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PART 1 - GENERAL

- 1.1 WORK COVERED BY CONTRACT DOCUMENTS .1 Work of this Contract comprises the upgrade of steam boilers to high-efficiency gas-fired boilers, and replacement of associated primary piping, pumps, and controls, as indicated on the contract drawings. Contract is further identified as CSC Project Number 402-3602-0.
- 1.2 CONTRACT METHOD .1 Construct Work under Lump Sum Contract.
- 1.3 CONTRACTOR USE OF PREMISE .1 Co-ordinate use of premises under direction of owner.
- .2 Repair or replace portions of existing work that have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.
- .3 At completion of operations condition of existing work: equal to or better than that which existed before new work started.
- 1.4 OWNER OCCUPANCY .1 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.
- 1.5 DOCUMENTS REQUIRED .1 Maintain at job site, one copy each document as follows:
- .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other Modifications to Contract.
 - .8 Field Test Reports.
 - .9 Copy of Approved Work Schedule.
 - .10 Health and Safety Plan and Other Safety Related Documents.
 - .11 Other documents as specified.
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1.6 ALTERATIONS TO EXISTING SITE .1 Remove all demolished equipment, material, and unused materials from site.

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 ACCESS AND
EGRESS

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 USE OF SITE AND
FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Contractor shall provide own forces and sub-contractors with sanitary facilities.
- .5 Closures: protect work temporarily until permanent enclosures are completed.

1.3 ALTERATIONS,
ADDITIONS OR
REPAIRS TO EXISTING
BUILDING

- .1 Execute work with least possible interference or disturbance to normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

1.4 EXISTING
SERVICES

- .1 Notify Departmental Representative of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 72 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions to a minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
- .3 Provide for pedestrian and vehicular traffic.

1.4 EXISTING SERVICES
(Cont'd)

.4 Construct barriers in accordance with Section 01 56 00.

1.5 SPECIAL REQUIREMENTS

.1 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.2 Keep within limits of work and avenues of ingress and egress.

1.6 SECURITY

.1 Security clearances:
.1 Personnel employed on this project will be subject to security check. Obtain clearance, as instructed, for each individual who will require to enter premises.
.2 Personnel will be checked daily at start of work shift and provided with pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.
.3 Contractor's personnel will require satisfactory RCMP initiated security screening in order to complete Work in premises and on site.

1.7 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not permitted.

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

- .11 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, MS Project and Autocad dwg files on USB compatible with the Institutions encryption requirements or through email.

1.2 SHOP DRAWINGS
AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .3 Allow 10 working days for Departmental Representative's review of each submission.
- .4 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .5 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .6 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.
- .7 Submissions shall include:
- .1 Date and revision dates.
 - .2 Project title and number.

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- 1.2 SHOP DRAWINGS .7 (Cont'd)
AND PRODUCT DATA .3 Name and address of:
(Cont'd)
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- .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
 - .8 After Departmental Representative's review, distribute copies.
 - .9 Submit three hard copies and one 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.
 - .10 Submit three hard copies and one electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
 - .11 Submit three hard copies and one electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
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1.2 SHOP DRAWINGS
AND PRODUCT DATA
(Cont'd)

- .12 Submit three hard copies and one electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .13 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .14 Submit three hard copies and one electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .15 Delete information not applicable to project.
- .16 Supplement standard information to provide details applicable to project.
- .17 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .18 The review of shop drawings by the Institution is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that Institution 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 requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

1.3 SAMPLES
(Cont'd)

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

1.4 PHOTOGRAPHIC
DOCUMENTATION

- .1 Submit electronic colour digital photography in jpg format, standard resolution as directed by Departmental Representative.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: 2 locations.
 - .1 Viewpoints and their location as determined by Departmental Representative.
- .4 Frequency of photographic documentation: as directed by Departmental Representative.
 - .1 Upon completion of Work, and as directed by Departmental Representative.

1.5 CERTIFICATES
AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Safety and Insurance Board Experience Report.

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 PURPOSE .1 To ensure that both the construction project and the institutional operations may proceed without undue disruption or hindrance and that the security of the Institution is maintained at all times.
- 1.2 DEFINITIONS .1 "Contraband" means:
.1 An intoxicant, including alcoholic beverages, drugs and narcotics.
.2 A weapon or a component thereof, ammunition for a weapon, and anything that is designed to kill, injure or disable a person or that is altered so as to be capable of killing, injuring or disabling a person, when possessed without prior authorization.
.3 An explosive or a bomb or a component thereof.
.4 Any item not described in paragraphs 1.2.1.1 to 1.2.1.6 that could jeopardize the security of a Penitentiary or the safety of persons, when that item is possessed without prior authorization.
- .2 "Commercial Vehicle" means any motor vehicle used for the shipment of material, equipment and tools required for the construction project.
- .3 "CSC" means Correctional Service Canada.
- .4 "Director" means Director, Warden or Superintendent of the Institution as applicable.
- .5 "Construction Employees" means persons working for the General Contractor, the sub-contractors, equipment operators, material suppliers, testing and inspection companies and regulatory agencies.
- .6 "Departmental Representative" means the project manager from Correctional Service Canada.
- .7 "Construction Limits" means the area as shown on the contract drawings that the Contractor will be allowed to work. This area may or may not be isolated from the security area of the Institution.
- .8 "Institution" means CSC property.
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1.3 PRELIMINARY
PROCEEDINGS

- .1 Prior to the commencement of work, the Contractor shall meet with the Director or his/her representative to:
 - .1 Discuss the nature and extent of all activities involved in the Project.
 - .2 Establish mutually acceptable security procedures in accordance with this instruction and the institution's particular requirements.
- .2 Contractor shall:
 - .1 Ensure that all Construction Employees are aware of the security requirements.
 - .2 Ensure that a copy of the security requirements is always prominently on display at the job site.
 - .3 Co-operate with institutional personnel in ensuring that security requirements are observed by all Construction Employees.

1.4 CONSTRUCTION
EMPLOYEES

- .1 Submit to the Director a list of the names with date of birth of all Construction Employees to be employed on the construction site and a security clearance form for each employee.
 - .2 Allow two (2) weeks for processing of security clearances. Employees will not be admitted to the Institution without a valid security clearance in place and a recent picture identification such as a provincial driver's license. Security clearances obtained from other CSC Institutions are not valid at this Institution.
 - .3 Entry to Institutional Property will be refused to any person there may be reason to believe may be a security risk.
 - .4 Any person employed on the construction site will be subject to immediate removal from Institutional Property if they:
 - .1 Appear to be under the influence of alcohol, drugs or narcotics.
 - .2 Behave in an unusual or disorderly manner.
 - .3 Are in possession of contraband.
 - .5 Smoking shall be limited to designated smoking areas.
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- 1.5 VEHICLES .1 All unattended vehicles on CSC property shall have windows closed; doors and trunks shall be locked and keys removed. The keys shall be securely in the possession of the owner or an employee of the company that owns the vehicle.
- .2 The Director may limit at any time the number and type of vehicles allowed within the Institution.
- 1.6 PARKING .1 Parking area(s) to be used by Construction Employees will be designated by the Director. Parking in other locations will be prohibited and vehicles may be subject to removal.
- 1.7 SHIPMENTS .1 All shipments of project material, equipment and tools shall be addressed in the Contractor's name to avoid confusion with the Institution's own shipments. The Contractor must have his/her own employees on site to receive any deliveries or shipments. CSC staff will NOT accept receipt of deliveries or shipments of any material, equipment or tools.
- 1.8 WORK HOURS .1 Work hours within the Institution are: Monday to Friday 08:00 to 16:00.
- .2 Work will not be permitted during weekends and statutory holidays without the permission of the Director. A minimum of seven days advance notice will be required to obtain the required permission. In case of emergencies or other special circumstances, this advance notice may be waived by the Director.
- 1.9 OVERTIME WORK .1 No overtime work will be allowed without permission of the Director. Give a minimum forty-eight (48) hours advance notice when overtime work on the construction project is necessary and approved. If overtime work is required because of an emergency such as the completion of a concrete pour or work to make the construction safe and secure, the Contractor shall advise the Director as soon as this condition is known and follow the directions given by the Director. Costs to the Crown for such events may be attributed to the Contractor.
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1.14 MOVEMENT OF VEHICLES

.1 The Contractor shall advise the Director forty-eight (48) hours in advance to the arrival on the site of heavy equipment such as concrete trucks, cranes, etc.

