



**Fisheries and Oceans
Canada**

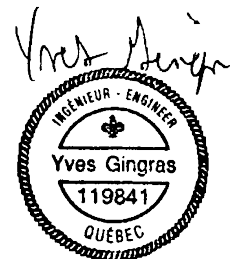


Small Craft Harbours

Gaspésie Sud

Precast Concrete Elements Manufacture

Project n° F3731-220046



Specifications for bid

July 2022

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Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 32 16 - Construction Progress Schedules - Bar (Gantt) Charts.

1.2 SCOPE OF WORK

- .1 This list of work is not necessarily complete and does not relieve the Contractor of their responsibility for executing any other work, change or modification required in addition of those listed herein, at the satisfaction of the Departmental Representative.
- .2 Manufacture of precast concrete elements for the fishing harbour of the South Gaspesia Region, comprises, but is not limited to:
 - .1 Supply of material and Manufacture of concrete slabs for a slipway and cribworks, bollards bases, lightning bases and pulling boxes, and artificial reefs, in accordance to details and quantities indicated in drawings.
 - .2 Delivery of precast elements to the fishing harbor of Paspébiac, Newport and Gascons, in accordance to lots indicated on drawings and tender form.

1.3 WORK SEQUENCE

- .1 Construct Work in stages, and if possible, as directed by Departmental Representative.
- .2 Coordinate Progress Schedule with Departmental Representative.

1.4 DOCUMENTS

- .1 Maintain at work site, one copy of each document mentioned above:
 - .1 Contract drawings
 - .2 Specifications
 - .3 Addenda
 - .4 Reviewed shop drawings
 - .5 List of outstanding shop drawings
 - .6 Change orders
 - .7 Other modifications to Contract
 - .8 Field test reports
 - .9 Copy of approved work schedule
 - .10 Health and safety plan and other safety related documents
 - .11 Other documents as specified

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 MEASUREMENT METHOD

- .1 The Contractor shall, within five (5) days after receiving an acceptance notice for the contract, provide cost breakdown for global units items.
- .2 The Contractor shall provide, within five (5) days after receiving an acceptance notice for the contract, a list of equipment and the hourly rates for each of the equipment available for the works.
- .3 The Contractor shall, within five (5) days after receiving an acceptance notice for the contract, provide a list of hourly rates for his staff.
- .4 The lump sum price and unit prices will include, but not limited to, leasing, equipment installation, equipment, tools, labour, administrative costs, profit, funding, expenditure for work not specifically defined either in the plan, or specifications or any other tender documents, but considered necessary so as to conform to best practices.
- .5 All work described in this specifications, or presented in the plans, or necessary for the completion of all the work specified herein, but not defined as a separate item requiring a fixed rate or unit payment, will be considered as directly or indirectly linked to the overall purpose of the contract and no separate payment will be made for any of these works; the cost of any work that is directly or indirectly linked to the aim of this contract must however be included in the unit prices quoted in the tender.
- .6 The method used to measure labour, tools or materials for the contract will be as follows:
- .7 Measuring method for items will be:
 - .1 Item n° 1 – Precast Concrete Elements Manufacture
 - .1 Item will be measured by unit. The item includes concrete, installation of steel reinforcement and synthetic macrofibre when required, anchors, bolts, adjuvants, formwork, equipment, materials, labor and transportation.
 - .2 The item also includes supply and installation of steel, anchors and synthetic macrofibres. If required, it includes galvanization of steel elements
 - .3 Heating of water and aggregates and provision of cold weather and hot weather protection, the cooling of concrete and the concrete curing procedures are also included.
 - .4 The cooling of concrete and hot weather protection will not be measured but considered an integral part of the work.
 - .5 The item is divided as follows:
 - .1 Paspébiac -lot 1
 - .1 Slab-slipway - type A
 - .2 Slab-silpway - type B
 - .3 Low wall
 - .4 Lightning base

- .5 Pulling box
 - .2 Newport – lot 2
 - .1 Slab - cribwork
 - .2 Anchor block
 - .3 Lightning Base
 - .4 Bollard Base
 - .5 Pulling Box
 - .3 Gascons – lot 3
 - .1 Artificial reefs
 - .2 Item n° 2 – Transportation
 - .1 The item will be measured as a global unit and include transportation and offloading of components at the fishing harbour of Paspébiac for lot-1, at the fishing harbour of Newport for lot-2 and at the fishing harbour of Gascons Chapados for lot-3.
 - .1 The item is divided as follows:
 - .1 Paspébiac -lot 1
 - .2 Newport – lot 2
 - .3 Gascons – lot 3
 - .8 The global lump sum that contractor had to furnish at item SA-03 of bid forms shall be detailed and furnished to Departmental Representative within 2 weeks after notice of acceptance of offer.

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 RELATED SECTIONS

- .1 Specific requirements for inspections and tests to be performed by the laboratory designated by the Departmental Representative are prescribed in the following sections of the Specifications.
- .1 Section 03 30 00 – Cast-in-Place Concrete
- .2 Section 03 41 00 – Precast Structural Concrete

1.2 APPOINTMENT AND PAYMENT

- .1 Departmental Representative will appoint and pay for services of testing laboratory except follows:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .2 Inspection and testing performed exclusively for Contractor's convenience.
 - .3 Mill tests and certificates of compliance.
 - .4 Tests specified to be carried out by Contractor under the supervision of Departmental Representative.
- .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.

1.3 CONTRACTOR'S RESPONSIBILITIES

- .1 Provide labour, equipment and facilities to:
 - .1 Provide access to Work for inspection and testing.
 - .2 Facilitate inspections and tests.
 - .3 Make good Work disturbed by inspection and test.
 - .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
- .2 Notify Departmental Representative sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by 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 ADMINISTRATIVE

- .1 Schedule project meetings throughout the course of the work and at the request of the Departmental Representative, and manage them.
- .2 Provide physical space and make arrangements for meetings.

1.2 PRECONSTRUCTION MEETING

- .1 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.
- .2 Points on the agenda of the day
 - .1 *Designation of official representatives* of the participants in the work.
 - .2 Schedule of work, according to section 01 32 16 – Construction progress schedule - bar (GANTT) charts.
 - .3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 – Submittal Procedures.
 - .4 Delivery of materials and materials prescribed schedule.
 - .5 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
 - .6 Owner provided products.
 - .7 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .8 Monthly progress claims, administrative procedures, photographs, hold backs.
 - .9 Appointment of inspection and testing agencies or firms.
 - .10 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

- .1 Schedule meetings that will be held during the course of the work.
- .2 Contractor, major subcontractors involved in work and Departmental Representative are to be in attendance.
- .3 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revision to construction schedule.
 - .8 Progress schedule, during succeeding work period.
 - .9 Review submittal schedules: expedite as required.

- .10 Maintenance of quality standards.
- .11 Review proposed changes for effect on construction schedule and on completion date.
- .12 Other

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

1.1 DÉFINITIONS

- .1 Activity: determined work carried out as part of a project. An activity normally has an expected duration and expected cost in resources-related needs. 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 5 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 The overall plan must provide for the realization of the work according to the prescribed milestones, within the agreed time.
- .3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Certificate of substantial performance and Final Certificate as defined times of completion are of essence of this contract.

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

- .2 Submit to Departmental Representative within 10 working days of Notice of acceptance of the offer, the 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.
- .4 The Contractor shall be responsible for the information required to set up the work schedule. The Contractor shall submit to the Departmental Representative information concerning the work operations and sequence, the breakdown of the work into activities and the duration of these activities.
- .5 Work schedules are submitted subject to approval by the Departmental Representative. The Departmental Representative may require additional schedules or reports to demonstrate timely progress in the work or any other project deadline or indication of unrealistic performance.
- .6 Approval of work schedules by the Departmental Representative does not release the Contractor from its obligation to complete the work in accordance with the contract documents. Approval of the submitted schedules by the Departmental Representative shall not make the latter liable for time or cost overruns resulting from delays in the schedule.
- .7 The work schedule and monthly schedule updates shall be provided to the Departmental Representative for review with each request for payment as a condition of processing the payment request.
- .8 The Departmental Representative and the Contractor shall revise the updated work schedule at each progress meeting. The Contractor shall revise the schedule to incorporate changes made during the progress meetings.
- .9 When the deadlines or the completion date are not met, the Contractor shall, at no additional cost to the Departmental Representative, undertake one or more of the following: increase labour, increase working hours or take other actions to eliminate work delays.

