PROJECT TITLE

PETERBOROUGH, ON
TRENT SEVERN WATERWAY
CONCRETE REHABILITATION LOCK 26

PROJECT NUMBER

30029883-4532-36

PROJECT DATE

2015-07-29

END OF SECTION

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

END OF SECTION

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Work Covered by Contract Documents.

.2 Contract Method.

.3 Cost Breakdown.

.4 Contractor use of premises.

.5 Owner occupancy.

1.2 PRECEDENCE

.1 For Federal Government projects, Division 01 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.3 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises rehabilitation of select concrete areas on the east and west lock walls, downstream east and west abutments including stair repairs, replacement of the downstream west approach wall, downstream east pier and minor repair to the downstream canal floor at Lock 26 Lakefield, located at 14 Hill St., Lakefield, ON,K0L 2H0; and further identified as Lock 26.

.2 In addition to typical contract permitting requirements, the Contractor will be required to secure a Permit to Take Water.

.3 A pre-condition and post-condition survey of the 4 structures and associated properties on Katherine Street South (immediately southeast of the intersection of Katherine St. and MarTully Drive) in Lakefield shall be undertaken by the contractor in accordance with Section 01 48 00 to ensure no damage related to work at Lock 26.

1.5 CONTRACT METHOD

.1 Construct work under combined price contract.

1.6 COST BREAKDOWN

.1 Schedule of Prices as listed on the Price Form - Schedule of Prices shall include all labour, equipment and materials necessary to complete the work as specified and as indicated on the drawings.

.2 Within 48 hours of bid acceptance submit a list of all subcontractors and a detailed breakdown of all cost associated with the lump sum arrangement. Minimum breakdown requirements include:
.1 Construction Control and Monitoring (Katherine St. South Structures)
.2 Mobilization/demobilzation
.3 Permits
.4 Site access and staging areas
.5 Cofferdams and dewatering
.6 Environmental management and monitoring
.7 Testing

1.7 CONTRACTOR USE OF PREMISES

.1 Contractor shall limit use of premises for Work, for storage, and for access, to allow;
.1 Owner occupancy.
.2 Protection of Cultural Resources.

.2 Use of Selwyn Township Property downstream of locks on Katherine St. South shall:
.1 be in accordance with negotiated agreement between Contractor and municipality,
.2 conform to protection and restoration requirements defined in Section 01 52 00, and
.3 shall require that the Contractor's liability insurance name the Township of Selwyn as an Insured at a level of $2,000,000.

1.8 OWNER OCCUPANCY

.1 Cooperate with Owner in scheduling operations to minimize conflict and to facilitate Owner's winter operations of the water control structures accessed through this site and maintenance of site buildings.

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 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 2015 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 Fire Commissioner of Canada, No. 301, Standard for Construction Operations, and No. 302, Standard for Welding and Cutting.
.4 Observe and enforce construction safety measures required by National Building Code 2010, Part 8 Safety Measures at Construction and Demolition Sites, Occupational Health and Safety Act and Regulations for Construction Projects, Revised Statutes of Ontario 1990, Chapter O.1 as amended, Workplace Safety and Insurance Board and municipal statutes and authorities.
.5 Environmental Protection Act, O. Reg. 102/94 and O. Reg. 103/94.
.6 Ontario Regulation 634/86 for Diving Operations.

1.2 TAXES

.1 Pay applicable Federal, Provincial and Municipal taxes.

1.3 FEES, PERMITS AND CERTIFICATES

.1 Provide authorities having jurisdiction with information requested.

.2 Pay fees and obtain certificates and permits required.

.3 Furnish certificates and permits when requested.

.4 Contact MOECC immediately following contract award to advise of pending application and to confirm Permit to Take Water submission requirements.

1.4 EXAMINATION

.1 Before submitting tender, examine existing conditions and determine conditions affecting work.

.2 Obtain all information which may be necessary for proper execution of Contract.

1.5 EXISTING CONDITIONS

.1 Sub-surface investigation report is bound to the specification in Appendix A.

.2 Water levels and flows are provided in Appendix B.

.3 Flows and water levels during construction period may exceed the regulated conditions.

1.6 COMMENCEMENT OF WORK

.1 Commence mobilization of plant and equipment to site immediately upon approval of "Site Access and Temporary Works Plan", including negotiated terms for use of properties not under control of Parks Canada and acceptance of pre-construction monitoring report.

1.7 ADDITIONAL DRAWINGS

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

.2 Such drawings become part of Contract Documents.

1.8 ACCESS

.1 Obtain permits from Municipality for temporary site access where no permanent access currently exists.

.2 Provide and maintain adequate access to and exit from working area.

.3 Provide appropriate construction road signage where such requirements are not specified as part of Municipal permit conditions.

.4 Make good damage to any existing land, roads, vegetation or structures resulting from Contractor's equipment and operations. Restore to original condition or better at no additional cost to contract.

.5 Existing structures and property along Katherine St. South require monitoring during construction as per Section 01 48 00.

.6 The proposed staging area on Twp. of Selwyn property requires an agreement with the municipality in accordance with conditions outlined in Section 01 52 00. Provide Insurance as per municipality's requirements and confirm in agreement with municipality, the terms of use protection and restoration.

1.9 MEASUREMENT PROCEDURES

.1 Items measured for payment are to be measured 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.

1.10 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.

.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.

1.11 CO-OPERATION & PROTECTION

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

.2 Maintain access and exits.

.3 Provide necessary barriers, warning lights and signs. Repair and clean existing structures, roads or other facilities damaged or fouled by the work. Protect work from damage. Replace damaged existing work with material and finish to match original.

.4 Minimize conflict and facilitate Owner's winter operations at the water control structures accessed through the work site and Owner's maintenance of site buildings.

1.12 EXISTING UTILITIES

.1 Establish location, protect and maintain existing buried, submerged and above ground utility lines.

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

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

1.13 OVERLOADING

.1 No part of Work shall be loaded with load which will endanger its safety or cause permanent deformation.

.2 Repair to original condition any part of work damaged due to overloading at no cost to the Contract.

1.14 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.

1.15 FIRES AND TEMPORARY HEATERS

.1 Burning of rubbish on site not permitted.

.2 Only fires for temporary heaters are permitted on site.

.3 Maintain temperature required to prevent frost damage to work.

1.16 PROGRESS PHOTOGRAPHS

.1 As soon as work commences, take weekly 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.

1.17 DATUM AND BENCHMARKS

.1 Elevations and soundings shown on Drawings are expressed in metres relative to National Geodetic Vertical Datum 1929.

.2 Local benchmark information is provided by the Province of Ontario through their COSINE database at www.applications.lrc.gov.on.ca. Local benchmarks information is provided by Parks Canada Trent Severn Waterway. Select benchmark information for this project is bound together with these specifications in Appendix C found at the end of the specifications.

.3 Reinstall and certify any survey markers which are disturbed by work.

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

END OF SECTION

PART 1 - GENERAL

1.1 CONSTRUCTION ORGANIZATION AND START-UP

.1 Within 5 days after award of Contract, request meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Departmental Representative, Consultant, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

.4 Agenda to include following:
.1 Appointment of official representative of participants in Work.
.2 Schedule of Work, progress scheduling in accordance with Section 01 32 16.
.3 Schedule of submission of shop drawings in accordance with Section 01 33 00.
.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00.
.5 Site security in accordance with Section 01 52 00.
.6 Requirements for permitting, environmental monitoring, tree pruning and removals and site disturbance limits.
.7 Confirmation of hydraulic conditions / variability and risk management issues (gate support, lock controls, environmental).
.8 Requirements for request for inspection and testing.
.9 Confirmation of waste management facilities to Section 01 74 20.
.10 Confirmation of QC and contractor inspection responsibilities to Section 01 45 00, Paragraph 1.4.
.11 Confirmation of monitoring and reporting requirements for protection of existing structures on Katherine St. South at Lock 26.
.12 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements (GC).

.13 Record drawings in accordance with Section 01 78 00.
.14 Take-over procedures, acceptance, and warranties in accordance with Section 01 77 00 and 01 78 00.
.15 Monthly progress claims, administrative procedures, photographs, and holdbacks (GC).
.16 Appointment of inspection and testing agencies or firms in accordance with Section 01 45 00.
.17 Insurances and transcript of policies (GC).
.18 Site-specific Health and Safety Plan in accordance with Section 01 35 29.
.19 Accommodation of Cultural and Environmental sensitivities of work area in accordance with Section 01 35 43.

.5 Comply with Departmental Representative's allocation of mobilization areas of site; for field offices and sheds, access, traffic, and parking facilities.

.6 During construction coordinate use of site and facilities through Departmental Representative's procedures for intra-project communications: submittals, reports and records, schedules, coordination of drawings, recommendations, and resolution of ambiguities and conflicts.

.7 Comply with instructions of Departmental Representative for use of temporary utilities and construction facilities.

.8 Coordinate field engineering and layout work with Departmental Representative.

1.2 SCHEDULES

.1 Submit preliminary construction progress schedule in accordance with Section 01 32 16 to Departmental Representative coordinated with Departmental Representative's project schedule.

.2 After review, revise and resubmit schedule to comply with revised project schedule.

.3 During progress of Work revise and resubmit as directed by Departmental Representative.

1.3 CONSTRUCTION PROGRESS MEETINGS

.1 During course of Work schedule progress meetings on a bi-weekly basis.

.2 Contractor, major subcontractors involved in Work, Consultant and Departmental Representative are to be in attendance.

.3 Notify parties minimum 4 days prior to meetings.

.4 Consultant to be responsible to record minutes of meetings and circulate to attending parties and affected parties not in attendance within 5 days after meeting.

.5 Agenda to include following:
.1 Review, approval of minutes of previous meeting.
.2 Review of Work progress since previous meeting.
.3 Field observations, problems, conflicts.
.4 Problems which impede construction schedule.
.5 Review of off-site fabrication delivery schedules.
.6 Corrective measures and procedures to regain projected schedule.
.7 Revision to construction schedule.
.8 Progress schedule, during succeeding work period.
.9 Review submittal schedules: expedite as required.
.10 Maintenance of quality standards.
.11 Review proposed changes for affect on construction schedule and on completion date.
.12 Other business.

1.4 ON-SITE DOCUMENTS

.1 Maintain at job site, one copy each of the following:
.1 Contract drawings.
.2 Specifications.
.3 Amendments.
.4 Reviewed shop drawings, product data and samples.
.5 Change orders.
.6 Other modifications to Contract.
.7 Field test records and reports.
.8 Inspection Certificates.
.9 Manufacturer's Certificates.

.10 Manufacturer's installation and application instructions.
.11 Copy of approved Work Schedule.
.12 Labour conditions and wage schedules.
.13 Material Safety Data Sheets.
.14 Labour and Material Bonds.
.15 All applicable Permits.
.16 Notice of Project.

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

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

1.5 SUBMITTALS

.1 Make submittals to Departmental Representative for review.

.2 Submit preliminary shop drawings, product data and samples in accordance with Section 01 33 00 for review for compliance with Contract Documents; for field dimensions and clearances, for relation to available space, and for relation to Work of other contracts. After review, revise and resubmit for transmittal to Departmental Representative.

.3 Submit requests for payment for Consultant review and verification, and for transmittal to Departmental Representative.

.4 Submit requests for interpretation of Contract Documents, and obtain instructions through Departmental Representative.

.5 Process substitutions through Departmental Representative.

.6 Where change orders are deemed necessary by Consultant, process change orders through Departmental Representative.

.7 Deliver closeout submittals for review and preliminary inspections, for transmittal to Departmental Representative.

1.6 COORDINATION DRAWINGS

.1 Provide information required by Departmental Representative for preparation of coordination drawings.

.2 Review and approve revised drawings for submittal to Departmental Representative.

1.7 CLOSEOUT PROCEDURES

.1 Notify Departmental Representative when Work is considered ready for Substantial Performance.

.2 Accompany Departmental Representative and Consultant on preliminary inspection to determine items listed for completion or correction.

.3 Comply with Departmental Representative's instructions for correction of items of Work listed in executed certificate of Substantial Performance.

.4 Notify Departmental Representative of instructions for completion of items of Work determined in Departmental Representative's final inspection.

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

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

.3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

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

.7 Milestone: significant event in project, usually completion of major deliverable.

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

.9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

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

.2 Plan to complete Work in accordance with prescribed milestones shown in paragraph 1.5 Project Schedule and project time frame.

.3 Ensure that it is understood that Certificate of Substantial Performance and Certificate of Completion as defined times of completion are of essence for this contract.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Submit to Departmental Representative within 5 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

.3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.4 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.2 Departmental Representative will review and return revised schedules within 5 working days.

.3 Revise impractical schedule and resubmit within 5 working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.5 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
.1 Award.
.2 Shop Drawings, Samples.
.3 Permits.
.4 Mobilization.
.5 Site Preparation and Protection.
.6 Cofferdam / Dewatering and Downstream Approach Wall and Pier Access.
.7 Demolition Downstream West Approach Wall.
.8 Demolition Downstream East Pier.
.9 Reconstruction Downstream West Approach Wall.
.10 Reconstruction Downstream East Pier.
.11 Demolition / Preparation Concrete Surfaces - East and West Abutments (including stairs).
.12 Rehabilitation Concrete Surfaces - East and West Abutments (including stairs).
.13 Demolition / Preparation Concrete Surfaces - East and West Lock Walls.
.14 Rehabilitation Concrete Surfaces - East and West Lock Walls.
.15 Removal of Cofferdams / Access Roads / Staging Areas.
.16 Tree Planting.
.17 Replacement of Site Features.
.18 Landscape Surface Restoration
.19 Closeout Submittals

1.6 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on bi-weekly basis reflecting activity changes and completions, as well as activities in progress.

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

1.7 PROJECT MEETINGS

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

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 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, MS Project and Autocad dwg files 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 for approval 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 Submissions shall include:
- .1 Transmittal Page / Letter.
- .2 Contractor's name and address.
- .3 Date and revision dates.
- .4 Project title and number.
- .5 Identification and quantity of each shop drawing, product data and sample.
- .6 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .7 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .8 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.

.8 After Departmental Representative's review, distribute copies.

.9 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.

.10 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.

.11 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 accordance with specified requirements.
.2 Testing must have been within 3 years of date of contract award for project.

.12 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.

.13 Submit three hard copies and one electronic copy of manufacturer's 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.

.14 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.

.15 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.16 Delete information not applicable to project.

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

.18 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.

.19 Contractor's responsibility for errors, omissions or deviations from requirements of Contract Documents is not relieved by Departmental Representative review of submittals.

1.3 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 2010, 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 O.Reg. 634/86 for Diving Operations
.6 O.Reg. 278/05: Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Projects.

.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.

.6 Fire Commissioner of Canada (FCC):
.1 FC-301 Standard for Construction Operations, June 1982.
.2 FC-302 Standard for Welding and Cutting, June 1982.

Human Resources and Social Development Canada
Labour Program
Fire Protection Engineering Services
4900 Yonge Street 8th Floor
North York, Ontario M2N 6A8

and copies may be obtained from:

Human Resources and Social Development Canada
Labour Program

Fire Protection Engineering Services
Ottawa, Ontario K1A 0J2

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Submit site-specific Health and Safety Plan: Within 5 days after date of Contract Award 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 operations found in work plan.

.3 Measures and controls to be implemented to address identified safety hazards and risks.

.4 Provide a Fire Safety Plan, specific to the work location, in accordance with NBC, Division B, Article 8.1.1.1 prior to commencement of work. Deliver two copies of the Fire Safety Plan to the Departmental Representative not later than 5 days before commencing work.

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

.6 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations.

.3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 3 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 3 days after receipt of comments from Departmental Representative.

.4 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.

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

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

.7 Submit Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative.

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

.9 Submit copies of incident and accident reports.

.10 Submit Material Safety Data Sheets (MSDS).

.11 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 and submit a copy of Notice of Project to Departmental Representative.

1.4 SAFETY ASSESSMENT

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

1.5 MEETINGS

.1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.6 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.

1.7 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:
.1 Silica in concrete.
.2 Lead in paint,.
.3 Work at or near water.
.4 Work at or near large vertical grade differentials.
.5 Asbestos containing materials, non friable.

1.8 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning 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.

1.9 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990 Chapter 0.1, as amended.

.2 Ontario Regulation 634-86 for Diving Operations.

.3 Comply with Ontario Regulation 278/05, Designated Substance - Asbestos on Construction Projects and in Building and Repair Operations.

1.10 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.

1.11 UNFORSEEN 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.

1.12 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have site-related working experience specific to activities associated with nature of site work.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

.5 Be on site during execution of Work and report directly to the site supervisor.

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 or Consultant 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 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 Health and Safety Supervisor to stop or start Work when, at Health and Safety Supervisor's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative or Consultant 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. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

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

.3 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.

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

.5 Include in Environmental Protection Plan:
.1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.

.2 Erosion and sediment control plan in accordance with Section 01 52 00, 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 and that runoff water from the site is controlled in accordance with authority requirements.

.3 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.

.4 Access Road and Staging Area Plan in accordance with Section 01 52 00, 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.

.5 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.

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

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

.8 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.9 Cofferdam and Dewatering Plan in accordance with Section 01 52 00, identifying measures for management of water levels on site during construction and the management and discharge of dewatering flows.

.10 Waste Water Management Plan identifying methods and procedures for management and or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, disinfection water, hydrostatic test water, and water used in flushing of lines.
.11 Site Feature and Vegetation Protection Plan in accordance with Section 01 52 00 that defines procedures for identifying and protecting historical, archaeological, cultural resources and biological/vegetation resources.

1.3 ENVIRONMENTAL MEASURES

.1 Meet or exceed the requirements of all environmental legislation and regulations, including all amendments up to the project date provided that in any case of conflict or discrepancy the more stringent requirements shall apply.

.2 Mitigating measures that the contractor is required to adhere to are located in Appendix D found at the end of the specification.

.3 No in water work is permitted after March 15, to protect local fish populations during their spawning and nursery. Schedule work such that all in water work is fully completed in advance of March 15, of the designated construction year.

1.4 FIRES

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

1.5 DRAINAGE

.1 Provide temporary drainage and pumping required to keep excavations and site free from water.

.2 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.

.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties as per the approved Site Feature and Vegetation Protection Plan.

.2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
.1 Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Identify, by tagging, trees required for removal and those required for pruning, for review by Departmental Representative. Restrict tree removal and pruning to areas approved by Departmental Representative.

1.7 WORK ADJACENT TO WATERWAYS

.1 Construction equipment to be operated on land or from dewatered areas only.

.2 Waterways and dewatered areas to be kept free of excavated fill, waste material and debris.

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

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

.5 Temporary crossings of waterways to be in accordance with approved Cofferdam and Dewatering Plan and Site Access and Staging Area Plan.

1.8 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features as per approved Erosion and Sediment Control Plan.

.2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.

.3 Prevent extraneous materials from contaminating air and waterways beyond application area.
.1 Provide temporary enclosures where necessary to achieve this control.

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

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

.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.

.11 Fires and temporary heaters in accordance with Section 01 11 02.

1.9 HISTORICAL/ ARCHAEOLOGICAL CONTROL

.1 Provide protection for historical, archaeological, cultural, and biological / vegetation resources in accordance with approved Site Feature and Vegetation Protection Plan.

.2 Accommodate Parks Canada Cultural Resources Management (CRM) representatives' needs for documentation of existing structures as per Section 02 41 16.

.3 Include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative to address situations where such resources not known to be on site are discovered during construction.

.4 Should any archaeological or cultural resource be discovered while excavating, stop work. Contact Departmental Representative for direction prior to continuing work.

1.10 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 pH should be neutral 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 shall be stopped and appropriate action taken to immediately rectify the situation.

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

.8 Prior to the commencement of operations the Contractor is to 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.

1.11 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.

1.12 POTENTIAL ENVIRONMENTAL ISSUES

.1 If during construction an environmental issue arises where suspected contamination or pollution is uncovered, the Contractor shall notify immediately the Departmental Representative.

.2 The Contractor shall permit the Departmental Representative access to the site for inspection and assessment of the environmental issues and allow a period of 10 working days from the time of notification by the Contractor to recommend remedial action.

.3 The Contractor shall make no part of the time lost during the period of inspection and assessment the subject of a claim for extension of time or for excess costs or damages.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 CLEANING

.1 Leave Work area clean at the end of each day.

.2 Ensure public waterways and drainage courses 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 SECTION INCLUDES

.1 This Section describes the Contractor's quality control requirements, duties and responsibilities during execution of the Work. Contractor quality control is the means by which the Contractor furnishes the independent resources necessary to control the Work and provide documentation to confirm that completed Work complies with the requirements of the Contract Documents.

.2 Inspection and testing, administrative and enforcement requirements.

.3 Compaction testing.

.4 Tests and mix designs.

1.2 SUBMITTALS

.1 Submit a Construction Quality Control (CQC) Plan to the Departmental Representative and Consultant for review and acceptance. The plan shall identify personnel, procedures, methods, instructions, records, and forms to be used by the CQC team to control the work and verify that the work conforms to the Contract Documents.

.2 The CQC Plan shall include the following:

.1 A description of the quality control organization including an organization chart showing the various CQC team members along with their designated responsibilities and lines of authority.

.2 Acknowledgement that the CQC staff will conduct inspections for all aspects of the work specified and shall report to a CQC Supervisor, or someone of higher authority, in the Contractor's organization.

.3 The name, qualifications, duties, responsibilities, and authorities of each person assigned a primary CQC function.

.4 A summary of the delegated responsibilities of the CQC Supervisor, signed by an authorized official of the firm.

.5 Procedures for scheduling and managing submittals including those of subcontractors, off-site fabricators, and material suppliers.

.6 Testing methods, schedules, and procedures used to report quality control information to the Departmental Representative including samples of the various reporting forms.

.3 The Contractor shall obtain the Departmental Representative's acceptance of the CQC Plan prior to the start of work. The Departmental Representative's acceptance is conditional, based on satisfactory performance during execution of the work. The Departmental Representative reserves the right to require the Contractor to adjust the CQC Plan and/or operations as necessary to comply with the provisions of the Contract documents at no extra cost.

.4 After the Departmental Representative's acceptance of the CQC Plan, the Contractor shall notify Departmental Representative in writing of any proposed change to the CQC Plan. Proposed changes are also subject to acceptance by the Departmental Representative.

1.3 CQC ORGANIZATION

.1 CQC Supervisor: Identify an individual within organization, located at the Work Area, who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The Departmental Representative must approve this CQC Supervisor.

.2 Personnel: Staff shall be maintained under the direction of the CQC Supervisor to perform all CQC activities. The actual number of the staff during any specific work period may vary to cover shift needs and rates of performance. The personnel of this staff shall be fully qualified by experience and technical training to perform their assigned responsibilities and shall be directly hired for the work by the prime Contractor.

1.4 COORDINATION MEETING

.1 During the pre-construction meeting (see Section 01 31 16 - Project Management and Coordination) the Contractor shall meet with the Departmental Representative, Consultant and appropriate agencies to discuss the CQC system. During the meeting, a mutual understanding of the system details shall be developed including the approval of forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's inspection and control with the Departmental Representative's inspection.

.2 There may also be occasions when subsequent conferences will be called to reconfirm mutual understanding.

1.5 INSPECTION

.1 Allow Departmental Representative and Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.

.3 Contractor quality control shall be adequate to cover all construction operations, including both onsite and offsite fabrication, and will be keyed to the proposed construction sequence. Quality control shall include the following levels of inspection for all definitive features of the work.

.4 Preparatory Inspection: This shall be performed prior to beginning any work or any definable feature of work. Such inspection shall be made a matter of record in the CQC documentation as required herein. Subsequent to the preparatory inspection and prior to commencement of work, the Contractor shall instruct each applicable worker as to the acceptable level of workmanship specified by the CQC Plan as necessary to meet the requirements of the Contract Documents. The preparatory inspection shall include:
.1 A review of Contract requirements.

.2 A check to ensure that all materials and / or equipment have been tested, submitted, and approved.

.3 A check to ensure that provisions have been made to provide required control testing.

.4 An examination of the Work Area to ascertain that all preliminary or previous Work has been completed.

.5 A physical examination of materials, equipment, and sample Work to ensure that they conform to approved shop drawings or submittal data.

.6 A check to ensure that all materials and / or equipment are on hand.

.5 Initial Inspection: This inspection shall be performed as soon as a representative portion of the particular feature of Work has been accomplished and shall include examination of the quality of workmanship and a review of control testing for compliance with contract requirements, use of defective or damaged materials, omissions, and dimensional requirements. Such inspection shall be made a matter of record in the CQC documentation as required herein.

.6 Follow-up Inspections: Inspections shall be performed daily to ensure continuing compliance with contract requirements, including control testing, until completion of the particular feature of Work. Such inspections shall be made a matter of record in the CQC documentation as required herein. Follow-up inspections shall be conducted and test deficiencies corrected prior to the addition of new features of Work.

.7 Pre-Final and Final Inspections: In accordance with Section 01 77 00.

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

.9 Departmental Representative or Consultant may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.6 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies may be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.

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

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative or Consultant at no cost to Departmental Representative. Pay costs for retesting and reinspection.

1.7 ACCESS TO WORK

.1 Allow Departmental Representative, Consultant and/or testing agencies access to Work Area, staging areas and , off site manufacturing and fabrication plants as required.

.2 The Contractor shall provide clear access to work areas to be inspected and assist as required by providing safety equipment, ladders, materials, and other items necessary for these inspections, including but not necessarily limited to concrete testing.

.3 Co-operate to provide reasonable facilities for such access.

1.8 PROCEDURES

.1 Notify appropriate agency, Departmental Representative and Consultant in advance of requirement for tests, in order that attendance arrangements can be made.

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

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

1.9 NOTICE OF NONCOMPLIANCE

.1 Departmental Representative will notify the Contractor of any noncompliance with the foregoing requirements. After receipt of such notice, Contractor shall take corrective action immediately. Such notice, when delivered to the Contractor or its representative at the Work Area, shall be deemed sufficient for the purpose of notification.

.2 If the Contractor fails or refuses to comply promptly, Departmental Representative may issue an order stopping all or any part of the Work until satisfactory corrective action has been taken.

.3 The Contractor shall make no part of the time lost due to any such Stop Work Order the subject of a claim for extension of time or for excess costs or damages.

1.10 REJECTED WORK

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

.2 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative may deduct from Contract Amount difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Departmental Representative.

1.11 REPORTS

.1 Submit 2 copies of inspection and test reports to Departmental Representative.

.2 Provide copies to Subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

1.12 COMPACTION TESTING

.1 Submit compaction test results for backfill materials and asphalt paving.

1.13 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs.

.2 The cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work shall be appraised by Departmental Representative and may be authorized as recoverable.

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 DESCRIPTION

.1 Work under this section relates to condition surveys and monitoring of structures and buildings which are adjacent to the construction site and which may be affected by site work (including excavation, demolition, compaction, etc.) and operation of heavy construction equipment.

