

PWGSC Ontario	SPECIFICATION	Section 00 00 00
Region Project	TITLE SHEET	Page 1
Number R.013375.034		2014-07-18

Project Title KINGSTON, ONTARIO  
LA SALLE CAUSEWAY BASCULE BRIDGE  
EMERGENCY POWER

Project Number R.013375.034

Project Date 2014-07-18

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PART 1 - GENERAL

1.1 GENERAL  
DESCRIPTION OF WORK

- .1 Work generally comprises of the following:
  - .1 Supply and install diesel generator set including subbase fuel tank.
  - .2 Supply and install manual transfer switch.
  - .3 Supply and install relay, control cable and power cables.
  - .4 Testing and commissioning.
  - .5 Saw cut, remove and dispose existing asphalt as required for concrete base installation.
  - .6 Excavate and remove existing material for new concrete and granular base.
  - .7 Supply and install new reinforced concrete base including new granular base and sub-base, new geotextile and compaction.
  - .8 Supply and install 3 new pipe bollards fill with concrete.
  - .9 Make good existing asphalt surface to match existing.

1.2 MINIMUM  
STANDARDS

- .1 Execute work to meet or exceed:
  - .1 National Building Code of Canada 2010, National Fire Code of Canada 2010, Ontario Building Code 2012 and any other code of provincial or local application, including all amendments up to project date, provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.
  - .2 Rules and regulations of authorities having jurisdiction.
  - .3 Observe and enforce construction safety measures required by National Building Code 2010, Part 8 Safety Measures at Construction and Demolition Sites, Occupational Health and Safety Act and Regulations for Construction Projects, Revised Statutes of Ontario 1990, Chapter O.1 as amended, O. Reg. 213/91 as amended by O. Reg. 631/94, O. Reg. 143/99, O. Reg. 571/99, O. Reg. 145/00, O. Reg. 527/00, R.R.O. 1990, Reg. 834, O. Reg. 278/05 (Asbestos), Workplace Safety and Insurance Board and municipal statutes and authorities.
  - .4 Environmental Protection Act, O. Reg. 102/94 and O. Reg. 103/94.

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| <u>1.3 TAXES</u>   | .1 | Pay applicable Federal, Provincial and Municipal taxes.  |
| <br>   |    |  |
| <u>1.4 FEES, PERMITS, CERTIFICATES AND LETTERS</u>           | .1 | Provide authorities having jurisdiction with information requested.  |
|  | .2 | Pay fees and obtain certificates including Electrical Safety Authority certificate, permits and letters required.  |
|  | .3 | Furnish certificates, permits and letters when requested.  |
| <br>   |    |  |
| <u>1.5 EXAMINATION</u>                                       | .1 | Examine existing conditions and determine conditions affecting work.   |
| <br>   |    |  |
| <u>1.6 DOCUMENTS</u>   | .1 | Keep one copy of contract documents on the site.   |
| <br>   |    |  |
| <u>1.7 ELECTRONIC SUBMITTALS</u>                             | .1 | Submit number of hard copies specified for each type and format of submittal and also submit in electronic format as pdf files. Forward pdf, NMSEdit Professional spp, MS Word, MS Excel, and Autocad dwg files; on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative. |
| <br>   |    |  |
| <u>1.8 CONTRACTOR'S AS-BUILT DRAWINGS AND SPECIFICATIONS</u> | .1 | As work progresses, neatly record significant deviations from the Contract drawings and specifications using fine, red marker on full size white prints and specifications. Make the same changes on the electronic files.   |
|  | .2 | Neatly print lettering and numbers in size to match original. Lines may be drawn free-hand but shall be neat and accurate. Add at each title block note: "AS BUILT". Also circle on List of Drawings each title and number of drawing marked with "AS-BUILT" information. Circle on Table of Contents each specification section number and  |
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1.8 CONTRACTOR'S  
AS-BUILT DRAWINGS  
AND SPECIFICATIONS  
(Cont'd)

- .2 (Cont'd)  
title of specification sections marked with  
"AS-BUILT" information.
- .3 Departmental Representative will provide one  
electronic set of drawings, schedules and  
specifications for as-built drawing and  
specification purposes.
  - .1 Drawings are in Autocad.
  - .2 Specifications are in NMSEdit  
Professional.
  - .3 Amendments and addenda are in MS Word.
- .4 Record following significant deviations:
  - .1 Horizontal and vertical location of  
underground utilities and appurtenances  
referenced to permanent surface improvement.
  - .2 Field changes of dimension.
  - .3 Other significant deviations which are  
concealed in construction and can not be  
identified by visual inspection.
  - .4 Alternative materials and systems  
installed replacing original materials and  
systems specified by trade name.
- .5 Turn one set, paper copy and electronic copy,  
of AS-BUILT drawings and specifications over to  
Departmental Representative on completion of  
work. Submit pdf files on USB compatible with  
PWGSC encryption requirements, through email or  
alternate electronic file sharing service such  
as ftp.
- .6 If project is completed without significant  
deviations from Contract drawings and  
specifications submit to Departmental  
Representative one set of drawings and  
specifications marked "AS-BUILT".

1.9 OPERATIONS AND .1  
MAINTENANCE DATA

- .1 On completion of project submit to Departmental  
Representative 3 copies of Operations and  
Maintenance Data assembled in three 255 x 295 mm  
vinyl-covered, 3-ring, loose-leaf binders with  
title sheet labelled "Operations Data and  
Maintenance Manual", project title, date and  
list of contents. Organize content into  
applicable sections between hard paper dividers  
with labelled tabs.

1.9 OPERATIONS AND .2  
MAINTENANCE DATA  
(Cont'd)

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Include in each binder maintenance instructions for finished surfaces, warranties and guarantees in form approved by Departmental Representative and operations and maintenance data for equipment and systems with parts list, suppliers' names and addresses, schematic diagrams for electrical hardware, complete set of final shop drawings (bound separately), names, addresses and phone numbers of sub-contractors and suppliers, list of materials with names of manufacturer and source of supply. Neatly type lists and rates. Use clear drawings, diagrams or manufacturer's literature.

1.10 SHOP DRAWINGS .1  
AND PRODUCT DATA  
SHEETS

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Prior to submission check and certify as correct, shop drawings and product data sheets. Issue to Departmental Representative each submission at least 14 days before dates reviewed submission will be needed.