1.4 MASTER PLAN

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar (GANTT) Chart.
- .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.
- .5 Contractor shall be responsible for information required to develop the construction schedule. Contractor shall provide Departmental Representative with information regarding work operations, sequence of work, breakdown of the work into activities, and time estimates for the activities.

1.5 PROJECT SCHEDULE

- .1 Develop a timetable for execution detailed from the master plan.

1.6 PROJECT SCHEDULE REPORTING

- .1 Update Project Schedule on 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.
- .3 The approval of Project Schedule by the Departmental Representative does not relieve the Contractor of his obligation to achieve works according to specifications. The acceptance of submitted Project Schedule by Departmental Representative will not make him responsible for goings of time or costs resulting from delays.
- .4 Both Departmental Representative and Contractor will have to update the Project Schedule at each site meeting. The Contractor will have to modify the Project Schedule in order to include the modifications that are done.
- .5 When the limit date or work achievement date will not be respected, the Contractor will, and this without additional fees for Departmental Representative, have to take one or more

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.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.

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 RELATED SECTIONS

- .1 Section 01 45 00 - Quality control

1.2 ADMINISTRATIVE

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

1.3 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 shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in the Province of Québec, Canada.
- .3 Coordinate the submission of necessary documents or samples in accordance with work and contract document requirements. Documents or samples submitted individually will not be verified until all related information is available.
- .4 Identify potential stakeholders in the project, such as the Contractor, subcontractors and suppliers, as well as all sections of the specifications, shop drawings and details relating thereto.

- .5 Leave a space on the documents for the "Document Verification" stamp by the Contractor and Departmental Representative.
- .6 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.
- .7 Allow 5 days for Departmental Representative's review of each submission.
- .8 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .9 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.
- .10 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date
 - .2 Project title and number
 - .3 Contractor's name and address
 - .4 Identification and quantity of each shop drawing, product data and sample
 - .5 Other pertinent data
- .11 Submissions include:
 - .1 Date and revision dates
 - .2 Project title and number
 - .3 Name and address of:
 - .1 Subcontractor
 - .2 Supplier
 - .3 Manufacturer
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.

- .9 Single line and schematic diagrams.
- .10 Relationship to adjacent work.
- .12 After Departmental Representative's review, distribute copies.
- .13 Submit 3 copies of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .14 Submit 3 copies 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.
- .15 Submit 3 copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .16 Submit three (3) copies 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.
- .17 Soumettre trois (3) copies des instructions du fabricant prescrites dans les sections techniques du devis et exigées par le Représentant du Ministère.
 - .1 Documents préimprimés décrivant la méthode d'installation des produits, matériels et systèmes, y compris des notices particulières et des fiches signalétiques indiquant les impédances, les risques ainsi que les mesures de sécurité à mettre en place.
- .18 Submit 3 copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by the Departmental Representative.
- .19 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .20 Submit 3 copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by the Departmental Representative.
- .21 Delete information not applicable to project.
- .22 Supplement standard information to provide details applicable to project.
- .23 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.

- .24 Review of shop drawings is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting all requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of all sub-trades.

1.4 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Departmental Representative's site office.
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing Departmental Representative prior to proceeding with Work.
- .6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.5 MOCK-UPS

- .1 Erect mock-ups in accordance with 01 45 00 - Quality Control

1.6 PHOTOGRAPHS SHOWING WORK PROGRESS

- .1 Submit a copy of colour digital photography in .jpg format, standard resolution as directed by the Departmental Representative.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Frequency of photographic documentation: as directed by the Departmental Representative.
 - .1 Upon completion of excavation, foundation, framing and services facilities works, before concealment

1.7 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 The Contractor shall:

- .1 When specified in individual Specification Sections, submit certification by manufacturer to Departmental Representative, in quantities required.
- .2 Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- .3 Certificates may be recent or previous test results on material or Product, but must be acceptable to Departmental Representative.

1.8 PRODUCT DATA

- .1 1 The Contractor shall:
 - .1 Submit the number of copies that the Contractor requires, plus two copies to be retained by Departmental Representative.
 - .2 Mark each copy to identify applicable products model, option, and other data. Supplement manufacturers' standard data to provide information unique to the Project.

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 Canada Labour Code - Part II, Canadian Occupational Safety and Health Regulations.
- .2 Province of Québec
 - .1 Act Respecting Occupational Health and Safety, R.S.Q. Chapter S-2.1.
 - .2 Construction Safety Code, S-2.1, r.6.
- .3 Canadian Standards Association (CSA)
- .4 Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.2 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative the site inspection sheet, duly completed, at the intervals indicated in 1.12.1.
- .3 Submit to Departmental Representative within 24 hours a copy of any inspection report, correction notice or recommendation issued by federal or provincial inspectors.
- .4 Submit to Departmental Representative within 24 hours an investigation report for any accident involving injury and any incident exposing a potential hazard.
- .5 Submit to Departmental Representative all safety data sheets for hazardous material to be used at the site at least three days before they are to be used.
- .6 Submit to Departmental Representative copies of all training certificates required to apply the safety program, in particular:
 - .1 General construction site safety and health courses;
 - .2 Safety officer attestations;
 - .3 First aid in the workplace and cardiopulmonary resuscitation;
 - .4 Wearing and fitting of individual protective gear;
 - .5 Forklift truck;
 - .6 Positioning platform;
 - .7 Any other requirement of Regulations or the safety program.
- .7 Medical examinations: Wherever legislation, regulations, directives, specification or a safety program require medical examinations, Contractor must:
 - .1 Prior to start-up, submit to Departmental Representative certificates of medical examination for all concerned supervisory staff and employees who will be on duty when the site opens.
 - .2 Thereafter, submit without delay certificates of medical examination for any newly hired concerned personnel as and when they start work at the site.

- .8 Certificate of compliance delivered by the CNESST: The certificate of compliance is a document delivered by the CNESST confirming that the contractor is in rule with the CSST, i.e. that he had pay out all the benefits concerning this contract. This document must be delivered to Departmental Representative at the end of the work.

1.3 HAZARDS ASSESSMENT

- .1 The contractor must identify all hazards inherent in each task to be carried out at the site.
- .2 The contractor must plan and organize work so as to eliminate hazards at source or promote mutual protection so that reliance on individual protective gear can be kept to a minimum. Where individual protection against falling is required, workers shall use safety harness that meets standard Can - CSA- Z-259.10 - 06. Safety belts shall not be used as protection against falling.
- .3 Equipment, tools and protective gear which cannot be installed, fitted or used without compromising the health or safety of workers or the public shall be deemed inadequate for the work to be executed.
- .4 All mechanical equipment shall be inspected before delivery to the site. Before using any mechanical equipment, submit to Departmental Representative a certificate of compliance signed by a qualified mechanic. Whenever he suspects a defect or accident risk, Departmental Representative may at any time order the immediate shut-down of equipment and require a new inspection by a specialist of his own choosing.

1.4 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.
- .2 Contractor decisional representative must attend any meetings at which site safety and health issues are to be discussed
- .3 Set up a site safety committee, and convene meetings in accordance with the Construction Safety Code.

