | | | | | | | | | | | 159 | |
| | | ±6.5 | | | | | | | | | | | | 158 | |
| | | ±7.0 | | | | | | | | | | | | 158 | |
| | | ±7.5 | | | | | | | | | | | | 157 | |
| | | ±8.0 | | | | | | | | | | | | 157 | |
| | | ±8.5 | | | | | | | | | | | | 156 | |
| | | ±9.0 | | | | | | | | | | | | 156 | |
| | | ±9.5 | | | | | | | | | | | | 155 | |
| | | ±10.0 | | | | | | | | | | | | 155 | |
| | | ±10.5 | | | | | | | | | | | | 155 | |

CTMET 18G008.GPJ 18-04-02

REVIEWING PROFESSIONAL:
T. O'Dwyer, P.Eng., P.E.
Soil & Materials
Engineering Inc.

**C.T. SOIL & MATERIALS
TESTING INC.**
2000 Legacy Park Drive
WINDSOR, ONTARIO, N8W 5S6
ph. (519) 966-8863, fx. (519) 966-8870
email ctsoil @ ctsoil.com





**C.T. SOIL & MATERIALS
TESTING INC.**
WINDSOR ONTARIO

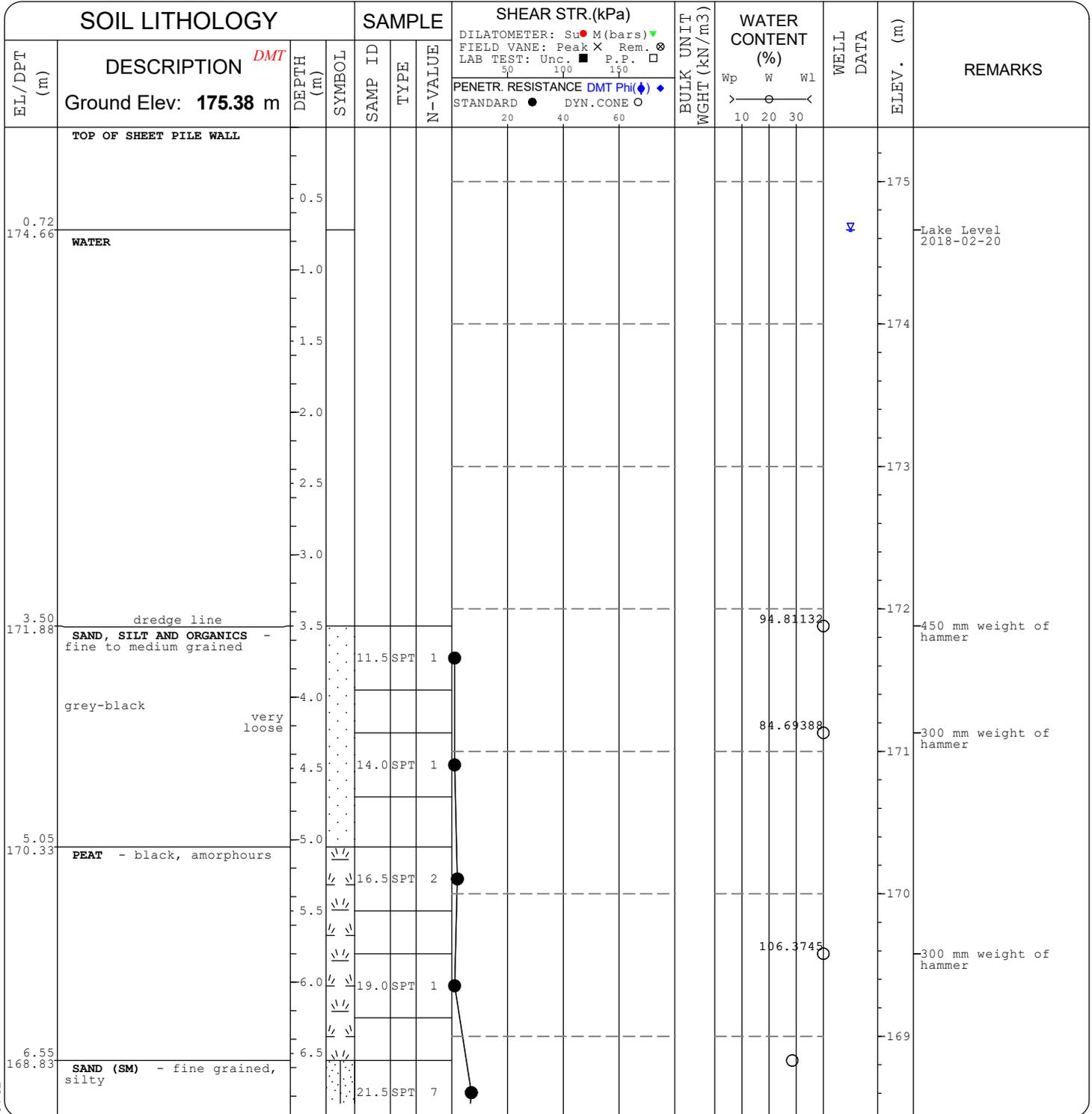
Client: **Riggs Engineering Ltd.**

Project: **Jetty 1, 2, 3, 6 & 7 - Option 3
Reconstruction**

Location: **Fisherman's Basin, Erieau, ON**

EQUIPMENT DATA

Machine: **Diedrich D50 Truck**
Method: **83 mm I.D. H/S Auger**
Size: **165 mm O.D.**
Date: **2018-02-23 TO 2018-02-23**



CTMET 18G008.GPJ 18-04-02

| | | |
|--|--|---|
| <p>REVIEWING PROFESSIONAL: T. O'Dwyer, P.Eng., P.E. Soil & Materials Engineering Inc.</p> | <p>C.T. SOIL & MATERIALS TESTING INC. 2000 Legacy Park Drive WINDSOR, ONTARIO, N8W 5S6 ph. (519) 966-8863, fx. (519) 966-8870 email ctsoil @ ctsoil.com</p> |  |
|--|--|---|