.2 Submit 3 prints and 1 electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.3 Submit 3 prints and 1 electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.4 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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| 1.10 SHOP DRAWINGS<br>AND PRODUCT DATA<br>SHEETS<br>(Cont'd)  | .5 | Responsibility for errors, omissions or deviations from requirements of Contract Documents is not relieved by Departmental Representative's review of submittals.                  |
| 1.11 CONSTRUCTION<br>PHOTOGRAPHS  | .1 | Submit electronic and hard copy of colour digital photography in jpg format, standard resolution.  |
|   | .2 | Identification: name and number of project and date of exposure indicated.   |
|   | .3 | Number of viewpoints and location of viewpoints determined by Departmental Representative.   |
|   | .4 | Frequency: as directed by Departmental Representative.   |
| 1.12 DESIGN DATA,<br>TEST REPORTS,<br>CERTIFICATES,<br>MANUFACTURER'S<br>INSTRUCTIONS,<br>MANUFACTURER'S<br>FIELD REPORTS | .1 | Prior to submission check and certify as correct each submission. Issue to Departmental Representative each submission at least 14 days before reviewed submission will be needed. |
|   | .2 | Submit 3 white print copies of each item requested.  |
|   | .3 | Responsibility for errors, omissions or deviations from requirements of Contract Documents is not relieved by Departmental Representative's review of submittals.                  |
| 1.13 ADDITIONAL<br>DRAWINGS   | .1 | Departmental Representative may furnish additional drawings to clarify work.   |
|   | .2 | Such drawings become part of Contract Documents.   |
| 1.14 PROTECTION   | .1 | Protect existing work from damage.   |
|   | .2 | Replace damaged existing work with material and finish to match original.  |
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1.14 PROTECTION (Cont'd)	.3	Protect existing trees and plants on site and adjacent properties.
1.15 EXISTING SERVICES	.1	Establish location, protect and maintain existing utility lines.
	.2	Maintain existing services in occupied areas.
	.3	Use existing water and electrical services at no cost.
1.16 TEMPORARY FACILITIES AND SERVICES	.1	Provide and maintain temporary facilities and services required to carry out work.
	.2	Remove temporary facilities and services on completion of work.
	.3	Provide and maintain temporary sanitary facilities.
	.4	Provide and maintain temperature and enclosure required to prevent frost damage to work.
1.17 METRIC SIZED MATERIALS	.1	SI metric units of measurement are used exclusively on the drawings and in the specifications for this project.
	.2	The Contractor is required to provide metric products in the sizes called for in the Contract Documents except where a valid claim can be made that a particular product is not available on the Canadian market.
1.18 MATERIAL AND EQUIPMENT	.1	Use new products unless otherwise specified.
	.2	Use CSA approved electrical products.
	.3	Deliver and store material and equipment to manufacturer's instructions with manufacturer's labels and seals intact.
	.4	When material or equipment is specified by standard or performance specifications, upon request of Departmental Representative, obtain



1.18 MATERIAL AND EQUIPMENT (Cont'd)	.4	(Cont'd) from manufacturer an independent testing laboratory report, stating that material or equipment meets or exceeds specified requirements.
1.19 CUTTING AND REMEDIAL WORK	.1	Co-ordinate work to keep cutting and remedial work to a minimum.
	.2	Execute cutting and remedial work required. Notify Departmental Representative before cutting, boring or sleeving structural members.
	.3	Prior to cutting or drilling horizontal or vertical surfaces including concrete, concrete block or other structural substrate, determine location of reinforcing, service lines, pipes, conduits or other items by appropriate method. Submit findings to Departmental Representative prior to cutting or drilling.
	.4	Match work to adjoining construction and finishes.
	.5	Make good surfaces exposed or disturbed by work with material and finish to match existing adjoining surfaces.
1.20 FASTENINGS	.1	Provide fastenings of type, size and spacing required to assure secure anchorage.
	.2	Obtain Departmental Representative's permission before using explosive actuated fasteners.
1.21 CO-ORDINATION AND CO-OPERATION	.1	Site and work area will not be occupied during execution of work.
	.2	Execute work with minimum disturbance to occupants and normal use of site and work area.
	.3	Where security has been reduced by work of contract, provide temporary means to maintain security.
	.4	Contractor's access to the site is across the adjacent site which other contractors occupy.

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|---|---|---|----|------------------------------|----|---|
| <u>1.21 CO-ORDINATION<br/>AND CO-OPERATION<br/>(Cont'd)</u> | .4  | (Cont'd)<br>Coordinate access to this site with the other<br>contractors and abide by their health and safety<br>plans.   |    |                              |    |   |
| <u>1.22 INSPECTION AND<br/>TESTING</u>                      | .1  | When initial tests and inspections reveal work<br>not to contract requirements, pay for tests and<br>inspections required by Departmental<br>Representative on corrected work.  |    |                              |    |   |
| <u>1.23 COST BREAKDOWN</u>                                  | .1  | Within 48 hours of notification of acceptance<br>of bid furnish a cost breakdown by Section<br>aggregating Contract Amount.   |    |                              |    |   |
|   | .2  | Within 48 hours of acceptance of bid submit a<br>list of subcontractors.  |    |                              |    |   |
| <u>1.24 SCHEDULING</u>                                      | .1  | On award of contract submit bar chart<br>construction schedule for work, indicating<br>anticipated progress stages within time of<br>completion. When schedule has been reviewed by<br>the Departmental Representative take necessary<br>measures to complete work within scheduled time.<br>Do not change schedule without notifying<br>Departmental Representative. |    |                              |    |   |
|   | .2  | Carry out work Monday to Friday from 08:00 to<br>17:00 hours and on Saturdays, Sundays and<br>statutory holidays.   |    |                              |    |   |
| <u>1.25 CLEANING</u>  | .1  | Maintain project free of accumulated waste and<br>rubbish.  |    |                              |    |   |
|   | .2  | Final cleaning: <table> <tr> <td>.1</td> <td>Remove temporary protection.</td> </tr> <tr> <td>.2</td> <td>Broom clean paved exterior surfaces, rake<br/>clean other exterior surfaces.</td> </tr> </table>  | .1 | Remove temporary protection. | .2 | Broom clean paved exterior surfaces, rake<br>clean other exterior surfaces. |
| .1  | Remove temporary protection.  |   |    |                              |    |   |
| .2  | Broom clean paved exterior surfaces, rake<br>clean other exterior surfaces. |   |    |                              |    |   |
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1.26 DESIGNATED  
SUBSTANCES .1 The work area has been surveyed for the  
presence of designated substances referred to in  
the Occupational Health and Safety Act and  
Regulations for Construction Projects, O.Reg.  
213/91 as amended.

1.27 SPECIAL  
PROTECTION AND  
PRECAUTIONS .1 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  
acceptable to HRSDC - Labour Program.

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

## PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

## PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

## PART 1 - GENERAL

### 1.1 REFERENCES

- .1 Canadian Standards Association (CSA): Canada
  - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
- .2 National Building Code 2010 (NBC):
  - .1 NBC 2010, Division B, Part 8 Safety Measures at Construction and Demolition Sites.
- .3 National Fire Code 2010 (NFC):
  - .1 NFC 2010, Division B, Part 5 Hazardous Processes and Operations, subsection 5.6.1.3 Fire Safety Plan.
- .4 Province of Ontario:
  - .1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.
  - .2 O. Reg. 490/09, Designated Substances.
  - .3 Workplace Safety and Insurance Act, 1997.
  - .4 Municipal statutes and authorities.
- .5 Treasury Board of Canada Secretariat (TBS):
  - .1 Treasury Board, Fire Protection Standard April 1, 2010 [www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=17316&section=text](http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=17316&section=text).