.2 The contractor is advised that structures, buildings and municipal services are located close to the proposed work and site access routes, and that construction activities are to be conducted in such a manner as to preclude damage to these structures, buildings and services. The Contractor shall be responsible for any damage caused by their activities.

.3 The scope of work described in this section is a minimum requirement for conducting a condition survey and monitoring of the work. The Contractor's Design Engineer together with the Monitoring Engineer are to review and advise the Departmental Representative on movement and vibration criteria and any additional monitoring requirements.

.4 The monitoring work under the present scope only covers the construction area and immediate surrounds. The Contractor shall take full responsibility for other areas as part of their construction operation including haul routes.

1.2 DEFINITIONS

.1 Monitoring Engineer: refers to the independent inspection/monitoring firm which is responsible for the work under this section.

.2 Design Engineer: refers to the engineer retained by the Contractor to design and oversee the construction of the temporary works, cofferdams and stabilization works and any other temporary works required to complete the work under the contract.

1.3 INDEPENDENT INSPECTION AGENCIES

.1 An Independent Inspection/Monitoring Firm(s) shall be retained by the Contractor for the purpose of inspection and/or monitoring portions of Work as described in this section. Cost of such services will be borne by the Contractor.

.2 The Independent Inspection/Monitoring Firm(s) team shall be qualfied and competent in:
.1 performing condition surveys,
.2 the determination of allowable movement including displacement and vibration at structures and embankments,
.3 the protection of municipal services,
.4 the establishment of measurement procedures and their implementation, and
.5 monitoring and reporting.

.3 The Condition Survey shall be underaken by a qualified and competent inspector.

.4 If requested by the Departmental Representative, submit the inspector and monitoring specialist qualifications and experience for review and approval.

1.4 CONSTRUCTION CONTROL & MONITORING

.1 At least 15 days prior to the start of work, the Contractor shall submit their Construction Control and Monitoring (CCM) Plan. The plan shall be prepared in conjunction with the Site Access and Temporary Works Plan, Environmental Protection Plan and Construction Quality Control Plan.

.2 As a minimum the CCM Plan is to cover:
.1 the format of the condition survey,
.2 the extent of the condition survey,
.3 the methodology used to monitor existing cracks in existing buildings and other structures including embankments,
.4 the extent and methodology for soil movement monitoring program at existing structures and embankments as requried, including establishent of critical movement criteria, type of monitoring equipment and frequency of measurement,

.5 the vibration monitoring program, including influence vibration zone, safe and critical vibration levels and anticipated vibration levels at the closest structure, including type of monitoring equipment and frequency of measurement,
.6 the format for reporting readings in CCM plan, and
.7 measures to protect existing municipal services.

.3 Prior to commencement of the work, meet with Departmental Representative to discuss the CCM plan, report format, report frequencies, emergency report and distribution list.

1.5 CONDITION SURVEY

.1 Prior to commencement of work, a Pre-Construction Condition Survey Report of the first four properties along Katherine St. South (and associated structures within 30 m of the construction access route)that may be affected by the work under this contract shall be submitted by the Contractor.

.2 The Condition Survey shall be undertaken by the Contractor's qualified inspector together with the Departmental Representative, private landowners and Township/municipality representatives.

.3 The survey shall include the location and condition at adjacent prioperties of: buildings, structures, underground structures and utility structures.

.4 As a minimum, the building and structure Condition Survey Reports are to cover above and sub-grade accessible interior walls, exterior visible walls, ceiling, roof and floors. The report shall detail, by sketches, video, photographs, and/or notes, the existing structural, cosmetic plumbing and electrical condition, but should not be limited to areas of building exhibiting distress (damage). Any significant cracks are to be identified and monitored.

.5 Condition Surveys are to be performed for all building and structures located within 30 metres of the access route on Katherine St. South. As a minimum, the following properties and structures are to be surveyed:
.1 #1 Katerine St. South,
.2 #5 Katherine St. South
.3 #7 Katherine St. South
.4 The property immediately southeast of #7 Katherine St. South (Civic Address unconfirmed).

.6 Furthermore, as part of the Condition Survey, the Contractor shall perform a monthly inspection of the haul routes and report their findings to the Township/municipality and Departmental Representative. Repair and make good any damage to the satisfaction of the local authorities and the Departmental Representative.

.7 Upon completion of the work under the contract, a Post-Construction Conditon Survey shall be perfromed on all properties, buildings or structures that were surveyed as part of the Pre-Construction Condition Survey. The survey needs to focus on the same issues that were identified under the original survey, plus any new issues that may have developed during the construction period.

1.6 CONDITION SURVEY REPORT

.1 Prepare and submit a DRAFT Condition Survey Report for review and approval by the Departmental Representative within 10 days of construction commencement.

.2 Revise as required by the Departmental Representative and submit Final version of report.

.3 For each property surveyed, provide four (4) copies of the Condition Survey Report (DVD or approved alternative) with annotation of location of interest and comments on the existing conditions.

.4 One copy of the approved report will be provided to the repsective individual landowner and/or township/municipality. One copy is to be maintained on site.

1.7 MONITORING

.1 Vibration (Seismograph) monitoring:

.1 The monitoring engineer shall:

.1 establish vibration influence zones and safe vibration levels and develop the Contractor's vibration monitoring program for structures of concern.

.2 supervise the Contractor vibration monitoring program.

.2 During vibration producing activities, the Contractor shall monitor vibration levels, and shall not exceed the established safe level to preclude damage to the adjacent structure(s).

.3 The vibration monitoring equipment shall be capable of:

.1 continuously record peak particle velocity,

.2 providing permanent record of the entire vibration event,

.3 providing an alarm when vibration limit exceeds the established safe vibration level, and

.4 being remotely monitored by the Monitoring Engineer.

.4 Copies of all vibration records and associated construction activities (demolition work, excavation of rock and frozen ground, compaction and operation of heavy construction equipment) data shall be provided to the Design Engineer and Departmental Representative on a daily basis.

.5 Reporting:

.1 The Monitoring Firm shall provide a written record of findings including new data and its interpretation including other figures and graphs. The record shall be continuous.

.2 The Contractor Design and Monitoring Engineer shall provide recommendations based on the findings to the Departmental Representative.

.3 The report shall be clear and concise and be acceptable to the Departmental Representative.

.4 Action requirements by the Contractor shall be clearly defined with schedule of implementation.

.5 An addendum to the report shall be made by the Monitoring Engineer based on the results of the action taken by the Contractor to address the construction issue.

.2 Take appropriate measures to reduce movement and vibration to adjacent properties and structures. If ground movement or if vibration measurements exceeds set criteria, immediately stop all construction activity and inform Design Engineer and Departmental Representative of the situation. Provide and implement remedial action to rectify the situation. Obtain written permission from Departmental Representative prior to resuming construction activities.

.3 Immediately repair any damage to any adjacent structure to the satisfaction of the Departmental Representative.

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 SECTION INCLUDES

.1 Construction aids.

.2 Office and sheds.

.3 Parking.

.4 Project identification.

.5 Construction Access Roads and Staging Areas.

.6 Cofferdams and Dewatering Facilities.

.7 Sediment and Erosion Control.

.8 Protection of Site Features and Vegetation.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CSA A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
.2 CSA 0121-08, Douglas Fir Plywood.
.3 CSA Z797-09, Code of practice for Access Scaffold.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Submit for review and approval by Departmental Representative and Consultant, a Cofferdam and Dewatering Plan which provides the following:
.1 Layout of proposed cofferdam areas and turbidity curtains.
.2 Typical cross sections of cofferdam structures.
.3 Turbidity curtain details.
.4 Details of connection/abutment with existing structures where applicable.
.5 Lock gate valve and cofferlog leakage control methodology.
.6 Dewatering collection area details.
.7 Dewatering pump and piping layout and specifications.

.8 Dewatering discharge layout and typical details and sections.
.9 Emergency Flood Management procedures and measures.
.10 Decommissioning procedures for cofferdam structures and dewatering system.
.11 Cofferdam and Dewatering Plan shall be sealed by a Professional Engineer registered in the Province of Ontario.

.3 Submit for review and approval by Departmental Representative, an Access Road and Staging Area Plan which provides the following:
.1 Proposed locations and dimensions of areas to be fenced for use by Contractor.
.2 Number of trailers to be located within work area, including dimensions and locations.
.3 Avenues of ingress and egress to the fenced work area, and travel routes within.
.4 Details of methods for protection of existing surfaces beneath travelled routes within fenced area as required.
.5 Details of grade transitions (fill areas) as required to prevent excavation outside proposed work areas as per Parks Canada Cultural Resources Management requirements.
.6 Details of fencing and installation.
.7 Copy of agreement with Selwyn Township regarding use of designated property for staging, and copy of insurance policy naming Selwyn Township as insured.

.4 Submit for review and approval by Departmental Representative, a Sediment and Erosion Control Plan which provides the following:
.1 Limits of sediment control boundaries /perimeters and typical details and sections of sediment control structures / measures.
.2 Areas to be treated and maintained to prevent tracking of mud from site and into waterway area including methods of protection and maintenance.
.3 Areas of proposed stockpiling for native and/or imported fills, granular materials or waste materials on site and methodology for preventing erosion and sediment delivery from these areas.
.4 Management of drainage on site and at site perimeter as required to provide positive relief for flows and to prevent delivery of sediment off site and to local water surface areas.

.5 Submit for review and approval by Departmental Representatives Features and Vegetation Protection Plan which provides the following:
.1 Areas within the defined work area to be fenced/barricaded for protection of existing vegetation including trees and surface vegetation.
.2 Vegetation where pruning is required to provide for adequate site access, and proposed pruning approach/limits. Trees to be pruned shall be identified in the field for review and approval by Departmental Representative.
.3 Vegetation which will need to be removed to accommodate the proposed work. Trees to be removed shall be identified in the field for review and approval by the Departmental Representative.
.4 Site features to remain in place during work, to be protected by fencing / barricades.
.5 Details of fencing or other protective barricades.

1.4 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use and restore disturbed surfaces.

1.5 SCAFFOLDING

.1 Scaffolding in accordance with CSA Z797.

.2 Provide and maintain scaffolding, ramps ladders, platforms and temporary stairs where employed.

1.6 HOISTING

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

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

1.7 SITE STORAGE/LOADING

.1 The limits of the Construction and Storage Area will be designated by the Departmental Representative prior to commencement of work based on review of "Site Access and Temporary Works Plan" to be submitted by Contractor.

.2 The Contractor shall develop the "Site Access and Temporary Works Plan" based on expected limits of work area as indicated on the plans and in accordance with negotiated terms for properties not under Parks Canada control.

.3 Any increase in required work area from that indicated on the drawings shall require prior approval of the Departmental Representative.

.4 Confine work, including temporary structures, plant, equipment, materials and operations of employees to areas defined by Contract Documents. Do not unreasonably encumber premises with products.

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

1.8 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 and work areas.

.3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.9 SECURITY

.1 Contractor is responsible for the work site and contents of the work site during and after working hours.

1.10 OFFICES

.1 Provide office heated to 22°C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.

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

.3 Subcontractors may provide their own offices as necessary. Direct location of these offices.

1.11 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.

.3 Departmental Representative assumes no responsibility for the security of tools, equipment and materials within the work area

1.12 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.

1.13 CONSTRUCTION SIGNAGE

.1 Erect a project sign to be provided by Parks Canada within one week of receipt. Project sign location will be designated by Departmental Representative.

.2 No other signs or advertisements, other than warning signs, are permitted on site.

.3 Erect project identification site sign comprising foundation, framing, and signboard as described below.
.1 Foundations: 15 MPa concrete to CAN/CSA-A23.1/A23.2 minimum 200 mm x 900 mm deep.
.2 Framework and battens: SPF, pressure treated minimum 89 x 89 mm.
.3 Fasteners: hot-dip galvanized steel nails and carriage bolts.

.4 Locate project identification sign as directed by Departmental Representative and construct as follows:
.1 Build concrete foundation, erect framework,and attach signboard to framing.

1.14 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, including seasonal limitations. Contractor is responsible for repair of damage to roads caused by construction operations.

.7 Construct access and haul roads necessary.

.8 Haul roads: constructed with suitable grades and widths ; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

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

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

.11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.

.12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.

.13 Provide snow removal during period of Work.

.14 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.15 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 IMPLEMENTATION

.1 Staging Areas and Access Roads (including Selwyn Twp. property):
.1 Construct temporary access roads and staging areas within defined Work limits in accordance with approved Access Road and Staging Area plan with sufficient cross section to accommodate expected construction traffic during work period.
.2 Inspect and maintain temporary access roads and staging areas for safe travel within the project area, and such that mud and dirt are not tracked onto local roads or onto river bed areas.

.3 Construct temporary access roads and staging areas without excavation of existing surfaces. Should excavation of existing surfaces be necessary to accommodate access road grade needs, obtain written permission of Departmental Representative prior to excavation.
.4 Construct temporary access roads and staging areas such that materials may be removed from site without excavation.
.5 Restore existing surface conditions and grades to satisfaction of Departmental Representative. Grassed areas to be re-vegetated for surface restoration shall be planted by hydroseeding or sodding as indicated on the drawings and as specified.
.6 Maintain at all times access for local traffic and emergency vehicles south of Lock 26 on Katherine Street South.
.7 Maintain at all times adequate drainage conveyance along Katherine St. South to ensure existing drainage routes and capacities are maintained. A temporary culvert will be required to access the Selwyn Township property; this culvert is to be removed during site restoration.

.2 Cofferdams and Dewatering:
.1 Construct temporary cofferdams within defined Work limits in accordance with approved Cofferdam and Dewatering Plan and in conformance with relevant permitting conditions, to sufficient elevation and cross section to permit dewatering of proposed work areas as required, and to provide for stability and protection against seepage under expected range of flows and water levels during work period.
.2 Cofferdams shall be designed and constructed to support all anticipated loads and shall be located such that they do not hinder the operations required to construct the permanent Works.
.3 Design and construct cofferdams to accommodate expected variations in flow velocities and ice conditions within the work area and over the construction period.

.4 Design and construct cofferdams to accommodate the risk of overtopping should water levels exceed expected ranges during flood events. Cofferdams should accommodate over topping without failure of cofferdam structure and in a manner that minimizes the risk of damage to work under construction within the dewatered area.

.5 Design cofferdams to be placed and removed without risk to water quality and local aquatic and terrestrial habitat conditions.

.6 Inspect cofferdams on a regular basis and maintain as necessary to ensure structural reliability and performance throughout the duration of the project.

.7 Cofferdams shall not be removed until the permanent Works below design water levels have been inspected and approved by the Departmental Representative and Consultant.

.8 Remove cofferdams such that river flow conditions are re-established gradually without damage to new or existing Works and without scour and erosion of bed and bank materials.

.3 Sediment and Erosion Control:

.1 Provide temporary erosion and sediment control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways according to approved Sediment and Erosion Control Plan and requirements of authorities having jurisdiction.

.2 Inspect, repair and maintain erosion and sediment 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 CONSTRUCTION & DEMOLITION WASTE

.1 Submit a Waste Management Plan indicating the materials and quantities of material that will be recycled and diverted from landfill.
.1 Indicate how material will be removed from the site and where it will be reused or recycled.

.2 Carefully deconstruct and source separate materials/equipment and divert, from D&C waste destined for landfill to maximum extent possible. Reuse, recycle, compost, anaerobic digest or sell material for reuse except where indicated otherwise. On site sales are not permitted.

.3 Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.
.1 Provide facilities for collection, handling and storage of source separated wastes.
.2 Source separate the following waste:
.1 Paper products
.2 Wood.
.3 Steel.
.4 Concrete.
.5 Unsuitable native backfill and existing timber crib ballast fill.

.4 Submit proof that all waste is being disposed of at a licensed land fill site or waste transfer site. A copy of the disposal/waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.

1.2 WASTE PROCESSING SITES

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

.2 Recycling Council of Ontario: 215 Spadina Avenue, #225, Toronto, ON, M5T 2C7.

.1 Telephone: 416-657-2797.
.2 Fax: 416-960-8053.
.3 Email: rco@rco.on.ca.
.4 Internet: http://www.rco.on.ca/.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Do not bury rubbish and waste materials on site.

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

.3 All waste materials should be disposed of in a legal manner at a site approved by Local Authorities.

.4 Do not allow deleterious substance to enter the waterway.

.5 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.6 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.7 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.

.8 Fold up metal banding, flatten and place in designated area for recycling.

.9 Divert unused concrete materials from landfill to local quarry approved by Departmental Representative.

.10 Divert unused admixtures and additive materials from landfill to official hazardous material collections site as approved by the Departmental Representative.

.11 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

.12 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal. Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

.13 Remove recycling containers to appropriate facility.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Government Chief Responsibility for the Environment:
.1 Province: Ontario, Ministry of Environment and Energy.
.2 Address: 135 St Clair Avenue West, Toronto, ON, M4V 1P5.
.3 General Inquires: (416) 323-4321.
.4 Fax: (416) 323-4682.

.2 Environment Canada, Toronto, ON, telephone (416) 734-4494.

END OF SECTION

PART 1 - GENERAL

1.1 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.

.2 Request Departmental Representative's Inspection.

.2 Departmental Representative's Inspection: Departmental Representative, Consultant and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:

.1 Work has been completed and inspected for compliance with Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Work is complete and ready for final inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative, Consultant and Contractor. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request reinspection.

1.2 CLEANING

.1 Remove waste and surplus materials, rubbish and construction facilities from the site in accordance with Section 01 74 20.

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 SUBMISSION

.1 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

1.2 FORMAT

.1 Provide 1:1 scaled CAD files in dwg Version 2004 format. Forward pdf, MS Word, MS Excel, MS Project and Autocad dwg files as required through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

1.3 AS-BUILTS AND SAMPLES

.1 In addition to requirements in General Conditions, maintain at the site for Departmental Representative one record copy of the following documents.

.1 Contract Drawings.
.2 Specifications.
.3 Amendments.
.4 Change Orders and other modifications to the Contract.
.5 Reviewed shop drawings, product data and samples.
.6 Field test records and reports.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

.6 Turn one set, paper copy and electronic copy, of AS-BUILT drawings and specifications over to Departmental Representative on completion of work.

.7 If project is completed without significant deviations from Contract drawings and specifications submit to Departmental Representative one set of drawings and specifications marked "AS-BUILT".

1.4 RECORDING ACTUAL SITE CONDITIONS

.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 information concurrently with construction progress. Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
.1 Measured depths of elements of footings and foundations.
.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
.4 Field changes of dimension and detail.
.5 Changes made by change orders.
.6 Details not on original Contract Drawings.
.7 References to related shop drawings and modifications.
.8 Other significant deviations which are concealed in construction and can not be identified by visual inspection.

.5 Specifications: legibly mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
.2 Changes made by Amendments and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.5 FINAL SURVEY

.1 Submit final site survey certificate in accordance with Section 01 33 00 , certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.6 WARRANTIES AND BONDS

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.

.4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Certificate of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

.7 Retain warranties and bonds until time specified for submittal.

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 DESCRIPTION OF WORK

.1 Demolition of structures shall include all necessary labour, materials and equipment required for the demolition/deconstruction, removal, disposal, salvage, recycling and reinstallation for reuse of those items as specified and as identified on the drawings.

.2 Demolition/deconstruction shall include removal and disposal of debris from the river bed and areas immediately adjacent to Lock 26 structures to prepare for new works. Rock excavation and general excavation or surface clearing where required is not covered under this section.

.3 Reinstallation of items indicated to be salvaged and reinstalled are considered included in demolition.

1.2 REFERENCES

.1 Definitions:

.1 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, include but not limited to: poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or materials that endanger human health or environment if handled improperly.

.2 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating related, required submittal and reporting requirements.

.2 Reference Standards:

.1 CSA International

.1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

.2 Department of Justice (jus)

.1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.

.2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

.1 SOR/2003-2, On-Road Vehicle_and Engine Emission Regulations.

.2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations.
.3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

.3 U.S. Environmental Protection Agency (EPA)
.1 EPA CFR 86.098-10, Emission standards for 1998 and later model year Otto-cycle heavy-duty engines and vehicles.
.2 EPA CFR 86.098-11, Emission standards for 1998 and later model year diesel heavy-duty engines and vehicles.
.3 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 MEASUREMENT PROCEDURES

.1 Demolition, removal and disposal of concrete on upper lock walls and abutment decks (excluding defined gate control areas) shall be measured by the square metre for the indicated depth of removal and shall include all labour, materials and equipment necessary to complete the work.

.2 Demolition, removal and disposal of concrete on upper lock walls at defined lock gate control area decks shall be measured by the square meter, and shall include all labour, materials and equipment necessary to complete the work.

.3 Demolition and removal of concrete on the upper lock walls, abutments and the isolated repair area faces shall be measured by the square metre of vertical face for the indicated depth of removal and shall include all labour, materials and equipment necessary to complete the work.

.4 Demolition and removal of concrete on the east and west monolith and step faces shall be measured by the square metre of vertical face for the indicated depth of removal and shall include all labour, materials and equipment necessary to complete the work.

.5 Demolition and removal of concrete on the east and west steps and step curbs shall be measured by the square metre of projected inclined length and width of the steps including curbs and shall include all labour, materials and equipment necessary to complete the work.

.6 Demolition, removal and disposal of downstream west approach wall including the concrete parapet, crib timbers and crib ballast fill shall be measured by the linear metre of approach wall length and shall include all labour, materials and equipment necessary to complete the work.

.7 Demolition, removal and disposal of downstream east pier including the concrete parapet, crib timbers and crib ballast fill shall be measured by the linear metre of pier and shall include all labour, materials and equipment necessary to complete the work.

.8 Demolition, removal and disposal of asphalt pavement shall be measured by the square metre and shall include all labour, materials and equipment necessary to complete the work.

.9 Concrete removals and saw cutting for the floor repair shall be considered incidental and not measured separately for payment. Include costs with the floor repair specified under Section 03 30 00.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Convene pre-demolition meeting 3 weeks prior to beginning any on-site demolition with Departmental Representative in accordance with Section 01 31 16 to:

.1 Verify demolition requirements.

.2 Verify waste management, recycling and disposal protocols.

.3 Verify existing site conditions adjacent to demolition work.

.4 Co-ordinate with other construction subtrades and site activities.

.5 Co-ordinate demolition schedule with Departmental Representative with regard to Parks Canada Cultural Resource Management (CRM) requirements for documentation of historic structures.

.6 Document in minutes of meeting the agreed process for coordination of demolition works with the Cultural Resource Management (CRM) on-site requirements for Departmental Representative's review and approval
.7 Ensure contractor's site supervisor and project manager attend meeting.
.8 Upon completion of the cofferdam and dewatering process the CRM team shall be permitted 2 days total to enter dewatered area to obtain as-built and heritage documentation of the downstream west approach wall and the downstream east pier.
.9 After the concrete cap has been demolished and removed from each structure, the CRM team shall be permitted to enter the dewatered area a second time to inspect the timber crib internal construction.
.10 Should in water work be accepted by the Departmental Representative for the downstream east pier construction, then equal time shall be permitted for CRM team divers to inspect the pier before and after the concrete caps are removed.
.11 Provide access and assistance as needed to on-site CRM team during the period of documentation.

.2 Provide report on status of demolition and waste diversion activity at each at scheduled Construction Progress Meeting when demolition work is in progress. Include confirmation of CRM coordination in report.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Sections 01 33 00 and Section 01 74 20.

.2 WMC is responsible for fulfilment of reporting requirements.

.3 Submit copies of certified weigh bills from authorized disposal sites and reuse and recycling facilities for material removed from site upon request of Departmental Representative.
.1 Written authorization from Departmental Representative is required to deviate from facilities listed in Waste Reduction Workplan.

.4 Shop Drawings:
.1 Submit for review and approval demolition drawings, diagrams, diagrams or details showing sequence of demolition work, staging and supporting structures. Drawings shall be stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
.2 Submit stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada drawings showing details to stabilize and hold vertical the east and west downstream and upstream lock gates and anchorages during demolition work and concrete work under Section 03 30 00.
.3 Construction Waste Management:
.1 Submit project Waste Management Plan highlighting recycling and salvage requirements in accordance with Section 01 74 20.

1.6 QUALITY ASSURANCE

.1 Regulatory Requirements : Ensure work is performed in compliance with CEPA, CEAA, TDGA and applicable Provincial/Territorial and Municipal regulations.

1.7 SITE CONDITIONS

.1 Environmental protection:
.1 Ensure Work is done in accordance with Section 01 35 43.
.2 Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
.3 Fires and burning of waste or materials is not permitted on site.
.4 Do not bury rubbish waste materials.
.5 Do not dispose of waste or volatile materials including but not limited to: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary drains.
.6 Ensure proper disposal procedures are maintained throughout project.
.7 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.

.8 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction.
.9 Protect trees, plants and foliage on site and adjacent properties.
.10 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.
.11 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

1.8 EXISTING CONDITIONS

.1 Structures and concrete surfaces to be demolished are based on their condition, at time of examination prior to tendering.
.1 Remove, protect and store items indicated for salvaged and re-installation as indicated on Drawings or otherwise directed by Departmental Representative.

.2 The lower west approach wall and lower east pier have settled with some structure rotation due to deterioration of the crib timbers. The concrete parapet is cracked, spalled with sections of missing concrete.

.3 The deck surfaces and vertical faces of the mass concrete lock structure, on the upper east and west lock walls, downstream east and west abutments (including the stairs), sill floor and east and west monoliths exhibit areas of concrete delamination, spalled and cracked concrete and some areas of missing and broken concrete.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Inspect the site with the Departmental Representative and verify the extent and location of items designated for removal, partial demolition, demolition, salvage and items to remain.

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

3.2 PREPARATION

.1 Temporary Erosion and Sedimentation Control:
.1 Provide and maintain temporary erosion and sedimentation control measures in accordance with Erosion and Sediment Control Plan submitted in accordance with 01 52 00.

.2 Protection of in-place conditions:
.1 Work in accordance with Section 01 35 43.
.2 Prevent movement, settlement or damage of adjacent and underlying parts of existing structures and surfaces to remain.
.3 Make good damage and be liable for injury caused by demolition and removal.
.4 If safety of structure being demolished or adjacent structures or services appears to be endangered, take preventative measures, stop Work and immediately notify Departmental Representative.
.5 Prevent debris and waste materials from falling into canal and waterway. Ensure removal of any such material in a timely manner.

.3 Existing Services and Utilities:
.1 Locate all existing services and utilities within work area.
.2 Do not disrupt active power and service lines. Post warning signs on electrical lines and equipment which must remain energized during period of demolition and removal.

.4 Surface Preparation:
.1 Remove the following existing surface features and accessories from demolition areas and salvage for reinstallation.

