PROJECT TITLE Wheatley, Ontario
East Harbour Wall Rehabilitation

PROJECT NUMBER 721974

PROJECT DATE 2017-03-31

END OF SECTION

DESIGN ENGINEER: Philip Lampkin P.Eng., Riggs Engineering Ltd.

END OF SECTION

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Sub-Surface Report
C.T.Soil & Materials Inc. Project: 2017 East Harbour Wall Repairs
Location: Wheatley Harbour Wheatley, ON 18
Number: 17G048

END OF SECTION

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 Secretatiat, Fire Protection Standard, April 1, 2010.

.4 Observe and enforce construction safety measures required by National Building Code 2015, 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 PRECEDENCE

.1 Division 01 Sections take precedence over technical specification sections in other Divisions of this Specification.

1.3 TAXES

.1 Pay applicable Federal, Provincial and Municipal taxes.

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 when requested.

1.5 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.

1.6 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.

1.7 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.

1.8 DOCUMENTS

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

.2 Maintain documents in clean, dry, legible condition.

.3 Make Documents available at all times for inspection by Departmental Representative.

1.9 CONTRACT METHOD

.1 Construct work under combined price contract.

.2 Within one week of notification of acceptance of tender furnish a cost breakdown of the Lump Sum Amount.

.3 Unit Price Table Scenario A is for all work as shown on the drawings within Area A

.4 Unit Price Table Scenario B is for all work as shown on the drawings within Area A and Area B.

1.10 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.

1.11 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.

.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.
.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 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 SHOP DRAWINGS

.1 To Section 01 33 00.

1.13 ADDITIONAL DRAWINGS

.1 Departmental Representative may furnish additional drawings to clarify work.

.2 Such drawings become part of Contract Documents.

1.14 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.

.3 Maintain all reference points and markers for duration of contract.

1.15 CO-OPERATION & PROTECTION

.1 Execute work with minimum disturbance to occupants, public and normal use of site. Make arrangements with Departmental Representative to facilitate execution of work.

.2 Maintain access and exits.

.3 Provide necessary barriers, warning lights and signs. Protect work from damage. Replace damaged existing work with material and finish to match original.

.4 Provide final protection and maintain conditions that ensure installed work is without damage or deterioration at time of Substantial Performance.

.5 Use equipment and procedures that prevent damage to existing structures.

.6 Work shall be conducted in a manner to protect the stability of structures on or adjacent to the existing structures, roads or other facilities damaged or fouled by work. Complete repairs and clean up at no additional expense to the Contract. Repairs made to damaged existing work to equal or better condition.

1.16 EXISTING UTILITIES

.1 Establish location, protect and maintain existing utility lines.

.2 Connect to existing utilities with minimum disturbance to pedestrian and vehicular traffic.

1.17 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.

1.18 INSPECTION AND TESTING

.1 The Departmental Representative may employ an Inspection and Testing company to ensure work conforms with Contract Documents.

.2 Contractor is to submit a Quality Control Plan and is responsible to engage the services of a Canadian Standards Association certified testing companies for work to be undertaken to Section 03 30 00, Section 31 23 11 and Section 32 12 17 for quality control testing.

.3 When initial tests and inspections reveal work not to contract requirements, pay for tests and inspections required by Departmental Representative on corrected work.

1.19 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.

1.20 FIRES

.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.

1.21 PROGRESS PHOTOGRAPHS

.1 As soon as work commences, take monthly progress photographs.

.2 View points, which will best illustrate progress of work, will be selected by Departmental Representative.

.3 Digital progress photographs shall be sent to the Departmental Representative on a weekly basis.

1.22 DATUM

.1 Elevations and soundings shown on Drawings are expressed in metres relative to chart datum.

.2 The elevation benchmark to be used is Chart datum 173.35 metres above I.G.L.D (1985).

1.23 CONSTRUCTION PARKING

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

.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.

.4 Contractor is responsable make arrangements to secure alternate access to the site over private land abutting the federal property, if desired.

1.24 SECURITY

.1 Pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

.2 Be Responsible for site security at all times.

.3 Entry and egress point shall be secured during non-working hours.

1.25 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.

1.26 DEMOBILIZATION

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

END OF SECTION

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 and samples 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.

.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,and Autocad dwg files on USB 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 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.

.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 three hard copies and one electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.11 Submit three hard copies and 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 three hard copies and 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 three hard copies and 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 three hard copies and 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.

.17 Submit three hard copies and 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, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.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 upon request.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Adjustments made on samples 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.

.5 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

.6 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Safety and Insurance Board Experience Report.

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

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&section=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.

.3 Contractor's and Sub-contractors' Safety Communication Plan.

.4 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 7 days after receipt of comments from Departmental Representative.

.5 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.

.6 Submit names of personnel and alternates responsible for site safety and health.

.7 Submit records of Contractor's Health and Safety meetings when requested.

.8 Submit 3 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, upon request.

.9 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.

.10 Submit copies of incident and accident reports.

.11 Submit Material Safety Data Sheets (MSDS).

.12 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 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:
.1 Silica in concrete.
.2 Work at or near water

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.

.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.

.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

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.

END OF SECTION

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 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 2 copies of WHMIS MSDS.

.3 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval 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.

.4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.6 Drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 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.

.8 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.

.9 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.

1.3 WORK ADJACENT TO WATERWAYS

.1 Construction equipment to be operated on land only.

.2 Do not use waterway beds for borrow material.

.3 Do not allow stone, gravel, crushed rock, broken concrete and other deleterious substances to enter the waterway unless otherwise indicated.

1.4 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 other 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 spread and clean up in accordance with provincial regulatory requirements.
.2 Report immediately to Ontario Spills Action Centre: 1-800-268-6060.
.3 Further information on dangerous goods emergency cleanup and precautions including a list of companies performing this work can be obtained from the Transport Canada 24-hour number (613) 996-6666 collect.

.7 Re-fuelling of machinery must take place at a safe distance from the waterway as designated by Departmental Representative.

.8 Machinery to arrive on site in a clean, washed condition and maintained free of leaks.

.9 Wash, refuel, and service machinery and store fuel and other materials for the machinery away from water to prevent any deleterious substance from entering the water.

.10 Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.

1.5 CONCRETE OPERATIONS

.1 The following clauses are applicable to all work under Section 03 30 00.

.2 Employ measures to prevent entry of concrete wash water or leachate from uncured concrete into the water.

.3 Containment facilities shall be provided at the site for the wash-down water from concrete delivery trucks, concrete equipment, and other tools and equipment as required. Water used to wash concrete should not be allowed to enter directly into water bodies. The sediment should be allowed to settle out and reach neutral pH before the clarified water is released to the drain system or allowed to percolate into the ground.

.4 Concrete trucks and concrete equipment should be washed out in a designated area where runoff to the marine environment, adjacent waterways and storm drains can be prevented.

.5 Prior to placement of concrete, all forms shall be thoroughly inspected to ensure that formwork is fully secured and sealed to prevent the release of concrete or concrete contaminated water into the waterway.

.6 If escape of concrete is observed or detected, pumping and or placement should be stopped and appropriate action taken to immediately rectify the situation.

.7 Measure and record baseline pH levels in the project area prior to commencement of work.

.8 Prior to the commencement of operations, demonstrate satisfactory knowledge and use of pH monitoring equipment to Departmental Representative.

.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 (C02) 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.

1.6 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 Leave Work area clean at end of each day.

.2 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

.4 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.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 U.S. Environmental Protection Agency (EPA)/ Office of Water

.1 EPA 833-R-06-004, May 2007, Developing Your Stormwater Pollution Prevention Plan - A Guide for Construction Sites.

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 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

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

.5 Remove from site all such work after use.

1.4 PROVISIONS

.1 Provide a clearly marked and fully stocked first-aid case in a readily available location.

.2 Provide private washroom facilities complete with flush or chemical type toilet, lavatory and mirror and maintain supply of paper towels and toilet tissue.

1.5 SITE STORAGE/LOADING

.1 Confine work and operations of employees to 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.

1.6 CONSTRUCTION PARKING

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

.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.

.4 Clean construction runways and taxi areas where used by Contractor's equipment.

1.7 SECURITY

.1 Be responsible for site security at all times.

.2 Entry and egress point shall be secured during non-working hours.

1.8 CONTRACTOR'S OFFICES

.1 Provide a suitable furnished temporary office for its own use.

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.

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

.8 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.

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

.4 Stack stored new or salvaged material.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction and sediment and erosion control drawings and sediment and erosion control plan, specific to site, that complies with EPA 833-R-06-004 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 03 30 00: Cast-in-Place Concrete.

.2 Section 31 32 19.01: Geotextiles.

.3 Section 39 50 30: Fenders, Bollards and Ladders.

1.2 MEASUREMENT PROCEDURES

.1 Asphalt pavement and concrete removal shall be measured by the linear metre and shall include all labour materials and equipment necessary to complete the work.

.2 Longitudinal drain removal shall be included in the Lump Sum Arrangement and shall include all labour materials and equipment necessary to complete the work.

.3 Transverse drain removal including air lifting clean catch basins and dye tests shall be included in the Lump Sum Arrangement and shall include all labour materials and equipment necessary to complete the work.

.4 Timber pile removal and disposal shall be included in the Lump Sum Arrangment and shall include all labour and materials necessary to complete the work including disposal.

.5 Steel pile removal and disposal shall be included in the Lump Sum Arrangement and shall include all labour and materials necessary to complete the work including disposal.

.6 Tire fender and attachments removal and salvage shall be included in the Lump Sum Arrangement and shall include all labour, materials and equipment necessary to complete the work.

.7 Electrical power pedestal removal including concrete footings, conduits, junction boxes and wiring shall be measured by each pedestal removed and shall include all labour, materials and equipment necessary to complete the work. Reinstallation of the salvaged power pedestals salvaged wiring including new concrete footings, and conduit shall be considered included in the removals and will not be measured separately for payment.

1.3 EXISTING CONDITIONS

.1 Sinkholes have been noted to exist behind the existing parapets randomly throughout the length of the work area.

1.4 WORK

.1 Dispose legally off the site all demolished and removed materials.

1.5 SAFETY CODE

.1 Unless otherwise specified, carry out demolition work in accordance with CSA S350-M1980.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Concrete: to Section 03 30 00.

.2 Filter Fabric: to Section 31 32 19.01.

.3 Paint: to Section 35 59 30.

.4 Electrical Components: as indicated on Drawings MA 12, MA 13 and MA 14.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Inspect site and verify with Departmental Representative items designated for removal and disposal and items to remain.

.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

.3 Do not disrupt active power and service lines entering existing buildings and wharf outlets as per rules and regulations of authorities having jurisdiction. Post warning signs on electrical lines and equipment which must remain energized to serve navigational equipment during period of demolition and removal.

.4 Obtain both private and public locates prior to commencement of work. Advise Departmental Representative when locates have been completed.

.5 Disconnect, cap, plug or divert, as required, existing utilities within the area of work where they interfere with the execution of the work. Complete work in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Maintain pipes and conduits encountered.

.6 Immediately notify Departmental Representative in case of damage to any utility or service, designated to remain in place.

.7 Immediately notify Departmental Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.2 PROTECTION

.1 Prevent movement, settlement, or damage to adjacent structures, asphalt pavement, utilities, services, and distribution panels.

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

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

.4 Prevent movement, settlement or damage of adjacent parts of existing structure to remain. Make good damage and be liable for injury caused by demolition and removal.

.5 Make good damage and be liable for injury caused by demolition and removal.

3.3 ASPHALT PAVEMENT AND CONCRETE REMOVAL

.1 Completely remove and dispose of existing asphalt pavement, concrete slabs, designated concrete items shown on the plans including the existing reinforced concrete parapets.

.2 Concrete is to be anticipated underneath areas of the existing asphalt pavement as is indicated in the sub-surface boreholes. Asphalt pavement thickness varies in thickness as shown in the subsurface boreholes.

3.4 LONGITUDINAL DRAIN REMOVAL

.1 The corrugated steel pipe longitudinal drain located between Station 0+141 EP and Station 0+269 EP shall be removed completely. Backfill the trench to underside of new corrugated high density polyethylene pipe with clear stone to Section 31 23 11 and balance of clear stone above the pipe upon acceptable installtion of the pipe.

3.5 TRANSVERSE DRAIN REMOVAL

.1 Transverse drains shall be removed completely back to the property line and plugged with concrete. Openings in the existing steel sheet pile wall left from drain removal shall be closed with the indicated drain closure.

.2 Confirm if drain is functioning prior commencing removal. Do not remove the drain if it is determined to be active. Air lift clean two catch basins in Area A and uncover drain outlets. Use dye test placed at source of drain to supplement findings to determine function outlets at steel sheet pile wall.

.3 Refer to Table 4, Drain Details on drawing MA 11 for the location of the transverse drains.

3.6 TIMBER PILE REMOVAL

.1 Timber piles are to be removed in their entirety and shall not be left as obstructions to driving of the new steel sheet pile wall.

.2 Refer to Table 1, Timber Pile Removal on drawing MA 11 for the location of the timber piles.

3.7 STEEL PILE REMOVAL

.1 Steel piles are to be removed in their entirety including tires which are place over top of the pile.

.2 Refer to Table 2, Steel Pile Removal drawing on MA 11 for the location of the steel piles.

3.8 FENDER AND ATTACHMENT REMOVAL

.1 Tire fenders and their attachments including steel plates are to be removed and salvaged for reinstallation.

.2 Attachment plates and brackets are to be painted prior to reinstallation. Complete painting to Section 35 59 30.

3.9 ELECTRICAL POWER PEDESTAL REMOVAL

.1 Remove electrical power pedestals complete with footings, conduit, junction boxes and wiring. Salvage the power pedestals for reinstallation.

.2 Reinstall the electrical power pedestals at the same stations and on the new alignment with the existing and new steel sheet pile walls. Secure the pedestals to new footings or new parapet as indicated. Power pedestal locations shall be determined in conjunction with Departmental Representative to make best use of salvaged wiring.

.3 Complete the reinstallation of the power pedestals, new conduit, new junction boxes and salvaged wiring to the details as shown on drawings MA 11, MA 12 and MA 13.

3.10 DISPOSAL

.1 Provide netting to capture and collect all demolished and removed concrete and asphalt. Legally disposed off site in accordance with provincial regulations.

.2 Disposal in the lake is not permitted.

3.11 CLEANING

.1 Progress cleaning: leave work area clean at the end of each day.

.2 Final cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 32 12 17: Asphaltic Concrete Paving.

1.2 MEASUREMENT PROCEDURES

.1 New concrete parapet will be measured by the linear metre and shall include all labour, materials and equipment necessary to complete the work of this item. All reinforcing steel, splices, wire ties, bar supports, chairs, spacers, and electrical conduits, joint filler, joint sealer and cap plate are considered incidental and will not be measured separately for payment.

.2 Grate and steel lid raising will be measured by unit raised and shall include all labour, materials and equipment necessary to complete the item.

