

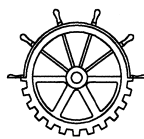
**RIDEAU CANAL  
KINGSTON MILLS LOCK 46  
CONCRETE REPAIRS**

Project No. 310707

**SPECIFICATION**

August 23, 2007

Prepared by:



Heritage Canals & Engineering Works  
Ontario Region



Public Works and  
Government Services  
Canada

Travaux publics et  
Services gouvernementaux  
Canada

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PART 1 - GENERAL

- |                                 |    |   |
|---------------------------------|----|---|
| <u>1.1 PRECEDENCE</u>           | .1 | Division 1 Sections take precedence over technical specification sections elsewhere in these specifications.  |
| <br>                            |    |   |
| <u>1.2 DESCRIPTION</u>          | .1 | This specification covers the requirements for the furnishing of all labour, materials, technical specification setools, equipment, plant, power, systems, transportation, and supervision necessary to completely perform the work of the Drawings and Specifications. |
|                                 | .2 | The work includes but is not limited to the following:<br>.1 Concrete removal.<br>.2 Stone removal.<br>.3 Cast-in-place concrete.<br>.4 Anchors.  |
|                                 | .3 | Most of the work is at the coping, but it also includes one gate quoin, the formwork for which is somewhat complicated and requires great care in taking measurements before concrete removal takes place, lest the mitre gates not fit properly upon re-installation.  |
| <br>                            |    |   |
| <u>1.3 HERITAGE VALUE</u>       | .1 | The Rideau Canal is a National Historic Site. The navigation locks, buildings, and landscape are "Level 1" cultural resources (highest level). Thus, the work of this contract must not cause damage to these heritage resources.                                       |
| <br>                            |    |   |
| <u>1.4 LOCATION OF THE WORK</u> | .1 | Kingston Mills lock-station is located approximately 8 km northeast of the City of Kingston.  |
|                                 | .2 | The site can be accessed off Frontenac County Road 21, about 2 km west of highway No 15. County road 21 intersects Highway 15 about 1 km north of Highway 401.  |
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1.4 LOCATION OF  
THE WORK  
(Cont'd)

- .3 Lock 46 is located immediately underneath a swing bridge.

1.5 ACCESS

- .1 limits of the work area, to be as shown on the plans or as directed by the Engineer - confine activities to those areas.
- .2 Secure the work area in an approved manner. This includes fencing off the construction site to prevent public access to any areas where construction activities occur.
- .3 Contractor parking:  
.1 Use only the upper rear parking lot. Do not use the upper front parking lot, as this is reserved for the public. The Engineer will indicate which parking lot is which.  
.2 Do not block access to the lower wharf and parking lot.  
.3 Ensure barriers to upper parking lot remain in place and intact. Engineer will indicate location of these barriers.

1.6 FIELD  
CONDITIONS

- .1 Tender package contains photographs showing condition of gates and drawings showing the configuration of dam.
- .2 A site visit will be organized to allow Bidders to examine the site, the surroundings, and the condition of the existing coating system before submitting a bid.

1.7 PUBLIC TRAFFIC  
FLOW

- .1 Do not interfere with public traffic flow over the swing bridge.

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|--------------------------------------|----|--|
| <u>1.8 SECURITY</u>                  | .1 | Take appropriate security precautions to safeguard equipment, tools, and materials on site, as experience has shown that vandalism to be a serious problem at this site.   |
| <br>                                 |    |  |
| <u>1.9 CANAL REGULATIONS</u>         | .1 | The "Historic Canal Regulations" SOR/84-116 apply to and govern the work of this Contract.   |
|                                      | .2 | These regulations may be found on the Internet at following web address:<br><a href="http://www.tc.gc.ca/acts-regulations/GENERAL/d/dta/regulations/001/dta005/dta005.html">http://www.tc.gc.ca/acts-regulations/GENERAL/d/dta/regulations/001/dta005/dta005.html</a>  |
| <br>                                 |    |  |
| <u>1.10 EXAMINATION OF THE WORK</u>  | .1 | Visit the site of Work before submittal of tender. Very carefully examine the following:<br>.1 The lock site.<br>.2 The access to both sides of the lock.  |
|                                      | .2 | Investigate and be fully informed as to the character and extent of Work to be performed and the difficulties involved, the facilities available for delivering, placing and operating the necessary plant and for delivering and handling materials.  |
| <br>                                 |    |  |
| <u>1.11 RELICS &amp; ANTIQUITIES</u> | .1 | If any relics, antiquities, cornerstones and contents, inscribed tablets, evidence of ancient persons and peoples, or similar objects of historic value are discovered in the course of work, immediately protect such items from damage. Give immediate notice to Engineer. Await Engineer's written instructions before proceeding with any work which might threaten such items. Such items are the property of the Department. |
| <br>                                 |    |  |
| <u>1.12 WORK/STORAGE AREA</u>        | .1 | Erect temporary site enclosure using modular free-standing fencing: galvanized, minimum 1.8m high, chain link or welded steel mesh, pipe rail. Provide one lockable truck entrance gate and at least one pedestrian door as  |
-

1.12 WORK/STORAGE  
AREA  
(Cont'd)

- .1 (Cont'd)  
directed. Equip all gates with locks and keys.  
Maintain fence in good repair and remove it at  
the end of Work.
- .2 Protect trees to Section 01 35 43 -  
ENVIRONMENTAL PROTECTION.
- .3 Place the construction trailer(s) and  
toilet(s) within the fenced work area.
- .4 Remove the fences in their entirety from the  
site only after all sod has been placed and  
accepted at the end of the contract. Make good  
all damage where the posts were in the ground.
- .5 At other times, provide and maintain  
competent signal flag operators, traffic  
signals, barricades and flares, lights, or  
lanterns as required to perform Work and  
protect the public.

1.13 DEWATERING

- .1 Parks Canada will lower the water level in  
the lock in the fall. Before starting work  
check with Engineer.
- .2 There will be a small amount of inflow water  
into the lock due to leakage. This will mean a  
certain amount of water will remain in certain  
places in the lock even after it is drained.
- .3 Do not contaminate this water. See Section 01  
35 43 - ENVIRONMENTAL PROTECTION.

1.14 CRITICAL  
DATES & SCHEDULE

- .1 Canal is closed to navigation mid-October and  
re-opens mid-May.
- .2 Work vigorously and continuously to complete  
Work in 18 weeks from award of contract.

- 
- 1.15 FIRE SAFETY .1 Maintain access to property including overhead clearances for use by emergency response vehicles.
- .2 Do not burn rubbish or light other fires on site.
- .3 Comply with the following Human Resources Development Canada (HRDC), Fire Commissioner of Canada (FCC) standards. These are available from HRDC or may be downloaded from the internet at:
- <http://www.hrsdc.gc.ca/asp/gateway.asp?hr=en/lp/lo/fp/standards/commissioner.shtml&hs=fzp>
- .1 No. 301: Standard for Construction Operations
- .2 No. 302: Standard for Welding and Cutting
- .3 No. 374: Fire Protection Standard for General Storage (Indoor and Outdoor)
- .4 Retain all fire safety documents and standards on site.
- 1.16 REQUIREMENTS OF REGULATORY AGENCIES .1 Also see Section 01 35 00 - HEALTH & SAFETY.
- .2 Also see Section 01 35 43 - ENVIRONMENTAL PROTECTION.
- 1.17 STANDARDS .1 Reference is made to CGSB, CSA, ASTM and other national and international standards. These standards when quoted form an integral part of and are to be considered as if reproduced within the Specification. The latest edition is applicable unless a dated edition is specified.
- 1.18 TERMINOLOGY .1 Definitions:
- .1 "Canal":- the Rideau Canal.
- .2 "Plans" also known as "Drawings":- the drawings listed in the List of Drawings.
- .3 "Specification":- the subject matter listed in the Index to Specification,
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1.18 TERMINOLOGY .1  
(Cont'd)

Definitions:(Cont'd)

.3 "Specification":(Cont'd)

Addenda to the Specification, and all relative written communications sent by the Engineer to the Contractor in connection with the work. Manufacturer's literature on the use of their products forms part of the specifications.

.4 "Department":- Department of Environment Canada.

.5 "Agency": - Parks Canada Agency

.2 Abbreviations:

.1 ASTM:- American Society for Testing and Materials.

.2 ACI:- American Concrete Institute.

.3 ANSI:- American National Standards Institute.

.4 CSA:- Canadian Standards Association.

.5 NBC:- National Building Code of Canada.

.6 CAN, CAN/CGSB national standards of Canada published by CGSB.

.7 CGSB: - Canadian General Standards Board.

.8 MNR:- Ontario Ministry of Natural Resources.

.9 SSPC:- Steel Structures Painting Council, former name of the Society for Protective Coatings.

.10 CPM:- Critical Path Method. Bar chart construction schedule format.

.11 CD:- Compact Disk.

.12 WHMIS:- Workplace Hazardous Material Information System.

.13 MSDS:- Material Safety Data Sheet.

1.19 DATUM .1

Is that established by the Geodetic Survey of Canada.

1.20 PROTECTION OF .1  
THE WORK

Protect the work from damage by ice, flooding and/or other adverse climatic conditions.

1.21 MEASUREMENT  
FOR PAYMENT

- .1 The work of this section will not be measured. It will be paid for under the following payment items:
  - .1 "Mobilization" - ONE FIXED LUMP SUM PRICE.
  - .2 "Demobilization" - ONE FIXED LUMP SUM PRICE
- .2 All other work covered by this section will not be considered separately for payment but will be considered as incidental to Work of this Contract.

PART 2 - PRODUCTS

2.1 ACCEPTANCE OF  
MATERIALS

- .1 Where materials are specified to CSA, CGSB, ASTM, or similar standards, submit a written request to Engineer for approval of the relevant items. Include relevant test data bearing a recent date of test, manufacturer's details and other documents which will substantiate its quality, conformance and cost. Submit to Section 01 33 00 - SUBMITTAL PROCEDURES.
- .2 Materials and equipment specified by a manufacturer's name, catalogue number or trade name are intended to establish a standard of quality. Materials or equipment at least equivalent thereto may be submitted to the Engineer for approval along with proof of equivalence.
- .3 Do not use materials or products in the work until written approval has been received from Engineer.
- .4 Bear the cost of additional work and modifications to the design due to use of alternatives.
- .5 Base tender on the exact material and equipment specified, and on the design concepts shown on the drawings. Alternatives may be submitted for consideration during the contract by following the same procedure as

2.1 ACCEPTANCE OF .5  
MATERIALS  
(Cont'd)

(Cont'd)  
for submittal fo materials specified to ASTM,  
CGSB, or other standards.

2.2 SAMPLES .1

To Section 01 45 00 - QUALITY CONTROL.

2.3 GUARANTEE .1

Guarantee Work completed under this contract.

.2 For a period of one year after the final  
acceptance of the completed work, immediately  
make good any defective work as determined by  
Engineer at no cost to the Department.

.3 Provide manufacturer's and other guarantees  
in written form to Engineer. Engineer will not  
issue final certificate of completion until  
these are submitted.

.4 Any certificate given, full or partial  
payment does not indicate acceptance of  
defective work or improper materials.

.5 This guarantee is not a waiver of any  
specified guarantee for any other greater  
length of time provided by manufacturers for  
any items supplied.

.6 Remain responsible for and provide all  
guarantees required under this specification.  
All guarantees including guarantees in writing  
required for specific portions of this  
contract must be provided by the Contractor  
before final acceptance of the work by the  
Engineer.

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PART 3 - EXECUTION

3.1 CONSTRUCTION  
PROGRESS SCHEDULE  
& COST BREAKDOWN

- .1 Within 10 days of Contract Award, submit two copies of the following items for review. When requested by Engineer, revise and resubmit within 3 days. Do not make changes to the approved schedule without Engineer's approval.
  - .1 Construction Progress Schedule
    - .1 Use bar-chart (CPM) format
    - .2 Provide time scale
    - .3 Provide a separate bar for each major item of work, trade, or operation.
    - .4 Show dates for submitting shop drawings, product data, samples, and mock-ups. Include review time and re-submission time. Show last possible date for meeting fabrication schedule.
  - .2 Cost Breakdown of each payment item, including lump sum items. Break down lump sum items in sufficient detail as to permit the calculation of progress payment amounts.
- .2 No progress payments will be made until the construction progress schedule is approved.
- .3 Engineer will review work progress based on approved Construction Progress Schedule.
- .4 With each application for progress payment, submit for Engineer's review and comment annotations to the Construction Progress Schedule. In these annotations, identify anticipated delays and other problems, quantify their anticipated effect on schedule, and plan alternatives to minimize the effect of delays.
- .5 It is the intent of this specification that the Work be completed within the scheduled times approved by Engineer. Work vigorously and continuously to complete the project by the time specified in contract documents.