C.T. SOIL & MATERIALS TESTING INC.
WINDSOR ONTARIO

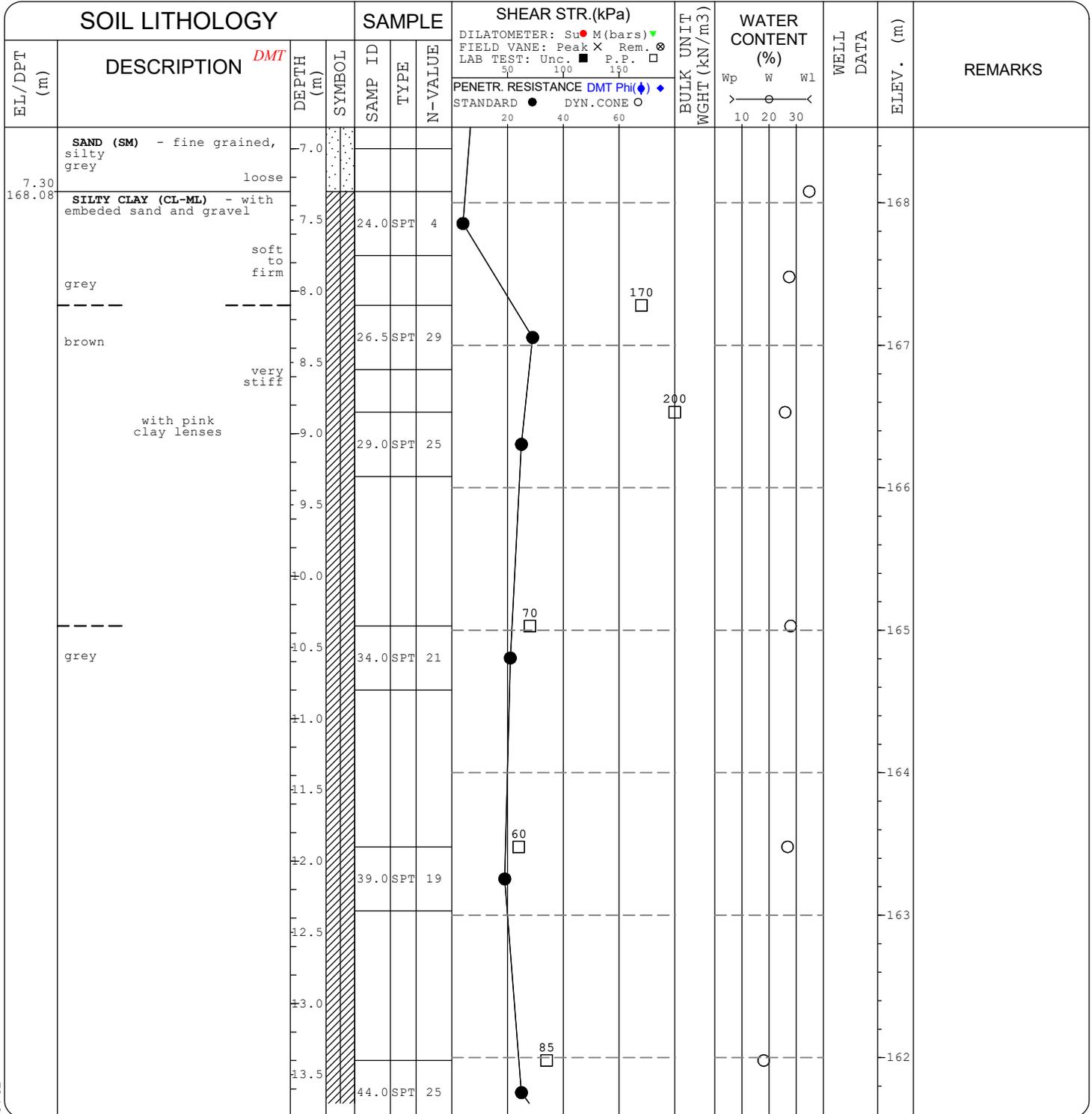
Client: **Riggs Engineering Ltd.**

Project: **Jetty 1, 2, 3, 6 & 7 - Option 3 Reconstruction**

Location: **Fisherman's Basin, Erieau, ON**

EQUIPMENT DATA

Machine: **Diedrich D50 Truck**
Method: **83 mm I.D. H/S Auger**
Size: **165 mm O.D.**
Date: **2018-02-23 TO 2018-02-23**



CTMET 18G008.GPJ 18-04-02

REVIEWING PROFESSIONAL:
T. O'Dwyer, P.Eng., P.E.
Soil & Materials Engineering Inc.

C.T. SOIL & MATERIALS TESTING INC.
2000 Legacy Park Drive
WINDSOR, ONTARIO, N8W 5S6
ph. (519) 966-8863, fx. (519) 966-8870
email ctsoil @ ctsoil.com





**C.T. SOIL & MATERIALS
TESTING INC.**
WINDSOR ONTARIO

Client: **Riggs Engineering Ltd.**

Project: **Jetty 1, 2, 3, 6 & 7 - Option 3
Reconstruction**

Location: **Fisherman's Basin, Erieau, ON**

EQUIPMENT DATA

Machine: **Diedrich D50 Truck**
Method: **83 mm I.D. H/S Auger**
Size: **165 mm O.D.**
Date: **2018-02-23 TO 2018-02-23**

| SOIL LITHOLOGY | | | SAMPLE | | | SHEAR STR.(kPa) | | | BULK UNIT WGHT (kN/m ³) | WATER CONTENT (%) | | | WELL DATA | ELEV. (m) | REMARKS |