1.3 REFERENCES

.1 Abbreviations and Acronyms:

.1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement.

.1 Type GU, GUb and GUL - General use cement.

.2 Type MS and MSb - Moderate sulphate-resistant cement.

.3 Type MH, MHb and MHL - Moderate heat of hydration cement.

.4 Type HE, HEb and HEL - High early-strength cement.

.5 Type LH, LHb and LHL - Low heat of hydration cement.

.6 Type HS and HSb - High sulphate-resistant cement.

.2 Fly ash:

.1 Type F - with CaO content less than 15%.

.2 Type CI - with CaO content ranging from 15 to 20%.

.3 Type CH - with CaO greater than 20%.

.2 American Concrete Institute (ACI)

.1 ACI SP-66-04, ACI Detailing Manual 2004.

.3 ASTM International
.1 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.
.2 ASTM C309-11 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
.3 ASTM C494/C494M-16 Standard Specification for Chemical Admixtures for Concrete.
.4 ASTM C881/C881M-15, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
.5 ASTM C882/C882M-13a Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
.6 ASTM D570-98(2010)e1 Standard Test Method for Water Absorbtion of Plastics.
.7 ASTM D638 - 14, Standard Test Method for Tensile Properties of Plastics.
.8 ASTM D695 - 15, Standard Test Method for Compressive Properties of Rigid Plastics.
.9 ASTM D1752 - 04, Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Filler for Concrete Paving and Structural Construction.

.4 Canadian Standards Association (CSA International):
.1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
.2 CSA A23.3-14, Design of Concrete Structures.
.3 CAN/CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
.4 CSA G30.18-09(R2014), Carbon Steel Bars for Concrete Reinforcement.
.5 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.6 CSA W59-13 - Welded steel construction (metal arc welding).
.7 CSA W186-M1990(R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.5 Reinforcing Steel Institute of Canada (RSIC)
.1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

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 material specifications of following materials proposed for use:
.1 Curing compound
.2 Cold weather protection
.3 Epoxy
.4 Joint filler and joint sealer.

.4 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

.5 Provide WHMIS MSDS.

1.5 QUALITY ASSURANCE

.1 Provide to Departmental Representative, 2 weeks minimum prior to starting concrete work, valid and recognized certificate from plant delivering concrete.
.1 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements.
.2 Quality Control Plan: provide concrete testing by Canadian Standards Association certified testing facility independent of concrete supplier testing.
.1 Provide concrete compression test results at 7 day strength and 28 day strength. Tests cylinders are to be cast at the commencement of each individual pour and every 30 cubic metres thereafter if the pour is greater than 30 cubic metres.
.2 Slump tests and air entrainment tests are to be taken for each load of concrete delivered to the site and associated with each pour.

.3 Submit in accordance with Section 01 33 00 all test results, verifications and certifications.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:
.1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
.1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
.2 Deviations to be submitted for review by the Departmental Representative.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

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 minimum 20% fly ash replacement or slag replacement by mass of total cementitious materials to CAN/CSA A3001.

.3 Aggregates: to CSA A23.1/A23.2.

.3 Water: to CSA A23.1/A23.2.

.4 Reinforcing steel:
.1 Bars and dowels: to CSA G30.18, Grade 400W, weldable.

.5 Formwork: to CSA A23.1/A23.2.

.6 Other concrete materials: to CSA A23.1/A23.2.

.7 Steel plates and shapes: as per Section 05 50 00.

.8 Chairs, bolsters, bar supports, spacers: to CSA A23.1/A23.2.

.9 Epoxy: 2 component, solvent free, high modulus moisture insensitive, usable underwater, high strength structural epoxy suitable for use in cracked or uncracked concrete, conforming to ASTM C881 Type I, II, IV and V, Grade 3, Class A, B and C with the following characteristics:
.1 Bond strength: 12.4 MPa at 2 days to ASTM C882.
.2 Compressive strength: 82.7 MPa to ASTM D695.
.3 Tensile strength: 49.3 MPa at 7 days to ASTM D638.
.4 Water absorption: 0.18% to ASTM D570.

.10 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.

.11 Curing compound: to CSA A23.1/A23.2 white and ASTM C309, Type 1-chlorinated rubber Type 1-D with fugitive dye.

.12 Joint sealant system shall be composed of three components:
.1 Cellular polyurethane foam impregnated with hydrophobic 100% acrylic, water based emulsion, factory coated with highway grade, fuel resistant silicone.
.2 Field applied epoxy adhesive primer.
.3 Field-injected silicone sealant bands.

.13 Premoulded joint fillers:

.1 Sponge rubber: to ASTM D1752, Type I, flexible grade.

2.4 FABRICATION OF REINFORCING STEEL

.1 Fabricate reinforcing steel in accordance with CSA A23.1/A23.2, ACI SP-66 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

.3 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.5 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 Surface texture: coarse broom finish.

.4 Intended application: concrete parapet repairs and new concrete surface.

.5 Aggregate size 19 mm maximum.

.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 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

.2 When field bending is authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars, which develop cracks or splits.

3.2 PLACING REINFORCEMENT

.1 Place steel cap, reinforcing steel and dowels as indicated on the drawings and in accordance with CSA A23.1/A23.2.

.2 Cut slots in the existing steel sheet piles to permit placement of stirrups. Slots tobe 90 mm wide and 40 mm below the bottom of the stirrup.

.3 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

.4 Ensure 60 mm cover to reinforcement is maintained during concrete pour.

.4 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.
.1 Place steel reinforcing dowels and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.

.5 Do welding to CSA W59.

3.3 JOINTS

.1 Install joint filler and joint sealer at 20 metre spacings along concrete parapet. Joints to be 20 mm wide.

.2 Install joint filler and joint sealer in accordance with manufacturers' recommendations.

3.4 FORMWORK

.1 Formwork: to CSA A23.1/A23.2.

3.5 PREPARATION

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

.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 Ensure reinforcement and inserts are not disturbed during concrete placement.

.4 Protect previous Work from staining.

.5 Clean and remove stains prior to application of concrete finishes.

.6 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.7 Do not place load upon new concrete until authorized by Departmental Representative.

.8 Where concrete must bond to existing surfaces, clean surfaces just prior to starting concrete placement.
.1 Use water jets, mechanical scrapers or other means, and when quantities of mud or rock cuttings are present, remove by air lift.

3.6 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 Plumb to 1:600.

.3 Sleeves, inserts, conduits:
.1 Cast in sleeves, anchors, dowels, reinforcement, conduit and other inserts required to be built-in. Due regard to ambient temperature at time of erection.

3.7 CONCRETE PLACEMENT

.1 Do cast-in-place concrete work in accordance with CSA A23.1/A23.2.

.2 Protect previous work from staining.

.3 In no case shall concrete be cast against frozen material.

.4 Place concrete from joint to joint.

.5 Complete work to the following tolerances:
.1 Straight to 1:500.
.2 Thickness to 6 mm.
.3 Plumb to 1:600.

3.8 FINISHES

.1 Formed surfaces exposed to view: in accordance with CSA A23.1/A23.2.

.2 Exposed surfaces:
.1 Screed to plane surfaces and use aluminum floats.
.2 Provide round edges and joint spacings using standard tools.
.3 Outside edge of parapet to have 50 mm chamfer.
.4 Trowel smooth to provide lightly brushed non-slip finish.

3.9 CURING AND COLD WEATHER PROTECTION

.1 Use curing compounds compatible with applied finish on concrete surfaces free of bonding agents and to CSA A23.1/A23.2.

.2 Provide cold weather protection in accordance with CSA A23.1/A23.2.

3.10 FIELD QUALITY CONTROL

.1 Concrete testing: to CSA A23.1/A23.2 by CSA certified concrete testing laboratory independent of the concrete supplier and paid for by the Contractor.

.2 Every load of concrete shall be tested for air content and slump.

.3 One complete set of test cylinders shall be cast at the commemcement of each concrete pour and every 30 cubic metres thereafter, to determine the 7 day and 28 day compressive strength.

3.11 CLEANING

.1 Use trigger operated spray nozzles for water hoses.

.2 Designate cleaning area for tools to limit water use and runoff.

.3 Cleaning of concrete equipment to be done in accordance with Section 01 35 43.

3.12 RAISING GRATES AND LIDS

.1 Raise indicated grates and lids to OPSD 704.010.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 All metal fabrications are included in measurment procedures defined in Section 03 30 00: Cast-in-place concrete.

1.2 REFERENCES

.1 CSA International
.1 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

1.3 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 sections, plates, pipe, tubing, bolts and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit two copies of WHMIS MSDS..

1.4 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.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Not used.

2.2 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Verify field dimensions prior to commencement of fabrication of all components. Adjust dimensions of new fabrications to accommodate existing conditions.

.3 Where possible, fit and shop assemble work, ready for erection.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

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 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

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 INSTALLATION

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Install metal work square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

3.4 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.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 02 41 14: Demolition and Removals.

.2 Section 32 12 17: Asphaltic Concrete Paving.

1.2 SITE CONDITIONS

.1 Sub-surface boreholes are bound into specification following Section 35 59 30.

1.3 UTILITY LINES

.1 Before commencing work, establish location and extent of underground utility lines in area of excavation. Notify Departmental Representative of findings.

.2 Advise to remove existing lines in area of excavation. Pay costs of such work.

.3 Maintain existing lines in areas of excavation which must remain active. Pay costs for this work.

.4 Record locations of maintained, re-routed and abandoned underground utility lines.

.5 Make good damage to existing utility lines resulting from work.

1.4 PROTECTION

.1 Protect excavated earth from freezing by approved method.

.2 Grade around excavations to prevent surface water runoff into excavated area.

.3 Protect bottoms of excavations from weather. Should softening in bottoms occur due to water or other causes, remove softened soil and replace with structural concrete at no additional cost.

1.5 MEASUREMENT PROCEDURES

.1 Excavated materials to subgrade depth shall be measured by the linear metre and shall include all labour materials and equipment necessary to excavate and dispose surplus material off site.

.2 Excavation to remove drains and expose the top of the existing wales is considered incidental and will not be measured separately for payment.

.3 Materials removed from beyond limits specified will be measured only when Departmental Representative authorizes additional excavation to obtain satisfactory bearing surfaces.

.4 Clear stone fill shall be measured by the tonnes supplied and placed and shall include a labour, materials and equipment necessary to complete the work.

1.6 QUALITY ASSURANCE

.1 Provide quality control testing and inspection requirements specified under this Section including but not limited to:
.1 Test results that verify compliance the materials specified to be supplied under this Section from each source.
.2 Submit in accordance with Section 01 33 00 all test results, verifications and certifications.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Native fill: excavated on site granular material free from roots, rocks larger that 75 mm and debris. Departmental Representative to approve excavated material before use as fill.

.2 Clear Stone Fill: to Ontario Provincial Standard Specification OPSS 1004, size 19.0 mm to 50.0 mm, uniformly graded.

PART 3 - EXECUTION

3.1 STOCKPILING

.1 Stockpile fill materials in areas designated by Departmental Representative. Stockpile granular materials in manner to prevent segregation.

3.2 DEWATERING

.1 Provide pumps and other equipment and materials necessary to keep excavations free of water while work is in progress.

.2 Excavation in the wet is anticipated if lake levels exceed the base elevation of the excavations. Pumping is not required.

.3 Do not pump during placing of concrete, or for a period of at least 24 hours thereafter, unless from a pump separated from concrete work by means of watertight wall or other effective means.

.4 Dispose of water in such a manner as not to be detrimental to public health, environment, public and private property, or any portion of work completed or under construction.

.5 Protect open excavations against flooding and damage due to surface run-off.

.6 When conditions are encountered which render it impracticable to dewater excavations before placing concrete, Departmental Representative may order additional excavation and placing underwater of a concrete seal of such dimensions as may be necessary to resist any possible uplift. Do not commence pumping until seal has set sufficiently to withstand hydrostatic pressures.

3.3 EXCAVATING

.1 After the removal of asphalt pavement and concrete to Section 02 41 14 and prior to commencing excavation to subgrade provide Departmental Representative 48 hour notice to examine the existing subgrade condition.

.2 Excavate to elevations and dimensions indicated or required for construction of work.

.3 Make excavation to clean lines to minimize quantity of fill material required.

.4 Earth bottoms of excavations to be dry undisturbed soil, reasonably level, free from loose or organic matter.

.5 When complete have Departmental Representative inspect excavations.

.6 Excavation exceeding that shown on drawings, if authorized in writing by Departmental Representative, will be paid as extra to Contract price in accordance with General Conditions. Quantities will be calculated in place, compaction included. Truck load measurements not acceptable.

.7 Correct unauthorized excavation at no extra cost.

.8 Remove concrete, paving and other obstructions encountered in the course of excavation.

.9 Dispose of excavated material off site.

.10 Excavate to top of existing wales as indicated.

3.4 EXCAVATION REQUIRED BY OTHER SECTIONS

.1 Excavation for work of other sections is included in this Section and shall be carried out in accordance with provisions specified herein and indicated. This work to be laid out and supervised by trade concerned.

3.5 BACKFILL

.1 Backfill between existing steel sheet pile wall and new steel sheet pile wall with clear stone to elevation indicated.

.2 Place clear stone to underside of drain on the inside of the existing steel sheet pile wall. Backfill remainder of trench upon acceptable installation of drain.

.3 Backfill behind the remainder of the existing steel sheet pile pile wall to details indicated.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT AND PAYMENT

.1 Geotextiles shall be measured in square metres of surface covered by material and shall include all labour materials and equipment necessary to complete the item. An allowance has been made to wrap the geotextile up the inpans and outpans of the exisitng and new steel sheet piles.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM):
.1 ASTM D3786/D3786M-13, Standard Test Method for Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method.
.2 ASTM D4491/D4491M-15, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
.3 ASTM D4632-08, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
.4 ASTM D4751-12, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
.5 ASTM D5261-10, Standard Test Method for Measuring Mass per Unit Geotextiles.

1.3 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 geotextile and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect geotextiles from direct sunlight and UV rays.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIAL

.1 Geotextile: non-woven synthetic fibre fabric, supplied in rolls.
.1 Width: 3.5 m minimum.
.2 Length: 100 m minimum.
.3 Composed of: minimum 85% by mass of polypropylene with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.
.4 Physical properties:
.1 Mass per unit area: to ASTM D5261, minimum 320 g/m^2.
.2 Grab tensile strength and elongation: to ASTM D4632.
.1 Grab tensile strength: minimum 1050 N, wet condition.
.2 Elongation at break: minimum 50%.
.3 Mullen Burst: to ASTM D3786/D3786M, minimum 3.2 MPa.
.5 Hydraulic properties:
.1 Apparent opening size (AOS): 0.15 mm (Max ARV) to ATSM D4751.
.2 Permittivity: to ASTM D4491, minimum 1.2 secâ^1.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Place geotextile material by unrolling onto graded surface in locations indicated and retain in position.

