

Part 1 General

1.1 SECTION INCLUDES

- .1 Documents and certain applicable terminology.
- .2 Associated requirements.
- .3 Work expectations.
- .4 Work by other parties.
- .5 Words and terms.
- .6 Examination
- .7 Closeout submittals
- .8 Operation and maintenance manual format.
- .9 Contents each volume.
- .10 Recording actual site conditions.
- .11 Record documents.
- .12 Warranties and bonds.
- .13 Regulations
- .14 Quality Assurance.
- .15 Demonstration and Training
- .16 Conditions for Demonstrations
- .17 Shop drawings and product data.
- .18 Samples.
- .19 Certificates and transcripts.
- .20 Product quality, availability, storage, handling, protection, and transportation.
- .21 Product changes and substitutions.
- .22 Manufacturer's instructions.
- .23 Quality of Work, coordination and fastenings.
- .24 Accessibility of Equipment
- .25 Coordination, work for other trades, electrical requirements, temporary use of equipment.
- .26 Existing facilities.

1.2 RELATED SECTIONS

- .1 Applicable sections in Division 01, including:
 - .1 Allowances
 - .2 Construction Progress Documentation.
 - .3 Submittal Procedures.
 - .4 Product Exchange Procedures.

- .5 Substitutions
- .6 Closeout Submittals.

- .2 This section describes common work applicable to all Sections within project Divisions 21, 22, 23 and 25.

1.3 COMPLEMENTARY DOCUMENTS

- .1 Drawings, specifications, and schedules are complementary to each other and what is called for by one will be binding as if called for by all.
- .2 Should any discrepancy appear between the drawings and specifications, which leaves the Contractor in doubt as to the true intent and meaning of the plans, and specifications, the Contractor shall obtain a ruling in writing from the Consultant in writing before submitting the bid. If this is not done it will be assumed that the most expensive alternative has been included in the bid price.
- .3 The drawings for mechanical work are performance drawings. They are generally diagrammatic and are not to scale unless detailed otherwise. They establish scope, material and installation quality and are not detailed installation instructions showing every offset, fitting, valve or every difficulty encountered during execution of work and will not be used as an excuse for deficiencies or omissions. Where required installations are not shown on plans or are only shown diagrammatically, install in such a way as to conserve headroom and interfere as little as possible with free use or space through which they pass, while adequate space is allowed for service, maintenance, repair, or replacement for all equipment.
- .4 Drawings indicate general location and route of new and existing mechanical systems. The review of exact location and routing of systems prior to bidding is the responsibility of the Contractor. Install piping and duct systems not exactly shown in plan or indicated by note, by graphic, or diagrammatically in schematic or riser diagrams to provide an operational assembly or system.
- .5 Install components to physically conserve headroom, to minimize furring spaces, to accommodate installed Work, or other obstructions.
- .6 Install ceiling mounted or exposed mechanical components such as diffusers, sprinkler heads and grilles in accordance with reflected ceiling drawings or floor plans.
- .7 Locate devices with primary regard for convenience of operation and usage.
- .8 Examine all discipline drawings, specifications, and schedules and related Work to ensure that Work can be satisfactorily executed. Conflicts or additional Work beyond Work described, to be brought to the attention of the Consultant.
- .9 All specification sections of the Project Manual and Drawings are affected by requirements of Division 01 sections.

1.4 DIVISION OF THE WORK

- .1 Division of the Work among other contractors, subcontractors, suppliers or vendors is solely the Contractor's responsibility. Neither the Owner nor Consultant assumes any responsibility to act as an arbiter to establish subcontract terms or disagreements between sectors or disciplines of the Work.

1.5 CONTRACT METHOD

- .1 Construct Work under the contract requirements in the applicable Division 00 sections.

- .2 Contract Documents were prepared by the Consultant for the Owner. Any use which a third party makes of the Contract Documents, or any reliance on or decisions to be made based on them, are the responsibility of such third parties. The Consultant accepts no responsibility for any damages suffered by any third party as a result of decisions made or actions based on the Contract Documents.