3.2 PROTECTION &  
RECTIFICATION

- .1 Before starting Work, visit the site with Engineer and observe pre-construction conditions. Take a series of photographs representing the pre-construction condition of all features in and around the work area. Provide a duplicate set of prints (or a CD of digital images) to Engineer for reference.
- .2 Protect surrounding private and public property from damage during performance of Work. Be responsible for damage incurred to surrounding properties to the satisfaction of Engineer.
- .3 Except as approved by Engineer, repair restore, or replace to Engineer's approval any and all utilities damaged due to Work or activities in connection with the work.
- .4 At the completion of work, remove temporary access structures. Restore the access and work areas, including the site access roads, path-ways, sodded areas, and existing lock bottom to the original condition upon completion of the work, at the contractor's expense.
  - .1 Restore sodded areas to original condition upon completion of Work, at Contractor's expense. Repairs to damaged grass areas must be made with sod only. Seed is not acceptable. Sodding to Section 32 92 23 - SODDING.
  - .2 Remove all debris accumulated during Work from the lock bottom and dispose of it to Section 01 45 00 - ENVIRONMENTAL PROTECTION.
- .5 The repaired, replaced, or refinished items to be at least equal to those that existed immediately before damage occurred.

3.3 WORK LAY-OUT

- .1 Engineer will locate the project, provide a bench mark and identify the initial line.
- .2 Be responsible for:
  - .1 All layout and control survey work.

3.3 WORK LAY-OUT  
(Cont'd)

- .2 Be responsible for:(Cont'd)
  - .2 Checking reference plan dimensions against field measurements.
  - .3 Errors resulting from failure to verify dimensions, elevations and other pertinent data shown on the drawings.
- .3 Lay out Work according to the elevations and dimensions:
  - .1 As shown on the drawings, and verified in the field; and,
  - .2 As determined in the field.
- .4 Notify Engineer immediately of any discrepancies between field measurements and dimensions shown on the plans or reference drawings.
- .5 Be responsible for rectification of errors resulting from failure to verify dimensions, elevations and other pertinent data shown on the plans and reference drawings, and from improper layout.

3.4 TEMPORARY  
FACILITIES

- .1 Temporary Utilities: Provide temporary light, telephone service, power, and water to fulfill the requirements of construction. Provide and maintain sufficient chemical toilets and maintain these in a sanitary condition for the use of all persons on-site. Cellular telephones are acceptable.
- .2 Contractor's Office: Provide an office at the site, open during working hours. The office facilities must include a board-room table and chairs suitable for holding construction meetings.
- .3 Provide and maintain the following:
  - .1 Suitable storage facilities for equipment, tools, and materials, at location shown on drawings.
  - .2 All necessary scaffolding, ladders and platforms to Canadian Construction Safety Code, NRCC 15562, Ontario Construction Safety Regulations and the Site Specific

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|--|----|---|
| <u>3.4 TEMPORARY<br/>FACILITIES<br/>(Cont'd)</u>   | .3 | Provide and maintain the following:(Cont'd)   |
|  | .2 | (Cont'd)<br>Safety Plan described in Section 013530 -<br>Health & Safety.   |
|  | .3 | All necessary enclosures, guards,<br>guard-rails, hoardings, barricades,<br>warning signs and similar items.  |
| <br>   |    |   |
| <u>3.5 SIGNS</u>                                   | .1 | Provide common-use signs related to traffic<br>control, information, instruction, use of<br>equipment, public safety devices, etc, in both<br>official languages or by the use of<br>commonly-understood graphic symbols to the<br>Engineer's approval. |
|  | .2 | No advertising is permitted on this project.  |
| <br>   |    |   |
| <u>3.6 EXPLOSIVES</u>                              | .1 | Do not use explosives.  |
| <br>   |    |   |
| <u>3.7 PROTECTION OF<br/>EXISTING UTILITIES</u>    | .1 | Before excavation, locate all underground<br>utilities. Shore and protect exposed utilities<br>until protective measures are ordered removed<br>by Engineer.  |
|  | .2 | Repair, replace and/or restore all utilities<br>damaged as determined by Engineer and to his<br>requirements.   |
| <br>   |    |   |
| <u>3.8 DAILY CLEANING<br/>&amp; WASTE DISPOSAL</u> | .1 | To Section 01 35 43 - ENVIRONMENTAL<br>PROTECTION.  |
| <br>   |    |   |
| <u>3.9 TAXES</u>                                   | .1 | Pay all taxes properly levied by law,<br>Federal, Provincial and Municipal.   |
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3.10 FEES,  
PERMITS,  
CERTIFICATES

- .1 Pay all fees and obtain all permits before starting work. Provide authorities with plans and information for acceptance certificates. Provide inspection certificates as evidence that work meets the requirements of authority having jurisdiction.

END OF SECTION

- |                         |    |   |
|-------------------------|----|---|
| <u>1</u> PRECEDENCE     | .1 | Division 1 Sections take precedence over technical specification sections elsewhere in these specifications.  |
|                         |    |   |
| <u>2</u> DESCRIPTION    | .1 | This section specifies general requirements and procedures for contractors' submissions of shop drawings, product data and samples to Engineer for review.  |
|                         |    |   |
| <u>3</u> RESPONSIBILITY | .1 | Contractor is responsible for errors and omissions in submission. This responsibility is not relieved by Engineer's review of submissions.  |
|                         | .2 | Contractor is responsibility for deviations in submission from requirements of contract documents. This responsibility is not relieved by Engineer's review of submission, unless Engineer gives written acceptance of specific deviations. |
|                         | .3 | Contractor is responsible for verifying field measurements and affected adjacent Work are coordinated. This responsibility is not relieved by Engineer's review of submissions.   |
|                         | .4 | Do not proceed with work until relevant submissions are reviewed by Engineer.   |
|                         |    |   |
| <u>4</u> ADMINISTRATIVE | .1 | Submit to Engineer all submittals listed for review in the other Sections of this Specification.  |
|                         | .2 | Submit with promptness and in orderly sequence. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.                 |
|                         | .3 | Make any changes in submissions which Engineer may require consistent with contract   |
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|------|----------------------------|----|--|
| 4    | ADMINISTRATIVE<br>(Cont'd) | .3 | (Cont'd)<br>documents and resubmit as directed by<br>Engineer.   |
|      |                            | .4 | Notify Engineer, in writing, when<br>resubmitting, of any revisions other than<br>those requested by Engineer.   |
| <br> |                            |    |  |
| 5    | FORMATTING                 | .1 | Coordinate each submission with requirements<br>of work and contract documents. Individual<br>submissions will not be reviewed until all<br>related information is available.  |
|      |                            | .2 | Accompany submissions with transmittal<br>letter, in duplicate, containing:<br>.1 Date.<br>.2 Project title and number.<br>.3 Contractor's name and address.<br>.4 Identification and quantity of each shop<br>drawing, product data and sample.<br>.5 Other pertinent data.   |
|      |                            | .3 | Include in submissions the following:<br>.1 Date and revision dates.<br>.2 Project title and number.<br>.3 Name and address of:<br>.1 Subcontractor.<br>.2 Supplier.<br>.3 Manufacturer.<br>.4 Contractor's stamp, signed by<br>Contractors authorized representative<br>certifying approval of submissions,<br>verification of field measurements and<br>compliance with contract documents.<br>.5 Details of appropriate portions of work<br>as applicable:<br>.1 Fabrication<br>.2 Layout, showing dimensions,<br>including identified field<br>dimensions, and clearances.<br>.3 Setting or erection details.<br>.4 Capacities.<br>.5 Performance characteristics.<br>.6 Standards.<br>.7 Operating weight.<br>.8 Wiring diagrams.<br>.9 Single line and schematic diagrams. |
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5 FORMATTING  
(Cont'd)

- .3 (Cont'd)
- .5 (Cont'd)
- .10 Relationship to adjacent work.
- .4 Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and shall be considered rejected.
- .5 After Engineer's review, distribute copies.

6 REVIEW PROCEDURE

- .1 Submit to Engineer all submittals listed for review.
  - .2 Submit 4 hardcopies of shop drawings, product data sheets, and/or brochures to completely describe each item of work for which submittals apply. Co-ordinate each submission with requirements of Work and Contract Documents. Individual submissions will not be reviewed until all related information is available.
  - .3 Delete information not applicable to project.
  - .4 Supplement standard information to provide details applicable to project.
  - .5 Notify Engineer, in writing at time of submission, identifying deviations from requirements of contract documents stating reasons for deviations.
  - .6 Allow 10 working days for Engineer's review of each submission.
  - .7 If upon review by Engineer, 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.
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6 REVIEW PROCEDURE .8  
(Cont'd)

If submittals are rejected, Engineer will annotate and return copies of the submission. Make all changes in submissions which Engineer requires. Resubmit as directed by Engineer. When resubmitting, notify Engineer in writing of any revisions other than those requested. Await review of resubmitted corrected shop drawings before fabrication and installation of Work may proceed.

.9 Adjustments made on submittals by Engineer are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Engineer before proceeding with Work.

.10 In all cases, do not start Work affected by submittal until submission review is complete.

.11 After Engineer's review, distribute copies. Keep one reviewed copy of each submission on site.

7 NATURE OF REVIEW .1

The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept. This review shall not mean that PWGSC 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. 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.

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- 8 SHOP DRAWINGS .1 "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 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 coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .3 Cross-reference shop drawing information to applicable portions of Contract Documents.
- .4 Delete information not applicable to project.
- .5 Supplement standard information to provide details applicable to project.
- .6 Verify field measurements and affected adjacent Work are co-ordinated.
- .7 Submit MSDS sheets as required in Section 01 35 00 - HEALTH & SAFETY.
- .8 Notify Engineer, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
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- 9 PRODUCT DATA .1 Product data: manufacturers catalogue sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products.
- .2 Submit 2 copies of product data.
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|----|---------------------------------|----|---|
| 9  | <u>PRODUCT DATA</u><br>(Cont'd) | .3 | Delete information not applicable to project.   |
|    |                                 | .4 | Supplement standard information to provide details applicable to project.   |
|    |                                 | .5 | Cross-reference product data information to applicable portions of contract documents.  |
|    |                                 |    |   |
| 10 | <u>SAMPLES</u>                  | .1 | "Samples" means examples of materials, equipment, quality, finishes, workmanship.   |
|    |                                 | .2 | Submit for review samples as requested in respective specification Sections. Label samples with origin and intended use.            |
|    |                                 | .3 | Where colour, pattern or texture is a criterion, submit full range of samples.  |
|    |                                 | .4 | If delivering samples to Engineer's business address, courier must be prepaid.  |
|    |                                 | .5 | Make changes in samples which Engineer may require, consistent with Contract Documents.   |
|    |                                 | .6 | Reviewed and accepted samples will become standard of material against which installed Work will be verified.                       |
|    |                                 |    |   |
| 11 | <u>MOCK-UPS</u>                 | .1 | "Mock-ups" mean small areas with a repair product or technique installed as an example of workmanship.                              |
|    |                                 | .2 | Erect mock-ups as specified in other Sections of this Specification. Erect in location acceptable to Engineer.                      |
|    |                                 | .3 | Prepare mock-ups for Engineer's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work. |
|    |                                 | .4 | If requested, Engineer will assist in preparing a schedule fixing dates for preparation.  |
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| <u>11 MOCK-UPS<br/>(Cont'd)</u>                      | .5 | Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.  |
|  | .6 | Reviewed and accepted mock-ups will become standard of workmanship against which installed work will be verified.  |
|  | .7 | Mock-ups may remain as part of Work.   |
| <br>   |    |  |
| <u>12 PROGRESS<br/>PHOTOGRAPHS AND<br/>AS-BUILTS</u> | .1 | Submit at weekly site meetings or at regular intervals determined by Engineer.   |
|  | .2 | As-Builts: update regularly and review with Engineer to Section 01 78 10 - PROJECT RECORD DOCUMENTS (AS-BUILTS)  |
| <br>   |    |  |
| <u>13 CERTIFICATES &amp;<br/>TRANSCRIPTS</u>         | .1 | Submit Workers' Compensation Board status immediately after award of Contract  |
| <br>   |    |  |
| <u>14 ELECTRONIC FILES</u>                           | .1 | When submissions are created electronically, the contractor is to make copies of all electronic records which are produced for the submissions listed in this section. This includes, but is not limited to, drawings, documents, and spreadsheet files. |
|  | .1 | All files are to be properly labeled and placed in a well organized folder structure.  |
|  | .2 | The data is to be stored on Compact Disc and include a Jewel case with a front cover and an insert sleeve listing content.   |
|  | .1 | Cover and CD is to include project title and number, and date.   |
|  | .3 | Convert all files to Adobe PDF format for submittal.   |
|  | .4 | Three copies of the electronic records on CD are to be submitted before the Certificate of Final Completion.   |
-

Rideau Canal: Lock #46  
Concrete Repairs  
Project No. 310707

SUBMITTAL PROCEDURES

Section 01 33 00  
Page 8  
August 23, 2007

15 MEASUREMENT FOR .1  
PAYMENT

The work covered by this section will not be considered separately for payment but will be considered as incidental to Work of the specification.