.2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.

.3 Overlap each successive strip of geotextile 900 mm over previously laid strip.

.4 Verify placement of geotextiles between face wall and anchor wall with divers.

.5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.

.6 After installation, cover with overlying layer within 4 hr of placement.

.7 Replace damaged or deteriorated geotextile to approval of Engineer.

.8 Place and compact granular A base in accordance with Section 32 12 17.

3.2 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.

3.3 INSPECTION

.1 Departmental Representative may randomly inspect geotextiles before or during installation.

3.4 PROTECTION

.1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT AND PAYMENT

.1 Geogrid shall be measured in square metres of surface covered by material and shall include all labour materials and equipment necessary to complete the item. An allowance has been made for placing the geogrid in the existing steel sheet pile outpans and inpans and side slope. No allowance will be made for seams and overlaps.

1.2 REFERENCES

.1 ASTM International

.1 ASTM D4101-14e1, Standard Specification for Polypropylene Injection and Extrusion Materials.

.2 ASTM D4218-15, Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds By the Muffle-Furnace Technique.

.3 ASTM D6637/D6637M-15, Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:

.1 Submit manufacture's instructions, printed product literature and data sheets for geogrids and include product characteristic, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 During delivery and storage, protect geogrids from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

PART 2 - PRODUCTS

2.1 MATERIAL

.1 Geogrid: open grid polymer having biaxial orientation, free of striations, roughness, pinholes, blisters, undispersed raw materials or any sign of contamination by foreign matter.
- .1 Roll width: 3.5 m minimum.
- .2 Roll length: 50 m minimum.
- .3 Rib thickness: mm minimum.
- .4 Aperture size:
  - .1 Machine direction: 39 mm.
  - .2 Cross machine direction: 39 mm.
- .5 Polymer: polypropylene: to ASTM D4101 with inhibitors added to resist deterioration by ultra-violet and heat exposure.

.2 Geogrid physical properties:
- .1 Peak tensile strength: to ASTM D6637/D6637M.
  - .1 Machine direction: minimum 30 N/mm.
  - .2 Cross machine direction: minimum 30 N/mm.
- .2 Carbon black content: to ASTM D4218, minimum 2%.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

.1 Place geogrid material by unrolling onto graded subgrade surface in manner and locations indicated and retain in position in accordance with manufacturer's written recommendations.

.2 Overlap each successive strip of geogrid 600 mm over previously laid strip.

.3 Join successive strips of geogridas recommended by manufacturer.

.4 Protect geogrid from displacement, damage or deterioration before and during placement of overlay soil layers.

.5 After installation, cover with overlay layer within 10 days of placement.

.6 Replace damaged or deteriorated geogrid to approval of Departmental Representative.

.7 Place and compact soil layers in accordance with Section 32 12 17.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.4 PROTECTION

.1 Vehicular traffic not permitted directly on geogrid.

END OF SECTION

PART 1 - GENERAL

1.1 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.

.3 If material is stockpiled on a structure, ensure that structure is not overloaded.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

1.3 PROTECTION

.1 Adopt safe procedures and protect public and construction personnel, adjacent structures and the work of other sections from all hazards attributable to pile driving operations.

1.4 EXISTING CONDITIONS

.1 Sub-surface boreholes logs are bound into specification following Section 35 59 30.

.2 Notify Departmental Representative in writing if subsurface conditions at site differ from those indicated and await further instructions from Departmental Representative.

1.5 SCHEDULING OF WORK

.1 Submit schedule of planned sequence of driving to Engineer, not less that 2 weeks prior to commencement of pile Work.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Material requirements for piles are specified in Section 31 62 16.

.2 Supply or fabricate full length piles as indicated and provide equipment to handle full length piles without cutting and splicing.

.3 Do not splice piles without written approval of Departmental Representative. When permitted, provide details for Departmental Representative review. Design details of splice to bear dated signature stamp of professional engineer registered or licensed in Ontario, Canada.

2.2 EQUIPMENT REQUIREMENTS

.1 Equipment information: Supply equipment of sufficient size and capacity to adequately install the piling to the indicated depth. For non-impact methods of installation such as augering, jacking, vibratory hammers or other means, give full details of characteristics necessary to evaluate performance. For impact hammers give manufacturer's name, type, rated energy per blow at normal working rate, mass of striking parts of hammer and mass of driving cap.

PART 3 - EXECUTION

3.1 FIELD MEASUREMENT

.1 Maintain accurate records of installation for
.1 Type and make of hammer, stroke or related. energy.
.2 Pile size, length, location of pile.
.3 Pile size, length, location of pile in pile in wall.
.4 Sequence of piles installation.
.5 Final tip, head and cut-off elevations.
.6 Other pertinent information such as interruption of continuous installation, pile damage.

.2 Provide Departmental Representative with three copies of records.

3.2 INSTALLATION

.1 Notify Departmental Representative at least 48 hours prior to commencement of installation.

.2 Provide all necessary facilities for inspection and co-operate with Departmental Representative in inspecting and recording installation data at all times.

.3 Furnish such equipment and labour as necessary to enable Engineer to install instrumentation on piles.

.4 Prior to commencement of pile installation inspect the harbour bottom for obstructions and clear obstructions found on the pile installation alignment.

.5 Hold piles securely and accurately in position while driving.

.6 Deliver hammer blows along axis of pile.

.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.

3.3 INSTALLATION TOLERANCES

.1 Pile heads to be within 25 mm of locations as indicated.

.2 Piles not to be more than 0.5% of length out of vertical alignment.

3.4 OBSTRUCTIONS

.1 Where obstruction is encountered that causes sudden unexpected change in penetration resistance or deviation from specified tolerances, immediately inform Departmental Representative and proceed as directed.

3.5 REPAIR/ RESTORATION

.1 Departmental Representative will reject any pile that is installed out of position during installation and handling. Extend piles installed below the cut-off elevation as directed by the Departmental Representative.

.2 Pull out rejected piles and replace with new piles as directed.

.3 No extra compensation will be made for removing and replacing or other work made necessary through rejection of defective piles due to faulty workmanship.

.4 Where piles are damaged or caused to drift outside specified tolerance due to Piles obstructions or other causes beyond Contractor's control the remedial measures adopted will be paid by the Departmental Representative in accordance with the General Conditions.

3.6 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.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Supply and installation of steel sheet pile will be measured in square meters of piling remaining in place after cut-off and shall include all labour, materials, and equipment necessary to complete the work.

.1 Piling will be measured in plane of bulkhead wall, calculated by multiplying straight horizontal centre line length of bulkhead wall measured at top of piles by average vertical length of piles installed and left in work.

.2 Supply and installation of the double channel wale shall be measured by the linear meter by measuring the straight horizontal centreline length of the wale and shall include all labour, materials, and equipment necessary to complete the work. Supply and installation of splices, wale bolts, plates, nuts, washers, and other associated hardware will be considered incidental to the work and will not be measured separately for payment.

.3 Supply and installation of tie rods will be measured by each unit installed and accepted in the work and shall include all labour, materials, and equipment necessary to complete the work. Supply and installation of nuts, sleeve nuts, turnbuckles, pipe sleeves, bearing plates, washers, and other associated hardware will be considered incidental to the work and will not be measured separately for payment.

.4 Pile cap shall be measured by the linear metre and shall include all labour materials and equipment necessary to complete the item.

.5 Clear stone backfill shall be measured in accordance with Section 31 23 11.

.6 Fabrication and installation of closure including bagged concrete shall be considered incidental and not measured separately for payment.

1.2 REFERENCES

.1 ASTM International (ASTM):
.1 ASTM A6/A6M-14, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.

.2 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 W47.1-09(R2014), Certification of Companies for Fusion Welding of Steel Structures.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Submit drawings for items as follows:
.1 Pile layout.

.3 Submit to Departmental Representative at least 2 weeks prior to fabrication, two copies of mill test reports in accordance with CSA G40.20/G40.21.

.4 Provide Departmental Representative with copy of certification for fusion welding in accordance with CSA W47.1.

1.4 QUALITY ASSURANCE

.1 Materials inspected or tested by Departmental Representative which fail to meet contract requirements will be rejected.

.2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, Contractor to pay costs for additional tests or inspections. Engineer to approve corrected work.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Steel sheet piles:
.1 Use slings for lifting piling so that mass is evenly distributed and piling is not subjected to excessive bending stresses.
.2 Store sheet piling on level ground or provide supports sos that sheet piling is level when stored.

.1 Provide blocking at spacing not exceeding 8 m so that there is no excessive sagging in piling.
.2 Overhang at ends not to exceed 2 m.
.3 Block between lifts directly above blocking in lower lift.

.2 Tie rods:
.1 Deliver, store and, handle materials in accordance with manufacturer's written instructions.
.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
.3 Storage and Handling Requirements:
.1 Store materials off ground and in accordance with manufacturer's recommendations in clean, well-ventilated area.
.2 Replace defective or damaged materials with new.

.3 If material is stock-piled on structure, ensure structure is not overloaded.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Steel sheet piles: to CSA G40.20/G40.21, including chemical and mechanical requirements grade 350W and with minimum section modulus of 839 cm^3 per meter of wall and 7.5 mm wall thicjness.

.2 Tie rods, sleeve nuts, and lock nuts:
.1 Tie rods to ASTM A615 and Grade 552 MPa.
.2 Sleeve nuts and lock nuts to have capacity in excess of tie rod capacity.
.3 Preassemble, mark, and test tie rod assemblies in shop. Align threaded connection to following tolerances at sleeve nut or connector sleeve: 1/80 of normal rod diameter, deviation of centreline: 1 in 160.

.3 Structural steel for wales, plates, bars, wale splices, capping channels, and miscellaneous steel: to CSA G40.20/G40.21, Grade 350 W.

.4 Wale bolts, bolts, threaded rods, nuts, and washers: to ASTM A325, minimum tensile strength of 830 MPa.

.5 Backfill material: to Section 31 23 11.

.6 Welding: to Section 05 12 26.

.7 Turbidity Curtain: to Section 03 37 26.

PART 3 - EXECUTION

3.1 FABRICATION

.1 Do fabrication to Section 05 50 00.

3.2 INSTALLATION

.1 Do pile installation Work in accordance with Section 31 61 13 except where otherwise specified.

.2 Do welding in accordance with CSA W59

.3 Do not begin pile installation until required quality control tests have been completed and test results approved by Engineer.

.4 Do pile installation work in accordance with Section 31 61 13 except where otherwise specified.

.5 Submit full details of method and sequence of installation of piling to Departmental Representative for approval prior to start of pile installation work. Details must include templates, bracing, setting and driving sequence and number of piles in panels for driving.

.6 When installing sheet piles in bulkhead wall, use procedure as follows:
.1 Provide temporary templates or bracing to hold piles in alignment during setting and driving. Temporary templates or bracing should be provided at a minimum of two elevations.
.2 Maximize the use of vibratory hammer before using impact hammers.

.3 Drive piles two at a time. Drive first double pile to full depth, then place panel of five to eight double sheet piles in templates and secure last (end) double pile in location to prevent spreading of piles in panel.
.4 Drive end double pile in panel sufficiently deep into ground to ensure that it will remain plumb, then, drive remaining double piles in panel to full depth beginning with double pile next to end double pile and finishing with double pile next to double pile first driven.
.5 After one panel has been driven, place and drive succeeding panels in similar manner. Complete driving of end double pile of first panel after double piles of second panel have been driven.
.6 After every fourth pair of piles driven: verify the verticality of the wall both in the horizontal and vertical plane.

.7 When installation is complete, top of sheet piles to be within 25mm of location as indicated and deviation from vertical not more than 0.5%.

.8 Fabricate and install double channel wale in accordance with Section 05 50 00.

3.3 WATER LEVEL

.1 The wales shall be raised 100 mm out of the water in the event they are submerged at the commencement of construction.

3.4 HOLES

.1 Patch holes in sheet pile wall, except where permanent holes are indicated.
.1 Use 8mm thick plate of material equal to that of piling to patch holes and overlap not less than hole diameter.
.2 Weld to develop full strength of plate.

.2 Drill any required holes in piling. Do not use flame cutting without permission of Engineer.

3.5 CUTTING

.1 When flame cutting tops of piles, and flame cutting holes in piles approved by Engineer, use following procedure:

.1 When air temperature is above 0 degrees C, no pre-heat is necessary.
.2 When air temperature is below 0 degrees C, pre-heat until steel 25 mm on each side of line of cut has reached a temperature very warm to hand (approximately 35 degrees C). Temperature indicating crayon marks may be used to measure temperature.
.3 Use torch guiding device to ensure smooth round holes or straight edges.
.4 Make cut smooth and free from notches throughout thickness. If grinding is employed to remove notch or crack, finished radius to be minimum 5 mm.

3.6 SPLICING

.1 Use full length piles.

3.7 TIE ROD ANCHORAGE SYST

.1 Do not place backfill behind anchored bulkhead until piles have been completely driven, adjusted and secured in final position by anchorage system.

.2 Fit and adjust tie rod systems so that connections at waling are tight before backfilling.

.3 Exercise care and protect tie rods from damage during placement of fill to final fill elevations indicated in the Drawings. Tie rods that are damaged during fill placement shall be replaced at no additional cost to the Engineer.

3.8 BACKFILLING

.1 Backfill in accordance with Section 31 23 11 and as indicated.

.2 Protect piling tie rods and anchorage systems from damage or displacement during backfilling operations.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 31 23 11: Excavation and Removals.

1.2 PROTECTION

.1 Protect buildings, landscaping, trench drains, ramps, on site and adjacent property that may be damaged by paving machinery, equipment or personnel. Make good property damaged due to paving operations.

.2 Take necessary precautions to protect workmen and public from hazards of paving operations.

.3 Keep vehicular traffic off newly paved areas until paving properly cured. Do not permit stationary loads on pavement until 24 h after placement.

.4 Provide access to building at all times. Arrange paving schedule so as not to interfere with normal use of premises.

1.3 MEASUREMENT PROCEDURES

.1 Asphalt base course will be measured by the tonne and shall include all labour, materials and equipment necessary to complete the work.

.2 Asphalt base course will be measured by the tonne and shall include all labour, materials and equipment necessary to complete the work.

.3 Granular A base will be measured in tonnes of aggregate incorporated into the work. Compaction is considered incidental to the work and will not be measured separately for payment.

.4 Grading and compaction of the subgrade will not be measured separately for payment but shall be considered included in the placement of the Granular A Base.

.5 Compaction, hauling and water for compaction are considered included in the supplying and placing of aggregates and asphaltic concrete and will not be measured separately for payment.

.6 Primer is considered included in the asphalt surface course and will not be measured separately for payment.

.7 Cleaning pavement surfaces considered included in the asphalt surface course and will not be measured separately for payment.

.8 Quality control testing and inspection is considered included in the above items and will not be measured separately for payment.

.9 Excavation will be measured in accordance to 31 23 11.