.1 All historic (black) cast iron button style mooring bollards.
.2 The navigation marker on the downstream east pier.
.3 The life ring on the west side lock wall railing.
.4 Wooden step blocks and angle brackets for south end lock gate walkways.
.5 Accessibility ramp structures and edge demarcation rails for the north end lock gate walkways.
.6 Mooring cables, off-set blocks and shackles.
.7 Mooring rings to be reinstalled at canoe steps only.
.8 Sweep crank valve covers and above-ground mechanisms.
.9 Wall-mounted sweep arm anchor plates and rollers.
.10 Ladder rungs.
.11 Pre-cast concrete parking curb sections along west lock wall.

.2 Remove and recycle or dispose the following surface features and accessories from demolition areas in accordance with approved waste management plan.
.1 All steel round tubing railings
.2 All fixed and articulating mooring rings not required for installation at canoe steps.
.3 All steel pipe bollards.

.3 Protect exposed mechanical and structural elements from environmental conditions and from demolition debris as may be required if exposed by removal of surface features.

3.3 DEMOLITION

.1 Downstream west approach wall and downstream east pier:
.1 Commence demolition of each structure upon receipt of notification from Departmental Representative that the CRM team has completed the initial historical documention work.
.2 Coordinate demolition according to agreed CRM documentation needs.
.3 Demolish completely existing concrete parapet.
.4 Recycle or dispose demolished concrete and associated waste materials off site in accordance with approved Waste Management Plan.

.5 Demolish existing timber crib structure.
.6 Recycle, dispose of or salvage crib and fill material as per approved Waste Management Plan.

.2 Downstream east and west abutments and monoliths (including stairs):
.1 Prior to commencement of demolition stabilize east and west downstream lock gates in accordance with reviewed shop drawing details. Maintain in stable position until concrete strength placed on the monolith face has reached sixty percent of the specified 28 day strength as specified in Section 03 30 00
.2 Neatly demolish concrete surfaces to lines and limits as indicated.
.3 Where poor quality concrete or weak cold joints are discovered at the limits of the proposed demolition, advise Departmental Representative and confirm whether work limits will be maintained or expanded.
.4 Recycle or dispose of concrete and associated waste materials as per approved Waste Management Plan.

.3 East and west lock wall faces and decks:
.1 Prior to commencement of demolition stabilize east and west downstream lock gates in accordance with reviewed shop drawing details. Maintain in stable position until concrete strength placed on the lock wall face and deck surface has reached sixty percent of the specified 28 day strength in accordance with Section 03 30 00
.2 Neatly demolish concrete surfaces to lines and limits indicated.
.3 Where poor quality concrete or weak cold joints are discovered at the limits of the proposed demolition, advise Departmental Representative and confirm whether work limits will be maintained or expanded.
.4 Neatly remove asphalt surface as indicated on drawings.
.5 Recycle or dispose of concrete, asphalt and associated waste materials as per approved Waste Management Plan.

.4 At end of each day's work, leave Work in safe and stable condition.
.1 Protect parts not to be demolished from exterior elements at all times.

.5 Demolish to minimize dusting. Keep materials wetted as directed by Departmental Representative.

.6 Prevent demolition debris from entering the waterway.

3.4 ASPHALT PAVEMENT

.1 Remove and dispose off site all asphalt pavement in areas of lock deck widening to the limits indicated.

3.5 DISPOSAL

.1 Remove and recycle or dispose of demolished materials not designated for salvage and reinstallation off site and in accordance with approved Waste Management Plan.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Cast-in place concrete for the decks of the upper lock walls and abutments excluding defined lock gate control areas shall be measured by the square metre for the indicated depth and shall include all labour, materials and equipment necessary to complete the work. For the purpose of measurement the deck area shall be measured from the inside edge of the face repair thickness and does not include the deck widening area.

.2 Cast-in place concrete for the decks of the upper lock walls at defined lock gate control areas shall be measured by the square meter for the indicated depth and shall include all labour, materials and equipment necessary to complete the work. For the purpose of measurement the deck area shall be measured from the inside edge of the face repair thickness and does not include the deck widening area.

.3 Cast-in place concrete for the upper lock walls and abutments and isolated area faces shall be measured by the square metre for the indicated depth and shall include all labour, materials and equipment necessary to complete the work. For the purpose of measurement the face area shall be measured from the deck level down.

.4 Cast-in place concrete for the lock floor between abutments shall be measured by the square metre for the indicated depth and shall include all labour, materials and equipment necessary to complete the work.

.5 Cast-in-place concrete for the east and west monolith and step faces shall be measured by the square metre of vertical face for the indicated depth and shall include all labour, materials and equipment necessary to complete the work.

.6 Cast-in-place concrete for the east and west steps and step curbs shall be measured by the square metre of the inclined projected area of the steps and step curbs for the indicated depth and shall include all labour, materials and equipment necessary to complete the work.

.7 Cast-in-place concrete for the downstream west approach wall shall be measured by the cubic metre and shall include all labour, materials and equipment necessary to complete the work.

.8 Cast-in-place concrete for the downstream east pier shall be measured by the cubic metre and shall include all labour, materials and equipment necessary to complete the work.

.9 Cast-in-place concrete for the deck widening shall be measured by the square metre for the indicated depth and shall include all labour, materials and equipment necessary to complete the work.

.10 Mud slab shall be measured by the square metre and shall include all labour, materials and equipment necessary to complete the work. No allowance will be made for irregularities in the rock surface and fragments of rock removed that exceed the range of rock removal as specified in Section 31 23 00.

.11 Measurement for the supply and placement of concrete shall be based on neat lines of the in place concrete and not on the basis of truck volume.

.12 Supply and placement of reinforcing steel, dowels and anchor bolts and re-establishment of channels within the monolith structures for existing gate anchor arms shall be considered incidental and will not be measured separately for payment.

.13 Optional cross walls for the downstream east pier shall be considered incidental and will not be measured separately for payment should the contractor elect to install them.

1.2 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%.

.3 GGBFS - Ground, granulated blast-furnace slag.

.2 Reference Standards:

.1 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-13, Standard Specification for Chemical Admixtures for Concrete.
.4 ASTM C1017/C1017M-13, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
.5 ASTM D412-06a(2013), Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
.6 ASTM D570-96, Standard Test Method for Water Absorption of Plastics.
.7 ASTM D624-00(2012), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
.8 ASTM D638-97, Standard Test Method for Tensile Properties of Plastics.
.9 ASTM D695-96, Standard Test Methods for Compressive Properties of Rigid Plastics.

.10 ASTM D1751-04(2013)e1, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.11 ASTM D1752-04a(2013), Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.

.2 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 CSA International

.1 CSA A23.1-09/A23.2-09, 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 CSA A23.4-09(R2014), Precast Concrete - Materials and Construction

.4 CSA A283-06(R2011), Qualification Code for Concrete Testing Laboratories.

.5 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings: in accordance with Section 01 32 16, convene pre-installation meeting one week prior to beginning concrete works.

.1 Ensure key personnel, site supervisor, Departmental Representative, Consultant, speciality contractor - finishing, forming concrete producer testing laboratories attend.

.1 Verify project requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 At least 3 weeks prior to beginning Work, provide Departmental Representative with product data sheets of materials proposed for use as follows:
- .1 Curing compound.
- .2 Each type of joint filler.
- .3 Each type of waterstops.
- .4 Epoxy

.3 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.

.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 two copies of WHMIS MSDS.

.6 Provide concrete reinforcing steel shop drawings in accordance with CSA A23.3 -14 indicating placement details for the reinforcing steel and cold joint locations. All reinforcing steel laps shall be Class B tension splice laps.

.7 Provide cross wall details if chosen to be installed.

.8 Provide details of cold weather protection, in accordance with CSA 23.1/23.2.

1.5 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00.

.2 Provide Departmental Representative, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.

.1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.

.3 Minimum 3 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:
.1 Falsework erection.
.2 Hot weather concrete.
.3 Cold weather concrete.
.4 Curing.
.5 Finishes.
.6 Formwork removal.
.7 Cold Joints.

.4 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

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 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 PRECAST CONCRETE ALTERNATIVE

.1 In water work may be considered by the Departmental Representative as an alternative to dewatering for the construction of the downstream east pier only, by using precast concrete in lieu of cast-in-place concrete. The Contractor shall clearly demonstrate post award of contract that significant savings to Canada may be achieved. The Departmental Representative does not guarantee that such an alternative shall be accepted. In such case the contract shall continue as awarded on the basis of cofferdams and dewatering and cast in place concrete.

.2 Placement of precast piers without cofferdams and dewatering shall be considered in water work and will require full enclosure of the work area with a turbidity curtain during all stages of the pier construction including all associated work under other sections that will become in water work.

.3 Design of precast piers shall be in accordance with CSA A23.4-09(R2014) and the Contractor shall be required to submitted precast pier drawings and details sealed by a Professional Engineer licensed in the Province of Ontario.

.4 Precast unit shall be designed to resist forces anticipated during lifting and placing including fluid forces anticipated during the placement of piers in water. The geometrical shape and wall thickness of the piers shall not be any less than detailed for cast-in-place concrete.

.5 Shop drawings sealed by a Professional Engineer licensed in the Province of Ontario shall be submitted to the Consultant for review in accordance with Section 01 33 00.

2.4 MATERIALS

.1 Portland Cement: to CSA A3001, Type GU.

.2 Supplementary cementing materials: with maximum 15% Type F replacement by mass of total fly ash cementitious materials to CSA A3001. To be used when placing fresh concrete against existing hardened concrete.

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

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

.5 Admixtures:
.1 Air entraining admixture: to ASTM C260/C260M.
.2 Chemical admixture: to ASTM C494/C494M ASTM C1017/C1017M. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.6 Anti-washout admixtures:
.1 Provide anti-washout cellulose or polymeric admixtures for underwater concrete placement including mud slab concrete placed underwater.
.2 Provide certification that the admixture is compatible with the cementitious materials and other chemical admixtures in the proposed concrete mixture.
.3 Anti-washout admixture to be approved by Consultant and have a proven record of performance with a minimum of five similar projects.
.4 Admixture supplier shall provide certification that the base concrete mixture as specified in C.O.E. CRD-C661-06, Level 1 acceptance to Table 1 is met or exceeded. Admixture dosage shall be adjusted on specified mix in Clause 2.2.

.7 Curing compound: to CSA A23.1/A23.2 white and ASTM C309, Type 1-chlorinated rubber Type1-D with fugitive dye.

.8 Premoulded joint fillers:
.1 Sponge rubber: to ASTM D1752, Type I, flexible grade.

.9 Weep hole tubes: plastic.

.10 Hinge arm pipe: HDPE corrugated pipe single wall.

.11 Epoxy adhesive: 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 IV, Grade 2 and 3, Class A, B and C with the following characteristics:
.1 Bond strength: 12.4 MPa at 2 days to ASTM C882-91
.2 Compressive strength: 82.7 MPa to ASTM D695-96.
.3 Tensile strength: 43.5 MPa at 7 days to ASTM D638-97.
.4 Water absorption: 0.07% to ASTM D570-95.

.12 Reinforcing bars: to CSA G30.18, Grade 400R.

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 in Quality Control Plan.
.2 Provide concrete mix to meet following plastic state requirements:
.1 Uniformity: to CSA A23.1/A23.2.
.2 Workability: free of surface blemishes, loss of mortar, colour variations, and segregation.
.3 Finishability: minimize amount of bleeding.
.3 Provide concrete mix to meet following hard state requirements:
.1 Durability and class of exposure: C-1.
.2 Compressive strength at 28 days age: 35 Mpa minimum.
.3 Intended application: overlay secured to hardened concrete and new retaining wall structures in a marine environment.
.4 Aggregate size 19 mm maximum.
.5 Supplementary cementing materials: Fly ash, Type F to be used when concrete is cast against existing hardened concrete.
.4 Provide quality management plan to ensure verification of concrete quality to specified performance.

.5 Concrete supplier's certification: both batch plant and materials meet CSA A23.1/A23.2 requirements.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Provide Departmental Representative 48 hours notice before each concrete pour. All reinforcing steel must be free of foreign debris and in place ready for inspection 24 hours minimum prior to ordering concrete.

.2 During concreting operations:
.1 Development of cold joints are permitted only after approval by the Consultant.
.2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

.3 Pumping of concrete is permitted only after approval of equipment and concrete mix by Consultant.

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

.5 Prior to placing of concrete obtain Consultant's approval of proposed method for protection of concrete during placing and curing.

.6 Protect previous Work from staining.

.7 Clean and remove stains prior to application for concrete finishes.

.8 Roughen surface of hardened concrete surfaces to a full amplitude of 5 mm minimum when to bond with fresh concrete.

.9 Thoroughly clean all surfaces in contact with fresh concrete of all foreign material including ice, snow and standing water prior to depositing fresh concrete.

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

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

.12 Do not place load upon new concrete until authorized by Consultant.

3.2 MUD SLAB

.1 Obtain Consultant's approval of excavated surface prior to construction of mud slab.

.2 Construct continuous mud slab for cast-in-place approach wall and pier base slab, to dimensions and grades indicated.

3.3 PLACING REINFORCEMENT

.1 Accurately place reinforcing steel to spacings shown on drawings and secure firmly during placing, compacting and setting of concrete in accordance with CSA A23.1/A23.2.

.2 Tie reinforcement bars at each cross over point.

.3 Prepare holes for epoxy anchor bars to epoxy manufactures' instructions. Install anchor bars to details indicated.

.4 Obtain Consultants approval of reinforcing material and placement 24 hours prior to placing of concrete.

.5 Ensure cover to reinforcement is maintained during concrete pour.

.6 Cross walls may be installed in the pier sections by the Contractor upon written acceptance from the Consultant and if their installation advances the sequence of work. Spacing of cross walls is not to exceed that indicated on the drawings. Submit shop drawing details for the cross walls.

3.4 INSTALLATION/ APPLICATION

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

.2 Carry out the placing of concrete continuously from joint to joint. Consolidate concrete mechanically unless otherwise specified.

.3 Formed surfaces exposed to view: Smooth formed surface in accordance with CSA A23.1/A23.2.

.4 Deck slabs: screed to plane surfaces and float using aluminum, magnesium, or wood floats in accordance with CSA-A23.1-09/A23.2-09. Round edges and provide dummy joint spacings using standard tools. Trowel smooth followed by light broom brushed non-slip finish, blending to match existing.

.5 Anchor bolts and dowels:
.1 Grout anchor bolts in holes drilled after concrete has set only after receipt of written approval from Departmental Representative.
.2 Grout dowels in holes drilled into existing hardened concrete where indicated after written approval of demolition from Departmental Representative.
.3 Protect drilled holes from water accumulations, snow and ice build-ups.
.4 Set bolts and dowels and fill holes with epoxy grout.

.6 Install drain holes as indicated.

3.5 CONTROL JOINTS

.1 Cut control joints in deck slabs at locations indicated, to CSA A23.1/A23.2 and install specified joint sealer/filler.

3.6 EXPANSION AND ISOLATION JOINTS

.1 Install at locations indicated premoulded joint filler in expansion and isolation joints full depth of slab flush with finished surface to CSA A23.1/A23.2.

3.7 CURING

.1 Use curing compounds compatible with applied finish on concrete surfaces free of bonding agents and to CSA A23.1/A23.2, Clause 7.4 and Table 20 Curing Type 2.

.2 Cure concrete by adding moisture continuously in to exposed finished surfaces for at least 7 days after placing, or sealing moisture in by curing compound as directed by Consultant.

.3 Where burlap is used for moist curing, place prewetted layers on concrete surface and keep continuously wet during curing period.

.4 Apply curing compound evenly to form continuous film, in accordance with manufacturer's requirements.

.5 Provide cold weather protection and curing in accordance with CSA 23.1/23.2.

3.8 SURFACE TOLERANCES

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

.2 Slab surfaces to within 3 mm in 3 m as measured with 3 m straightedge placed on surface. Straight edge shall be in accordance with CSA A23.1/A23.21.

3.9 FIELD QUALITY CONTROL

.1 Site tests: conduct tests as follows in accordance with Section 01 45 00 and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .1 Concrete pours.
- .2 Slump.
- .3 Air content.
- .4 Compressive strength at 7 and 28 days.
- .5 Air and concrete temperature.

.2 Concrete testing: perform compressive strength concrete testing to CSA A23.1/A23.2 by CSA accredited laboratory. Cure cylinders on job site under same conditions as concrete which they represent.

.3 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory, Consultant and Departmental Representative.

.4 Departmental Representative may carry out independent concrete testing. Provide access to work and assistance to Departmental Representative for concrete testing.

.5 Departmental Representative may take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.6 Inspection or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

3.10 CLEANING

.1 Use trigger operated spray nozzles for water hoses.

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

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21.

.1 Divert unused concrete materials from landfill to local quarry or facility after receipt of written approval from Departmental Representative.

.2 Provide appropriate area on job site where concrete trucks can be safely washed.

.3 Divert admixtures and additive materials from landfill to approved official hazardous material collections site after receipt of written approval from Departmental Representative.

.4 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental issues.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International
.1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
.2 ASTM A307-10, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
.3 ASTM C881/C881M-13, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
.4 ASTM C882/C882M-13a, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
.5 ASTM D698-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3)).
.6 ASTM F593-13a, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
.7 ASTM F594-09e1, Standard Specification for Stainless Steel Nuts.

.2 CSA International
.1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CSA S16-09, Design of Steel Structures.
.3 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
.4 CSA W59-13 Welded Steel Construction (metal arc welding).

.3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for sections plates pipe tubing bolts and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.3 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.

1.4 MEASUREMENT PROCEDURES

.1 Bollards shall be measured by each bollard and shall include all labour, materials and equipment necessary to fabricate, supply and install.

.2 Steel cover plates shall be measured by each plate and shall include all labour materials and equipment necessary to fabricate, supply and install.

.3 Cast iron button bollards including painting shall be measured by each bollard and shall include all labour, materials and equipment necessary to paint and install.

.4 Guard rail shall be measured by the linear metre and shall include all labour, equipment necessary to fabricate, supply and install.

.5 Step guard rail shall be measured by the linear metre along the inclined length and shall include all labour, material and equipment necessary to fabricate, supply and install.

.6 Scramble ladders with grab bars shall be measured by each ladder and shall include all labour, material and equipment necessary to fabricate, supply and install.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

.4 Develop Waste Reduction Work plan related to Work of this Section and in accordance with Section 01 74 20.

.5 Packaging Waste Management: remove for reuse of pallets, crates, padding and packaging materials as specified in Waste Reduction Workplan in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Steel sections, plates and checker plate: to CSA G40.20/ G40.21, Grade 350W, minimum 30% recycled content.

.2 Steel pipe: to ASTM A53/A53M extra strong minimum 30% recycled content.

.3 Welding materials: to CSA W59.

.4 Welding electrodes: to CSA W48 Series.

.5 Bolts and anchor bolts: to ASTM A307 galvanized.

.6 Epoxy adhesive: to Section 03 30 00.

.7 Grout: non-shrink cementitious grout shrinkage compensating in both the plastic and hardened state, containing no chlorides and capable of achieving 48 MPa at 10 degrees C in 28 days.

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

2.2 FABRICATION

.1 Examine existing field conditions and obtain measurements and dimensions required to fabricate bollards, scramble ladders, cover plates, guard rails and step rail. Advise Departmental Representative of any adjustments and conditions affecting the work.

.2 Confirm fit and field dimensions prior to commencing fabrication of all items.

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

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

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

2.3 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 610 g/m^2, Coating Grade 85, to ASTM A123/A123M.

2.4 BOLLARDS

.1 Steel pipe bollards: 100 mm nominal outside diameter, fabricated to shapes and sizes as indicated with 25 mm diameter solid steel cross bar and 9.5 mm base plate.

.2 Galvanize after fabrication.

2.5 CAST IRON BOLLARDS

.1 Cast iron button bollards salvaged from the demolished lock walls, downstream east pier. Provide Consultant with details of existing anchorage.

2.6 SCRAMBLE LADDERS

.1 Fabricate scramble ladders as indicated.

.2 Galvanize after fabrication.

2.7 STEP AND GUARD RAIL

.1 Fabricate guard rail sections as indicated.

.2 Galvanize guard rails sections after fabrication.

2.8 COVER PLATE

.1 Fabricate cover plates as indicated

.2 Galvanize after fabrication.

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 ERECTION

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

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Supply components for work by other trades in accordance with shop drawings and schedule.

.4 Make field connections as indicated.

.5 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.

.6 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.
.1 Primer: maximum VOC limit 250 g/L

3.3 STEP AND GUARD RAIL

.1 Install guard rail to details indicated.

.2 Install posts with anchor bolts set into concrete with epoxy adhesive as indicated.

.3 Grout under guard rail post base plates and provide level surface and full contact between base plates and concrete. Hardened concrete is to be roughened prior to application of grout.

3.4 SCRAMBLE LADDERS

.1 Install new scramble ladders as indicated.

3.5 COVER PLATE

.1 Install cover plates as indicated.

3.6 BOLLARDS

.1 Install bollards to details indicated with anchor bolts set into the concrete with epoxy adhesive.

.2 Grout under bollard base plates and provide level surface and full contact between base plates and concrete.

3.7 CAST IRON BOLLARDS

.1 Clean bollard surfaces as follows:
.1 Clean surfaces by removing loose, cracked, brittle or non-adherent paint, rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with following.
.2 Power tool cleaning: to SSPC-SP 3.

.2 Shop paint bollards as follows:
.1 One primer coat to minimum dry film thickness of 50 microns to prepared surface.
.2 One epoxy coat to minimum dry film thickness of 75 microns.
.3 One polyurethane coat to minimum dry film thickness of 50 microns.

.3 Install salvaged cast iron button bollards at the same stations and locations where they previously existed on the downstream east pier. Provide Consultant with installation details prior commencing installation.

3.8 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.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

3.9 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Clearing shall be measured by the square metre and shall include all labour, materials equipment necessary to complete the work.

.2 Grubbing of trees in areas of excavation shall be considered incidental and not measured separately for payment.

.3 Clearing and grubbing of isolated trees as may be permitted to establish staging areas and temporary access routes shall be measured by each tree and shall include all labour, materials and equipment necessary to complete the work.

.4 Pruning of isolated trees as may be permitted to establish staging areas and temporary access routes is considered incidental and will not be measured separately for payment.

1.2 DEFINITIONS

.1 Clearing consists of cutting off trees and brush vegetative growth to not more than a specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.

.2 Clearing isolated trees consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.

.3 Grubbing consists of excavation and disposal of stumps and roots to not less than a specified depth below existing ground surface.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Samples:
.1 Submit 3 samples of each material listed below for approval prior to delivery of materials to project site.

.2 Tree wound paint: one litre can with manufacturer's label.
.3 Herbicide: one litre can with manufacturer's label.

.3 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.4 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Do construction occupational health and safety in accordance with Section 01 35 29.

.2 Safety Requirements: worker protection.
.1 Workers must wear gloves, respirators long sleeved clothing, eye protection and protective clothing when applying herbicide materials.
.2 Workers must not eat, drink or smoke while applying herbicide or preservative materials.
.3 Clean up spills of preservative materials immediately with absorbent material and safely discard to landfill.

1.5 STORAGE AND PROTECTION

.1 Prevent damage to fencing, trees landscaping, natural features, bench marks, existing buildings, existing pavement, utility lines, site appurtenances, water courses and root systems of trees which are to remain.
.1 Repair any damaged items to approval of Departmental Representative.
.2 Replace any trees designated to remain, if damaged, as directed by Departmental Representative.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

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 approved sediment and erosion control plan, specific to site, that complies with requirements of authorities having jurisdiction.

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

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

3.2 PREPARATION

.1 Inspect site and identify, by tagging, trees that are to be removed and trees that are to be pruned to facilitate work.

.2 Review site with Departmental Representative to verify removals and items designated to remain.

.3 Locate and protect utility lines. Preserve in operating condition active utilities traversing site.

.4 Notify utility authorities before starting clearing and grubbing.

.5 Keep roads and walks free of dirt and debris.

3.3 APPLICATION

.1 Manufacturer's instructions: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.4 CLEARING

.1 Clearing includes felling, trimming, and cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within cleared areas.

.2 Clear area below rock outcrop to be excavated for demolition and reconstruction of downstream west approach wall as indicated, by cutting at a height of not more than 300 mm above ground.

.3 Prune trees overhanging area cleared as approved and directed by Departmental Representative.

.4 Cut off unsound branches on trees designated to remain as approved and directed by Departmental Representative.

.5 Where authorized by Departmental Representative clear and grub isolated trees as required to accommodate staging and access routes within areas indicated.

3.5 ISOLATED TREES

.1 Where authorized by Departmental Representative cut off isolated trees as required to accommodate staging and access routes within areas indicated. Cut off trees at height of not more than 300 mm above ground surface.

.2 Grub out isolated tree stumps and roots to not less than 200 mm below ground surface.
.1 Grub out visible rock fragments and boulders greater than 300 mm in greatest dimension but less than 0.25 m^3.
.2 Fill depressions made by grubbing with approved material and to make new surface conform with adjacent surface of existing ground.

.3 Where authorized by the Departmental Representative, prune individual trees as required to accommodate staging and establishment of access routes within areas indicated.
.1 Cut limbs and branches to be trimmed close to the bole of the tree or main branches.
.2 Paint cuts more than 3 cm in diameter with approved tree wound paint.

3.6 REMOVAL AND DISPOSAL

.1 Remove cleared and grubbed materials off site for disposal in accordance with approved Waste Management Plan.

.2 Remove diseased trees identified by Departmental Representative and dispose of this material to approval of Departmental Representative.

3.7 FINISHED SURFACE

.1 Leave ground surface in condition suitable for subsequent operations or intended use to approval of Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Rock removal shall be measured by the square metre plan area and shall include all labour, materials and equipment necessary to excavate and dispose of the excavated rock. The depth of rock removal ranges from 100 mm to 300 mm.

.2 No additional compensation shall be made for rock fragments removed that exceed the maximum range of rock removal.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit submittals in accordance with Section 01 33 00.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Not used.

PART 3 - EXECUTION

3.1 ROCK REMOVAL

.1 Confirm rock elevations after excavation / demolition of existing structures and report any discrepancies to Departmental Representative.

.2 Perform excavation in accordance with Erosion and Sedimentation Control Plan.

.3 Co-ordinate this Section with Section 01 35 29.

.4 Remove rock to elevations and width indicated.

.5 Explosive blasting is not permitted.

.6 Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.

.7 Excavate rock to horizontal surface.

.8 Prepare rock surfaces which are to bond to concrete, by scaling, pressure washing and broom cleaning surfaces.

.9 Remove rock fragments which may slide or roll into excavated areas.

.10 Correct unauthorized rock removal at no extra cost with additional concrete as specified for the mud slab under section 03 30 00.

3.2 DISPOSAL

.1 Dispose of removed rock off site in accordance with Section 01 74 20.

.2 Do not dispose removed rock into landfill. Send material to appropriate quarry approved by Departmental Representative.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

3.3 PROTECTION

.1 Prevent damage to surroundings.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

.1 Excavating and backfilling shall include all necessary labour, material and equipment as required to excavate, stockpile, transport, dispose, backfill and compact as indicated on the drawings and as specified. Supply, installation and removal silt fence barrier shall be considered included.