### 1.2 SUBMITTALS

- .1 Make submittals in accordance with Section 01 11 01.
  - .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
    - .1 Results of site specific safety hazard assessment.
    - .2 Results of safety and health risk or hazard analysis for site tasks and operations found in work plan.
    - .3 Measures and controls to be implemented to address identified safety hazards and risks.
    - .4 Provide a Fire Safety Plan, specific to the work location, in accordance with NBC, Division B, Article 8.1.1.3 prior to commencement of work. Deliver two copies of the Fire Safety Plan to the Departmental
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1.2 SUBMITTALS  
(Cont'd)

- .2 (Cont'd)
- .4 (Cont'd)
- Representative not later than 14 days before commencing work.
- .5 Contractor's and Sub-contractors' Safety Communication Plan.
- .6 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. Coordinate plan with existing Emergency Response requirements and procedures provided by Departmental Representative.
- .3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 7 days after receipt of comments from Departmental Representative.
- .4 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .5 Submit names of personnel and alternates responsible for site safety and health.
- .6 Submit records of Contractor's Health and Safety meetings when requested.
- .7 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, bi-weekly.
- .8 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.
- .9 Submit copies of incident and accident reports.
- .10 Submit Material Safety Data Sheets (MSDS).
- .11 Submit Workplace Safety and Insurance Board (WSIB)- Experience Rating Report.

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| <u>1.3 FILING OF<br/>NOTICE</u>        | .1 | File Notice of Project with Provincial<br>authorities prior to commencement of Work.  |
| <u>1.4 WORK PERMIT</u>                 | .1 | Obtain building permits related to project<br>prior to commencement of Work.  |
| <u>1.5 SAFETY<br/>ASSESSMENT</u>       | .1 | Perform site specific safety hazard assessment<br>related to project.   |
| <u>1.6 MEETINGS</u>                    | .1 | Schedule and administer Health and Safety<br>meeting with Departmental Representative prior<br>to commencement of Work.   |
| <u>1.7 REGULATORY<br/>REQUIREMENTS</u> | .1 | Comply with the Acts and regulations of the<br>Province of Ontario.   |
|  | .2 | Comply with specified standards and regulations<br>to ensure safe operations at site.   |
| <u>1.8 GENERAL<br/>REQUIREMENTS</u>    | .1 | Develop written site-specific Health and Safety<br>Plan based on hazard assessment prior to<br>beginning site Work and continue to implement,<br>maintain, and enforce plan until final<br>demobilization from site. Health and Safety Plan<br>must address project specifications. |
|  | .2 | Departmental Representative may respond in<br>writing, where deficiencies or concerns are<br>noted and may request re-submission with<br>correction of deficiencies or concerns either<br>accepting or requesting improvements.   |
|  | .3 | Relief from or substitution for any portion or<br>provision of minimum Health and Safety standards<br>specified herein or reviewed site-specific<br>Health and Safety Plan shall be submitted to<br>Departmental Representative in writing.   |
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1.9 COMPLIANCE REQUIREMENTS .1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990 Chapter 0.1, as amended.

1.10 RESPONSIBILITY .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

.3 Where applicable the Contractor shall be designated "Constructor", as defined by Occupational Health and Safety Act for the Province of Ontario.

1.11 UNFORSEEN HAZARDS .1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing.

.2 Follow procedures in place for Employees Right to Refuse Work as specified in the Occupational Health and Safety Act for the Province of Ontario.

1.12 HEALTH AND SAFETY CO-ORDINATOR .1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

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

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

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

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| 1.12 HEALTH AND<br>SAFETY CO-ORDINATOR<br>(Cont'd) | .1 | (Cont'd)<br>.4 Be on site during execution of Work and report directly to and be under direction of Registered Occupational Hygienist and or site supervisor.   |
| 1.13 POSTING OF<br>DOCUMENTS                       | .1 | Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with Departmental Representative.<br>.1 Contractor's Safety Policy.<br>.2 Constructor's Name.<br>.3 Notice of Project.<br>.4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).<br>.5 Ministry of Labour Orders and reports.<br>.6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.<br>.7 Address and phone number of nearest Ministry of Labour office.<br>.8 Material Safety Data Sheets.<br>.9 Written Emergency Response Plan.<br>.10 Site Specific Safety Plan.<br>.11 Valid certificate of first aider on duty.<br>.12 WSIB "In Case of Injury At Work" poster.<br>.13 Location of portable toilet and cleanup facilities. |
| 1.14 CORRECTION OF<br>NON-COMPLIANCE               | .1 | Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.  |
|  | .2 | Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.   |
|  | .3 | Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.  |
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- 1.15 BLASTING .1 Blasting or other use of explosives is not permitted.
- 1.16 POWDER ACTUATED DEVICES .1 Use powder actuated devices only after receipt of written permission from Departmental Representative.
- 1.17 PROJECT/SITE CONDITIONS .1 Work at site will involve contact with:  
.1 Silica in concrete.  
.2 Guano.  
.3 Near water.
- 1.18 WORK STOPPAGE .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.  
.2 Assign responsibility and obligation to Competent Supervisor to stop or start Work when, at Competent Supervisor's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.

PART 2 - PRODUCTS

- 2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

- 3.1 NOT USED .1 Not used.

PART 1 - GENERAL

- 1.1 DEFINITIONS
- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
  - .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.
- 1.2 SUBMITTALS
- .1 Product data: Submit 2 copies of WHMIS MSDS.
  - .2 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.
  - .3 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.
  - .4 Address topics at level of detail commensurate with environmental issue and required construction tasks.
  - .5 Include in Environmental Protection Plan:
    - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
    - .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
    - .3 Names and qualifications of persons responsible for training site personnel.
    - .4 Descriptions of environmental protection personnel training program.
    - .5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal,
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1.2 SUBMITTALS  
(Cont'd)

.5

(Cont'd)

.5 (Cont'd)

Provincial, and Municipal laws. and regulations and EPA 832/R-92-005, Chapter 3.

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

.7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.

.1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.

.1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.

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

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

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

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

.13 Waste Water Management Plan identifying methods and procedures for management and discharge of waste waters which are directly derived from construction activities.

.14 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

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| <u>1.3 FIRES</u>                                      | .1 | Fires and burning of rubbish on site is not permitted.   |
| <br>  |    |  |
| <u>1.4 DRAINAGE</u>                                   | .1 | Develop and submit erosion and Sediment Control Plan (ESC) identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws. |
|   | .2 | Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.   |
|   | .3 | Provide temporary drainage and pumping required to keep excavations and site free from water.  |
|   | .4 | Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.  |
|   | .5 | Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.  |
| <br>  |    |  |
| <u>1.5 SITE CLEARING<br/>AND PLANT<br/>PROTECTION</u> | .1 | Protect trees and plants on site and adjacent properties as indicated.   |
|   | .2 | Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.   |
|   | .3 | Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.<br>.1 Avoid unnecessary traffic, dumping and storage of materials over root zones.  |
|   | .4 | Minimize stripping of topsoil and vegetation.  |
|   | .5 | Restrict tree removal to areas or designated by Departmental Representative.   |
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1.6 WORK ADJACENT  
TO WATERWAYS

- .1 Construction equipment to be operated on land only.
- .2 Use waterway beds for borrow material is not permitted
- .3 Waterways to be kept free of excavated fill, waste material and debris.
- .4 Do not skid logs or construction materials across waterways.
- .5 Avoid constructing temporary crossings of waterways.
- .6 Blasting is not allowed for his project.

1.7 POLLUTION  
CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- .5 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.