1.4 QUALITY ASSURANCE

.1 Provide quality control testing and inspection requirements specified under this Section including but not limited to:
.1 Test results that verify compliance to the specification of the materials to be supplied under this Section from each source.
.2 Compaction testing conducted every 50 m^2 minimum of surface area of subgrade area, each lift of granular base area, asphaltic base course and asphaltic surface course.
.3 Submit in accordance with Section 01 33 00 all test results, verifications and certifications.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Asphalt base course: to Ontario Provincial Standard Specification OPSS 1150, November 2010 for type HL 8HS. Maximum size aggregate 26.5 mm.

.2 Asphalt surface course: to Ontario Provincial Standard Specification OPSS 1150, November 2010 for type HL 3HS. Maximum size aggregate 16 mm.

.3 Primer: emulsified asphalt to Ontario Provincial Standard Specification OPSS 1103, November 2012 for rapid setting type.

.4 Granular A Base: to Ontario Provincial Standard Specification OPSS 1010.PROV, April 2013 for Granular A. Maximum size 19.0 mm. From Quarried bedrock.

PART 3 - EXECUTION

3.1 CLEANING

.1 Remove dust, contaminants, loose and foreign materials, oil and grease from th trench drain and the trough and in designated areas.

.2 Use rotary power brooms supplemented by hand brooming as required.

.3 Where directed, remove to existing pavement level, sealing compound which has protruded excessively and dispose of removed material as directed.

.4 Keep drainage system clear of loose and waste materials.

3.2 EXCAVATING

.1 Excavations to be performed in accordance with 31 23 11.

3.3 SUBGRADE

.1 Grade subgrade material upon completion of excavation.

.2 Compact to 98% Standard Proctor Density.

.3 Add water as required to maintain material at or near optimum moisture content while compacting.

.4 Finish compacted subgrade surface to within 25 mm of established grade as indicated by a 3 m straightedge placed in any direction

.5 Correct irregularities greater than 25 mm by loosening the surface and adding or removing material until surface is within specified tolerance.

3.4 INSPECTION

.1 Check graded subgrade for conformity with elevations and cross-sections before placing new approved base material.

.2 Proof-roll subgrade and base surface with mass and type of roller approved by Departmental Representative.
.1 Check for unstable areas.
.2 Check for areas requiring additional compaction.

.3 Notify Departmental Representative of unsatisfactory conditions.

.4 Do not begin paving work until such conditions have been corrected and are ready to receive paving.

.5 When complete, have Departmental Representative inspect excavations to verify soil bearing capacity, depths and dimensions.

.6 Excavation, beyond limits shown on drawings, if authorized in writing by Departmental Representative, will be paid for as extra to Contract price in accordance with General Conditions. Quantities will be calculated in place, compaction included. Truck load measurements not acceptable.

.7 Correct unauthorized excavation at no extra cost by filling with granular A material.

3.5 GRANULAR BASE

.1 Place compacted granular A base to thickness indicated.

.2 Place material in layers not exceeding 150 mm when compacted.

.3 Spread each layer uniformly using approved grading equipment and methods.

.4 Compact each layer to 100% Standard Proctor Density.

.5 Add water as required to maintain material at or near optimum moisture content while compacting.

.6 Finish compacted surface to within 12 mm of established grade as indicated by a 3 m straightedge placed in any direction

.7 Correct irregularities greater than 12 mm by loosening the surface and adding or removing material until surface is within specified tolerance.

3.6 ASPHALT COURSE

.1 Place 60 mm of compacted asphaltic concrete base course.

.2 Place 40 mm of compacted asphaltic concrete surface course.

.3 Minimum 7°C air temperature when placing mixture.

.4 Minimum 118°C mixture temperature when spread.

.5 Maximum 149°C mixture temperature at any time.

.6 Compact each course with roller when it can support roller mass without undue cracking or displacement.

.7 Vibratory roller, power driven, minimum mass 9 tonnes, minimum wheel width 1500 mm.

.8 Roll asphalt continuously to density not less than 92% of Maximum Relative Density and not more than 96.5% of Maximum Relative Density.

.9 Keep roller speed slow enough to avoid mixture displacement.

.10 Moisten roller wheels to prevent mixture adhesion.

.11 Compact mixture with hot tampers in areas inaccessible to roller.

.12 Finish surface true to grade and free from deviations exceeding 5 mm when measured in any direction with a 3 m straight edge.

.13 Finished surface to be free of roller marks.

.14 Carefully place and compact hot asphaltic material against joints and catchbasin frames.

.15 Place base course flush to existing pavement surface. Place around catch basin covers such to permit placement of full thickness asphalt paving overlay.

3.7 JOINTS

.1 Cut back bituminous course to full depth in straight or curved lines as required to expose fresh vertical surfaces. Remove any broken or loose material.

.2 Paint exposed edge of asphaltic joints, edges of manholes and catchbasin frames, parapets, trench drain, curbs, building foundations and similar items with asphalt primer prior to placing asphalt courses.

.3 Where paving comprises two courses overlap longitudinal joints not less that 600 mm.

.4 Carefully place and compact hot asphaltic material against joints.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 03 30 00: Cast in Place Concrete

.2 Section 05 50 00: Metal Fabrication.

.3 Section 31 23 11: Excavation and Backfilling.

.4 Section 35 59 30: Fenders, Bollards and Ladders.

1.2 MEASUREMENT PROCEDURES

.1 Drain shall be measured by the linear metre and shall include all labour, materials and equipment necessary to complete the work including the all pipe splices, fabricated outlet

1.3 REFERENCES

.1 ASTM International.
.1 ASTM D2412-11 Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
.2 ASTM D3350-14 Standard Specification for Polyethylene Plastic Pipe and Fitting Materials.
.3 ASTM D6241-14 Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
.4 ASTM F667/F667M Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings.

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 pipes, and backfill and include product characteristics, performance criteria, physical size, finish and limitations.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance 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 accordance with manufacturer's recommendations.
.2 Store and protect pipes from damage.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Drain: Perforated pipe with pre-installed woven knitted sock, fittings and external split couplers: shall be manufactured from high density polyethylene resin to ASTM D3350.
.1 Corrugated polyethylene pipe: high density to ASTM F667.
.2 Knitted sock: pre-installed woven polyester sock, minimum puncture resistance 1000 N to ASTM D6241.
.3 Two layer pipe: interior to be smooth, exterior to be perforated with knitted sock.
.4 Pipe stiffness: 210kPa to ASTM D2412.
.5 Fitting/joining system to be soil tight.

.2 Concrete: to Section 03 30 00.

.3 Steel plate and pipe to Section 35 59 30.

.4 Welding: to Section 05 50 00.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Do excavation work to Section 31 23 11.

.2 Install drain as indicated

.3 Lay drain on clear stone bed.

.4 Fabricate steel plate flange to details indicated and weld to face of steel sheet pile.

.5 Fit drain to installed flange.

.6 Place concrete plug around drain at outlet at Station 0+144.8 EP to details as indicated.

3.2 BACKFILL

.1 Place backfill material to Section 31 23 11.

3.3 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

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 MEASUREMENT PROCEDURES

.1 No separate measurement shall be made for the turbidity curtain. Include costs under lump sum arrangement.

1.3 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.

1.4 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 Bouyancy: 20 Kg/m.
- .2 Curtain Body Properties:
  - .1 Nylon Vinyl Reinforced: 5492 g/m^2.

.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.
.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 and remove silt curtains for the following work:
.1 Parapet Resurfacing.
.2 Closure Plate Type 1.
.3 Closure Plate Type 2.
.4 When requested by 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 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 floatation 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.

.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.

.10 The turbidity curtain shall enclose the area of each concrete pour and around the area of steel sheet pile installation and the area of clear stone backfilling and shall be moved as the work progresses to enclosed these areas.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 03 30 00: Cast in Place Concrete.

1.2 REFERENCES

.1 ASTM International
- .1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
- .2 ASTM A307-14e1, Standard Specification for Carbon steel Bolts, Studs, and Threaded Rods 60 000 PSI Tensile Strength.

.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 W47-09(R2014) - Certification of companies for fusion welding of steel.
- .3 CSA W59-13 - Welded steel construction (metal arc welding).

1.3 MEASUREMENT PROCEDURES

.1 Pipe bollards will be measured by the unit and shall include all labour, materials and equipment necessary to complete the work. Welding, concrete fill and painting, will not be measured separately for payment but considered included in this item.

.2 Ladders Type 1 will be measured by the unit and shall include all labour, materials and equipment necessary to complete the work. Welding and painting, will not be measured separately for payment but considered included in this item.

.3 Ladders Type 2 will be measured by the unit and shall include all labour, materials and equipment necessary to complete the work. Welding and painting, will not be measured separately for payment but considered included in this item.

.4 Salvaged fenders Type 1 will be measured by the unit and shall include all labour, materials and equipment necessary to complete the item. Welding will not be measured separately for payment but considered included in this item.

.5 Fenders Type 1 will be measured by the unit and shall include all labour, materials and equipment necessary to complete the item. Welding, will not be measured separately for payment but considered included in this item.

.6 Salvaged fenders Type 2 will be measured by the unit and shall include all labour, materials and equipment necessary to complete the item. Welding and painting will not be measured separately for payment but considered included in this item.

1.4 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.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Steel pipe: to ASTM A53/A53M, Grade B, minimum 30% recycled content.

.2 Concrete: to Section 03 30 00

.2 Plates and bars: steel to CSA G40.20-13/G40.21, Grade 300W minimum 30% recycled content.

.3 Galvanized steel bolts and nuts: to ASTM A307-14, minimum 30% recycled content, hot dipped.

.4 Primer: to Master Painters Institute MPI# 79 - Primer, Alkyd, Anti-Corrosive for Metal. Ecologo certified.

.5 Paint: two component, high solids, polyester-aliphatic urethane suitable for marine environment, volume of solids 65%; Colour: traffic yellow.

.6 Tires: new or used, with beads, chord body and tread plies intact; no wear below outer plies; no injuries to tread or sidewalls greater than 100 mm long or wide and no more than two injuries in tread or sidewall and no more than a total of four injuries for each tire; minimum 28 ply rating; sizes as shown. Departmental Representative to inspect tires for approval prior to use in the work. Provide at least 48 hours notice prior to inspection.

.7 Chain: Grade 30 proof coil, size as indicated.

.8 Shackles: Bolt type chain shackle, size and grade to match chain strength.

.9 Epoxy: to Section 03 30 00.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPE BOLLARDS

.1 Install pipe bollards to details indicated.

.2 Do welding to CSA W59.

.3 Prior to installation and after fabrication, paint pipe bollards with one coat of primer full height and two coats of finish paint from top of bollard to 100 mm below finish grade.

3.2 INSTALLATION OF LADDERS

.1 Install to details indicated for Type 1 and Type 2 ladders.

.2 Do welding to CSA W59.

.3 For Type 2 ladders complete concrete work to Section 03 30 00.

.4 Prior to installation and after fabrication, paint ladders with one coat of primer full height and two coats of finish paint.

3.3 FENDERS TYPE 1 AND TYPE 2

.1 Fabricate new attachments brackets and weld in position to details indicated for both salvaged and new Type 1 fenders.

.2 Install salvaged Type 1 fenders to details indicated.

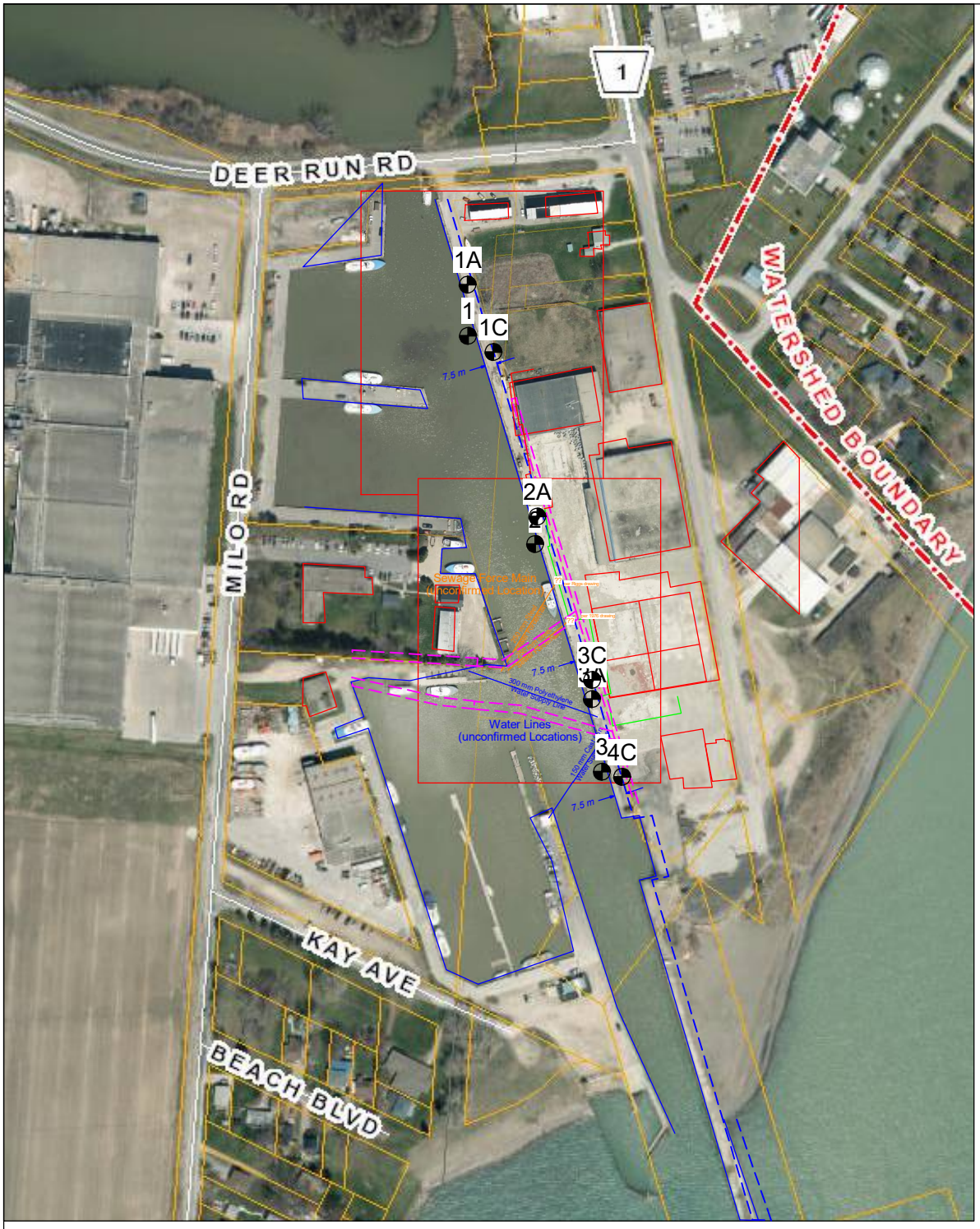
.3 Assemble new Type 1 fenders with new chains, new shackles and tires and secure to new attachments.