1.2 SITE CONDITIONS

.1 Sub-surface investigation report is bound to the specification in Appendix A.

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

.3 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 West approach wall excavation, to the neat lines indicated, will be measured by the linear metre along the length of the approach wall and shall include all labour materials and equipment necessary to complete the work.

.2 East pier excavation, to the neat lines indicated, will be measured by the linear metre along the length of the pier and shall include all labour materials and equipment necessary to complete the work.

.3 Deck widening excavation, to the neat lines indicated, will be measured by the square metre and shall include all labour materials and equipment necessary to complete the work.

.4 Materials removed beyond limits of the existing approach wall and pier at each end shall be considered included in excavation and not measured separately for payment.

.5 Stockpiling, backfilling of excavated material for use in work and disposal off site of surplus excavated material shall be considered incidental and not measured separately for payment

.6 Granular A backfill shall be measured by the tonne accepted in the work and shall include supply, placement, compaction all labour and equipment necessary to complete the work.

.7 Granular B backfill shall be measured by the tonne accepted in the work and shall include supply, placement, compaction, all labour and equipment necessary to complete the work.

.8 Rip Rap stone shall be measured by the tonne accepted in the work and shall include all labour, materials and equipment necessary to complete the work.

.9 Wall drains shall measured by each wall drain satisfactorily installed and shall include all labour, materials including clear stone and filter fabric and equipment necessary to complete each drain.

1.6 QUALITY ASSURANCE

.1 Provide Contractors Quality Control(CQC) Plan in accordance with Section 01 45 00.

.2 CQC Plan shall include:

.1 Gradation curves for materials specified and supplied from each source.
.2 Compaction testing shall be conducted by the Contractor every 50 m^2 of surface area for each 300 mm loose lift of backfill material after compaction.
.3 Compressive strength testing of concrete to determine when 70% of the compressive strength of newly placed concrete is achieved in areas to be backfilled.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Granular material to Ontario Provincial Standard Specification 1010, April 2004:
  .1 Granular A Aggregate. Maximum size 26.5 mm.
  .2 Granular B Type II Aggregate. Maximum size 106 mm.

.2 Clear stone: to Ontario Provincial Standard Specification 1004, November 2005, 19 mm Type I. Maximum size 26.5 mm.

.3 Rip Rap: R-50 Rip Rap Rock Protection to Ontario Provincial Standard Specification 1004, November 2012.

.4 Native fill: excavated soil, free from roots, rocks larger that 100 mm and debris. Departmental Representative to approve excavated material before use as native backfill.

.5 Geotextile: to Ontario Provincial Standard Specification OPSS 1860, April 2012, Class II, Non-woven, Filtration Opening Size (FOS) 125-250 µm.

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

3.3 EXCAVATING

.1 Clear, to Section 31 11 00 the area to be excavated for demolition and reconstruction of downstream west approach wall.

.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 Excavation is not to interfere with normal 45° splay of bearing from bottom of any footing.

.6 When complete have Consultant inspect excavations to verify soil bearing capacity, depths and dimensions.

.7 Correct unauthorized excavation at no extra cost as follows:
.1 Fill under bearing surfaces with concrete as specified for mud slab.
.2 Fill under other areas with Granular A fill compacted to 98% Standard Proctor Density.

.8 Remove obstructions encountered in the course of excavation.

.9 Dispose of surplus excavated material off site.

3.4 BACKFILLING

.1 Do not commence backfilling until areas of work to be backfilled have been inspected by Consultant and approved by Departmental Representative.

.2 Backfill all spaces excavated and not occupied by parts of the structure, or other permanent works, with specified material placed as shown on the drawings.

.3 Areas backfilled to be free from debris, snow, ice, water or frozen ground.

.4 Prior to placing backfill, compact existing subgrade to obtain same compaction as for specified fill. Cut out "soft" areas and fill with suitable material until specified compaction can be obtained.

.5 Do not backfill around newly placed concrete until concrete has been in place 14 days and concrete test cylinders show compressive strength to be at least 70% of specified compressive strength.

.6 Place and compact fill materials in continuous horizontal layers not exceeding 300 mm loose depth. Use methods to prevent disturbing or damaging any part of the work. Make good any damage.

.7 Maintain optimum moisture content to enable compaction to attain specified density.

.8 Compact each layer to 100% Standard Proctor Density. Where working space is limited, employ approved mechanical hand operated tamping devices. When such devices are employed, deposit backfill material in layers not exceeding 150 mm in thickness.

3.5 RIP RAP

.1 Place rip rap at south end of west approach wall to supplement rock material in place and protect a stable base for new wall as per drawings.

.2 Place rip rap along east side of downstream east pier to protect backfilled excavation as per drawings.

3.6 WALL DRAIN

.1 Place clear stone and geotextile to indicated details to construct the wall drains.

3.7 RESTORATION

.1 Restore shoreline to original condition upon completion of approach wall construction and backfilling.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Top soil placement and grading shall be measured by the square metre and shall include all labour, materials and equipment necessary to supply, place, spread and grade top soil as indicated on the drawings and as specified.

1.2 REFERENCES

.1 Agriculture and Agri-Food Canada
.1 The Canadian System of Soil Classification, Third Edition, 1998.

.2 U.S. Environmental Protection Agency (EPA)/Office of Water
.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

PART 2 - PRODUCTS

2.1 TOPSOIL

.1 Topsoil for seeding areas and planting beds: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.
.1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70% sand, minimum 7% clay, and contain 3 to 5% organic matter by weight.
.2 Contain no toxic elements or growth inhibiting materials.
.3 Finished surface free from:
.1 Debris and stones over 13 mm diameter.
.2 Vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
.4 Consistency: friable when moist.

2.2 QUALITY ASSURANCE

.1 The Contractor as part of CQC Plan shall provide test results indicating that the top soil meets the specified requirements for each source.

2.3 SOURCE QUALITY CONTROL

.1 Advise Departmental Representative of sources of topsoil to be utilized with sufficient lead time for testing.

PART 3 - EXECUTION

3.1 PREPARATION OF EXISTING GRADE

.1 Verify that grades are correct. If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.

.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

.3 Remove existing grass designated to be stripped and seeded, debris, roots, branches, stones in excess of 13 mm diameter and other deleterious materials.
.1 Remove debris which protrudes more than 25 mm above surface.
.2 Dispose of removed material off site.

.4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.
.1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.2 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

.1 Spread topsoil in uniform layers to a compacted depth of 100 mm over areas where grass is to be restored. Compaction of topsoil to be sufficient to resist significant footprint impressions.

3.3 FINISH GRADING

.1 Grade entire cleared area to eliminate rough spots and low areas and ensure positive drainage. Grade to tolerance of 50 mm in 3,000 mm. Notify Departmental Representative 24 hours before final grading is undertaken.

.2 Compacted topsoil grade shall ensure that vegetated surfaces transition smoothly to concrete walk surfaces, providing positive drainage and eliminating trip hazards.

3.4 RESTORATION

.1 Restore site access to original conditions upon completion of the work.

3.5 ACCEPTANCE

.1 Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil, finish grading and restoration of site access.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT AND PAYMENT

.1 Hydraulic seeding as required for restoration of the Selwyn Township property shall be included in the Lump Sum Arrangement cost and shall include all labour, materials and equipment to hydraulically seed areas identified to receive:
.1 Legume mixture including fertilizer.

.2 Areas of blending into existing landscaped surfaces will not be measured for payment.

.3 Maintenance during establishment period of areas seeded shall not be measured for payment and shall be considered incidental to seeding.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings: conduct pre-installation meeting with Departmental Representative to verify project requirements and installation instructions.

.2 Scheduling:
.1 Schedule hydraulic seeding to coincide with preparation of soil surface.
.2 Schedule hydraulic seeding using grass mixtures and mixtures containing Trefoil between dates recommended by Provincial Agricultural Department.

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:
.1 Seed
.2 Hydraulic Mulch
.3 Bonded Fibre Matrix Mulch
.4 Tackifier
.5 Fertilizer

.3 Submit in writing 5 days prior to commencing work:
.1 Volume capacity of hydraulic seeder in litres.

.2 Amount of material to be used per tank based on volume.
.3 Number of tank loads required per hectare to apply specified slurry mixture per hectare.

.4 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.5 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

1.4 QUALITY ASSURANCE

.1 Qualifications:
.1 Landscape Contractor: to be a Member in Good Standing of a recognized Horticultural Trades Association.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements:
.1 Labelled bags of fertilizer identifying mass in kg, mix components and percentages, date of bagging, supplier's name and lot number.

.3 Storage and Handling Requirements:
.1 Store fertilizer in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

.4 Packaging Waste Management: manage wastes including pallets, crates, padding and packaging materials as specified in approved Construction Waste Management Plan.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.

.1 Legume mixture: "Certified", "Specialty Seed", "Canada No. 1" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".

.1 Mixture Composition:

.1 66% Creeping Red Fescue (Festuca rubra).

.2 34% Birdsfoot Trefoil (Lotus corniculatus).

.2 Innoculant: as per manufacturer's instructions for site conditions.

.2 Bonded Fiber Matrix (BFM) Mulch: thermally refined wood fibres and 10% by weight cross-linked hydro-colloidal tackifiers.

.1 100% biodegradable.

.2 Curing period not more than 48 hours.

.3 In dry state, comprised of not less than 70% by weight of long-stranded wood fibers.

.3 Tackifier: water dilutable, liquid dispersion.

.4 Water: free of impurities that would inhibit germination and growth.

.5 Fertilizer:

.1 To Canada "Fertilizers Act" and Regulations.

.2 Complete synthetic, slow release with 35% of nitrogen content in water-insoluble form.

.6 Inoculants: inoculant containers to be tagged with expiry date.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrate previously installed are acceptable for hydraulic seeding in accordance with manufacturer's written instructions.

.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PROTECTION OF EXISTING CONDITIONS

.1 Protect structures, signs, guide rails, fences, plant material, utilities and other surfaces not intended for spray.

.2 Immediately remove any material sprayed where not intended as directed by Departmental Representative.

3.3 PREPARATION OF SURFACES

.1 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.

.2 Fine grade areas to be seeded free of humps and hollows.
.1 Ensure areas are free of deleterious and refuse materials.

.3 Cultivated areas identified as requiring cultivation to depth of 25 mm.

.4 Ensure areas to be seeded are moist to depth of 150 mm before seeding.

.5 Obtain Departmental Representative's approval of grade and topsoil depth before starting to seed.

3.4 FERTILIZING PROGRAM

.1 Initial fertilization to be applied within hydroseed slurry as per manufacturer's instructions.

.2 Fertilize 30 days after seeding with high nitrogen formulation approved by Departmental representative at rates recommended by manufacturer.

3.5 PREPARATION OF SLURRY

.1 Measure quantities of materials by weight or weight-calibrated volume measurement satisfactory to Departmental Representative. Supply equipment required for this work.

.2 Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.

.3 After materials are in seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

3.6 SLURRY APPLICATION

.1 Hydraulic seeding equipment:
.1 Slurry tank.
.2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and/or mechanical agitation method.
.3 Capable of seeding by 50 m hand operated hoses and appropriate nozzles.
.4 Tank volume to be certified by certifying authority and identified by authorities "Volume Certification Plate".

.2 Mix Bonded Fiber Matrix Mulch slurry as per manufacturer's instructions for components based on seed mix application rates as follows:
.1 Seed: legume mixture 140kg/10,000 sq.m.

.3 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.
.1 Using correct nozzle for application.
.2 Using hoses for surfaces difficult to reach and to control application.

.4 Blend application 300 mm into adjacent grass areas and previous applications to form uniform surfaces.

.5 Re-apply where application is not uniform.

.6 Remove slurry from items and areas not designated to be sprayed.

3.7 CLEANING

.1 Upon completion remove surplus materials, rubbish, tools and equipment.
.1 Clean and reinstate areas affected by Work.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Divert unused fertilizer from landfill to official hazardous material collections site approved by Departmental Representative.

3.8 PROTECTION

.1 Protect seeded areas from trespass until plants are established.

.2 Remove protection devices as directed by Departmental Representative.

3.9 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following operations from time of seed application until acceptance by Departmental Representative.

.2 Legume Mixture:
.1 Repair minor dead and bare spots as determined by Departmental Representative to allow establishment of seed prior to acceptance.
.2 Repair major dead and bare spots as determined by Departmental Representative.
.3 Water seeded areas to maintain optimum soil moisture level for germination and continued growth. Control watering to prevent washouts.

3.10 ACCEPTANCE

.1 Seeded areas will be accepted by Departmental Representative provided that:
.1 Plants are uniformly established with minimum 100 mm growth and seeded areas are free of rutted, eroded, bare or dead spots.
.2 Areas have been fertilized.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT AND PAYMENT

.1 Payment for sodding will be made at unit price bid of actual area surface measurements taken and computed by Departmental Representative for:
.1 Turf Grass Nursery Sod: per square metre.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling:
.1 Schedule sod laying to coincide with preparation of soil surface.
.2 Schedule sod installation when frost is not present in ground.
.3 Advise Departmental Representative of proposed sod laying schedule 2 weeks in advance of delivering sod to site.

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 sod and fertilizer and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit 2 copies of WHMIS MSDS.

.3 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements of seed mix, seed purity, and sod quality.

.4 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties of seed mix, seed purity, and sod quality.

1.4 QUALITY ASSURANCE

.1 Qualifications:
.1 Landscape Contractor: to be a Member in Good Standing of a recognized Horticultural Trades Association.

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 in accordance with supplier's recommendations.
.2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.
.1 Turf Grass Nursery Sod types:
.1 Number One Kentucky Bluegrass Sod: Nursery Sod grown solely from seed of cultivars of Kentucky Bluegrass, containing not less than 50% Kentucky Bluegrass cultivars.
.2 Turf Grass Nursery Sod quality:
.1 Not more than 1 broadleaf weed and up to 1% native grasses per 40 square metres.
.2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.
.3 Mowing height limit: 35 to 65 mm.
.4 Soil portion of sod: 6 to 15 mm in thickness.

.2 Sod establishment support:
.1 Wooden pegs: 17 x 8 x 200 mm.

.3 Water:
.1 Supplied by Contractor.

.4 Fertilizer:
.1 To Canada "Fertilizers Act" and Fertilizers Regulations.
.2 Complete, synthetic, slow release with 65% of nitrogen content in water-insoluble form.

2.2 SOURCE QUALITY CONTROL

.1 Obtain written approval from Departmental Representative of sod at source.

.2 When proposed source of sod is approved, use no other source without written authorization from Departmental Representative.

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 sod installation in accordance with manufacturer's written instructions.
.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.2 Proceed with installation only after unacceptable conditions have been remedied to satisfaction of Departmental Representative.

3.2 PREPARATION

.1 Verify that grades are correct and prepared in accordance with Section 32 91 19. If discrepancies occur, notify Departmental Representative and commence work when instructed by Departmental Representative.

.2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.

.3 Fine grade surface free of humps and hollows to smooth, even grade, to tolerance of 8 mm, for Turf Grass Nursery Sod, surface to drain naturally.

.4 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site, in accordance with Section 01 74 20.

3.3 SOD PLACEMENT

.1 Lay sod within 24 hours of being lifted.

.2 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

.3 Roll sod as directed by Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.4 SOD PLACEMENT ON SLOPES AND PEGGING

.1 Start laying sod at bottom of slopes.

.2 Peg sod on slopes steeper than 3 horizontal to 1 vertical, within 1 m of catch basins and within 1 m of drainage channels and ditches to following pattern:
.1 100 mm below top edge at 200 mm on centre for first sod sections along contours of slopes.
.2 Not less than 4 pegs per square metre.
.3 Not less than 6 pegs per square metre in drainage structures. Adjust pattern as directed by Departmental Representative.
.4 Drive pegs to 20 mm above soil surface of sod sections.

3.5 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following operations from time of installation until acceptance.
.1 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.
.2 Cut grass to 60 mm when or prior to it reaching height of 85 mm.
.3 Maintain sodded areas weed free 95%.
.4 Fertilize areas in accordance with supplier's recommandations during maintenance and establishment periods. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

3.6 ACCEPTANCE

.1 Turf Grass Nursery Sod areas will be accepted by Departmental Representative provided that:
.1 Sodded areas are properly established.
.2 Sod is free of bare and dead spots.

.3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 60 mm.

.4 Sodded areas have been cut minimum 2 times prior to acceptance.

.2 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Definitions:
.1 Mycorrhiza: association between fungus and roots of plants. This symbiosis, enhances plant establishment in newly landscaped and imported soils.

.2 Reference Standards:
.1 Agriculture and Agri-Food Canada (AAFC).
.1 Plant Hardiness Zones in Canada-2000.
.2 Canadian Nursery Landscape Association (CNLA)
.1 Canadian Standards for Nursery Stock-2006.
.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling: obtain approval from Departmental Representative of schedule 7 days in advance of shipment of plant material.

.2 Schedule to include:
.1 Quantity and type of plant material.
.2 Shipping dates.
.3 Arrival dates on site.
.4 Planting Dates.

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 trees, ground cover, fertilizer, mycorrhiza, anti-desiccant, anchoring equipment, and mulch and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit 2 copies of WHMIS MSDS.

.3 Samples:
.1 Submit samples of mulch and Mycorrhizaa.

1.4 MEASUREMENT PROCEDURES

.1 Tree planting shall be measured by each tree planted for the species indicated on the unit price table and shall include all labour, materials and equipment necessary to complete the work including but not limited to plant material, accessories, mulch, planting, tree support, mulching and maintenance.

.2 Ground cover planting shall be measured by the square meter for the species indicated on the unit price table, planted at densities indicated on drawings and shall include all labour,materials and equipment necessary to complete the work, including but not limited to plant material, mulch, planting, mulching and maintenance.

1.5 QUALITY ASSURANCE

.1 Qualifications:
.1 Landscape Contractor: to be a Member in Good Standing of a recognized Horticultural Trades Association.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
.1 Protect plant material from frost, excessive heat, wind and sun during delivery.
.2 Protect plant material from damage during transportation:
.1 Delivery distance is less than 30 km and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.
.2 Delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical.
.3 Protect foliage and root balls using anti-desiccants and tarpaulins, where use of enclosed vehicle is impractical due to size and weight of plant material.

.2 Storage and Handling Requirements:
.1 Immediately store and protect plant material which will not be installed within 1 hour in accordance with supplier's written recommendations after arrival at site.

.2 Protect stored plant material from frost, wind and sun and as follows:

.1 For bare root plant material, preserve moisture around roots by heeling-in or burying roots in sand or topsoil and watering to full depth of root zone.

.2 For pots and containers, maintain moisture level in containers. Heel-in fibre pots.

.3 For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.

.3 Store and manage hazardous materials in accordance with manufacturer's written instructions.

.3 Packaging Waste Management: remove for reuse or return of pallets, crates, padding and packaging materials as per Waste Management Plan in accordance with Section 01 74 20.

1.7 WARRANTY

.1 For plant material over 75 mm caliper the 12 months warranty period is extended to 24 months.

.2 End-of-warranty inspection will be conducted by Consultant and Departmental Representative.

.3 Departmental Representative reserves the right to extend Contractor's warranty responsibilities for an additional one year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

.1 Type of root preparation, sizing, grading and quality: comply to Canadian Standards for Nursery Stock.

.1 Source of plant material: grown in Zone 5a in accordance with Plant Hardiness Zones in Canada.

.2 Plant material must be planted in zone specified as appropriate for its species.

.3 Plant material in location appropriate for its species.

.2 Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.

.3 Trees: with straight trunks, well and characteristically branched for species.

.4 Bare root stock: nursery grown, in dormant stage, not balled and burlapped or container grown.

2.2 WATER

.1 Free of impurities that would inhibit plant growth.

2.3 STAKES

.1 T-bar, steel, 40 x 40 x 5 x 2440 mm.

2.4 WIRE TIGHTENER

.1 Type 1: galvanized steel, stamped plate type, rod, triangular shape.

.2 Type 2: turnbuckle, galvanized steel, 9.5 mm diameter with 270 mm open length.

2.5 GUYING WIRE

.1 Type 1: steel, 3 mm wire.

.2 Type 2: 1.5 mm diameter multi-wire steel cable.

.3 Type 3: 3 mm diameter multi-wire steel cable.

.4 Colour contrasted to CSA B651-12.

2.6 CLAMPS

.1 U-bolt: galvanized, 13 mm diameter, c/w curved retaining bar and hex nuts.

2.7 ANCHORS

.1 Wood:
.1 Type 1: 38 x 38 x 460 mm.
.2 Type 2: 38 x 67 x 600 mm.

2.8 GUYING COLLAR
.1 Tube: plastic, 13 mm diameter, nylon reinforced.

2.9 TRUNK PROTECTION
.1 Plastic: perforated spiralled strip.

2.10 MULCH
.1 Shredded wood: varying in size from 25 to 125 mm in length, from coniferous trees.

2.11 FERTILIZER
.1 Synthetic commercial type as recommended by manufacturer.
.1 Ensure new root growth is in contact with mycorrhiza.
.2 Use mycorrhiza as recommended by manufacturer's written recommendations.

2.12 ANTI-DESICCANT
.1 Wax-like emulsion.

2.13 FLAGGING TAPE
.1 Fluorescent, orange colour.

2.14 SOURCE QUALITY CONTROL
.1 Obtain approval from Departmental Representative of plant material prior to planting.

PART 3 - EXECUTION

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

3.2 PRE-PLANTING PREPARATION

.1 Proceed only after receipt of written acceptability of plant material from Departmental Representative.

.2 Remove damaged roots and branches from plant material.

.3 Apply anti-desiccant to conifers and deciduous trees in leaf in accordance with manufacturer's instructions.

.4 Locate and protect utility lines.

.5 Notify and acquire written acknowledgement from utility authorities before beginning excavation of planting pits for trees and shrubs.

3.3 EXCAVATION AND PREPARATION OF PLANTING BEDS

.1 For individual planting holes:
.1 Stake out location and obtain approval from Departmental Representative prior to excavating.
.2 Excavate to depth and width as indicated.
.3 Remove subsoil, rocks, roots, debris and toxic material from excavated material that will be used as planting soil for trees and individual shrubs. Dispose of excess material.
.4 Remove water which enters excavations prior to planting. Notify Departmental Representative if water source is ground water.

.2 Preparation of planting beds in accordance with 32 91 19.

3.4 PLANTING

.1 Excavate and provide planting soil for roots as indicated.
.1 Trees shall be planted where indicated, with minimum 2 m setback from structures.
.2 Plant trees and shrubs with roots placed straight out in hole.

.2 For jute burlapped root balls, cut away top one third of wrapping and wire basket without damaging root ball.
.1 Do not pull burlap or rope from under root ball.

.3 For container stock or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.

.4 Plant vertically in locations as indicated.
.1 Orient plant material to give best appearance in relation to structure, roads and walks.

.5 For trees and shrubs:
.1 Backfill soil in 150 mm lifts.
.1 Tamp each lift to eliminate air pockets.
.2 When two thirds of depth of planting pit has been backfilled, fill remaining space with water.
.3 After water has penetrated into soil, backfill to finish grade.
.2 Form watering saucer as indicated.

.6 For ground covers, backfill soil evenly to finish grade and tamp to eliminate air pockets.

.7 Water plant material thoroughly.

.8 After soil settlement has occurred, fill with soil to finish grade.

3.5 TRUNK PROTECTION

.1 Install trunk protection on deciduous trees as indicated.

.2 Install trunk protection before installation of tree supports.

3.6 TREE SUPPORTS

.1 Install tree supports as indicated to CSA B651-12.

.2 Use two stake tree supports for deciduous trees less than 3 m in height and evergreens less than 2 m in height.
.1 Place stakes on prevailing wind side and 150 mm minimum from trunk.
.2 Drive stake 150 mm minimum into undisturbed soil beneath roots.
.1 Ensure stake is secure, vertical and unsplit.

.3 Install 150 mm long guying collar 1500 mm above grade.

.4 Thread Type 1 guying wire through guying collar tube.

.1 Twist wire to form collar and secure firmly to stake. Cut off excess wire.

.3 Use 3 guy wires and anchors for deciduous trees greater than 3 m in height and evergreens greater than 2 m in height.

.1 Use Type 2 guying wire with clamps for trees less than 75 mm in diameter and Type 3 guying wire with clamps for trees greater than 75 mm in diameter.

.2 Use Type 1 anchors for trees less than 75 mm in diameter and Type 2 anchors for trees greater than 75 mm in diameter.

.3 Install guying collars above branch to prevent slipping at approximately 2/3 height for evergreens and 1/2 height for deciduous trees. Collar mounting height not to exceed 2.5 m above grade.

.4 Guying collars to be of sufficient length to encircle tree plus 50 mm space for trunk clearance. Thread guy wire through collar encircling tree trunk and secure to lead wire by clamp or multi-wraps; cut wire ends close to wrap. Spread lead wires equally proportioned about trunk at 120 degrees.

.5 Install anchors at equal intervals about tree and away from trunk so guy wire will form 45 degree angle with ground. Install anchor at angle to achieve maximum resistance for guy wire.

.6 Attach guy wire to anchors. Tension wire and secure by installing clamps.

.7 Install wire tightener ensuring that guys are secure and leave room for slight movement of tree.

.8 Saw tops off wooden anchors which extend in excess of 100 mm above grade or as directed by Consultant.

.9 Install flagging tape to guys as indicated.

.4 After tree supports have been installed, remove broken branches with clean, sharp tools.

3.7 MULCHING

.1 Ensure soil settlement has been corrected prior to mulching.

.2 Spread mulch as indicated.

3.8 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following maintenance operations from time of planting to acceptance by Departmental Representative.

.1 Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion.

.1 For evergreen plant material, water thoroughly in late fall prior to freeze-up to saturate soil around root system.

.2 Remove weeds monthly.

.3 Replace or respread damaged, missing or disturbed mulch.

.4 For non-mulched areas, cultivate as required to keep top layer of soil friable.

.5 If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Departmental Representative prior to application.

.6 Remove dead or broken branches from plant material.

.7 Keep trunk protection and guy wires in proper repair and adjustment.

.8 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

3.9 MAINTENANCE DURING WARRANTY PERIOD

.1 From time of acceptance by Departmental Representative to end of warranty period, perform following maintenance operations.

.1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.

.2 Reform damaged watering saucers.

.3 Remove weeds monthly.

.4 Replace or respread damaged, missing or disturbed mulch.

.5 For non-mulched areas, cultivate monthly to keep top layer of soil friable.

.6 If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Departmental Representative prior to application.
.7 Apply fertilizer in early spring as indicated by soil test.
.8 Remove dead, broken or hazardous branches from plant material.
.9 Keep trunk protection and tree supports in proper repair and adjustment.
.10 Remove trunk protection, tree supports and level watering saucers at end of warranty period.
.11 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.
.12 Submit monthly written reports to Departmental Representative identifying:
.1 Maintenance work carried out.
.2 Development and condition of plant material.
.3 Preventative or corrective measures required which are outside Contractor's responsibility.