|-----------------|--|--------------|---------|------|---------|---|-------------------------|---------------------|--|----------------------|---|----|--------------|-----------|---------|
| EL./DPT (m) | DESCRIPTION <i>DMT</i> | DEPTH (m) | SAMP ID | TYPE | N-VALUE | DILATOMETER: Su (bars) M (bars) | FIELD VANE: Peak X Rem. | LAB TEST: Unc. P.P. | | Wp | W | Wl | | | |
| 15.35 160.03 | SILTY CLAY (CL-ML) - with embedded sand and gravel grey very stiff ----- hard | ±4.0 | 49.0 | SPT | 81 | PENETR. RESISTANCE DMT Phi STANDARD ● DYN. CONE ○ | 50 100 150 20 40 60 | 81 ● | > ○ < | 10 20 30 | | | | | |
| ±5.0 | | ±4.5 | | | | | | | | | | | | | ±5.5 |
| | End of Testhole | | | | | | | | | | | | | | |

CTMET 18G008.GPJ 18-04-02

REVIEWING PROFESSIONAL:
T. O'Dwyer, P.Eng., P.E.
Soil & Materials
Engineering Inc.

**C.T. SOIL & MATERIALS
TESTING INC.**
2000 Legacy Park Drive
WINDSOR, ONTARIO, N8W 5S6
ph. (519) 966-8863, fx. (519) 966-8870
email ctsoil @ ctsoil.com





C.T. SOIL & MATERIALS
TESTING INC.
WINDSOR ONTARIO

Client: Riggs Engineering Ltd.