.4 Do welding to CSA W59.

.5 Install salvaged Type 2 fenders to details indicated. Prep steel plate and attachment and paint with one coat of primer and two coats of finish paint prior to installation. Secure to concrete with new anchor bolts epoxied to concrete parapet. Dispose of surplus salvaged fenders off site.

END OF SECTION

SITE MAP



N

LEGEND:

- Soil Boring
- Monitoring Well
- Test Well
- DMT
- Inclinometer
- Test Pit

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Windsor, ON N8W 5S6
Telephone: (519) 966-8863
Fax: (519) 966-8870

Project: 2017 East Harbour Wall Repairs
Location: Wheatley Harbour, Wheatley, ON
Number: 17G048

Notes:

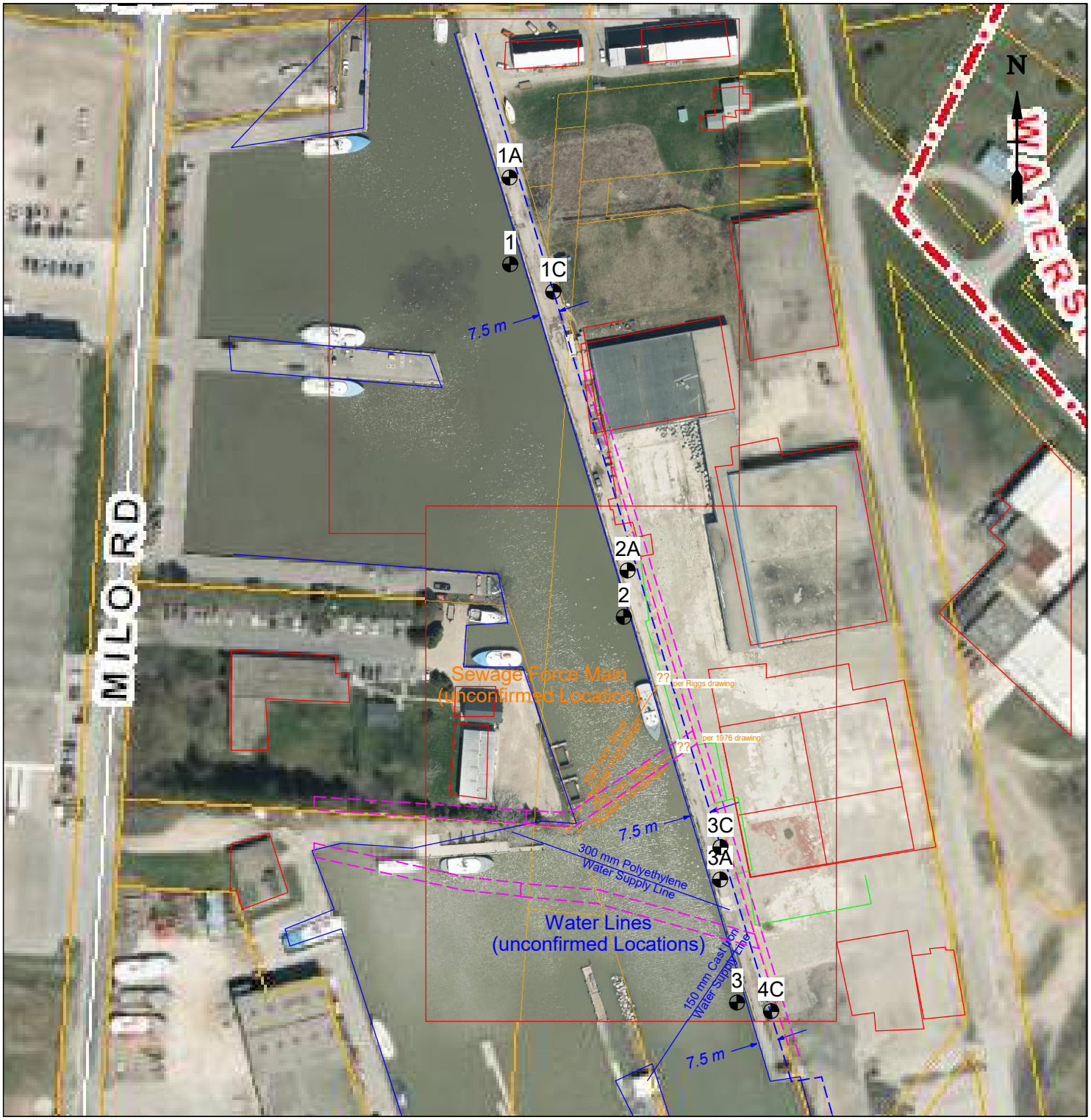
Testhole Locations

DRAWING

1

CT SITE PLAN PORTRAIT 17G048.GPJ 17-6-12

SITE MAP



LEGEND:

- Soil Boring
- Monitoring Well
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Project: 2017 East Harbour Wall Repairs
Location: Wheatley Harbour, Wheatley, ON
Number: 17G048

Notes:

Testhole Locations

DRAWING

2

CT SITE PLAN PORTRAIT 17G048.GPJ 17-6-12

JOB No: **17G048**

TESTHOLE No. **1**

Dwg. No.: 3
Sheet 1 of 1

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

Client: **Riggs Engineering Ltd.**

Project: **2017 East Harbour Wall Repairs**

Location: **Wheatley Harbour, Wheatley, ON**

EQUIPMENT DATA
Machine: **Diedrich D50**
Method: **83 mm I.D. H/S Auger**
Size: **165 mm OD**
Date: **2017-06-05** TO **2017-06-05**

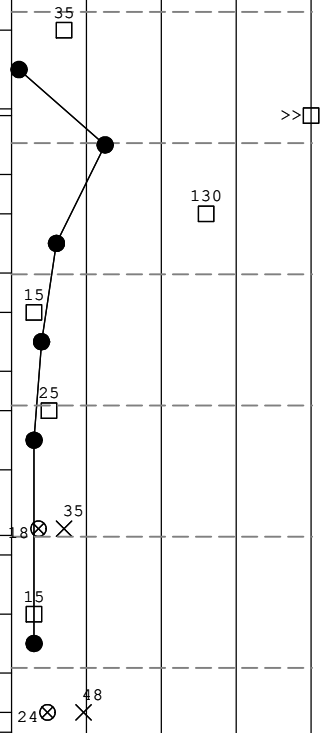
SOIL LITHOLOGY

DESCRIPTION *DMT*

Ground Elev: **175.26** m

EL/DPT (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMP ID	TYPE	N-VALUE
0.35 / 174.91	**Top of Breakwall = 0.00 m** **WATER**	0.5				
		1.0				
		1.5				
		2.0				
		2.5				
		3.0				
		3.5				
		4.0				
4.40 / 170.86		4.5		14.5	SPT	0 1 1 2
4.55 / 170.71	**SANDY CLAY (CLS)** - black, organic **CLAYEY SAND (SC)** - with roots, very soft to stiff					
5.05 / 170.21	**SILTY CLAY (CL-ML)** mottled brown-grey	5.0		16.5	SPT	5 10 15
	grey, stiff	5.5				
		6.0		19.0	SPT	12
		6.5		21.5	SPT	8
	SILTY CLAY (CL-ML) grey, firm	7.0				
		7.5		24.0	SPT	6
		8.0		27.0	VN	
		8.5				
		9.0		29.0	SPT	6
9.75 / 165.51	End of Testhole	9.5		31.5	VN	
		10.0				

SHEAR STR.(kPa)
DILATOMETER: Su● M(bars)▼
FIELD VANE: Peak × Rem. ⊗
LAB TEST: Unc. ■ P.P. □
50 100 150
PENETR. RESISTANCE DMT Phi(◆) ◆
STANDARD ● DYN.CONE ○
20 40 60



BULK UNIT WGHT (kN/m3)

WATER CONTENT (%)
Wp W Wl
10 20 30

WELL DATA

ELEV. (m)
175
174
173
172
171
170
169
168
167
166

REMARKS

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

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CTMET 17G048.GPJ 17-6-12

JOB No: **17G048**

TESTHOLE No. **2**

Dwg. No.: 4
Sheet 1 of 1

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

Client: **Riggs Engineering Ltd.**

Project: **2017 East Harbour Wall Repairs**

Location: **Wheatley Harbour, Wheatley, ON**

EQUIPMENT DATA
Machine: **Diedrich D50**
Method: **83 mm I.D. H/S Auger**
Size: **165 mm OD**
Date: **2017-06-06** TO **2017-06-06**

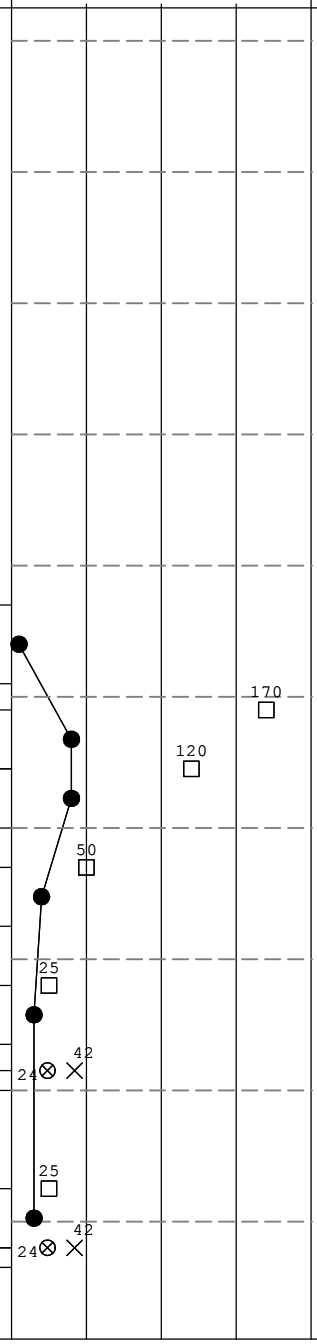
SOIL LITHOLOGY

DESCRIPTION *DMT*

Ground Elev: **175.25** m

EL/DPT (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMP ID	TYPE	N-VALUE
0.34 / 174.91	**Top of Breakwall = 0.00 m**					
	WATER	0.5				
		1.0				
		1.5				
		2.0				
		2.5				
		3.0				
		3.5				
		4.0				
4.55 / 170.70	**CLAYEY SAND (SC)** - black river bottom very soft with grey silt seams	4.5		15.0	SS	0 1 1 2
		5.0				
5.65 / 169.60	**SILTY CLAY (CL-ML)** - with embeded sand and gravel stiff very stiff brown	5.5		17.5	SS	2 6 10
		6.0		19.0	SS	16
	stiff grey firm	6.5		21.5	SS	8
	SILTY CLAY (CL-ML) - with embeded sand and gravel	7.0				
		7.5		24.5	SS	6
	firm grey	8.0		26.5	VN	
		8.5				
		9.0		29.5	SS	6
9.60 / 165.65	End of Testhole	9.5		32.0	VN	
		10.0				

SHEAR STR.(kPa)
DILATOMETER: Su● M(bars)▼
FIELD VANE: Peak × Rem. ⊗
LAB TEST: Unc. ■ P.P. □
50 100 150
PENETR. RESISTANCE DMT Phi(◆) ◆
STANDARD ● DYN.CONE ○
20 40 60



BULK UNIT WGHT (kN/m3)

WATER CONTENT (%)
Wp W Wl
10 20 30

WELL DATA

ELEV. (m)
175
174
173
172
171
170
169
168
167
166

REMARKS

REVIEWING PROFESSIONAL:
T. O'Dwyer, P.Eng., P.E.
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CTMET 17G048.GPJ 17-6-12

JOB No: **17G048**

TESTHOLE No. **3**

Dwg. No.: 5
Sheet 1 of 1

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

Client: **Riggs Engineering Ltd.**

Project: **2017 East Harbour Wall Repairs**

Location: **Wheatley Harbour, Wheatley, ON**

EQUIPMENT DATA
Machine: **Diedrich D50**
Method: **83 mm I.D. H/S Auger**
Size: **165 mm OD**
Date: **2017-06-06** TO **2017-06-06**

SOIL LITHOLOGY

EL/DPT (m)	DESCRIPTION (DMT)	DEPTH (m)	SYMBOL	SAMP ID	TYPE	N-VALUE
0.14 / 174.91	**Top of Breakwall = 0.00 m** **WATER**					
		0.5				
		1.0				
		1.5				
		2.0				
		2.5				
		3.0				
		3.5				
		4.0				
4.40 / 170.65	**SANDY CLAY (SC)** with organics, very soft, grey	4.5		14.5	SS	0 0 1 1
5.05 / 170.00	**SILTY CLAY (CL-ML)** - with embeded sand and gravel, stiff, brown / grey	5.0		16.5	SS	3 6 13
		5.5				
	very stiff	6.0		19.0	SS	28
		6.5		21.5	SS	20
	SILTY CLAY (CL-ML) - with embeded sand and gravel, grey, stiff	7.0				
		7.5		24.5	SS	10
		8.0				
		8.5				
		9.0		29.5	SS	6
9.60 / 165.45	End of Testhole	9.5		31.5	VN	12
		10.0				

SHEAR STR.(kPa)
DILATOMETER: Su ● M(bars) ▼
FIELD VANE: Peak × Rem. ⊗
LAB TEST: Unc. ■ P.P. □
50 100 150
PENETR. RESISTANCE DMT Phi(◆) ◆
STANDARD ● DYN.CONE ○
20 40 60

130
>>
120
105
25
42
12

BULK UNIT WGHT (kN/m3)

WATER CONTENT (%)
Wp W Wl
10 20 30

WELL DATA

ELEV. (m)	REMARKS
175	
174	
173	
172	
171	
170	
169	
168	
167	
166	

CTMET 17G048.GPJ 17-6-12

REVIEWING PROFESSIONAL:
T. O'Dwyer, P.Eng., P.E.
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JOB No: **17G048**

TESTHOLE No. **1A**

Dwg. No.: 6
Sheet 1 of 1

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

Client: **Riggs Engineering Ltd.**

Project: **2017 East Harbour Wall Repairs**

Location: **Wheatley Harbour, Wheatley, ON**

EQUIPMENT DATA
Machine: **Diedrich D50**
Method: **83 mm I.D. H/S Auger**
Size: **165 mm OD**
Date: **2017-05-30** TO **2017-05-30**