1.8 NOTIFICATION

- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform Departmental Representative of proposed

- 1.8 NOTIFICATION (Cont'd)
- .2 Contractor:(Cont'd)  
corrective action and take such action for approval by Departmental Representative.  
.1 Take action only after receipt of written approval by Departmental Representative.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

PART 2 - PRODUCTS

- 2.1 NOT USED
- .1 Not Used.

PART 3 - EXECUTION

- 3.1 CLEANING
- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Bury rubbish and waste materials on site where directed after receipt of written approval from Departmental Representative.
- .3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.
- .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .5 Waste Management: separate waste materials for reuse and recycling.  
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

PART 1 - GENERAL

1.1 REFERENCES

- .1 ASTM International (ASTM):
  - .1 ASTM A497/A497M-07, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
  - .2 ASTM D260-86(2001), Standard Specification for Boiled Linseed Oil.
  - .3 ASTM D1751-04(2008), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types).
  - .4 ASTM A1060/A1060M-11e1, Standard Specification for Zinc-Coated (Galvanized) Steel Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- .2 Canadian General Standards Board (CGSB):
  - .1 CAN/CGSB-19.24-M90, Multicomponent, Chemical-Curing Sealing Compound.
- .3 CSA International (CSA):
  - .1 CSA A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
  - .3 CSA G30.18-09, Carbon Steel Bars for Concrete Reinforcement.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 11 01.
- .2 Shop Drawings for concrete work:
  - .1 Submit placing drawings prepared in accordance with plans to clearly show size, shape, location and necessary details of reinforcing.
  - .2 Submit drawings showing formwork and falsework design to: CSA A23.1/A23.2.
  - .3 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
- .3 At least 4 weeks prior to beginning Work, submit to Departmental Representative samples of

1.2 ACTION AND  
INFORMATIONAL  
SUBMITTALS  
(Cont'd)

- .3 (Cont'd)  
following materials proposed for use: curing compound.
- .4 Provide testing inspection results and reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.

1.3 QUALITY  
ASSURANCE

- .1 Provide to Departmental Representative, 4 weeks minimum prior to starting concrete work, valid and recognized certificate from plant delivering concrete.
  - .1 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements.
  - .2 Sustainability Standards Certification:
    - .1 Construction Waste Management: provide copy of plan.
    - .2 Recycled Content:
      - .1 Provide listing of recycled content products used.
      - .2 When Supplementary Cementing Materials (SCMs) are used, provide evidence to certify reduction in cement from Base Mix to Actual SCMs Mix, as percentage.
- .2 Submit in accordance with Section 1 11 01 and as described in PART 2 - SOURCE QUALITY CONTROL.
  - .1 Mill Test Report: upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.
  - .2 Upon request submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

1.4 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Delivery and Acceptance Requirements:
  - .1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
    - .1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and



- 1.4 DELIVERY,  
STORAGE AND  
HANDLING  
(Cont'd)
- .1 (Cont'd)  
.1 (Cont'd)  
.1 (Cont'd)  
concrete producer as described in CSA  
A23.1/A23.2.  
.2 Deviations to be submitted for review  
by the Departmental Representative.
- .2 Concrete delivery: ensure continuous concrete  
delivery from plant meets CSA A23.1/A23.2.
- .3 Packaging Waste Management: remove for reuse  
and return by manufacturer of pallets, crates,  
padding, and packaging materials in accordance  
with Section 01 11 01.

## PART 2 - PRODUCTS

- 2.1 DESIGN CRITERIA .1 Alternative 1: to CSA A23.1/A23.2, and as  
described in MIXES of PART 2 - PRODUCTS.
- 2.2 PERFORMANCE  
CRITERIA .1 Quality Control Plan: ensure concrete supplier  
meets performance criteria of concrete as  
established by Departmental Representative and  
provide verification of compliance as described  
in PART 1 - QUALITY ASSURANCE.
- 2.3 MATERIALS .1 Cement: to CSA A3001, Type GU. Reduction in  
cement from Base Mix to Actual Supplementary  
Cementing Materials (SCMs) Mix, as percentage.
- .2 Water: to CSA A23.1/A23.2.
- .3 Reinforcing steel: weldable low alloy steel  
deformed bars to CSA G30.18, Grade 400, minimum  
30% recycled content.
- .4 Welded steel wire fabric: to ASTM A1060/A1060M  
or ASTM A497/A497M, flat sheets only, minimum  
30% recycled content.
- .5 Chairs, bolsters, bar supports, spacers: to CSA  
A23.1/A23.2.

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|---------------------------|--|
| 2.3 MATERIALS<br>(Cont'd) | .6 Plain round bars: to CSA G40.20/G40.21, minimum 30% recycled content.   |
|                           | .7 Joint sealer/filler: grey to CAN/CGSB-19.24, Type 1, Class B.   |
|                           | .8 Sealer: proprietary poly-siloxane resin blend.  |
|                           | .9 Steel sections, plates and hollow structural sections: to CSA G40.20/G40.21, Grade 350W, minimum 30% recycled content, minimum thickness 8.0 mm.  |
|                           | .10 Paint: <ul style="list-style-type: none"> <li>.1 Primer: MPI EXT 5.1G, zinc rich epoxy primer. Maximum MPI E2 rating on VOC.</li> <li>.2 Epoxy: MPI EXT 5.1G, high build epoxy. Maximum MPI E2 rating on VOC.</li> <li>.3 Polyurethane: MPI EXT 5.1G, aliphatic polyurethane. Maximum MPI E2 rating on VOC.</li> <li>.4 Colour: Traffic yellow.</li> <li>.5 Material for sandblasting: to SSPC steel structures painting council.</li> </ul> |
| 2.4 FABRICATION           | .1 Fabricate reinforcing steel in accordance with CSA A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.  |
|                           | .2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.  |
|                           | .3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.   |
|                           | .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.   |
| 2.5 MIXES                 | .1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2. <ul style="list-style-type: none"> <li>.1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as described in PART 3 - VERIFICATION.</li> </ul>  |
-

- 2.5 MIXES  
(Cont'd)
- .1 (Cont'd)
  - .2 Provide concrete mix to meet following plastic state requirements:
    - .1 Uniformity: To Table 13, CSA 23.1/A23.2.
    - .2 Workability: free of surface blemishes loss of mortar colour variations segregation.
  - .3 Provide concrete mix to meet following hard state requirements:
    - .1 Durability and class of exposure: C-1.
    - .2 Compressive strength at 28 days: 35 MPa minimum.
    - .3 Intended application:.
    - .4 Aggregate size 19 mm maximum.
  - .4 Concrete supplier's certification.
  - .5 Provide quality management plan to ensure verification of concrete quality to specified performance.

### PART 3 - EXECUTION

- 3.1 PREPARATION
- .1 Provide Departmental Representative 24 hours notice before each concrete pour.
  - .2 Place concrete reinforcing.
  - .3 During concreting operations:
    - .1 Development of cold joints not allowed.
    - .2 Ensure concrete delivery and handling facilitates placing with minimum of rehandling, and without damage to existing structure or Work.
  - .4 New metal surfaces for painting:
    - .1 Clean urfaces of new metal to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and foreign in accordance with the following: Commercial blast cleaning: to SSPC-SP 6.
  - .5 Clean and remove stains prior to application of concrete finishes.