1.5 LEGAL AND REGULATORY REQUIREMENTS

- .1 Perform Work in accordance to Section 01 41 00 – Regulatory Requirements
- .2 Comply with all legislation, regulations and standards applicable to the site and its related activities.
- .3 Comply with specified standards and regulations to ensure safe operations at site containing hazardous or toxic materials.
- .4 Regardless of the publication date shown in the construction safety code, always use the most recent version.

1.6 RESPONSIBILITIES

- .1 Assume responsibility of health and safety of those present, assume also, in contiguous areas, the protection of people and the environment insofar as they are affected by the work.

- .2 Respect, and ensure respect by employees, security requirements set out in the contract Documents, orders, laws and local regulations, territorial, provincial and federal law applicable.
- .3 Take all necessary measures to ensure application of and compliance with the safety and health requirements of the contract documents, applicable federal and provincial regulations and standards as well as the site-specific safety program, complying without delay with any order or correction notice issued by the Commission de la santé et de la sécurité du travail.

1.7 CONFORMITY REQUIREMENTS

- .1 Comply with the labour act : Loi sur la santé et la sécurité du travail, L.R.Q., c. S-2.1, et au Code de sécurité pour les travaux de construction, c. S-2.1, r. 4.
- .2 Comply with the Regulations on health and safety at work made under the Canada Labour Code

1.8 UNFORESEEN CIRCUMSTANCES

- .1 Whenever a source of danger not defined in the specifications or identified in the preliminary site inspection arises as a result of or in the course of the work, immediately suspend work, take appropriate temporary measures to protect the workers and the public and notify Departmental Representative, both verbally and in writing. Then the Contractor must modify or update the site specific safety program in order to resume work in safe conditions.

1.9 DOCUMENTS DISPLAYING

- .1 Ensure that documents, articles, orders, and relevant notices are displayed prominently on the site, in accordance with the laws and to the province and in consultation with the Departmental Representative.

1.10 WORK STOPS

- .1 Priority to the health and safety of the public as well as the site personnel, and the protection of the environment, on issues related to the cost and timing of the work.

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 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

1.2 DEFINITIONS

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

1.3 DOCUMENTS/ÉCHANTILLONS À SOUMETTRE POUR APPROBATION/INFORMATION

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets.

1.4 POLLUTION CONTROL

- .1 Control emissions from equipment and plant to local authorities emission requirements.
- .2 Use machinery in good operating condition to avoid grease, oil or fuel leaks. Submerged equipment parts shall be clean and free of leaks.

1.5 TRANSPORT OF MATERIALS

- .1 Materials may be transported on public roads to construction site from Monday to Saturday unless notified otherwise by the authorities having jurisdiction. Transport is prohibited on Sundays and public holidays.
- .2 Materials may be transported through the city between 7:00 a.m. and 6:00 p.m. (18h00) Transport outside these hours is prohibited.
- .3 Ensure proper operation of trucks used. Any trucks or other means of transport creating sound levels that Departmental Representative deems to exceed standards shall cease transporting materials or be repaired or modified to be made acceptable.
- .4 Contractor shall use adequate signalization and co-operate with municipality, Departmental Representative and other authorities having jurisdiction to minimize the impact of transportation on the daily lives of residents in area adjacent to truck route and construction site.
- .5 Use a sheet to cover granular material during transportation.
- .6 Limit traffic for the transportation of material to roads and areas identified in the specifications.

- .7 Maintain the roads used in good condition at all times and take the necessary measures to ensure they can be safely used and crossed by other users.
- .8 Upon work completion, promptly restore the roads to a condition that is at least equal to their original state.

1.6 NOISY WORKS

- .1 Noisy works are prohibited at night, unless absolutely necessary.

1.7 NON-COMPLIANCE NOTICE

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

Part 2 Product

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.

FIN DE LA SECTION

Part 1 General

1.1 REFERENCES AND CODES

- .1 All work shall meet or exceed the requirements of the latest edition of the standards of the Canadian Government Specifications Board (CGSB), the Canadian Standards Association (CSA), the National Building Code of Canada (NBC), the American Society for Testing and Materials (ASTM), the Canadian Standard Association (CSA), the American Concrete Institute (ACI), Cahier des charges et Devis généraux (CCDG) from Ministère des Transports du Québec and the other standards and codes referred to herein, including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Where conflict arises in the course of work, the strictest standards shall apply.
- .3 At any time when the specifications refer to standards, standard to be applied shall be the latest edition available, regardless of the edition designated in specification.
- .4 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.

1.2 LAWS, REGULATIONS AND DECREES

- .1 Contractor shall conform to all rights and privileges of others, and to all federal, provincial and municipal laws, regulations and decrees; he must also make sure that his employees, in law or in fact, and his subcontractors conform to same.
- .2 The applicable permits and approvals will have to be obtained by the Contractor before the beginning of work.

1.3 PERMITS, FEES AND TAXES

- .1 Contractor shall give all notices, obtain and pay all fees and construction permits for the demolition and for construction, and for all other services, as required by the authorities having jurisdiction.
- .2 Contractor shall be responsible for all damage and costs resulting from default to obtain these fees and permits.

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 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal procedures
- .2 Section 01 77 00 – Closeout procedures

1.2 INSPECTION

- .1 Allow Departmental Representative 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 inspections, approvals or special tests required by Departmental Representative or by law of Place of Work.
- .3 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.
- .4 Departmental Representative 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 will 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 at no cost to Departmental Representative. Pay costs for retesting and reinspection.

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 appropriate agency and Departmental Representative 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 Departmental Representative 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 Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative 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 Departmental Representative.

1.7 REPORTS

- .1 Submit 2 copies of inspection and test reports to Departmental Representative
- .2 Provide copies to manufacturer or fabricator of material being inspected or tested.

1.8 TESTS AND MIX DESIGNS

- .1 Furnish test results and mix designs as requested.
- .2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative.

1.9 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct mock-ups in locations approved by the Departmental Representative.
- .3 Prepare mock-ups for Departmental Representative review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups 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.
- .5 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.
- .6 Remove mock-up at conclusion of Work or when acceptable to Departmental Representative.
- .7 Mock-ups may remain as part of Work.
- .8 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.10 MILL TESTS

- .1 Submit mill test certificates as required of specification Sections.

1.11 EQUIPMENT AND SYSTEMS

- .1 Submit adjustment and balancing reports for mechanical, electrical Products

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Partie 1 General

1.1 RELATED SECTIONS

- .1 Section 01 45 00 - Quality Control.

1.2 QUALITY CONTROL

- .1 Contractor obligations:
 - .1 The Contractor is responsible for quality control and shall establish and maintain an effective quality control program. This includes the personnel, procedures and organization required to produce a final product that meets contract requirements. Quality control must cover all construction operations, both on the work site and elsewhere, and must be adapted to the proposed construction sequence.
 - .2 The Contractor shall monitor quality control for suppliers, manufacturers, products, services, work site conditions and work activities to produce the specified quality of work.
 - .3 The Contractor shall comply with manufacturers' instructions for each step of the construction sequence.
 - .4 If manufacturers' instructions conflict with contract documents, the Contractor shall request clarification from the Departmental Representative before proceeding.
 - .5 The Contractor shall comply with the specified standards for the minimum quality of work unless there are tolerances for codes or prescribed requirements that require stricter standards or more detailed work.
 - .6 The Contractor shall perform the work with qualified personnel to produce work of the prescribed quality.

1.3 TOLERANCES

- .1 The Contractor shall monitor the control of tolerances to produce acceptable work. The Contractor shall not allow tolerances to accumulate.
- .2 The Contractor shall comply with manufacturer and specification tolerances. If manufacturer tolerances conflict with contract documents, the Contractor shall request clarification from the Departmental Representative before proceeding.

1.4 REFERENCES

- .1 For products or work prescribed by an association, a construction trade or other recognized standards, the Contractor shall comply with the standards unless more stringent requirements are prescribed or required by applicable codes.
- .2 The Contractor shall comply with the reference standards in effect at the time of receipt of bids, except where a specific date is set by the code.
- .3 The Contractor shall obtain copies of the standards if required by the specification sections.