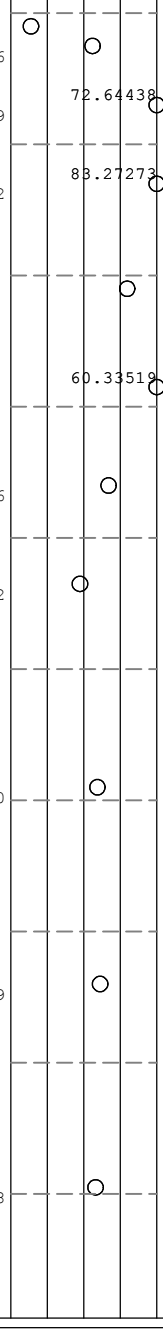
SOIL LITHOLOGY

EL/DPT (m)	DESCRIPTION (DMT)	DEPTH (m)	SYMBOL
0.04 / 175.16	**ASPHALT CONCRETE** - 38 mm		
0.35 / 174.85	**GRAVEL & SAND (GWS-ML)** - with silt		
	ORGANIC SILT - black	0.5	
0.75 / 174.45	**PEAT** - black, fibrous to amorphouse	1.0	
		1.5	
		2.0	
		2.5	
		3.0	
3.65 / 171.55	**SILTY CLAY (CL-ML)** - with embeded sand and gravel, soft, mottled brown-grey	3.5	
	firm	4.0	
	grey	4.5	
		5.0	
	stiff	5.5	
		6.0	
	firm	6.5	
	SILTY CLAY (CL-ML) - with embeded sand and gravel	7.0	
		7.5	
	grey	8.0	
		8.5	
		9.0	
9.75 / 165.45	End of Testhole	9.5	
		10.0	

SAMPLE

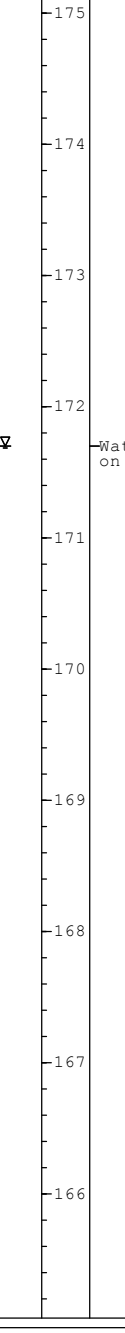
SAMP ID	TYPE	N-VALUE
1.0	SPT	13, 6, 9
3.0	SPT	3, 2, 2, 3
5.0	SPT	4, 2
7.4	SPT	2
10.0	SPT	1
12.5	SPT	4
15.0	SPT	5
20.0	SPT	10
25.0	SPT	6
26.5	VN	
30.0	SPT	6
36.5	VN	12

SHEAR STR.(kPa)
DILATOMETER: Su ● M(bars) ▼
FIELD VANE: Peak × Rem. ⊗
LAB TEST: Unc. ■ P.P. □
50 100 150
PENETR. RESISTANCE DMT Phi(◆)
STANDARD ● DYN.CONE ○
20 40 60



BULK UNIT WGHT (kN/m3)
19.6
12.9
13.2
19.6
20.2
20.0
18.9
18.8

WATER CONTENT (%)
Wp W Wl
10 20 30



WELL DATA

ELEV. (m)
175
174
173
172
171
170
169
168
167
166

REMARKS
Water level at 3.5 m on completion

REVIEWING PROFESSIONAL:
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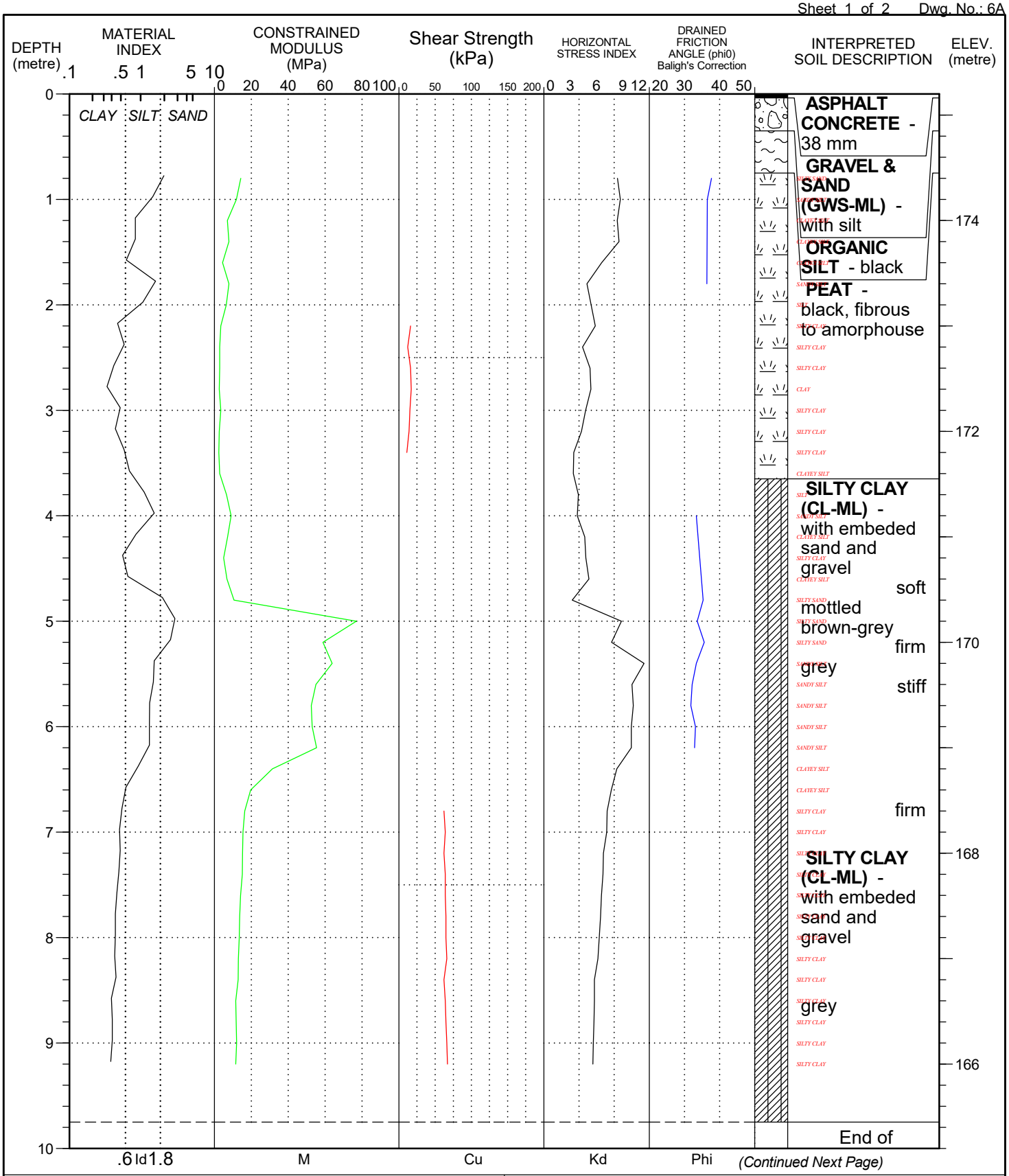

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LOG OF 1A

2017 East Harbour Wall Repairs
Wheatley Harbour, Wheatley, ON

PROJECT NO.:	REVIEWED BY:	DATE ADVANCED:
17G048	T. O'Dwyer, P.Eng., P.E.	2017-05-30

CT DMT LOG 17G048.GPJ 17-6-12

JOB No: **17G048**

TESTHOLE No. **1C**

Dwg. No.: 7
Sheet 1 of 1

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

Client: **Riggs Engineering Ltd.**

Project: **2017 East Harbour Wall Repairs**

Location: **Wheatley Harbour, Wheatley, ON**

EQUIPMENT DATA
Machine: **Diedrich D50**
Method: **83 mm I.D. H/S Auger**
Size: **165 mm OD**
Date: **2017-06-07** TO **2017-06-07**

SOIL LITHOLOGY

EL/DPT (m)	DESCRIPTION (DMT)	DEPTH (m)	SYMBOL	SAMP ID	TYPE	N-VALUE
0.04 / 175.26	**ASPHALT** - 38 mm					
	GRAVEL & SAND (GWS) - crushed	0.5				
0.65 / 174.65	**ORGANIC SILT** - black, with clay, dark brown	1.0		1.5	SS	13
1.20 / 174.10	**PEAT** - with topsoil mix			3.0	SS	7
	with wood	1.5		5.0	SS	2
	black	2.0				
	very soft	2.5		7.5	SS	1
		3.0		10.0	SS	2
3.80 / 171.50	**SILTY CLAY (CL-ML)** - with embeded sand and gravel	3.5				
	greenish-blue, soft	4.0		12.5	SS	3
		4.5		15.0	SS	2
	brown, stiff	5.0				
		5.5		17.5	SS	15
	firm	6.0		20.0	SS	7
		6.5				
	SILTY CLAY (CL-ML) - with embeded sand and gravel	7.0				
		7.5		25.0	SS	6
	firm, becoming grey	8.0				
		8.5				
	grey	9.0				
		9.5		30.0	SS	6
9.75 / 165.55	End of Testhole	10.0		31.5	VN	12

SHEAR STR.(kPa)
DILATOMETER: Su ● M(bars) ▼
FIELD VANE: Peak × Rem. ⊗
LAB TEST: Unc. ■ P.P. □
50 100 150
PENETR. RESISTANCE DMT Phi(◆) ◆
STANDARD ● DYN.CONE ○
20 40 60

85, 25, 180, 35, 35, 25, 35

BULK UNIT WGHT (kN/m3): 21.8, 18.5, 15.1, 13.8

WATER CONTENT (%)
Wp W Wl
10 20 30

132.4841, 335.6436, 474.359, 413.3333

WELL DATA

ELEV. (m): 175, 174, 173, 172, 171, 170, 169, 168, 167, 166

REMARKS: Water level at 3.95 m and rising on completion

REVIEWING PROFESSIONAL:
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CTMET 17G048.GPJ 17-6-12

JOB No: **17G048**

TESTHOLE No. **2A**

Dwg. No.: 8
Sheet 1 of 1

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

Client: **Riggs Engineering Ltd.**

Project: **2017 East Harbour Wall Repairs**

Location: **Wheatley Harbour, Wheatley, ON**

EQUIPMENT DATA
Machine: **Diedrich D50**
Method: **83 mm I.D. H/S Auger**
Size: **165 mm OD**
Date: **2017-05-30** TO **2017-05-30**

SOIL LITHOLOGY

EL/DPT (m)	DESCRIPTION (DMT)	DEPTH (m)	SYMBOL
0.03	**ASPHALT CONCRETE** - 25 mm		
175.18			
0.20	**GRAVEL AND SAND (GWS)** - crushed		
175.00			
0.35	**CONCRETE**		
174.85			
0.75	**GRAVEL AND SAND (GWS)** - pit run fine grained, medium to coarse sand		
174.45			
1.20	**FILL** - organic clay with concrete and rubble		
174.00			
	GRAVEL AND SAND (GP-SW) brown loose		
2.15			
173.05	**PEAT** - black, organics, fibrous to amorphouse		
3.95			
171.25	**SILTY CLAY (CL-ML)** -with embeded sand and gravel very stiff to soft grey		
		4.5	
	firm	5.0	
		5.5	
	stiff	6.0	
		6.5	
	SILTY CLAY (CL-ML) -with embeded sand and gravel	7.0	
		7.5	
	grey	8.0	
		8.5	
		9.0	
		9.5	
9.75			
165.45	End of Testhole	10.0	

SAMP ID	TYPE	N-VALUE
2.0	SPT	5, 7, 6
5.0	SPT	5
7.4	SPT	2
10.0	SPT	2
12.5	SPT	1
15.0	SPT	2
16.5	VN	
20.0	SPT	13
25.0	SPT	6
26.5	VN	
30.0	SPT	6
31.5	VN	

SHEAR STR.(kPa)
DILATOMETER: Su● M(bars)▼
FIELD VANE: Peak × Rem. ⊗
LAB TEST: Unc. ■ P.P. □
50 100 150
PENETR. RESISTANCE DMT Phi(◆) ◆
STANDARD ● DYN.CONE ○
20 40 60

BULK UNIT WGHT (kN/m3)
712
531
16.8
14.3
22.6
226
504
315
203
252
208
23.8
23.2
23.0

WATER CONTENT (%)
Wp W Wl
10 20 30
149.7076
49.39759
109.9447

WELL DATA

ELEV. (m)
175
174
173
172
171
170
169
168
167
166

REMARKS
Water level at 4.55 on completion

REVIEWING PROFESSIONAL:
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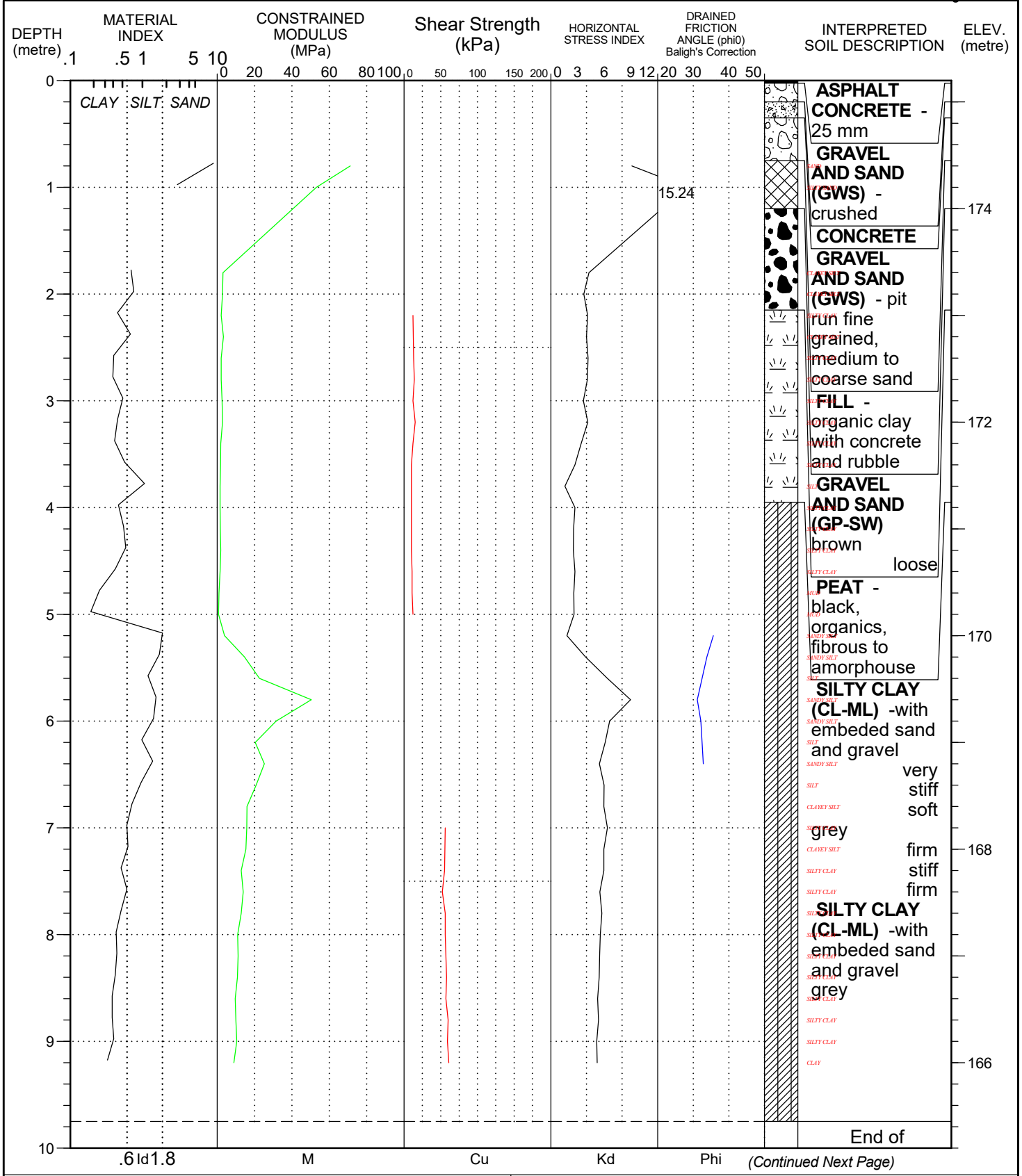
CTMET 17G048.GPJ 17-6-12