- 
- 3.2 FIELD BENDING .1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.
- .2 When field bending is authorized, bend without heat, applying slow and steady pressure.
- .3 Replace bars, which develop cracks or splits.
- 3.3 PLACING REINFORCEMENT .1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA A23.1/A23.2.
- .2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .3 Ensure cover to reinforcement is maintained during concrete pour.
- .4 Sleeves and inserts:  
.1 Cast in sleeves, ties, slots, anchors, reinforcement, frames, conduit, bolts, waterstops, joint fillers and other inserts required to be built-in.  
.2 Sleeves and openings greater than 100 mm x 100 mm not indicated, must be reviewed by Departmental Representative.
- 3.4 FINISHES .1 Formed surfaces exposed to view: sack rubbed finish in accordance with CSA A23.1/A23.2.
- .2 Equipment pads: provide smooth trowelled surface.
- .3 Exposed site concrete:  
.1 Provide round edges and joint spacings using standard tools.  
.2 Trowel smooth to provide lightly brushed non-slip finish.
- 3.5 CURING .1 Use curing compounds compatible with applied finish on concrete surfaces free of bonding agents and to CSA A23.1/A23.2.
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- 3.6 SEALING APPLICATION .1 After curing is complete, apply two even coats of linseed oil mixture to clean dry surfaces, each at 8 m<sup>2</sup> /L. Allow first coat to dry before applying second coat apply poly-siloxane resin blend sealer at 4 m<sup>2</sup> /L.
- 3.7 SITE TOLERANCES .1 Concrete floor slab finishing tolerance to CSA A23.1/A23.2.
- 3.8 FIELD QUALITY CONTROL .1 Concrete testing: to CSA A23.1/A23.2 by testing laboratory designated and paid for by Departmental Representative. Accelerated test methods will apply.
- 3.9 PAINTING .1 Clean surfaces of new metal to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and foreign substances in accordance with the following:  
.1 Commercial blast cleaning: to SSPC-SP6.  
.2 Number of paint coats: 3.  
.1 Shop: 1 primer coat to minimum dry film thickness of 75 microns per coat.  
.2 Shop: 1 epoxy coat to minimum dry film thickness of 125 microns per coat.  
.3 Shop: 1 polyurethane coat to minimum dry film thickness of 75 microns per coat.  
.3 Shop painting:  
.1 Shop paint after fabrication and before damage to surface occurs from weather or other exposure.  
.2 Spray paint contact surfaces of field assembled with prime coat. Do not brush primer after spraying.  
.3 Do not paint metal surfaces which are to be embedded in concrete.
- 3.10 CLEANING .1 Clean in accordance with Section 01 11 01.  
.2 Use trigger operated spray nozzles for water hoses.
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|---------------------------|----|--|
| 3.10 CLEANING<br>(Cont'd) | .3 | Designate cleaning area for tools to limit water use and runoff.               |
|                           | .4 | Cleaning of concrete equipment to be done in accordance with Section 01 35 43. |

## PART 1 - GENERAL

- |                                |    |   |
|--------------------------------|----|---|
| <u>1.1 REFERENCES</u>          | .1 | Canadian Standards Association (CSA International)<br>.1 CSA-C22.1-12, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.<br>.2 CAN3-C235-83(R2010), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.  |
|                                | .2 | Health Canada / Workplace Hazardous Materials Information System (WHMIS)<br>.1 Material Safety Data Sheets (MSDS).  |
|                                | .3 | The Ontario Electrical Safety Code 2012, and all bulletins (Ontario).   |
|                                | .4 | Electrical Safety Authority (ESA) requirements and local applicable codes and regulations.  |
| <u>1.2 DESIGN REQUIREMENTS</u> | .1 | Operating voltages: to CAN3-C235.   |
|                                | .2 | Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.<br>.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment. |
|                                | .3 | Language operating requirements: provide identification nameplates and labels for control items in English.   |
| <u>1.3 SUBMITTALS</u>          | .1 | Submittals: in accordance with Section 01 11 01.  |
|                                | .2 | Product Data: submit WHMIS MSDS.  |
|                                | .3 | Shop drawings:<br>.1 Submit drawings.<br>.2 Submit 6 number of copies of 600 x 600 mm minimum size drawings and product data to authority having jurisdiction.  |
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1.3 SUBMITTALS  
(Cont'd)

- .3 Shop drawings:(Cont'd)
  - .3 If changes are required, notify Departmental Representative of these changes before they are made.
- .4 Quality Control: in accordance with Section 01 11 01.
  - .1 Provide CSA certified equipment and material.
  - .2 Where CSA certified equipment and material is not available, submit such equipment and material to authority having jurisdiction for special approval before delivery to site.
  - .3 Submit test results of installed electrical systems and instrumentation.
  - .4 Permits and fees: in accordance with General Conditions of contract. Pay associated fees. Departmental Representative will provide drawings and specifications required by Electrical Inspection Department and Supply Authority at no cost.
  - .5 Submit certificate of acceptance from Electrical Safety Authority having jurisdiction upon completion of Work to Departmental Representative.

1.4 QUALITY  
ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 11 01.
- .2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices as per the conditions of Provincial Act respecting manpower vocational training and qualification.
  - .1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
  - .2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.
- .3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.



1.5 DELIVERY,  
STORAGE AND  
HANDLING .1 Material Delivery Schedule: provide  
Departmental Representative with schedule within  
two weeks after award of Contract.

.2 Construction/Demolition Waste Management and  
Disposal: separate waste materials for reuse and  
recycling in accordance with Section 01 11 01.

1.6 SYSTEM STARTUP .1 Instruct Departmental Representative and  
operating personnel in operation, care and  
maintenance of systems, system equipment and  
components.

## PART 2 - PRODUCTS

2.1 MATERIALS AND  
EQUIPMENT .1 Provide material and equipment in accordance  
with Section 01 11 01.

.2 Material and equipment to be CSA certified.  
Where CSA certified material and equipment are  
not available, obtain special approval from  
authority having jurisdiction before delivery to  
site and submit such approval as described in  
PART 1 - Submittals.

.3 Factory assemble control panels and component  
assemblies.

2.2 WARNING SIGNS .1 Warning signs: in accordance with requirements  
of authority having jurisdiction.

.2 Porcelain enamel signs: minimum size 175 x  
250 mm.

2.3 WIRING  
TERMINATIONS .1 Ensure lugs, terminals, screws used for  
termination of wiring are suitable for either  
copper or aluminum conductors.

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2.4 EQUIPMENT  
IDENTIFICATION

- .1 Identify electrical equipment with nameplates and labels as follows:
- .1 Nameplates: plastic laminate 3 mm thick plastic engraving sheet, matt white finish face, black core, mechanically attached with self tapping screws.
- .2 Sizes as follows:

NAMEPLATE SIZES

Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

- .2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
- .3 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.
- .4 Allow for minimum of twenty-five (25) letters per nameplate and label.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY No. " as directed by Departmental Representative.
- .7 Manual transfer: indicate equipment being controlled and voltage.
- .8 Terminal cabinets and pull boxes: indicate system and voltage.

- 2.5 WIRING IDENTIFICATION
- .1 Identify wiring with permanent indelible identifying markings, coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
  - .2 Maintain phase sequence and colour coding throughout.
  - .3 Colour coding: to CSA-C22.1.
  - .4 Use colour coded wires in communication cables, matched throughout system.

