

**SPECIFICATIONS FOR  
HARBOUR IMPROVEMENTS  
BALSAM BAY, MB  
  
SOLICITATION NUMBER F2470-150020/A**



Department of Fisheries & Oceans  
Small Craft Harbours Branch  
Winnipeg, Manitoba

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**01 11 05 – GENERAL INSTRUCTIONS**

**Part 1 General**

**1.1 MEASUREMENT FOR PAYMENT**

- .1 No measurement will be made under this Section.

**1.2 DESCRIPTION OF WORK**

- .1 The work site described in this specification is located at the Balsam Bay Public Wharf. Balsam Bay is located on the east shore of Lake Winnipeg at the location shown on drawing BB-1 of 2.
- .2 The work under this contract covers the following:
  - .1 Supply and installation of a steel sheet pile wavebreak wall and related work on the north side of the wharf approach.
  - .2 Repairs to the existing steel cap channel on the main wharf wavebreak wall.
  - .3 The dredging of the entrance channel and a portion of the harbour basin.
- .3 The work to be done by the Contractor under this Contract shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, insurance, and all things necessary for and incidental to the satisfactory performance and completion of all work as specified herein. All work to be done in accordance with details shown on the accompanying plans as specified herein.

**1.3 DEFINITIONS**

- .1 The word "provide" means "supply and install".
- .2 For purposes of this contract, "Departmental Representative", "Architect/Engineer" and "Engineer" shall have the same meaning.

**1.4 WORK SCHEDULE**

- .1 Provide within 10 working days after Contract award, schedule showing anticipated progress stages and final completion of work within time period required by contract documents.
- .2 Interim reviews of work progress based on work schedule will be conducted as decided by Engineer and schedule updated by Contractor in conjunction with and to approval of Engineer.
- .3 Work under this contract is to be performed Completion in a timely manner. Commence planning and preparatory work immediately upon receipt of official notification of acceptance of Contract and schedule the work so that the project will be completed **February 28, 2016**.
- .4 Work sequence:
  - .1 Before work is undertaken, ensure that all materials and trades required are available to finish work in as short a period as possible.
  - .2 No area to be renovated shall be placed out of service until it is confirmed that there shall be no need to stop the work waiting for receipt of materials, equipment or labour.

**1.5 CERTIFICATES AND TRANSCRIPTS**

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.

**1.6 FEES, PERMITS AND CERTIFICATES**

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

**1.7 MEASUREMENT FOR PAYMENT**

- .1 Notify Engineer sufficiently in advance of operations to permit required measurements for payment.
- .2 Submit to Engineer, at least 14 days before Information for first application for payment, cost breakdown, Progress Payment in detail as directed by Engineer, for parts of Work, aggregating total amount of Contract Price, so as to facilitate evaluation of applications for payment. After approval by Engineer, cost breakdown will be used as basis for progress payments.

**1.8 INTERPRETATION OF DOCUMENTS**

- .1 In the event of discrepancies or conflicts in interpreting the Plans (drawings) and Specifications, Specifications take precedence over drawings bound with specifications.
- .2 Drawings and specifications are complementary. When work is shown or mentioned on the drawings but is not indicated in the specifications, or when work is indicated in the specifications but is not shown or mentioned on the drawings, it shall nevertheless be included in the Contract.
- .3 The sub-division of the Specification into sections, identified by title and number, is for convenience only and does not modify the singularity of the document, nor does it operate to make or imply that the Engineer is an arbiter to establish the limits or extent of contract between Contractor and Subcontractors or to determine the limits or extents of work that may be decided by trade unions or contractors' organizations. Extras to the Contract will not be considered on the grounds of differences in interpretation of the Specification and/or Drawings as to which trade performs the work.
- .4 Do not scale off drawings.

**1.9 CONTRACTOR'S USE OF SITE**

- .1 Co-ordinate use of premises under direction of the Engineer.
- .2 Do not unreasonably encumber the site with materials and equipment.
- .3 Assume full responsibility for protection and safekeeping of products under this Contract.
- .4 Move stored products or equipment which interfere with operations of Engineer or other harbour users.
- .5 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .6 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.

- .7 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Engineer.
- .8 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

#### **1.10 EXISTING SERVICES**

- .1 Notify Engineer and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Engineer 72 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions.
- .3 Establish location and extent of service lines in area of work before starting Work. Notify Engineer of findings.
- .4 Submit schedule to and obtain approval from Engineer for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .5 Where unknown services are encountered, immediately advise Engineer and confirm findings in writing.
- .6 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .7 Record locations of maintained, re-routed and abandoned service lines.

#### **1.11 DOCUMENTS REQUIRED**

- .1 Maintain at job site, one copy each document as follows:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Reviewed Shop Drawings.
  - .5 Change Orders.
  - .6 Other Modifications to Contract.
  - .7 Copy of Approved Work Schedule.
  - .8 Health and Safety Plan and Other Safety Related Documents.
  - .9 Other documents as specified.

#### **1.12 CODES AND STANDARDS**

- .1 Perform work in accordance with latest editions of National Building Code of Canada (NBC) and any other code of provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.
- .2 Work to meet or exceed requirements of contract documents, specified standards, codes and referenced documents.

**1.13 PROJECT MEETINGS**

- .1 Engineer will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.

**1.14 SETTING OUT OF WORK**

- .1 Engineer will provide only those survey control points and set such stakes as necessary to define general location, alignment and elevations of work. Give engineer reasonable notice of requirements for such control points and stakes.
- .2 Set grades and lay out work in detail from control points and grades established by Engineer.
- .3 Provide devices needed to lay out and construct work.
- .4 Supply such devices needed to lay out and construct work.
- .5 Supply such devices as straight edges and templates required to facilitate Engineer's inspection of work.
- .6 Supply stakes and other survey markers required for laying out work.

**1.15 ADDITIONAL DRAWINGS**

- .1 Engineer may furnish additional drawings for clarification. These additional drawings have same meaning and intent as if they were included with plans referred to in Contract documents.
- .2 When additional drawings and instructions are required by the Contractor, provide reasonable notice in writing to the Engineer in advance of the date they are required.