- .4 Neither contractual relationships nor the duties and responsibilities of the contract parties or those of the Departmental Representative can change with respect to the contract documents by mention or suggestion of any reference document.

Partie 2 Products

2.1 NOT USED

- .1 Not used.

Partie 3 Execution

3.1 QUALITY CONTROL PHASES

- .1 Quality control is a means by which the Contractor can ensure that the construction, including for subcontractors and suppliers, fulfills contract requirements. Quality control must cover all construction operations, both on the work site and elsewhere, and correspond to the proposed construction sequence. It must include at least three control phases to be carried out by the Contractor's quality control system manager for all definable portions of the work, as follows:

- .1 **Preparatory phase:** This phase must be completed before work begins for each definable portion of work and must include:

- .1 A review of each paragraph of the applicable specifications.
- .2 A review of the contract plans.
- .3 A review to ensure all materials and/or equipment have been tested, submitted and approved.
- .4 A review to ensure the required control inspection and testing have been planned.
- .5 A review of the work area to ensure that all required preliminary work has been performed and is consistent with the contract.
- .6 A physical examination of materials, equipment and work samples required to ensure they are available, in accordance with the approved shop drawings or on the required bid submission date, and are properly stored.
- .7 A discussion on construction work procedures, including necessary changes to resolve recurring problems.
- .8 Construction tolerances in documents and work standards for this work phase.
- .9 A review to ensure the Departmental Representative has approved the portion of the quality control plan for the work to be done.

- .2 **Initial phase:** This phase must be carried out at the beginning of a definable portion of work. The following must be done:

- .1 A review of the completed work to ensure it complies with contract requirements.
 - .2 Review of overall compliance with the contract: Verify inspection and testing required by quality control.
 - .3 Establish the level of qualification for the work to be carried out and make sure it meets the minimum acceptable standards for the work. Compare with test sections and approved sample panels, where applicable.
 - .4 Correct any differences.
 - .5 The initial phase should be repeated for each new team to work on the site or whenever the prescribed minimum acceptable standards are not met.
- .3 **Monitoring phase:** Daily checks must be performed to ensure continued compliance with contract requirements, including control testing, until the specific portion of the work is completed. Reviews must be recorded in the Contractor's quality control documents and submitted to the Departmental Representative. Final monitoring reviews must be performed and all problems must be corrected before the start of a new portion of work that could be affected by the defective work. The Contractor shall not build on or conceal non-compliant work.

3.2 STONE MATERIAL CONTROL PLAN

- .1 The Contractor is responsible for establishing and maintaining a quality control plan for quarry materials to ensure that all quarry materials incorporated into the structure comply with specifications.

3.3 SURVEY CONTROL, PROJECT LAYOUT AND STONE PLACEMENT SURVEYS

- .1 The Contractor is responsible for establishing and maintaining all land survey controls required to perform the work as described in Section 01 71 00 – Examination and Preparation.
- .2 The Contractor is responsible for the project location, including establishing and maintaining the survey control line, and for construction surveys necessary to perform the work required by the contract documents.
- .3 The Contractor is responsible for conducting spot-check surveys for all work performed on-site to ensure compliance with requirements. Spot-check surveys will be used to determine payment amounts and must be performed in the presence of the Departmental Representative, unless the latter determines otherwise.

3.4 COMPLETION INSPECTION

- .1 Once all the work is completed, the Contractor's quality control manager and the Departmental Representative shall inspect the work and list the elements that are inconsistent with the plans and specifications. The Contractor shall provide an estimated date on which the Contractor's quality control manager and personnel will conduct a

second inspection to ensure all defects have been corrected and shall notify the Departmental Representative of the date.

3.5 DOCUMENTATION

- .1 The Contractor shall maintain records of operations, activities and quality control tests conducted, including work carried out by subcontractors and suppliers. These records must be in an acceptable format and must include factual evidence that the required activities and/or quality control testing have been carried out, including, but not limited to, the following:
 - .1 The Contractor/subcontractor and their area of responsibility
 - .2 Testing and/or control activities conducted with results and references to plan and/or specification requirements
 - .3 Identification of elements submitted and reviewed with contract reference
 - .4 Conflicts with plans and/or specifications
 - .5 Contract plans as created, including full set of contract plans marked in red to indicate all conditions differing from original plans
 - .6 Shop drawings having received final approval

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal procedures

1.2 REFERENCES

- .1 Within text of each specifications section, reference may be made to reference standards.
- .2 Conform to reference standards, in whole or in part as specifically requested in specifications.
- .3 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .4 Cost for such testing will be born Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.3 QUALITY

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.4 AVAILABILITY

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

- .2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work might be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.5 STORAGE, HANDLING AND PROTECTION

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

1.6 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Departmental Representative will be paid for by Departmental Representative. Unload, handle and store such products.

1.7 MANUFACTURER'S INSTRUCTIONS

- .1 Unless otherwise indicated in specifications install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.8 QUALITY OF WORK

- .1 Ensure Quality of Work is of best quality, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

1.9 REMEDIAL WORK

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

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 RELATED SECTIONS

- .1 Section 01 77 00 - Closeout Procedures

1.2 NETTOYAGE FINAL

- .1 When work is substantially performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining work.
- .2 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .3 Make arrangements to obtain all necessary licences from authorities for waste disposal.
- .4 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

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 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct 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 submit verification that corrections have been made.
 - .2 Request for Departmental Representative inspection.
 - .2 Departmental Representative Inspection:
 - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: tested, adjusted, balanced and fully operational.
 - .4 Certificates required by Utility companies: submitted.
 - .5 Operation of systems: demonstrated to Owner's personnel.
 - .6 Commissioning of mechanical systems: completed in accordance with Departmental Representative.
 - .7 Work: complete and ready for final inspection.
 - .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Departmental Representative, and contractor
 - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.
 - .5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
 - .6 Final Payment:
 - .1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.

- .2 When Work deemed incomplete by Departmental Representative,
complete outstanding items and request re-inspection.

1.3 FINAL CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.

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 EXIGENCES CONNEXES

- .1 Section 03 20 00 – Concrete reinforcing
- .2 Section 03 30 00 – Cast-in-place concrete
- .3 Section 03 41 00 – Precast structural concrete

1.2 REFERENCE STANDARDS

- .1 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-O86S1, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
 - .3 CSA O121, Douglas Fir Plywood.
 - .4 CSA O151, Canadian Softwood Plywood.
 - .5 CSA O153, Poplar Plywood.
 - .6 CSA O437 Series, Standards for OSB and Waferboard.
 - .7 CSA S269.1, Falsework for Construction Purposes.
 - .8 CAN/CSA-S269.3, Concrete Formwork, National Standard of Canada
- .2 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings for formwork and falsework.
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the province of Quebec in Canada.
- .3 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1, for falsework drawings Comply with CAN/CSA-S269.3 for formwork drawings .
- .4 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.
- .5 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.
- .6 When slip forming or lying forms are used, submit details of equipment and procedures for review by Departmental Representative.

1.4 MATERIALS

- .1 Formwork materials:
 - .1 For concrete without special architectural features, use wood and wood product formwork materials to CSA O437 Series, CSA-O121, CAN/CSA-O86, CSA-O153.
 - .2 The formwork must be in conformity with standard CAN3-A23.1-M77. Respect the maximum tolerances for the finished concrete works as mentioned in standard 347 of ACI « Recommended Practice for Concrete Formwork ».
- .2 Form ties:
 - .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
 - .2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.
- .3 Form liner:
 - .1 Plywood: Canadian Softwood Plywood to CSA O151, Poplar to CSA O153 or Douglas Fir to CSA O121
 - .2 Waferboard: to CAN3-0188.0
- .4 Form release agent: biodegradable, low VOC, non-toxic .
- .5 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with a viscosity between 70 and 110s in Saybolt Universal with viscosity between 15 to 24 mm²/s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.
- .6 Falsework materials: to CSA-S269.1.