3.10 CLOSEOUT ACTIVITIES

.1 Submit maintenance reports for trees, shrubs, and other plantings.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

.1 Turbidity curtain shall include all necessary labour, materials and equipment required to supply, install, maintain and remove the turbidity curtain during in water work.

1.2 SUBMITTALS

.1 Submit details of the turbidity curtain system to the Contract Administrator 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.

.3 Submit to Departmental Representative, turbidity monitoring details as per Environmental Protection Plan.

1.3 DELIVERY AND STORAGE

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

PART 2 - PRODUCTS

2.1 MATERIAL

.1 Turbidity Curtain: Design to conform to US Army Corp of Departmental Representatives EP 1110-1-16 Appendix C, BMP 27, DOT Type III, 1.5 m/sec current and the following minimum properties:

.1 Flotation Properties:
- .1 Buoyancy: 40 Kg/m

.2 Curtain Body Properties:
- .1 Nylon Vinyl Reinforced: 521 g/square metre
- .2 Top Load Cable: 8 mm
- .3 Grab Tensile: to ASTM D5034-09, 718 N/cm x 718 N/cm
- .4 Tear: to ASTM D2261-07a, 178 N/cm x 178 N/cm.
- .5 Adhesion: to ASTM D751-06,16.5 N/cm2.

.6 Hydrostatic Pressure: 6118 kPa to ASTM D-751-95.
.7 Curtain Depth: to be determined by contractor.
.8 Ballast Chain: 8 mm.
.9 Chain Connectors :Aluminum stress plates and shackles.

.3 Seams: in accordance with manufacturer's recommendations.

.4 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 turbidity curtain for all in water work.

.2 Monitoring of water turbidity outside the silt curtain shall be part of the Contractor's Environmental Protection Plan.

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 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 terminated at the existing structure face.

3.3 OPERATION AND MAINTENANCE

.1 Turbidity curtains shall be installed to prevent sediment 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 location for all in water work, with the entire top edge above the water surface.

.4 The curtain shall be free of tears and gaps, and the bottom edge of the curtain is to be continuously in contact with the water course bed so that sediment passage from the area enclosed is prevented.

.5 Any folds in the turbidity curtain which form next to the flotation collar shall be regularly monitored and freed of collected sediment.

.6 Monitor and maintain the turbidity 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 geotextile to approval of Departmental Representative.

.9 Remove turbidity curtain when authorized by the Departmental Representative or after completion of the work.

3.4 WATER QUALITY PERFORMANCE CRITERIA

.1 Turbidity:
.1 Monitor turbidity as per approved Environmental Protection Plan.

.2 When background levels are below 8 NTU's maximum increase is 8 NTUs from background levels for short term exposure (i.e. 24 hour period) and maximum average increase is 2 NTUs from background levels for a longer term exposure (i.e. 30 day period) at a distance of 100 metres away from the in-water work.
.1 When background levels are between 8 and 80 NTUs, maximum increase is 8 NTUs from background levels at any one time and when background level is greater than 80 NTUs, maximum increase is 10% from background levels at a distance of 100 metres away from the in-water work.

3.5 CORRECTIVE ACTIONS FOR WATER

.1 When water quality is not in compliance with the required water quality performance criteria limits, stop in-water work and adjust operations to minimize turbidity. Make no claims for delays or adjustment to operations resulting from water quality exceedances.

END OF SECTION

Sub-surface Investigation Report

Project No. 14-6-7081

Trent Severn Waterway
Geotechnical Report for Locks 22-26

Prepared by:

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March 2015

Geotechnical Report for
Locks 22, 23, 24, 25, 26
Trent Severn Waterway
Peterborough, Ontario

Project No. 14-6-7081

Prepared by:

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March 2015

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terraspec engineering inc.

geotechnical engineers * materials testing

973 Crawford Drive
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March 31, 2015

Riggs Engineering Ltd.
205-1240 Commissioners Road West
London, Ontario
N6K 1C7

Re: Geotechnical Report for Locks 22, 23, 24, 25, 26
Trent Severn Waterway, Peterborough
Project Number 14-6-7081

General Site Data

This project includes 5 locks along the Trent Severn Waterway on the Otonabee River. The lock numbers are Locks 22, 23, 24, 25, 26, and the locks can be accessed from Nassau Mills Road, which extends from Trent University in Peterborough, northerly to Lakefield.

Terraspec was retained by Riggs Engineering to place test holes and to extract rock cores from the lock sites, and to provide geotechnical recommendations with respect to the replacement of the existing approach walls to the locks.

The locks were built circa 1900. It appears that some approach wall repair or reconstruction may have occurred as recently as the early 1960's.
The existing approach walls generally consist of timber crib construction.
The timber cribs rest directly on the surface bedrock.
The top surface of the timber crib has been finished with a poured concrete cap or deck.

The difference in elevation between the river banks and the river bed suggest that some rock removal was performed in order to place the cribs on a flat surface, although the rock may not have been removed to expose a sound bedrock surface at all locations along the crib.
There does not appear to be an issue with the competency of the existing rock surface.
The general tilting of the existing approach walls towards the lock channel appears to be the result of structural failure of the timber cribs, due to loss of integrity or decay of the timber.

Site Investigation
The locks were investigated during the months of December 2014 and January 2015.
The main focus of the investigation was on the river bed. Rock samples were collected using a core drill to extract rock cores from the river bed. These samples were taken by coring from the deck surface, below the existing water level, just over the front face of the approach walls. This method allowed sampling the of rock right at the interface between the existing timber cribs and the riverbed / bedrock surface.

Where accessible, test holes were excavated along the back side of the approach walls, to determine the nature of the fill soils placed behind the approach walls, and the presence of lateral bedrock.

Throughout the project limits, a total of 20 cores were placed, and a total of 9 test holes were placed. The core and test hole data has been appended to this report. The locations are identified by Lock number, side (generally east or west), and stationing (in metres) which was applied to the approach walls for the site survey. The stationing begins at the lock and ascends to the far limit of the approach wall. For example, L25 NW 42.9, indicates Lock 25, northwest approach wall, station 42.9 along the wall.

A water sample for chemical testing was collected from the river at Lock 25 in January.
The water sample was tested for sulphate and chloride content, and pH level.

Physiography
The bedrock in this area typically consists of Middle Ordovician limestones of the Trenton Group, which may contain a small percentage of quartz and/or chert.

The limestone retrieved from rock coring was typically of good quality and was classified as Grade R4, Strong Rock. The typical Rock Quality Designation of the core samples (based on the total core length) ranged from 25 to 60 %. The bedding of the limestone was typically classified as very-thinly bedded to thinly bedded. The bedding plane was horizontal. Discontinuity spacing was typically closely-spaced. The weathering of the bedrock was generally slight to moderate.

The rock surface of the river bed was more shaley at Locks 22, 23, and 26. There were typically thin (less than 20mm) clay seams within the upper limestone layers. These thin seams were in a dense condition, and could be found as deep as 1m into the bedrock surface. Atterberg Limits testing of a clay seam from Lock 23 indicated that the soil was classified as ASTM CL, indicating a clay of low plasticity.

The soils data from excavated test holes indicated that the backfill soils typically consisted of silty sand and rock fill. The rock fill was typically limestone fragments. This fill occupied a narrow space (approximately 1m) between the approach wall and the adjacent lateral bedrock. There was perceptible shudder in the approach walls when placing the test holes, suggesting that the timber cribs have lost integrity.

Summary of Depths
Based on the coring data obtained for this project, the following summary has been compiled. The typical depth from the top of the deck surface to the underlying river bed, ranged from 2.4 to 3.8m. The typical depth from the river bed surface to a competent bedrock surface, ranged from 230 to 920mm.

The following chart indicates the typical depth from the top of deck to the river bed, and the typical depth from the river bed to the competent and sound bedrock surface for each of the rock core locations.

Location	depth to river bed	depth to sound bedrock	sound rock elevation
L22 E 12	3.15m	610mm	209.59
L22 E 47.5	3.02	920	209.26
L22 W 10	3.05	690	209.43
L22 W 32	2.72	800	209.63
L23 E 20	2.36	580	214.08
L23 E 48	2.62	620	213.88
L24 E 5	3.07	410	217.97
L24 W 10	3.63	530	217.2
L24 W 35	3.77	550	217.03
L25 E 46	2.74	580	221.38
L25 E 0	3.05	230	221.51
L25 W 9	2.79	305	221.53
L25 W 60	2.72	400	221.58
L25 NW 42.9	3.68	560	223.08
L25 NW 1	3.66	410	223.56
L26 E 2	2.77	260	224.76
L26 E 33	2.72	660	224.1
L26 W 40	2.82	470	224.6
L26 W 11	2.74	300	224.76
L26 NW 62	3.35	450	229.18

Recent Rehabilitation Activity
The Lock 23 west pier was replaced in 2010. It is founded on the limestone/shale surface. The rock removal depth required to expose the competent bedrock surface was approximately 0.4m.

The west side of the pier (adjacent to the river) has scour damage within the granular fill placed on this side. It will be preferable for new vertical side walls, such as concrete walls, to extend all the way down to the bedrock surface, to prevent this type of damage.

Seismic Parameters
The following seismic design parameters may be utilized for this project location.

Seismic Site Class B
Average Shear Wave Velocity (m/s) = 760 < Vs < 1500
The ground acceleration values for Peterborough, as given by the OBC, are as follows:

Sa(0.2)=0.20, Sa(0.5)=0.12, Sa(1.0)=0.061, Sa(2.0)=0.017, PGA=0.099.

Dewatering
With the assistance of the Trent Severn Waterway staff, it should be feasible to conduct construction operations in the off seasons, utilizing a lowered water level and the placement of coffer dams. This approach would allow bedrock surface preparation and concrete work to be done under relatively dry conditions.

Bearing Capacity
Spread or strip footings may be placed onto the underlying bedrock surfaces.
The following bedrock bearing capacities will be available at the base of new footings:

Bearing capacities for sound, clean bedrock:

Locks 22, 23, 26	706kPa Factored ULS	600kPa SLS
Locks 24 & 25	1176kPa Factored ULS	1000kPa SLS

Loose bedrock surfaces must be removed to expose the underlying sound bedrock, or at minimum a competent bedrock surface. It is expected that removal of loose bedrock can be accomplished by using an excavator to scrape the surface of the bedrock, until a competent bedrock surface is obtained. If it is not feasible to clear the bedrock down to the sound, competent depths as indicated above, then the following values are recommended for the less competent bedrock surfaces.

Bearing capacities for less competent bedrock:

Locks 22, 23, 26	471kPa Factored ULS	400kPa SLS
Locks 24 & 25	706kPa Factored ULS	600kPa SLS

Concrete footings should be keyed or dowelled into the bedrock, where necessary to provide sufficient resistance to sliding.

Use of pile construction for new retaining structures would also be feasible. All piles should be fitted with rock points. Pile capacities would be near to the maximum allowable; typically 1000kN Factored ULS, 900kN SLS for an HP310x110 pile.

It should be noted, however, that the site conditions appear to be more favourable to the use of gravity structures. Lateral support for standard piles and sheet piles is somewhat limited due to the shallow depth of the loose bedrock surface, which is typically only 300-600mm deep at most

locations. Similarly, pinning the toe of sheet pile walls may require pins that extend beyond this typical 300-600mm depth.

Rock Excavation

There will be a tendency to over-excavate when levelling the bedrock to obtain a sound bedrock surface during construction, due to the loose nature of surface rock on the existing river bed. With respect to the competent bedrock depths listed above, it would be prudent to allow for a further 300mm depth of rock removal, when estimating the contract quantities.

The existing approach walls typically have lateral bedrock within 1m of the outside edge of the wall, in the adjacent river banks. Accordingly, any proposed widening of the approach walls into the adjacent river banks should allow for full-depth bedrock excavation in the contract. It is expected that bedrock removal within the adjacent river banks can be accomplished by utilizing hoe-ram equipment.

Subgrade Inspection

It is recommended that a geotechnical firm be involved during construction to inspect all proposed footing areas, and to ensure that footings are placed only onto competent bedrock surfaces, with minimum bearing capacities as given above.

Rock Parameters

The unit weight and compressive strength was determined for select intact sections of the rock core samples. The compressive strength was determined as per test method CSA A23.2-14C.

Core sample	core depth tested	unit weight	compressive strength
	mm	kN/m3	MPa
L22W32	790-974	27.96	70.3
L23E48	610-740	23.51	115.4
L24W10	0-150	24.03	81.6
L25E0	65-200	26.69	82.4
L25W60	615-772	25.75	76.7
L26E2	360-531	26.86	67.9

As with the compressive strengths, the elastic moduli of intact sections of the rock cores were relatively high, however, this does not take into consideration the potential fractures and fissures that exist in the rock mass overall. As such, it is recommended that the elastic modulus values at 15% stress be utilized.

Core sample	Secant Modulus E at 15% stress MPa
L22W32	7532
L23E48	5623
L24W10	5440
L25E0	7694
L25W60	6052
L26E2	5312

Rock Material	Internal Angle of Friction	Ka	Kp
sound, clean limestone	35°	0.20	7.14
less competent limestone	28°	0.31	6.55

Rock Material	Concrete / Bedrock Coefficient of Sliding Friction
sound, clean limestone	0.60
less competent limestone	0.47

Modulus of Subgrade Reaction, Ks

For sound, clean bedrock:

Locks 22, 23, 26	283 MPa/m
Locks 24, 25	472 MPa/m

For less competent bedrock:

Locks 22, 23, 26	189 MPa/m
Locks 24, 25	283 MPa/m

Concrete Specification

The chemical testing of the river water indicated a sulphate concentration of 6 parts per million, hence, the potential for sulphate attack on new concrete is expected to be low.
Accordingly, the specification for new concrete is: Type 10 concrete cement.

The frost penetration treatment depth for this project location is 1.5m. All concrete placed within the frost penetration treatment depth of 1.5m, or exposed to outside temperature extremes, should generally consist of a 30 to 35 MPa concrete mix, with air entrainment. The typical concrete classes that would be appropriate for this project are:

Class C1	35 MPa	5-8 % air entrainment
Class C3	30 MPa	4-7 % air entrainment

Use of Native and Imported Fill
None of the native soils on site can be used as fill beneath any structures.

It is feasible that the backfill soils behind the approach walls may be re-used as backfill, typically behind the new approach walls. It should be noted in the contract that most of these fill materials are saturated, hence, the fill will need to be dried before it is replaced as backfill.

For calculating vertical and lateral earth pressures, the following coefficients may be utilized for local imported granular materials:

Typical sandy Granular B Type 1 backfill
phi = 32°
Ka = 0.31 Ko = 0.47 Kp = 3.25
Moist unit weight = 22.3 kN/m3
Saturated unit weight = 23.1 kN/m3
Effective submerged unit weight = 13.3 kN/m3

Typical gravelly Granular B Type 1 backfill
phi = 35°
Ka = 0.27 Ko = 0.43 Kp = 3.69
Moist unit weight = 23.0 kN/m3
Saturated unit weight = 23.9 kN/m3
Effective submerged unit weight = 14.1 kN/m3

Compaction Requirements
All native soil and all granular fill compaction requirements for the project should conform with OPSS 501, Subsection 501.08.02 - Method A, utilizing soil placement in maximum 300mm lifts and a compaction standard of 100% of Standard Proctor Maximum Dry Density.

Statement of Limitations
This report is intended for the guidance of the project design team. From a construction standpoint, contractors must make their own assessment of the soil, bedrock, and groundwater conditions and how these will affect their proposed construction techniques and schedules.

The recommendations in this report are based on information determined at the test hole locations. Soils, bedrock quality, and groundwater conditions between and beyond the test hole locations may differ from those encountered at the test hole locations, and conditions may become apparent during construction that could not be detected or anticipated at the time of the geotechnical investigation. If this occurs, we recommend that Terraspec be recalled to the site for further consultation, testing, and analysis.

We also recommend that Terraspec be retained to ensure that all subgrade preparation requirements are met, and to confirm that the soil and rock conditions do not deviate materially from those encountered in test holes. In the case that our recommendations are not followed, the

company's responsibility is limited solely to interpreting the information from the test hole locations.

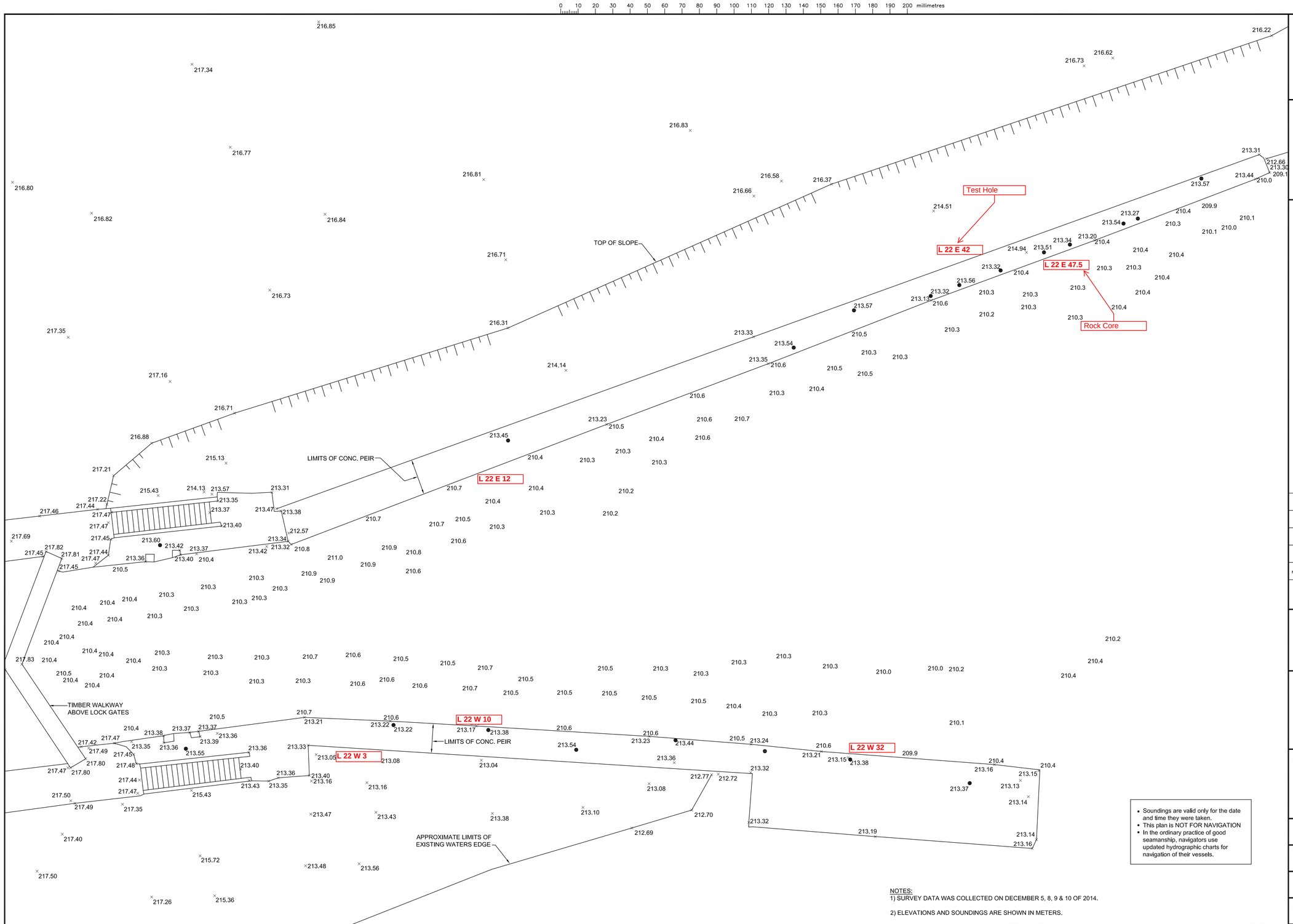
This report is applicable only to this project, constructed substantially in accordance with the details of alignment and elevations quoted in the report.

~ ~ ~

TERRASPEC ENGINEERING INC.
GEOTECHNICAL ENGINEERS

Shane Galloway, B.A.
Manager

N.A. MacKinnon, P.Eng.
Senior Engineer



LEGEND:

- BM# BENCHMARK
- 213.21 ELEVATIONS RELATIVE TO SITE BENCHMARK
- 210.7 SOUNDINGS RELATIVE TO SITE BENCHMARK
- ● EXISTING BOLLARDS AND MOORING RINGS

LOCK 22 DOWNSTREAM EXISTING CONDITIONS

SCALE: 1:100

- Soundings are valid only for the date and time they were taken.
- This plan is NOT FOR NAVIGATION
- In the ordinary practice of good seamanship, navigators use updated hydrographic charts for navigation of their vessels.

NOTES:

1) SURVEY DATA WAS COLLECTED ON DECEMBER 5, 8, 9 & 10 OF 2014.

2) ELEVATIONS AND SOUNDINGS ARE SHOWN IN METERS.

3) ELEVATIONS AND SOUNDINGS ARE REFERENCED TO BENCHMARK #0011960U3258 HAVING AN ELEVATION OF 217.081 METERS.

4) WATER LEVEL ELEVATION AT THE TIME OF SURVEY WAS 212.70 METERS.

5) POSITIONING SYSTEM - HEMISPHERE R320

6) SOUNDER - RESON NAVISOUND 110

* THE SOUNDING INFORMATION REPRESENTS RESULTS OF THE SURVEY MADE ON THE DATES SPECIFIED AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS AT THAT TIME.

TRENT SEVERN WATERWAY,
NATIONAL HISTORIC SITE OF CANADA,
PARKS CANADA AGENCY

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LONDON, ONTARIO
N6K 1C7
(519)-657-1040
WWW.RIGGSENGINEERING.COM

revision		date

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the department representative of all discrepancies.

A Detail No. / No. du détail
B drawing no. – where detail required / dessin no. – où détail exigé
C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet
PETERBOROUGH ONTARIO

CONCRETE CANAL WALL REHABILITATION
LOCKS 22-26, TRENT SEVERN WATERWAY,
PARKS CANADA AGENCY

drawing title / titre du dessin
LOCK 22
EXISTING CONDITIONS

drawn by / dessine par: A.MARCZENKO

designed by / conc par:

approved by / approuve par:

tender / soumission: DUNCAN MANSER
project manager / administrateur de projets

project date / date du projet: JANUARY 19, 2015

project no. / no. du projet: 30025771

drawing no. / dessine no.: FIGURE 1

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 millimetres

LEGEND:
- BM# BENCHMARK
- ×213.21 ELEVATIONS RELATIVE TO SITE BENCHMARK
- 210.7 SOUNDINGS RELATIVE TO SITE BENCHMARK
- ● EXISTING BOLLARDS AND MOORING RINGS

NOTES:
1) SURVEY DATA WAS COLLECTED ON DECEMBER 5, 9 & 10 OF 2014.

2) ELEVATIONS AND SOUNDINGS ARE SHOWN IN METERS.

3) ELEVATIONS AND SOUNDINGS ARE REFERENCED TO BENCHMARK #0011960U525 HAVING AN ELEVATION OF 221.10 METERS.

4) WATER LEVEL ELEVATION AT THE TIME OF SURVEY WAS 215.85 METERS.

5) POSITIONING SYSTEM - HEMISPHERE R320

6) SOUNDER - RESON NAVISOUND 110

* THE SOUNDING INFORMATION REPRESENTS RESULTS OF THE SURVEY MADE ON THE DATES SPECIFIED AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS AT THAT TIME.

- Soundings are valid only for the date and time they were taken.
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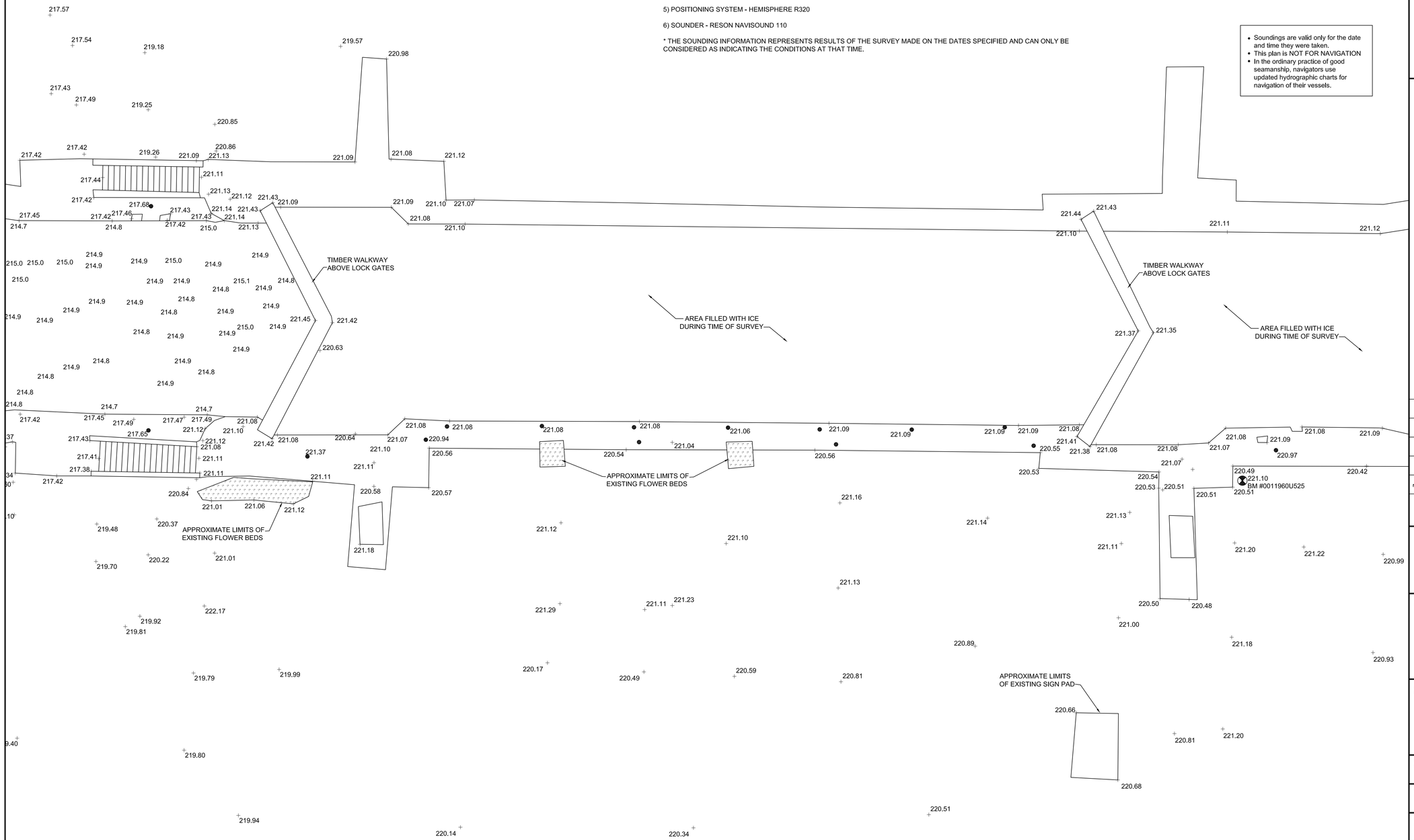
- In the ordinary practice of good seamanship, navigators use updated hydrographic charts for navigation of their vessels.