Project: Jetty 1, 2, 3, 6 & 7 - Option 3
Reconstruction

Location: Fisherman's Basin, Erieau, ON

EQUIPMENT DATA

Machine:

Method:

Size:

Date: 1973-09-18 TO 1973-09-18

| SOIL LITHOLOGY | | SAMPLE | | | SHEAR STR.(kPa) | | BULK UNIT WGHT (kN/m ³) | WATER CONTENT (%) | | | WELL DATA | ELEV. (m) | REMARKS |
|----------------|--|--------------|--------|---------|-----------------|---------|--|--|----|---|--------------|-----------|---------|
| EL./DPT (m) | DESCRIPTION <i>DMT</i> | DEPTH (m) | SYMBOL | SAMP ID | TYPE | N-VALUE | | DILATOMETER: Su M (bars) ▼ FIELD VANE: Peak X Rem. ◻ LAB TEST: Unc. ■ P.P. ◻ 50 100 150 | Wp | W | | | |
| | Water | | | | | | | | | | | | |
| 1.30 173.05 | SAND (SW) - medium grained, trace of organics very loose to compact grey | 1.5 | | 5.0 | SPT | 14 | | | | | | | |
| | | 2.5 | | 7.5 | SPT | 11 | | | | | | | |
| 3.50 170.85 | SAND (SP) - fine grained, trace of organics compact grey | 3.5 | | 12.5 | SPT | 10 | | | | | | | |
| 4.40 169.95 | PEAT - fibrous black | 4.5 | | 15.0 | SPT | 2 | | | | | | | |
| 5.90 168.45 | SAND (SW) - fine to medium grained loose grey | 6.0 | | 20.0 | SPT | 4 | | | | | | | |
| 6.40 167.95 | SILT & CLAY (CL-ML) - stratified, occasional gravel | 6.5 | | | | | | | | | | | |

Log developed from
pre-existing
available data
gathered by others

CTMET 18G008.GPJ 18-04-02

REVIEWING PROFESSIONAL:

Soil & Materials
Engineering Inc.

C.T. SOIL & MATERIALS
TESTING INC.

2000 Legacy Park Drive
WINDSOR, ONTARIO, N8W 5S6
ph. (519) 966-8863, fx. (519) 966-8870
email ctsoil @ ctsoil.com





**C.T. SOIL & MATERIALS
TESTING INC.**
WINDSOR ONTARIO

Client: **Riggs Engineering Ltd.**

Project: **Jetty 1, 2, 3, 6 & 7 - Option 3
Reconstruction**

Location: **Fisherman's Basin, Eriau, ON**

EQUIPMENT DATA

Machine:

Method:

Size:

Date: **1973-09-18 TO 1973-09-18**

| SOIL LITHOLOGY | | | SAMPLE | | | SHEAR STR.(kPa) | | | BULK UNIT WGHT (kN/m ³) | WATER CONTENT (%) | | | WELL DATA | ELEV. (m) | REMARKS |
|----------------|---|--------------|---------|------|---------|--------------------------|---------------------------|-------------------------|--|----------------------|---|----------------|--------------|-----------|---------|
| EL/DPT (m) | DESCRIPTION <i>DMT</i> | DEPTH (m) | SAMP ID | TYPE | N-VALUE | DILATOMETER: Su (bars) ▼ | FIELD VANE: Peak X Rem. □ | LAB TEST: Unc. ■ P.P. □ | | W _p | W | W _L | | | |
| | | 7.0 | | | | | | | | | | | | | |
| | stiff to hard brown and grey | 7.5 | | | | | | | | | | | | | |
| | | 8.0 | | | | | | | | | | | | | |
| | | 8.5 | | | | | | | | | | | | | |
| | | 8.5 | 27.5 | SPT | 26 | | | | | | | | | | |
| | | 9.0 | | | | | | | | | | | | | |
| | | 9.5 | | | | | | | | | | | | | |
| | | 9.5 | 30.0 | SPT | 23 | | | | | | | | | | |
| | | 10.0 | | | | | | | | | | | | | |
| | | 10.0 | 32.5 | SPT | 32 | | | | | | | | | | |
| | | 10.5 | | | | | | | | | | | | | |
| 10.60 | | 10.5 | | | | | | | | | | | | | |
| 163.75 | SILTY CLAY (CL-ML) - trace of sand, occasional gravel (TILL) | 10.5 | | | | | | | | | | | | | |
| | very stiff | 11.0 | | | | | | | | | | | | | |
| | grey | 11.0 | 35.0 | SPT | 29 | | | | | | | | | | |
| | | 11.5 | | | | | | | | | | | | | |
| | | 11.5 | 37.5 | SPT | 26 | | | | | | | | | | |
| | | 12.0 | | | | | | | | | | | | | |
| | | 12.5 | | | | | | | | | | | | | |
| | | 12.5 | 40.0 | SPT | 23 | | | | | | | | | | |
| | | 13.0 | | | | | | | | | | | | | |
| 12.75 | End of Testhole | 13.0 | | | | | | | | | | | | | |
| 161.60 | | 13.5 | | | | | | | | | | | | | |

CTMET 18G008.GPJ 18-04-02

REVIEWING PROFESSIONAL:

C.T. SOIL & MATERIALS TESTING INC.
2000 Legacy Park Drive
WINDSOR, ONTARIO, N8W 5S6
ph. (519) 966-8863, fx. (519) 966-8870
email ctsoil @ ctsoil.com



Soil & Materials Engineering Inc.