.2 Vehicles shall be refused access to Institutional Property if, in the opinion of the Director, they contain any article which may jeopardize the security of the Institution.

1.15 SURVEILLANCE AND INSPECTION

.1 Construction activities and all related movement of personnel and vehicles will be subject to surveillance and inspection by CSC security staff members to ensure that established security requirements are met.

.2 CSC staff members will ensure that an understanding of the need to carry out surveillance and inspections, as specified above, is established among Construction Employees and maintained throughout the construction project.

1.16 STOPPAGE OF WORK

.1 The Director may request at any time that the Contractor, his/her employees, sub-contractors and their employees not enter or leave the work site immediately due to a security situation occurring within the Institution. The Contractor's site supervisor shall note the name of the staff member making the request and the time of the request and obey the order as quickly as possible.

.2 The Contractor shall advise the Departmental Representative within 24 hours of this delay to the progress of the work.

1.17 COMPLETION OF CONSTRUCTION PROJECT

.1 Upon completion of the construction project or, when applicable, the takeover of a facility, the Contractor shall remove all remaining construction material, tools and equipment that are not specified to remain in the Institution as part of the construction contract.

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 2015 (NBC):
 - .1 NBC 2010, Division B, Part 8 Safety Measures at Construction and Demolition Sites.
- .3 National Fire Code 2015 (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§ion=text.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00.
- .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 operation found in work plan.
 - .3 Measures and controls to be implemented to address identified safety hazards and risks.
- .3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 10 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.

1.2 ACTION AND
INFORMATIONAL
SUBMITTALS
(Cont'd)

- .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 one copie of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative and authority having jurisdiction, .
- .6 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.
- .7 Submit copies of incident and accident reports.
- .8 Submit Material Safety Data Sheets (MSDS).
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

1.3 FILING OF
NOTICE

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

1.4 SAFETY
ASSESSMENT

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

1.5 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.6 REGULATORY
REQUIREMENTS

- .1 Comply with the Acts and regulations of the Province of Ontario.
 - .2 Comply with specified standards and regulations to ensure safe operations at site.
-

1.7 GENERAL
REQUIREMENTS

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

1.8 COMPLIANCE
REQUIREMENTS

- .1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990 Chapter 0.1, as amended.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.9 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 and Regulations for Construction Projects for the Province of Ontario.

1.10 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.
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1.10 UNFORSEEN HAZARDS
(Cont'd) .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.

1.11 POSTING OF DOCUMENTS .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with Departmental Representative.

- .1 Contractor's Safety Policy.
- .2 Constructor's Name.
- .3 Notice of Project.
- .4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).
- .5 Ministry of Labour Orders and reports.
- .6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.
- .7 Address and phone number of nearest Ministry of Labour office.
- .8 Material Safety Data Sheets.
- .9 Written Emergency Response Plan.
- .10 Site Specific Safety Plan.
- .11 Valid certificate of first aider on duty.
- .12 WSIB "In Case of Injury At Work" poster.
- .13 Location of toilet and cleanup facilities.

1.12 CORRECTION OF 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.

1.13 BLASTING .1 Blasting or other use of explosives is not permitted.

1.14 POWDER ACTUATED DEVICES .1 Use of powder actuated devices is not permitted.

1.15 WORK STOPPAGE .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

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 REFERENCES

- .1 OPSS 1860 (apr 2012) Material Specifications for Geotextiles
- .2 OPSS 506 (nov 2013) Construction Specifications for Dust Suppressants

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00.
 - .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 task.
 - .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.
-

1.3 ACTION AND
INFORMATIONAL
SUBMITTALS
(Cont'd)

.5 (Cont'd)

.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, Provincial, and Municipal laws and regulations .

.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 or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

1.6 SITE CLEARING
AND PLANT
PROTECTION
(Cont'd)

.5 Restrict tree removal to areas indicated or designated by Departmental Representative.

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.

.1 Provide temporary enclosures where indicated directed by Departmental Representative.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

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 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

PART 3 - EXECUTION

3.1 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11.
 - .1 Leave Work area clean at end of each day.
- .2 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

PART 1 - GENERAL

- 1.1 REFERENCES AND CODES .1 Perform Work in accordance with National Building Code of Canada (NBC) 2015, National Fire Code of Canada (NFC) 2015 and Ontario Building Code (OBC) 2012, including all amendments up to bid closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply as directed by the Departmental Representative.
- .2 Meet or exceed requirements of:
.1 Contract documents.
.2 Specified standards, codes and referenced documents.
- 1.2 HAZARDOUS MATERIAL DISCOVERY .1 Stop work immediately and notify Departmental Representative if materials which may contain designated substances or PCB's are discovered in course of work.
- 1.3 BUILDING SMOKING ENVIRONMENT .1 Comply with smoking restrictions and municipal bylaws.
- 1.9 TAXES .1 Pay applicable Federal, Provincial and Municipal taxes.
- 1.10 EXAMINATION .1 Examine existing conditions and determine conditions affecting work.

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 INSPECTION

- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.2 PROCEDURES

- .1 Provide labour and facilities to complete equipment startup in accordance with manufacturer's written instructions.
- .2 Complete startup report indicating tested equipment functions and results.

1.3 REJECTED WORK

- .1 Remove defective Work, whether result of poor workmanship, use of defective products, or damage, whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
 - .2 Make good all damage caused by work.
-

1.3 REJECTED WORK .3 If in opinion of Departmental Representative it is
(Cont'd) not expedient to correct defective Work or Work
not performed in accordance with Contract
Documents, Departmental Representative may deduct
from Contract Amount difference in value between
Work performed and that called for by Contract
Documents, amount of which shall be determined by
Departmental Representative.

1.4 REPORTS .1 Submit copies of inspection and startup reports to
Departmental Representative.
.2 Provide copies to Subcontractor of work being
inspected or tested, manufacturer or fabricator of
material being inspected or tested.

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 International)
.1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
.2 CSA 0121-08(R2013), Douglas Fir Plywood.
.3 CSA Z797-09(R2014), Code of practice for Access Scaffold.
.4 CAN/CSA-Z321-96(R2006), Signs and Symbols for the Occupational Environment, withdrawn but still available from CSA, CCOHS and Techstreet.
- 1.2 SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00.
- 1.3 INSTALLATION AND REMOVAL .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
.2 Identify areas which have to be gravelled to prevent tracking of mud.
.3 Indicate use of supplemental or other staging area.
.4 Provide construction facilities in order to execute work expeditiously.
.5 Remove from site all such work after use.
- 1.4 SITE STORAGE/LOADING .1 Confine work and operations of employees to areas defined by Contract Documents. Do not unreasonably encumber premises with products.
.2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.
- 1.5 CONSTRUCTION PARKING .1 Parking will be permitted on site within a designated area for designated number of vehicles by Departmental Representative.
-

- 1.9 PROTECTION AND MAINTENANCE OF TRAFFIC
(Cont'd)
- .5 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
 - .6 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
 - .7 Dust control: adequate to ensure safe operation at all times.

- 1.10 CLEAN-UP
- .1 Remove construction debris, waste materials, packaging material from work site daily.
 - .2 Clean dirt or mud tracked onto paved or surfaced roadways.
 - .3 Store materials resulting from demolition activities that are salvageable.
 - .4 Stack stored new or salvaged material.

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 RELATED SECTIONS .1 Section 01 52 00 - Construction Facilities.
- 1.2 REFERENCES .1 Canadian General Standards Board (CGSB):
.1 CAN/CGSB-1.189-2000, Exterior Alkyd Primer for Wood.
.2 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel.
.2 Canadian Standards Association (CSA):
.1 CSA 0121-08(R2013), Douglas Fir Plywood.
- 1.3 INSTALLATION AND REMOVAL .1 Provide temporary controls in order to execute Work expeditiously.
.2 Remove from site all such work after use.
- 1.4 HOARDING .1 Erect temporary site enclosure using new 1.2 m high snow fence wired to rolled steel "T" bar fence posts spaced at 2.4 m o.c. Provide one lockable truck gate. Maintain fence in good repair.
.2 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.
- 1.5 GUARD RAILS AND BARRICADES .1 Provide secure, rigid guard rails and barricades around deep excavations.
.2 Provide as required by governing authorities .
- 1.6 ACCESS TO SITE .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.
-

- 1.7 PUBLIC TRAFFIC FLOW .1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect the public.
- 1.8 FIRE ROUTES .1 Maintain access to property including overhead clearances for use by emergency response vehicles.
- 1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY .1 Protect surrounding private and public property from damage during performance of Work.
.2 Be responsible for damage incurred.
- 1.10 PROTECTION OF BUILDING FINISHES .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
.2 Provide necessary screens, covers, and hoardings.
.3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.
.4 Be responsible for damage incurred due to lack of or improper protection.