(Continued Next Page)

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LOG OF 2A

2017 East Harbour Wall Repairs
Wheatley Harbour, Wheatley, ON

PROJECT NO.:	REVIEWED BY:	DATE ADVANCED:
17G048	T. O'Dwyer, P.Eng., P.E.	2017-05-30

CT DMT LOG 17G048.GPJ 17-6-12

JOB No: **17G048**

TESTHOLE No. **3A**

Dwg. No.: 9
Sheet 1 of 2

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

Client: **Riggs Engineering Ltd.**

Project: **2017 East Harbour Wall Repairs**

Location: **Wheatley Harbour, Wheatley, ON**

EQUIPMENT DATA
Machine: **Diedrich D50**
Method: **83 mm I.D. H/S Auger**
Size: **165 mm OD**
Date: **2017-06-01** TO **2017-06-01**

SOIL LITHOLOGY

EL/DPT (m) | DESCRIPTION (DMT) | DEPTH (m) | SYMBOL

Ground Elev: **175.05** m

0.11 — **ASHPALT CONCRETE** - 115 mm
174.94
0.25 — **CONCRETE**
174.80 — **GRAVEL AND SAND (GWS)**

0.65
174.40 — **PEAT** - black organic, fibrous to amorphouse — SAND

CLAYEY SILT — 1.0
CLAYEY SILT
SILT — 1.5
SILTY SAND
CLAYEY SILT
SILTY CLAY — 2.0
MUD
MUD — 2.5
CLAYEY SILT
SILTY CLAY
SILTY CLAY — 3.0
SILTY CLAY
SILTY CLAY
SILTY CLAY — 3.5
CLAYEY SILT

3.95
171.10 — **SILTY CLAY (CL-ML)** - with embeded sand and gravel — SILT — 4.0
SILT
very stiff
SILT — 4.5
stiff
SILT
firm
grey
SILT — 5.0
SANDY SILT
SILTY SAND — 5.5
SILTY SAND
SILTY SAND
stiff
SANDY SILT — 6.0
very stiff
SANDY SILT
SANDY SILT — 6.5
SILT
CLAYEY SILT

SAMPLE

SAMP ID	TYPE	N-VALUE
1.0	SPT	3 4 5 1
3.0	SPT	1 1 1
5.0	SPT	25
7.4	SPT	0
10.0	SPT	0
12.5	SPT	1
15.0	SPT	5
20.0	SPT	21

SHEAR STR.(kPa)

DILATOMETER: Su ● M(bars) ▼
FIELD VANE: Peak × Rem. ⊗
LAB TEST: Unc. ■ P.P. □
50 100 150
PENETR. RESISTANCE DMT Phi(◆) ◆
STANDARD ● DYN.CONE ○
20 40 60

10 — 50

903
757
793
954
>> 1077
800
435
298

BULK UNIT WGHT (kN/m3)

14.6
16.1
21.5
23.8

WATER CONTENT (%)

Wp W Wl
10 20 30

101.6
47.45763
299.3865
117.6707

WELL DATA

Water level at 5.18 m, and rising on completion

ELEV. (m)

175
174
173
172
171
170
169

REMARKS

REVIEWING PROFESSIONAL:
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CTMET 17G048.GPJ 17-6-12

JOB No: **17G048**

TESTHOLE No. **3A**

Dwg. No.: 9
Sheet 2 of 2

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

Client: **Riggs Engineering Ltd.**

Project: **2017 East Harbour Wall Repairs**

Location: **Wheatley Harbour, Wheatley, ON**

EQUIPMENT DATA
Machine: **Diedrich D50**
Method: **83 mm I.D. H/S Auger**
Size: **165 mm OD**
Date: **2017-06-01** TO **2017-06-01**

SOIL LITHOLOGY

EL/DPT (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMP ID	TYPE	N-VALUE
	stiff	7.0				
	SILTY CLAY (CL-ML) - with embeded sand and gravel					
	grey	7.5				
				25.0	SPT	12
		8.0				
	firm					
		8.5				
		9.0				
				30.0	SPT	7
9.60		9.5				
165.45	End of Testhole					
		10.0				
		10.5				
		11.0				
		11.5				
		12.0				
		12.5				
		13.0				
		13.5				

SHEAR STR.(kPa)
DILATOMETER: Su ● M(bars) ▼
FIELD VANE: Peak × Rem. ⊗
LAB TEST: Unc. ■ P.P. □
50 100 150
PENETR. RESISTANCE DMT Phi(◆) ◆
STANDARD ● DYN.CONE ○
20 40 60

235
207
145
10

BULK UNIT WGHT (kN/m3)
23.4
23.0

WATER CONTENT (%)
Wp W Wl
10 20 30

WELL DATA

ELEV. (m)
168
167
166
165
164
163
162

REMARKS

CTMET 17G048.GPJ 17-6-12

REVIEWING PROFESSIONAL:
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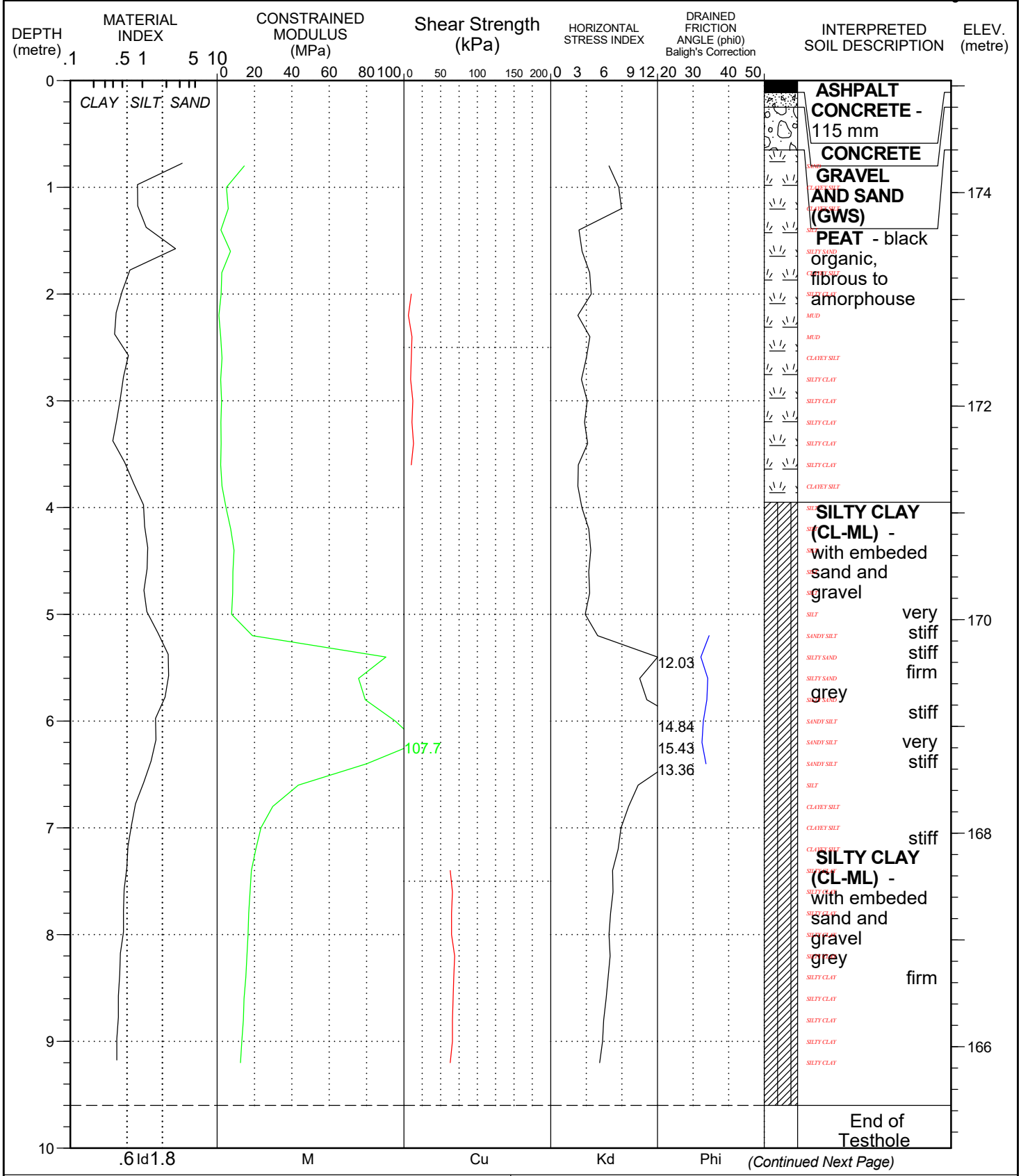

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LOG OF 3A

2017 East Harbour Wall Repairs
Wheatley Harbour, Wheatley, ON

PROJECT NO.:	REVIEWED BY:	DATE ADVANCED:
17G048	T. O'Dwyer, P.Eng., P.E.	2017-06-01

CT DMT LOG 17G048.GPJ 17-6-12

JOB No: **17G048**

TESTHOLE No. **3C**

Dwg. No.: 10
Sheet 1 of 1

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

Client: **Riggs Engineering Ltd.**

Project: **2017 East Harbour Wall Repairs**

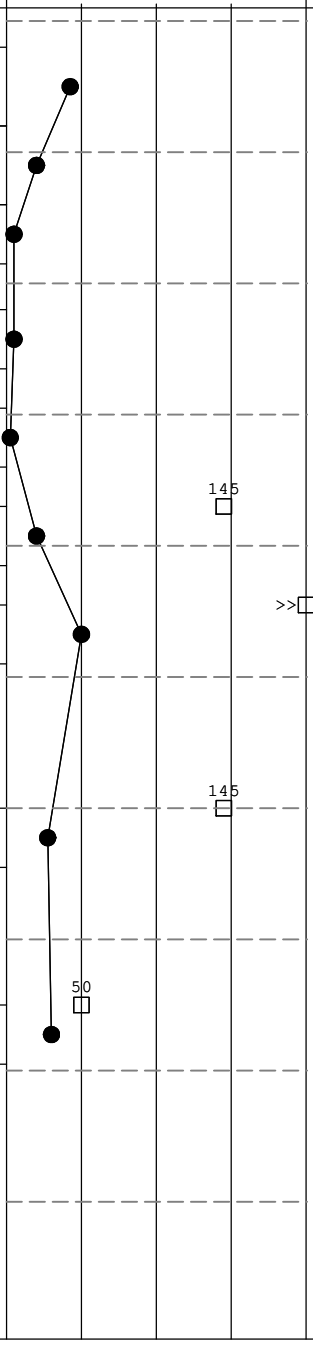
Location: **Wheatley Harbour, Wheatley, ON**

EQUIPMENT DATA
Machine: **Diedrich D50**
Method: **83 mm I.D. H/S Auger**
Size: **165 mm OD**
Date: **2017-06-07** TO **2017-06-07**

SOIL LITHOLOGY

EL/DPT (m)	DESCRIPTION (DMT)	DEPTH (m)	SYMBOL	SAMP ID	TYPE	N-VALUE
0.10 / 175.00	**ASPHALT** - 100 mm					
0.35 / 174.75	**GRAVEL & SAND (GWS)** - crushed					
0.75 / 174.35	**ORGANIC SILT** - with clayey gravel mix	0.5		1.0	SS	12 10 7
0.90 / 174.20	**FILL** - silty clay					
1.30 / 173.80	**SAND (SW)** - medium to fine grained with topsoil loose	1.0		3.0	SS	3 2 4 4
	PEAT - with topsoil	1.5		5.0	SS	2
	black	2.0				
	very loose	2.5		7.5	SS	2
3.05 / 172.05	**ORGANIC SILT** - clay mix with wood fragments	3.0		10.0	SS	1
	very loose	3.5				
	dark brown					
3.80 / 171.30	**SANDY CLAY (SC)** - very soft, grey	4.0		12.5	SS	8
3.90 / 171.20	**SILTY CLAY (CL-ML)** - with embeded sand and gravel grey					
	stiff	4.5		15.0	SS	20
	brown	5.0				
	very stiff	5.5				
	stiff	6.0		20.0	SS	11
	SILTY CLAY (CL-ML) - with embeded sand and gravel	6.5				
	stiff	7.0				
	grey	7.5		25.0	SS	12
8.05 / 167.05	End of Testhole	8.0				
		8.5				
		9.0				
		9.5				
		10.0				

SHEAR STR.(kPa)
DILATOMETER: Su ● M(bars) ▼
FIELD VANE: Peak × Rem. ⊗
LAB TEST: Unc. ■ P.P. □
50 100 150
PENETR. RESISTANCE DMT Phi(◆) ◆
STANDARD ● DYN.CONE ○
20 40 60



BULK UNIT WGHT (kN/m3)

WATER CONTENT (%)
Wp W Wl
10 20 30

WELL DATA

ELEV. (m)	REMARKS
175	Water running in through gravel
174	
173	
172	
171	
170	
169	
168	
167	
166	

CTMET 17G048.GPJ 17-6-12

REVIEWING PROFESSIONAL:
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JOB No: **17G048**

TESTHOLE No. **4C**

Dwg. No.: 11
Sheet 1 of 1

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

Client: **Riggs Engineering Ltd.**

Project: **2017 East Harbour Wall Repairs**

Location: **Wheatley Harbour, Wheatley, ON**

EQUIPMENT DATA
Machine: **Diedrich D50**
Method: **83 mm I.D. H/S Auger**
Size: **165 mm OD**
Date: **2017-06-07** TO **2017-06-07**