END OF SECTION.

---

END

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PART 1 - GENERAL

1.1 PRECEDENCE .1 Division 1 Sections take precedence over technical specification sections elsewhere in these specifications.

1.2 REFERENCES .1 Province of Ontario:  
.1 Occupational Health and Safety Act and Regulations for Construction Projects, Revised Statutes of Ontario 1990, Chapter O.1 as amended, O. Reg. 213/91 as amended, Reg. 834, O. Reg. 278/05 (Asbestos - Construction).  
.2 Workplace Safety and Insurance Act, 1997.  
.3 Municipal statutes and authorities.  
.2 Fire Commissioner of Canada (FCC):  
.1 FC-301 Standard for Construction Operations.  
.2 FC-302 Standard for Welding and Cutting, June 1982.

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

and copies may be obtained from:

Human Resources and Social Development Canada  
Labour Program  
Fire Protection Engineering Services  
Ottawa, Ontario K1A 0J2

1.3 SUBMITTALS .1 Make submittals in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.  
.2 Submit site-specific Health and Safety Plan:  
Within 7 days after date of Notice to Proceed

---

1.3 SUBMITTALS  
(Cont'd)

- .2 (Cont'd)  
and prior to commencement of Work. Health and Safety Plan must include:
- .1 Results of site specific safety hazard assessment.
  - .2 Results of safety and health risk or hazard analysis for site tasks and operations.
  - .3 Measures and controls to be implemented to address identified safety hazards and risks.
  - .4 Proof of training for employees and sub-contractors related to identified hazards.
  - .5 Provide a Fire Safety Plan, specific to the work location.
  - .6 Contractor's and Sub-contractors' Safety Communication Plan.
  - .7 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations.
- .3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and may provide comments to Contractor within 3 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 3 days after receipt of comments from Departmental Representative.
- .4 Departmental Representative's review of Contractor's final Site Specific Health and Safety Plan should not be construed as an approval and does not reduce the Contractor's overall responsibility for construction site health and safety.
- .5 Submit records of Contractor's Safety Meetings when requested.
- .6 Submit 2 copies of the Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, when requested.

- 
- |                                |     |   |
|--------------------------------|-----|---|
| 1.3 SUBMITTALS<br>(Cont'd)     | .7  | Submit copies of reports or directions issued by safety inspectors of authority having jurisdiction.  |
|                                | .8  | Submit copies of incident and accident reports.   |
|                                | .9  | Submit Material Safety Data Sheets (MSDS) to Departmental Representative.   |
|                                | .10 | Submit names of personnel and alternates responsible for site safety and health   |
|                                | .11 | Submit WSIB - Workplace Safety and Insurance Board, Experience Rating Report for Province of Ontario.                                       |
| <br>                           |     |   |
| 1.4 FILING OF<br>NOTICE        | .1  | File Notice of Project with Provincial authorities prior to commencement of Work.   |
| <br>                           |     |   |
| 1.5 SAFETY<br>ASSESSMENT       | .1  | Perform site specific safety hazard assessment related to project.  |
| <br>                           |     |   |
| 1.6 MEETINGS                   | .1  | Pre-construction meeting: schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of work. |
| <br>                           |     |   |
| 1.7 REGULATORY<br>REQUIREMENTS | .1  | Comply with Acts and regulations of the Province of Ontario.  |
|                                | .2  | Comply with specified standards and regulations to ensure safe operations at site.  |
|                                | .3  | In event of conflict between any provisions of specified standards and regulations, the most stringent provision governs.                   |
-

1.8 PROJECT/SITE  
CONDITIONS

- .1 Work at site will involve contact with:
  - .1 Lead in paint.
- .2 Scope of work at site will involve:
  - .1 Work at Height.
  - .2 Work around open water.
  - .3 Confined and enclosed spaces.
  - .4 Exposure to road traffic.

1.9 GENERAL  
REQUIREMENTS

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to commencing any site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Relief from or substitution for any portion or provision of minimum Health and Safety Guidelines specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing. Departmental Representative will respond in writing, where deficiencies are noted and request resubmission with correction of deficiencies.

1.10 RESPONSIBILITY

- .1 Be responsible for safety of persons and property on site and for protection of persons off site and environment to extent that they may be affected by conduct of Work.
  - .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
  - .3 Where applicable the Contractor shall be designated "Constructor", as defined by Ontario Act.
-

- 1.11 COMPLIANCE REQUIREMENTS .1 Comply with Ontario Health and Safety Act, R.S.O. 1990 Chapter 0.1, as amended.
- 1.12 UNFORESEEN HAZARDS .1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing.
- .2 Follow procedures in place for Employees Right to Refuse Work as specified in the Act for the Province of Ontario.
- 1.13 POSTING OF DOCUMENTS .1 Provide documents as follow and post on site in a conspicuous location:
- .1 Contractor's Safety Policy.
  - .2 Constructor's Name
  - .3 Health & Safety Represent's Name
  - .4 Ministry of Labour Orders for Province of Ontario.
  - .5 Occupational Health and Safety Act for Province of Ontario.
  - .6 Material Safety Data Sheets.
  - .7 Safety Plans.
  - .8 Notice of Project.
  - .9 Joint Health and Safety Committee Members(where required).
- .2 Comply with Provincial general posting requirements.
- 1.14 CORRECTION OF NON-COMPLIANCE .1 Immediately address health and safety non-compliance issues identified by Departmental Representative and regulatory agency having jurisdiction in the Province.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
-

1.14 CORRECTION OF .3  
NON-COMPLIANCE  
(Cont'd)

Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.15 WORK STOPPAGE .1

Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

.2

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

1.16 MEASUREMENT FOR.1  
PAYMENT

The work covered by this section will not be considered separately for payment but will be considered as incidental to Work of the specification.

PART 2 - PRODUCTS

2.1 NOT USED .1

Not used.

PART 3 - EXECUTION

3.1 NOT USED .1

Not used.

END

- 1 PRECEDENCE .1 Division 1 Sections take precedence over technical specification sections elsewhere in these specifications.
- 2 DESCRIPTION .1 This Section describes requirements for the protection of environment that apply to the Work. These requirements apply to all Sections of this Specification, without limiting the conditions and approvals imposed by statute.
- .2 Control Work to provide effective environmental, waterbody, and fish habitat protection. Engineer will monitor environmental protection measures and will identify whenever such protection is found to be ineffective. Change protective measures or work procedures as directed by Engineer to ensure environmental, waterbody and fish habitat protection.
- 3 SUBMITTALS .1 Submit a Site-Specific Environmental Protection Plan within 7 days of award of contract and before starting work. As a minimum, the Site-Specific Environmental Protection Plan must include measures and controls to:
- .1 Prevent debris and concrete chips arising from the Work from entering the waterway
- .2 Prevent contaminated water which exceeds limits for turbidity from entering waterway
- .3 Protection of trees
- .4 Storage of fuel and volatile materials.
- .5 Re-fuelling procedures for all equipment.
- 4 EXPLOSIVES .1 Do not use explosives.
-

- 5 FIRES
- .1 Do not burn rubbish or light other fires on site.
  - .2 See Section 01 11 11 - GENERAL REQUIREMENTS.
  - .3 See Section 01 35 00 - HEALTH & SAFETY.
- 6 DEFINITIONS
- .1 "Deleterious Material" - any substance that, if added to a waterbody, could degrade water quality or impact fish, fish habitat and aquatic wildlife. This includes, but is not limited to:
    - .1 Concrete dust and fragments.
    - .2 Silt.
    - .3 Oil, diesel, or gasoline.
    - .4 Chipped or fresh concrete and admixtures.
    - .5 Earth.
  - .2 "Dripline" - means the location on the ground surface directly beneath a theoretical line described by the tips of the outermost branches of the trees.
  - .3 "Barrier" - means fence consisting of approved material, supported by steel posts and being a minimum of 1.2 m high, without breaks or unsupported sections.
- 7 TURBIDITY  
CONTROL AND  
DRAINAGE WATER
- .1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
  - .2 Control turbidity of all water released during the Work. This includes but is not limited to: pumped drainage water and all other water used or handled during the Work.
  - .3 Unless water already meets turbidity requirements, donot pump water directly into the waterway. Send all discharge to a settling pond or filtration area before being released into the waterway.
-

7 TURBIDITY  
CONTROL AND  
DRAINAGE WATER  
(Cont'd)

- .4 Provide a silt curtain where required to control turbidity at discharge into waterway. Silt curtain to be anchored along its length to form a continuous seal on the river bed with adequate flotation at water surface to prevent over spills of turbid water.
- .5 Total suspended solids in any and all water discharged to waterway: to Ministry of Natural Resources (MNR) regulations, Department of Fisheries and Oceans (DFO) regulations, or maximum 80 mg/L whichever is the strictest. Note that MNR and DFO regulations vary with the circumstances and cannot be described ahead of time.
- .6 In the event of significant silting or turbidity caused by construction activities, contractor must take appropriate measures to confine work and install additional silt curtains.
- .7 Control disposal or runoff of water containing other harmful substances in accordance with local authority requirements.
- .8 Obtain a "Permit to Take Water" from the Ontario Ministry of the Environment if more than 50,000 litres of water per day is taken from the waterway, or if the waterway is restricted during construction.

8 WORK ADJACENT TO  
WATERWAYS

- .1 Do not release any Deleterious Material into waterway.
- .2 Provide housing during concrete removal work over water and prevent concrete chips and dust from entering water.
- .3 Ensure all equipment and temporary access structures such as scaffolding placed in waterbodies is free of earth material, and excess, loose or leaking fuel, lubricants, coolant and other Deleterious Material that could enter the waterbody.

8 WORK ADJACENT TO  
WATERWAYS  
(Cont'd)

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- .4 Do not operate construction equipment in waterways.
- .5 Do not use waterway beds for borrow material.
- .6 Do not dump excavated fill, waste material or debris in waterways.
- .7 Design and construct temporary crossings to minimize erosion to waterways.
- .8 Avoid spawning beds when constructing temporary crossings of waterways. Engineer will identify spawning beds.
- .9 Do not stockpile excavated or fill materials near the water, or in a location where the runoff from stockpiled material may enter the waterway.