- 2.6 CONDUIT AND CABLE IDENTIFICATION
- .1 Colour code conduits, boxes and metallic sheathed cables.
  - .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
  - .3 Colours: 25 mm wide prime colour and 20mm wide auxiliary colour.
 

Prime	Auxiliary	
up to 250 V	Yellow	
up to 600 V	Yellow	Green

- 2.7 FINISHES
- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
    - .1 Paint indoor distribution enclosures light gray.

- 2.8 DISTRIBUTION SYSTEM
- .1 347/600V, 3 phase, 4W, 60 Hz.

- 2.9 WIRING SYSTEM
- .1 Power and lighting circuits in EMT with drawn-in conductors.
  - .2 Use heavy wall rigid conduit for service entrance and where required by codes.
-

- 2.9 WIRING SYSTEM  
(Cont'd)
- .3 RWU-90, XLPE insulated wire and control cables as indicated.
  - .4 #12 AWG minimum wire size, #10 AWG or larger shall be stranded.
  - .5 Copper conductors.
  - .6 Provide insulated green ground conductor in conduits.
  - .7 Provide nylon insulated bushings on the ends of all conduits in junction boxes, pullboxes, panelboards, etc.
  - .8 PVC duct in trench.
- 2.10 GROUNDING
- .1 Ground service entrance and equipment with approved conductors and connectors.
  - .2 Make tests required by code and authorities having jurisdiction.

## PART 1 - GENERAL

1.1 SECTION INCLUDES .1 Power generator sets to 40kW rating.

1.2 REFERENCES .1 American Petroleum Institute (API)  
.1 API 650-2007, Welded Steel Tanks for Oil Storage Eleventh Edition.

.2 American National Standards Institute (ANSI)/National Electrical Manufacturers' Association (NEMA)  
.1 ANSI/NEMA MG1-2006, Motors and Generators.

.3 International Organization for Standardization (ISO)  
.1 ISO 3046-1-2002, Reciprocating Internal Combustion Engines - Performance - Part 1: Declarations of Power, Fuel and Lubricating Oil Consumptions, and Test Methods.

.4 Underwriters' Laboratories of Canada (ULC)  
.1 ULC-S601-00, Standard for Shop Fabricated Steel Aboveground Horizontal Tanks for Flammable and Combustible Liquids.  
.2 CAN/ULC-S603-00, Standard for Steel Underground Tanks for Flammable and Combustible Liquids.

1.3 SYSTEM DESCRIPTION .1 Generator set consists of:  
.1 Engine.  
.2 Alternator.  
.3 Control cubicle.  
.4 Manual transfer switch.  
.5 Fuel system.  
.6 Engine exhaust system.  
.7 Mounting base.  
.8 Generator main breaker.  
.9 Separate terminal for load bank test.

.2 Set designed for standby service.

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- 1.4 SHOP DRAWINGS .1 Submit shop drawings.
- .2 Include:
- .1 Dimensioned drawing of set including engine, alternator, control cubicle, exhaust system, fuel system and accessories.
  - .2 Line diagram showing alternator, control cubicle, voltage regulator, battery, battery charger, governor specifications.
  - .3 Diagram for automatic engine ventilation.
  - .4 Flow diagrams for:
    - .1 Fuel.
    - .2 Lubricating oil.
    - .3 Cooling air.
  - .5 Continuous full load output at 0.8 power factor lagging.
  - .6 Type and make of governor.
  - .7 British standard or DIN rating of engine.
  - .8 Set operation:
    - .1 Manual starting.
    - .2 Automatic shut down on over cranking, overspeed, high engine temperature, low lube oil pressure, short circuit and alternator over voltage.
- 1.5 CLOSEOUT SUBMITTALS .1 Provide data for incorporation into maintenance manual. Ensure that information is for unit supplied and not general description of units manufactured.
- .2 Operation and maintenance instructions for engine, alternator, control panel, manual transfer switch, battery charger, fuel system and accessories to permit effective operation, maintenance and repair.
- .3 Technical data:
  - .1 Illustrated parts lists with parts numbers.
  - .2 Schematic diagram of electrical controls.
  - .3 Flow diagrams for fuel, lube oil and cooling air.
-

1.6 WASTE  
MANAGEMENT AND  
DISPOSAL

- .1 Separate and recycle waste materials.
  - .1 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Divert unused batteries from landfill to battery recycling facility approved by Departmental Representative.
- .6 Divert unused lubricating oil materials from landfill to oil recycling facility approved by Departmental Representative.
- .7 Divert unused antifreeze from landfill to antifreeze recycling facility approved by Departmental Representative.
- .8 Fold up metal banding, flatten and place in designated area for recycling.

1.7 WARRANTY

- .1 For the Work of this Section 12 month warranty period prescribed in subsection GC 3.13 of General Conditions is extended to 60 months or 1500 operating hours, whichever ever occurs first.

1.8 EXTRA MATERIALS

- .1 Provide maintenance materials in accordance with Section 01 11 01.
- .2 Include:
  - .1 Five fuel filter replacement elements.
  - .2 Five lube oil filter replacement elements.
  - .3 Five air cleaner filter elements.
  - .4 Special tools for unit servicing.

## PART 2 - PRODUCTS

- 2.1 GENERATING SET .1 Capacity:
- .1 Total output of engine in hp (brake) = British standard rating as defined to ISO 3046-1 expressed in hp (brake), minus the sum of the following:
    - .1 Power to drive cooling fan.
    - .2 Power loss for site conditions.
  - .2 Site conditions; derate for:
    - .1 Ambient temp: 40 degrees C.
    - .2 Relative humidity: 60%.
  - .3 Generator rating in kW x 1.34 divided by generator efficiency.
- .2 Enclosure:
- .1 Weather protected, steel.
  - .2 Sound attenuation to less than 69 db.
  - .3 Door alarm switch.
- .3 Engine: to to ISO 3046-1, diesel 4 cycle, operating speed 1800 r/min, liquid cooled:
- .1 Liquid cooled: radiator with engine driven fan and ethylene glycol anti-freeze non-sludging above -46 degrees C.
  - .2 Block heater: liquid coolant heater, 120 VAC.
  - .3 Starting system:
    - .1 12 V dc motor, remote control, 12 V lead-acid storage battery of sufficient capacity to crank engine for 3 min at 0 degrees C without using more than 25% battery capacity.
    - .2 Battery charger: battery charging alternator.
  - .4 Governor:
    - .1 Electronic type, conforming to latest US EPA emission requirements and having EPA tier rating for its size in HP.
  - .5 Instruments: digitally displayed.
    - .1 Lube oil pressure.
    - .2 Lube oil cooling temperature.
  - .6 Fuel rack solenoid energized when engine running.
- .4 Alternator: to NEMA MG1, single bearing, revolving field, coupled to engine by means of semi-flexible coupling and SAE housing, drip