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 SECTION
INCLUDES

- .1 Progressive cleaning.
- .2 Final cleaning.

1.2 PROJECT
CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner or other Contractors.
 - .2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
 - .3 Clear snow and ice from access to building, bank/pile snow in designated areas only remove from site.
 - .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
 - .5 Provide on-site containers for collection of waste materials and debris.
 - .6 Provide and use clearly marked separate bins for recycling. Refer to Section 01 74 20.
 - .7 Remove waste material and debris from site and deposit in waste container at end of each working day.
 - .8 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.
 - .9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
 - .10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
 - .11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
-

1.2 PROJECT
CLEANLINESS
(Cont'd)

- .12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 FINAL CLEANING

- .1 When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review, remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris other than that caused by Owner or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.
- .9 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .10 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .11 Remove dirt and other disfiguration from exterior surfaces.
- .12 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .13 Sweep and wash clean paved areas.

- 1.3 FINAL CLEANING
(Cont'd)
- .14 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.
 - .15 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
 - .16 Remove snow and ice from access to building.

PART 2 - PRODUCTS

- 2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

- 3.1 NOT USED .1 Not Used.
\$END

PART 1 - GENERAL

- 1.1 CONSTRUCTION & DEMOLITION WASTE
- .1 Carefully deconstruct and source separate materials/equipment and divert, from demolition and construction waste destined for landfill to maximum extent possible. On site sales are not permitted.
 - .2 Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.
 - .1 Provide facilities for collection, handling and storage of source separated wastes.
 - .2 Source separate the following waste:
 - .1 Brick and portland cement concrete.
 - .2 Corrugated cardboard.
 - .3 Wood, not including painted or treated wood or laminated wood.
 - .4 Gypsum board, unpainted.
 - .5 Steel.
 - .3 Submit proof that all waste is being disposed of at a licensed land fill site or waste transfer site. A copy of the disposal/waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.

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)
 - .1 CSA B149.1-10, Natural gas and propane installation code.
 - .2 CSA C390-10, Test methods, marking requirements, and energy efficiency levels for three-phase induction motors.
- .2 American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)
 - .1 ASHRAE 90.1-13, Energy Standard for Buildings Except Low-Rise Residential Buildings (ANSI Approved; IES Co-sponsored).
- .3 Canadian General Standards Board (CGSB).
 - .1 CGSB 1-GP-181M, Coating, Zinc-Rich, Organic, Ready-Mixed.
- .4 Ontario Building Code (OBC).

1.2 General

- .1 This section covers items common to all sections of Division 20, 22, 23. Division 20 items apply to Divisions 20, 22, 23.
 - .2 All of division 01 applies to divisions 20, 22 and 23. In case of conflict, the more stringent requirement shall apply.
 - .3 Obtain and pay for all required permits and approvals.
 - .4 The following codes shall apply:
 - .1 National Building Code 2015
 - .2 National Fire Code 2015
 - .3 Ontario Building Code-12.
 - .4 Ontario Building Code; Part 7 Plumbing.
 - .5 Ontario Fire Code.
 - .6 Ontario Gas Utilization Code.
 - .7 National Fire Protection Association; N.F.P.A.
 - .8 Technical Standards and Safety Authority (T.S.S.A.) Safety Act and associated documents.
 - .5 All code references shall be the latest edition, including revisions and addenda.
 - .6 Materials and equipment to be new and free from blemishes, oxidation, damage, etc. New materials and equipment to be of proven design and quality, and for which replacement parts are readily available. Use current models of equipment.
-

- .7 It is the intent of the specification that there be one prime contractor for all of Division 20, 22, 23 work. The prime mechanical shall be responsible for all Division 20, 22, 23 subtrades. The prime mechanical shall be responsible for overall coordination and commissioning of systems.

1.3 Equipment Installation

- .1 Unions or flanges: provide for ease of maintenance and disassembly.
- .2 Space for servicing, disassembly and removal of equipment and components: provide as recommended by manufacturer or as indicated.
- .3 Equipment drains: pipe to drains, or funnel floor/hub drains.
- .4 Install equipment, rectangular cleanouts and similar items parallel to or perpendicular to building lines.
- .5 Provide and install all necessary vibration control components.
- .6 Provide and install all backflow preventers necessary to protect the potable water system.
- .7 Pipe humidifier and other interior mounted equipment drains, such as fan coils, to funnel floor/hub drains.

1.4 Anchor Bolts and Templates

- .1 Supply and install anchor bolts and templates for equipment provided by this division.

1.5 Equipment Usage

- .1 Consultant may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing. Trial usage to apply to all systems.

1.6 Definitions

- .1 This definition shall apply to all sections and drawings of Division 22, 23.
- .1 "CONCEALED" - mechanical services and equipment in hung ceilings and non-accessible chases and furred spaces.
- .2 "EXPOSED" - will mean "not concealed" as defined herein, e.g. Mechanical Rooms.
- .3 "PROVIDE" - will mean supply, installation and connection.
- .4 "T.S.S.A." shall mean "Technical Standards and Safety Authority".

1.7 Protection of Openings

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.8 Electrical

- .1 Electrical work to conform to Division 26 including the following.
- .2 Provide all controls, disconnects, magnetic starters, transformers, relays, wiring and panels for all motors and devices for packaged equipment as indicated in various specification sections.
- .3 Electrical equipment shall bear CSA labels and/or ULC approvals to comply with Ontario Hydro requirements. Conform to the requirements of the Canadian Electrical Code, Ontario Building Code, local, municipal and provincial authorities.
- .4 Control panels to be complete with barriered numbered terminal strip for interconnecting of conductors between master control panel and remote control panel and associated equipment.
- .5 Controls
 - .1 All power and control wiring, relays, transformers and wiring related to motorized dampers, thermostats, controllers, sensors, control panels, control devices, valves, pressure limit switches, etc., which are related to control systems to be provided by Division 22 and 23, unless specifically indicated on electrical drawings otherwise. Refer to electrical control schematics.
 - .2 All wiring in walls to be run in conduit. All wiring in plenum spaces to be plenum rated type FT6. Refer to Division 26 for further details.
 - .3 Control wiring to be copper conductor type RW 90 (XLPE); minimum #14 AWG for power circuits and minimum #18 AWG for control only.
 - .4 Conduit to be E.M.T. minimum 21 mm complete with set screw cast couplings. Provide ground conductor in all conduit runs.
 - .5 Use liquid tight flexible conduit for final connection to motorized dampers and vibrating equipment.
- .6 Panels to be complete with required components including but not limited to:
 - .1 One main fused switch suitable current rating for the station load. Pad lockable in both open and closed positions. Mechanically interlocked door to prevent opening when handle is in "on" position.
- .7 Ensure that electrical contractor has provided for auxiliary contacts for the building control systems.

1.9 Motors

- .1 Provide motors for mechanical equipment as specified.
-

- .2 If delivery of specified motor will delay delivery or installation of any equipment, install motor approved by Consultant for temporary use. Final acceptance of equipment will not occur until specified motor is installed.
- .3 Motors under 1/2HP: speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, 120V, unless otherwise specified or indicated.
- .4 Motors 1/2HP and larger: EEMAC Class B, squirrel cage induction, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 40°C, 3 phase, 575V, unless otherwise specified or indicated.
- .5 Motor efficiency shall be in accordance with CSA C390. Motors 1 HP and larger to be energy efficient motors conforming to ASHRAE 90.1.
- .6 Power factor correction shall apply to all motors with 3.73KW (5 hp) rating or more.
- .7 All motor starters for loads with a running ampacity (RLA) greater than 20 amps shall be of the solid state reduced voltage type with current ramp and current limit capability. Current limit shall be set at 4 times RLA and ramped to this value over a period of not less 1½ seconds.