Part 2 Execution

2.1 FABRICATION AND ERECTION

- .1 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.
- .2 Align form joints and make watertight.
 - .1 Keep form joints to minimum.
- .3 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.
- .4 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .5 Construct forms for architectural concrete, and place ties as directed as indicated.
 - .1 Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.
- .6 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.

- .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .7 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.
- .8 When slip forming or flying forms are used, submit details as indicated in PART 1 - SUBMITTALS.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 03 10 00 – Concrete forming and accessories
- .2 Section 03 30 00 - Cast-in-Place Concrete
- .3 Section 03 41 00 – Precast Structural Concrete

1.2 REFERENCES

- .1 American Concrete Institute (ACI)
 - .1 ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure
- .2 American National Standards Institute/American Concrete Institute (ANSI/ACI)
 - .1 ANSI/ACI 315, Details and Detailing of Concrete Reinforcement
- .3 American Society for Testing and Materials (ASTM)
 - .1 ASTM A 775/A 775M, Specification for Epoxy-Coated Reinforcing Steel Bars
- .4 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction
 - .2 CAN3-A23.3, Design of Concrete Structures for Buildings
 - .3 CAN/CSA-G30.18-M, Billet-Steel Bars for Concrete Reinforcement
 - .4 CAN/CSA-G40.20/G40.21, Structural Quality Steels
 - .5 CAN/CSA-G164-M, Hot Dip Galvanizing of Irregularly Shaped Articles
 - .6 CAN/CSA-S6, Canadian Highway Bridge Design Code
 - .7 CAN/CSA W186-M, Welding of Reinforcing Bars in Reinforced Concrete Construction
- .5 Reinforcing Steel Institute of Canada (RSIC)
 - .1 RSIC-Reinforcing Steel, Manual of Standard Practice.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit shop drawings, including placing of reinforcement in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Prepare reinforcement drawings in accordance with SP-66 and RSIC Manual of Standard Practice.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Québec.
 - .1 Indicate placing of reinforcement and:
 - .1 Bar bending details.

- .2 Lists.
- .3 Quantities of reinforcement.
- .4 Sizes, spacing, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.
- .5 Indicate sizes, spacing and locations of chairs, spacers and hangers.
- .2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3, unless otherwise indicated.
 - .1 Provide tension lap splices unless otherwise indicated.
- .4 When Chromate solution is used as replacement for galvanizing non-prestressed reinforcement, provide product description for review by Departmental Representative prior to its use.

1.4 QUALITY ASSURANCE

- .1 Submit in accordance with Section 01 45 00 - Quality Control and as described in PART 2 - SOURCE QUALITY CONTROL.
 - .1 Mill Test Report: upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.
 - .2 Upon request submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in a clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

- .1 Substitute different size bars only if permitted in writing by Departmental Representative
- .2 Reinforcing steel: billet steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise.
- .3 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.

- .4 In addition to steel reinforcement, provide for the use of synthetic macrofibres for precast slabs (slipway and cribs) and artificial reefs, with a minimum dosage of 3 kg / m3 of concrete and according to the manufacturer's instructions for the intended use.**
- .5 Cold-drawn annealed steel wire ties: to ASTM A82/A82M.
- .6 Deformed steel wire for concrete reinforcement: to ASTM A82/A82M.
- .7 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .8 Mechanical splices: subject to approval of Departmental Representative.
- .9 Plain round bars: to CSA-G40.20/G40.21.

2.2 FABRICATION

- .1 Fabricate reinforcing steel in accordance with Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada SP-66 CSA-A23.1/A23.2.
 - .1 SP-66 unless otherwise indicated.
- .2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.
 - .1 Ship epoxy coated bars in accordance with ASTM A775A/A775M.

2.3 SOURCE QUALITY CONTROL

- .1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.
- .2 Upon request, advise the Departmental Representative of the proposed source of materials to be supplied.

Part 3 Execution

3.1 PLACING REINFORCEMENT

- .1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.
- .2 Use plain round bars as slip dowels in concrete.
 - .1 Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.
 - .2 When paint is dry, apply thick even film of mineral lubricating grease.
- .3 Ask the Departmental Representative to accept the reinforcements and their placement before pouring concrete.

- .4 Take care to preserve the integrity of the reinforcement coating during the pouring of concrete.
- .5 During transport and handling, cover the parts of the bars coated with paint or epoxy in order to protect them adequately.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 03 10 00 - Concrete Forming and Accessories
- .2 Section 03 20 00 - Concrete Reinforcing
- .3 Section 03 41 00 – Precast Structural Concrete

1.2 MEASUREMENT METHOD

- .1 Measurement and Payment:
 - 1. No deductions will be made for volume of concrete displaced by reinforcing steel.

1.3 REFERENCE STANDARDS

- .1 ASTM International
 - 1. ASTM C260/C260M, Standard Specification for Air-Entraining Admixtures for Concrete.
 - 2. ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - 3. ASTM C494/C494M, Standard Specification for Chemical Admixtures for Concrete.
 - 4. ASTM C1017/C1017M, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 - 5. ASTM D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
 - 6. ASTM D624, Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
 - 7. ASTM D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types).
 - 8. ASTM D1752, 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, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Damp proofing and Waterproofing and for Roof Coatings.
 - 2. CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .3 CSA International
 - 1. CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - 2. CSA A283, Qualification Code for Concrete Testing Laboratories.

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

1.4 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.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit certificates in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Minimum four (4) week prior to starting concrete work submit to Departmental Representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:
 1. Portland cement
 - .1 Supplementary cementing materials
 - .2 Grout
 - .3 Admixtures
 - .4 Aggregates
 - .5 Water
- .3 Provide results and reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.
- .4 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.
- .5 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.

1.6 QUALITY ASSURANCE

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

- .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 4 weeks prior to starting concrete work, submit proposed quality control procedures for Departmental Representative's approval for following items:
 1. Falsework erection.
 2. Hot weather concrete.
 3. Cold weather concrete
 4. Curing
 5. Finishes
 6. Formwork removal
- .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.

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 article 1.4 of PART 1 - QUALITY ASSURANCE.

2.3 MATERIALS

- .1 Portland cement, for general purposes, GU, to CAN/CSA-A3001.
- .2 Cementitious hydraulic slag: to CAN/CSA-A23.1/A23.2.
- .3 Water: to CAN/CSA-A23.1/A23.2.
- .4 Aggregates: to CAN/CSA-A23.1/A23.2. Coarse aggregates to be normal density.
- .5 **Synthetic macrofibers for precast slabs (slipway and cribs) and artificial reefs: minimum dosage of 3 kg/m3 of concrete and according to the manufacturer's instructions**
- .6 Chemical admixtures
 1. Air entraining admixture: to ASTM C260.
 2. Chemical admixtures: to ASTM C494. Departmental Representative shall approve accelerating or set retarding admixtures during cold and hot weather placing.

- .7 Curing compound: to CSA A23.1/A23.2, white, Type I-D with fugitive dye.
- .8 Steel, Anchors: to CAN/CSA-G40.20/G40.21 Grade 350W or as indicated.