**1.16 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.

**1.17 SITE INSPECTION**

- .1 The submission of a tender is deemed to be a confirmation of the fact that the Tenderer has inspected the site and is fully conversant with all the conditions under which the work is to be carried out.

**1.18 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 specified by standard 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.

**1.19            SECURING WORK AREA**

- .1        Secure the work areas in each stage in an approved manner. This includes fencing or barricades to prevent public access to any areas where construction activities occur and construction materials are stored.

**1.20            VEHICLE AND PEDESTRIAN PROTECTION**

- .1        Provide snow fencing, wooden barriers, or other approved barriers to prevent vehicles and pedestrians from accessing the site during construction.
- .2        Contractor shall provide appropriate signage for vehicle and pedestrian protection.
- .3        All barriers shall include delineation and reflectors to stand out at nightfall.

**1.21            DRAWINGS**

- .1        The following drawings are to be read in conjunction with this specification:
  - .1        BB-1 Harbour Improvements
  - .2        BB-2 Harbour Improvements
  - .3        BB-3 Harbour Improvements

**Part 2           Products**

**2.1            NOT USED**

- .1        Not Used.

**Part 3           Execution**

**3.1            NOT USED**

- .1        Not Used.

**END OF SECTION**

**01 35 29 – HEALTH AND SAFETY REQUIREMENTS**

**Part 1 General**

**1.1 MEASUREMENT FOR PAYMENT**

- .1 No measurement will be made under this Section.

**1.2 REFERENCES**

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .3 Province of Manitoba
  - .1 The Workers Compensation Act (latest edition).

**1.3 SUBMITTALS**

- .1 Submit site-specific Health and Safety Plan: Within 10 days after date of Notice to Proceed and prior to commencement of Work.
- .2 Submit copies of incident and accident reports to Engineer.
- .3 Submit WHMIS MSDS – Material Safety Data Sheets to Engineer
- .4 Engineer will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor after receipt of plan. Revise plan as appropriate and resubmit plan to Engineer within 5 days after receipt of comments from Engineer.
- .5 Engineer's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .6 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

**1.4 FILING OF NOTICE**

- .1 File Notice of Project with Provincial authorities prior to beginning of Work.

**1.5 SAFETY ASSESSMENT**

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

**1.6 GENERAL REQUIREMENTS**

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Observe and enforce construction safety measures required by Canadian Construction Safety Code, Provincial Government, Worker's Compensation Board and municipal statutes and authorities.
- .3 In the event of a conflict between any provisions of above authorities having the most stringent provision will apply.



**1.7 RESPONSIBILITY**

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

**1.8 UNFORSEEN HAZARDS**

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

**1.9 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 dock reconstruction at an active harbour site.
  - .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.

**1.10 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 having jurisdiction, and in consultation with Departmental Representative verbally and in writing.

**1.11 CORRECTION OF NON-COMPLIANCE**

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1                Not Used.

**END OF SECTION**

**01 35 43 – ENVIRONMENTAL PROCEDURES**

**Part 1            General**

**1.1            MEASUREMENT FOR PAYMENT**

- .1        No separate measurement will be for work of this section. Work is incidental to the project cost.

**1.2            FIRES**

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

**1.3            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.

**1.4            WORK ADJACENT TO WATERWAYS**

- .1        Construction equipment will enter and leave the lake at such a location and in such a manner that disturbance to the lakeshore.
- .2        No construction debris from work activities will be allowed to enter the lake. The work site must be cleaned daily. Every effort will be made to minimize the introduction of sediment to the lake during work activities.
- .3        Do not use waterway beds for borrow material.
- .4        Waterways to be free of excavated fill, waste material and debris.
- .5        Design and construct temporary crossings to minimize erosion to waterways.
- .6        Do not skid logs or construction materials across waterways.
- .7        Avoid damage to shoreline.
- .8        Supply, install, and maintain approved erosion control blankets to unprotected slopes until revegetation is established.
- .9        Any impacts below ordinary high water mark that are not shown on the site plan are not permitted without written approval from the Engineer. Up to 30 days may be required for approval.
- .10       Reclaim and restore disturbed areas to previous or better condition.
- .11       Areas used for stockpiling construction materials, including fill or other equipment storage will be well back from the edge of the water body and, if possible, in areas which have already been disturbed or are devoid of vegetation.
- .12       All required machinery should be supplied with appropriate spill containment kits as a precaution in the event of accidental fuel spills or hydraulic leaks. Additional kits should

be available on site with the capacity to contain any spills of deleterious substances that may be reasonably expected to occur. Contractors should ensure that all personnel are familiar with the spill kits.

## **1.5 POLLUTION CONTROL**

- .1 Control emissions from equipment and plant to local authorities' emission requirements.
- .2 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.
- .3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- .4 Locate temporary fuel storage 100 metres from shore and comply with Provincial Environmental Legislation.
- .5 Refueling, servicing, or cleaning of equipment on ice or within 100 metres of shore is prohibited. Contractor to ensure all equipment operating on project is free of external fluid leaks, grease, oil, and mud.
- .6 Contractor to contain all oil leaks from equipment working adjacent to waterways.
- .7 No maintenance of vehicles or equipment in construction areas.
- .8 Use drip pans to catch leaking oil from compressors, pumps, etc.
- .9 Keep an emergency spill kit for in-water use on site during construction.
- .10 Disposal of wastes
- .11 Do not bury rubbish and waste materials on site unless approved by Engineer.
- .12 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways. Hazardous wastes including fuels, oils and lubricants to be disposed of by a licensed hazardous waste carrier/handler in accordance with Provincial Environment Legislation.
- .13 Collect all rubbish and waste material and dispose of in accordance with applicable governing authorities.
- .14 Do not allow debris of any type to enter waterway.

## **1.6 PLANT PROTECTION**

- .1 Protect trees and plants on site and adjacent properties.
- .2 Avoid disturbance of topsoil and vegetation unless otherwise specified. Contractor is responsible to restore all impacted areas to original state.

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1            Not Used.