1.10 Belt Drives

- .1 Fit reinforced belts in sheave matched to drive. Multiple belts to be matched sets.
- .2 Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise specified.
- .3 For motors under (7.5kW) 10HP: standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified r/min.
- .4 For motors (7.5 kW) 10HP and over: sheave with split tapered bushing and keyway having fixed pitch unless specifically required for item concerned. Provide sheave of correct size to suit balancing.
- .5 Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturer's design requirements on prime mover shafts.
- .6 Motor slide rail adjustment plates to allow for centre line adjustment.
- .7 Provide one complete set of spare belts for every drive supplied under this contract.

1.11 Guards

- .1 Provide guards for unprotected drives.
- .2 Guards for belt drives:
 - .1 Expanded metal screen welded to steel frame.
 - .2 Minimum 1.2 mm thick sheet metal tops and bottoms.
 - .3 38 mm dia holes on both shaft centres for insertion of tachometer.
 - .4 Removable for servicing.
- .3 Provide means to permit lubrication and use of test instruments with guards in place.
- .4 Install belt guards to allow movement of motors for adjusting belt tension.
- .5 Guard for flexible coupling:
 - .1 "U" shaped, minimum 1.6 mm thick galvanized mild steel.
 - .2 Securely fasten in place.
 - .3 Removable for servicing.
- .6 Unprotected fan inlets or outlets:
 - .1 Wire or expanded metal screen, galvanized, 19 mm mesh.
 - .2 Net free area of guard: not less than 80% of fan openings.
 - .3 Securely fasten in place.
 - .4 Removable for servicing.
- .7 Guards to meet safety requirements of Provincial Ministry of Labour and local Authorities Having Jurisdiction.

1.12 Equipment Supports

- .1 Equipment supports supplied by equipment manufacturer: specified elsewhere in Division 22, 23.
- .2 Equipment supports not by equipment manufacturer: fabricate from structural grade steel.
- .3 Provide all necessary mechanical equipment vibration control, specified or recommended by equipment manufacturer.
- .4 Size anchor bolts to withstand seismic zone acceleration and velocity forces for region of installation.
- .5 Provide seismic restraint of equipment, ducting, piping, tanks and machinery in accordance with Section 20 05 20 - Seismic Restraints.
- .6 Install base-mounted equipment on chamfered edge housekeeping pads, minimum of 100 mm (4") high and 150 mm (6") larger than equipment dimensions all around. Concrete shall be to industry standard strength, but in no case less than 25 MPa. Contractor shall enlist the services of a masonry contractor to provide all required housekeeping pads.

1.13 Sleeves

- .1 Pipe sleeves: at points where pipes pass through masonry, concrete or fire rated assemblies and as indicated.
- .2 Schedule 40 steel pipe.
- .3 Cast iron sleeves or steel sleeves with annular fin continuously welded at midpoint:
 - .1 Through foundation walls.
 - .2 Where sleeve extends above finished floor.
- .4 Sizes: maximum 6 mm ($\frac{1}{4}$ ") clearance all around, between sleeve and uninsulated pipe or between sleeve and insulation.
- .5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25 mm (1") above other floors. For equipment room floors, terminate 100 mm (4") above floor and provide concrete curb.
- .6 Fill voids around pipes:
 - .1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.
 - .2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.
 - .3 Ensure no contact between copper tube or pipe and ferrous sleeve.
 - .4 Fill future-use sleeves with lime plaster or other easily removable filler.
 - .5 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M+Amdt.
- .7 This Division shall prepare sleeving drawings indicating the size and locations of openings required in concrete floor slabs, roof slabs/decks and walls for piping, ductwork and equipment. In case of failure to provide information in time (i.e. before the concrete is poured) any extras incurred shall be at the expense of this Division.
- .8 Where ducts pass through equipment room floors, provide 100 mm (4") high concrete curb around duct allowing adequate space for fire damper sleeve and room for expansion. Concrete curbs where pipes and ducts pass through equipment room floors shall be by Division 22, 23.

1.14 Preparation for Firestopping

- .1 Firestopping material and installation within annular space between pipes, ducts, insulation and adjacent fire separation: to ULC-Listed system. Submit proposed system for review.
- .2 Uninsulated unheated pipes not subject to movement: no special preparation.

- .3 Uninsulated heated pipes subject to movement: wrap with non-combustible smooth material to permit to move without damaging firestopping material.
- .4 Insulated pipes and ducts: ensure integrity of insulation and vapour barrier at fire separation. Insulation material used to meet requirements of ULC listing of firestopping system.

1.15 Escutcheons

- .1 On pipes passing through walls, partitions, floors and ceilings in finished areas. On pipes passing through millwork and cabinetry.
- .2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws. Use cast iron type in equipment rooms.
- .3 Outside diameter to cover opening or sleeve.
- .4 Inside diameter to fit around finished pipe.
- .5 Do not use split-type escutcheon plates.
- .6 Secure to pipe on finished surface but not insulation.

1.16 Tests

- .1 Give 24h written notice of date for tests.
- .2 Insulate or conceal work only after testing and approval by Consultant.
- .3 Conduct tests in presence of Consultant or authority having jurisdiction.
- .4 Bear costs including retesting and making good.
- .5 Piping:
 - .1 General: maintain test pressure without loss for 4h unless otherwise specified.
 - .2 Hydraulically test hydronic piping systems at $1\frac{1}{2}$ times system operating pressure or minimum 860 kPa, whichever is greater.
 - .3 Test drainage, waste and vent piping to Ontario Building Code and authorities having jurisdiction.
 - .4 Test domestic hot, cold and recirculation water piping at $1\frac{1}{2}$ times system operating pressure or minimum 860 kPa, whichever is greater.
 - .5 Test natural gas system to CAN/B149.1 and requirements of authorities having jurisdiction.
 - .6 Test fire systems in accordance with NFPA & authorities having jurisdiction.
- .6 Equipment: test as specified in relevant sections.

- .7 Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures or test medium.
- .8 Provide written confirmation for each test conducted.
- .9 Provide any equipment required to conduct tests.
- .10 Test water shall be potable water and should be from a municipal system that treats water with chlorination or some other appropriate means to kill bacteria.
- .11 Test fire systems in accordance with NFPA & Authorities Having Jurisdiction.

1.17 Painting

- .1 Apply at two coats of corrosion resistant primer paint to ferrous supports and site fabricated work.
- .2 Prime and touch up marred finished paintwork to match original.
- .3 Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up. Items suffering major damage to finish shall be replaced entirely, if in the opinion of the Consultant, the damage is too extensive to be remedied by touch up.
- .4 Convector, wall fins, unit heaters, cabinet unit heaters (force flows) and other mechanical equipment exposed in finish areas shall be finish painted by manufacturer with minimum baked enamel finish. Color to be selected by Architect during shop drawing submittals.

1.18 Access Doors

- .1 Supply access doors to concealed mechanical equipment for operating, inspecting, adjusting and servicing.
- .2 Flush mounted 600 x 600 mm (24" x 24") for body entry and 300 x 300 mm (12" x 12") for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.
- .3 Material:
 - .1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by Consultant.
 - .2 Remaining areas: use prime coated steel.
- .4 Installation:
 - .1 Locate so that concealed items are accessible.
 - .2 Locate so that hand or body entry is achieved.
 - .3 Installation by Division 09.
- .5 Standard of Acceptance: Acudor UF-5000.

- .1 Alternate: Mifab UA.
- .6 Fire rated access panels: 16 ga. mounting frame, 20 gauge sandwich type insulated self-closing door with concealed hinge, 50 mm thickness of fire rated insulation in door, self latching ring pull latch, primer coated, 1½ hour rating.
 - .1 Standard of Acceptance: Acudor FW-5050.
 - .2 Alternate: Mifab MPFR.
- .7 Access doors must maintain fire rating if installed in a fire rated assembly. Refer to Architectural Drawings for location of fire rated walls and ceilings.

1.19 Dielectric Couplings

- .1 General:
 - .1 To be compatible with and to suit pressure rating of piping system.
 - .2 Where pipes of dissimilar metals are joined.
- .2 Pipes NPS 2 and under: isolating unions.
- .3 Pipes NPS 2½ and over: isolating flanges.