LOCK 23 EXISTING CONDITIONS
SCALE: 1:100

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project title / titre du projet
PETERBOROUGH ONTARIO

CONCRETE CANAL WALL REHABILITATION
LOCKS 22-26, TRENT SEVERN WATERWAY,
PARKS CANADA AGENCY

drawing title / titre du dessin
LOCK 23
EXISTING CONDITIONS

drawn by / dessine par: A.MARCZENKO

designed by / conc par:

approved by / approuve par:

tender / soumission: DUNCAN MANSER — project manager / administrateur de projets

project date / date du projet: JANUARY 19, 2015

project no. / no. du projet: 30025771

drawing no. / dessine no.: FIGURE 2

LEGEND:

- BM# BENCHMARK
- 213.21 ELEVATIONS RELATIVE TO SITE BENCHMARK
- 210.7 SOUNDINGS RELATIVE TO SITE BENCHMARK
- ● EXISTING BOLLARDS AND MOORING RINGS

NOTES:

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4) WATER LEVEL ELEVATION AT THE TIME OF SURVEY WAS 215.85 METERS.

5) POSITIONING SYSTEM - HEMISPHERE R320

6) SOUNDER - RESON NAVISOUND 110

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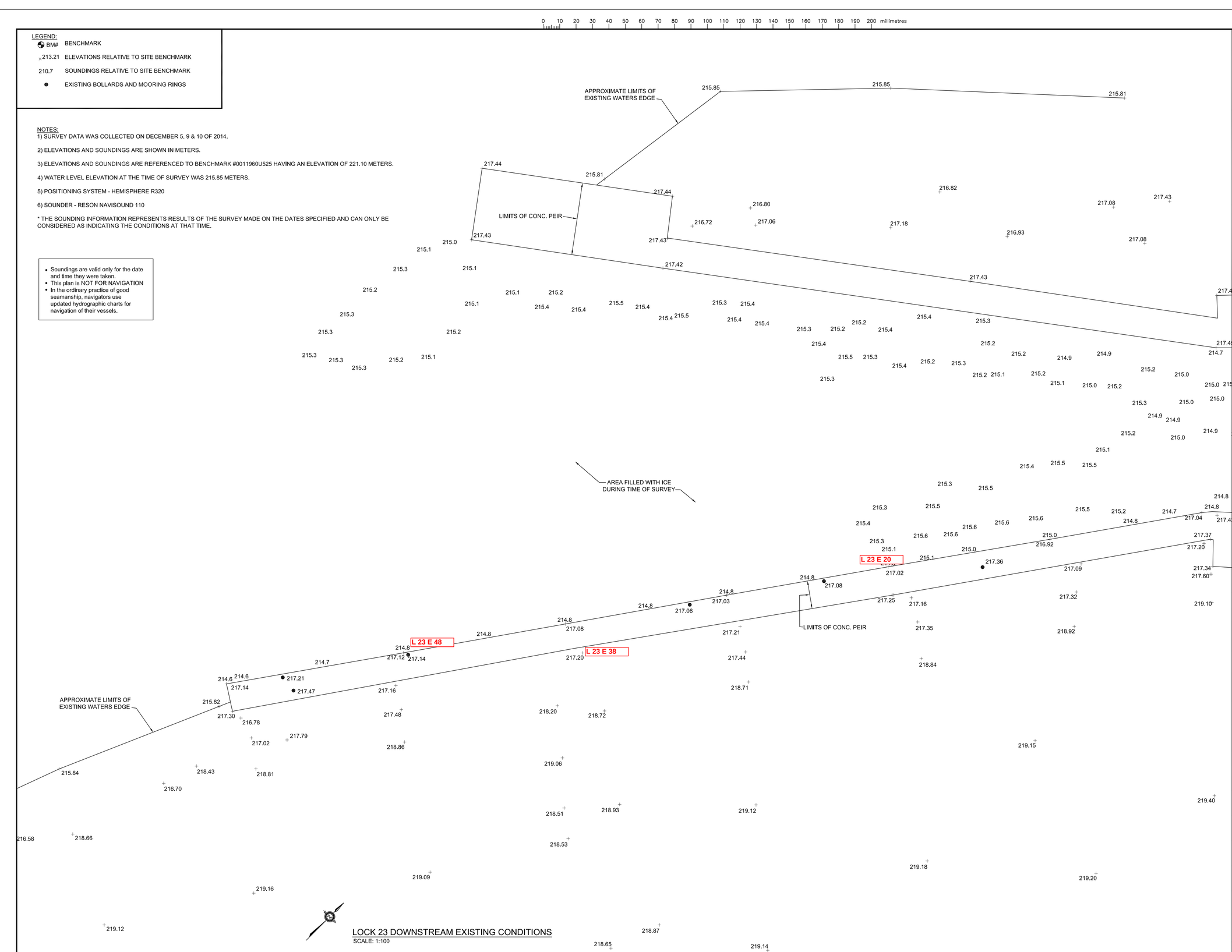

LOCK 23 DOWNSTREAM EXISTING CONDITIONS
SCALE: 1:100

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C drawing no. – where detailed dessin no. – où détaillé

project title / titre du projet
PETERBOROUGH ONTARIO

CONCRETE CANAL WALL REHABILITATION
LOCKS 22-26, TRENT SEVERN WATERWAY,
PARKS CANADA AGENCY

drawing title / titre du dessin
LOCK 23
EXISTING CONDITIONS

drawn by / dessine par: A.MARCZENKO

designed by / conc par:

approved by / approuve par:

tender / soumission: DUNCAN MANSER
project manager / administrateur de projets

project date / date du projet: JANUARY 19, 2015

project no. / no. du projet: 30025771

drawing no. / dessine no.: FIGURE 3

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 millimetres

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LEGEND:
- BM# BENCHMARK
- 213.21 ELEVATIONS RELATIVE TO SITE BENCHMARK
- 210.7 SOUNDINGS RELATIVE TO SITE BENCHMARK
- ● EXISTING BOLLARDS AND MOORING RINGS

APPROXIMATE LIMITS OF EXISTING WATERS EDGE

LIMITS OF CONC. PEIR

AREA FILLED WITH ICE DURING TIME OF SURVEY

L 24 W 35

L 24 W 10

L 24 E 5

L 24 E 22

TIMBER WALKWAY ABOVE LOCK GATES

APPROXIMATE LIMITS OF CONC. FOOTING

EXISTING STRUCTURE

APPROXIMATE LIMITS OF ASPHALT PATHWAY

NOTES:
1) SURVEY DATA WAS COLLECTED ON DECEMBER 8, 9 & 10 OF 2014.

2) ELEVATIONS AND SOUNDINGS ARE SHOWN IN METERS.

3) ELEVATIONS AND SOUNDINGS ARE REFERENCED TO BENCHMARK #0011972U414 HAVING AN ELEVATION OF 224.783 METERS.

4) WATER LEVEL ELEVATION AT THE TIME OF SURVEY WAS 220.45 METERS.

5) POSITIONING SYSTEM - HEMISPHERE R320

6) SOUNDER - RESON NAVISOUND 110

* THE SOUNDING INFORMATION REPRESENTS RESULTS OF THE SURVEY MADE ON THE DATES SPECIFIED AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS AT THAT TIME.

LOCK 24 DOWNSTREAM EXISTING CONDITIONS
SCALE: 1:100

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revision	date

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B drawing no. – where detail required / dessin no. – où détail exigé
C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet
PETERBOROUGH ONTARIO

CONCRETE CANAL WALL REHABILITATION
LOCKS 22-26, TRENT SEVERN WATERWAY,
PARKS CANADA AGENCY

drawing title / titre du dessin
LOCK 24
EXISTING CONDITIONS

drawn by / dessine par: A.MARCZENKO

designed by / conc par:

approved by / approuve par:

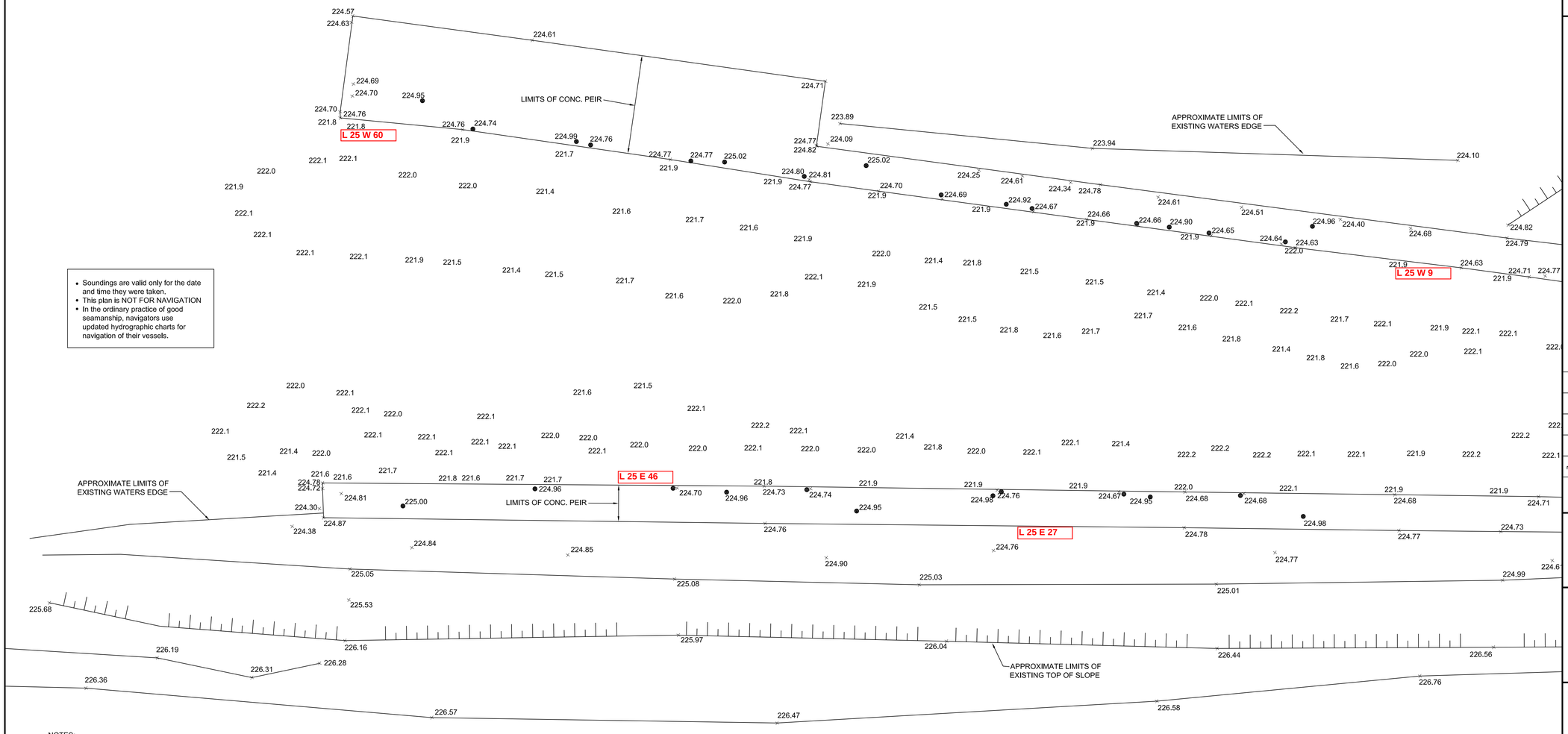
tender / soumission: DUNCAN MANSER — project manager / administrateur de projets

project date / date du projet: JANUARY 19, 2015

project no. / no. du projet: 30025771

drawing no. / dessine no.: FIGURE 4

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 millimetres



- Soundings are valid only for the date and time they were taken.
- This plan is NOT FOR NAVIGATION
- In the ordinary practice of good seamanship, navigators use updated hydrographic charts for navigation of their vessels.

NOTES:
1) SURVEY DATA WAS COLLECTED ON DECEMBER 8, 9 & 10 OF 2014.

2) ELEVATIONS AND SOUNDINGS ARE SHOWN IN METERS.

3) ELEVATIONS AND SOUNDINGS ARE REFERENCED TO BENCHMARK #0011960U526 HAVING AN ELEVATION OF 227.799 METERS.

4) DOWNSTREAM WATER LEVEL ELEVATION AT THE TIME OF SURVEY WAS APPROXIMATELY 223.9 METERS, UPSTREAM WATER LEVEL ELEVATION AT THE TIME OF SURVEY WAS APPROXIMATELY 226.78 METERS.

5) POSITIONING SYSTEM - HEMISPHERE R320

6) SOUNDER - RESON NAVISOUND 110

* THE SOUNDING INFORMATION REPRESENTS RESULTS OF THE SURVEY MADE ON THE DATES SPECIFIED AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS AT THAT TIME.

LEGEND:

BM#	BENCHMARK
213.21	ELEVATIONS RELATIVE TO SITE BENCHMARK
210.7	SOUNDINGS RELATIVE TO SITE BENCHMARK
●	EXISTING BOLLARDS AND MOORING RINGS

LOCK 25 DOWNSTREAM EXISTING CONDITIONS
SCALE: 1:100

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C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet
PETERBOROUGH ONTARIO

CONCRETE CANAL WALL REHABILITATION
LOCKS 22-26, TRENT SEVERN WATERWAY,
PARKS CANADA AGENCY

drawing title / titre du dessin
LOCK 25
EXISTING CONDITIONS

drawn by / dessine par: A.MARCZENKO

designed by / conc par:

approved by / approuve par:

tender / soumission: DUNCAN MANSER
project manager / administrateur de projets

project date / date du projet: JANUARY 19, 2015

project no. / no. du projet: 30025771

drawing no. / dessine no.: FIGURE 5

NOTES:
1) SURVEY DATA WAS COLLECTED ON DECEMBER 8, 9 & 10 OF 2014.

2) ELEVATIONS AND SOUNDINGS ARE SHOWN IN METERS.

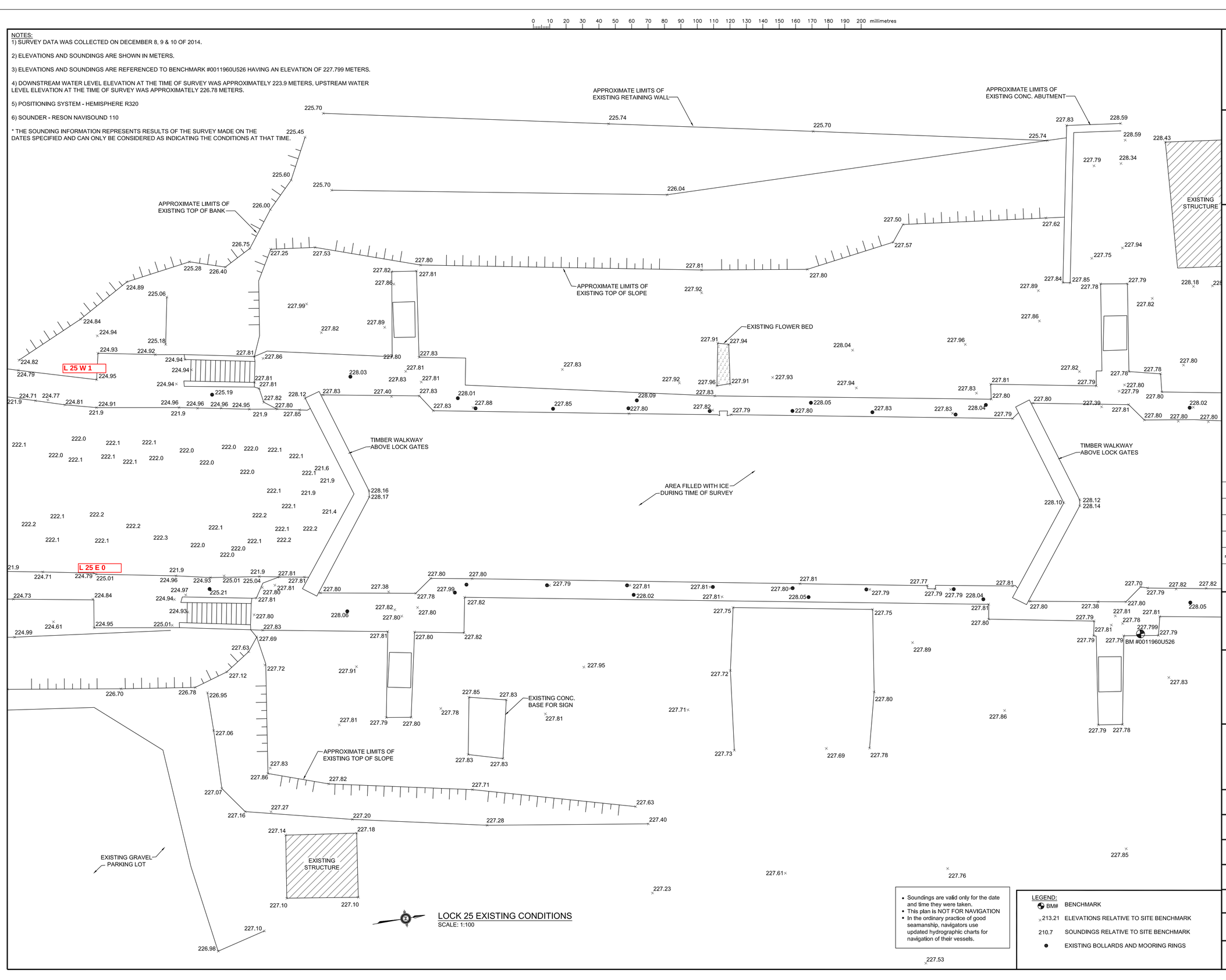
3) ELEVATIONS AND SOUNDINGS ARE REFERENCED TO BENCHMARK #0011960U526 HAVING AN ELEVATION OF 227.799 METERS.

4) DOWNSTREAM WATER LEVEL ELEVATION AT THE TIME OF SURVEY WAS APPROXIMATELY 223.9 METERS, UPSTREAM WATER LEVEL ELEVATION AT THE TIME OF SURVEY WAS APPROXIMATELY 226.78 METERS.

5) POSITIONING SYSTEM - HEMISPHERE R320

6) SOUNDER - RESON NAVISOUND 110

* THE SOUNDING INFORMATION REPRESENTS RESULTS OF THE SURVEY MADE ON THE DATES SPECIFIED AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS AT THAT TIME.



LOCK 25 EXISTING CONDITIONS
SCALE: 1:100

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- In the ordinary practice of good seamanship, navigators use updated hydrographic charts for navigation of their vessels.

LEGEND:
- BM# BENCHMARK
- 213.21 ELEVATIONS RELATIVE TO SITE BENCHMARK
- 210.7 SOUNDINGS RELATIVE TO SITE BENCHMARK
- ● EXISTING BOLLARDS AND MOORING RINGS

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A Detail No. No. du détail
B drawing no. – where detail required dessin no. – où détail exigé
C drawing no. – where detailed dessin no. – où détaillé

project title / titre du projet
PETERBOROUGH ONTARIO

CONCRETE CANAL WALL REHABILITATION
LOCKS 22-26, TRENT SEVERN WATERWAY,
PARKS CANADA AGENCY

drawing title / titre du dessin
LOCK 25
EXISTING CONDITIONS

drawn by / dessine par: A.MARCZENKO

designed by / conc par:

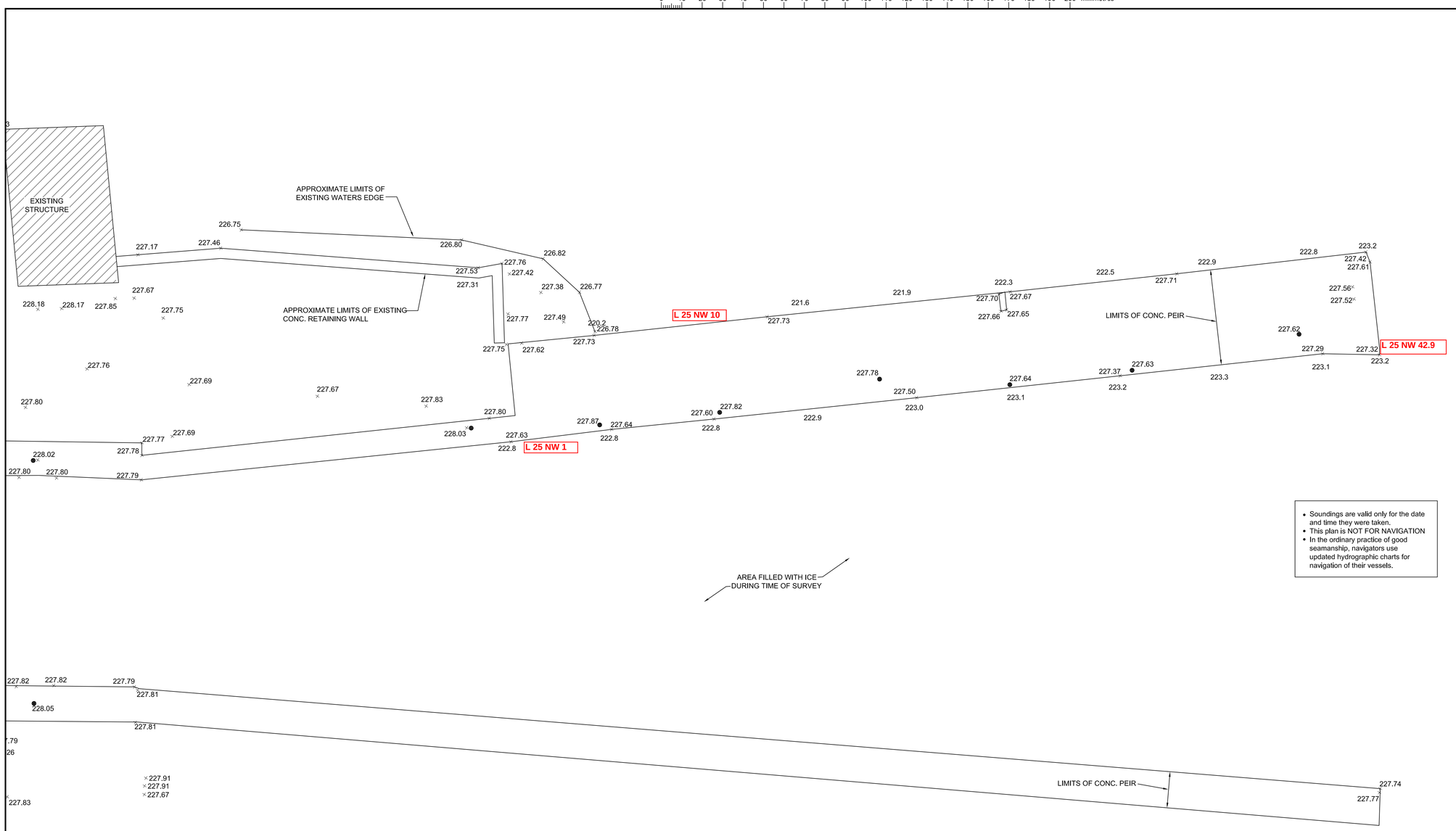
approved by / approuve par:

tender / soumission: DUNCAN MANSER
project manager / administrateur de projets

project date / date du projet: JANUARY 19, 2015

project no. / no. du projet: 30025771

drawing no. / dessine no.: FIGURE 6



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- This plan is NOT FOR NAVIGATION
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LOCK 25 UPSTREAM EXISTING CONDITIONS
SCALE: 1:100

NOTES:
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2) ELEVATIONS AND SOUNDINGS ARE SHOWN IN METERS.

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4) DOWNSTREAM WATER LEVEL ELEVATION AT THE TIME OF SURVEY WAS APPROXIMATELY 223.9 METERS, UPSTREAM WATER LEVEL ELEVATION AT THE TIME OF SURVEY WAS APPROXIMATELY 226.78 METERS.

5) POSITIONING SYSTEM - HEMISPHERE R320

6) SOUNDER - RESON NAVISOUND 110

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LEGEND:
- BM# BENCHMARK
- ×213.21 ELEVATIONS RELATIVE TO SITE BENCHMARK
- 210.7 SOUNDINGS RELATIVE TO SITE BENCHMARK
- ● EXISTING BOLLARDS AND MOORING RINGS

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revision		date

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C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet
PETERBOROUGH ONTARIO

CONCRETE CANAL WALL REHABILITATION
LOCKS 22-26, TRENT SEVERN WATERWAY,
PARKS CANADA AGENCY

drawing title / titre du dessin
LOCK 25
EXISTING CONDITIONS

drawn by / dessine par: A.MARCZENKO
designed by / conc par:
approved by / approuve par:
tender / soumission: DUNCAN MANSER
project manager / administrateur de projets
project date / date du projet: JANUARY 19, 2015
project no. / no. du projet: 30025771
drawing no. / dessine no.: FIGURE 7

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 millimetres

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APPROXIMATE LIMITS OF EXISTING TOP OF SLOPE

APPROXIMATE LIMITS OF EXISTING WATERS EDGE

EXISTING FLOWER BED

L 26 E 10

L 26 E 33

L 26 E 2

LIMITS OF CONC. PEIR

TIMBER WALKWAY ABOVE LOCK GATES

L 26 W 11

L 26 W 15

LIMITS OF CONC. PEIR

L 26 W 40

APPROXIMATE LIMITS OF EXISTING TOP OF SLOPE

APPROXIMATE LIMITS OF EXISTING TOP OF VERTICAL BANK

EXISTING GRAVEL DRIVEWAY

NOTES:

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3) ELEVATIONS AND SOUNDINGS ARE REFERENCED TO BENCHMARK #0011960U527 HAVING AN ELEVATION OF 227.799 METERS.

4) WATER LEVEL ELEVATION AT THE TIME OF SURVEY WAS 227.28 METERS.