**END OF SECTION**

**01 45 00 – QUALITY CONTROL**

**Part 1            General**

**1.1                MEASUREMENT FOR PAYMENT**

- .1        No measurement will be made under this Section.

**1.2                INSPECTION**

- .1        Allow Engineer 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 Engineer.
- .3        Engineer will order 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.

**1.3                INDEPENDENT INSPECTION AGENCIES**

- .1        Independent Inspection/Testing Agencies may be engaged by Engineer for purpose of inspecting and/or testing portions of Work.
- .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 Engineer at no cost to. Pay costs for retesting and re-inspection.

**1.4                ACCESS TO WORK**

- .1        Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2        Co-operate to provide reasonable facilities for such access.

**1.5                PROCEDURES**

- .1        Notify Engineer 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 orderly sequence to not cause delays 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.

**1.6 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 Engineer as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Engineer it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Engineer.

**1.7 TESTS AND MIX DESIGNS**

- .1 Furnish test results and mix designs as requested.

**1.8 MILL TESTS**

- .1 Submit mill test certificates as requested.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**01 77 00 – CLOSEOUT PROCEDURES**

**Part 1            General**

**1.1            MEASUREMENT FOR PAYMENT**

- .1        No measurement will be made under this Section.

**1.2            ADMINISTRATIVE REQUIREMENTS**

- .1        Acceptance of Work Procedures:
  - .1        Contractor's Inspection: Contractor to conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
  - .2        Final Inspection:
    - .1        When completion tasks are done, request final inspection of Work by Engineer.
    - .2        When Work incomplete according to Engineer, complete outstanding items and request re-inspection.
  - .3        Final Payment:
    - .1        When Engineer considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
  - .4        Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

**1.3            FINAL CLEANING**

- .1        Remove surplus materials, excess materials, rubbish, tools and equipment.

**1.4            RECORD DRAWINGS**

- .1        Maintain project “as-built” record drawings and record accurately significant deviations from Contract documents caused by site conditions and changes ordered by Engineer.
- .2        Mark “as-built” changes in red coloured ink.
- .3        Record the following information:
  - .1        Field changes of dimension and detail.
  - .2        Changes made by Change Order or Field Order.
- .4        At completion of project and prior to final inspection, neatly transfer “as-built” notations to second set and submit both sets to Engineer.

**Part 2            Products**

**2.1            NOT USED**

- .1        Not Used.



**Part 3            Execution**

**3.1                NOT USED**

.1            Not Used.

**END OF SECTION**

## **01 82 01 – WEIGH SCALES**

### **Part 1 General**

#### **1.1 MEASUREMENT FOR PAYMENT**

- .1 Weigh all rip-rap placed in the Work and measured in tonnes at the quarry or project site on a scale approved and certified as correct. Prior to use, have weigh scale certified as meeting requirements of Statutes of Canada, Chapter 36, Weights and Measures Act 1971 and subsequent amendments. Provide the Departmental Representative with a copy of the certificate and display certificate in prominent location. Costs for maintenance and operation of scale shall be considered incidental to the work.
- .2 Provide the Departmental Representative with weigh tickets at time of delivery to site.

### **Part 2 Products**

#### **2.1 EQUIPMENT**

- .1 Provide weigh scales of sufficient capacity to weigh loaded vehicles in a single operation.
- .2 Provide scale house to enclose mass indicator and in which Contractor's representative can perform work and maintain records.
- .3 Scale house to be waterproof and have one sliding window facing scale platform. Entrance door not face scale platform.

### **Part 3 Execution**

#### **3.1 INSTALLATION**

- .1 Provide, install and maintain scale at quarry or project site at location approved by Engineer.
- .2 Remove scale and scale house when no longer required and level approach ramps.

#### **3.2 OPERATION**

- .1 Contractor's representative will be responsible for weighing materials.

#### **3.3 MAINTENANCE**

- .1 Maintain scale platform and scale mechanism clean and free from gravel, snow, ice and debris.
- .2 Maintain approach roads in good condition free from sags and ruts.
- .3 Have scales retested and recertified if requested by Engineer.

**END OF SECTION**

## **02 41 13 – SELECTIVE SITE DEMOLITION**

### **Part 1 General**

#### **1.1 MEASUREMENT FOR PAYMENT**

- .1 Mobilization, demobilization, removal of all materials and work required for the repairs to the existing wavebreak wall and installation of the new wavebreak wall to be included in lump sum costs.

#### **1.2 DELIVERY, STORAGE AND HANDLING**

- .1 Storage and Protection.
  - .1 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Engineer and at no cost to Engineer.
  - .2 Remove and store materials to be salvaged, in manner to prevent damage.
  - .3 Store and protect in accordance with requirements for maximum preservation of material.
  - .4 Handle salvaged materials as new materials.

#### **1.3 SITE CONDITIONS**

- .1 Site Environmental Requirements:
  - .1 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
  - .2 Ensure proper disposal procedures are maintained throughout the project.

### **Part 2 Products**

#### **2.1 NOT USED**

- .1 Not Used.

### **Part 3 Execution**

#### **3.1 PREPARATION**

- .1 Inspect site and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- .2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .3 Notify and obtain approval of utility companies before starting demolition.

#### **3.2 REMOVAL OPERATIONS**

- .1 Remove items as indicated.
- .2 Do not disturb items designated to remain in place.

**3.3            REMOVAL FROM SITE**

- .1        Dispose of materials not designated for salvage or re-use in work, off-site at location acceptable to Engineer.

**3.4            RESTORATION**

- .1        Remove debris, trim surfaces and leave work site clean, upon completion of Work.
- .2        Reinstate areas and existing works outside areas of demolition to conditions that existed prior to commencement of work.