1.20 Drain Valves

- .1 Locate at low points and at section isolating valves unless otherwise specified. Locate so that exterior piping and coils can be drained.
- .2 Minimum NPS 3/4 unless otherwise specified: bronze, with hose end male thread and complete with cap and chain.

1.21 Demonstration and Operating and Maintenance Instructions

- .1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .2 Where specified elsewhere in Mechanical Specification, manufacturers to provide demonstrations and instructions.
- .3 Use operation and maintenance manual, as-built drawings, audio visual aids, etc. as part of instruction materials.
- .4 Instruction duration time requirements as specified in appropriate sections.
- .5 Where deemed necessary, Consultant may record these demonstrations on video tape for future reference.

- .6 Demonstration and Operating and Maintenance Instructions to building operating staff to be completed prior to requesting Certification of Substantial Performance. Provide a written certificate that all training has been completed signed by each manufacturer's representative and the Owner's representative.

1.22 Operation and Maintenance Manual

- .1 Provide operation and maintenance data for equipment supplied. Faxed copies are not acceptable. Photocopied data must be clear.
- .2 Operation and maintenance manual to be approved by, and final copies deposited with, Consultant before final inspection. Operation and Maintenance Manuals shall be prepared in English.
- .3 Operation data to include:
 - .1 Control schematics for each system including environmental controls.
 - .2 Description of each system and its controls.
 - .3 Description of operation of each system at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for each system and each component.
 - .5 Description of actions to be taken in event of equipment failure.
 - .6 Valves schedule and flow diagram.
 - .7 Colour coding chart.
 - .8 Symbol and legend description.
- .4 Maintenance data shall include:
 - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
 - .3 Replacement parts list.
 - .4 Warranties.
- .5 Performance data to include:
 - .1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified elsewhere.
 - .4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
- .6 Approvals:
 - .1 Submit 1 copy of draft Operation and Maintenance Manual to Consultant for review. Submission of individual data will not be accepted unless so directed by Consultant. Manual must be compiled in a hard cover, 3-ring, 'D' ring binder complete with inside pockets, index page and index tabs. The name of the project must be clearly visible on the front and spine of each binder.
 - .2 Make changes as required and re-submit as directed by Consultant.
 - .3 Submit four (4) copies of the approved operation and maintenance manual to the Consultant two weeks prior to substantial completion.

- .7 Additional data:
 - .1 Prepare and insert into operation and maintenance manual when need for same becomes apparent during demonstrations and instructions specified above.
 - .2 The contact information (name, address, contact, telephone number, fax number) of the Mechanical and all Sub-Contractors and all suppliers must be included in the manual.
- .8 Conform also to Section 01 77 00 - Closeout Procedures.

1.23 Shop Drawings and Product Data

- .1 Submit 6 copies of shop drawings and product data for equipment supplied. Refer to Section 01 33 00 - Submittal Procedures.
 - .1 Faxed copies of equipment data will not be accepted.
 - .2 Shop drawings indicating a range of models and sizes with no selection shown will not be accepted.
- .2 Shop drawings and product data shall show:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances. eg. access door swing spaces.
 - .3 Make model and nameplate data for each piece of equipment.
 - .4 Size and capacity of each piece of equipment.
 - .5 Electrical characteristics.
- .3 Shop drawings and product data shall be accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify as to current model production.
 - .5 Certification of compliance to applicable codes.
 - .6 All operating and performance data indicated in relevant specification sections.
- .4 Shop drawings shall be submitted by specification section. Do not combine more than one section into one submission.
- .5 Shop drawings shall indicate clearly the materials and/or equipment actually being supplied, all details of construction, accurate dimensions, capacity, operating characteristics and performance. Each shop drawing shall give the identifying number of the specific pump, fan, etc. for which it was prepared (e.g. fan F-7).
- .6 Each shop drawing for non-catalogue items shall be prepared specifically for this project. Shop drawings and brochures for catalogue items shall be marked clearly to show the items being supplied.

- .7 Each shop drawing or catalogue sheet shall be stamped and signed by the contractor to indicate that he has checked the drawing for conformance with all requirements of the drawings and specifications, that he has co-ordinated this equipment with other equipment to which it is attached and/or connected and that he has verified all dimensions to ensure the proper installation of equipment within the available space and without interference with the work of other trades. Ensure that electrical co-ordination is complete before submitting drawings for review. If shop drawings are submitted without the contractors stamp and initials, or it is apparent that the contractor has not completed their review, the shop drawings will be returned by the Consultant and identified to be resubmitted.
- .8 Installation of any equipment shall not start until after final review of shop drawings by the Consultant has been obtained.
- .9 When requested, shop drawings shall be supplemented by data explaining the theory of operation - for example: a variable speed motor control - the Consultant may also request that this information be added to the maintenance and operating manual.
- .10 Provide a lead sheet with the project name, issue date, issue number, specification section number, title of section and with space for shop drawing review stamps for the Contractor and Consultant.
- .11 One original shop drawing will be returned. All copies required for the trades, suppliers or other consultants will be printed by the Contractor.
- .12 Any equipment data, requested calculations, written certifications or other similar information specified or shown on the drawings shall be included with shop drawing submittals.
- .13 The Contractor shall make notations with respect to the following aspects and any other deviations from the contract documents:
 - .1 Deviation from specified performance, electrical requirements and equipment specified.
 - .2 Changes in dimensions from equipment indicated or specified, including confirmation that equipment will fit into space allotted. Contractor shall provide written notation how deviations are being addressed and what coordination with other affected trades has been or will be undertaken.
- .14 Consultant review of shop drawings is for general conformance only, and does not relieve the contractor from meeting all aspects of specification. The contractor is solely responsible for the completeness, correctness, and all information presented on shop drawings. There shall be no additional cost to Project for failure of the consultant to complete a thorough review of shop drawings for compliance. The contractor shall not assume consultant has performed a thorough review and the contractor shall be ultimately responsible for completeness of shop drawings and the equipment conformance with specifications.

- .15 Shop drawings shall be submitted in order of delivery requirements. That is, the items which have long deliveries or are to be installed first shall be submitted first. Not all shop drawings shall be submitted at once. The contractor shall coordinate the sequence of submittals with the Consultant at start of project. The Consultant requires 2 weeks to review individual submissions. For submission of complete systems or for multiple units, such as fan coils submissions, the Consultant requires 3 weeks for their review. The Contractor shall allow for Consultant review times in their schedule.

1.24 Cleaning

- .1 Clean interior and exterior of all systems including strainers.
- .2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition including replacement of all filters in all air and piping systems.
- .3 Upon completion remove temporary protection. Remove stains and smudges from paint work. Wash and polish plumbing fixtures.
- .4 During the course of construction, each - Subcontractor shall keep his work tidy and not allow an accumulation of debris resulting from his work.
- .5 Upon completion of this work he shall leave the premises in a broom clean condition.
- .6 Replace broken, damaged or scratched fixtures.

1.25 As-built Drawings

- .1 Site records:
- .1 The Consultant will provide the mechanical contractor with two extra sets of white prints on which the mechanical contractor shall clearly mark, as the job progresses, all changes and deviations from that shown on contract drawings. This shall also include changes to existing mechanical systems, control systems and low voltage control wiring. It will not be sufficient to check off line locations. Definite measurements shall be taken for each service line. Drawings shall be kept up-to-date during construction and in addition to field measurements shall include variation orders, field instructions and all other changes. On completion of the building, the mechanical contractor shall forward to the Consultant the two sets of drawings indicating all such changes and deviations for review by the Consultant.
- .2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.
- .3 Use different colour waterproof ink for each service.
- .4 Make available for reference purposes and inspection at all times.
- .2 As-built drawings:

- .1 Prior to start of Testing, Adjusting and Balancing (TAB), finalize production of as-built drawings.
 - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (date).
 - .3 Submit to Consultant for approval and make corrections as directed.
 - .4 TAB to be performed using as-built drawings.
 - .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- .3 Submit copies of as-built drawings for inclusion in final TAB report.
- .4 CAD As-builts
- .1 Mechanical Contractor shall, at the end of the project update the original CAD drawing files to as-built drawings at no extra cost.
 - .2 CAD as-built drawings shall follow the same layering convention and symbology as the original drawing.
 - .3 Revised CAD files will be reviewed by the Consultant and drawings shall be plotted by Mechanical contractor at no extra cost.
 - .4 The project will remain incomplete and a holdback will be retained until satisfactory as-built drawings and data storage devices are provided.
 - .5 Final as-builts prints/plots shall not contain markings or corrections by hand (i.e. marker, pen, pencil, etc.). Drawings containing mark-ups shall be revised on computer and printed/ plotted. Provide two sets of data storage device and two sets of prints to the Owner.