9 SEDIMENT, DUST,  
AND EROSION  
PROTECTION

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- .1 Before starting work which will create dust, (such as improvements concrete sawing and removal, excavation, backfilling, etc.), install effective mitigation techniques for sediment, dust, and erosion control to the satisfaction of Engineer. Maintain these protective measures at all times, including shut down periods.
- .2 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

10 PLANT & TREE  
PROTECTION

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- .1 Limit clearing, grubbing, and tree-branch removal to areas of work or access roads indicated on approved shop drawings.
  - .2 Remove only those trees designated in writing by Engineer. Replace all trees removed without authorization and all trees designated to remain but damaged beyond recovery, with native hardwoods, such as Oak, at Contractor's expense. Exact species and size to Engineer's approval.
-

10 PLANT & TREE PROTECTION (Cont'd)	.3	Protect trees and plants on site and adjacent properties where indicated.
	.4	Tree and shrub removal must start after July 15.
	.5	Provide Barrier around trees which may be affected by the Work. Locate Barrier 1 metre beyond Dripline. Barrier to consist of a protective wood framework covered with plastic construction fence material, extending from gade level to a height of 2 metres. Maintain Barriers in good repair throughout the duration Work. Remove these upon completion of Work.
	.6	Damage to trees as a result of Contractor's operations:
	.1	Broken branches 25 mm or greater in diameter: cut back cleanly at the break, or to within 10 mm of their base, if a substantial portion of the branch is damaged. Engineer will direct.
	.2	Exposed roots 25 mm or larger: cut back cleanly to the soil surface within five calendar days of exposure.
11 OPERATION AND MAINTENANCE OF EQUIPMENT	.3	Damaged bark: neatly trim back to uninjured bark, without causing further injury, within five calendar days of damage.
	.1	Do not operate heavy equipment in waterway.
	.2	Provide drip trays to prevent the discharge of oil, grease, antifreeze, or any other materials into the ground.
	.3	Equipment and heavy machinery used to meet or exceed all applicable emission requirements.
	.4	Leave machinery running only while in actual use, except where extreme temperatures prohibit shutting machinery down.
	.5	Prevent any and all hydrocarbons from entering watercourse. Do not refuel, perform

11 OPERATION AND  
MAINTENANCE OF  
EQUIPMENT  
(Cont'd)

- .5 (Cont'd)  
oil changes, or any and all other maintenance  
on equipment parked within 5 metres of water.

12 DAILY CLEAN-UP

- .1 Clean up work area as work progresses. At the  
end of each work day, and more often if  
ordered by the Engineer, remove debris from  
site, neatly stack material for use, and clean  
up generally.
- .2 Neither bury nor burn rubbish and waste  
materials on site.
- .3 Separate and recycle all materials that can  
be recycled.
- .4 Dispose of waste or volatile materials, such  
as mineral spirits, oil or paint thinner by  
taking them to a special designated waste  
facility. Do not dump these into waterways,  
storm or sanitary sewers.
- .5 Ensure all emptied containers are sealed and  
stored safely for disposal away from children.

13 SPILLS

- .1 Report all spills immediately to the Engineer  
and to the Ministry of the Environment SPILL  
Coordinator (Telephone No. 1-800-268-6060).
- .2 Using appropriate safety precautions, collect  
liquid or solidify liquid with an inert,  
noncombustible material and remove for  
disposal.
- .3 Be responsible for all costs of cleaning up  
any spills to the satisfaction of the  
Engineer.
-

- 14 FINAL CLEAN-UP .1 At the completion of the Work remove all scaffolding, temporary protection and surplus materials, tools, plant, rubbish and debris and dispose of them in an approved manner off Crown property.
- .2 Clean areas under contract to a condition at least equal to that previously existing and to approval of Engineer.
- .3 Ensure that no material is left on the canal bed and that final elevations are the same as existed before starting work.
- 15 REMOVED MATERIAL .1 Unless otherwise specified, materials designated for removal become the Contractor's property. Remove these from site.
- 16 HAZARDOUS MATERIAL .1 Place materials defined as hazardous or toxic waste in designated containers.
- .2 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and the provision of Material Safety Data Sheets (MSDS) acceptable to Human Resources Development Canada, Labour Program.
- 17 WASTE MANAGEMENT .1 Comply with the following Regulations made under Ontario Environmental Protection Act, R.S.O. 1990, c. E.19.
- .1 O. Reg. 347 Amended to O. Reg. 326/03
- .2 O. Reg. 102/94.
- .3 O. Reg. 103/94.
- .2 Dispose of materials not designated for salvage, re-use, or recycling in an approved manner off site and off adjacent and neighbouring property.
- .3 Ensure all emptied containers are sealed and stored safely for disposal away from children.
-

17 WASTE MANAGEMENT .4  
(Cont'd)

Prevent chemicals (e.g. cleaning agents) from entering drinking water supplies or waterway. Using appropriate safety and environmental precautions, collect liquid or solidify liquid with an inert, noncombustible material and remove for disposal.

.5 Dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner by taking them to a special designated waste facility. Do not dump these into waterways, storm or sanitary sewers.

.6 Hazardous materials:  
.1 Place materials defined as hazardous or toxic waste in designated containers.

.7 All waste subject to Regulation 558 of the Ontario Environmental Protection Act must be transported with a valid "Certificate of Approval for a Waste Management System" to a site approved by Ontario Ministry of the Environment to accept that waste.

.8 Be responsible for obtaining all Waste Generator Numbers, permits, manifests, and all other paperwork necessary to comply.

18 CLEANING OF  
CONCRETE TRUCKS

.1 Use trigger operated spray nozzles for water hoses.

.2 Engineer will designate a cleaning area for trucks and tools to limit water use and runoff. The cleaning area will be sufficiently far away from the watercourse to prevent contamination.

19 NOISE CONTROL .1

Minimize the noise levels from construction activities by using proper muffling devices, in addition to appropriate timing and location of these activities to reduce or minimize the effect of noise on nearby residents, recreationists, and wildlife.

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Rideau Canal: Lock #46  
Concrete Repairs  
Project No. 310707

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ENVIRONMENTAL  
PROTECTION

Section 01 35 43  
Page 9  
August 23, 2007

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20 MITIGATING  
MEASURES FOR IN-  
WATER WORKS

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.1 Refer to Appendix B for additional mitigating  
measures required for this project under  
"Routine In-Water Works Projects Along the  
Rideau Canal And Trent Severn Waterway"

21 MEASUREMENT FOR  
PAYMENT

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.1 The work covered by this section will not be  
considered separately for payment but will be  
considered as incidental to Work of the  
Contract.

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END

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- |                       |    |  |
|-----------------------|----|--|
| <u>1 PRECEDENCE</u>   | .1 | Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.   |
|                       |    |  |
| <u>2 DESCRIPTION</u>  | .1 | Section describes the administrative and enforcement requirements associated with inspection and testing of the Work.  |
|                       |    |  |
| <u>3 RELATED WORK</u> | .1 | Section 01 33 00 - SUBMITTAL PROCEDURES.   |
|                       |    |  |
| <u>4 INSPECTION</u>   | .1 | Allow Engineer access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.  |
|                       | .2 | Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Engineer instructions, or 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 | Engineer may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Engineer shall pay cost of examination and replacement. |
-

5 INDEPENDENT  
INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Engineer for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Engineer.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Engineer at no cost to Engineer. Pay costs for retesting and reinspection.

6 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.

7 PROCEDURES

- .1 Notify Engineer in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

- 
- 8 REJECTED WORK .1 Refer to CCDC, GC 2.4.
- .2 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Engineer as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .3 Make good other Contractor's work damaged by such removals or replacements promptly.
- .4 If in opinion of Engineer it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Engineer.
- 
- 9 TESTS AND MIX DESIGNS .1 Furnish test results and mix designs as may be requested.
- .2 The cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work shall be appraised by Engineer and may be authorized as recoverable.
- 
- 10 MILL TESTS .1 Submit mill test certificates as requested by Engineer.
- 
- 11 MEASUREMENT FOR PAYMENT .1 The work covered by this section will not be considered separately for payment but will be considered as incidental to Work of the specification.

PART 1 - GENERAL

- 1.1 PRECEDENCE .1 Division 1 Sections take precedence over technical specification sections elsewhere in these specifications.
- 1.2 DESCRIPTION .1 This section covers the work of supplying, maintaining, and removing temporary access, housing, and supplementary heating and ventilating for the workspaces and the work described by the drawings and the specification.
- .2 The access, housing, heating and ventilating must be sufficient to:
- .1 To ensure safe working environment.
- .2 To facilitate progress of Work in an efficient manner.
- .3 To protect areas adjacent to the Work during procedures which may damage surrounding areas.
- .4 To protect Work and products against dampness and cold.
- .5 To prevent moisture condensation on surfaces.
- .6 To provide ambient temperatures and humidity levels for storage, installation and curing of materials.
- .3 The requirements of this section apply to all other sections of the specification that call for dust, cold and weather protection.
- 1.3 RELATED WORK .1 Section 01 35 00 - HEALTH & SAFETY.
- .2 Section 03 30 00 - CAST-IN-PLACE CONCRETE.
- .3 Section 01 33 00 - SUBMITTAL PROCEDURES.
- .4 Section 01 35 43 - ENVIRONMENTAL PROTECTION.
-

- 1.4 DEFINITIONS .1 Scaffolding: any method used for access to carry out the work such as rigid framed scaffolding, mobile access buckets, cranes, ladders, etc. Scaffolding includes swing staging.
- .2 Housing: enclosure placed around Work or around scaffolding and work to provide either protection for the work taking place or to provide a micro-climate more suitable to the work than ambient atmospheric conditions, or both.
- 1.5 SUBMITTALS .1 Submit shopdrawings for housing.
- .2 Information to show must include, but is not limited to, the following:
- .1 Scaffolding design & anchorages.
  - .2 Housing design.
  - .3 Ventilation fan location and capacity.
  - .4 Heater numbers, types, locations, and capacities.
  - .5 Number and location of fire extinguishers associated with heating equipment.
- 1.6 DESIGN .1 Engage a Professional Engineer who is licensed in the Province of Ontario and who is experienced in this work to design, draw, and inspect scaffolding and housing. Ensure all drawings are sealed and signed by the engaged Professional Engineer.
- 1.8 SCAFFOLDING .1 Provide all scaffolding, ladders, access, lifting equipment, to carry out the work. Field measure to ensure proper fit. Transition area from the ladder(s) to the scaffolding shall be clear of obstructions and cross bracing so men and materials can easily enter.
- .2 Carry out all work in accordance with the Occupational Health and Safety Act and the
-

- 1.8 SCAFFOLDING      .2      (Cont'd)  
(Cont'd)
- .3      Make periodic inspections of scaffolding as the work progresses.
- .4      Remove all anchors installed in the concrete as part of the scaffolding and housing work. Ensure all holes are filled to the satisfaction of the Engineer as scaffolding is dismantled.
- 
- 1.9 HOUSING            .1      Provide strong and durable housing for portions of the work which must be protected, heated, and/or ventilated during the Work. Design housing to be strong enough to withstand rain, wind and snow.
- .2      Install and maintain plywood or other coverings in order to protect existing features from damage in the course of the Work. Remove these at the end of Work. Make good all damage to the satisfaction of the Engineer.
- 
- 1.10 HEATING           .1      Provide temporary heating required during construction period, including Watchkeeping attendance, maintenance, and fuel.
- .2      Be responsible for damage to Work due to failure in providing adequate heat and protection during construction..
- .3      Temperature requirements: to Section 03 30 00 - Cast in Place Concrete.
- 
- 1.11 VENTILATING      .1      Provide ventilation to exchange air inside housed enclosures. Intent of ventilation:
- .1      To ensure required air temperature and quality in all parts of enclosure.
- .2      To remove solvents from atmosphere and allow for proper paint curing.
-

1.11 VENTILATING  
(Cont'd)

- .1 (Cont'd)
- .3 To enhance health & safety of workers.
- .2 Depending upon configuration of enclosure, it may be necessary to install both a mechanical supply and exhaust ventilation system to effect adequate air changes within confined space. Locate air-moving devices in a manner that assures that airflow is not restricted or short circuited and is supplied in proper direction and does not interfere with Work.
- .3 Be aware that in previous projects of a similar nature, Ministry of Labour was particular concerned with adequacy of ventilation system.
- .4 Ventilate storage spaces containing hazardous or volatile materials.

1.12 GUARD RAILS &  
BARRICADES

- .1 Provide secure, rigid guard rails around areas where work is to take place on the lock coping.