**END OF SECTION**

**05 50 00 – METAL FABRICATIONS**

**Part 1 General**

**1.1 MEASUREMENT FOR PAYMENT**

- .1 Steel Cap Channel Supply and Install:
  - .1 Payment for steel cap channels shall be by the lineal metre and shall include all labour equipment and material required to:
    - .1 Supply prime painted steel cap to the new and existing steel sheet pile wavebreaks.
    - .2 Fasten steel cap channel to the new and existing steel sheet pile wavebreaks as per drawings including any required clip angles.
- .2 Steel Cap Channel Refurbishment:
  - .1 Payment for refurbishment of steel cap channels shall be by the lineal meter and shall include all labour, equipment, and material required to remove, refurbish, and reinstall existing cap channels. Reinstall as per drawings including any required clip angles.
- .3 Steel Waler:
  - .1 Payment for steel walers shall be by the lineal metre and shall include all labour equipment and material required to:
    - .1 Supply and install new steel waler including any required fasteners and spacers.
- .4 Any bent plate or miscellaneous steel shall be included in the lump sum costs for the project.

**1.2 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM A53/A53M-02, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - .2 ASTM A269-02, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
  - .3 ASTM A307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
  - .2 CAN/CGSB-1.181-92, Ready-Mixed, Organic Zinc-Rich Coating.
- .3 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel.
  - .2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .3 CAN/CSA-S16.1-01, Limit States Design of Steel Structures.

- .4 CSA W48-01, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
- .5 CSA W59-1989(R2001), Welded Steel Construction (Metal Arc Welding) (Imperial Version).
- .4 The Environmental Choice Program
  - .1 CCD-047a-98, Paints, Surface Coatings.
  - .2 CCD-048-98, Surface Coatings - Recycled Water-borne.
- 1.3 ACTION AND INFORMATIONAL SUBMITTALS**
  - .1 Shop Drawings:
    - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Manitoba, Canada.
    - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
- 1.4 DELIVERY, STORAGE AND HANDLING**
  - .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.
  - .2 Storage and Handling Requirements:
    - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
    - .2 Replace defective or damaged materials with new.
- Part 2 Products**
- 2.1 MATERIALS**
  - .1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 350W.
  - .2 Welding materials: to CSA W59.
  - .3 Welding electrodes: to CSA W48 Series.
  - .4 Bolts and anchor bolts: to ASTM A307.
- 2.2 FABRICATION**
  - .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
  - .2 Where possible, fit and shop assemble work, ready for erection.
  - .3 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

## **2.3 FINISHES**

- .1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m<sup>2</sup> to CAN/CSA-G164.
- .2 Chromium plating: chrome on steel with plating sequence of 0.009 mm thickness of copper 0.010 mm thickness of nickel and 0.0025 mm thickness of chromium.
- .3 Shop coat primer: to CAN/CGSB-1.40.
- .4 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

## **2.4 ISOLATION COATING**

- .1 Isolate aluminum from following components, by means of bituminous paint:
  - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
  - .2 Concrete, mortar and masonry.
  - .3 Wood.

## **2.5 SHOP PAINTING**

- .1 Primer: VOC limit 250 g/L maximum to GS-11 CCD-047a CCD-048.
- .2 Apply one shop coat of primer to metal items unless stated otherwise on drawings, with exception of galvanized or concrete encased items.
- .3 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.
- .4 Clean surfaces to be field welded; do not paint.

## **2.6 NEW CAP CHANNELS ON STEEL SHEET PILING**

- .1 Steel channels: prime painted, sizes indicated.
- .2 Finish: shop painted.
- .3 Primer: VOC limit 250 g/L maximum to GS-11 when applied on site

## **Part 3 Execution**

### **3.1 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 Provide suitable means of anchorage acceptable to Engineer such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.

- .5 Provide components for building by other sections in accordance with shop drawings and schedule.
- .6 Make field connections with bolts to CAN/CSA-S16.1, or weld.
- .7 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.
- .8 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

### **3.2 NEW CAP CHANNELS ON STEEL SHEET PILING**

- .1 Install cap channels as indicated to top of steel sheet piling.
- .2 Fasten underside of cap channels to top of steel sheet piling as indicated.
- .3 In areas where direct welding cannot be achieved, provide steel angles to connect the cap channels to the steel sheet piling.

### **3.3 CLEANING**

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

### **3.4 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**



**31 23 33 – EXCAVATING, TRENCHING AND BACKFILLING**

**Part 1 General**

**1.1 MEASUREMENT FOR PAYMENT**

- .1 This section specifies general requirements for excavation, trenching, and backfilling for the steel sheet pile wavebreak
- .2 No measurement will be made under this section. Include in lump sum costs.
- .3 Regrading and compaction of existing suitable granular material to be included in lump sum costs for project.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Granular material for fill :
  - .1 Crushed, pit run or screened stone, gravel or sand.
  - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.
  - .3 The gradation and physical requirements to be as follows:
  - .4

Sieve Designation	% Passing
50 mm	95-100
25 mm	75-100
9.5 mm	57-83
4.75 mm	37-61
1.18 mm	12-32

**Part 3 Execution**

**3.1 EXCAVATION**

- .1 Excavate to lines, grades, elevations and dimensions shown on drawings.
- .2 Excavation must not damage or interfere with adjacent foundations.
- .3 Keep excavated and stockpiled materials safe distance away from edge of excavation.
- .4 Dispose of surplus and unsuitable excavated material off site.
- .5 Do not obstruct flow of surface drainage or natural watercourses.

**3.2 PLACEMENT AND INSTALLATION**

- .1 Place granular base after sub-grade surface is inspected and approved in writing by Engineer.
- .2 Placing:

- .1 Construct granular base to depth and grade in areas indicated.
- .2 Ensure no frozen material is placed.
- .3 Place material only on clean unfrozen surface, free from snow and ice.
- .4 Begin spreading base material on crown line.
- .5 Place material using methods which do not lead to segregation or degradation of aggregate.
- .6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
- .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .8 Remove and replace that portion of layer in which material becomes segregated during spreading.
- .3 Compacting:
  - .1 Ensure compaction equipment is capable of obtaining required material densities.
  - .2 Compact to density not less than 95% corrected maximum dry density.
  - .3 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
  - .4 Apply water as necessary during compacting to obtain specified density.
  - .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Engineer.
  - .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
  - .7 For underwater compaction provide adequate compaction by means of backhoe bucket or other approved method.