1.26 Examination of Site and Information

- .1 The contractor, before tendering shall examine the site, the existing building construction and services, the Architectural, Structural, Mechanical and Electrical drawings and he shall familiarize himself with the building construction and finish in order that his tender may include everything necessary for the proper completion of the work.
- .2 It shall be this contractor's responsibility that material and equipment be brought in such assemblies and sizes as to enter into the spaces where they are to be located and to be small enough to be hoisted onto the building without difficulty. Any cutting, patching, etc. involved in getting large assemblies into place shall be the responsibility of this contractor. Coordinate equipment installation access with Architectural.

- .3 Immediately inform the Consultant, in writing, of all discrepancies, errors, omissions, contradictions and ambiguities. The necessary Addendum or bulletin will be issued to all Bidders. Include a complete cross-checking of Drawing and Specifications for sizes and quantities to correspond correctly. Data mentioned in the Specifications and not shown on Drawings, and vice-versa, must be interpreted as part of the Work. Oral, telephone or "Faxed" instructions are not valid. Bring obvious discrepancies or omissions to the attention of the Consultant during the Tender Period. Questions may be presented by bidders up to time of tender closing. Questions presented near this time may not be answered. Where the contractor is not able to obtain directions on questions, they shall prepare quotation based on specifications or drawings and include all items required to comply. Where discrepancies still exist within the documents, contractors shall allow for the more demanding installation, more stringent requirement or more expensive equipment specification. Contractors shall instruct all suppliers and distributors of this time limitation.
- .4 The drawings and specifications are intended to describe complete working systems including all necessary labour and materials. Where items required to complete working system are not specified or showing on drawings, contractor shall include costs at no additional expense to Project.

1.27 Cutting and Remedial Work

- .1 Assume full responsibility for laying out mechanical work and for any damage caused by incorrectly located equipment and mechanical services.

1.28 Co-ordination

- .1 Locate distribution systems, equipment and materials to provide minimum interference and maximum useable space.
- .2 Where interference occurs, Consultant shall approve relocation of equipment and materials.
- .3 This contractor shall notify other Subcontractors who are concerned, of all openings, foundation work, hangers, inserts, anchors, or other provisions necessary in their work for the installation of this work and he shall furnish all information and necessary materials in ample time so that proper provisions can be made for same, and shall supply and correctly and accurately place all inserts, sleeves, anchors, etc.
- .4 Division 20 shall supply inserts, hangers, sleeves, anchors, etc. which must be placed within concrete forms to other subcontractors that are concerned. Division 20 shall inform responsible contractor of locations. Where anchors are required to be drilled and placed, Division 20 shall be responsible for their supply and installation. Pipe hangers and supports listed in Section 20 05 29 - Pipe Hangers and Supports shall be provided by Mechanical Contractor.

- .5 Enlist the services of an excavation contractor to provide all required excavation, trenching, and backfilling required for the work of Division 20, 22, 23. Division 20, 22, 23 shall coordinate the work of the excavation contractor for their required work. Divisions 20, 22, 23 shall be responsible for laying out excavation work and advising excavation contractor of required grades.

1.29 Requirements of Inspection Departments

- .1 All work shall be installed in accordance with all laws and regulations of all authorities having jurisdiction in each case, particularly all affected departments of the Municipality and Province. Electrical equipment supplied must conform to the regulations of CSA and the local utility. Anything necessary to make the work comply with these requirements shall be provided by this contractor without additional cost to the Project if reasonably could have been foreseen when tendering.
- .2 The contractor shall prepare drawings in addition to Consultant's drawings as may be required by various Inspection Departments having jurisdiction, and obtain their approval before proceeding with the work.
- .3 In the event that the Inspection Department's request deviates from the Consultant's layout, contractor shall consult the Consultant before proceeding with same.
- .4 Provide all inspection certificates prior to request for substantial completion. Include copy of inspection certificates in Operation and Maintenance Manuals.

1.30 Drawings

- .1 The drawings shall be considered to show the general character and scope of the work and not the exact details of the installation. The installation shall be complete with all accessories required for a complete and operative installation.
- .2 The drawings show the approximate location for the special apparatus and the materials throughout the building. The arrangement shown on the drawings is more or less diagrammatic and as such approximate only, and may be altered, as approved by the Consultant, to meet the requirements of the apparatus, etc., and of the building. Each Subcontractor shall be held responsible for all measurements for his work throughout, and he shall arrange his piping, wiring and apparatus to conform to the Architectural and Structural details in a satisfactory manner and shall cooperate with other contractors to ensure that work shall meet all requirements of diverse Contracts.
- .3 The contractor is particularly cautioned that small scale Consultant's plans must be supplemented by his own detail drawings where necessary for proper coordination of the work.

- .4 Items shown on the drawings but not specified or specified but not shown shall be included.
- .5 Items obviously required to provide a complete working system, but not specified nor shown shall be included.
- .6 In order to show more clearly the arrangement of the work, plans and sections do not show every valve, thermometer, pressure gauge or other system accessory. Refer to the Mechanical Standards details and to the specifications to determine the requirements.
- .7 Certain details indicated on the drawings are general in nature and specific labelled detail references to each and every occurrence of use are not indicated, however, such details shall be applicable to every occurrence on the drawings.
- .8 The location and size of existing services shown on the drawings are based on the best available information. The actual location of existing services shall be verified in the field before work is commenced. Particular attention shall be paid to buried services.
- .9 Changes and modifications necessary to ensure co-ordination and to avoid interference and conflicts with other trades, or to accommodate existing conditions, shall be made at no extra cost to the Project.
- .10 Leave areas clear of piping and ducts where space is indicated reserved for future equipment, and equipment for other trades.
- .11 Adequate space and provisions shall be left for removal of coils and servicing of equipment, with minimum inconvenience to the operation of systems.
- .12 Before fabricating piping or ducting for installation, make certain that such items can be installed as shown on the drawings without interfering with the structure or the work of all other trades. Any problems that cannot be solved in agreement with the other trades affected, shall be submitted for decision. If piping or ducting is prefabricated prior to the investigation and reaching of a solution to possible interference problems, necessary changes in such prefabricated items shall be made at no extra cost to the Project.
- .13 Off-sets in piping or ducting may not be indicated in all cases, but are to be included in the contract as required.
- .14 All piping and ductwork in finished areas shall be concealed in ceiling spaces and shafts or chased into walls. No exposed piping or ductwork shall be installed in such areas unless specifically reviewed by the Consultant. No piping shall be concealed in outside walls.
- .15 Vent pipes, exhaust hoods or other mechanical equipment mounted on roof, or housing for such equipment, shall not be closer to the edge of roof than 6'-0", unless specifically reviewed by the Consultant.

- .16 The actual location of thermostats, switches, etc. shall be reviewed by the Consultant before installation.
- .17 Where equipment is shown to be 'roughed-in only' obtain accurate information from the Consultant before proceeding with the work.

1.31 Installation, Interference and Setting Drawings

- .1 Installation, interference and setting drawings dimensioned and to scale, shall be submitted for review to the Consultant, as may be required or requested by the Consultant to make clear the work intended or to show its relation to adjacent work or to the work of other trades. When an alternative piece of equipment is to be substituted for equipment shown, drawings of the area involved shall be prepared by this division. Three copies of such drawings shall be submitted for review, of which one will be retained by the Consultant.
- .2 Installation working drawings to 1:50 scale for the mechanical room showing plan and sections of the plant, services, bases, curbs, drains, motor terminals, shall be prepared by this division.
- .3 Interference drawings are required for shafts, ceiling spaces and wherever there is possible conflict in the positioning of mechanical equipment, piping, ductwork subtrades or architectural features.
- .4 The design of the structural framing of the mechanical equipment and major pipe run supports has been based on assumed loadings supplied during the design phase. Well ahead of the construction of the affected areas, prepare and submit drawings for review to the Consultant showing the layout and weights of all finally selected mechanical equipment including details of concrete pads, concentrated pipe loads and point reactions of the equipment onto the structure. Structural design has been based on equipment listed by model number. Alternate equipment shall not exceed weight and dimensions of equipment listed without prior approval of Consultant. If alternate equipment is not approved by Consultant, contractor shall supply equipment listed at no additional cost to project. If alternate equipment is selected, contractor shall provide all structural revisions necessary and pay all cost including engineering.
- .5 Pump capacities, control valve sizing, etc., have been based on equipment specified. Upon submission of shop drawings, contractor shall review with consultant all design and equipment changes and where required to accommodate design or equipment changes contractor shall consult and revise equipment capacities as required. There shall be no extra cost to Project for changes to equipment to accommodate changes discussed above. No installations shall proceed until this coordination has been completed.

