

RETURN BIDS TO:

RETOURNER LES SOUMISSIONS À:

Bid Receiving Public Works & Government Services
Canada/Réception des soumissions Travaux publics et
Services gouvernementaux Canada
1713 Bedford Row
Halifax, N.S./Halifax, (N.E.)
B3J 1T3
Halifax
Bid Fax: (902) 496-5016

Revision to a Request for a Standing Offer

Révision à une demande d'offre à commandes

Regional Individual Standing Offer (RISO)

Offre à commandes individuelle régionale (OCIR)

The referenced document is hereby revised; unless
otherwise indicated, all other terms and conditions of the
Offer remain the same.

Ce document est par la présente révisé; sauf indication
contraire, les modalités de l'offre demeurent les mêmes.

Comments - Commentaires

Vendor/Firm Name and Address

Raison sociale et adresse du
fournisseur/de l'entrepreneur

Issuing Office - Bureau de distribution

Real Property Contracting
1713 Bedford Row
P.O. Box 2247/C.P. 2247
Halifax, N.S./Halifax, (N.E.)
B3J 3C9
Halifax

Title - Sujet ELECTRICAL REPAIRS AND INSTALLATION		
Solicitation No. - N° de l'invitation W0102-12B816/A		Date 2012-06-28
Client Reference No. - N° de référence du client W0102-12-B816		Amendment No. - N° modif. 001
File No. - N° de dossier PWA-1-64208 (122)	CCC No./N° CCC - FMS No./N° VME	
GETS Reference No. - N° de référence de SEAG PW-\$PWA-122-4895		
Date of Original Request for Standing Offer Date de la demande de l'offre à commandes originale		2012-06-25
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2012-08-07		Time Zone Fuseau horaire Atlantic Daylight Saving Time ADT
Address Enquiries to: - Adresser toutes questions à: Chinye, Chukwudi		Buyer Id - Id de l'acheteur pwa122
Telephone No. - N° de téléphone (902) 496-5476 ()		FAX No. - N° de FAX (902) 496-5016
Delivery Required - Livraison exigée		
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction:		
Security - Sécurité This revision does not change the security requirements of the Offer. Cette révision ne change pas les besoins en matière de sécurité de la présente offre.		

Instructions: See Herein

Instructions: Voir aux présentes

Acknowledgement copy required Accusé de réception requis	Yes - Oui <input type="checkbox"/>	No - Non <input type="checkbox"/>
The Offeror hereby acknowledges this revision to its Offer. Le proposant constate, par la présente, cette révision à son offre.		
Signature	Date	
Name and title of person authorized to sign on behalf of offeror. (type or print) Nom et titre de la personne autorisée à signer au nom du proposant. (taper ou écrire en caractères d'imprimerie)		
For the Minister - Pour le Ministre		

Solicitation No. - N° de l'invitation

W0102-12B816/A

Client Ref. No. - N° de réf. du client

W0102-12-B816

Amd. No. - N° de la modif.

001

File No. - N° du dossier

PWA-1-64208

Buyer ID - Id de l'acheteur

pwa122

CCC No./N° CCC - FMS No/ N° VME

Amendment 001 is raised to incorporate the following change:

ANNEX "A"

STATEMENT OF WORK

Insert as follows

All Other Terms and Conditions Remain the Same

DEPARTMENT OF NATIONAL DEFENCE



SPECIFICATION

ELECTRICAL TRADE SOA

14 WING GREENWOOD,

GREENWOOD, NS

PROJECT MANAGER:

Mr. B BREWER

Tel: 902-765-1494 Ext 5188

JOB NO. L-G111-9900/1002
CCID # B816

2012-01-11

National Defence	List of Contents	Index
14 Wing Greenwood,N.S		Page 1
Job No.L-G111-9900/1002		2012-01-11

<u>Section</u>	<u>Title</u>	<u>Pages</u>
	<u>Division 01 - General Requirements</u>	
1 001	Summary of Work	2
2 005	General Instructions	6
3 340	Shop Drawings, Product Data Samples and Mock-ups	4
4 545	Safety Requirements	2
5 546	Fire Safety Requirements	4
6 547	Hazardous Material	4
7 561	Environmental Protection	2
8 600	Material and Equipment	4
9 710	Cleaning	1
10 20	Project Record Documents	1
11 30	Operation and Maintenance Manual	2
12 31	Maintenance Materials, Special Tools and Spare Parts	1
13 00	Airports in Use	2
	<u>Division 16 - Electrical</u>	
14 10	Electrical General Requirements	8

- | | | |
|------------------------------|----|---|
| <u>1 Site Visit</u> | .1 | Before submitting a Tender, the Contractor may visit the site and acquaint himself with all ascertainable conditions that may affect his work. |
| | .2 | Consult with Engineer or his representative regarding services available, material accommodations the Contractor may require, access to the site and obtain any and all information that may affect the Contractor's Tender. |
| <u>2 Location of Site</u> | .1 | 14 Wing Greenwood is located 150 km west of Halifax and 4 km south of Highway 101 near Kingston, Kings County, NS. and (Remote Sites) Located at Middleton Armouries, Middleton N.S., Yarmouth Armouries, Yarmouth N.S. and CCR Barrington, Barrington N.S. |
| <u>3.3 Invoicing</u> | .1 | Contractor shall provide one invoice for each DSS 942 (Call-Up Against a Standing Offer) received, on satisfactory completion of the work. |
| <u>4.4 Frequency of Work</u> | .1 | Work of this Section to be performed on an as and when required basis, as requested by the Engineer on a DSS 942. Each DSS 942 to provide in writing the scope of Work to be completed. |
| | .2 | Contractor to provide written estimate to Engineer for approval prior to any work commencing. |
| | .3 | Engineer to provide specific material specifications when deemed necessary for inclusion in the scope of work for each DSS 942. Materials not specified to be in accordance with the Canadian Electrical Code. |
| <u>5 Description of Work</u> | .1 | Work under this Standing Offer comprises the provision of all labour, material and equipment and transportation required to complete the work at 14 Wing Greenwood and (Remote Sites) in accordance with the specifications for this project. |