1.13 PROTECTION  
FOR ADJACENT  
PROPERTY

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

1.14 PROTECTION OF  
ADJACENT WORK

- .1 Provide protection for adjacent structure and the finished, and partially finished Work.
- .2 Be responsible for damage incurred due to lack of or improper protection.

1.15 MEASUREMENT  
FOR PAYMENT

- .1 The work of this section will not be measured for payment. It will be paid for by the following prices.
  - .1 "Access & Housing" - ONE FIXED LUMP SUM PRICE.

1.15 MEASUREMENT .1  
FOR PAYMENT  
(Cont'd)

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(Cont'd)  
.2 "Heating & Ventilating" - ONE FIXED LUMP  
SUM PRICE.

- .2 For purposes of facilitating progress  
payments during construction, the Engineer  
will break down the "Access and Housing" lump  
sum item as follows:
- .1 50% of the lump sum items will be paid  
upon satisfactory completion of set-up,  
(pro-rated for the percentage of set-up  
accomplished).
  - .2 15% of of the lump sum items will be  
paid upon satisfactory completion of  
dismantling and removing the scaffolding  
and housing from the site.
  - .3 The remaining 35% shall be pro-rated  
over the duration of the Contract based  
on the schedule submitted by the  
Contractor.
- .3 All other work necessary to the completion of  
the work of this section, will not be measured  
separately for payment but will be considered  
incidental to the work of this section.

PART 2 - PRODUCTS

2.1 MATERIALS .1

- The following alternatives are acceptable:
- .1 New materials; or,
  - .2 Used, salvaged or recycled materials, in  
good condition, subject to the approval  
of the Engineer; or,
  - .3 Prefabricated, portable components in a  
good, safe condition, approved by the  
Engineer as to type, materials and  
detail.
-

PART 3 - EXECUTION

3.1 HEATING  
EQUIPMENT

- .1 Use only heating equipment types acceptable to Engineer.
- .2 Heating fuels:
  - .1 Use electricity, gas, diesel oil or other fuels approved by the Engineer.
  - .2 Fuel Storage: to the requirements of the Fire Commissioner of Canada and Section 01 35 43 - ENVIRONMENTAL PROTECTION.
  - .3 Provide and maintain temporary fire protection equipment during performance of Work commensurate with fuel source selected.
- .3 Ensure that the heating requirements are met by providing, at optimum efficiency of the equipment, a capacity of 125% of the heat requirement and a sufficient number of standby heaters ready for use at the site.
- .4 Vent the exhausts of heating equipment to the outside of the housing and well clear of combustible materials and fresh air intake.

3.2 REMOVAL OF  
HEATING AND  
VENTILATING  
EQUIPMENT

- .1 Upon receipt of the Engineer's approval:
  - .1 Discontinue heating operations;
  - .2 Remove housing and heating equipment from the site.

3.3 FIELD QUALITY  
CONTROL

- .1 Provide maximum-minimum thermometers inside the housing at approximately one thermometer per 10 square meters of plan area of housing and in other locations as directed by Engineer.
- .2 Ensure continuity of protection by providing a Watchkeeper to make periodic checks, at all times when work is not in progress. This includes overnight and weekend checks.
  - .1 The Watchkeeper's qualifications, under this section of the specification, are to

3.3 FIELD QUALITY .2  
CONTROL  
(Cont'd)

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(Cont'd)

.1 (Cont'd)

be sufficient to perform, on heating equipment, such duties as:

- .1 Maintain strict supervision of operation of temporary heating and ventilating equipment.
- .2 Enforce safe practices.
- .3 Prevent abuse of services.
- .4 Prevent damage to finishes due to mis-use of heating and ventilating equipment.
- .5 Undertake preventive maintenance and re-fuelling normally performed on any shift.
- .6 Complete emergency repairs of minor complexity.
- .7 Place standby items in service.

.3 Record maximum and minimum temperature at each thermometer on a daily basis, and resetting the thermometers as necessary.

- .1 Make the temperature records available to the Engineer on a daily basis.
- .2 Provide certified written records to the Engineer on a weekly basis.

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END

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|---------------------------------|----|--|
| <u>1 PRECEDENCE</u>             | .1 | Division 1 Sections take precedence over technical specification sections in other Divisions of this Specification.  |
| <br>                            |    |  |
| <u>2 DESCRIPTION</u>            | .1 | This Section describes requirements for product and material quality, availability, storage, handling, protection, and transportation.   |
| <br>                            |    |  |
| <u>3 REFERENCE<br/>STANDARD</u> | .1 | Within text of each specifications section, reference may be made to reference standards.  |
|                                 | .2 | Conform to these reference standards, in whole or in part as specifically requested in specifications.   |
|                                 | .3 | If there is question as to whether any product or system is in conformance with applicable standards, Engineer reserves right to have such products or systems tested to prove or disprove conformance.  |
|                                 | .4 | Cost for such testing will be borne by Crown in event of conformance with Contract Documents, or by Contractor in event of non-conformance.  |
|                                 | .5 | Conform to latest date of issue of referenced standards in effect on date of submission of Tenders, except where specific date or issue is specifically noted.   |
| <br>                            |    |  |
| <u>4 QUALITY</u>                | .1 | Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work must be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided. |
|                                 | .2 | Defective products, whenever identified prior to completion of Work, will be rejected,   |
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|--|----|--|
| <u>4    QUALITY<br/>      (Cont'd)</u>                                       | .2 | (Cont'd)<br>regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection. |
|  | .3 | Should any dispute arise as to quality or fitness of products, decision rests strictly with Engineer based upon requirements of Contract Documents.  |
|  | .4 | Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout Work.  |
|  | .5 | Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.  |
|  |    |  |
| <u>5    STORAGE,<br/>      HANDLING, &amp;<br/>      PROTECTION: GENERAL</u> | .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 | Remove and replace damaged products at own expense and to satisfaction of Engineer.  |
|  |    |  |
| <u>6    TRANSPORTATION</u>   | .1 | Pay costs of transportation of products required in performance of Work.   |
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|----------|----------------------------|----|--|
| <u>6</u> | TRANSPORTATION<br>(Cont'd) | .2 | Transportation cost of products supplied by Crown will be paid for by Crown. Unload, handle and store such products. |
|----------|----------------------------|----|--|
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|----------|--------------------------------|----|--|
| <u>7</u> | MANUFACTURER'S<br>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 Engineer in writing, of conflicts between specifications and manufacturer's instructions, so that Engineer may establish course of action.  |
|          |                                | .3 | Improper installation or erection of products, due to failure in complying with these requirements, authorizes Engineer to require removal and re-installation at no increase in Contract Price or Contract Time.                            |
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- |          |                 |    |  |
|----------|-----------------|----|--|
| <u>8</u> | QUALITY OF WORK | .1 | Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Engineer if required Work is such as to make it impractical to produce required results. |
|          |                 | .2 | Do not employ anyone unskilled in their required duties. Engineer reserves right to require dismissal from site, workers deemed incompetent or careless.   |
|          |                 | .3 | Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Engineer, whose decision is final.   |
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- |          |               |    |   |
|----------|---------------|----|---|
| <u>9</u> | CO-ORDINATION | .1 | Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision. |
|----------|---------------|----|---|
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|--|----|---|
| <u>9 CO-ORDINATION</u><br>(Cont'd)           | .2 | Be responsible for co-ordination and placement of openings, sleeves and accessories.  |
|  |    |   |
| <u>10 REMEDIAL WORK</u>                      | .1 | Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable before removal of scaffolding or access structures. 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.   |
|  |    |   |
| <u>11 PROTECTION OF<br/>WORK IN PROGRESS</u> | .1 | Prevent overloading of any part of structure. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Engineer.   |
|  |    |   |
| <u>12 MEASUREMENT FOR<br/>PAYMENT</u>        | .1 | The work covered by this section will not be considered separately for payment but will be considered as incidental to Work of the specification.   |

- 1 PRECEDENCE .1 Division 1 Sections take precedence over technical specification sections in other Divisions of this Specification.
- 2 RECORD DRAWINGS .1 Print off two sets of project drawings for record drawing purposes.
- .2 Maintain project record drawings and record accurately any and all deviations from Contract documents.
- .3 Record changes in red. Mark on one set of prints and at completion of project and prior to final inspection, neatly transfer notations to second set and submit both sets to Engineer.
- .4 Record following information:
- .1 Depths of various elements of foundation in relation to Canadian Geodetic Datum.
- .2 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvement.
- .3 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.
- .4 Field changes of dimension and detail.
- .5 Changes made by Change Order or Field Order.
- .5 Pay particular attention to the measurements for the gate quoin.
- 3 MEASUREMENT FOR PAYMENT .1 The work covered by this section will not be considered separately for payment but will be considered as incidental to the work of the specification.

PART 1 - GENERAL

1.1 DESCRIPTION

- .1 This section covers the requirements for:
  - .1 Common excavation.
  - .2 Saw-cuts.
  - .3 Removal of existing concrete.
  - .4 Removal of existing stone.
  - .5 Preparation of existing concrete and stone surfaces against which new concrete is to be cast.
  - .6 Backfilling, topsoil, and sodding.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International).
  - .1 CSA S350-(R1998), Code of Practice for Safety in Demolition of Structures.
- .2 Federal Legislation.
  - .1 Canadian Environmental Assessment Act (CEAA), 1992, c. 37.
  - .2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

1.3 RELATED WORK

- .1 Section 01 33 00 - SUBMITTAL PROCEDURES.
- .2 Section 01 35 43 - ENVIRONMENTAL PROCEDURES.
- .3 Section 01 35 00 - HEALTH & SAFETY.
- .4 Section 01 45 00 - QUALITY CONTROL.

1.4 MEASUREMENT FOR PAYMENT

- .1 All work described in this section will be paid for under the following payment items:
    - .1 Concrete Excavation: will be measured and paid for as a unit price per cubic metre in place within the lines and limits shown on the drawings.
-

- .1 (Cont'd)
  - .2 Saw-cuts: will be measured and paid for as a unit price per lineal metre.
  - .3 Dismantling coping stone: will be measured and paid for as a unit price per cubic metre.
  - .4 Common Excavation and Backfill: will not be measured for payment, but will be paid as one lump sum price.
  - .5 Preparation of Concrete Surfaces: will not be measured for payment, but will be paid as one lump sum price.
- 
- .2 No payment will be made for concrete excavation beyond the limits shown on the drawings which has not been authorized by the Engineer; any overbreak beyond these limits shall be replaced by concrete at the Contractor's expense.
  - .3 All other work necessary to the completion of the work of this section, will not be measured separately for payment but will be considered incidental to the work of this section.

## PART 2 - PRODUCTS

### 2.1 NOT USED

- .1 Not used.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- .1 Examine the site with Engineer and confirm location and extent of repairs.
  - .2 Pay particular attention to the gate quoin area. Take measurements of existing quoin with respect to vertical and horizontal and also in profile. Before starting demolition work, submit these measurements to Engineer. NOTE: Existing gate will not mitre properly unless extreme care is taken in rebuilding quoin.
-

.2 (Cont'd)

3.2 COMMON EXCAVATION, BACKFILLING, TOPSOIL AND SODDING

- .1 Excavate by hand behind those repairs which will need excavation for the placement of formwork.
- .2 Remove and dispose of existing sod.
- .3 Excavate common material sufficiently to allow the construction of new work.
- .4 Stockpile excavated material and re-use as backfill. Compact backfill.
- .5 Supply and place new topsoil required to bring up elevation of backfill to within 75mm of coping elevation.
- .6 Supply and place new sod to cover disturbed area upon completion of work.

3.3 SALVAGE

- .1 Where repairs interfere with existing boat tie cables, remove and protect existing boat tie cable and re-install after completion of concrete work.

3.4 CCNCRETE EXCAVATION

- .1 Saw cut perimeter of the area to be repaired to provide a true, straight line between the existing concrete and repair concrete. Sawcut to depths shown on drawings. Use a 5 degree back cut to key the new repair to the existing.
  - .2 Remove existing concrete by using pneumatic hammers and chippers to minimum depths shown on the drawings or as directed by the Engineer.
    - .1 Chipping hammers: 7 kg maximum.
    - .2 Jack hammers: 14 kg maximum.
  - .3 Excavation exceeding the minimum limits shown on the drawings will only be paid if authorized in writing by the Engineer.
-

- .3 (Cont'd)
- .4 Dispose of the excavated concrete material in an approved manner off Crown lands to satisfaction of Engineer.
- .5 Ensure concrete dust and chips do not enter watercourse. See Section 01 35 43 - Environmental Procedures.
- .6 To prevent damages to lock surfaces, protect the gate sill and lower 1500mm of chamber wall with plywood, or equivalent material, where debris will fall.