1.32 Alternates

- .1 Tenders shall be prepared only on the basis of specified or listed equivalent material.
- .2 The design, space allocation, orientation, piping, control systems, etc., are arranged to suit the material and equipment named by model number in the text of the specifications and shown on the drawings. Assume responsibility for adjustments or extension of the work of this or other Division necessary for the accommodation of equivalent or substitute equipment.
- .3 Structural design has been based on equipment listed by model number. Alternate equipment shall not exceed weight and dimensions of equipment listed without prior approval of Consultant. If alternate equipment is not approved by Consultant, Contractor shall supply equipment listed at no additional cost to project. If alternate equipment is selected, contractor shall provide all structural revisions necessary and pay all cost including engineering.

1.33 Energy Consumption

- .1 Submitted proposed equipment may be rejected on a basis of performance or energy consumed or demanded.

1.34 Conformance

- .1 Materials specified by referenced standard, select any material that meets or exceeds the specified standard.
 - .2 Materials specified by "Prescriptive" or "Performance" specification, select any material meeting or exceeding specification.
 - .3 When materials are specified by a Standard, Prescriptive or Performance specifications, upon request of the Consultant, obtain from manufacturer an independent testing laboratory report showing that the material or equipment meets or exceeds the specified requirements.
 - .4 Materials specified by naming one or more materials, select any material named. Where only one name appears in the specification, the tender shall include for the specified equipment. For the purpose of these specifications, the term "Acceptable Material" is deemed to be a complete and working commodity as described by a manufacturer's name, catalogue number, trade name or any combination thereof.
 - .5 Manufacturers or subcontractors specified by naming one or more, select any one named. Where only one name appears in the specification, the tender shall include for the specified name.
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1.35 Statement of Prices

- .1 To form a basis for progress payments the successful bidder shall submit a statement of his estimated prices for the various portions of the work, including labour, materials and equipment shown separately. The total price of all portions of the work shall equal the total price of the work covered under the mechanical division.
- .2 The successful bidder shall confer with the Consultant to determine the breakdown of work for this contract.
- .3 The breakdown shall have commissioning cost separated. A minimum of 2% of the contract value shall be assigned for commissioning.
- .4 Equipment values shall not be paid out in full until the equipment is commissioned and working as intended by the design. Ten percent of the equipment value will be held back until such time that the equipment is commissioned and all closeout documentation requested is also submitted.

1.36 Metric Conversions

- .1 Particular care shall be taken with imperial versus S.I. metric conversions. This applies to all services including, but not limited to, equipment, pipes, ductwork and site services in both new and existing installations.
- .2 When converting from one form of measure to the other, do not round-off numbers.

1.37 ASHRAE 90.1

- .1 All mechanical equipment must meet the minimum efficiency standards set out in ASHRAE 90.1. Submit all necessary information to substantiate conformance.

1.38 Schedule

- .1 This contractor shall provide a schedule outlining all aspects of the work in sufficient detail to track the progress of the work. Include all critical dates, including delivery to and return of shop drawings to Consultant, inspection dates, dates for training and commissioning systems. Submit schedule to Consultant for review at start of project.
 - .2 Contractor shall review schedule on a regular basis and at each construction meeting. The contractor shall provide additional workers as required to meet the schedule. Update schedule as required in conjunction with General Contractor and Consultant.
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1.39 Pipe Troughs

- .1 Avoid running piping above electrical, telephone and server rooms. If unavoidable provide pipe troughs beneath piping.
- .2 Provide galvanized steel troughs below all pipes or groups of pipes passing over electrical, telephone and server rooms.
- .3 Troughs to be fabricated from 1.0mm (20 ga.) galvanized steel, formed wide enough to catch drips from piping.
- .4 Troughs to be adequately supported and sloped for positive drainage. Provide low point drain and pipe to nearest funnel floor drain, hub drain or janitor sink.

1.40 Hoisting and Rigging

- .1 Provide and arrange for transportation, of all equipment and materials to site, and for the rigging, hoisting, storing and setting in place of equipment.

1.41 Workmanship and Qualifications of Workers

- .1 Perform the work in a neat and careful manner so that items are installed, and will remain, plumb, square and straight. Items not so installed will be rejected and redone at no extra cost to the Consultant.
 - .2 When required either by the specifications or manufacturers instructions, have manufacturer or his accredited agent or the supplier supervise the work.
 - .3 Provide qualified tradespeople to perform all the work. Provide an on site supervisor to supervise the work of Division 20, 22, 23. When requested of the Consultant provide documentation demonstrating experience of tradespeople and supervisor. If tradesperson or supervisor does not have adequate experience or qualifications remove from site and provide suitable replacement. Site supervisor to have minimum of 10 years of experience with demonstrated supervisory experience on similar sized projects. Provide resume of site supervisor to Consultant prior to start of project. Consultant has the right to reject or remove at any time any worker or site supervisory if in his opinion the individual does not possess the required experience or qualifications. When a personnel has been removed or rejected provide suitable replacement.
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1.42 Certificates, Permits & Fees

- .1 The contractor shall give all necessary notices, obtain all required permits, and pay all fees, in order that the work herein specified may be carried out, and he shall furnish any certificates needed as evidence that the work installed conforms with the laws and regulations of the Municipality and Province and as approved by the local utility.

1.43 Special Tools

- .1 Provide one set of special tools required to service equipment as recommended by manufacturers.

1.44 Inspection/ Takeover Procedures

- .1 Conform to General Instruction Section and Closeout Procedures specification sections.
 - .2 Contractor's Inspection: The Contractor and all Subcontractors shall conduct an inspection of the Work, identify deficiencies and defects; repair as required. Notify the Consultant in writing of satisfactory completion of the contractor's Inspection and that corrections have been made. Request a Consultant's review.
 - .3 Consultant's review: Consultant and the Contractor will perform an review of the Work to identify obvious defects or deficiencies. The contractor shall correct Work accordingly. If during the Consultant's review it is obvious that the work is incomplete, the Consultant will notify the Contractor without provision of a deficiency list and the contractor shall complete and correct deficiencies as per item 1.
 - .4 Final Review: When the items noted above are complete, request a final review of the Work by the Consultant. If Work is deemed incomplete by the Consultant, complete the outstanding items and request another review.
 - .5 Declaration of Substantial Performance: When the Consultant considers that deficiencies and defects have been corrected and it appears requirements of the Contract have been substantially performed, make application for Certificate of Substantial Performance. All other requirements noted elsewhere shall be completed prior to request for Certificate of Substantial Completion.
 - .6 Do not apply for substantial performance until:
 - .1 All systems are complete and operational.
 - .2 All systems have been commissioned and successfully past testing over the entire range of their operating capacities under automatic control. (Note: seasonal or environmental conditions resulting in the delay of some testing will be accommodated by issuance of conditional certificate).
 - .3 Commissioning and testing reports have been submitted for the Consultant's review.
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- .4 Air and water balancing has been completed and reports have been submitted for the Consultant's review.
- .5 "As-built" and/or record drawings have been prepared and submitted for the Consultant's review.
- .6 Final Operations and Maintenance Manuals have been prepared and submitted to the Consultant.
- .7 The Owner, operating and maintenance personnel have received training on all systems and equipment and the required certificate has been submitted to the Consultant.
- .8 Packaged rooftop air conditioning unit certification and training session.
- .9 Packaged rooftop VAV unit certification and training session.
- .10 Controls verification and training session.
- .11 Boiler certification and training session.