- 5 Description of Work
(Cont'd)
- .2 Specified work is to be carried out at the following locations:
 - .1 As directed by the Engineer.
 - .3 Work of this Standing Offer is located in an area where normal working hours are:
 - .1 0730 to 1600 hours, Monday to Friday inclusive.
 - .4 In general terms, the work includes the following:
 - .1 The furnishing of all labour, materials equipment and transportation required to carry out maintenance, installations and repairs of Electrical materials and systems at 14 Wing Greenwood,NS as and when requested.
 - .2 The contractor shall provide a 24 hour emergency service for service calls.
 - .3 Testing in presence of Engineer and in accordance with the Canadian Electrical Code.
 - .4 Clean-up.

- 1 References .1 National Building Code of Canada (NBC) 1995 including all amendments up to tender closing date.
- 2 Description of Work .1 Work under this Standing offer covers the supply of all labour, equipment, material, and transportation to provide as required electrical construction and maintenance at 14 Wing Greenwood N.S. and (Remote Sites).
- 3 Codes .1 Perform work in accordance with National Building Code of Canada (NBC) Canadian Electrical Code (CEC) and any other code of provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.
- .2 Meet or exceed requirements of:
.1 Standing Offer documents,
.2 specified standards, codes and referenced documents.
- 4 Briefing .1 The Standing Offeror shall attend fire, safety, airfield and security briefing as required by the engineer.
- 5 Documents Required .1 Maintain at job site, one copy each of following:
.1 Project drawings.
.2 Specifications.
.3 Addenda.
.4 Reviewed shop drawings.
.5 Change orders.
.6 Other modifications to Project
.7 Field test reports.
.8 Copy of approved work schedule.
.9 Manufacturers' installation and application instructions.
- 6 Work Schedule .1 Contractor will provide within 24 hours qualified tradesmen .
-

- 6 Work Schedule (Cont'd) .2 Provide in form acceptable to Engineer, within 7 working days after Contract award, schedule showing dates for:
- .1 Submission of shop drawings, material lists and samples.
 - .2 Commencement and completion of work of each Section of Specification.
 - .3 Final completion date within time period required by Contract documents.
- .3 Interim reviews of work progress based on work schedule will be conducted as decided by Engineer and schedule updated by Contractor in conjunction with and to approval of Engineer.
- .4 Carry out noise generating work Monday to Friday from 07:30 to 16:00 hours.
- 7 Cost Breakdown .1 Before submitting invoice, submit breakdown of Standing Offer price in detail as directed by Engineer and aggregating Standing Offer price. After approval by Engineer, cost breakdown will be used as basis for payment in accordance with the Standing Offer Agreement.
- 8 Measurement for Payment .1 Labour payment will be based on:
- .1 Electricians Per Hour
 - .2 Apprentice electricians Per Hour
- .2 The following to be paid at invoice cost no mark-up permitted:
- .1 Electrical permits or Fees.
- 9 Contractor's Use of Site .1 Obtain and pay for use of additional storage or work areas.
- 10 Project Meetings .1 Engineer will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.
-

-
- | | |
|--|--|
| <u>11 Setting Out of Work</u> | <ul style="list-style-type: none">.1 Set grades and lay out work in detail from control points and grades established by Engineer..2 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated..3 Provide devices needed to lay out and construct work..4 Supply such devices and equipment required to facilitate Engineer's inspection of work..5 Supply stakes and other survey markers required for laying out work. |
|
 | |
| <u>12 Location of Equipment and Fixtures</u> | <ul style="list-style-type: none">.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate..2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance..3 Inform Engineer of impending installation and obtain his approval for actual location..4 Submit field drawings to indicate relative position of various services and equipment when required by Engineer. |
|
 | |
| <u>13 Concealment</u> | <ul style="list-style-type: none">.1 Conceal conduit, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise. |
|
 | |
| <u>14 Cutting, and Patching</u> | <ul style="list-style-type: none">.1 Obtain Engineer's approval before cutting, boring or sleeving load-bearing members..2 Cut and patch as required to make work fit..3 Make cuts with clean, true, smooth edges..4 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work. |
-

15 Existing
Services

- .1 Where Work involves breaking into or connecting to existing services, carry out work at times directed by authorities having jurisdiction, with minimum of disturbance to pedestrian and vehicular traffic.
- .2 Before commencing work, establish location and extent of service lines in area of Work and notify Engineer of findings.
- .3 Submit schedule to and obtain approval from Engineer for any shut-down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties.
- .4 Where unknown services are encountered, immediately advise Engineer and confirm findings in writing.
- .5 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Engineer.
- .6 Record locations of maintained, re-routed and abandoned service lines.

16 Alterations,
Additions or
Repairs to Existing
Building

- .1 Execute work with least possible interference or disturbance to occupants, public and normal use of premises. Arrange with Engineer to facilitate execution of work.
- .2 Where security has been reduced by work of Contract, provide temporary means to maintain security.
- .3 Where elevators, dumbwaiters, conveyors or escalators exist in building, only those assigned for Contractor's use may be used for moving personnel and material within building. Protect walls of passenger elevators, to approval of Engineer before use. Accept liability for damage, safety of equipment and overloading of existing equipment.
- .4 Provide temporary dust screens, barriers, warning signs in locations where renovation and alteration work is adjacent to areas used by public or government staff.