### **3.3 SITE TOLERANCES**

- .1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

### **3.4 PROTECTION**

- .1 Maintain finished granular surface in condition conforming to this section until granular surfacing is accepted by Engineer.

**END OF SECTION**

**31 61 13 – PILE FOUNDATIONS, GENERAL REQUIREMENTS**

**Part 1 General**

**1.1 MEASUREMENT FOR PAYMENT**

- .1 No measurement to be made under this section. For measurement refer to Section 31 62 16.13 Steel Sheet Piles.

**1.2 SUBMITTALS**

- .1 Product Data: submit manufacturer's printed product literature, specifications and datasheet.
- .2 Submit schedule of planned sequence of driving to Engineer for review, as specified.
- .3 Spliced piles: when authorized, submit design details of splice complete with signature and stamp of qualified professional engineer registered or licensed in Province of Manitoba.
- .4 Equipment:
  - .1 Submit prior to pile installation for review by Engineer, list and details of equipment for use in installation of piles.
  - .2 Impact hammers: submit manufacturer's written data as specified.
  - .3 Non-impact methods; submit characteristics to evaluate performance.
- .5 Quality assurance submittals:
  - .1 Test reports: submit copy of certified test reports for piles from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
  - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

**1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's instructions.
- .2 Protect piles from damage due to excessive bending stresses, impact, abrasion or other causes during delivery, storage and handling.
- .3 Replace damaged piles as directed by Engineer.

**1.4 SCHEDULING**

- .1 Drive piles in what is considered most economical sequence.
- .2 Submit schedule of planned sequence of driving to Engineer for approval, not less than 2 weeks prior to commencement of pile driving.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Material requirements for piles are specified in Section 31 62 16.13.

- .2 Supply full length piles and provide equipment of sufficient capacity to handle full length piles without cutting or splicing.
- .3 Do not splice piles without written permission from Engineer.
- .4 Pile lengths indicated on plans are based on lengths to be supplied. 300 mm to be cut off after installation of piles.

## **2.2 EQUIPMENT**

- .1 Impact hammers: provide manufacturer's name, type, rated energy per blow at normal working rate, mass of striking parts of hammer, mass of driving cap and type and elastic properties of hammer and pile cushions.
- .2 Non-impact methods of installation such as augering, jacking, vibratory hammers or other means: provide full details of characteristics necessary to evaluate performance.
- .3 Hammer:
  - .1 Hammers to be selected on basis of driveability analysis using wave equation theory, performed to show that piles can be driven to levels indicated.
  - .2 Driveability analysis to include, but not be limited to, following: hammer, cushion, and cap block details; static soil parameters; quake and damping factors, total soil resistance, blow count, pile stresses and energy throughput at representative penetrations.
  - .3 When required criteria cannot be achieved with the proposed hammer, use larger hammer and take other measures as required.

## **Part 3 Execution**

### **3.1 PREPARATION**

- .1 Protection:
  - .1 Protect adjacent structures, services and work of other sections from hazards due to pile driving operations.
  - .2 Arrange sequencing of pile driving operations and methods to avoid damages to adjacent existing structures.
  - .3 When damages occur, remedy damaged items to restore to original or better condition at own expense.
- .2 Ensure that ground conditions at pile locations are adequate to support pile driving operation and load testing operation.
  - .1 Make provision for access and support of piling equipment during performance of Work.

### **3.2 INSTALLATION**

- .1 Leads: construct pile driver leads to provide free movement of hammer.
  - .1 Hold leads in position at top and bottom, with guys, stiff braces, or other means to ensure support to pile while being driven.
- .2 Followers:

- .1 Provide followers of such size, shape, length and mass to permit driving pile in desired location to required depth and resistance.
- .3 Installation of each pile will be subject to approval of Engineer.
- .4 Drive each pile to pile tip elevation indicated on drawings.

### **3.3 APPLICATION / DRIVING**

- .1 Hold piles securely and accurately in position while driving.
- .2 Deliver hammer blows along axis of pile.
- .3 Cut off piles neatly and squarely at elevations as indicated.
- .4 Provide sufficient length above cut-off elevation so that part damaged during driving is cut off.
- .5 Remove cut-off lengths from site on completion of work.

### **3.4 DRIVING TOLERANCES**

- .1 Pile heads to be within 75 mm of locations as indicated.
- .2 Piles not to be more than 2% of length out of vertical alignment.

### **3.5 REPAIR AND RESTORATION**

- .1 Pull out rejected piles and replace with new piles.
  - .1 Remove rejected pile and replace with a new and if necessary, a longer pile.
  - .2 Engineer will reject any pile that is driven out of position, is driven below cut-off elevation, or is damaged during driving or handling.
- .2 No extra compensation will be made for removing and replacing or other work made necessary through rejection of defective piles.

### **3.6 FIELD QUALITY CONTROL**

- .1 Measurement:
  - .1 Maintain accurate records of driving for each pile, including:
    - .1 Type and make of hammer, stroke or related energy.
    - .2 Other driving equipment including water jet, driving cap, cushion.
    - .3 Pile size and length, location of pile in pile group, location or designation of pile group.
    - .4 Sequence of driving piles in group.
    - .5 Number of blows per metre for entire length of pile and number of blows per 10 mm for last 75 mm.
    - .6 Final tip and cut-off elevations.
    - .7 Other pertinent information such as interruption of continuous driving, pile damage.
    - .8 Record elevation taken on adjacent piles before and after driving of each pile.
  - .2 Provide Engineer with three copies of records.

**3.7 CLEANING**

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

### **31 62 16.13 – STEEL SHEET PILES**

#### **Part 1        General**

##### **1.1            MEASUREMENT FOR PAYMENT**

- .1      Supply of Z profile steel sheet piling for Payment will be measured in square metres of piling delivered to site.
- .2      Installation of Z profile steel sheet piling will be measured in square metres of piling remaining in place after cut-off. Piling will be measured in plane of bulkhead, calculated by multiplying straight horizontal centre line length of bulkhead measured at top of piles by average vertical length of piles installed and left in work.
- .4      Nuts, pipe spacers, splice and corner plates, plate washers, tie bolts, cap channels, waler, bent plate, corner brackets and other associated hardware to included in the square metre cost for installation of sheet pile above. This item not to include tie rods or their associated hardware.
- .5      Dywidag tie rods, nuts, bearing plates, washers, and all associated hardware to be measured by the number of tie (complete) rods supplied, installed, and remaining in work.
- .8      Mobilization and de-mobilization of equipment for installation of steel sheet piling will be included in lump sum costs for the work.