2.4 MIXES

- .1 Proportion concrete in accordance with CAN/CSA-A23.1/A23.2. Mix proportions as specified below.
- .2 Ensure materials used in concrete mix have been submitted for testing and meet requirements of CSA A23.1.
 - 1. Co-ordinate construction methods to suit Departmental Representative concrete mix proportions and parameters.
 - 2. Identify and report immediately to Departmental Representative when concrete mix design and parameters pose anticipated problems or deficiencies related to construction.
 - 3. Departmental Representative to proportion concrete mix for normal including:
 - 4. **Standard Concrete:**
 - .1 GU-b SF Portland cement.
 - .2 Minimal compressive strength at 28 days: 35 Mpa.
 - .3 Class of exposure: C-1.
 - .4 20 mm nominal size coarse aggregate.
 - .5 Slump at time and point of discharge: 80 mm to 125 mm.
 - .6 Air content 5% to 8 %.
 - .7 Chemical admixtures: water reducing strength increasing, set retarding, accelerating, strength increasing, air entraining, super plasticizers, following admixtures in accordance with ASTM C 494.
 - .8 Dry weight per cubic meter: 2 400 kg/m³ minimum.
 - .9 Water/Cement content: lower than 0.40.
 - .10 Minimum cement content: 375 kg/m³ of concrete.
 - 5. **High Performance Concrete for artificial reefs:**
 - .1 GU-b SF Portland cement.
 - .2 Minimal compressive strength at 28 days: 50 Mpa.
 - .3 Class of exposure: C-XL.
 - .4 14 mm nominal size coarse aggregate.
 - .5 Sable module de finesse entre 2,2 et 2,8
 - .6 Slump at time and point of discharge: 170 mm +- 30 mm.
 - .7 Air content 4% to 8 %.
 - .8 Dry weight per cubic meter: 2 400 kg/m³ minimum.
 - .9 Water/Cement content: lower than 0.37.
 - .10 Minimum cement content: 375 kg/m³ of concrete.
 - .11 Sandblast finish (interior and exterior) to obtain a rough surface
 - .12 Mandatory additives:
 - .1 Air entraining: to ASTM C-260

- .2 Water reducing: according to ASTM C494
 - .3 Silica fume: according to ASTM C-1240
 - .4 Fibers: according to ASTM C1116
- .13 Optional additives:
 - .1 Fly ash: non-toxic type F: according to ASTM C-618
- .14 Unauthorized additives:
 - .1 Accelerating.
- .15 In addition to the above requirements, the contractor must demonstrate that the mix formula chosen for the high-performance concrete meets the following criteria:
 - .1 High durability in marine environment.
 - .2 High roughness to promote the establishment of marine flora and fauna.
 - .3 Low toxicity to marine plants and wildlife.
 - .4 High sulphate resistance.
 - .5 High chipping resistance.
 - .6 High crack resistance
- 6. Ensure materials to be used in concrete mix have been submitted for testing.
- 7. Co-ordinate construction methods with Departmental Representative to suit concrete mix proportions and parameters.
- 8. Identify and report immediately to Departmental Representative when concrete mix design and parameters pose anticipated problems or deficiencies related to construction.
- 9. Artificial reefs identification
 - .1 The artificial reefs will have two (2) identification plates, one (1) attached to each of the two (2) "U" anchors.
 - .1 The rigid nylon identification plate:
 - .1 Brightly colored (yellow, red, royal blue, etc.)
 - .2 Length: 89mm
 - .3 Width: 57mm
 - .4 Font size: 32mm
 - .5 Engraved: 3mm
 - .6 Opening: 25mm in diameter
 - .2 Anchors: Stainless steel or galvanized, of sufficient diameter to allow lifting of reefs.
 - .3 Wooden pallet: artificial reefs must be provided with a wooden pallet meeting the following characteristics:
 - .1 Species: Hemlock, Red Cedar or Larch.
 - .2 Dimensions: 1400 x 1400mm.
 - .3 Height: 150mm ± 15mm.
 - .4 Pallet Fastening: Hardened nails, or galvanized or stainless steel screws.

- .5 Fixing between the reef and the pallet: 6 to 8 galvanized or stainless steel screws fixed between the wooden pallet and the sole of the reef. The screws must penetrate 100mm into the sole.
- .3 Not with standing specification CAN/CSA_A23.1 and CAN/CSA-A23.4, the Contractor will provide the Departmental Representative with a mixing formula for the concrete. This formula is only a guide prepared according the aggregates supplied by the Contractor and submitted to the designated laboratory for all processes such as grading, washing, etc. It is the Contractor's responsibility to use similar aggregates and to handle them so as to obtain good results. It is also Contractor's responsibility to set the mixing guide formula depending on possible variations of aggregates or other concrete components.

Part 3 Execution

3.1 PREPARATION

- .1 Obtain Departmental Representative's written approval before placing concrete.
 - 1. Provide 24 hours minimum notice prior to placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 During concreting operations:
 - 1. Development of cold joints not allowed.
 - 2. Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to Work.
- .4 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .5 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing.
- .6 Clean and remove stains prior to application for concrete finishes.
- .7 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .8 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 CONSTRUCTION

- .1 Execute cast-in-place concrete works in accordance with CSA A23.1/A23.2.
- .2 Sleeves and inserts:
 - 1. Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by Departmental Representative.
 - 2. Where approved by Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.
 - 3. Sleeves and openings greater than 100 x 100 mm not indicated, must be reviewed by Departmental Representative.

4. Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Departmental Representative before placing of concrete.
 5. Confirm locations and sizes of sleeves and openings shown on drawings.
 6. Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
- .3 Anchor bolts
1. Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.
 2. Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from Departmental Representative.
 - .1 Formed holes: 100 mm minimum diameter.
 - .2 Drilled holes: diameter to manufacturers' recommendations.
 3. Protect anchor bolt holes from water accumulations, snow and ice build-ups.
 4. Set bolts and fill holes with epoxy grout.
 5. Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.
- .4 Finishing
1. Finish concrete in accordance with CAN/CSA-A23.1/A23.2.
 2. Use procedures noted in CAN/CSA-A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
 3. Use curing compounds compatible with applied finish on concrete surfaces.
 4. For concrete slab, execute a broom or brush groovy finish for maximum grip.
 5. For artificial reefs, perform a sandblast, water and air jet finish or other process to produce a rough finish to optimize fixation of marine species.

3.3 TOLERANCE

- .1 Concrete finishing tolerance in accordance with CAN/CSA-A23.1/A23.2

3.4 FIELD QUALITY CONTROL

- .1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Agencies designated by Departmental Representative in accordance with CAN/CSA-A23.1/A23.2 and Section 01 45 00 - Quality Control.
- .2 Departmental Representative will pay for costs of tests as specified in Section 01 29 83 - Payment Procedures: Testing Laboratory Services.
- .3 Departmental Representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .4 Non-destructive Methods for Testing Concrete shall be in accordance with CAN/CSA-A23.1/A23.2.

- .5 Inspection or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.
- .6 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing agency and Departmental Representative.

3.5 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

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

1.2 REFERENCE STANDARDS

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - .2 ASTM A775/A775M, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
 - .3 ASTM C260, Standard Specification for Air-Entraining Admixtures for Concrete.
 - .4 ASTM D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
 - .5 ASTM D2240, Standard Test Method for Rubber Property - Durometer Hardness.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.40, Anticorrosive Structural Steel Alkyd Primer.
 - .2 CAN/CGSB-1.181, Ready Mixed Organic Zinc-Rich Coating.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-A23.3, Design of Concrete Structures.
 - .3 CSA-A23.4, Precast Concrete Materials and Methods.
 - .4 CAN/CSA-A3000, Cementitious Materials Compendium.
 - .1 CSA-A3001, Cementitious Materials for Use in Concrete.
 - .5 CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement.
 - .6 CAN/CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .7 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .8 CAN/CSA-S6, Canadian Highway Bridge Design Code.
 - .9 CSA-W47.1, Certification of Companies for Fusion Welding for Steel.
 - .10 CAN/CSA W48, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .11 CSA-W59, Welded Steel Construction (Metal Arc Welding) (Metric version).
 - .12 CSA-W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .4 The Master Painters Institute (MPI) - Architectural Painting Specification Manual (ASM)
 - .1 MPI # 18, Organic Zinc Rich Primer.
 - .2 MPI # 23, Oil Alkyd Primer.