- 17 Additional Drawings .1 Engineer may furnish additional drawings for clarification. These additional drawings have same meaning and intent as original drawings.
- 18 Relics and Antiquities .1 Protect relics, antiquities, items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tablets, and similar objects found during course of work.
- .2 Give immediate notice to Engineer and await Engineer's written instructions before proceeding with work in this area.
- .3 Relics, antiquities and items of historical or scientific interest remain her Majesty's property.
- 19 Building Smoking Environment .1 Comply with smoking restrictions.
- 20 Workmanship .1 All tradesmen shall be qualified journeyperson or apprentices and shall be certified by the Provincial Department of labour. Apprentices shall work only under the direct supervision of a journeyperson. A copy of a Tradespersons Certificate shall be supplied to the Engineer upon request.
- .2 The Contractor shall employ a competent and experienced supervisor with the authority to speak on his behalf on day-to-day routine matters and shall be named at time of pre job meeting be Engineer.
- 21 Asbestos Discovery .1 Demolition of spray or trowel-applied asbestos can be hazardous to health. Should material resembling spray or trowel-applied asbestos be encountered in course of demolition work stop work and notify Engineer immediately. Do not proceed until written instructions have been received from Engineer.

- 1 General
- .1 This section specifies general requirements and procedures for contractors submissions of shop drawings, product data, samples and mock-ups to Engineer for review. Additional specific requirements for submissions are specified in individual sections of Divisions 2 to 16.
 - .2 Do not proceed with work until relevant submissions are reviewed by Engineer.
 - .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
 - .4 Where items or information is not produced in SI Metric units converted values are acceptable.
 - .5 Contractor's responsibility for errors and omissions in submission is not relieved by Engineer's review of submissions.
 - .6 Notify Engineer, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
 - .7 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Engineer's review of submission, unless Engineer gives written acceptance of specific deviations.
 - .8 Make any changes in submissions which Engineer may require consistent with Contract Documents and resubmit as directed by Engineer.
 - .9 Notify Engineer, in writing, when resubmitting, of any revisions other than those requested by Engineer.
- 2 Submission Requirements
- .1 Coordinate each submission with requirements of work and Contract Documents. Individual submissions will not be reviewed until all related information is available.
 - .2 Allow 4 days for Engineers review of each submission.
-

- 2 Submission Requirements (Cont'd)
- .3 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
 - .4 Submissions shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractors authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
 - .5 After Engineer's review, distribute copies.
 - .6 Shop drawings: original drawings, or modified standard drawings provided by Contractor, to illustrate details of portions of Work, which are specific to project requirements.
 - .7 Maximum sheet size: 850 x 1050 mm.
 - .8 Submit shop drawings as follows:
 - .1 opaque diazo prints 4 copies
 - .9 Cross-reference shop drawing information to applicable portions of Contract Documents.
-

- 3 Product Data
- .1 Product data: manufacturers catalogue sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products.
 - .2 Submit 4 copies of product data.
 - .3 Sheet size: 215 x 280 mm, maximum of 3 modules.
 - .4 Delete information not applicable to project.
 - .5 Supplement standard information to provide details applicable to project.
 - .6 Cross-reference product data information to applicable portions of Contract Documents.
- 4 Samples
- .1 Samples: examples of materials, equipment, quality, finishes, workmanship.
 - .2 Where colour, pattern or texture is criterion, submit full range of samples.
 - .3 Reviewed and accepted samples will become standard of workmanship and material against which installed work will be verified.
- 5 Mock-ups
- .1 Mock-ups: field-erected example of work complete with specified materials and workmanship.
 - .2 Erect mock-ups at locations acceptable to Engineer.
 - .3 Reviewed and accepted mock-ups will become standards of workmanship and material against which installed work will be verified.
- 6 Shop Drawings Review
- .1 The review of shop drawings by the Department of National Defence is for the sole purpose of ascertaining conformance with the general concept. This review shall not mean that the Department of National Defence approves the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of responsibility for errors or omissions in the
-

6 Shop Drawings	.1	(Cont'd)
Review		shop drawings or of responsibility for meeting
(Cont'd)		all requirements of the construction and
		contract documents. Without restricting the
		generality of the foregoing, the Contractor is
		responsible for dimensions to be confirmed and
		correlated at the job site, for information
		that pertains solely to fabrication processes
		or to techniques of construction and
		installation and for co-ordination of the work
		of all sub-trades.

- | | | |
|--|----|---|
| <u>1 References</u> | .1 | CSA S269.1-1975 Falsework for Construction Purposes. |
| | .2 | CAN/CSA-S269.2-M87 Access Scaffolding for Construction Purposes. |
| | .3 | FCC No. 301-1982 Standard for Construction Operations. |
| <u>2 Construction Safety Measures</u> | .1 | Observe construction safety measures of National Building Code 1990 Part 8, Provincial Government, Workers'/Workmen's Compensation Board and municipal authority provided that in any case of conflict or discrepancy more stringent requirements shall apply. |
| | .2 | Comply with requirements of FCC No. 301. |
| <u>3 Overloading</u> | .1 | Ensure no part of Work is subjected to loading that will endanger its safety or will cause permanent deformation. |
| <u>4 Falsework</u> | .1 | Design and construct falsework in accordance with CSA S269.1. |
| <u>5 Scaffolding</u> | .1 | Design and construct scaffolding in accordance with CSA S269.2 |
| <u>6 Minimum Work Practice: Asbestos-Containing Products</u> | .1 | In view of fact that inhalation of asbestos fibres may be hazardous to health, but without in any way guaranteeing their effectiveness as protection against health hazards, the following practices shall apply. |
| | .2 | When working with asbestos-containing materials workers shall wear respirators acceptable to Labour Canada or Provincial Labour Department as suitable for asbestos exposure in work area. Workers shall also be educated as to risks, and be trained in safe work practices. Power tools shall be equipped with high efficiency particulate air-filtered vacuum equipment. |
-