5) POSITIONING SYSTEM - HEMISPHERE R320

6) SOUNDER - RESON NAVISOUND 110

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LEGEND:

- BM# BENCHMARK
- 213.21 ELEVATIONS RELATIVE TO SITE BENCHMARK
- 210.7 SOUNDINGS RELATIVE TO SITE BENCHMARK
- ● EXISTING BOLLARDS AND MOORING RINGS

LOCK 26 DOWNSTREAM EXISTING CONDITIONS

SCALE: 1:100

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revision		date

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A Detail No. No. du détail
B drawing no. – where detail required dessin no. – où détail exigé
C drawing no. – where detailed dessin no. – où détaillé

project title
titre du projet

PETERBOROUGH ONTARIO

CONCRETE CANAL WALL REHABILITATION LOCKS 22-26, TRENT SEVERN WATERWAY, PARKS CANADA AGENCY

drawing title
titre du dessin

LOCK 26
EXISTING CONDITIONS

drawn by
dessine par: A.MARCZENKO

designed by
conc par:

approved by
approuve par:

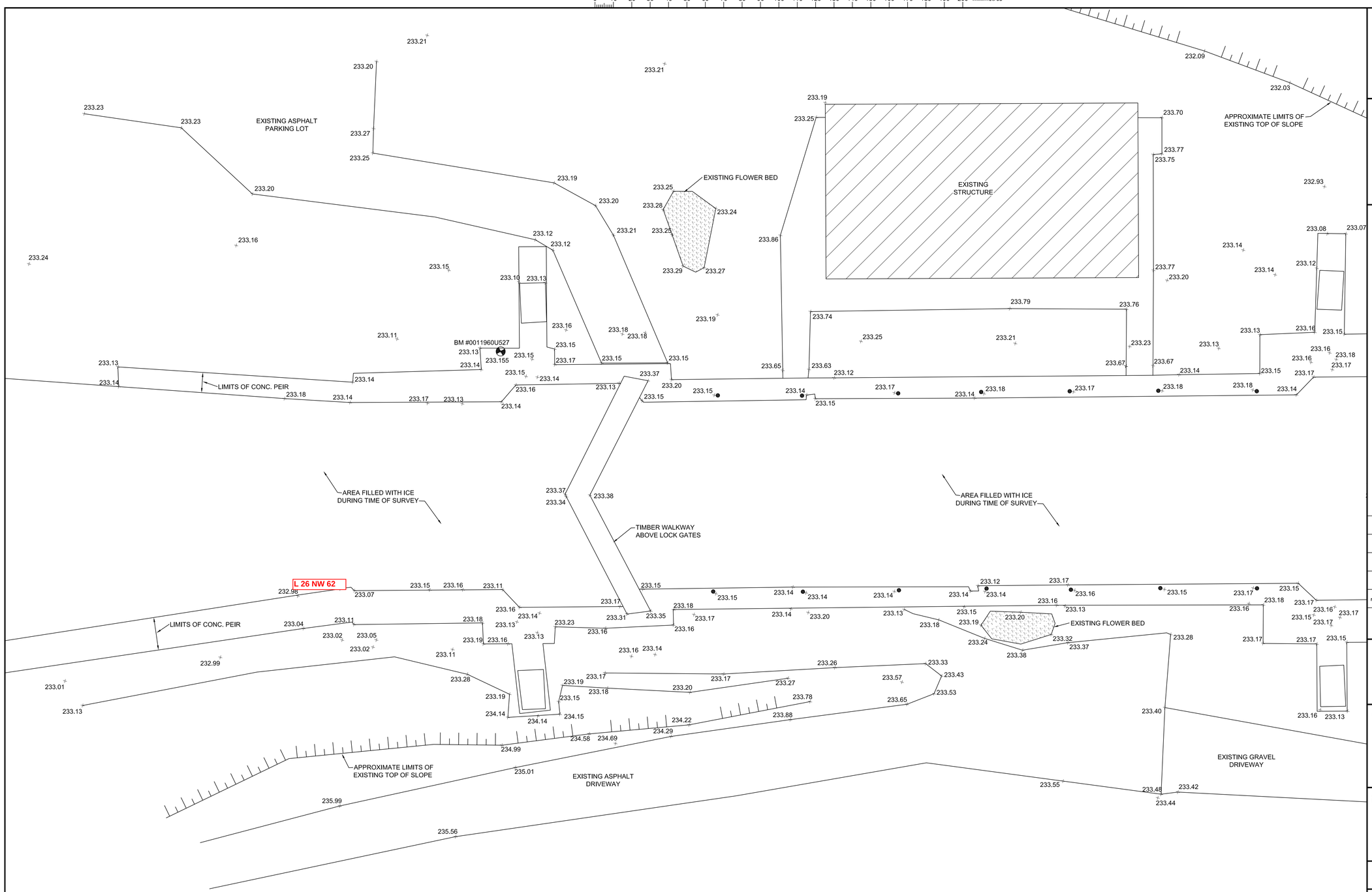
tender soumission: DUNCAN MANSER
project manager administrateur de projets

project date
date du projet: JANUARY 19, 2015

project no.
no. du projet: 30025771

drawing no.
dessine no.: FIGURE 8

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 millimetres



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LEGEND:

- BM# BENCHMARK
- 213.21 ELEVATIONS RELATIVE TO SITE BENCHMARK
- 210.7 SOUNDINGS RELATIVE TO SITE BENCHMARK
- EXISTING BOLLARDS AND MOORING RINGS

LOCK 26 EXISTING CONDITIONS
SCALE: 1:100

NOTES:
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3) ELEVATIONS AND SOUNDINGS ARE REFERENCED TO BENCHMARK #0011960U527 HAVING AN ELEVATION OF 227.799 METERS.

4) WATER LEVEL ELEVATION AT THE TIME OF SURVEY WAS 227.28 METERS.

5) POSITIONING SYSTEM - HEMISPHERE R320

6) SOUNDER - RESON NAVISOUND 110

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NATIONAL HISTORIC SITE OF CANADA,
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A Detail No. / No. du détail
B drawing no. – where detail required / dessin no. – où détail exigé
C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet
PETERBOROUGH ONTARIO

CONCRETE CANAL WALL REHABILITATION
LOCKS 22-26, TRENT SEVERN WATERWAY,
PARKS CANADA AGENCY

drawing title / titre du dessin
LOCK 26
EXISTING CONDITIONS

drawn by / dessine par: A.MARCZENKO

designed by / conc par:

approved by / approuve par:

tender / soumission: DUNCAN MANSER
project manager / administrateur de projets

project date / date du projet: JANUARY 19, 2015

project no. / no. du projet: 30025771

drawing no. / dessine no.: FIGURE 9

Core Data
December 15-20, 2014 & January 22-23, 2015

Notes
The bedrock conditions have been established only at test hole locations.
Dimensions are in millimetres up to 1 metre, then in metres thereafter.
Rock coring begins at the river bed surface.
The competent rock surface encountered has been indicated in **bold** face type.

Location	**L22 E 12**		
Elevation	**Depth**		
213.35	0	deck level	
210.2	-3.15	river bed	(coring starts at -3.15m below deck surface)
	from	to	Core Description
	0	610	fractured limestone, slight weathering
209.59	**610**	890	fractured limestone, moderate weathering
	890	900	clay seam
	900	1.22	limestone, good quality, some fractures
			RQD = 48

Location	**L22 E 47.5**		
Elevation	**Depth**		
213.2	0	deck level	
210.18	-3.02	river bed	
	from	to	Core Description
	0	140	gravel & limestone rubble, severe weathering
	140	920	fractured limestone, moderate weathering
209.26	**920**	1.31	limestone, good quality
	1.31	1.41	shale with clay seams, limestone layers
			RQD = 25

Location	**L22 W 10**		
Elevation	**Depth**		
213.17	0	deck level	
210.12	-3.05	river bed	
	from	to	Core Description
	0	450	limestone with shale, clay seams, moderate weathering
	450	620	limestone, good quality
	620	690	fractured limestone
209.43	**690**	860	limestone, good quality
			RQD = 23

Location	**L22 W 32**		
Elevation	**Depth**		
213.15	0	deck level	
210.43	-2.72	river bed	
	from	to	Core Description
	0	240	fractured limestone, slight weathering
	240	800	limestone, some fractures, slight weathering
209.63	**800**	1.26	limestone, good quality
			RQD = 43
			Core tested from 800-984mm

Location	**L23 E 20**		
Elevation	**Depth**		
217.02	0	deck level	
214.66	-2.36	river bed	
	from	to	Core Description
	0	580	fractured limestone, moderate weathering
214.08	**580**	1.14	limestone with shale layers, fair quality
			RQD = 26

Location	**L23 E 48**		
Elevation	**Depth**		
217.12	0	deck level	
214.5	-2.62	river bed	
	from	to	Core Description
	0	620	weak shale with limestone layers, moderate weathering
213.88	**620**	1.21	limestone, good quality
	1.21	1.32	shale with clay seams, limestone layers
	1.32	1.45	limestone, good quality
	1.45	1.63	fractured limestone
			RQD = 23
			Core tested from 620-750mm

Location	**L24 E 5**		
Elevation	**Depth**		
221.45	0	deck level	
218.38	-3.07	river bed	
	from	to	Core Description
	0	205	limestone, some fractures
	205	410	limestone, good quality
217.97	**410**	810	limestone, good quality, some fractures
	810	1.22	limestone, good quality
	1.22	1.32	limestone, good quality, some fractures
	1.32	1.53	limestone, good quality

RQD = 52

Location	**L24 W 10**		
Elevation	**Depth**		
221.36	0	deck level	
217.73	-3.63	river bed	
	from	to	Core Description
	0	380	limestone, good quality
	380	530	fractured limestone
217.2	**530**	870	limestone, good quality
	870	960	fractured limestone
			RQD = 64
			Core tested from 0-150mm

Location	**L24 W 35**		
Elevation	**Depth**		
221.35	0	deck level	
217.58	-3.77	river bed	
	from	to	Core Description
	0	100	fractured limestone, moderate weathering
	100	440	limestone, some fractures
	440	550	fractured limestone
217.03	**550**	860	limestone, good quality
			RQD = 44

Location	**L25 E 46**		
Elevation	**Depth**		
224.7	0	deck level	
221.96	-2.74	river bed	
	from	to	Core Description
	0	450	gravel & limestone rubble, severe weathering
	450	580	limestone, slight weathering, good quality
221.38	**580**	1.08	limestone, good quality
	1.08	1.40	lost bottom two sections during core retrieval, intact limestone
			RQD = 67

Location	**L25 E 0**		
Elevation	**Depth**		
224.79	0	deck level	
221.74	-3.05	river bed	
	from	to	Core Description
	0	70	fractured limestone, moderate weathering
	70	210	limestone, good quality
	210	230	fractured limestone
221.51	**230**	650	limestone, good quality
	650	1.22	lost bottom sections during core retrieval, intact limestone
			RQD = 58
			Core tested from 70-205mm

Location	**L25 W 9**		
Elevation	**Depth**		
224.63	0	deck level	
221.84	-2.79	river bed	
	from	to	Core Description
	0	305	limestone, slight weathering
221.53	**305**	914	limestone, good quality
			RQD = 54

Location	**L25 W 60**		
Elevation	**Depth**		
224.7	0	deck level	
221.98	-2.72	river bed	
	from	to	Core Description
	0	400	gravel & limestone rubble, severe weathering
221.58	**400**	500	limestone, good quality
	500	640	fractured limestone, good quality
	640	900	limestone, good quality
	900	950	fractured limestone, good quality
	950	1.30	lost bottom two sections during core retrieval, intact limestone
			RQD = 38
			Core tested from 640-797mm

Location	**L25 NW 42.9**		
Elevation	**Depth**		
227.32	0	deck level	
223.64	-3.68	river bed	
	from	to	Core Description
	0	310	gravel & limestone rubble, severe weathering
	310	420	limestone, good quality
	420	560	fractured limestone, some rubble
223.08	**560**	850	limestone, good quality
	850	1.20	lost bottom sections during core retrieval, intact limestone
			RQD = 47

Location	**L25 NW 1**		
Elevation	**Depth**		
227.63	0	deck level	
223.97	-3.66	river bed	
	from	to	Core Description
	0	410	gravel rubble
223.56	410		encountered dense rock surface at 410mm

Location	**L26 E 2**		
Elevation	**Depth**		
227.79	0	deck level	
225.02	-2.77	river bed	
	from	to	Core Description
	0	260	fractured limestone
224.76	**260**	630	limestone, good quality
			RQD = 62
			Core tested from 360-531mm

Location	**L26 E 33**		
Elevation	**Depth**		
227.48	0	deck level	
224.76	-2.72	river bed	
	from	to	Core Description
	0	390	limestone with shale layers, some clay seams, slight weathering
	390	550	limestone, good quality
	550	560	clay seam
	560	650	limestone, good quality
	650	660	clay seam
224.1	**660**	990	limestone, good quality
			RQD = 20

Location **L26 W 40**

Elevation	**Depth**		
227.89	0	deck level	
225.07	-2.82	river bed	
	from	to	Core Description
	0	200	fractured limestone, slight weathering
	200	450	limestone, good quality
	450	470	clay seam
224.6	**470**	630	limestone, good quality
	630	920	limestone, good quality
			RQD = 65

Location **L26 W 11**

Elevation	**Depth**		
228.0	0	deck level	
225.26	-2.74	river bed	
	from	to	Core Description

abandoned; smooth rock surface, could not get core to advance into rock.
this location is approximately 15m west of the L26E2 core.

Location **L26 NW 62**

Elevation	**Depth**		
232.98	0	deck level	
229.63	-3.35	river bed	
	from	to	Core Description
	0	50	gravel/rubble
	50	450	limestone, good quality, some fractures
229.18	**450**	1.30	limestone, good quality
			RQD = 58

Location **L23 E 48**

Sample of clay seam within rock core
Atterberg Limits

LL	30.7	liquid limit
PL	18.2	plastic limit
PI	12.5	plastic index
ASTM	CL	soil classification

Test Hole Data
December 23&24, 2014

Notes

1. Soil types, strata, and groundwater conditions have been established only at test hole locations.
2. Soils are described according to the MTO Soils Classification System and OPSD 100.06.
3. Dimensions are in millimetres up to 1 metre, then in metres thereafter.
4. Test hole depths are relative to the top of existing deck surface.

Abbreviations

asph	-	asphalt	&	-	and
blds	-	boulders	w	-	with
blk	-	black	so	-	some
br	-	brown	tr	-	trace
BR	-	bedrock			
cl	-	clay(ey)	S	-	soil sample
cob	-	cobbles	Su	-	undrained shear strength (kPa)
conc	-	concrete			
cr	-	crushed			
f	-	fine			
gr	-	gravel(ly)			
gry	-	grey			
lt	-	light			
med	-	medium			
NFP	-	no further progress			
org	-	organics			
RF	-	rock fill			
Rk	-	rock			
sa	-	sand(y)			
si	-	silt(y)			
tps	-	topsoil			

L22 E 42 Deck Elevation 213.3

0	-	430	br si sa/tps mix w org roots -moist, loose	
430	-	1.23	br gr sa w flat limestone fragment Fill -moist, dense	Type 3 soils
1.23			NFP, br gr sa w limestone RF -saturated, dense	Type 4 soils

-standing water at 0.76m

L22 W 3 Deck Elevation 213.05 **610mm west of concrete deck**

0 weathered limestone BR on surface

L23 E 38 Deck Elevation 217.2

0	-	150	br sa tps w org roots -moist, loose	
150	-	1.21	br si cl sa w flat limestone fragment Fill -moist, compact - longitudinal timber at 910mm	
1.21			NFP, fractured limestone fragment Fill -moist, compact	Type 3 soils

-water not encountered

L24 E 22 Deck Elevation 221.45

0	-	130	br sa tps -moist, loose	
130	-	1.55	br sa & gr w rounded cob/blds Fill -moist, compact -boulders up to 250mm diameter	
1.55			NFP, Type 4 collapsing soils	

-standing water at 0.91m

L25 NW 10 Deck Elevation 227.73 **west side of deck**

0	-	2.13	standing water	
2.13	-	2.44	cob & flat limestone RF - saturated, dense	
2.44			NFP, RF	

-limestone bedrock expected at 4.2m
-standing water at 1.07m below deck

L25 E 27 Deck Elevation 224.78

0	-	130	br sa tps -moist, compact	
130	-	300	br si sa w gr/flat limestone fragment Fill -moist, compact	
300	-	1.83	br si sa & fractured limestone fragment Fill -moist to wet, compact -limestone fragments up to 300mm diameter	
1.83			NFP, limestone fragments / Type 4 collapsing soils	

-standing water at 1.17m

L25 W 1 Deck Elevation 224.9

0	-	150	br sa tps -moist, loose	
150	-	750	br si sa w gr & flat limestone fragment Fill -moist, dense	
750			NFP, RF/BR	

L26 W 15 Deck Elevation 227.99

0	-	230	br sa tps w org roots -moist, loose
230	-	1.52	br si sa & fractured limestone fragment Fill -moist, compact
			-limestone fragments up to 450mm diameter
1.52			NFP, limestone fragments / Type 4 collapsing soils

-concrete deck cap extended down to 1.12m from deck surface
-existing bedrock wall is present at 1.8m west of the concrete deck
-standing water at 1.12m

L26 E 10 Deck Elevation 227.75 **east side of deck**

0	-	1.22	standing water
1.22	-	1.4	gr & RF -saturated, dense
1.4			NFP, RF

-weathered limestone bedrock at 1.8m
-standing water at 0.61m below deck

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

03-February-2015

Terraspec
Attn : Shane Galloway

973 Crawford Drive
Peterborough, ON
K9J 3X1,

Phone: 705-743-7880
Fax:705-743-9592

Date Rec. : 28 January 2015
LR Report: **CA14436-JAN15**

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	5: W1
Sample Date & Time			23-Jan-15
Temperature Upon Receipt [°C]	---	---	5.0
pH [no unit]	30-Jan-15	10:29	8.19
Sulphate [mg/L]	02-Feb-15	09:47	6.0
Chloride [mg/L]	02-Feb-15	09:47	10

Brian Graham B.Sc.
Project Specialist
Environmental Services, Analytical

OnLine LIMS

0000338328

Photo 1 L22E12

Photo 2 L22E47.5

Photo 3 L22W10

Photo 4 L22W32

Photo 5 L23E20

Photo 6 L23E48

Photo 7 L24E5

Photo 8 L24W10

Photo 9 L24W35

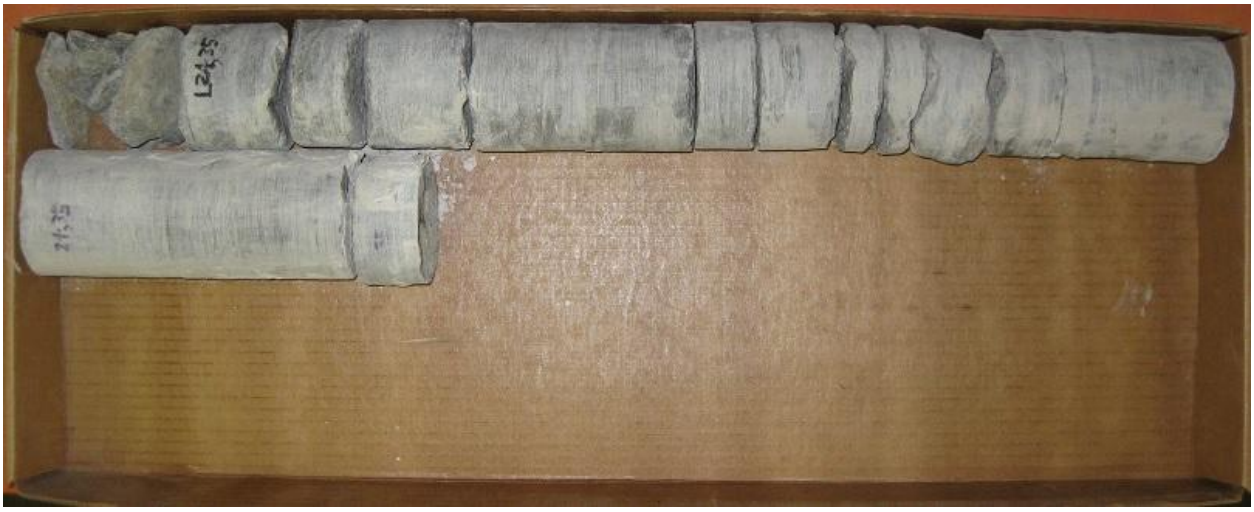

Photo 10 L25E46

Photo 11 L25N42.9, L25E0, L25W60

Photo 12 L25W9

Photo 13 L26E2

Photo 14 L26E33

Photo 15 L26W40

Photo 16 L26NW62

Water Levels and Flows

Trent Severn Waterway - Lock 26 Local Hydraulic Conditions[1]

Parks Canada Targets for Water Level Control [2]

Location	Summer Season		Winter Season	
	Maximum (m)	Minimum (m)	Maximum (m)	Minimum (m)
Upstream of Lock 26 (Lakefield)	232.02	231.92	232.17	231.62
Upstream of Lock 25 (Sawyer Creek)	227.14	226.98	227.29	226.23

Otonabee River Flows [3]

(Cubic Meters per Second)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.
Mean =	117	100	100	168	107	54	38	32	39	59	88	106
Max =	297	275	325	445	328	300	340	137	284	284	277	317
Min =	16	12	12	12	9	9	11	9	10	10	8	10

Notes:

1. The values on this page have been provided by Parks Canada only as guidance for the Contractor and should not be assumed to be absolute. It is the responsibility of the Contractor to accommodate the flows and water levels on site during the construction period.
2. Water levels are targets only and cannot be gauranteed throughout the construction period due to natural varaibilities in flows and needs to manage water level issues throughout the system.
3. Flow information is based on typical historic data and does not gaurantee that flow conditions throughout the construction period will behave in accordance with the values presented here.

Benchmark Information

Site Name : Parkhill Road Bridge **Latitude :** 0 **Elevation :** 0 m
Station Number : 0 **Longitude :** 0 **Ref No. :** 61
Description : 0

Site Name : Nassau Mills **Latitude :** 44 21 4 **Elevation :** 215.752 m
Station Number : 60U3257 **Longitude :** 78 17 35 **Ref No. :** 62
Description : NASSAU_MILLS C.N.RY., SWING BRIDGE OVER TRENT CANAL, IMMEDIATELY SOUTHWEST OF HIGHWAY SWING BRIDGE, 1.6 KM SOUTH OF LOCK NO. 22, TABLET IN NORTHWEST FACE OF NORTHEAST CONCRETE ABUTMENT, 49 CM SOUTHWEST OF NORTHEASTERLY CORNER AND 60 CM BELOW TOP.

Site Name : Nassau Mills **Latitude :** 0 **Elevation :** 213.738 m
Station Number : 0 **Longitude :** 0 **Ref No. :** 63
Description : TRENT-SEVERN WATERWAY NASSAU MILLS OIL GAUGE - NEW BRASS PLUG INSTALLED JULY 19, 2006. LOCATED APPROXIMATELY 15 FEET SOUTH OF GAUGE SHELTER.

Site Name : Nassau Mills **Latitude :** 0 **Elevation :** 213.727 m
Station Number : 0 **Longitude :** 0 **Ref No. :** 64
Description : TRENT-SEVERN WATERWAY NASSAU MILLS OIL GAUGE - NEW BRASS PLUG INSTALLED JULY 19, 2006. LOCATED APPROXIMATELY 15 FEET NORTH OF GAUGE SHELTER.

Site Name : Nassau Mills **Latitude :** 44 21 54 **Elevation :** 217.082 m
Station Number : 60U3258 **Longitude :** 78 17 28 **Ref No. :** 65
Description : NASSAU_MILLS CONCRETE DAM ON OTONABEE RIVER, 183 M NORTHWEST OF TRENT CANAL LOCK NO. 22, 1.8 KM NORTH OF HIGHWAY SWING BRIDGE, TABLET IN SOUTH FACE OF CONCRETE RETAINING WALL ON SOUTH (DOWNSTREAM) SIDE AND AT EAST END OF DAM, 1.1 M EAST OF WEST FACE OF EA

Site Name : Nassau Dam **Latitude :** 0 **Elevation :** 214.401 m
Station Number : 0 **Longitude :** 0 **Ref No. :** 66
Description : TRENT-SEVERN WATERWAY NASSAU MILLS DAM AT TRENT UNIVERSITY, NEW BM INSTALLED JULY 19 2006. LOCATED IN CENTRE BULL-NOSE OF DAM (NEAR OVER-HEAD LIGHT) APPROXIMATELY 2 FEET FROM EACH EDGE.

Site Name : Nassau Dam **Latitude :** 0 **Elevation :** 214.404 m
Station Number : 0 **Longitude :** 0 **Ref No. :** 67
Description : TRENT-SEVERN WATERWAY NASSAU MILLS DAM AT TRENT UNIVERSITY, NEW BM INSTALLED JULY 19 2006. LOCATED AT FAR END OF DAM APPROXIMATELY 2 FEET FROM UPSTREAM EDGE FENCING - NEAR END OF LOGGING RAIL.

Site Name : Lock 22 **Latitude :** 44 21 47 **Elevation :** 217.469 m
Station Number : 60U524 **Longitude :** 78 17 28 **Ref No. :** 68
Description : NASSAU_MILLS TRENT CANAL LOCK NO. 22, ON EAST SIDE OF OTONABEE RIVER, 1.6 KM NORTH OF HIGHWAY SWING BRIDGE, COPPER BOLT IN TOP OF COPING ON EAST SIDE OF CANAL, 7.3 M NORTH OF UPPER GATE AND 3.0 M EAST OF EAST WALL. ESTABLISHED BY DEPARTMENT OF TRANSPORT.