### 3.5 STONE REMOVAL

- .1 Remove stone units individually.
- .2 Use housing and heating as required in advance of dismantling to remove frost, and maintain the unfrozen condition.
- .3 Rake out mortar joints and dislodge stone by wedging, chipping or other means which will cause no damage to adjacent stones.
- .4 Do not exert concentrated pressure on edges of adjacent stones.
- .5 If Contractor thinks that removal of an individual stone will not be possible without damaging an adjacent stone, discuss this with Engineer before removal. Be responsible for damages unless Engineer agrees in writing that damage is unavoidable.
- .6 If adjacent stones become loose during the removal process, quickly stabilize the area and inform Engineer.

### 3.6 PREPARATION OF STONE AND CONCRETE SURFACES

- .1 Use a stiff broom to remove loose concrete from excavated surfaces, and a high pressure water jet to clean the surfaces after the excavation has been completed to clean all
-

- .1 (Cont'd)  
surfaces and to partially expose the coarse aggregate.
- .2 Do not exceed 1000 kPa water jet pressure.
- .3 Keep the surfaces clean until new concrete is cast.
- .4 Do not discharge the water from cleaning directly to the water course. Direct the water to a settling pond, or filter before releasing to the water course. See Section 01 35 43 - ENVIRONMENTAL PROCEDURES.

3.7      CLEANING

- .1 Remove debris, trim surfaces and leave work site clean, upon completion of Work.

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END

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PART 1 - GENERAL

- 1.1 RELATED WORK
- .1 Section 03 20 00 - Concrete Reinforcing.
  - .2 Section 03 30 00 - Cast-in-Place Concrete.
  - .3 Section 01 33 00 - Submittal Procedures.
- 1.2 REFERENCES
- .1 CAN/CSA-A23.1-94, Concrete Materials and Methods of Concrete Construction.
  - .2 CAN/CSA-O86.1-94, Engineering Design in Wood (Limit States Design).
  - .3 CSA O153-M1980, Poplar Plywood.
  - .4 CSA S269.1-1975, Falsework for Construction Purposes.
  - .5 CAN/CSA-S269.3-M92, Concrete Formwork.
  - .6 Council of Forest Industries of British Columbia (COFI) Exterior Plywood for Concrete Formwork.
- 1.3 SUBMITTALS
- .1 Submit shop drawings for formwork and falsework in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 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.
  - .3 Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms.
-

1.4 MEASUREMENT  
FOR PAYMENT

- .1 No measurement will be made under this Section. Include costs in items of work for which concrete formwork and falsework is required.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Formwork materials: plywood and wood product formwork materials to CSA-086.1-94 and CSA-0153.
- .2 Form ties: removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm dia. in concrete surface.
- .3 Form stripping agent: colourless mineral oil, free of kerosene, with viscosity between 15 to 24 mm<sup>2</sup> /s at 40°C, flashpoint minimum 150°C, open cup.
- .4 Falsework materials: to CSA-S269.1.

PART 3 - EXECUTION

3.1 FABRICATION  
AND ERECTION

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .3 Fabricate and erect falsework in accordance with CSA S269.1 and COFI Exterior Plywood for Concrete Formwork.
- .4 Do not place shores and mud sills on frozen ground.
- .5 Provide site drainage to prevent washout of soil supporting mud sills and shores.
-

3.1 FABRICATION  
AND ERECTION  
(Cont'd)

- .6 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 CAN/CSA-A23.1.
- .7 Align form joints and make watertight. Keep form joints to minimum.
- .8 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.
- .9 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .10 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .11 Clean formwork in accordance with CAN/CSA-A23.1, before placing concrete.

3.2 FORM REMOVAL  
AND SHORING

- .1 Remove formwork when concrete has reached 70% of its design strength.
- .2 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
- .3 Re-use formwork and falsework subject to requirements of CAN/CSA-A23.1.

PART 1 - GENERAL

- 1.1 RELATED WORK
- .1 Section 03 10 00 - CONCRETE FORMING & ACCESSORIES.
  - .2 Section 03 30 00 - CAST-IN-PLACE CONCRETE.
  - .3 Section 01 33 00 - SUBMITTAL PROCEDURES.
- 1.2 REFERENCES
- .1 Reinforcing Steel Manual of Standard Practice, Reinforcing Steel Institute of Canada.
  - .2 Canadian Standards Association (CSA)
    - .1 CAN/CSA-A23.1-94, Concrete Materials and Methods of Concrete Construction.
    - .2 CAN3-A23.3-94, Design of Concrete Structures for Buildings.
    - .3 CSA G30.3-M1983(R1991), Cold Drawn Steel Wire for Concrete Reinforcement.
    - .4 CSA G30.5-M1983(R1991), Welded Steel Wire Fabric for Concrete Reinforcement.
    - .5 CSA G30.14-M1983(R1991), Deformed Steel Wire for Concrete Reinforcement.
    - .6 CSA G30.15-M1983(R1991), Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
    - .7 CAN/CSA-G30.18-M92, Billet-Steel Bars for Concrete Reinforcement.
    - .8 CSA W186-M1990, Welding of Reinforcing Bars in Reinforced Concrete Construction.
- 1.3 SUBMITTALS
- .1 To Section 01 33 00 - SUBMITTAL PROCEDURES.
  - .2 Upon request, provide Engineer with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks before starting reinforcing work.
  - .3 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacings, locations of reinforcement
-

1.3 SUBMITTALS  
(Cont'd)

- .3 (Cont'd)  
and mechanical splices if approved by Engineer, with identifying code marks to permit correct placement without reference to structural drawings. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada.
- .4 Detail lap lengths and bar development lengths to CAN3-A23.3, unless otherwise indicated. Provide type C tension lap splices unless otherwise indicated.

1.4 MEASUREMENT  
FOR PAYMENT

- .1 Reinforcing steel will be measured in kilograms of steel incorporated into work, computed from theoretical unit mass specified in CAN/CSA-G30.18 for lengths and sizes of bars as indicated or authorized in writing by Engineer.
- .2 No measurement will be made under this section. Include costs in items of concrete work for which reinforcement is required.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Substitute different size bars only if permitted in writing by Engineer.
  - .2 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18.
  - .3 Cold-drawn annealed steel wire ties: to CSA G30.3.
  - .4 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.
  - .5 Mechanical splices: subject to approval of Engineer.
-

- 2.2 FABRICATION
- .1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ANSI/ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
  - .2 Obtain Engineer's approval for locations of reinforcement splices other than those shown on placing drawings.
  - .3 Upon approval of Engineer, weld reinforcement in accordance with CSA W186.
  - .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

PART 3 - EXECUTION

- 3.1 FIELD BENDING
- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Engineer.
  - .2 When field bending is authorized, bend without heat, applying a slow and steady pressure.
  - .3 Replace bars which develop cracks or splits.
- 3.2 PLACING REINFORCEMENT
- .1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CAN/CSA-A23.1.
  - .2 Prior to placing concrete, obtain Engineer's approval of reinforcing material and placement.
  - .3 Ensure cover to reinforcement is maintained during concrete pour.

PART 1 - GENERAL

- |                         |    |   |
|-------------------------|----|---|
| <u>1.1 DESCRIPTION</u>  | .1 | This section specifies requirements for cast-in-place concrete.   |
|                         | .2 | Heating, cooling, hot and cold weather protection, curing, formwork and falsework, finishing, and jointing materials are considered as included in the price of the concrete. |
|                         |    |   |
| <u>1.2 RELATED WORK</u> | .1 | Section 03 10 00 - CONCRETE FORMING & ACCESSORIES.  |
|                         | .2 | Section 03 20 00 - CONCRETE REINFORCING.  |
|                         |    |   |
| <u>1.3 REFERENCES</u>   | .1 | American Society for Testing and Materials (ASTM)   |
|                         | .1 | ASTM C 260-94, Specification for Air-Entraining Admixtures for Concrete.  |
|                         | .2 | ASTM C 494-92, Specification for Chemical Admixtures for Concrete.  |
|                         | .3 | ASTM C1059-91, Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.  |
|                         | .2 | Canadian Standards Association (CSA)  |
|                         | .1 | CAN/CSA-A5-93, Portland Cement.   |
|                         | .2 | CAN/CSA-A23.1-94, Concrete Materials and Methods of Concrete Construction.  |
|                         | .3 | CAN/CSA-A23.2-94, Methods of Test for Concrete.   |
|                         | .4 | CAN/CSA-A23.5-M86(R1992), Supplementary Cementing Materials.  |
|                         | .5 | CAN/CSA A363-M88(R1996), Cementitious Hydraulic Slag.   |
|                         |    |   |
| <u>1.4 SUBMITTALS</u>   | .1 | To Section 01 33 00 - Submittal Procedures.   |
|                         | .2 | Minimum 4 weeks before starting concrete work submit to Engineer manufacturer's test data   |
-

1.4 SUBMITTALS  
(Cont'd)

- .2 (Cont'd)  
and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:
  - .1 Portland cement.
  - .2 Admixtures.
  - .3 Aggregates.
  - .4 Water.
- .3 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.
- .4 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.
- .5 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures for:
  - .1 Falsework erection.
  - .2 Hot weather concrete.
  - .3 Cold weather concrete.
  - .4 Curing.
  - .5 Formwork removal.

1.5 WASTE  
MANAGEMENT AND  
DISPOSAL

- .1 Separate and recycle all waste materials that can be recycled, especially leftover reinforcing steel.
- .2 Engineer will designate a location for cleaning out concrete trucks.
- .3 Carefully coordinate the specified concrete work with weather conditions.
- .4 Ensure emptied containers are sealed and stored safely for disposal away from children.
- .5 Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, noncombustible material and remove for

1.5 WASTE  
MANAGEMENT AND  
DISPOSAL  
(Cont'd)

- .5 (Cont'd)  
disposal. Dispose of all waste in accordance with applicable local, provincial and national regulations.

1.6 MEASUREMENT  
FOR PAYMENT

- .1 Work described in this section will be paid for under the following payment items:  
.1 Concrete  
.2 Bonding agent.
- .2 Concrete will be measured in cubic metres calculated from neat dimensions indicated or authorized in writing by Engineer. Concrete placed beyond dimensions indicated will not be measured.
- .3 Bonding agent will be measured in square metres of area treated with two coats, for payment.
- .4 No deductions will be made for volume of concrete displaced by reinforcing steel, structural steel, or piles.
- .5 Heating of water and aggregates and providing cold weather protection will not be measured but considered incidental to work.
- .6 Cooling of concrete and providing hot weather protection will not be measured but considered incidental to work.
- .7 Include in the prices of concrete the installation of all items embedded therein.
- .8 Supply and installation of anchor bolts, nuts and washers and bolt grouting will not be measured but considered incidental to work.
- .9 Supply and installation of waterstops will be measured in lineal metres installed.
- .10 All other work, necessary to the completion of the work of this section, will not be measured separately for payment, but will be considered incidental to the work.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Cement: Type 10 Portland cement to CAN/CSA-A5.
- .2 Water: to CAN/CSA-A23.1.
- .3 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density.
- .4 Air entraining admixture: to ASTM C 260.
- .5 Chemical admixtures: to ASTM C 494. Engineer to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .6 Curing compound: to CAN/CSA-A23.1 white and to ASTM C 309, Type 1-chlorinated rubber.
- .7 Bonding adhesive: to ASTM C1059.
- .8 Superplasticizers: to ASTM C1017.