6 Minimum Work
Practice: Asbestos-
Containing Products
(Cont'd)

- .3 When working in an enclosed area separate work area from rest of project by barrier capable of preventing spread of asbestos fibres outside of work area.
- .4 When working with asbestos-cement pipe comply with recommendations of Asbestos-Cement Pipe Producers Association "Recommended Work Practices for A/C Pipe" subject to more stringent requirements of 6.2 above.
- .5 Upon completion of work, clean work areas using wet methods or high efficiency particulate air-filtered vacuum equipment. Remove waste asbestos-containing material in sealed containers labelled as to contents to disposal area acceptable to authorities having jurisdiction.
- .6 In event of conflict between these requirements and those of Provincial Governments, Labour Canada, or Health and Welfare Canada, more stringent requirements shall apply.

7 WHMIS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada and Health and Welfare Canada.
- .2 Deliver copies of WHMIS data sheets to Engineer on delivery of materials.

PART 1 - GENERAL

1.1 Fire Department Briefing .1 Engineer will coordinate arrangements for the contractor to be briefed on Fire Safety at their pre-work conference by Fire Chief before any work is commenced.

1.2 Reporting Fires .1 Know the location of nearest fire alarm box and telephone, including the emergency phone number.

.2 Report immediately all fire incidents to the Fire Department as follows:
.1 activate nearest fire alarm box; or
.2 telephone.

.3 Person activating fire alarm box will remain at the box to direct Fire Department to scene of fire.

.4 When reporting a fire by telephone, give location of fire, name or number of building and be prepared to verify the location.

1.3 Interior and Exterior Fire Protection and Alarm Systems .1 Fire protection and alarm system will not be:
.1 obstructed;
.2 shut-off; and
.3 left inactive at the end of a working day or shift without authorization from Fire Chief.

.2 Fire hydrants, standpipes and hose systems will not be used for other than fire-fighting purposes unless authorized by Fire Chief.

1.4 Fire Extinguishers .1 Supply fire extinguishers, as scaled by fire Chief, necessary to protect, the work in progress and the contractors physical plant on site.

1.5 Blockage of Roadways .1 Advise Fire Chief of any work that would impede fire apparatus response. This includes violation of minimum overhead clearance, as prescribed by fire chief, erecting of barricades and the digging of trenches.

1.6 Smoking
Precautions

- .1 Observe at all times smoking regulations.

1.7 Rubbish and
Waste Materials

- .1 Rubbish and waste materials are to be kept to a minimum.
- .2 The burning of rubbish is prohibited.
- .3 Removal:
 - .1 Remove all rubbish from the work site at the end of the work day or shift or as directed.
- .4 Storage:
 - .1 Store oily waste in approved receptacles to ensure maximum cleanliness and safety.
 - .2 Deposit greasy or oily rags and materials subject to spontaneous combustion in an approved receptacles and remove as required in 1.7.3.1.

1.8 Flammable and
Combustible Liquids

- .1 The handling, storage and use of flammable and combustible liquids are to be governed by the current National Fire Code of Canada.
- .2 Flammable and combustible liquids such as gasoline, kerosene and naphtha will be kept for ready use in quantities not exceeding 45 litres provided they are stored in approved safety cans bearing the Underwriter's Laboratory of Canada or Factory Mutual seal of approval. Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes, requires the permission of the Fire Chief.
- .3 Transfer of flammable and combustible liquids is prohibited within buildings or jetties.
- .4 Transfer of flammable and combustible liquids will not be carried out in the vicinity of open flames or any type of heat-producing devices.
- .5 Flammable liquids having a flash point below 38°C such as naphtha or gasoline will not be used as solvents or cleaning agents.
- .6 Flammable and combustible waste liquids, for disposal, will be stored in approved containers located in a safe ventilated area.

<u>1.8 Flammable and Combustible Liquids (Cont'd)</u>	.6	(Cont'd) Quantities are to be kept to a minimum and the Fire Department is to be notified when disposal is required.
---	----	---

<u>1.9 Hazardous Substances</u>	.1	Work entailing the use of toxic or hazardous materials, chemicals and/or explosives, otherwise creates a hazard to life, safety or health, will be in accordance with the National Fire Code of Canada.
	.2	Obtain from Fire Chief a "Hot Work" permit for work involving welding, burning or the use of blow torches and salamanders, in buildings or facilities.
	.3	When work is carried out in dangerous or hazardous areas involving use of heat, provide fire watchers, equipped with sufficient fire extinguishers. Determination of dangerous or hazardous areas along with the level of protection necessary for Fire Watch is at the discretion of the Fire Chief. Contractors are responsible for providing fire watch service for work on a scale established and in conjunction with the Fire Chief at the pre-work conference.
	.4	Where flammable liquids, such as lacquers or urethanes are to be used, proper ventilation will be assured and all sources of ignition are to be eliminated. The Fire Chief is to be informed prior to and at the cessation of such work.