1.45 Schedule, Access, Protection and Clean-up

- .1 The construction schedule places restrictions on the duration of construction within areas and the duration of shut-down of equipment. Refer to the General Requirements and General contractor for all requirements.
- .2 Access to the site is limited to location and time of day. Access to areas of the building is limited to location and time of day. Refer to the General Requirements for all requirements.
- .3 Refer to the security and protection requirements in the General Requirements, conform to all requirements. In particular no open flames shall be used without prior written approval of the Consultant. There shall be no smoking, and the site shall be kept clean at all times.
- .4 Contractor shall complete all work required in the various spaces during the time scheduled for that phase. Where work or connections are to be made into systems located in a prior phase, the contractor shall complete the work or connections outside of normal hours of operations. Contractor shall complete all work required to systems. Contractor shall place systems back into operation prior to start of normal hours of operation. Include in tender for all overtime costs.

1.46 Cutting and Patching

- .1 The cost of cutting, patching and finishing is not included in this divisions contract.
- .2 This division shall advise the trade responsible for cutting, in advance of the time required, of the location and extent of cutting required, and any other pertinent information.
- .3 This division shall advise the trade responsible for patching and finishing of any pertinent information such as, clearance requirements.

- .4 Refer also to item 27 - Coordination, and 12 - Sleeves, for other coordination requirements.
- .5 In case of costs arising to correct work, due to failure to provide coordination information on time, incorrect sizes or locations or other incorrect pertinent information, shall not be extra to Project.

1.47 Guarantee

- .1 This contractor shall guarantee all material and workmanship used in the work to be in strict accordance with the specifications, of best quality and type obtainable to give first-class construction and proper and efficient operation, and free from any defects. Any such defects which may appear in any of the work within one year after written acceptance of this work shall be repaired and replaced by this contractor without additional expense to the Owner. Where such defects occur, this contractor shall be held responsible for all costs incurred in making the defective work good.
- .2 This shall not obsolete any longer warranties on specific items of equipment.
- .3 All injuries to adjacent work particularly plaster, wood finishes or other materials, or damage to other equipment, caused by such defects of this contractor's work or by subsequent replacement and repairs, shall be made good at the expense of this contractor. All repair work shall be done by trades responsible for the original work.

1.48 Spare Parts

- .1 Furnish spare parts as specified in relevant sections.

1.49 Protection of Equipment

- .1 Temporarily protect all equipment and systems throughout construction from damage as required. Remove measures of protection at end of job.
- .2 Temporarily enclose boilers in plywood box designed and constructed to protect boiler jacketing from damage due to work above. Remove enclosures at end of job.
- .3 Any damaged equipment shall be replaced by contractor at no cost to Owner.
- .4 Do not use equipment or systems as support platforms for work above, provide necessary work platforms as required.

1.50 Existing Systems

- .1 Connections into existing systems to be made at time acceptable to Owner. Request written approval of time when connections can be made. Assume connections are to be completed outside of normal work hours and include for any overtime and premium charges.
- .2 Be responsible for damage to existing plant by this work.
- .3 Where connections are made to existing services, existing insulation shall be made good under this division.

1.51 Interruption of Services

- .1 Any interruption of mechanical services to any part of the building shall be scheduled with the Owner and General Contractor. Make all necessary arrangements with those concerned. Assume interruptions are to occur outside of normal work hours and include for any overtime required. Ensure that the interruption is held to a minimum (maximum 4 hours).
- .2 All such overtime work shall be carried out without additional cost to the Project.

1.52 Demolition

- .1 Division 20 contractor shall remove existing systems and equipment indicated on drawings. In order to determine the extent of the demolition of the existing system, the contractor, before tendering, shall examine the site and determine the extent of existing systems to be removed. The contractor shall be responsible for obtaining an understanding of the extent of the existing systems. No additional cost to the Project will be entertained due to failure of the contractor from reviewing on site the extent of the existing systems to be removed.
 - .2 The demolition drawings showing existing mechanical systems may not represent "as-built" conditions and it shall be the responsibility of the contractor to verify on site the extent of the existing systems. Contractor shall visit site and confirm extent of existing equipment and system before submitting tender price to determine extent of systems to be demolished. No extras will be allowed for failure of the contractor in completing a thorough review of the site prior to submitting tender price.
 - .3 Provide temporary equipment and systems as indicated on the drawings and remove upon completion.
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- .4 For exact details and total extent each service must be carefully checked on site. Before removing any service, follow the service through to its source to ensure other areas of the building are not adversely affected by the removal of this service. Open shafts, walls and ceilings as required to examine the service.
- .5 If there are no isolating valves readily available to isolate sections of pipe that requires removal, add valves as required. Coordinate with the facilities manager to shut-down systems. Install caps on all services. Add caps to all valves at the termination point of existing services.
- .6 Where valves are removed, remove valve tags, revise existing charts and hand tags over to facility manager.
- .7 Where services are to be removed as part of the demolition, obtain written consent from the owner before starting any work or removing any services.
- .8 Unless noted otherwise, removed equipment shall become the property of the contractor and disposed of off site at an approved location.

1.53 Abandoned Services

- .1 Within the work areas of the existing building unknown abandoned services may be encountered. Obtain clarification from the Owner regarding these services and remove any sections of services from the work areas as directed.

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 International)
 - .1 CSA-C22.1-15, Canadian Electrical Code, Part 1 (26th Edition), Safety Standard for Electrical Installations.
 - .2 CAN3-C235-83(R2006), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .2 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 The Ontario Electrical Safety Code 2015, and all bulletins (Ontario).
- .4 Hydro requirements and local applicable codes and regulations.

1.2 DESIGN REQUIREMENTS

- .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.
 - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification nameplates for control items in English.

1.3 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00.
- .2 Product Data: submit WHMIS MSDS in accordance with Section 01 47 15 and Section 02 61 33.
- .3 Quality Control: in accordance with Section 01 45 00.
 - .1 Provide CSA certified equipment and material.
 - .2 Where CSA certified equipment and material is not available, submit such equipment and material to inspection authorities for special approval before delivery to site.
 - .3 Submit test results of installed electrical systems and instrumentation.

1.3 SUBMITTALS
(Cont'd)

- .3 (Cont'd)
- .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 Inspection Department upon completion of Work to Departmental Representative.

1.4 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00.
- .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 29.06.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Material Delivery Schedule: provide Departmental Representative with schedule within 2 weeks after award of Contract.
- .2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

1.6 SYSTEM STARTUP

- .1 Instruct Departmental Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.
 - .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
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1.6 SYSTEM STARTUP (Cont'd) .3 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 aspects of its care and operation.

PART 2 - PRODUCTS

2.1 SUSTAINABLE REQUIREMENTS .1 Materials and products in accordance with Section 01 47 15.

2.2 MATERIALS AND EQUIPMENT .1 Provide material and equipment in accordance with Section 01 61 00.

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

.3 Factory assemble control panels and component assemblies.

2.3 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS .1 Control wiring and conduit: in accordance with Section 26 29 03.

2.4 WARNING SIGNS .1 Warning Signs: in accordance with requirements of inspection authorities and Departmental Representative.

.2 Decal signs, minimum size 175 x 250 mm.

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

2.6 EQUIPMENT IDENTIFICATION .1 Identify electrical equipment with nameplates as follows:

- 2.9 FINISHES
(Cont'd)
- .1 (Cont'd)
 - .1 Paint outdoor electrical equipment "equipment green".
 - .2 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1.

PART 3 - EXECUTION

- 3.1 FIELD QUALITY CONTROL
- .1 Conduct following tests in accordance with Section 01 45 00.
 - .1 Systems: fire alarm system, communications.
 - .2 Carry out tests in presence of Departmental Representative.
 - .3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
 - .4 Verification requirements in accordance with Section 01 47 17 include:
 - .1 Materials and resources.
 - .2 Storage and collection of recyclables.
 - .3 Construction waste management.
 - .4 Resource reuse.
 - .5 Recycled content.
 - .6 Local/regional materials.
 - .7 Certified wood.
 - .8 Low-emitting materials.
- 3.2 CLEANING
- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
 - .2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.
- 3.3 FIREPROOFING
- .1 Where cables or conduits pass through floors and fire rated walls proper firestopping for the specific construction shall be used. Refer to Section 07 84 00.
- 3.4 OPERATION AND MAINTENANCE DATA
- .1 Provide operation and maintenance data for incorporation into operation and maintenance manuals specified in Section 01 78 00.
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