##### **1.2            REFERENCES**

- .1      American Society for Testing and Materials International, (ASTM).
  - .1      ASTM A6/A6M-02b, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
  - .2      ASTM A307-02, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.
  - .3      ASTM A615/A615M-01b, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  - .4      ASTM A1011/A1011M-02, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
- .2      Canadian Standards Association (CSA International).
  - .1      CAN/CSA G40.20/G40.21-98, June 2000), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2      CSA W47.1-92R2001), Certification of Companies for Fusion Welding of Steel Structures.
  - .3      CSA W47.1S1-M1989(R1998)], Supplement No.1-1989 to W47.1-1983, Certification of Companies for Fusion Welding of Steel Structures.
  - .4      CSA W59-M1989(R2001), Welded Steel Construction (Metal Arc Welding) (Metric Version).
  - .5      CSA W59S1-M1989(R1998)], Supplement No.1-M1989, Steel Fixed Offshore Structures, to W59-M1989, Welded Steel Construction (Metal Arc Welding).

### **1.3 SUBMITTALS**

- .1 Submit shop drawings for following items:
  - .1 A plan layout of the steel sheet piling sections comprising the wall indicating all dimensions.
  - .2 A play layout of the tie rods and anchors.
  - .3 Details of the steel sheet piling sections including welding details for plates.
  - .4 Special details for corners and bends in the wall.
  - .5 Details for all miscellaneous steel elements.
- .2 At least 2 weeks prior to fabrication, submit to Engineer, 2 copies of steel producer certificates in accordance with ASTM A1011/A1011M, and mill test reports in accordance with CAN/CSA-G40.20/G40.21.

### **1.4 QUALITY ASSURANCE**

- .1 Inspection and testing of steel sheet piling material may be carried out by testing laboratory designated by Engineer at any time during course of Work.
- .2 Materials inspected or tested by Engineer which fail to meet contract requirements will be rejected.
- .3 Materials failing to meet contract requirements may be rejected.
- .4 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, Contractor to pay costs for additional tests or inspections. Engineer to approve corrected work.

### **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Use slings for lifting piling so that mass is evenly distributed and piling is not subjected to excessive bending stresses.
- .2 Store sheet piling on level ground or provide supports so that sheet piling is level when stored.
  - .1 Provide blocking at spacing not exceeding 5 m so that there is no excessive sagging in piling.
  - .2 Overhang at ends not to exceed 0.5 m.
  - .3 Block between lifts directly above blocking in lower lift.
- .3 If material is stock-piled on structure, ensure that structure is not overloaded.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Steel sheet piles: to CAN/CSA-G40.21, including chemical and mechanical requirements and following:
- .3 Continuous interlocking flat web with minimum web thickness 9.5 mm and minimum mass of 72.8 kg/m.
- .5 Continuous interlocking Z section:



- .1 Minimum effective section modulus of 1300 x 10 mmu per metre of wall for Grade 300W.
- .2 Minimum flange thickness of 9.5 mm.
- .3 Minimum web thickness of 9.5 mm.
- .4 Sheet piling:
  - .1 Minimum thickness of any portion of web or flange to be 9.5 mm.
- .6 Special corners: shop fabricate by welding as indicated.
- .7 Interlocks: to be such that section of interlock bar of 1 m minimum length will pass along full length of pile without binding.
- .8 Mark each piece of sheet piling legibly by stencilling or die-and-stamping with following information.
  - .1 Heat Number.
  - .2 Manufacturer's Name.
  - .3 Length and Section Number.
- .9 Do not precut lifting or slinging holes in sheet piles.
- .10 Structural steel for wales, bearing plates, wales splices, capping channels, support angles and miscellaneous steel: to CAN/CSA-G40.21, Grade 300W.
- .11 Tie rods, sleeve nuts and turnbuckles:
  - .1 Tie rods: #11 galvanized Dywidag tie rods, lengths as indicated on plans
  - .2 Nuts and bolts: hexagon nuts, bolts, and washers: to ASTM A307.
- .12 Backfill material: to Section 31 23 33 - Excavating, Trenching and Backfilling.

## **2.2 SOURCE QUALITY CONTROL: HOT ROLLED SHEET STEEL PILING**

- .1 Provide results of tests of sheet piling material to be used on project as follows:
  - .1 One tension test and one bend test from each heat for quantities of finished material less than 50 tonnes.
  - .2 Tension tests in accordance with CAN/CSA-G40.20/G40.21. Bend tests in accordance with ASTM A6/A6M.

## **2.3 SOURCE QUALITY CONTROL: COLD FORMED STEEL SHEET PILING**

- .1 Provide results of tension tests of sheet piling material to be used on project as follows:
  - .1 One tension test from each heat for quantities of finished material less than 50 tonnes.
- .2 Tension tests in accordance with CAN/CSA-G40.20/G40.21.
- .3 Provide results of bend tests of sheet piling material to be used on project as follows:
  - .1 Bend tests in accordance with [ASTM A6/A6M, with following amendments:
    - .1 S14.1 Bend tests to be performed with material in condition as used in cold forming operation. Three tests to be made from each heat and each thickness of material produced. Bend test specimens to be taken from edge of each coil. Longitudinal axis of specimen to be transverse to coil rolling direction.

- .2 S14.1.1 - Except as provided below, bend test specimens to have minimum width to thickness ratio of 8, with both edges parallel throughout section in which bending occurs, and is maintained.
- .3 S14.2 - Minor surface separations less than 0.8 mm in depth related to superficial steel surface or subsurface discontinuities to not cause rejection. Surface separations in excess of 0.8 mm depth and/or cracks normal to metal surface to cause rejection.