<u>1.10 Questions and/or Clarification</u>	.1	Direct any questions or clarification on Fire Safety in addition to above requirements to Fire Chief.
--	----	---

<u>1.11 Fire Inspection</u>	.1	Site inspections by Fire Chief will be coordinated through Engineer.
	.2	Allow Fire Chief unrestricted access to the work site.
	.3	Co-operate with the Fire Chief during routine fire safety inspection of the work site.

1.11 Fire .4 Immediately remedy all unsafe fire situations
Inspection observed by the Fire Chief.
(Cont'd)

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

1 General

- .1 Contractors and their personnel to read and be familiar with this section and its requirements.
- .2 Contractor to post, in a noticeable location on job site, the following names and emergency telephone numbers:
 - .1 14 Wing Greenwood:
 - .1 Wing Fire Chief (WFC) - Local 5473.
 - .2 Engineer - 902-765-1494 Ext 5188.
 - .3 911.
- .3 Work with hazardous materials to be done by workers who are thoroughly educated to the risks and handling procedures involved with the material and are trained in safe work practices.
- .4 Encounters with material suspected of being hazardous and not previously identified are to be reported to Engineer immediately, and work in this area of project halted until direction is received from Engineer.
- .5 Contractors are to comply with regulations and procedures of Federal, Provincial and local area environmental protection agency when dealing with hazardous materials.
- .6 Inquiries regarding Hazardous Materials can be directed to Engineer.

2 Reference
Stand

- .1 NFC-1995 - National Fire Code of Canada 1995.
- .2 CLC-Part IV - Canada Labour Code.
- .3 WHMIS - Workplace Hazardous Materials Information System (Federal Legislation Bill C-70).
- .4 Hazardous Products Act.
- .5 Hazardous Materials Information Review Act.
- .6 Occupational Health and Safety Regulations.
- .7 Regulations and standards currently in force for products not covered under WHMIS legislation, designed for the regulation of specific categories of products such as but not limited to:
 - .1 Explosives Act.
 - .2 Atomic Energy Control Act.

2 Reference .7 (Cont'd)
Stand .3 Pest Control Products Act.
(Cont'd)

3 Documentation .1 Where Contractor supplied materials or chemicals are of a hazardous nature, provide Engineer with two copies of Material Safety Data Sheet (MSDS) for each hazardous product.
.1 Hazardous products that do not have a Material Safety Data Sheet are not permitted on DND property.
.2 Information (MSDS) on known or suspected hazardous materials on site can be obtained through Engineer from the Hazardous Materials Coordinator.

4 Signs and Notices .1 Contractor to make available a copy of the Material Safety Data Sheet for each product on site, for the information of site workers and visitors to the site.
.1 Site workers to familiarize themselves with the Material Safety Data Sheet for each product.
.2 Signs and/or notices for safety and instruction to be in both official languages, or commonly understood WHMIS symbols, and to be posted in prominent locations around area of work.

5 Worker Safety .1 Workers involved with hazardous materials on jobsite to be equipped with all necessary personal protective equipment (PPE) required by Labour Canada and/or Provincial Labour Department.

6 Indemnity .1 Contractor accepts liability and indemnifies the Department of National Defence and its employees in the event of injury or damage resulting from the use of or exposure to hazardous materials.

- 7 Compliance .1 In event of conflict between the requirements referred to throughout this section and in paragraph 2 - Reference Standards, the more stringent requirement to govern.
- 8 Delivery and Storage .1 In addition to requirements of Section 01005 - General Instructions, deliver and store hazardous materials to the following:
.1 Incompatible substances and chemicals to be kept segregated at all times.
.2 Contractor can obtain clarification and identification of subject substances and chemicals through Engineer from Base Hazardous Materials Coordinator.
- 9 Spills and Leaks .1 Notify Wing Fire Department and Engineer at 14 Wing CFB Greenwood immediately in the event of a spill or leak. Wing Fire Chief will coordinate and direct clean-up.
.2 Prevent injury to personnel until responsible authorities arrive and implement procedures necessary to contain and secure spill area.
.3 Spills and leaks resulting from Contractor neglect or mishandling to be cleaned up at Contractor's expense.
- 10 Clean-up .1 Additional requirements to Section 01710 - Cleaning are listed below:
.1 All hazardous material waste to be stored in containers as recommended by manufacturer of hazardous material and removed from site at end of each work day.
.2 Disposal of waste material to be in accordance with the Department of the Environment regulations and to be off DND property at approved dump sites for materials to be disposed off.
- 11 WHMIS .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada and Health and Welfare Canada.
-

National Defence	Hazardous Material	Section	01547
14 Wing Greenwood, N.S		Page	4
Job No. L-G111-9900/1002			2012-01-11

11 WHMIS (Cont'd)	.2	Deliver copies of WHMIS data sheets to Engineer on delivery of materials.
----------------------	----	--

- | | | |
|---|----|---|
| <u>1 Fires</u> | .1 | Fires and burning of rubbish on site not permitted. |
| <u>2 Disposal of Wastes</u> | .1 | Do not bury rubbish and waste materials on site unless approved by Engineer. |
| | .2 | Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers. |
| <u>3 Drainage</u> | .1 | Provide temporary drainage and pumping as necessary to keep excavations and site free from water. |
| | .2 | Do not pump water containing suspended materials into waterways, sewer or drainage systems. |
| | .3 | Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements. |
| <u>4 Site Clearing and Plant Protection</u> | .1 | Protect trees and plants on site and adjacent properties where indicated. |
| | .2 | Wrap in burlap, 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. |
| | .3 | Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones. |
| | .4 | Minimize stripping of topsoil and vegetation. |
| | .5 | Restrict tree removal to areas indicated or designated by Engineer. |
-