- .5 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.3 DESIGN REQUIREMENTS

- .1 Design precast elements to CSA- A23.3 and A23.4 to carry handling stresses.**
- .2 Design precast elements to carry loads as indicated.
- .3 Perform vibration tests and analyses, when request and as directed by the Departmental Representative.
- .4 Calculate assembly and fastening parts of the precast concrete elements according to the loads and forces specified by the Departmental Representative.
- .5 Provide detailed calculations and design drawings for typical precast elements and connections as described in PART 1 - SUBMITTALS.

1.4 PERFORMANCE REQUIREMENTS

- .1 Tolerance of precast elements to CAN/CSA-A24.

1.5 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings in accordance with CSA-A23.3 and include following items:
 - .1 Calculations of elements designed by the manufacturer.
 - .2 Details of prestressed and non-prestressed members, reinforcement and their connections.
 - .3 Camber.
 - .4 Finishing schedules.
 - .5 Methods of handling and erection.
 - .6 Openings, sleeves, inserts and related reinforcement.
- .3 Shop Drawings: submit drawings stamped and signed by qualified professional engineer registered or licensed in Province of Québec.
- .4 Submit sample number of each finish to be used on project to Departmental Representative.

1.6 QUALITY ASSURANCE

- .1 Quality Control Plan: submit written report, as described in PART 3 - VERIFICATION, to Departmental Representative verifying compliance that concrete provided meets performance requirements of concrete as established in PART 2 - PRODUCTS.

1.7 QUALIFICATIONS

- .1 Precast concrete elements to be manufactured in Canadian Standards Association (CSA) certified mills in the appropriate product categories as per CSA A251.**
- .2 Manufacturers of precast concrete components shall be certified in accordance with the precast concrete manufacturing certification procedures established by CSA**

prior to submitting their bid. They shall also expressly state in their tender that their mills are duly certified in the appropriate product categories, ie precast structural concrete products.

- .3 Only precast concrete products produced by certified manufacturers will be accepted by the Departmental Representative. In addition, the accreditation of these manufacturers shall remain valid throughout the period of manufacture and implementation of elements, and until the end of the warranty period.**
- .4 Welding companies certified to CSA-W47.1.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, handle and store precast/prestressed units according to manufacturer's instructions.
- .2 Protect unit corners from contacting earth to prevent from staining.

Part 2 Product

2.1 MATERIALS

- .1 Steel:
 - .1 Structural steel: in accordance with Standard CAN/CSA-G40.20/G40.21, Shade 350W or as per specifications.
 - .2 Hot dip galvanizing: as per indications, galvanized steel elements in accordance with CAN/CSA-G164, with minimum zinc coating of 600 g/m² or with ASTM A123/123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Production.
 - .1 Galvanize the various parts in accordance with the following rates:
 - .1 Bolts and nuts: 460 g/m²;
 - .2 Section, plates and rods: 705 g/m²
 - .3 All mechanical bolts, lag screw, drift bolt and nails shall be galvanized, medium grade steel in accordance with ASTM A-307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- .2 Formwork
 - .1 Formwork materials:
 - .1 For concrete without special architectural features, use wood and wood product formwork materials to CSA O437 Series, CSA-O121, CAN/CSA-O86, CSA-O153.
 - .2 The formwork must be in conformity with standard CAN3-A23.1-M77. Respect the maximum tolerances for the finished concrete works as mentioned in standard 347 of ACI « Recommended Practice for Concrete Formwork ».
 - .2 Form ties:
 - .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.

- .2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.
- .3 Form liner:
 - .1 Plywood: Canadian Softwood Plywood to CSA O151, Poplar to CSA O153 or Douglas Fir to CSA O121
 - .2 Waferboard: to CAN3-0188.0
- .4 Form release agent: biodegradable, low VOC, non-toxic .
- .5 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with a viscosity between 70 and 110s in Saybolt Universal with viscosity between 15 to 24 mm²/s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.
- .6 Falsework materials: to CSA-S269.1.
- .3 Reinforcement
 - .1 Substitute different size bars only if permitted in writing by Departmental Representative
 - .2 Reinforcing steel: billet steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise.
 - .3 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.
 - .4 **Synthetic macrofibres for precast slabs (slipway and cribs) and artificial reefs: minimum dosage of 3 kg/m³ of concrete and according to the manufacturer's instructions**
 - .5 Cold-drawn annealed steel wire ties: to ASTM A82/A82M.
 - .6 Deformed steel wire for concrete reinforcement: to ASTM A82/A82M.
 - .7 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
 - .8 Mechanical splices: subject to approval of Departmental Representative.
 - .9 Plain round bars: to CSA-G40.20/G40.21.
- .4 Portland cement,
 - .1 For general purposes, GU, to CAN/CSA-A3001.
 - .2 Cementitious hydraulic slag: to CAN/CSA-A23.1/A23.2.
 - .3 Water: to CAN/CSA-A23.1/A23.2.
 - .4 Aggregates: to CAN/CSA-A23.1/A23.2. Coarse aggregates to be normal density.
 - .5 Chemical admixtures
 - .1 Air entraining admixture: to ASTM C260.
 - .2 Chemical admixtures: to ASTM C494. Departmental Representative shall approve accelerating or set retarding admixtures during cold and hot weather placing.
 - .6 Curing compound: to CSA A23.1/A23.2, white, Type1-D with fugitive dye.
 - .7 Steel, Anchors: to CAN/CSA-G40.20/G40.21 Grade 350W or as indicated.

2.2 MIXES

- .1 Concrete

- .1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria in accordance with CAN/CSA-A23.1/A23.2.
 - .1 Ensure concrete supplier meets performance criteria as established in Section 03 30 00 – Cast in place Concrete and provide verification of compliance as described in PART 3 - VERIFICATION.
 - .2 Provide quality management plan to ensure verification of concrete quality to specified performance.
 - .3 Concrete supplier's certification.
 - .4 Not with standing specification CAN/CSA_A23.1 and CAN/CSA-A23.4, the Contractor will provide the Departmental Representative with a mixing formula for the concrete. This formula is only a guide prepared according the aggregates supplied by the Contractor and submitted to the designated laboratory for all processes such as grading, washing, etc. It is the Contractor's responsibility to use similar aggregates and to handle them so as to obtain good results. It is also Contractor's responsibility to set the mixing guide formula depending on possible variations of aggregates or other concrete components.

2.3 MANUFACTURED UNITS

- .1 Manufacture units in accordance with CAN/CSA-A23.1/A23.2.
- .2 Mark each precast unit to correspond to identification mark on shop drawings for location with date cast on part of unit which will not be exposed.
- .3 Provide hardware suitable for handling elements.

2.4 FINISHES

- .1 Finish units to CSA-A23.4.

2.5 SOURCE QUALITY CONTROL

- .1 Provide Departmental Representative with certified copies of quality control tests related to this project as specified in CAN/CSA G279 and CAN/CSA A23.4.
- .2 Provide records from in-house quality control programme based upon plant certification requirements to Departmental Representative for inspection and review.
- .3 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel supplied, showing physical and chemical analysis.
- .4 Precast plants should keep complete records of supply source of concrete material, steel reinforcement, prestressing steel and provide to Departmental Representative for review upon request.

Part 3 Execution

3.1 ERECTION

- .1 Do precast concrete work in accordance with CSA-A23.3/A23.4 and CAN/CSA-S6.

- .2 Do welding in accordance with CSA-W59, for welding to steel structures and CSA-W186, for welding of reinforcement.
- .3 Clean field welds with wire brush and touch-up galvanized finish with zinc-rich primer.