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- 2.1 GENERATING SET (Cont'd)
- .4 Alternator: (Cont'd)  
proof, amortisseur windings, synchronous type,  
class H insulation with:
    - .1 Brushless exciter, direct driven.
    - .2 Voltage regulator: solid state with series  
boost option.
    - .3 Output:
      - .1 50 kVA at 0.8 pf, 3 phase, 600 V, 4  
wire, 60 Hz.
      - .2 100% full load continuously at 40  
degrees C ambient.
  - .5 Generator main breaker: 600V, 60A, 3P.
  - .6 Separate terminals for full load, load bank  
test completed with a separate 600V, 60A, 3P  
breaker.
- 2.2 CONTROL PANEL
- .1 Totally enclosed, mounted on stand straddling  
generator.
  - .2 Panel door with formed edges and lockable  
handle with 2 keys.
  - .3 Flexible conductors between door and fixed  
panel.
  - .4 Instruments: digitally displayed ac ammeter, ac  
voltmeter, ac wattmeter, frequency meter, engine  
and running time meter.
  - .5 Controls:
    - .1 Engine start and emergency stop buttons,  
test button, alternator output moulded case  
circuit breaker, program selector switch, power  
transfer switch, digital voltage regulator,  
"normal power" and "emergency power" pilot  
lights.
  - .6 Automatic shut-down and alarms:
    - .1 Engine overcrank, overspeed, high temp,  
low lube oil pressure, short circuit, low  
battery voltage to alarm only, and alternator  
overvoltage.
    - .2 Alarms to be illuminated drop type  
annunciator, manual reset and set of NC/NO  
contacts be provided wired to terminal block for  
future connection to remote annunciator.
-

- 2.3 GENERATING SET OPERATION
- .1 Program selector switch set at "Manual".
    - .1 Start button controls engine but automatic transfer of load prevented.
    - .2 Manual transfer possible.
  - .2 Program selector switch set at "OFF".
    - .1 Engine will not start.
    - .2 Switch lockable in this position.

- 2.4 EXHAUST SYSTEM
- .1 Heavy duty, critical garade type, horizontally mounted exhaust silencer with condensate drain, plug and flanged couplings.
  - .2 Heavy duty flexible exhaust hose with flanged couplings as indicated.
  - .3 Expansion joints, stainless steel, corrugated, of suitable length to absorb both vertical and horizontal expansion.

- 2.5 MANUAL TRANSFER SWITCH
- .1 Heavy duty, quick-make, quick-break, double throw.
  - .2 Enclosure: CSA type 1.
  - .3 600V, 200A, 3 phases, 3poles, solid neutral.
  - .4 Dimension: 950mm(H)x500mm(W)x300mm(D).
  - .5 Completed with N.O. contact.
  - .6 Normal operation: connected to local utility.

- 2.6 FUEL SYSTEM
- .1 Fuel storage tanks: to ANSI/API 650, ULC labelled:
    - .1 Above ground tank: to UL C-S601.
    - .2 Below diesel generator set.
  - .2 Fuel tank: subbase to TSSA approval, double wall, 200 L mounted outdoors.
  - .3 Fuel level gauge integral and vent alarm.
  - .4 Drain and end plug.
-

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|------------------------------|----|--|
| 2.6 FUEL SYSTEM<br>(Cont'd)  | .5 | Black iron feed and return lines with flexible terminations at engine, shut-off cock renewable cartridge filter and fire valve.  |
|                              | .6 | Isolating valves on fuel lines serving auxiliaries.  |
|                              | .7 | Electrically driven fuel transfer pump.  |
|                              | .8 | Fuel level switch.   |
| 2.7 EQUIPMENT IDENTIFICATION | .1 | Provide equipment identification in accordance with Section 26 05 01.  |
|                              | .2 | Controls: size 4 nameplates.   |
|                              | .3 | Meters, alarms, indicating lights: size 2 nameplates.  |
| 2.8 SOURCE QUALITY CONTROL   | .1 | Complete generator set factory tested.   |
|                              | .2 | Tests: <ul style="list-style-type: none"> <li>.1 4 hour test at 100% rated load.</li> <li>.2 Automatic shut down devices on trouble alarms.</li> <li>.3 Battery charger's ability to revert to high rate charge after cranking.</li> </ul> |
|                              | .3 | Submit certified copy of test results to Departmental Representative before shipment to site.  |

### PART 3 - EXECUTION

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|------------------|----|---|
| 3.1 INSTALLATION | .1 | Position generating set and install as indicated.           |
|                  | .2 | Complete wiring and interconnections as indicated.          |
|                  | .3 | Start generating set and test to ensure proper performance. |
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3.2 FIELD QUALITY  
CONTROL

- .1 Perform tests in accordance with Section 26 05 01 and to CSA C282-09, Clause 10 Initial Installation Performance Tests.
- .2 Notify Departmental Representative 10 working days in advance of test date.
- .3 Demonstrate:
  - .1 Manual start, transfer, retransfer and shut down.
  - .2 Operation of automatic shut-down devices and alarms.
- .4 Run unit on load for 24 hours to show load carrying ability, stability of voltage and frequency and satisfactory performance of engine ventilation system to provide adequate engine cooling.

## PART 1 - GENERAL

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| <u>1.1 RELATED SECTIONS</u> | .1 | Section 32 32 19: Geotextile.  |
|                             | .2 | Section 03 33 00: Cast-in-Place Concrete.  |
| <u>1.2 UTILITY LINES</u>    | .1 | Before commencing work, establish location and extent of underground utility lines in area of excavation. Notify Departmental Representative of findings.                          |
|                             | .2 | Known underground and surface utility lines are indicated.   |
|                             | .3 | Record locations of maintained, re-routed and abandoned underground utility lines.   |
|                             | .4 | Make good damage to existing utility lines resulting from work.  |
| <u>1.3 PROTECTION</u>       | .1 | Protect excavated earth from freezing by approved method.  |
|                             | .2 | Grade around excavations to prevent surface water runoff into excavated area.  |
|                             | .3 | Protect bottoms of excavations from weather. Should softening in bottoms occur due to water or other causes, remove softened soil and replace with concrete at no additional cost. |

## PART 2 - PRODUCTS

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|----------------------|----|---|
| <u>2.1 MATERIALS</u> | .1 | Granular material: to Ontario Provincial Standard Specification 1010, April 2004 for Granular A and B Aggregate. Granular A, maximum size aggregate 13.2 mm. Granular B maximum size aggregate 26.5 mm. |
|                      | .2 | Sand: clean, washed, minimum 100% passing a 4.75 mm sieve, maximum 5% passing a 0.075 mm sieve.   |
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| 2.1 MATERIALS<br>(Cont'd) | .3 | Native fill: excavated soil, free from roots, rocks larger than 75 mm and debris. Departmental Representative to approve excavated material before use as fill. |
|                           | .4 | Geotextile: refer to section 31 32 19.  |
|                           | .5 | Asphalt base course: to Ontario Provincial Standard Specification OPSS 1150, November 2008 for type HL8. Maximum size aggregate 19.0 mm.                        |
|                           | .6 | Asphalt surface course: to Ontario Provincial Standard Specification OPSS 1150, November 2008 for type HL4. Maximum size aggregate 9.5 mm.                      |