- 5 Work Adjacent to Waterways
- .1 Do not operate construction equipment in waterways.
 - .2 Do not use waterway beds for borrow material without Engineer's approval.
 - .3 Do not dump excavated fill, waste material or debris in waterways.
 - .4 Design and construct temporary crossings to minimize erosion to waterways.
 - .5 Do not skid logs or construction materials across waterways.
 - .6 Avoid indicated spawning beds when constructing temporary crossings of waterways.
 - .7 Do not blast under water or within 100 m of indicated spawning beds.
- 6 Pollution Control
- .1 Maintain temporary erosion and pollution control features installed under this contract.
 - .2 Control emissions from equipment and plant to local authorities emission requirements.
 - .3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.
 - .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

- | | | | |
|----------------|-----------------------------------|----|--|
| <u>1</u> | <u>General</u> | .1 | Use new material and equipment unless otherwise specified. |
| | | .2 | Within four (4) days of written request by Engineer, submit following information for materials and equipment proposed for supply:
.1 name and address of manufacturer,
.2 trade name, model and catalogue number,
.3 performance, descriptive and test data,
.4 manufacturer's installation or application instructions,
.5 evidence of arrangements to procure. |
| | | .3 | Use products of one manufacturer for material and equipment of same type or classification unless otherwise specified. |
| <u>2</u> | <u>Manufacturers Instructions</u> | .1 | Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods. |
| | | .2 | Notify Engineer in writing of any conflict between these specifications and manufacturers instructions. Engineer will designate which document is to be followed. |
| <u>General</u> | | .3 | Provide metal fastenings and accessories in same texture, colour and finish as base metal in which they occur. Prevent electrolytic action between dissimilar metals. Use non-corrosive fasteners, anchors and spacers for securing exterior work. |
| | | .4 | Space anchors within limits of load bearing or shear capacity and ensure that they provide positive permanent anchorage. Wood plugs not acceptable. |
| | | .5 | Fastenings which cause spalling or cracking are not acceptable. |
| | | .6 | Obtain Engineer's approval before using explosive actuated fastening devices. If approval is obtained comply with CSA Z166-1975. |
-

- | | | | |
|---|--|----|---|
| 3 | <u>Fastenings - Equipment</u> | .1 | Use fastenings of standard commercial sizes and patterns with material and finish suitable for service. |
| | | .2 | Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas. |
| | | .3 | Bolts may not project more than one diameter beyond nuts. |
| | | .4 | Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel. |
| 4 | <u>Delivery and Storage</u> | .1 | Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact. |
| | | .2 | Prevent damage, adulteration and soiling of material and equipment during delivery, handling and storage. Immediately remove rejected material and equipment from site. |
| | | .3 | Store material and equipment in accordance with suppliers instructions. |
| | | .4 | Touch-up damaged factory finished surfaces to Engineer's satisfaction. Use primer or enamel to match original. Do not paint over name plates. |
| 5 | <u>Contractor's Options for Selection of Materials for Tendering</u> | .1 | Materials specified by referenced standard, select any material that meets or exceeds the specified standard. |
| | | .2 | Where materials are required to be listed on the "Canadian General Standards Board, Qualified Products List" select any manufacturer so listed. |
| | | .3 | Materials specified by "Prescriptive" or "Performance" specification, select any material meeting or exceeding specification. |
| | | .4 | Materials specified by naming one or more materials, select any material named. For the purpose of these specifications, the term "Acceptable Material" is deemed to be a |
-

- | | | |
|---|----|---|
| 5 Contractor's Options for Selection of Materials for Tendering
(Cont'd) | .4 | (Cont'd)
complete and working commodity as described by a manufacturer's name, catalogue number, trade name or any combination thereof. |
| | .5 | When materials are specified by a Standard, Prescriptive or Performance specifications, upon request of the Engineer, obtain from manufacturer an independent testing laboratory reporting, showing that the material or equipment meets or exceeds the specified requirements. |
| 6 Substitution | .1 | No substitutions will be permitted without prior written approval of Engineer. |
| | .2 | Proposals for substitution may only be submitted after award of contract. Such request must include statements of respective costs of items originally specified and the proposed substitution. |
| | .3 | Proposals will be considered by Engineer if:
.1 materials selected by tenderer from those specified, are not available;
.2 delivery date of materials selected from those materials specified would unduly delay completion of contract, or
.3 alternative material to those specified, which are brought to the attention of and considered by Engineer as equivalent to the material specified and will result in a credit to the Contract amount. |
| | .4 | Should proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on project. Pay for design or drawing changes required as result of substitution. |
| | .5 | Amounts of all credits arising from approval of substitutions will be determined by Engineer and Contract Price will be reduced accordingly. |
| 7 Construction Equipment and Plant | .1 | On request, prove to the satisfaction of Engineer that the construction equipment and plant are adequate to manufacture, transport, place and finish work to quality and production rates specified. If inadequate, |

- | | | |
|---------------------|----|--|
| 7 Construction | .1 | (Cont'd) |
| Equipment and Plant | | replace or provide additional equipment or |
| (Cont'd) | | plant as directed. |
| | .2 | Maintain construction equipment and plant in |
| | | good operating order. |

- 1 General
- .1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - .2 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
 - .3 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- 2 Materials
- .1 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- 3 Cleaning During Construction
- .1 Provide on-site containers for collection of waste materials, and debris.
 - .2 Dispose of waste materials, and debris off site.
 - .3 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.
- 4 Final Cleaning
- .1 Remove grease, dust dirt, stains, labels, fingerprints, and other foreign materials, from interior and exterior finished surfaces including glass and other polished surfaces.
 - .2 Clean lighting reflectors, lenses, and other lighting surfaces.
 - .3 Broom clean paved surfaces; rake clean other surfaces of grounds.
 - .4 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
 - .5 Remove snow and ice from access to building.