3.1 VERIFICATION

- .1 Ensure concrete supplier meets performance criteria of concrete as established in Part 2 B Products, by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

3.2 CLEANING

- .1 Use cleaning methods as reviewed by Departmental Representative before cleaning soiled precast concrete surfaces.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 61 00 – Common product requirements
- .3 Section 01 74 21 - Construction/Demolition Waste Management and Disposal

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A6/A6M, Standard Specification for general Requirements for Rolled Structural Steel Bars, Plates, Shapes and Sheet Piling.
 - .2 ASTM A53, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .3 ASTM A 36/A36M, Specification for Structural Steel.
 - .4 ASTM A123/123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Production
 - .5 ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
 - .6 ASTM A 325M, Specification for High-Strength Bolts for Structural Steel Joints (Metric).
 - .7 ASTM A563, Standard Specification for Carbon and Alloy Steel Nuts
 - .8 ASTM A 780, repainting of damaged galvanized coating.
- .2 American National Standards Institute, (ANSI)
 - .1 AWS D3.6M, Specification for underwater welding.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA-G164-M, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CAN/CSA-S16-S1, Limit States Design of Steel Structures.
 - .4 CSA-S136.S1, Limit States Design of Steel Structures (Specification for the Design of Cold-Formed Steel Structural Members).
 - .5 CSA-S136.1, Commentary on CSA Standard S136.
 - .6 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.
 - .7 CSA W47.2, Fusion welding of aluminum company certification
 - .8 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding.
 - .9 CSA W59, Welded Steel Construction for Metal Arc Welding.
 - .10 CSA W59.2, Welded aluminum construction
- .4 Canadian Institute of Steel Construction

- .1 Handbook of steel construction
- .5 The Master Painters Institute (MPI)

1.3 SUBMITTALS PROCEDURES

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for sections, plates, pipe, tubing and bolts and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit one copy of WHMIS MSDS in accordance with Section 01 35 29 - Health and Safety Requirements and Section 01 35 43 - Environmental Procedures.
 - .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Québec.
 - .2 Shop drawings for the following components:
 - .1 **Cleats**
 - .2 **Services stations**
 - .3 **Ladder, clamp**
 - .4 Steel angles, plates, profiles, pipes, bars and other steel pieces to be incorporated into the works
 - .3 Indicate materials, core thicknesses, finishes, connections, joint, methods of anchorage, number of anchors, supports, reinforcement, details, and accessories.
 - .4 Submit shop drawings, including materials processing and assembly, and the list of equipment and materials in accordance with Section 01 33 00 - Submittal Procedures.
 - .5 Erection drawings: indicate details and information necessary for assembly and erection purposes including:
 - .1 Description of methods.
 - .2 Sequence of erection.
 - .3 Type of equipment used in erection.
 - .4 Temporary walers.
- .4 Ensure Fabricator drawings showing designed assemblies, components and connections are stamped and signed by qualified professional engineer licensed in the province of Quebec, Canada.

1.4 QUALITY ASSURANCE

- .1 Submit 2 copies of mill test reports 4 weeks prior to fabrication of structural steel.
 - .1 Mill test reports to show chemical and physical properties and other details of steel to be incorporated in project.

- .2 Provide mill test reports certified by metallurgists qualified to practice in province of Quebec, Canada.
- .2 Provide structural steel Fabricator's affidavit stating that materials and products used in fabrication conform to applicable material and products standards specified and indicated.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location, off ground indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

1.6 WASTE MANAGEMENT

- .1 Sort and remove for reuse waste in accordance with Section 01 74 21 - Construction/Demolition Waste Management.

Part 2 Products

2.1 MATERIALS

- .1 Structural steel: to CAN/CSA-G40.20/G40.21 Grade 350W or as indicated.
- .2 Welding materials: to CSA W59 and CSA W59.2 and certified by Canadian Welding Bureau.
- .3 Welding electrodes: to CSA W47 and CSA W48 and Series.
- .4 Anchor bolts: to ASTM A307 or A325, as indicated on drawings.
- .5 Nuts and washers: following asked bolts, to develop full strength. Lubricated in accordance with ASTM A563.
- .6 Hot dip galvanizing: galvanize steel, where indicated, in accordance with ASTM A123/123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Production and to CAN/CSA-G164, minimum zinc coating of 600 g/m².
- .7 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 FABRICATION

- .1 Fabricate structural steel in accordance with CAN/CSA-S16, CAN/CSA-S136 and in accordance with reviewed shop drawings.
- .2 Continuously seal members by continuous welds where indicated. Grind smooth.
- .3 Bolts Tightening: use tightening torque in accordance with CISC

- .4 Exposed welds should be continuous throughout the length of the joint; they must be filed down or ground to present a smooth, even surface.
- .5 Where possible, fit and shop assemble work, ready for erection.

2.3 METAL FABRICATION - GENERAL

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Use self-tapping shake-proof headed screws on items requiring assembly by screws or as indicated.
- .3 Where possible, fit and shop assemble work, ready for erection.
- .4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.4 FINISH

- .1 All steel components to be hot-dip galvanized, not painted, in accordance to CAN/CSA-G164.

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 GENERAL

- .1 Structural steel work: in accordance with CAN/CSA-S16 and CAN/CSA-S136.
- .2 Provide a letter of validation of the steel manufacturer and welders as evidence of certification by the Canadian Welding Bureau, Division 2.1.
- .3 Welding: in accordance with CSA W59.
- .4 Companies to be certified under Division 2 of CSA W47.1 for fusion welding of steel structures, CSA W47.2 for aluminum or CSA W55.3 for resistance welding of structural components.

3.3 INSTALLATION

- .1 Surface welding: welding work must be done in conformity with the requirements of the standards indicated to article 1.3 of this section, and with the dimensional tolerances specified in the standards of this article. The welders must be qualified according to Canadian Welding Bureau for the type of welding corresponding to work carried out.
- .2 Finish: Carefully finish the various parts of work. Cutting, carving, boring and machining shall be done with care and precision. Finished components must meet prescribed alignment requirements and be free from torsion, curves, open joints, sharp corners and ridges.
- .3 On-site additional splices: obtain Departmental Representative's approval before making on-site additional splices (to facilitate transport and assembly of elements). No additional cost for expenses incurred by the additional splices done on-site.
- .4 All the adjacent welding with galvanized parts will receive a coat of rich zinc protective paint.

3.4 ERECTION

- .1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16, CAN/CSA-S136 and in accordance with reviewed erection drawings.
- .2 Does welding work in accordance with CSA W59 or CSA W59.2, unless specified otherwise.
- .3 Field cutting or altering structural members, to approval of Departmental Representative.
- .4 Erect steel accurately, level, plumb straight, line up and adjusted with precision, joints and crossing well fixed.
- .5 Provide and install suitable anchors approved by Departmental Representative such as studs, tie-rods, anchor bolts, expansion bolts, etc.
- .6 Visible fastening to be compatible with crossed or fixed to material.
- .7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.
- .8 Clean with mechanical brush and touch up coat protection to bolts, rivets, welds or burned or scratched surfaces at completion of erection.
- .9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.
- .10 Continuously seal members by continuous welds where indicated. Grind smooth.
- .11 Allowable tolerances for bolt holes:
 - .1 Matching holes for bolts to register so that a gauge 2 mm less than diameter than hole will pass freely through assembled members at right angles to such members.
 - .2 Finish holes not more than 2 mm in diameter larger than diameter of bolt unless otherwise specified by Departmental Representative.
 - .3 Centre-to-centre distance between 2 holes of a group of holes to vary but not more than 1 mm from dimensioned distance between such holes..

- .4 Centre-to-centre distance between any group of holes to vary not more than following:

Centre-to-centre (m)	Difference (\pm) (mm)
Less than 10	1
10 to 20	2
20 to 30	3

3.5 CLEANING

- .1 .Cleaning up work: perform cleanup in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work site clean at the end of each workday.
- .2 Final Cleaning: upon completion remove materials / surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management.
 - .1 Remove bins and recycling bins from site and dispose of materials at appropriate facilities.

3.6 PROTECTION

- .1 Protect installed products and components against damage during construction.
- .2 In case of galvanization failure, repair according to ASTM A780 / A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
- .3 Repair damage to adjacent materials and equipment from installation of steel components.

END OF SECTION