### **Part 3 Execution**

#### **2.4 INSTALLATION**

- .1 Do welding in accordance with CSA W59 and] CSA W59S1, except where specified otherwise.
- .2 Do not begin pile installation until required quality control tests have been completed and test results approved by Engineer.
- .3 Do pile installation Work in accordance with Section 31 61 13 - Pile Foundations, General Requirements except where otherwise specified.
- .4 Submit full details of method and sequence of installation of piling to Engineer for approval prior to start of pile installation work. Details must include templates, bracing, setting and driving sequence and number of piles in panels for driving.
- .5 When installing sheet piles in bulkhead wall, use following procedure:
  - .1 Provide temporary templates or bracing to hold piles in alignment during setting and driving.
  - .2 Drive piles two at a time. Drive first double pile to full depth, then place panel of five to eight double sheet piles in templates and secure last (end) double pile in location to prevent spreading of piles in panel.
  - .3 Drive end double pile in panel sufficiently deep into ground to ensure that it will remain plumb, then, drive remaining double piles in panel to full depth beginning with double pile next to end double pile and finishing with double pile next to double pile first driven.
  - .4 After one panel has been driven, place and drive succeeding panels in similar manner. Complete the driving of end double pile of first panel after double piles of second panel have been driven.
- .6 When installation is complete, face of wall at top of sheet piles to be within 75 mm of location as indicated and deviation from vertical not to exceed 1 in 100.

#### **2.5 OBSTRUCTIONS**

- .1 If obstruction encountered during driving, leave obstructed pile and proceed to drive remaining piles. Return and attempt to complete driving of obstructed pile later.
- .2 Advise Engineer immediately if impossible to drive pile to full penetration, and obtain direction from Engineer on further steps required to complete Work.

#### **2.6 HOLES**

- .1 Patch holes in sheet pile wall, except where permanent holes are indicated.

- .1 Use 9.5 mm thick plate of material equal to that of piling to patch holes and overlap not less than hole diameter.
- .2 Weld to develop full strength of plate.
- .2 Drill any required holes in piling.

## **2.7 CUTTING**

- .1 When flame cutting tops of piles, and when permitted flame cutting holes in piles approved by Engineer, use following procedure:
  - .1 When air temperature is above 0 degrees C, no pre-heat is necessary.
  - .2 When air temperature is below 0 degrees C, pre-heat until steel 25 mm on each side of line of cut has reached a temperature very warm to hand (approximately 35 degrees C). Tempil sticks may be used to measure temperature.
  - .3 Use torch guiding device to ensure smooth round holes or straight edges.
  - .4 Make cut smooth and free from notches throughout thickness. If grinding is employed to remove notch or crack, finished radius to be minimum 5 mm.

## **2.8 SPLICING**

- .1 Use full length piles unless splicing is approved by Engineer.

## **2.9 TIE ROD ANCHORAGE SYSTEM**

- .1 Do not place backfill behind anchored bulkhead [or remove material from in front of bulkhead until piles have been completely driven, adjusted and secured in final position by anchorage system.
- .2 Support tie rods at intervals along their length as indicated. Piles used for this purpose to b
- .3 Fit and adjust tie rod systems so that connections at waling and anchor end of tie rods are tight before backfilling.

## **2.10 BACKFILLING**

- .1 Backfill in accordance with Section 31 23 33 - Excavating, Trenching and Backfilling and as indicated.
- .2 Protect piling tie rods and anchorage systems from damage or displacement during backfilling operations.

**END OF SECTION**

### **35 20 23 - DREDGING**

#### **Part 1        General**

##### **1.1        MEASUREMENT PROCEDURES**

- .1        Only material excavated above grade plane and within side slopes indicated or specified will be measured.
- .2        Dredging is to be considered for payment as a lump sum item for material dredged and removed from the existing harbour basin to lines and grades as specified on drawings. The quantity of dredged material to be removed is estimated to be 2,000 cubic metres. The material is estimated to be Class B material as defined in Section 1.2 below.
- .3        All operations in connection with field positioning of excavation equipment will not be measured separately for payment.
- .4        No separate payment will be made for Contractor's survey vessel, equipment and crew or diving services.
- .5        Payment will include disposal of excavation material, at approved spoil location.
- .6        Any public roads used as haul roads between the excavation area and spoil area shall be kept clean and free of debris. Maintenance of these roads is to be considered incidental to the cost for excavation.
- .7        Use of existing launch ramp as access to lake is not permitted.

##### **1.2        DEFINITIONS**

- .1        Dredging: excavating, transporting and disposing of underwater materials.
- .2        Class A material: solid rock requiring drilling and blasting to loosen, and boulders or rock fragments of individual volumes 1.5 cubic meters or more.
- .3        Class B material: loose or shale rock, layered limestone, silt, sand, quick sand, mud, shingle, gravel, clay, sand, gumbo, boulders, hardpan and debris of individual volumes less than 1.5 cubic meters.
- .4        Grade: plane above which material is to be excavated.
- .5        Estimated quantity:
  - .1        Volume of material calculated to be above grade and within specified side slopes unless otherwise specified.
- .6        Side slope: inclined surface or plane from grade at side limit of excavation area to intersect original ground line outside of side limit and to be expressed as ratio of horizontal to vertical.
- .7        Chart Datum: permanently established plane from which soundings or tide heights are referenced.
- .8        Coordinates:
  - .1        U.T.M.: universal transverse mercator projection.
  - .2        U.T.M. Coordinates: plane rectangular coordinates used in grid system in which grid network is applied to U.T.M. projection. Horizontal control information as indicated.

- .9 Cleared Area: area of excavation accepted as complying with plans and specifications.

### **1.3 SUBMITTALS**

- .1 Submit to Engineer for approval, four weeks before excavation, the proposed location of spoil area.

### **1.4 REGULATORY REQUIREMENTS**

- .1 Comply with municipal, provincial and national codes and regulations relating to project.

### **1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Metals, wood and recyclable materials removed during the excavation activities must be diverted appropriate recycling facilities.