C.T. SOIL & MATERIALS TESTING INC.
WINDSOR ONTARIO

Client: **Riggs Engineering Ltd.**

Project: **Jetty 1, 2, 3, 6 & 7 - Option 3 Reconstruction**

Location: **Fisherman's Basin, Erieau, ON**

EQUIPMENT DATA

Machine:

Method:

Size:

Date: **1973-09-25 TO 1973-09-25**

| SOIL LITHOLOGY | | SAMPLE | | | SHEAR STR.(kPa) | | | BULK UNIT WEIGHT (kN/m ³) | WATER CONTENT (%) | | | WELL DATA | ELEV. (m) | REMARKS |
|----------------|---|-----------|--------|---------|-----------------|---------|----------------------------------|---------------------------------------|-------------------|---|----|-----------|-----------|---------|
| EL/DPT (m) | DESCRIPTION <i>DMT</i> | DEPTH (m) | SYMBOL | SAMP ID | TYPE | N-VALUE | DILATOMETER: Su (bars) ▼ | | Wp | W | Wl | | | |
| | Water | | | | | | DILATOMETER: Su (bars) ▼ | | | | | | | |
| 2.70 171.65 | SAND (SW) - fine to medium grained, some silt | | | | | | FIELD VANE: Peak X Rem. ⊗ | | | | | | | |
| 4.10 170.25 | PEAT - fibrous black | | | 12.5 | SPT | 4 | LAB TEST: Unc. ■ P.P. □ | | | | | | | |
| 5.80 168.55 | SAND (SW) - fine to medium grained grey loose | | | 15.0 | SPT | 2 | PENETR. RESISTANCE DMT Phi (♦) ◆ | | | | | | | |
| 6.55 167.80 | SILT & CLAY (CL-ML) - stratified, occasional gravel, occasional silt | | | 17.5 | SPT | 5 | STANDARD ● DYN. CONE ○ | | | | | | | |
| | | | | 20.0 | SPT | 7 | | | | | | | | |

CTMET 18G008.GPJ 18-04-02

REVIEWING PROFESSIONAL:

Soil & Materials Engineering Inc.

C.T. SOIL & MATERIALS TESTING INC.
2000 Legacy Park Drive
WINDSOR, ONTARIO, N8W 5S6
ph. (519) 966-8863, fx. (519) 966-8870
email ctsoil @ ctsoil.com





C.T. SOIL & MATERIALS TESTING INC.
WINDSOR ONTARIO

Client: **Riggs Engineering Ltd.**

Project: **Jetty 1, 2, 3, 6 & 7 - Option 3 Reconstruction**

Location: **Fisherman's Basin, Eriau, ON**

EQUIPMENT DATA

Machine:

Method:

Size:

Date: **1973-09-25 TO 1973-09-25**

| SOIL LITHOLOGY | | | SAMPLE | | | SHEAR STR.(kPa) | | | BULK UNIT WGHT (kN/m ³) | WATER CONTENT (%) | | | WELL DATA | ELEV. (m) | REMARKS |
|-----------------|---|--------------|---------|------|---------|-----------------------------------|---------------------------|-------------------------|--|----------------------|---|----|--------------|-----------|---------|
| EL/DPT (m) | DESCRIPTION <i>DMT</i> | DEPTH (m) | SAMP ID | TYPE | N-VALUE | DILATOMETER: Su (bars) M (bars) ▼ | FIELD VANE: Peak X Rem. ◊ | LAB TEST: Unc. ■ P.P. □ | | Wp | W | Wl | | | |
| | parting mottled brown and grey | 7.0 | | | | | | | | | | | | | |
| | firm to very stiff | 7.5 | | | | | | | | | | | | | |
| | | 8.0 | | | | | | | | | | | | | |
| | | 8.5 | 27.5 | SPT | 6 | | | | | | | | | | |
| | | 9.0 | | | | | | | | | | | | | |
| | | 9.5 | 30.0 | SPT | 24 | | | | | | | | | | |
| | | 10.0 | | | | | | | | | | | | | |
| | | 10.5 | | | | | | | | | | | | | |
| | | 11.0 | 35.0 | SPT | 15 | | | | | | | | | | |
| | | 11.5 | | | | | | | | | | | | | |
| 11.60 162.75 | SILTY CLAY (CL-ML) - trace of sand, occasional gravel (TILL) | | | | | | | | | | | | | | |
| 12.05 162.30 | End of Testhole | | | | | | | | | | | | | | |