1.6 PERMITS, INSPECTION AND TESTING

- .1 File all necessary notices and approved layouts, obtain and pay for all Local Authority and Fire Underwriters Inspections, approvals and permits applicable to each Mechanical Section. Make changes required to secure Local Authorities approval, without extra cost. Where conflicting requirements occur, comply with most stringent regulation. Note that requirements shown or specified may exceed minimum standards set by Local Authorities.
- .2 The Regulations of the A.S.M.E. Code and the Provincial Labour Department shall cover the design, manufacture, installation, welding and tests of piping and other equipment as specified hereafter.
- .3 The owner may request the Mechanical Section to operate device or material installed for such time as Consultant may require, as a thorough test, before final acceptance. Such tests shall not be construed as evidence of acceptance, and no claim for cost of such operation for test, or damage due to inadequacy or defect will be recognized.
- .4 Note that site reviews by the Consultant are for the purpose of determining in general if the work is proceeding in accordance with the Contract Documents, and to endeavour to guard the Owner against defects and deficiencies and not to superintend the execution of the work, which is the Mechanical Contractor's and their Subcontractors' responsibility.

1.7 WORDS AND TERMS

- .1 Conform to definitions and their defined meanings as in Division 01.
- .2 Conform to the following definitions and their defined meanings in addition to those referenced in Division 01:
 - .1 **Install:** To remove from site storage, move or transport to intended location, install in position, connect to utilities, repair site caused damage, and make ready for use.
 - .2 **Supply:** To acquire or purchase, ship or transport to the site, unload, remove packaging to permit inspection for damage, re-package, replace damaged items, and safely store on-site.
 - .3 **Provide:** Wherever the term "provide" is used in relationship to equipment, piping and other materials specified for the work, it means "supply, install and connect". Wherever the terms "provide" is used in connection with services such as testing, balancing, start-up, preparation of drawings for any part of the work, it means procure, prepare, supervise, take responsibility for, and pay for these services.
 - .4 **Typical:** A representative characteristic that is standard for all installations whether individually noted or not throughout the documents. "Typical" applies to each individual or combined installation except where specifically noted or otherwise indicated that the application is non-typical.
 - .5 **Exposed:** Any work not concealed in wall, shaft, or ceiling cavities or spaces. Work behind doors, in closets or cupboards or under counters is considered exposed.

- .6 **New:** Produced from new materials.
- .7 **Renewed:** Produced or rejuvenated from an existing material to like-new condition to serve a new or existing service.
- .8 **Defective:** A condition determined exclusively by the Consultant.

1.8 EXAMINATION

- .1 Inspect existing conditions, including elements or adjacent Work subject to irregularities, damage, movement, including Work during cutting and patching.
- .2 After uncovering, inspect conditions affecting performance of the Work.
- .3 Examine all contract documents to ensure work can be performed without changes to the Work as shown on plans. No allowance will be made later for necessary changes, unless notification of interferences have been brought to Consultant's attention in writing, prior to bid closing.
- .4 Verify that materials and equipment can be delivered to the place of the work and that sufficient space and access is available to permit installation as shown on the drawings.
- .5 Verify the locations and inverts of service lines leaving and entering building to ensure their proper function prior to commencing work.

1.9 CLOSEOUT SUBMITTALS

- .1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .2 Copy will be returned with Consultant's comments.
- .3 Revise content of documents as required prior to final submittal.
- .4 Two (2) weeks prior to Substantial Performance of the Work, submit to the Consultant, three (3) final copies of operating and maintenance manuals in Canadian English.
- .5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.
- .6 If requested, furnish evidence as to type, source and quality of products provided.
- .7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .8 Pay costs of transportation.

1.10 OPERATION AND MAINTENANCE MANUAL FORMAT

- .1 Refer to Section 01 78 00 for formats for manuals.
- .2 Drawings:
 - .1 Hard Copy: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
 - .2 Digital Copy: provide on CD in DWG format based on facility's existing DWG files. Use facility's CAD standards.

1.11 CONTENTS - EACH VOLUME

- .1 Refer to Section 01 78 00 for formats for contents.

- .2 Refer to Section 01 91 51 Building Management Manual for additional requirements.
- .3 Training: Refer to 01 79 00 - Demonstration and Training in this Section.