2.2 MIXES

- .1 Proportion normal density concrete in accordance with CAN/CSA-A23.1, Alternative 1 to give following quality
    - .1 Cement: Mix of Type 10 Portland cement and a cementitious hydraulic slag cement ranging between 20% and 30%.
    - .2 Minimum compressive strength at 28 days: 30 MPa.
    - .3 Maximum water/cementing materials ratio 0.45.
    - .4 Class of exposure: F-1.
    - .5 Nominal size of coarse aggregate: 20 mm.
    - .6 Slump at time and point of discharge: 50 to 110 mm.
    - .7 Air content: 6 to 8%.
    - .8 Chemical admixtures: to approval of Engineer and to ASTM C 494.
      - .1 Engineer may withdraw prior approval of admixtures if conditions encountered during Work indicate unsatisfactory results.
-

2.2 MIXES  
(Cont'd)

- .1 (Cont'd)
- .8 Chemical admixtures:(Cont'd)
  - .2 Do not use calcium chloride or materials containing calcium chloride for any purpose.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Obtain Engineer's approval before placing concrete. Provide 24 hours notice before placing of concrete.
- .2 Pumping of concrete is permitted only after approval of equipment and mix.
- .3 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .4 Before placing of concrete obtain Engineer's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .5 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .6 In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.
- .7 Do not place load upon new concrete until authorized by Engineer.

3.2 BONDING AGENT

- .1 Apply 2 coats to manufacturer's instructions.
-

- 3.3 CONSTRUCTION .1 To CAN/CSA-A23.1.
- .2 Anchor bolts.
- .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.
- .2 With approval of Engineer , grout anchor bolts in preformed holes or holes drilled after concrete has set. Formed holes to be minimum 100 mm diameter. Drilled holes to be minimum 25 mm larger in diameter than bolts used to manufacturers's recommendations.
- .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
- .4 Set bolts and fill holes with shrinkage compensating grout 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.
- .3 Finishing.
- .1 Finish concrete in accordance with CAN/CSA-A23.1.
- .2 Unformed surface concrete tolerance to conventional classification in accordance with straight edge method.
- .3 Use wood float finish for unformed surfaces.
- .4 Use smooth-form finish for formed surfaces.
- .5 Use procedures noted in CAN/CSA-A23.1 or other procedure acceptable to Engineer to remove excess bleed water. Ensure surface is not damaged.
- 3.4 SITE TOLERANCE .1 Concrete tolerance in accordance with CAN/CSA-A23.1 straight edge method
- 3.5 COLD WEATHER PROTECTION .1 For concrete and grout placed when air temperature is at or below 5 degrees Celsius, in addition to cold weather requirements of CAN/CSA-A23.1:
-

3.5 COLD WEATHER .1  
PROTECTION  
(Cont'd)

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(Cont'd)

.1 Protect concrete by a windproof shelter of canvas or other material to allow free circulation of inside air around fresh concrete. At no point let walls of shelter touch formwork. Provide sufficient space for removal of formwork for finishing. Supply approved heating equipment. Vent the products of combustion outside the protective shelter.

.2 Maintain concrete or grout at following curing temperatures:

- .1 For an initial 3 days, at a temperature of not less than 15 degrees Celsius nor more than 27 degrees Celsius at concrete surfaces.
- .2 Cure at not less than 10 degrees Celsius for an extra 4 days.
- .3 Keep concrete surfaces moist continuously while protected.
- .4 Reduce temperature at a rate not exceeding 10 degrees Celsius per day until outside temperature has been reached.

3.6 HOT WEATHER .1  
REQUIREMENTS

During hot weather place concrete to hot weather requirements of CAN/CSA-A23.1.

3.7 CURING .1

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Unformed surfaces: cure with burlap and water. Carefully place two layers of damp burlap on the surface of the concrete. Overlap each strip by at least 75 mm and secure against displacement by wind. Maintain burlap in place and keep thoroughly wet for 7 days after day of placing.

.2 Formed surfaces: if formwork is left in place for 7 days or more no additional curing will be required. If formwork is removed in less than 7 days, cure in manner specified for unformed surfaces for remainder of seven day period.

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3.7 CURING  
(Cont'd)

- .3 During curing period uncover only such areas as are immediately needed for finish treatment. Recover and continue curing.

3.8 FIELD QUALITY  
CONTROL

- .1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Engineer in accordance with CAN/CSA-A23.1 and Section 01 45 00 - Quality Control.
- .2 Engineer will pay for costs of tests.
- .3 Engineer will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .4 Inspection or testing by Engineer will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

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END

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PART 1 - GENERAL

- 1.1 DESCRIPTION .1 This section specifies requirements for drilling anchor holes, and supply and installation of anchors, including grouting, as described by the drawings and the specification.
- 1.2 RELATED WORK .1 Section 033000 - Cast-in-Place Concrete.
- 1.3 QUALIFICATIONS .1 The installation of grouted rock anchors requires extensive experience and is to be performed by a contractor experienced in this type of work.
- 1.4 SUBMITTALS .1 Shop drawings.
- 1.5 SEQUENCE .1 Anchors A1 are to be installed, including post-tensioning, after concrete excavation of at gate quoin and spider is completed, but before placing concrete.
- 1.6 MEASUREMENT FOR PAYMENT .1 The work of this section will be measured and paid for under the following items:  
.1 Type A1 - per each anchor.  
.2 Type B1 - per each anchor.  
.3 Type D1 - per each anchor (25 M Dowels).
- .2 The price for Type A1 anchors includes:  
.1 drilling, including casing when required; setting; supplying and placing all attached hardware; supplying and placing grout pad for anchor plates; supplying and placing anchor grout; proof testing; and tensioning each anchor.
-

1.6 MEASUREMENT  
FOR PAYMENT  
(Cont'd)

- .3 Payment for Types B1 and D1 anchors includes drilling hole in concrete base material; supplying and placing all attached hardware, including supply of rebar for Type D1 anchors; and supplying and placing anchor grout.
- .4 Housing and heating are included in unit price for each anchor.
- .5 All other work, necessary to completion of the work of this section, will not be measured separately for payment, but will be considered as incidental to work of this section.

PART 2 - PRODUCTS

2.1 MATERIALS:  
GENERAL

- .1 Use materials approved by Engineer.
- .2 Resin anchors shall not be considered as equivalent for Type B1 anchors. Use only mechanical anchors.
- .3 Supply anchors in one piece, up to maximum continuous length produced by manufacturer. Strength of couplings: equal to bar.
- .4 Anchors to be complete with all accessory parts as specified by the manufacturer, and additional accessories indicated on drawings or described in specification.
- .5 Clean steel surfaces of all rust and deleterious matter. Remove grease or oils thoroughly. Bars showing pitting will be rejected.
- .6 Store bars straight and protect threads.
- .7 Deliver cementitious materials in clearly marked, sealed, bags.
- .8 Store materials in dry, heated enclosure maintained between 2 and 40 degrees C.
- .9 Record sequence of deliveries and use materials in same sequence.

- 2.2 TYPE A1 ANCHORS
- .1 Solid rock and concrete anchor.
  - .2 Pre-stressable all-thread steel bar.
  - .3 To CSA Standard G279-M1992, Grade 517 MPa proof stressed prestressing bars. All-thread bar conforming to ASTM A615/A615M.
  - .4 Nominal diameter: 25 mm.
  - .5 Guaranteed ultimate tensile strength: 350 kN.
  - .6 Steel bearing plates to ASTM A36/A36M-96.
  - .7 Nuts to be hexagonal, heavy duty type with round head, conforming to ASTM A325M-93 or the bar manufacturer's specifications.
  - .8 Provide two grout tubes: one for grouting the bond length and one for grouting the free stressing length. Also, provide one de-air tube.
  - .9 Locations:
    - .1 Type A1 - Vertical anchors near gate quoin and spider.
  - .10 Acceptable product: Williams Grade 75 ksi all thread rebar or equivalent.

- 2.3 TYPE B1 ANCHORS
- .1 Solid rock and concrete anchor.
  - .2 Pre-stressable mechanical expansion anchor and steel bar, threaded as required.
  - .3 Steel plates to ASTM A36/A36M-96.
  - .4 Location, capacity, diameter and length:
    - .1 B1 - vertical refacing of monoliths; guaranteed ultimate tensile strength 80 kN; nominal diameter 12 mm; 550 mm long.
-

- 2.4 TYPE D1 ANCHORS .1 Deformed bars to CAN/CSA G30.18-M92, billet steel, grade 400.
- .2 Plastic grout tube and de-air tube secured to bar, as shown on the plans, is optional.
- .3 Size and location:  
.1 D1 - 25M with standard hook, minimum 500 mm embedment, in monolith coping section, including gate recess coping refacing at monolith M6.
- 2.5 ANCHOR GROUT .1 Proportion grout mix to comply with following requirements:  
.1 28 day compressive strength: 35 MPa;  
.2 Maximum water/cement ratio 0.4;  
.3 Portland cement type 30;  
.4 Shrinkage compensating admixture to approval of Engineer.

PART 3 - EXECUTION

- 3.1 GENERAL .1 Except as specified in this section, install to manufacturer's recommendations.
- .2 For all anchors: provide housing and heating for anchors and grouting and stressing equipment, when temperature is under 5° Celsius. Maintain housing above 10° Celsius for 5 days after grouting.
- .3 For installation of Type A1 anchors, hole can be pre-heated by using steam. Allow sufficient time for the holes to thaw the surrounding area. Within anchor bond length, temperature in hole is to be a minimum of 5 C at time of grouting. Temperature readings should be taken a minimum of one hour after hole has been pre-heated with steam to monitor ambient temperature in hole.

3.2 STRESSING  
EQUIPMENT

- .1 Supply tensioning equipment specially adapted to anchor system used.
- .2 Design equipment to impose a controlled force gradually, inducing no dangerous secondary stresses in the bar, anchor head or supported structure.
- .3 Tension anchor in one operation.
- .4 Provide load cells which are robust and appropriately protected for site work; capable of accurate centering on the jack to ensure co-axiality with the bar. Provide calibration certificates.
- .5 Calibrate load recording instruments with actual cable to be used on site.
- .6 Provide calibration certificates for pressure gauges. Mount duplicate gauges adjacent to jack, when pump is more than 5 m from the jack. Provide gauge capacity within 80% to 160% of bar strength; accuracy within 2% of actual tensioning force.
- .7 Assemble stressing head and bearing plate concentrically with anchor bar within plus or minus 10 mm, and not more than 5 degrees from bar axis.
- .8 Ensure that free anchor length is ice-free before stressing.
- .9 During stressing, take adequate precautions to protect personnel and property from injury and damage due to failure of bar or stressing equipment.

3.3 GROUT MIXING

- .1 Provide water free of deleterious materials.
- .2 Add water to mixer before cement.
- .3 Mix for 3 minutes minimum, with high speed mixer (1000 rpm minimum), or paddle mixer (150 rpm minimum).

- 
- |                              |     |   |
|------------------------------|-----|---|
| 3.3 GROUT MIXING<br>(Cont'd) | .4  | Provide holding tank with paddle mixer.   |
|                              | .5  | Inject grout within initial setting time.   |
|                              | .6  | Grout temperature: between 15°C and 22°C.   |
| <br>                         |     |   |
| 3.4 ANCHOR<br>INSTALLATION   | .1  | Type A1 anchors:  |
|                              | .1  | During drilling, record all changes in bedrock characteristics.   |
|                              | .2  | Drill hole entry point to be within 75 mm of plan.  |
|                              | .3  | Drill hole alignment to be within 3 degrees of angle shown on the drawings. Straightness of drill hole to be such that deviation from a straight line in any 3 meters is less than 25 mm. |
|                              | .4  | Drill hole using casing where required, continuously cleaning out with water.   |
|                              | .5  | Before installation of anchor, clean out with water jet.  |
|                              | .6  | Probe hole to ensure absence of obstruction.  |
|                              | .7  | Depth of holes shown on drawings is the minimum required.   |
|                              | .8  | Install anchor to manufacturer's instructions.  |
|                              | .9  | Use centering devices at 1.5 m centers.   |
|                              | .10 | Inject grout at lowest point of drill hole, and fill bond length only, in one continuous operation.   |
|                              | .11 | Place grout pad for anchor bearing plate, plate and nut.  |
|                              | .12 | After grout has cured for a minimum of 72 hours, start post tensioning.   |
|                              | .13 | Do proof test for all anchors.  |
|                              | .14 | Lock-off anchors at 180 kN.   |
|                              | .15 | At the appropriate stage, grout free-stressing length through grout tube until a continuous non-diluted flow of grout starts coming out of the de-air tube.                               |
|                              | .16 | Install extensions, couplings and accessory plates and nuts as shown on drawings.   |
-

3.4 ANCHOR  
INSTALLATION  
(Cont'd)

- .2 Type B1 anchors:
  - .1 Type B1 anchors are not prestressed.
  - .2 Drill holes, using manufacturer's recommended drill size, to extend 75 mm beyond the length of rock bolt.
  - .3 Clean the hole thoroughly of dust and debris.
  - .4 Place nut, washer and plate on rock bolt, attach grout tube, and lower bolt into drill hole with thrust-ring and malleable shell cone set in position on the inner threaded portion of the bolt.
  - .5 Set the expansion anchor by torquing the rod to the torque required by the manufacturer's specifications.
  - .6 Place de-air tube at the highest point of the hole.
  - .7 At the appropriate stage, grout with anchor grout through grout tube until a continuous flow of grout starts coming out of the de-air tube.
- .3 Type D1 anchors:
  - .1 Drill holes at least 25 mm larger than bar diameter. Clean thoroughly by air or water jet. Ensure no water is in hole.
  - .2 Install bars with grout.