CTMET 18G008.GPJ 18-04-02

REVIEWING PROFESSIONAL:

C.T. SOIL & MATERIALS TESTING INC.
2000 Legacy Park Drive
WINDSOR, ONTARIO, N8W 5S6
ph. (519) 966-8863, fx. (519) 966-8870
email ctsoil @ ctsoil.com



Soil & Materials Engineering Inc.



C.T. SOIL & MATERIALS TESTING INC.
WINDSOR ONTARIO

Client: **Riggs Engineering Ltd.**

Project: **Jetty 1, 2, 3, 6 & 7 - Option 3 Reconstruction**

Location: **Fisherman's Basin, Erieau, ON**

EQUIPMENT DATA

Machine:

Method:

Size:

Date: **1973-09-26 TO 1973-09-26**

| SOIL LITHOLOGY | | SAMPLE | | | SHEAR STR.(kPa) | | | BULK UNIT WGHT (kN/m ³) | WATER CONTENT (%) | | | WELL DATA | ELEV. (m) | REMARKS |
|----------------|---|--------------|--------|---------|-----------------|---------|--|--|----------------------|---|----|--------------|-----------|---|
| EL./DPT (m) | DESCRIPTION <i>DMT</i> | DEPTH (m) | SYMBOL | SAMP ID | TYPE | N-VALUE | DILATOMETER: Su M (bars) ▼ FIELD VANE: Peak X Rem. ⊗ LAB TEST: Unc. ■ P.P. □ | | Wp | W | Wl | | | |
| | Water | | | | | | PENETR. RESISTANCE <i>DMT</i> Phi (♦) ◆ STANDARD ● DYN. CONE ○ | | | | | | | |
| | | 0.5 | | | | | | | | | | | 174 | Log developed from pre-existing available data gathered by others |
| | | 1.0 | | | | | | | | | | | 173 | |
| | | 1.5 | | | | | | | | | | | 172 | |
| | | 2.0 | | | | | | | | | | | 171 | |
| | | 2.5 | | | | | | | | | | | 170 | |
| | | 3.0 | | | | | | | | | | | 169 | |
| | | 3.5 | | | | | | | | | | | 168 | |
| 3.75 170.60 | PEAT - fibrous | 4.0 | | | | | | | | | | | | |
| | very soft to firm | 4.5 | | | | | | | | | | | | |
| | black | 5.0 | | 15.0 | SPT | 1 | ● | | | | | | | |
| 5.80 168.55 | SAND (SW) - seams of peat throughout | 6.0 | | | | | | | | | | | | |
| | grey | 6.5 | | 20.0 | SPT | 2 | ● | | | | | | | |

CTMET 18G008.GPJ 18-04-02

REVIEWING PROFESSIONAL:

Soil & Materials Engineering Inc.

C.T. SOIL & MATERIALS TESTING INC.
2000 Legacy Park Drive
WINDSOR, ONTARIO, N8W 5S6
ph. (519) 966-8863, fx. (519) 966-8870
email ctsoil @ ctsoil.com