1.12 RECORDING ACTUAL SITE CONDITIONS

- .1 Also refer to Section 01 78 00. Where this section conflicts, refer to Section 01 78 00.
- .2 Record information on a full-sized set of drawings, and within the Project Manual.
- .3 Annotate with coloured felt tip marking pens, maintaining separate colours for each major system, for recording changed information.
- .4 Record information concurrently with construction progress. Do not conceal Work of the Project until required information is accurately recorded.
- .5 Contract drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .2 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .3 Field changes of dimension and detail.
 - .4 Changes made by change orders.
 - .5 Details not on original Contract Drawings.
 - .6 References to related shop drawings and modifications.
- .6 Specifications: legibly mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
- .7 Other Documents: Maintain manufacturer's certifications, inspection certifications, field test records required by individual specifications sections.

1.13 RECORD DOCUMENTS

- .1 Prior to Substantial Performance of the Work, electronically transfer the marked-up information from the as-built documents, as follows:
 - .1 Drawings: Scan the full-sized field-verified as-built drawing set and save to PDF format. Scans shall be in colour and with good resolution to ensure drawings and markups are legible.
 - .2 Drawings: Transfer the marked-up information to AutoCAD and produce an electronic record set in Adobe Acrobat (PDF) format, as well as the AutoCAD file.
 - .3 Specifications: Adobe Acrobat (PDF).
- .2 Mark revised documents as "RECORD DOCUMENTS". Include all revisions.
- .3 Submit completed record documents to Consultant on a CD, DVD, or by electronic transfer.

1.14 WARRANTIES AND BONDS

- .1 Refer also to Section 01 78 00 for Warranties and Bonds.

- .2 Provide written guarantee that complete installation including materials, work and operation of all equipment provide under Mechanical Sections are first class in every respect, subject only to improper usage by Owner, and make good forthwith when reported all defects which develop within one year from date of acceptance of building by Owner at no additional cost to the Owner.
- .3 In addition, guarantee heating and cooling systems through one complete heating or cooling season, as applicable.
- .4 Deliver to the Owner all equipment manufacturer's guarantees specified in excess of one year.

1.15 REGULATIONS

- .1 Construction to follow the 2015 National Building Code.
- .2 Codes and standards referenced in the drawings are based on the most current edition available.

1.16 FABRICATION AND WORKMANSHIP

- .1 Employ skilled mechanics in their respective trades, under competent supervision, and where required by Provincial or Local regulations holder of acceptable qualification certificates.

1.17 QUALITY ASSURANCE

- .1 Provide testing organization services as specified in subsequent Sections.
- .2 Testing organization: Current member in good standing of their respective professional or industry organization and certified to perform specified services.
- .3 Comply with applicable procedures and standards of the certification sponsoring association.
- .4 Perform services under direction of supervisor qualified under certification requirements of sponsoring association.
- .5 Qualifications:
 - .1 Provide adequate workforce training through meetings and demonstrations.
 - .2 Provide a designated experienced person on site with de-construction experience throughout the project for consultation and supervision purposes.

1.18 DEMONSTRATION AND TRAINING

- .1 Refer also to Section 01 79 00 for Demonstration and Training and Div 01 Commissioning sections. Where there is a discrepancy with this section, follow the requirements of 01 79 00 and Div 01 Commissioning.
- .2 Instruct Owner's designated employees in proper care, operation, use and maintenance of all systems and equipment, and provide general explanatory literature required and start up supervision and instructions.
- .3 Provide two (2) weeks prior notice to the Owner to schedule the training.
- .4 The Owner will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.
- .5 Upon completion of instructions, forward to Consultant with a copy to the Owner a letter indicating person instructed and dates that the instruction took place. If in Consultant's

opinion, this is not done satisfactorily, Consultant may direct such instruction, and charge all costs involved to relevant section.