SOIL LITHOLOGY

EL/DPT (m)	DESCRIPTION (DMT)	DEPTH (m)	SYMBOL	SAMP ID	TYPE	N-VALUE
0.08 / 175.28	**ASHPALT** - 75 mm					
0.30 / 175.05	**GRAVEL & SAND (GWS)** - crushed					
	FILL - topsoil, gravel and clay mix	0.5		1.0	SS	12 10 7
0.90 / 174.45	**PEAT** - with topsoil and wood fill	1.0		3.0	SS	3 2 4 4
	wet	1.5		5.0	SS	2 1
	very loose	2.0				
	black					
2.45 / 172.90	**SILTY CLAY (CL-ML)** - with embeded sand and gravel	2.5		7.5	SS	2
	grey	3.0		10.0	SS	8
	firm brown	3.5				
	very stiff	4.0		12.5	SS	27
		4.5		15.0	SS	22
		5.0				
		5.5				
	stiff	6.0		20.0	SS	11
6.55 / 168.80	End of Testhole	6.5				
		7.0				
		7.5				
		8.0				
		8.5				
		9.0				
		9.5				
		10.0				

SHEAR STR.(kPa)
DILATOMETER: Su● M(bars)▼
FIELD VANE: Peak × Rem. ⊗
LAB TEST: Unc. ■ P.P. □
50 100 150
PENETR. RESISTANCE DMT Phi(◆) ◆
STANDARD ● DYN.CONE ○
20 40 60

35
145

BULK UNIT WGHT (kN/m3)
16.0
>>
>>
>>

WATER CONTENT (%)
Wp W Wl
10 20 30
273.6
268.4211
205.2288

WELL DATA

ELEV. (m)	REMARKS
175	
174	
173	
172	
171	
170	
169	Testhole open and dry on completion
168	
167	
166	

REVIEWING PROFESSIONAL:
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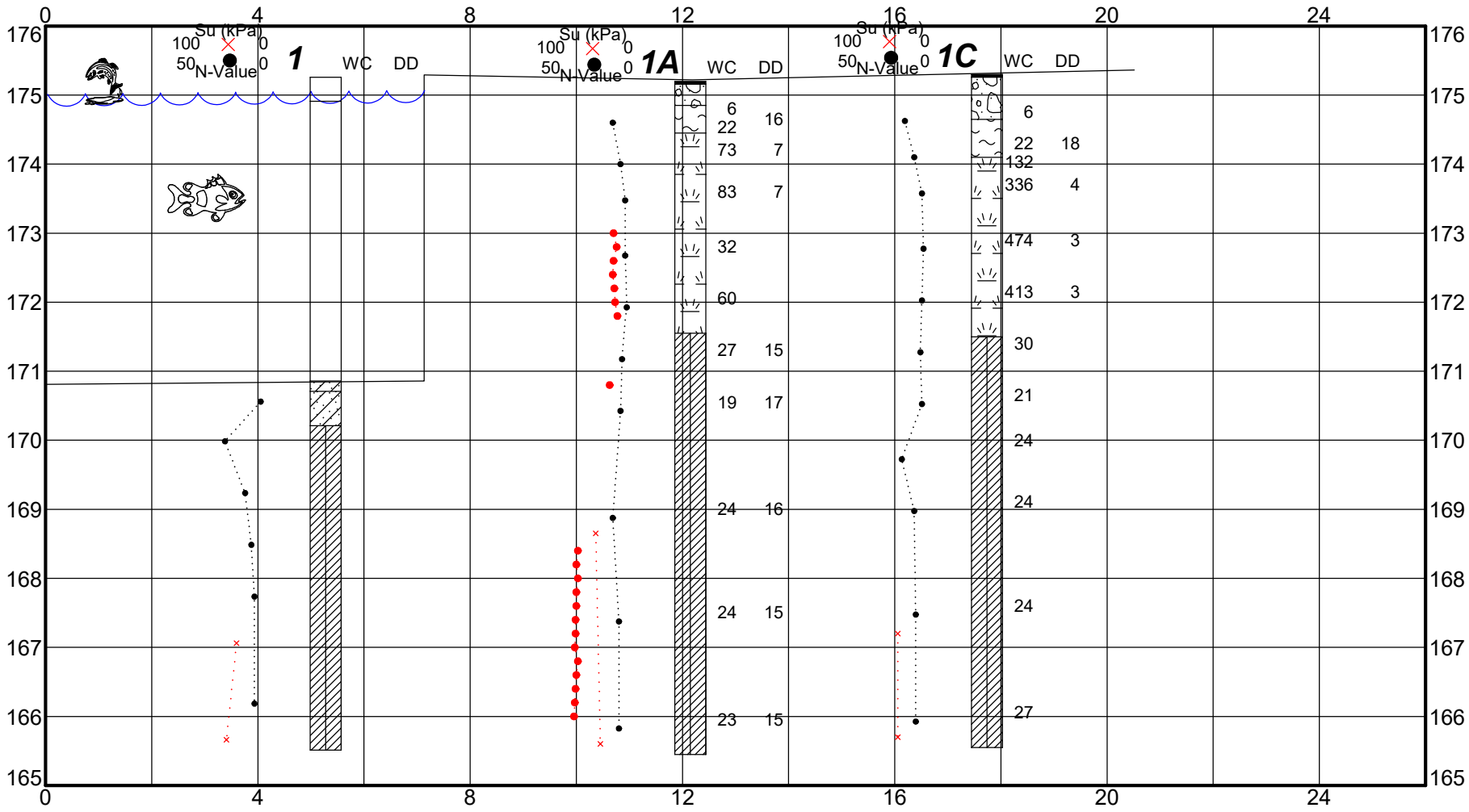


Boring	North	East	Elev.	Depth
1	4658129	378778	175.3	9.6
1A	4658159	378777	175.2	9.8
1C	4658119	378793	175.3	7.6

DISTANCES:

Beginning	0
Ending	26

VIEWING ANGLES (degrees):

Horizontal	0.0
Vertical	0.0

Position	North	East
Left, Front	4658127	378773
Right, Front	4658133	378799
Left, Back	4658127	378773
Right, Back	4658133	378799

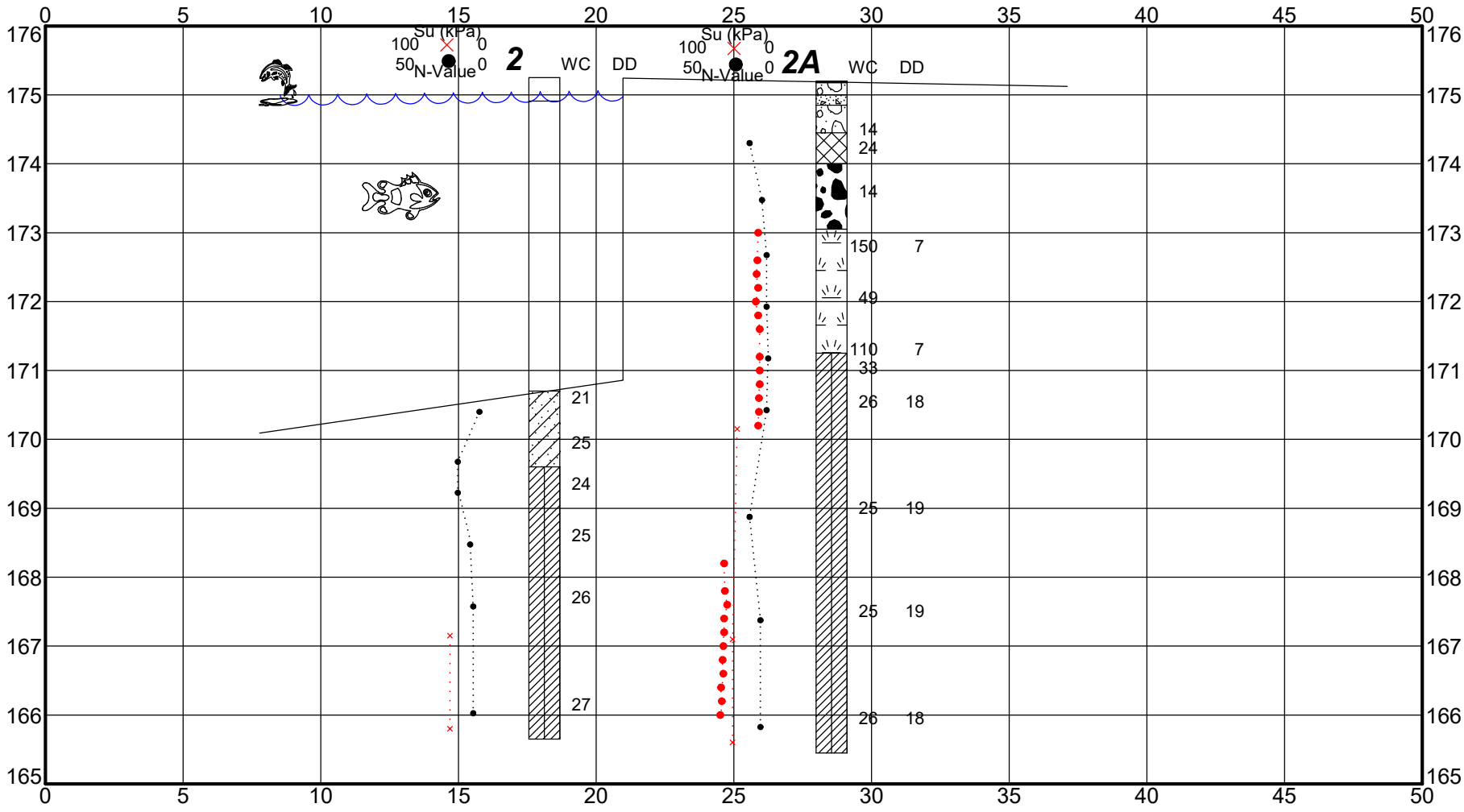
SUBSURFACE FENCE DIAGRAM

North End
West to East

2017 East Harbour Wall Repairs

Wheatley Harbour, Wheatley, ON

PROJECT #	DATE	PLATE
17G048	Jun 17	12



Boring	North	East	Elev.	Depth
2	4658005	378817	175.3	1.0
2A	4658021	378819	175.2	9.8

DISTANCES:

Beginning	0
Ending	50

VIEWING ANGLES (degrees):

Horizontal	0.0
Vertical	0.0

Position	North	East
Left, Front	4658002	378799
Right, Front	4658030	378840
Left, Back	4658002	378799
Right, Back	4658030	378840

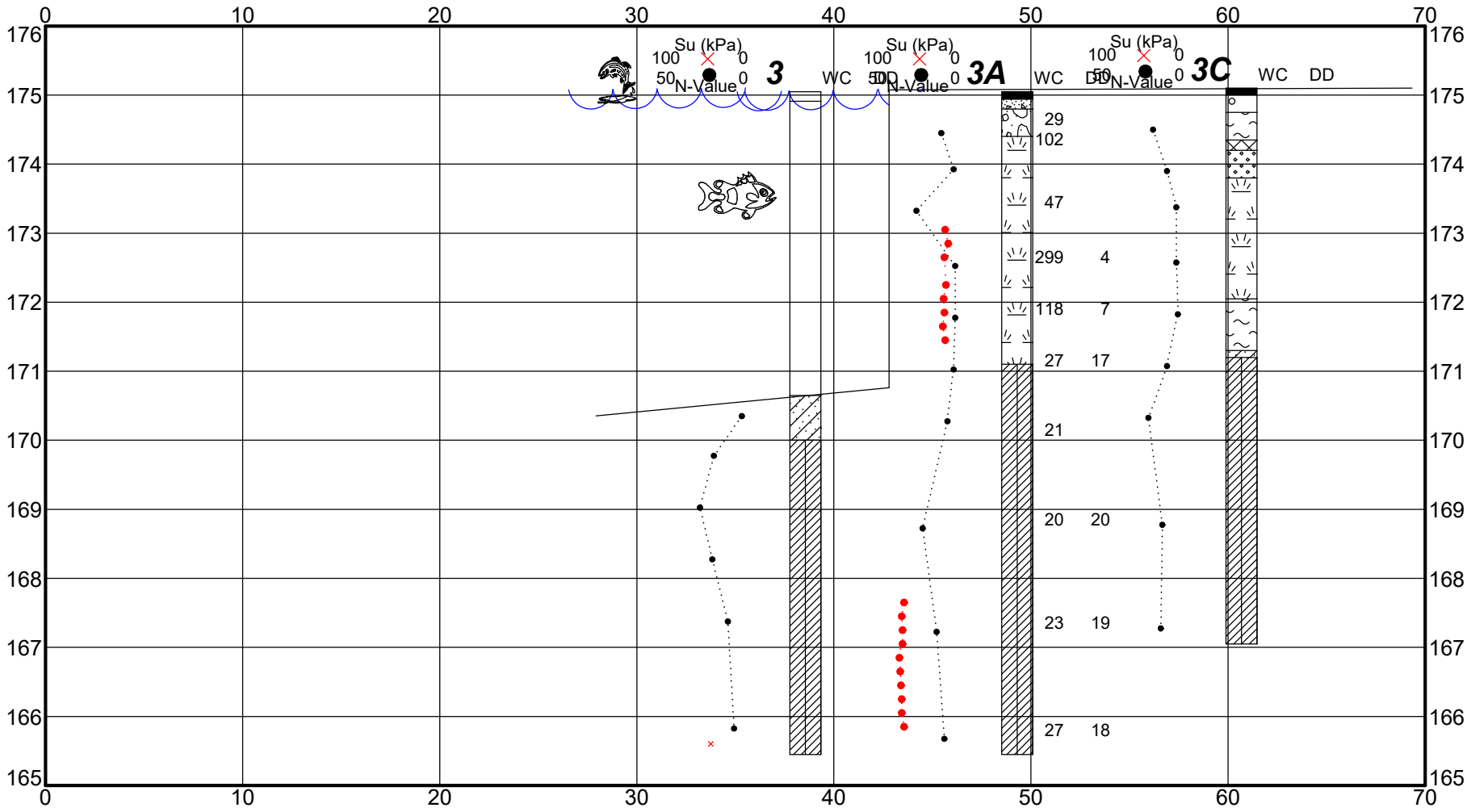
SUBSURFACE FENCE DIAGRAM

Upper Central
West to East

2017 East Harbour Wall Repairs

Wheatley Harbour, Wheatley, ON

PROJECT #	DATE	PLATE
17G048	Jun 17	13



Boring	North	East	Elev.	Depth
3	4657870	378857	175.1	1.0
3A	4657913	378851	175.1	9.6
3C	4657924	378851	175.1	7.0

DISTANCES:

Beginning	0
Ending	70

VIEWING ANGLES (degrees):

Horizontal	0.0
Vertical	0.0

Position	North	East
Left, Front	4657865	378853
Right, Front	4657935	378856
Left, Back	4657865	378853
Right, Back	4657935	378856

SUBSURFACE FENCE DIAGRAM

Lower Central
West to East

2017 East Harbour Wall Repairs

Wheatley Harbour, Wheatley, ON

PROJECT #	DATE	PLATE
17G048	Jun 17	