- 1 Record Drawings
- .1 Engineer will provide two sets of white prints for record drawing purposes.
 - .2 Maintain project record drawings and record accurately 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 first floor level.
 - .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.

- 1 Manual .1 An organized compilation of operating and maintenance data including detailed technical information, documents and records describing operation and maintenance of individual products or systems as specified in individual sections of Divisions 02 - 16.
- 2 General .1 Assemble, coordinate, bind and index required data into Operation and Maintenance Manual.
- .2 Submit complete operation and maintenance manual to Engineer two (2) weeks prior to application for payment.
- .3 Submit four (4) copies in English.
- .4 Organize data into same numerical order as contract specifications.
- .5 Material: label each section with tabs protected with celluloid covers fastened to hard paper dividing sheets.
- .6 Type lists and notes.
- .7 Drawings, diagrams and manufacturers literature must be legible.
- 3 Binders .1 Binders: vinyl, hard covered, 3 "D" ring, loose leaf, sized for 215 x 280 mm paper, with spine pocket.
- .2 Identify contents of each binder on spline.
- 4 Contents .1 Binder 1:
- .1 Cover sheet containing:
- .1 Date submitted.
- .2 Project title, location and project number.
- .3 Names and addresses of Contractor, and all Sub-contractors.
- .2 Table of Contents of all binders.
- .3 List of maintenance materials as specified in Section 01731 - Maintenance Materials, Special Tools and Spare Parts.
- .4 List of special tools as specified in Section 01731 - Maintenance Materials, Special Tools and Spare Parts.
-

4	Contents	.1	Binder 1:(Cont'd)
	(Cont'd)	.5	List of spare parts as specified in
			Section 01731 - Maintenance Materials, Special
			Tools and Spare Parts.
		.6	Warranties, guarantees.
		.7	Copies of approvals, and certificates.
		.2	Shop drawings:
		.1	Bind separately one complete set of
			reviewed final shop drawings and product data.

- 1 General .1 Specific requirements for maintenance materials, tools and spare parts are specified in individual sections of Divisions 02 to 16.
- .2 Deliver maintenance materials, special tools and spare parts to Engineer.
- .3 Prepare lists of maintenance materials special tools and spare parts for inclusion in Manual specified Section 01731.
- 2 Maintenance Materials .1 Deliver specified items packaged to prevent damage.
- .2 Identify, on carton or package, colour, room No., system or area as applicable where item is used.
- 3 Special Tools .1 Assemble special tools as specified.
- .2 Include following:
.1 Identification tag reference.
.2 Identification of equipment or system for which tools are applicable.
.3 Instruction on intended use of tool.
- .3 Identify special tools to indicate equipment or system for which tools are intended.
- 4 Spare Parts .1 Assemble spare parts as specified.
- .2 Include the following:
.1 Part number.
.2 Identification of equipment or system for which parts are applicable.
.3 Installation instructions as applicable.
.4 Name and address of nearest supplier.
- .3 Identify spare parts to indicate equipment or system for which parts are applicable.

- | | |
|--|--|
| <u>1 General Protection</u> | <ul style="list-style-type: none">.1 Do not disrupt airport business except as permitted by Engineer..2 Provide temporary protection for safe handling of personnel, pedestrians and vehicular traffic..3 Provide barricades and lights where directed. |
| <u>2 Movement of Equipment and Personnel</u> | <ul style="list-style-type: none">.1 In areas of airport not closed to aircraft traffic:<ul style="list-style-type: none">.1 Obtain Engineer's approval on scheduling of work..2 Control movements of equipment and personnel as directed by Engineer..3 Provide competent flagmen at locations designated by Engineer to relay signals from airport traffic control tower to equipment and personnel wishing to cross live traffic areas..4 Signals from airport traffic control tower to be obeyed instantly. |
| <u>3 Unserviceable Areas</u> | <ul style="list-style-type: none">.1 Mark off areas made unserviceable for aircraft by work of this Contract by providing plainly visible danger markings by day and red lights by night. Open flames and inflammable fuels not permitted..2 Park equipment not in use and stockpile materials so that their tops are below a 50 to 1 ratio from ends of useable landing strip and below 20 to 1 ratio from sides of aircraft traffic areas. Where directed, mark tops with red lights. |
| <u>4 Trenching</u> | <ul style="list-style-type: none">.1 On pavements open to aircraft traffic, obtain Engineer's written permission to undertake trenching which cannot be completed, backfilled and sealed within one working day. |
| <u>5 Airport Facilities</u> | <ul style="list-style-type: none">.1 Engineer will stake or inform as to the location of underground facilities such as cables, pipes and ducts. Notify Engineer of work areas sufficiently in advance of operations so that underground facilities can be located. |

- 1 General .1 This Section covers items common to Sections of Division 16. This section supplements requirements of Division 1.
- 2 Codes and Standards .1 Do complete installation in accordance with CSA C22.1-1998 except where specified otherwise.
- .2 Do overhead and underground systems in accordance with CSA C22.3No.1-M1979 except where specified otherwise.
- .3 Abbreviations for electrical terms: to CSA Z85-1983.
- 3 Care, Operation and Start-up .1 Instruct Engineer and operating personnel in the operation, care and maintenance of equipment.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components.
- .3 Arrange and pay for services of manufacturer's personnel for verification of alarm systems.
- .4 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.
- 4 Voltage Ratings .1 Operating voltages: to CAN3-C235-83.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
-