1.19 CONDITIONS FOR DEMONSTRATIONS

- .1 Equipment has been inspected and put into operation in accordance with related sections.
- .2 Testing, adjusting, and balancing have been performed and equipment and systems are fully operational.
- .3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.20 SHOP DRAWINGS - ADMINISTRATIVE REQUIREMENTS

- .1 Refer also to Section 01 33 00 for Submittal Procedures.
- .2 **Shop drawings shall be submitted electronically in PDF format documents to shopdrawings@eppsiepman.com in addition to the requirements of Section 01 33 00.**
- .3 Submit to Consultant submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .4 Work affected by submittal shall not proceed until review is complete.
- .5 Present Shop Drawings, product data, samples and mock-ups in SI Metric to match the units used in the schedules.
- .6 Review submittals prior to submission to Consultant. 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.
- .7 Submittals not stamped, signed, dated, identified as to specific project, and attesting to their being reviewed will be returned without being examined and shall be considered rejected.
- .8 Notify Consultant, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .9 Verify field measurements and affected adjacent Work are coordinated.
- .10 Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review of submittals.
- .11 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant review.
- .12 Keep one (1) reviewed copy of each submission on site.

1.21 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 coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications. Indicate layouts, quantity, details of equipment, control wiring diagrams, sizes, capacities and roughing in and exact requirements for concrete pits, bases and other supporting members.

- .3 Each shop drawing must be certified by manufacturer and as such shall indicate that all product engineering has been performed to ensure the product will meet the requirements of the intended installation.
- .4 Shop drawings for grilles, registers and diffusers shall be accompanied by an itemized list indicating the unit locations by room number and the unit size.
- .5 Allow ten (10) days for Consultant's review of each submission.
- .6 Adjustments made on Shop Drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
- .7 Make changes in Shop Drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of any revisions other than those requested.
- .8 Accompany submissions with transmittal letter, 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.
- .9 Submissions shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by 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 other parts of the Work.
- .10 After Consultant's review, distribute copies.
- .11 Submit one (1) copy of Shop Drawings as a pdf document by email attachment for each requirement requested in specification Sections and as consultant may reasonably request. Any electronic copy of shop drawings shall bear all the required marks of certification and approval by the manufacturer and contractor(s) as indicated above. The consultant will review and mark up one copy of the shop drawing, and return to the contractor by email attachment. The contractor shall then make copies as required for ordering and documentation purposes. Multiple copies of shop drawings will not be returned.
- .12 Submit one electronic copy of product data sheets or brochures for requirements requested in specification sections and as requested by Consultant where Shop Drawings will not be prepared due to standardized manufacture of product. Submittals shall be submitted as a pdf document by email attachment, or delivered as a hard copy. Any electronic copy of shop drawings shall bear all the required marks of certification and approval by the manufacturer and contractor(s) as indicated above.
- .13 Delete information not applicable to project.
- .14 Supplement standard information to provide details applicable to project.
- .15 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, one electronic copy will be returned and fabrication and installation of Work may proceed. If Shop Drawings are rejected, noted copy will be returned and re-submission of corrected Shop Drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed. The contractor shall then make copies as required for ordering and documentation purposes. Multiple copies of shop drawings will not be returned.
- .16 Checking of shop drawings by the Consultant does not constitute acceptance of responsibility. Such checking constitutes assistance only to the Mechanical Division in the proper execution of their work.

1.22 SAMPLES

- .1 Submit for review samples in duplicate or triplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Consultant's business address unless otherwise instructed.
- .3 Notify Consultant 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 Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
- .6 Make changes in samples which Consultant 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.

1.23 PRODUCT QUALITY

- .1 Products, materials, equipment, parts or assemblies (referred to as Products) incorporated in Work: New, not damaged or defective, of best quality (compatible with specification requirements) for purpose intended. If requested, provide evidence as to type, source and quality of Products provided.
- .2 Defective Products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective Products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Should any dispute arise as to quality or fitness of Products, decision rests strictly with Consultant.
- .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .5 Permanent labels, trademarks and nameplates on Products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.24 AVAILABILITY

- .1 Immediately upon signing Contract, review Product delivery requirements and anticipate foreseeable supply delays for any items.
- .2 If delays in supply of Products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .3 In event of failure to notify Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves right to substitute more readily available Products of similar character, at no increase in Contract Price or Contract Time.