**C.T. SOIL & MATERIALS
TESTING INC.**
WINDSOR ONTARIO

Client: **Riggs Engineering Ltd.**

Project: **Jetty 1, 2, 3, 6 & 7 - Option 3
Reconstruction**

Location: **Fisherman's Basin, Eriean, ON**

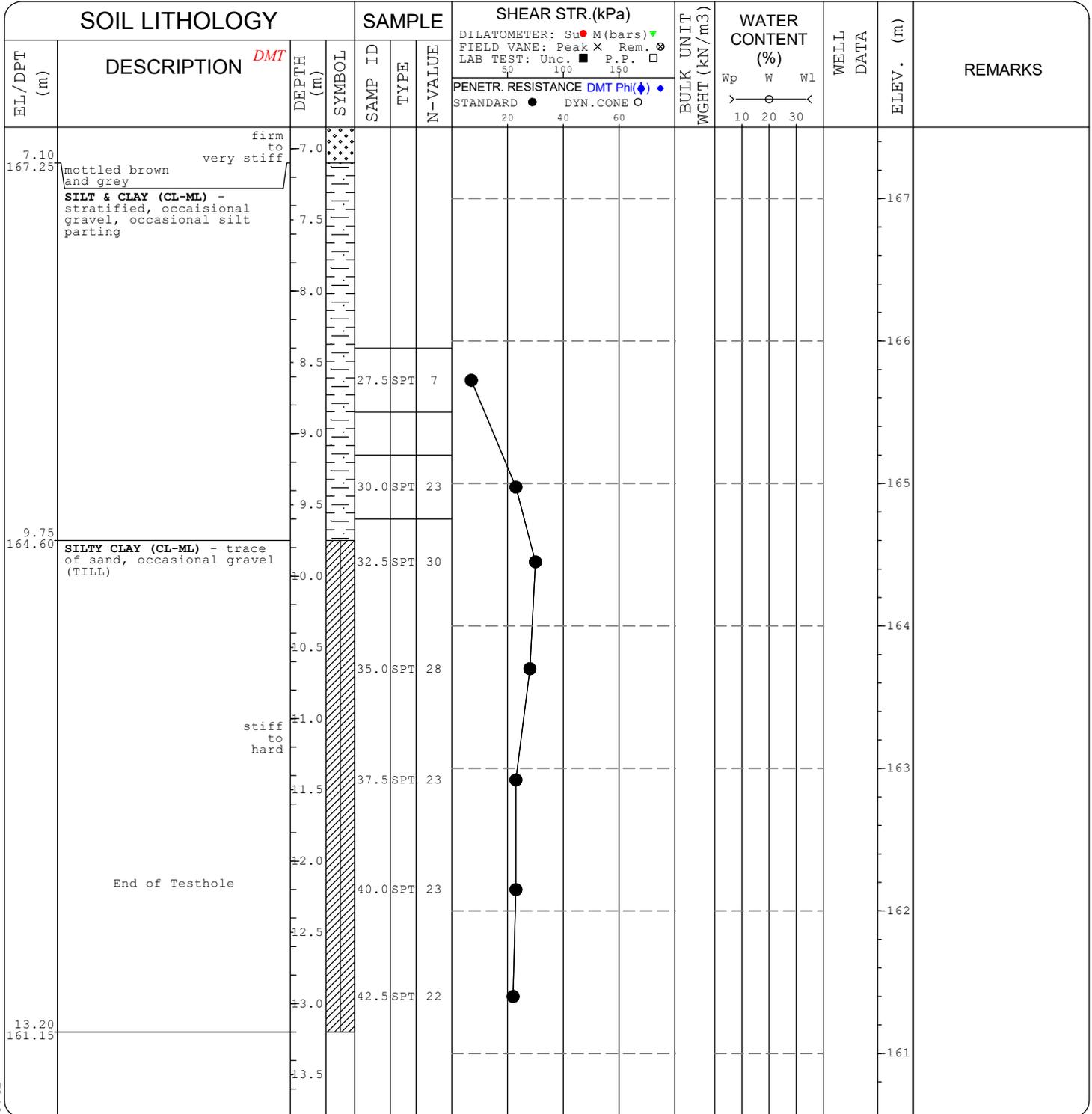
EQUIPMENT DATA

Machine:

Method:

Size:

Date: **1973-09-26 TO 1973-09-26**



CTMET 18G008.GPJ 18-04-02

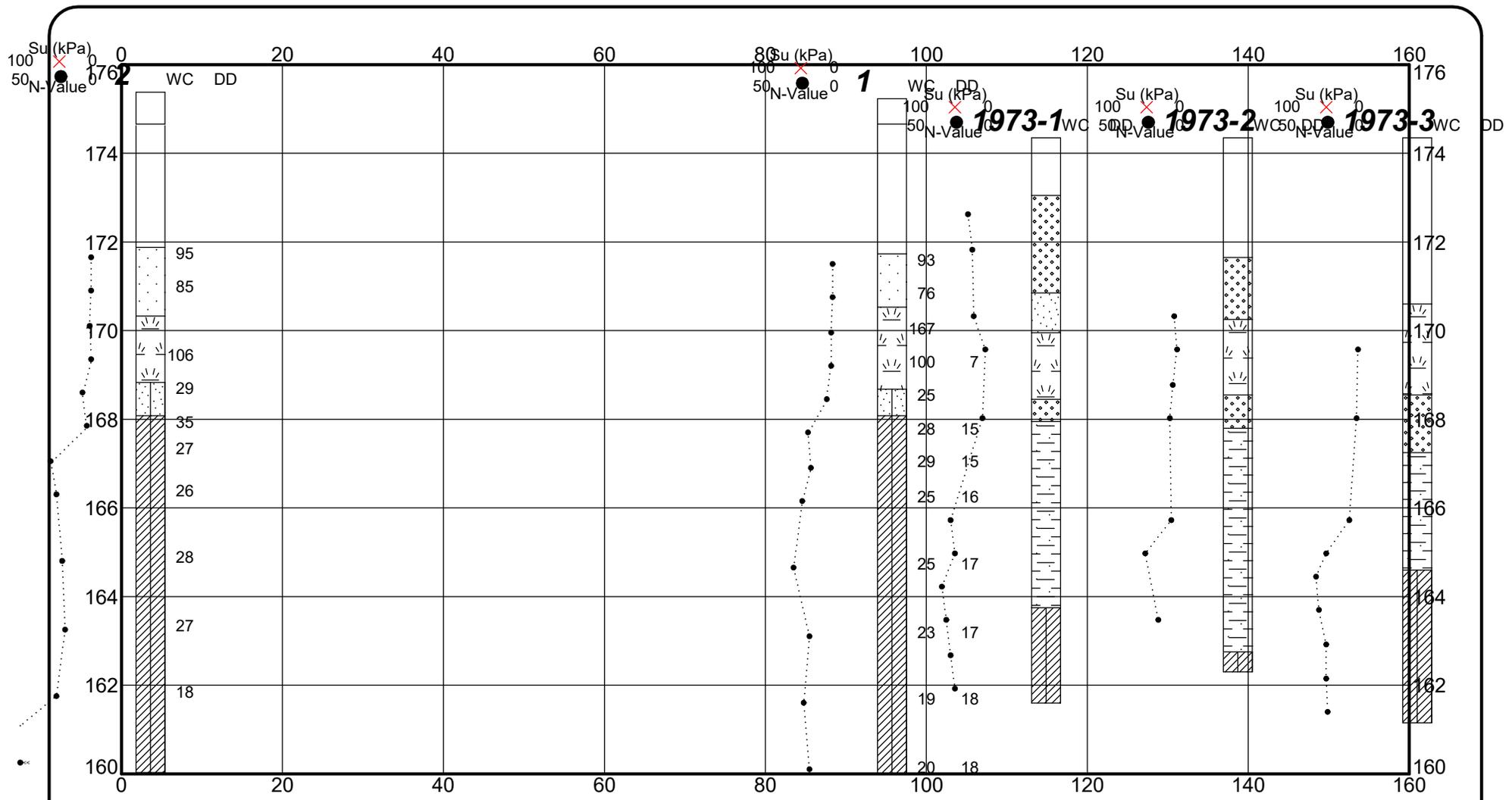
REVIEWING PROFESSIONAL:

**Soil & Materials
Engineering Inc.**

**C.T. SOIL & MATERIALS
TESTING INC.**
2000 Legacy Park Drive
WINDSOR, ONTARIO, N8W 5S6
ph. (519) 966-8863, fx. (519) 966-8870
email ctsoil @ ctsoil.com



SUBSURFACE FENCE DIAGRAM



| Boring | North | East | Elev. | Depth |
|--------|---------|--------|-------|-------|
| 1 | 4679194 | 425075 | 175.2 | 15.0 |
| 2 | 4679076 | 425047 | 175.4 | 15.0 |
| 1973-1 | 4679209 | 425088 | 174.4 | 12.8 |
| 1973-2 | 4679200 | 425124 | 174.4 | 12.1 |
| 1973-3 | 4679187 | 425161 | 174.4 | 13.4 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

DISTANCES:
 Beginning 0
 Ending 160
 VIEWING ANGLES (degrees):
 Horizontal 0.0
 Vertical 0.0

| Position | North | East |
|--------------|---------|--------|
| Left, Front | 4679115 | 425019 |
| Right, Front | 4679209 | 425148 |
| Left, Back | 4679115 | 425019 |
| Right, Back | 4679209 | 425148 |

SUBSURFACE FENCE DIAGRAM

Clockwise
South to North

Jetty 1, 2, 3, 6 & 7 - Option 3 Reconstruction

Fisherman's Basin, Erieau, ON

| | | |
|-----------|--------|-------|
| PROJECT # | DATE | PLATE |
| 18G008 | Apr 18 | |