### **1.6 SCHEDULING**

- .1 Submit to Engineer, within two weeks after award of Contract, schedule of work including time periods during which each operation involved in Work will be undertaken. At time of submission of schedule, meet with Engineer to review schedule.
- .2 Adhere to schedule and take immediate action to correct any slippage by effectively altering existing excavation operations or mobilizing other equipment. Notify Engineer of corrective action to be taken.

### **1.7 DATUM, WATER GAUGES AND TARGETS**

- .1 Elevations used in this specification and contract drawings are in metres referred to Canadian Geodetic Vertical Datum of 1928 (CGVD28).
- .2 Horizontal control points used in this specification and contract drawings are in metres referred to North American Datum of 1983 (NAD83).

### **1.8 INSPECTION OF SITE**

- .1 Contractor to visit site of Work and become thoroughly familiar with extent and nature of Work and conditions affecting Work before tendering.

### **1.9 SURVEY REQUIREMENTS**

- .1 Provide, at own expense, survey vessel, equipment and crew to set up and maintain control for location of excavation limits and to sound areas immediately after excavation to verify that grade depth has been attained.
- .2 Results of prior soundings are available upon request. It should be noted that this information may differ from site condition. Take this into consideration when submitting tender.

### **1.10 SURVEYS AND ACCEPTANCE OF WORK**

- .1 Contractor to re-excavate as necessary to remove all material within excavation areas which is found to be above grade.
- .2 One additional survey will be undertaken at Engineer's cost, for those areas not meeting acceptance criteria for excavation. All additional surveys required to clear areas will be undertaken by the Engineer at Contractor's cost.

- .3 All elevations obtained in minimum mode within specified areas of excavation must be at or deeper than grade before area will be considered completed.

## **Part 2 Products**

### **2.1 EXCAVATION EQUIPMENT**

- .1 Contractor to determine required equipment necessary to excavate material specified and to dispose of excavated material.

## **Part 3 Execution**

### **3.1 GENERAL**

- .1 Contractor to install approved barricades and warning signs around perimeter of work site for the duration of project.
- .2 Lay out Work from bench marks and base lines established by Engineer. Be responsible for accuracy of Work relative to established bench marks and baseline.
- .3 Dredge area to grade depth of EL 215.2 metres.
- .4 Dredge side slopes to 1.5 horizontal to one vertical unless otherwise indicated.
- .5 Remove materials above specified grade depths, within limits indicated. Material removed from below grade depth or outside specified area or side slope is not part of Work.
- .6 Remove shoaling which occurs as result of Work at no expense to Engineer.
- .7 Remove material cast-over on surrounding area and dispose of it as excavation material. Do not over-cast material unless authorized by engineer.
- .8 Immediately notify Engineer upon encountering an object which might be classified as an obstruction. By-pass the object after clearly marking its location and continue work.
- .9 Contractor to clean excavated material spilled on ice adjacent to excavation area.

### **3.2 DISPOSAL OF EXCAVATED MATERIAL**

- .1 Dispose of excavated material by depositing in spoil area approved by Engineer and in accordance with local governing authorities. Do not dispose of material in waterways.
- .2 All floating debris to be removed to spoil areas upon completion of operations. No separate payment to be made for this item.
- .3 Ice removed for the purposes of this excavation may be used to form a barricade around the excavation area.

### **3.3 SWEEPING**

- .1 Prior to completion of excavation, sweep areas to confirm that grade depth has been achieved.
- .2 Contractor to clean up site upon completion of work.

**3.4 RE-EXCAVATION**

- .1 Re-excavate unsatisfactory Work and verify depths with additional sounding to approval of Engineer.

**3.5 CO-OPERATION AND ASSISTANCE TO ENGINEER**

- .1 Co-operate with Engineer on inspection of Work and provide assistance requested.
- .2 On request of Engineer, furnish use of such boats, equipment, labour and materials forming ordinary and usual part of excavation as may be reasonably necessary to inspect and supervise Work.

**END OF SECTION**

### **35 31 24 – RIP-RAP**

#### **Part 1 General**

##### **1.1 MEASUREMENT PROCEDURE**

- .1 Supply and installation of rip-rap to be measured in tonnes of material supplied and installed.
- .2 Mobilization and demobilization of equipment will not be measured for payment. Include costs in units for supply and installation of rip-rap.
- .3 Construction, maintenance and removal of haul roads to be incidental to this work.

##### **1.2 SOURCE SAMPLING**

- .1 Inform Engineer of proposed source of materials and provide access for sampling at least 2 week prior to commencing work.

#### **Part 2 Products**

##### **2.1 MATERIALS**

- .1 Rock Materials:
  - .1 Rip-rap:
    - .1 Rip-rap to be granite to match existing rock on breakwaters.
    - .2 Greatest dimension of each stone not to exceed two times least dimension.
    - .3 Stone sizes to be in range of 600mm to 1000mm. Rip-rap to be fractured and angular. Field stone is not acceptable.
    - .4 Free from cracks, seams and other defects which may impair durability. The Los Angeles abrasion loss determined using ASTM procedures shall not exceed 35%. The rip-rap shall be durable, granite material. Limestone rip-rap is not acceptable. Slate and shale not acceptable.

#### **Part 3 Execution**

##### **3.1 RIP-RAP**

- .1 Place armour stone to lines, grades and dimensions as indicated.
- .2 Place each armour stone in stable position.
- .3 Remove ice from sides of breakwater prior to installing rip-rap.

##### **3.2 TOLERANCES**

- .1 Completed component layers to be within following tolerances of lines and grades as indicated:
  - .1 Armour: plus or minus 200 mm.



**3.3 HAUL ROADS**

- .1 Be solely responsible for construction and maintenance of haul roads. Remove haul roads from site upon completion of project. No separate payment to be made for construction, maintenance and removal of haul roads.
- .2 Contractor to be responsible for obtaining approval from applicable agencies for using access roads to site. Contractor is not to use existing launch ramp as a haul road.
- .3 Contractor to repair any damage caused to roads or property as a result of hauling operations.

**END OF SECTION**