1.25 STORAGE AND PROTECTION

- .1 Store and protect Products in accordance with manufacturers' written instructions.
- .2 Store with seals and labels intact and legible.
- .3 Store sensitive Products in weather tight, climate controlled, enclosures in an environment favourable to Product.
- .4 For exterior storage of fabricated Products, place on sloped supports above ground.
- .5 Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.
- .6 Cover open ends of pipes, fixtures, ductwork, etc. to prevent entry of building rubbish.
- .7 Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- .8 Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- .9 Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

1.26 TRANSPORTATION AND HANDLING

- .1 Transport and handle Products in accordance with manufacturer's written instructions.
- .2 Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.
- .3 Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.
- .4 Protect all finished and unfinished work from soiling or damage, cover floors with tarpaulins or plywood as necessary, and repair any damage resulting from work of Mechanical Section.
- .5 Protect finished surfaces to remain exposed, by paper, polyethylene or other satisfactory removable protective covering using paste acceptable to fixture manufacturer to prevent possible damage to finishes, until all reason for construction damage has passed and until acceptance by Owner, and make good any such damage.

1.27 SPECIAL CLEANING

- .1 Maintain tidiness within work of Mechanical Sections and at completion remove protective paper, labels, etc. and tools and waste materials. Leave clean and in perfect operating condition.
- .2 Remove dirt, rubbish, grease, and dust for which this section is responsible from all exposed surfaces and fixtures.
- .3 Operate, drain and flush out bearings and refill with new charge of lubricant, before final acceptance.
- .4 Thoroughly clean piping, ducts and equipment of dirt, cuttings and other foreign substances within the scope of work area. Disconnect, clean and reconnect whenever necessary for purpose of locating and removing obstructions. Repair work damaged in course of removing obstructions. Refer to 23 31 00 for any additional duct cleaning requirements.
- .5 Clean exposed surfaces of mechanical equipment, ductwork, piping, etc., and polish plated work.
- .6 Protect bearings and shafts during installation. Grease shafts and sheaves to prevent corrosion. Supply and install extended nipples to outside of bearing enclosures for lubrication purposes.
- .7 Remove tools, surplus, and waste material from the building site upon completion of work. Clean grease, dirt, and excess material from walls, floors, ceilings, surfaces, and fixtures for which this Contractor was responsible, and leave the premises suitable for immediate use.
- .8 At the end of construction all systems shall be left ready for operation.
- .9 This Section shall be responsible for repair work as may be necessary to remove dents and touch-up of factory finishes.

1.28 PRODUCT CHANGES & SUBSTITUTIONS

- .1 Change in Product/Products: Submit request for substitution or alternative in accordance with this Section, the Instructions to Bidders, and Division 01 Product Exchange Procedures Division 01 Substitutions Sections. In case of a discrepancy between this section and Division 00 and Divisions 01, the more stringent requirements shall apply.

- .2 The Instructions to Bidders specify time restrictions for submitting requests for Substitutions during the bidding period to requirements specified in this section.
- .3 Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- .4 Any substituted item submitted for consideration must not exceed the available space and weight limitations, and all additional costs for mechanical, electrical, structural and architectural revisions required to incorporate the substituted material shall be the responsibility of the Mechanical Division. Review maximum dimensions and weights when provided in the specification and schedules, and where not specified review the drawings for space limitations.
- .5 A request constitutes a representation that the Bidder:
 - .1 Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
 - .2 Will provide the same warranty for the Substitution as for the specified Product.
 - .3 Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 - .4 Waives claims for additional costs or time extension which may subsequently become apparent.
 - .5 Will reimburse Owner and Consultant for review or redesign services associated with re-approval by authorities.
- .6 Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

1.29 EXISTING UTILITIES

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to the Work, building occupants, or pedestrian or vehicular traffic.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

1.30 MANUFACTURER'S WRITTEN INSTRUCTIONS

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

1.31 QUALITY OF WORK

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

- .2 Do not employ anyone unskilled in their required duties. Consultant reserves right to require dismissal from site any workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Consultant, whose decision is final.
- .4 Assume full responsibility for layout of own work and for any damage caused to property of others through improper location or poor workmanship.