- 5 Permits, Fees and Inspection
- .1 Submit to Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.
 - .2 Pay associated fees.
 - .3 Engineer will provide drawings and specifications required by Electrical Inspection Department and Supply Authority at no cost.
 - .4 Notify Engineer of changes required by Electrical Inspection Department prior to making changes.
 - .5 Furnish Certificates of Acceptance from Electrical Inspection Department on completion of work to Engineer .
- 6 Materials and Equipment
- .1 Provide materials and equipment in accordance with Section 01600 - Material and Equipment.
 - .2 Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Electrical Inspection Department.
 - .3 Factory assemble control panels and component assemblies.
- 7 Electric Motors, Equipment and Controls
- .1 Supplier and installer responsibility is indicated in Motor, Control and Equipment Schedule on electrical drawings and related mechanical responsibility is indicated on Mechanical Equipment Schedule on mechanical drawings.
 - .2 Control wiring and conduit is specified in Division 16 except for conduit, wiring and connections below 50 V which are related to control systems specified in Division 15 and shown on mechanical drawings.
- 8 Finishes
- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
-

- 8 Finishes (Cont'd)
- .1 (Cont'd)
 - .1 Paint outdoor electrical equipment "equipment green" finish to EEMAC Y1-1-1955.
 - .2 Paint indoor switchgear and distribution enclosures light grey to EEMAC 2Y-1-1958.
 - .2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
 - .3 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

- 9 Equipment Identification
- .1 Identify electrical equipment with nameplates and labels as follows:
 - .2 Nameplates:
 - .1 Lamicoid 3 mm thick plastic engraving sheet, black white face, black white core, mechanically attached with self tapping screws.

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

- .3 Labels:
 - .1 Embossed plastic labels with 6 mm high letters unless specified otherwise.
- .4 Wordings on nameplates and labels to be approved by Engineer prior to manufacture.
- .5 Allow for average of twenty-five (25) letters per nameplate and label.
- .6 Identification to be English.
- .7 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

9 Equipment
Identification
(Cont'd)

- .8 Disconnects, starters and contactors:
indicate equipment being controlled and
voltage.
- .9 Terminal cabinets and pull boxes: indicate
system and voltage.
- .10 Transformers: indicate capacity, primary and
secondary voltages.

10 Wiring
Identification

- .1 Identify wiring with permanent indelible
identifying markings, either numbered or
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 code: to CSA C22.1.
- .4 Use colour coded wires in communication
cables, matched throughout system.

11 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 20 mm
wide auxiliary colour.

	<u>Prime</u>	<u>Auxiliary</u>
up to 250 V	yellow	
up to 600 V	yellow	green
up to 5 kV	yellow	blue
up to 15 kV	yellow	red
Telephone	green	
Other communication systems	green	blue
Fire alarm	red	
Emergency voice	red	blue
Other security systems	red	yellow

- | | | |
|--|----|--|
| <u>12 Wiring Terminations</u> | .1 | Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors. |
| <u>13 Manufacturers and CSA Labels</u> | .1 | Visible and legible after equipment is installed. |
| <u>14 Warning Signs</u> | .1 | To meet requirements of Electrical Inspection Department and Engineer. |
| <u>15 Location of Outlets</u> | .1 | Locate outlets in accordance with Section 01005 - General Instructions. |
| | .2 | Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes. |
| | .3 | Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation. |
| | .4 | Locate light switches on latch side of doors. Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor. |
| <u>16 Mounting Heights</u> | .1 | Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise. |
| | .2 | If mounting height of equipment is not specified or indicated, verify before proceeding with installation. |
| | .3 | Install electrical equipment at following heights unless indicated otherwise. |
| | .1 | Local switches: 1400 mm. |
| | .2 | Wall receptacles: |
| | .1 | General: 300 mm. |
| | .2 | Above top of continuous baseboard heater: 200 mm. |
| | .3 | Above top of counters or counter splash backs: 175 mm. |
| | .4 | In mechanical rooms: 1400 mm. |
| | .3 | Panelboards: as required by Code or as indicated. |
-

- 16 Mounting Heights
(Cont'd)
- .3 (Cont'd)
- .4 Telephone and interphone outlets: 300 mm.
- .5 Wall mounted telephone and interphone outlets: 1500 mm.
- .6 Fire alarm stations: 1500 mm.
- .7 Fire alarm bells: 2100 mm.
- .8 Television outlets: 300 mm.
- .9 Wall mounted speakers: 2100 mm.
- .10 Clocks: 2100 mm.
- .11 Door bell pushbuttons: 1500 mm.
- 17 Load Balance
- .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
- .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
- .3 Submit, at completion of work, report listing phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.
- 18 Conduit and Cable Installation
- .1 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm.
- .2 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.
- 19 Field Quality Control
- .1 Conduct and pay for following tests:
- .1 Power generation and distribution system including phasing, voltage, grounding and load balancing.
- .2 Circuits originating from branch distribution panels.
- .3 Lighting and its control.
- .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
-

- 19 Field Quality Control
(Cont'd)
- .1 (Cont'd)
.5 Systems: fire alarm system, communications.
- .2 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.
- .3 Insulation resistance testing.
.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
.3 Check resistance to ground before energizing.
- .4 Carry out tests in presence of Engineer.
- .5 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .6 Submit test results for Engineer's review.
- 20 Co-ordination of Protective Devices
- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.