Site Name : Lock 22 **Latitude :** 0 **Elevation :** 0 m
Station Number : 0 **Longitude :** 0 **Ref No. :** 69
Description : 0

Site Name : Lock 23 **Latitude :** 44 22 23 **Elevation :** 221.101 m
Station Number : 60U525 **Longitude :** 78 17 24 **Ref No. :** 70
Description : NASSAU_MILLS TRENT CANAL LOCK NO. 23 ON SOUTHEAST SIDE OF OTONABEE RIVER, 2.6 KM NORTH OF HIGHWAY SWING BRIDGE OVER CANAL AT NASSAU MILLS, COPPER BOLT IN TOP OF COPING ON SOUTHEAST SIDE OF CANAL, 7.2 M NORTHEAST OF UPPER GATE AND 2.9 M SOUTHEAST OF SOUTHE

Site Name : Lock 23 **Latitude :** 0 **Elevation :** 221.132 m
Station Number : 0 **Longitude :** 0 **Ref No. :** 71
Description : TSW BENCHMARK

Site Name : Lock 24 **Latitude :** 44 22 52 **Elevation :** 222.408 m
Station Number : 60U3259 **Longitude :** 78 16 23 **Ref No. :** 72
Description : LAKEFIELD C.N.RY., IRON PIPE WITH BRASS CAP, 4.7 KM NORTH OF HIGHWAY SWING BRIDGE OVER CANAL AT NASSAU MILLS, 0.8 KM SOUTHWEST OF TRENT CANAL LOCK NO. 24, 8.7 M NORTHWEST OF CENTRE LINE OF TRACKS, 16.8 M SOUTHEAST OF CENTRE LINE OF PETERBOROUGH-LAKEFIELD

Site Name : Lock 24 **Latitude :** 44 23 17 **Elevation :** 224.784 m
Station Number : 72U414 **Longitude :** 78 16 12 **Ref No. :** 73
Description : LAKEFIELD TRENT CANAL LOCK NO. 24, 4.2 KM SOUTH OF HIGHWAY NO. 28 IN VILLAGE, TABLET IN TOP OF CONCRETE WALL ON SOUTHEAST SIDE OF CANAL, 11.3 M NORTHEAST OF UPPER GATE, 4.9 M NORTHEAST OF MANUAL CONTROL FOR UPPER GATE, 91 M SOUTHEAST OF NORTHWEST EDGE OF

Site Name : Lock 26 **Latitude :** 44 24 0 **Elevation :** 227.032 m
Station Number : 60U3260 **Longitude :** 78 15 47 **Ref No. :** 74
Description : LAKEFIELD CONCRETE DAM ON OTONABEE RIVER, 2.6 KM SOUTHEAST OF HIGHWAY HIGH LEVEL BRIDGE OVER TRENT CANAL IN VILLAGE, OPPOSITE END 38 M NORTHWEST OF LOCK NO. 25, TABLET IN SOUTHWEST FACE OF CONCRETE RETAINING WALL ON SOUTHWEST SIDE AND AT SOUTHEAST END OF

Site Name : Lock 25 **Latitude :** 44 24 0 **Elevation :** 227.799 m
Station Number : 60U526 **Longitude :** 78 15 47 **Ref No. :** 75
Description : LAKEFIELD TRENT CANAL LOCK NO. 25 ON SOUTHEAST SIDE OF OTONABEE RIVER, 2.6 KM SOUTHEAST OF HIGHWAY HIGH LEVEL BRIDGE OVER CANAL IN VILLAGE, COPPER BOLT IN TOP OF COPING ON SOUTHEAST SIDE OF CANAL, 7.3 M NORTHEAST OF UPPER GATE AND 2.9 M SOUTHEAST OF SOUTH

Site Name : Lock 25 **Latitude :** 44 24 0 **Elevation :** 227.832 m
Station Number : 72U413 **Longitude :** 78 15 47 **Ref No. :** 76
Description : LAKEFIELD TRENT CANAL LOCK NO. 25, 2.6 KM SOUTH OF HIGHWAY NO. 28 IN VILLAGE, TABLET IN TOP OF CONCRETE WALL ON SOUTHEAST SIDE OF CANAL, 2.3 KM SOUTHWEST OF LOWER GATE, 1.5 M NORTH OF STAIRWAY TO DOWNSTREAM APPROACHES, 1.2 M NORTHEAST OF SOUTHWEST END AND

Site Name : Lock 26 **Latitude :** 44 25 12 **Elevation :** 233.155 m
Station Number : 60U527 **Longitude :** 78 16 30 **Ref No. :** 77
Description : LAKEFIELD TRENT CANAL LOCK NO. 26, ON SOUTHWEST SIDE OF OTONABEE RIVER, 0.3 KM SOUTHEAST OF HIGHWAY HIGH LEVEL BRIDGE OVER CANAL IN VILLAGE, COPPER BOLT IN TOP OF COPING ON NORTHEAST SIDE OF CANAL, 7.2 M NORTHWEST OF UPPER GATE AND 2.9 M NORTHEAST OF NORT

Mitigation Measures

(Reference Parks Canada, Basic Impact Analysis)

Appendix D: Environmental Practices and Mitigation Measures

Responsible Authority: Parks Canada Agency - Trent Severn Waterways
Peterborough Locks Concrete Rehabilitation - Lock 26 Lakefield
14 Hill Street, Lakefield, ON, K0L 2H0

Parks Canada Project No. 30029883-4535-36

The purpose of this record is to monitor the implementation of mitigation measures and best management practices identified in the Parks Canada Basic Impact Analysis (BIA) Approach Wall Repairs - Locks 22-26 Otonabee River (Parks Canada Ontario Waterways-Trent Severn, November, 2015 and Update August, 2016). It is the responsibility of the Contractor to ensure that this record is completed and approved by the Consultant over the duration of the project to the satisfaction of the Departmental Representative. This environmental Mitigation Monitoring Report form must be completed in full. Specify in the table below whether the mitigation measures and associated best management practices have been applied. If a mitigation measure has not been applied, specify the reason(s) why this was not done.

Furthermore, although some of the pertinent legislation, regulations, guidelines and policies are noted in the mitigation, the information is not considered necessarily complete. It is to be expected that new, amended, modified or otherwise updated legislation, regulations, guidelines and policies will come available over time. The Contractor is responsible to ensure that all applicable legislation, regulations, guidelines and policies are adhered to.

No.	Environmental Mitigation Measure	Implementation Schedule/Date	Person/Title/Firm Responsible	Compliance (Task Complete – Yes or No/Date) - If No, provide reason
1.0	General:			
1.1	Inform Environmental Officer, Sarah Bunting - Trent Severn Waterway in Peterborough (Phone: (705) 750-4959, email: sara.bunting@pc.gc.ca) regarding any changes to project plans and/or scheduling. Any changes not assessed under the Parks Canada Agency (PCA) BIA (Initial or Secondary) will require approval from PCA and may require further mitigation measures.			

No.	Environmental Mitigation Measure	Implementation Schedule/Date	Person/Title/Firm Responsible	Compliance (Task Complete – Yes or No/Date) - If No, provide reason
1.2	The Parks Canada Environmental Officer, Trent Severn Waterway will outline all the prescribed mitigation measures, including those found in BMP's, in a construction start-up meeting with the project manager and the contractor, to ensure that all on-site personnel are aware of these mitigation measures.			
1.3	Ensure that all site personnel are aware of, and comply with the mitigation measures set out herein.			
1.4	Should conditions at the work site indicate that there are unforeseen negative impacts to fish, wildlife, cultural or visitor experience resources, all works shall cease until the problem has been corrected and/or any required input can be obtained by Parks Canada or other relevant authorities. The Trent-Severn Waterway has the right to require that work be altered or ceased immediately.			
1.5	Prior to commencement of work, inspect access points and work areas for any nests or dens and avoid disturbing any that may be found.			
1.6	Any additional measures necessary to mitigate direct effects to navigation included as conditions of the Navigation Protection Act authorization shall be abided by and implemented as directed.			
2.0	Water quality:			
2.1	Water quality impacts due to construction shall be managed such that water quality parameter concentrations shall not exceed existing conditions or where existing conditions are below Ontario Drinking Water Quality Guidelines (ODWQG) or Canadian Council of Ministers of Environment (CCME) Canadian Water Quality Guidelines for Protection of Aquatic Life (http://ceqg-rcqe.ccme.ca/en/index.html#void), then the more stringent of these guidelines shall apply.			
2.2	Ensure that sediment settling basins are of adequate size to compensate for excess sediment run-off and erosion (i.e. storm water run-off, misdirect drainage).			
2.3	Turbidity curtains are not to act as secondary sediment curtains. Supplementary sediment and erosion control measures should be installed prior to construction activities ad should be added upon / reinforced as necessary.			

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3.0	Fish and Fish Habitat:			
3.1	All in water work should be completed before March 15 to protect fish populations during their spawning and nursery periods. Should work be required beyond this date, additional mitigation measures may be required based on site specific characteristics.			
3.2	Maximum increase of suspended sediment concentration shall not exceed 25 mg/L over background levels during any short-term exposure period (e.g. 24-h). For longer term exposure (e.g., 30d or more), average suspended sediment concentrations shall not be increased by more than 5 mg/L over background levels			
3.3	Maximum increase in turbidity shall not exceed 8 NTU over background levels for short-term exposure (e.g. 24 h period). Maximum average increase in turbidity shall not exceed 2 NTU over background levels for longer term exposures (e.g. 30-d period).			
3.4	The proponent is advised to abide by those mitigation measures and best management practices outlined within DFO's online guidance materials: Measures to Avoid Causing Harm to Fish and Fish Habitat (http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html)			
3.5	Schedule work to protect Walleye spawning habitat d/s of east pier and ensure availability to fish for spring spawning.			
4.0	Dewatering Operations:			
4.1	Where feasible, all lock and approach wall work shall be completed in the dry by de-watering the work area and diverting and/or pumping flows around cofferdams placed at the limits of the work area.			
4.2	Existing river flows shall be maintained downstream of the dewatered work area without interruption as per operational guidelines, during all stages of the work.			
4.3	Fish shall be removed from the work area prior to complete dewatering and released alive in the river.			
4.4	Flow dissipaters and/or filter bags, or equivalent, shall be placed at water discharge points to prevent erosion and sediment release.			

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4.5	Silt or debris that has accumulated around the temporary cofferdams shall be removed prior to their withdrawal. All cofferdam material will be removed from the watercourse upon decommissioning.			
4.6	Fine materials such as limestone screening, unwashed rocks, or materials that have the possibility of being suspended or transported downstream will not be used.			
4.7	Turbidity curtains shall be used when constructing cofferdams: • they should be placed in accordance with specifications as close to the cofferdam as possible to minimize the area of potential impact of sedimentation, • Turbidity curtains should not be used as a primary or secondary settling area for dewatering activities, • Place the curtain at the shoreline or cofferdam and move into desired location to help ensure fish are not trapped inside. Ensure edges are tight to shoreline to reduce the risk of sediment getting out, or fish getting in.			
4.8	Sediment control measures to be maintained during dewatering activities shall be designed and implemented as required to meet water quality criteria and accommodate flow rates and sediment characteristics: • determine maximum flow rate for dewatering activities • if sediment consists or relatively large particles (primarily gravel or sand) a single treatment using basic technology such as a sediment trap or sediment bag may be adequate, • if sediment consists of relatively fine particles (silt and/or clay), the effluent will likely require more advanced technology, such as a filter press or chemical treatment with anionic flocculant and a filtration method, • if the sediment contains crushed concrete dust or concrete washwater, follow the BMP's for working with concrete, • if the sediment consist of a large spectrum of particle sizes, primary treatment may be required to remove larger particles, followed by secondary treatment to remove finer particles.			

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4.9	Fish shall be relocated safely during dewatering operations: • Staff must be on hand with appropriate equipment to remove any stranded fish in the dewatered area. As water levels drop in the work area monitor the deeper pool areas where fish are congregating. If safe to do so Seine nets or Dip nets can be operated by field staff to remove the fish. A qualified consultant may be required to remove fish with specialized equipment where conditions dictate. • Fish shall be immediately transported to the closest open water source and released. Try to minimize the length of time fish are out of the water. • Contact EA staff should there be any issues with fish removal.			
4.10	Pumping activities shall be undertaken with the following considerations: • Typically submersible pumps are used for dewatering and they should be placed in the low point of the work site. If there is high turbidity consider pre-filtering water that goes to the pump by placing it in a perforated drum with clear stone around the outside or other similarly designed approach. • If the area is likely to contain a large number of fish ensure that there is a fish screen that complies with DFO guidelines to prevent impingement or entrainment of fish. • Discharged water should be filtered by means of an appropriately designed sediment basin, anionic flocculation or by physical means such as a filter press. • Discharge of pumped water must be a manner that does not cause additional erosion • Discharge water quality shall be monitored daily or as required if nature of work or mitigation changes. Should there be any observable turbidity at the discharge point work should be halted until the source is determined and additional mitigation measures are applied. • If turbidity monitoring is conducted during periods of visible turbidity, measurements shall be in Nephelometric Turbidity Units (NTU). The Water Quality Guidelines for the Protection of Aquatic Life will determine acceptable concentrations and duration of turbidity.			

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4.11	Eliminate unnecessary sources of sediment to the dewatering area by ensuring surface water flow is prevented from entering the work site.			
4.12	Upon completion of work and prior to re-watering, all debris shall be completely removed and the area shall be restored to its original state or better.			
4.13	Re-watering of the worksite will require the following considerations: • Ensure that all construction material/debris is removed from the site. • Remove any excess sediment sources and cap with clean rock or gravel if appropriate. • Fish timing windows for in-water work still apply. • Sediment control measures and exclusion fencing must be removed in a way that prevents the escape or re-suspension of sediments.			
5.0	Site and Equipment Management			
5.1	Use clean, well maintained heavy equipment and machinery, preferably fitted with fully functional emission control systems/muffler/exhaust baffles, engine covers, etc.			
5.2	All materials and equipment used for the purpose of site preparation and project completion shall be operated and stored in a manner that prevents any deleterious substance (e.g. petroleum productions, debris etc.) from entering the water.			
5.3	Temporary fencing, where practical, shall secure the immediate construction site during the construction phase.			
5.4	Any stockpiled materials, or concrete debris shall be stored and stabilized a safe distance away from any watercourse, drainage course or swales to prevent erosion and subsequent entry into the Otonabee River or removed from the site, in accordance with all federal, municipal and provincial regulations.			
5.5	A properly contained staging area set back at the maximum available on-site distance from the water's edge (recommended 30 m minimum) shall be established for the storage of materials, liquid products (in a secure area on impermeable pads) and equipment.			

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5.6	Vehicle and equipment (e.g. pumps, chainsaws, etc.) re-fuelling and/or maintenance shall be conducted off slopes and away from the water on impermeable pads to allow for full containment of spills, at a recommended minimum distance of 30 m from water.			
5.7	Any part of a vehicle and/or equipment entering the water shall be free of fluid leaks and externally degreased to prevent any deleterious substance from entering the water.			
5.8	Only clean material free of fine particulate matter shall be placed in the water.			
5.9	A spill response kit will be maintained on site; ensure that all personnel on-site are trained in the use of the spill control and response procedures, including spill source and receptor recognitions, spill prevention techniques and spill reporting protocol. The contractor will ensure that adequate additional resources are available. The Ontario Ministry of Environment and Climate Change Spills Action Center, (1-800-268-6060) shall be immediately notified of any spills occurring on site. Parks Canada shall also be notified.			
5.10	Noise during construction shall be managed to acceptable levels; the contractor will be required to: • abide by municipal noise by-laws • keep idling of construction equipment to a minimum • maintain equipment in good working order • be available to address any concerns that may arise • schedule work to avoid sensitive time periods			
6.0	Sediment and Erosion Control			
6.1	Sediment and erosion control measures shall be implemented prior to work and maintained during the work phase, to prevent entry of sediment into the water.			

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6.2	Prior to commencement of work, install and maintain water, erosion and sediment control measures to both prevent water from entering the work site and sediment from leaving and entering the watercourse. The following principals should be considered: • Diversions to limit run-on water, • Reduction of erosional forces by surface water velocity reduction, • Reduction of sediment development through sediment collection or anchoring, • Sedimentation of mobilized sediments, • Filtration of sediment-carrying flows, • Collection of captured or contained sediments, • Treatment of pH (hydronium and hydroxide).			
6.3	A turbidity curtain will be used during installation and removal of the cofferdams. It will be maintained in the water around all working areas during construction to contain and control the suspension of fines. If water levels/conditions do not permit the flotation of a turbidity curtain, other measures as approved will be implemented.			
6.4	All sediment and erosion control measures shall be inspected daily to ensure they are functioning properly and are maintained and/or upgraded as required to prevent entry of sediment into the water.			
6.5	If sediment and erosion control measures are not functioning properly, no further work shall occur until the sediment and/or erosion problem is addressed.			
6.6	All disturbed areas of the work site shall be stabilized immediately following work and re-vegetated as soon as conditions allow. All exposed areas should be covered with erosion control blankets or other measures to keep the soil in place and prevent erosion until vegetated in the spring.			
6.7	Sediment and erosion control measures shall be left in place until all areas of the work site have been stabilized.			

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7.0	Working with Concrete in and Around Water			
7.1	Concrete leachate is alkaline and highly toxic to fish and aquatic life. Measures must be taken to prevent the incidence of concrete or concrete leachate from entering the watercourse. Maintain complete isolation of all cast-in-place concrete and grouting from fish-bearing waters for a minimum of 48 hours if ambient air temperate is above 0ºC or until significantly cured to allow the pH to reach neutral levels. Avoid project activity during wet weather conditions.			
7.2	Ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials (concrete) will **not** deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any watercourse.			
7.3	Completely isolate all work from the watercourse and any water that enters the watercourse or storm water system. Any concrete wash water shall be directed to a collection basin or vegetated area to effectively remove all suspended solids, dissipate velocity and prevent deleterious substances from entering the watercourse. Control turbidity of all water released to watercourse during work; in the event of silting or turbidity caused by construction activity, contractor shall stop all work and install additional silt barriers as necessary to ensure watercourse is protected.			
7.4	All concrete, sealants, or other compounds used for this project shall be utilized according to the appropriate Product Technical Data Sheet, stating guidelines and methods for proper use, and provided by the manufacturer of the product.			
7.5	A properly contained staging area set back at the maximum available site distance from the water's edge (recommended 30 meter minimum) shall be identified for the storage of materials, liquid products (in a secure area on impermeable pads) and equipment.			

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7.6	A spill response kit shall be maintained on site; ensure all personnel on-site are trained in the use of spill control and response procedures, including spill source and receptor recognitions, spill prevention techniques and spill reporting protocol. Any spills will be immediately contained and cleaned up in accordance with provincial regulatory requirements. The Ontario Ministry of the Environment Spills Action Centre, (1-800-268-6060) shall be immediately notified of any spills occurring on site; Parks Canada will also be notified			
7.7	For underwater pouring: • use Anti-washout Admixture to decrease the percentage of concrete fines released to the water column • use grout bags where possible to further contain the concrete • ensure placement of a turbidity curtain during the pour and left in place until pH is ≤ 9 • ensure that fish are not trapped within the turbidity curtain during placement • stop placement of concrete if fish kill is observed and contact EA staff.			
7.8	Filter material will consider the grain size characteristics of the concrete sediment and shall be designed around the principals of maintaining sufficient hydraulic flow and prevention of particle movement through the material.			
7.9	Wash equipment away from water and provide containment facilities for the wash-down water from concrete delivery trucks, concrete pumping equipment and other tools and equipment.			
7.10	Any concrete wash water shall be directed to a collection basin to effectively remove all suspended solids, dissipate velocity and prevent deleterious substances from entering the watercourse.			

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7.11	Concrete debris and dust generated as a result of various concrete work shall be removed in a way that will ensure material does not enter the waterway. All debris including unused aggregate/concrete rubble shall be completely removed and area restored to original state upon completion of work.			
7.12	Conduct work around water in general accordance with the following guidelines, where not specifically directed in this appendix: www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf			
8.0	Vegetation			
8.1	Ensure that the work is not affecting species at risk			
8.2	Ensure that timing and locations of Vegetation Removal Activities do not interfere with visitor experience opportunities (boating swimming, hiking, etc.)			
8.3	Vegetation removal should not be undertaken during between March 15th and June 30th in order to prevent impact to fish habitat.			
8.4	Trees, shrubs and vegetation which are to be removed for work should be properly identified and tagged for review.			
8.5	Root systems of trees identified to remain should be properly delineated and fenced off, so as to protect the root systems from being crushed and impacted by machinery.			
8.6	Migratory birds, their nests and eggs are protected under the Migratory Birds Convention Act (1994). Project works or activities are potentially disruptive activities to birds and should be avoided during breeding times. No vegetation shall be removed from April 1st to August 27th to protect nesting birds unless a qualified Biologist conducts nesting surveys prior to work.			
8.7	Where it is necessary to remove mature vegetation at any time of year, an inventory of species to be removed, coupled with a replanting plan using native species shall be submitted.			
8.8	Clear vegetation from unstable or erodible banks by hand, where possible avoid the use of heavy machinery.			

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8.9	Should any vegetation require chipping/mulching, the after product will be stored onsite for the duration of the project to supplement erosion and sediment control methods when required.			
8.10	The success of all vegetative plantings shall be assessed through visual site inspections not less than once each spring and fall for the first two growing seasons following planting. If at any time during the monitoring period any plantings are found dead or failing, mitigation measures shall be implemented to reduce the risk of future failure and the plants shall be replaced and monitored accordingly.			
8.11	Every effort will be made to retain as much of the natural vegetation as reasonably possible to help ensure bank stability, control erosion and expedite re-colonization of vegetative cover.			
8.12	Minimize clearing as much as possible to maintain riparian vegetation cover and windbreaks, where possible maintain vegetated buffer at shoreline and minimize clearing near water bodies. If buffers cannot be maintained, avoid grubbing of vegetation root mass in proximity to shorelines and stream banks.			
8.13	When practical, alter riparian vegetation in the right-of-way by hand. If machinery must be used, operate machinery on land and in a manner that minimizes disturbance to the banks of the water body.			
8.14	Whenever possible, vegetation should be trimmed in early spring, late fall or winter. Trimming when the plant is actively growing(i.e. late spring, summer and early fall) can further stimulate growth, weakening the plant and making is susceptible to disease.			
8.15	Prune limbs close to the tree trunk . For a clean cut, make a shallow undercut first, and follow with the top cut. Do not use an axe for pruning.			
8.16	When cutting trees, cut trees off at ground level and do not leave pointed stumps.			

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8.17	Restore banks to original conditions or as directed by Parks Canada representative, where disturbance occurs outside predefined re-vegetation limits.			
8.18	All disturbed surfaces and shorelines shall be stabilized and re-vegetated as soon as possible after project completion. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g. cover exposed areas, where machinery will not be operating, with erosion control blankets to keep soil in place and prevent erosion) and vegetate in the following spring.			
9.0	Cultural Resources, Natural Landscape and Archeological Resources			
9.1	Cultural Resources, Natural Landscape and Archaeological Resources shall be protected:			
9.2	Approach Wall- Recording: Given the demolition of the walls, and in the absence of as-built drawings and a record of changes over time, Parks Canada personnel shall undertake a basic heritage recording of the walls to be replaced. This task shall be accommodated by the contractor.			
9.2.1	Heritage recording will consist of sufficient photo documentation, measurements, and description of the timber cribbing, concrete capping and the assembly details (joints, etc.). The contractor shall assist to accommodate access for such needs.			
9.3	Impacts to known or potential Archeological Resources shall be managed and mitigated.			

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9.3.1	The location for the installation of cofferdams should be reviewed by a Parks Canada underwater archaeologist to ensure that no significant known or potential in-water cultural resource will be impacted without a defined mitigation measure by the construction activities at the site. (This will be coordinated through contractor submission review.)			
9.3.2	Terrestrial archaeological resources not necessarily apparent above ground may exist underground and work should be completed with care such that any cases may be identified and addressed accordingly.			
9.3.3	The access route location should be constructed using gravel or larger stone rather than levelling or excavating soils on the embankments so that potential archaeological resources are not impacted by construction.			
9.3.4	The approximate area for historic buildings should be protected from additional impact from construction activities. Potential mitigation includes, but is not limited to laying metal sheeting over the location or gravel to prevent further compaction.			
9.4	Should any artifact be found that could be of historical significance work shall stop until the object can be assessed; contact Trent-Severn Waterway, Peterborough Office at 705-750-4900.			

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10	Species at Risk			
10.1	Should work-related activities have potential to negatively impact Species at Risk, contact an EA officer for guidelines on how to proceed.			
10.2	All measures must be taken not to impact these species or their habitat and be consistent with any applicable Recovery Strategy and Action Plan. Blandings Turtle and Eastern Musk Turtle have proposed critical habitat identified within project limits at L24, L25 and L26. Butternut and Common Nighthawk have been identified within 5km of the general project area. The following specific mitigation measures are provided such that the federal Species at Risk Act (SARA) and provincial Endangered Species Act will not be contravened.			
10.3	To protect Blandings and Eastern Musk Turtles during hibernation, water drawdown should occur either before or as soon after boating navigation season as possible and not be lowered below normal winter operating levels if possible.			
10.4	If a turtle is found within the limits of the project fencing, it should be left alone to leave the area if possible, or the animal should be gently placed outside the construction site. Typically, animals should not be released more than 250 m from the capture site. Release sites should be near water with vegetative cover for shelter.			
10.5	If turtles or any other Species at Risk are observed on or near the worksite, the species must not be harmed or harassed. If the species cannot leave the site, the contractor must immediately stop the works and contact the Canadian Wildlife Service.			
10.6	Should Butternut trees be identified they are not to be removed and measures to protect the tree and roots using fencing will be implemented.			

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10.7	Common Nighthawk will not be present during time of work due to southern migration.			
10.8	Should any Species at Risk be encountered, work shall stop until advise is provided by the Parks Canada Environmental Assessment Officer - contact at Trent Severn Waterway, Peterborough Office, (705) 750-4900			
11	Invasive Species			
11.1	Any equipment of vehicles which are to be used in water should be thoroughly cleaned, before and after use, of any visible mud, vegetation, mussels, etc.			
11.1.1	Vessels/equipment should be drained of standing water			
11.1.2	Vessels/equipment should ideally be cleaned with hot water (>50 °C) at high pressure (>250 psi)			
11.1.3	Vessels/equipment should be dried for 2 - 7 days in sunlight before transported between water bodies			
11.1.4	Cleaning of vessels/equipment should be conducted away from water bodies at a recommended distance of at least 30 m from the shoreline			
11.2	Mud, dirt and vegetation should be cleaned from clothing and footweat prior to entering the work site, and prior to leaving the work site.			
11.3	Should an invasive species be encountered (or at least suspected), a photo and report of the specimen should be sent to the Invading Species Hotline at 1-800-563-7711 or online at EDDMapS Ontario, https://www.eddmaps.org/ontario/			
11.3.1	Conduct a site assessment for invasive species plant infestations prior to carrying out field activities.			
11.4	Use weed-free material (i.e. sand, gravel, etc.) for erosion control and stabilization.			
11.5	Use weed free seed and confirm that seed mix to be used for re-vegetation purposes does not (potentially) contain invasive plants.			

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11.5.1	Seed purchased commercially should have a label that states the following: • Species, • Purity: Most seed should be no less than 75% pure and preferably over 85% pure. The rest is inert matter, weed seed and other seed, • Weed seed content: the tag should state NO invasive plants are present. Only certified weed-free seed should be used, and • Germination of the desired seed: Germination generally should be not less than 50% for most species, although some shrubs and forbs will have lower percentages.			
11.6	Move only weed/contaminant-free materials into non-infested areas. Moving materials from one infested location to another within a particular zone may not cause contamination, but moving materials from infested to non-infested areas could lead to the introduction and spread of invasive plants.			
11.7	Workers should familiarize themselves with invasive species potentially present within the work site areas: • Dog-strangling Vine: https://www.ontario.ca/document/dog-strangling-vine • Giant Hogweed: https://www.ontario.ca/document/giant-hogweed • Purple Loosestrife: https://www.ontario.ca/document/purple-loosestrife-0 • Round Goby: https://www.ontario.ca/document/round-goby • Rusty Crayfish: https://www.ontario.ca/document/rusty-crayfish • Spiny Waterflea: https://www.ontario.ca/document/spiny-and-fishhook-water-flea			

NOTES: _____

Completed by:

Name: _____ Title: _____

Firm: _____ Telephone No.: _____

Signature: _____ Date: _____