3.5 GROUT TESTING

- .1 Test compressive strength of grout using 50 mm cube specimens to CAN3-A23.2-94.
- .2 Obtain samples for testing from each different batch of grout, from the grout tube.

3.6 TYPE A1 ANCHOR  
TESTING

- .1 Proof test:
  - .1 Incrementally load the anchor in accordance with the following schedule. Record movement at each increment to an accuracy of 0.025 mm with respect to an independent fixed reference point. Monitor jack load with a pressure gauge or load cell. P = design load. Proof Test  
0.25 P 0.50 P 0.75 P 1.00 P 1.20 P

3.6 TYPE A1 ANCHOR .2  
TESTING  
(Cont'd)

Acceptance Criteria: an anchor will be acceptable if:

- .1 The total elastic movement obtained from the performance test exceeds 80 % of the theoretical elastic elongation of the stressing length and is less than the theoretical elastic elongation of the stressing length plus 50 % of the bond length.
- .2 Lift-off tests show an anchor load within 10% of the specified lock-off load.

- .3 Reports: provide copies of all data to Engineer.

3.7 MANUFACTURERS' .1  
INSTRUCTIONS

Keep manufacturers' instructions at work site.

END OF SECTION.

END

PART 1 - GENERAL

- |                                    |        |   |
|------------------------------------|--------|---|
| <u>1.1 DESCRIPTION</u>             | .1     | This section specifies requirements for excavating and backfilling to complete Work described by drawings and specifications.   |
|                                    | .2     | The work includes but is not necessarily limited to: <ul style="list-style-type: none"><li>.1 Hand excavation behind coping where required for placement of formwork.</li><li>.2 Backfilling.</li><li>.3 Disposing of surplus material.</li><li>.4 Topsoil and sodding.</li><li>.5 Removal of tree shown on drawings.</li></ul> |
| <br><u>1.2 DEFINITIONS</u>         | <br>.1 | <br>"Common Excavation" includes all materials, excluding rock, which must be removed to complete Work including boulders and rock fragments less than 0.4 m3 in volume, and soil of whatever nature encountered.   |
|                                    | .2     | "Backfilling" includes: Supplying, placing, grading and compacting topsoil material.  |
| <br><u>1.3 REGULATORY AGENCIES</u> | <br>.1 | <br>Comply with local, provincial and national codes and regulations.   |
|                                    | .2     | Adhere to municipal, provincial and national requirements relating to safety of excavations and protection of workers.  |
| <br><u>1.4 SUBMITTALS</u>          | <br>.1 | <br>Provide source of topsoil and sod.  |
| <br><u>1.5 PROTECTION</u>          | <br>.1 | <br>Prevent damage to existing structures, utilities, archaeological resources, and site appurtenances which are to remain. Make good all damage.   |
-

1.6 EXPLOSIVES .1 Do not use explosives.

1.7 MEASUREMENT  
FOR PAYMENT .1 All work described in this section will not  
be measured. It will be paid for under the  
following payment item:  
.1 "Excavation and Backfilling" - ONE FIXED  
LUMP SUM PRICE.  
.2 All other work, necessary to completion of  
Work of this section, will not be considered  
separately for payment but will be considered  
incidental to the work of this section.

PART 2 - PRODUCTS

2.1 MATERIALS .1 Topsoil: supplied by garden centre for use as  
topsoil or garden soil.  
.2 Nursery sod: supplied by garden centre.

PART 3 - EXECUTION

3.1 EXCAVATION .1 Remove ice and snow, from surfaces to be  
excavated and dispose of it in an approved  
manner, off Canal property.  
.2 Do no burning.  
.3 Excavate to depth required for placing of  
formwork. Backfill slope to be no steeper than  
1:1.  
.4 Do not start further work until Engineer has  
inspected, measured and approved excavated  
surfaces.

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3.2 BACKFILLING  
WITH TOPSOIL

- .1 Do not proceed with backfilling operations until Engineer has inspected and approved work in place.
- .2 Backfill spaces excavated to the approved elevations, and between the approved limits.
- .3 Do not backfill adjacent to structure until it has sufficient strength to withstand earth and compaction pressures and approval has been obtained from Engineer.
- .4 Compact each layer to minimum 95% of maximum dry density in accordance with ASTM D698-78.
- .5 When using hand operated tamping devices, deposit backfill material in uniform layers not exceeding 100 mm loose thickness.
- .6 Backfill elevation must permit a 75 mm thickness of sod below finished elevation.

3.3 SODDING

- .1 Scarify topsoil with a rake and apply water before installing sod.
- .2 Sod must be laid within 2 hours of its delivery to the site.
- .3 Water sod immediately upon installation, and twice a day thereafter for seven days. For the next seven days, water once a day.
- .4 Acceptance of sod: after 14 days, sod must be uniformly green and growing.

3.4 FIELD QUALITY  
CONTROL

- .1 Notify the Engineer not less than 72 hours in advance of backfilling operation.
  - .2 Field testing of compaction to ASTM D1556.
-

- 3.5 RESTORATION .1 Upon completion of Work, remove surplus materials and debris, and correct defects noted by Engineer.
- .2 Reinststate areas affected by equipment outside of area of work to condition which existed before starting Work.

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END

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PART 1 - GENERAL

- |  |    |   |
|--|----|---|
| <u>1.1 DESCRIPTION</u>                   | .1 | This section specifies the requirements for rectifying sodded areas by means of:<br>.1 Supplying, placing, and finish grading of a topsoil bed.<br>.2 Supplying and placing nursery sod.<br>.3 Supplying and placing meadow-mix seed mixture. |
|  | .2 | Work not included:<br>.1 Protection of mature trees and other plant material during construction: to Section 01 35 43 - ENVIRONMENTAL PROTECTION.   |
| <u>1.2 PRELIMINARY INSPECTION</u>        | .1 | Establish the condition of sodded areas in conjunction with Engineer before starting work.  |
| <u>1.3 SOURCE QUALITY CONTROL</u>        | .1 | At least 2 weeks before starting final topsoil work, advise Engineer of proposed sources of topsoil, sod, and seed mixture. Provide Engineer with access to the sources for inspection, sampling and testing.                                 |
|  | .2 | When proposed sources are approved, use no other sources without written authorization from Engineer.   |
| <u>1.4 DELIVERY &amp; STORAGE OF SOD</u> | .1 | Schedule deliveries in order to keep storage at the job site to a minimum without causing delays.   |
|  | .2 | Deliver, unload and store rolled sod on pallets only.   |
|  | .3 | Deliver sod to site within 24 hours of being lifted and lay sod within 36 hours of being lifted.  |

1.4 DELIVERY &  
STORAGE OF SOD  
(Cont'd)

- .4 Do not deliver small, irregular, or broken pieces of sod. Engineer will reject these.
- .5 During wet weather, allow sod to dry sufficiently to prevent tearing during lifting and handling.
- .6 During dry weather, protect sod from drying. Water sod as necessary to ensure its vitality and prevent dropping soil in handling. The Engineer will reject dried-out sod.
- .7 Supply sod in standard-sized units and of a uniform thickness, rolled for easy handling.

1.5 SCHEDULING

- .1 Schedule sod laying to coincide with final topsoil operations.
- .2 Obtain Engineer's approval of the schedule for sodding before proceeding.

1.6 MEASUREMENT  
FOR PAYMENT

- .1 The work of this Section will not be measured. It will be paid for under the following payment item:
  - .1 "Sodding". ONE FIXED LUMP SUM PRICE.
- .2 All other work covered by this section will not be considered separately for payment but will be considered as incidental to Work of this Contract.

PART 2 - PRODUCTS

2.1 TOPSOIL

- .1 New topsoil to be a friable sandy-clayish loam of good humus content, suitable for supporting sod growth, free from:
  - .1 Debris and stones over 50 mm diameter.
  - .2 Coarse vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

2.1 TOPSOIL  
(Cont'd) .2 Approval of topsoil material subject to soil testing and analysis. Testing of topsoil will be carried out by testing laboratory designated by Engineer. Engineer will pay for cost of tests.

2.2 SOD .1 Nursery sod: Quality and source to comply with standards outlined in "Guide Specification for Nursery Stock", Section 17, 1978 edition, published by Canadian Nursery Trades Association.  
.1 Number 1 Kentucky Bluegrass/Fescue sod: sod grown from minimum 40% Kentucky Bluegrass, 30% Creeping Red Fescue.

PART 3 - EXECUTION

3.1 PREPARATION OF  
TOPSOIL SUB-GRADE .1 Remove damaged sod and fair off subgrade eliminating uneven areas and low spots, ensuring that new sodded surface will be faired-off to the existing sodded areas with no sharp transition.  
.2 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials. Remove debris which protrudes more than 75 mm above surface. Dispose of removed material off site.  
.3 Coarse cultivate entire area which is to receive topsoil to depth of 100 mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.2 PLACING &  
SPREADING TOPSOIL .1 Place topsoil after Engineer has accepted sub-grade.  
.2 Spread topsoil to 150 mm minimum depth after settlement and 80% compaction. Keep final elevation 15 mm below finished grade to allow room for sod.

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<u>3.2 PLACING &amp; SPREADING TOPSOIL (Cont'd)</u>	.3	Manually spread topsoil around trees, shrubs and obstacles.
	.4	Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.
	.5	Consolidate topsoil to required bulk density using equipment approved by Engineer. Leave surfaces smooth, uniform and firm enough to resist deep footprints.
 <u>3.3 ACCEPTANCE OF TOPSOIL GRADING</u>	.1	 Engineer will inspect topsoil in place and determine acceptance of depth of topsoil and finish grading.
 <u>3.4 SURPLUS TOPSOIL</u>	.1	 Dispose of materials not required off Crown property.
 <u>3.5 SODDING</u>	.1	 Obtain Engineer's approval of topsoil grade and depth before starting sodding.
	.2	Loosen surface of topsoil where it has become compacted.
	.3	Protect all sodded areas against any damage until sod has been fully established. Supply and install required protective apparatus.
 <u>3.6 MAINTENANCE OF SODDED AREA</u>	.1	 Maintain sodded and seeded areas until accepted by Engineer.
	.2	Apply water to ensure establishment and continuous growth of grass and wildflowers. Apply sufficient water to ensure moisture penetration of 200 mm into soil below sod.
	.3	Cut grass when it reaches a height of 80 mm. Cut grass thereafter frequently enough to be

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3.6 MAINTENANCE OF .3  
SODDED AREA  
(Cont'd)

(Cont'd)  
kept at a height of 80 to 100 mm. Allow  
clippings to remain.

3.7 ACCEPTANCE .1  
CRITERIA

Approval of material at its source does not  
prevent subsequent rejection on job site.

- .2 Sod will be approved when:
- .1 Growth of sodded areas has been properly established;
  - .2 Turf is free of bare and dead spots;
  - .3 No surface soil is visible when grass has been mowed to a height of 80 mm; and,
  - .4 Grass has been cut a minimum of 2 times.

END