### PART 3 - EXECUTION

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| 3.1 STOCKPILING | .1 | Stockpile fill materials in areas designated by Departmental Representative. Stockpile granular materials in manner to prevent segregation.  |
| 3.2 DEWATERING  | .1 | Provide pumps and other equipment and materials necessary to keep excavations free of water while work is in progress.   |
|                 | .2 | Do not pump during placing of concrete, or for a period of at least 24 hours thereafter, unless from a pump separated from concrete work by means of watertight wall or other effective means.   |
|                 | .3 | Dispose of water in such a manner as not to be detrimental to public health, environment, public and private property, or any portion of work completed or under construction.   |
|                 | .4 | Protect open excavations against flooding and damage due to surface run-off.   |
|                 | .5 | When conditions are encountered which render it impracticable to dewater excavations before placing concrete, Departmental Representative may order additional excavation and placing underwater of a concrete seal of such dimensions as may be necessary to resist any possible uplift. Do not commence pumping until seal has |
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<u>3.2 DEWATERING</u> (Cont'd)	.5	(Cont'd) set sufficiently to withstand hydrostatic pressures.
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<u>3.3 EXCAVATING</u>	.1	Excavate to elevations and dimensions as indicated or required for construction of work.
	.2	Make excavation to clean lines to minimize quantity of fill material required.
	.3	Earth bottoms of excavations to be dry undisturbed soil, reasonably level, free from loose or organic matter.
	.4	When complete have Departmental Representative inspect excavations to verify depths and dimensions.
	.5	Correct unauthorized excavation at no extra cost as follows: .1 Fill areas with Granular fill compacted to 100% Standard Proctor Density.
	.6	Dispose of surplus excavated material off site.

<u>3.4 BACKFILLING</u>	.1	Do not commence backfilling until areas of work to be backfilled have been inspected and approved by Departmental Representative.
	.2	Backfill all spaces excavated and not occupied by parts of the structure, or other permanent works, with specified material placed as shown on the drawings.
	.3	Areas backfilled to be free from debris, snow, ice, water or frozen ground.
	.4	Prior to placing fill, compact existing subgrade to 98% Standard Proctor Density. Cut out "soft" areas and fill with suitable material until specified compaction can be obtained if required.
	.5	Install geotextile as indicated and as specified in Section 32 31 19. Do not backfill until the geotextile material installed, inspected and approved by Departmental Representative.

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| 3.4 BACKFILLING<br>(Cont'd)  | .6 | Place and compact fill materials in continuous horizontal layers not exceeding 75 mm loose depth. Use methods to prevent disturbing or damaging any part of the work. Make good any damage.   |
|                              | .7 | Maintain optimum moisture content to enable compaction to attain specified density.   |
|                              | .8 | Compact each layer to 100% Standard Proctor Density. Where working space is limited, employ approved mechanical hand operated tamping devices. When such devices are employed, deposit backfill material in layers not exceeding 150 mm in thickness. |
| 3.5 FINISHING                | .1 | Finish compacted surface to within 9 mm of established grade as indicated by a 3 m straight edge placed in any direction.   |
|                              | .2 | Correct irregularities greater than 9 mm by loosening the surface and adding or removing material until surface is within specified tolerance.  |
|                              | .3 | Make good asphalt as specified to grade and thickness to match existing.  |
| 3.6 FIELD QUALITY<br>CONTROL | .1 | The Departmental Representative may perform field and laboratory tests for control of moisture, density and aggregate gradation. Results will control Contractor's operations.  |



## PART 1 - GENERAL

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| <u>1.1 REFERENCES</u>                          | .1 | ASTM International   |
|  | .1 | ASTM D3786/D3786M-13, Standard Test Method for Bursting Strength of Textile Fabrics - Diaphragm Bursting Strength Tester Method.   |
|  | .2 | ASTM D4491-99a(2014)e1, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.   |
|  | .3 | ASTM D4595-11, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.  |
|  | .4 | ASTM D4751-12, Standard Test Method for Determining Apparent Opening Size of a Geotextile.   |
|  | .2 | Canadian General Standards Board (CGSB)  |
|  | .1 | CAN/CGSB-4.2 No. 11.2-2004, Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).  |
|  | .2 | CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.  |
|  | .1 | No.2-M85, Methods of Testing Geosynthetics - Mass per Unit Area.   |
|  | .2 | No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.  |
| <u>1.2 ACTION AND INFORMATIONAL SUBMITTALS</u> | .1 | Submit in accordance with Section 01 11 01.  |
|  | .2 | Product Data: Submit manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations. |
|  | .3 | Samples: Submit following samples 4 weeks prior to beginning Work.   |
|  | .1 | Minimum length of 2 m of roll width of geotextile.   |
|  | .2 | Methods of joining.  |
|  | .4 | Test and Evaluation Reports: Submit copies of mill test data and certificate at least 3 weeks prior to start of Work.  |
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1.3 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
  - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect geotextiles from direct sunlight and UV rays.
  - .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIAL

- .1 Geotextile: non-woven synthetic fibre fabric, supplied in rolls.
  - .1 Width: as indicated on drawing.
  - .2 Length: as indicated on drawing.
  - .3 Composed of: minimum 85% by mass of polypropylene with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.
- .2 Physical properties:
  - .1 Mass per unit area: to CAN/CGSB-148.1, No.2, minimum 320 g/m<sup>2</sup>.
  - .2 Tensile strength and elongation (in any principal direction): to ASTM D4595.
    - .1 Tensile strength: minimum 1050 N, wet condition.
    - .2 Elongation at break: 50%.
  - .3 Grab tensile strength and elongation: to CAN/CGSB-148.1, No.7.3.
    - .1 Breaking force: minimum 1050 N, wet condition.
    - .2 Elongation at future: minimum 50%.
  - .4 Mullen Burst: to ASTM D3786/D3786M, minimum 3.2 MPa.
- .3 Hydraulic properties:
  - .1 Apparent opening size (AOS): to ASTM D4751, 0.15 mm.
  - .2 Permittivity: to ASTM D4491, minimum 1.2 sec-1.
- .4 Securing pins and washers: to CSA G40.20/G40.21, Grade 300W, hot-dipped galvanized with

2.1 MATERIAL  
(Cont'd)

- .4 Securing pins and washers:(Cont'd)  
minimum zinc coating of 600 g/m<sup>2</sup>, Coating Grade  
85 to ASTM A123/A123M.
- .5 Factory seams: sewn in accordance with  
manufacturer's recommendations.
- .6 Thread for sewn seams: equal or better  
resistance to chemical and biological  
degradation than geotextile.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Place geotextile material by unrolling onto  
graded surface in orientation, manner and  
locations indicated and retain in position with.
- .2 Place geotextile material smooth and free of  
tension stress, folds, wrinkles and creases.
- .3 Place geotextile material on sloping surfaces  
in one continuous length from toe of slope to  
upper extent of geotextile.
- .4 Overlap each successive strip of geotextile 600  
mm over previously laid strip if required and  
approved by Departmental Representative.
- .5 Join successive strips of geotextile by sewing.

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|-------------------------------------|--|
| <u>3.2 INSTALLATION</u><br>(Cont'd) | <p>.6 Pin successive strips of geotextile with securing pins at mm interval at mid point of lap as indicated.</p> <p>.7 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.</p> <p>.8 After installation, cover with overlying layer within 4 hours of placement.</p> <p>.9 Replace damaged or deteriorated geotextile to approval of Departmental Representative.</p> |
| <u>3.3 PROTECTION</u>               | <p>.1 Vehicular traffic not permitted directly on geotextile.</p>  |