1.32 ACCESSIBILITY OF EQUIPMENT

- .1 The Owner places a high priority on being able to safely and efficiently gain access to systems and equipment for replacement and repair. All equipment must be accessible, as defined as follows:
 - .1 Ceiling mounted equipment shall only be considered accessible if a tradesman can place both hands on the equipment components which requires services (ie: fan motor, belt, pulley, bearing, fire damper linkages, valve/control valve, strainer or any other equipment component which requires periodic maintenance). The component must be in clear view, and access must be gained from an 8 or 10 foot step ladder. Access panels provided in drywall shall be sized and placed in such a manner that trades personnel can place two hands on the equipment components as stated above. Equipment located above acoustic tile ceiling shall be positioned in such a manner that equipment and its components can be accessed through a full tile which does not contain any devices such as light fixtures, speakers, smoke detectors or sprinkler heads. If this is not possible, it should be reviewed by the Consultant/Owner before deemed acceptable.
 - .2 Conduit, pipe, ducting and support racking or any other obstruction to accessibility shall be relocated at the contractor's expense by the contractor's forces.

1.33 COORDINATION

- .1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.
- .3 Check levels shown before commencement to ensure adequate falls for sewers and pipes and report discrepancies immediately. Failure to so check and report does not relieve this section from responsibility for consequent extra expenditures.
- .4 Where space is indicated as reserve for future equipment, leave clear and install piping and other work so that connections can be made to future equipment.
- .5 Secure approval where necessary to cut holes in either finished or unfinished work, employ section whose work is involved, cut openings no larger than necessary and without damage to adjoining work and carefully repair all damage to match adjacent work. Note the Mechanical Division is responsible for all required cutting and patching relating to this Contract, except as specifically noted otherwise.
- .6 Provide and set bolts, templates, sleeves and fixing materials for fixing work under this section securely to work provided under other sections, in advance of other work, where required.

- .7 Locate all openings in walls, partitions, beams, etc. required for installation of ducts, pipes and equipment, etc. specified in this section of the specifications and frame all openings as required.
- .8 Installation of all equipment shall allow sufficient space to facilitate ease of maintenance. Clearance space shall allow for the removal of all components of equipment without hindrance. Where clearance requirements are not shown on the mechanical plans, manufacturer clearances must be maintained at a minimum.

1.34 WORK FOR OTHER TRADES

- .1 The Mechanical Contractor shall install rough-ins and/or connections for all equipment requiring mechanical services, as shown on drawings or mentioned elsewhere in the specifications.
- .2 Supply other trades with all necessary details, rough-in drawings, wiring diagrams, etc. as required.

1.35 ELECTRICAL REQUIREMENTS

- .1 Motors and electrical equipment supplied under Mechanical Division shall comply with Electrical Section and electrical characteristics scheduled or shown.
- .2 See "Installation and Wiring Controls" in Electrical Section for equipment supplied under Electrical Section.
- .3 The Electrical section shall provide starters for all motors and wire from starters to motors, unless otherwise indicated.
- .4 The Electrical section shall wire between starters and switching components such as relays, float switches, and pressure switches.
- .5 Supply to Electrical Section within four (4) weeks after contract award, fully detailed diagrams of power and control wiring required for equipment supplied by Sections 21 – 25.
- .6 Motors shall be squirrel cage induction type 1800 RPM unless otherwise noted. Where dampness occurs, all motors and electrical apparatus such as float switches, etc. supplied integrally with any piece of apparatus, shall be totally enclosed.
- .7 All motors 1 hp and larger shall be high efficiency as defined in CSA C390.

1.36 CONCEALMENT

- .1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
- .2 Before installation, inform Consultant if there is interference. Install as directed by Consultant.

1.37 ACCESS PANELS

- .1 Provide in ample time for installation under relevant sections all necessary access panels in walls and ceilings to allow access to dampers, valves, etc., size 300 mm x 300 mm (12" x 12") min. or as required for proper maintenance with steel panel and frame, similar to Acudor, type to suit application. Instruct relevant section for proper location of access panels. Final locations subject to Consultant's approval. ULC approved access panels must be provided where access is through or into a fire partition or assembly. If access

doors have been specified by architectural sections the architectural specification shall supersede this section.

1.38 REMEDIAL WORK

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

1.39 ALTERATION WORK

- .1 Where work is to be done in existing buildings, accurately survey, provide for avoidance of damage and interference to existing work and rectify any such damage due to work under Mechanical Sections. Accept existing work as it exists at time of tendering.
- .2 Carefully dismantle existing mechanical equipment to be removed or relocated. Temporarily disconnect, remove, and reinstall existing equipment, piping, ductwork, conduit, light fixtures, and similar items, which interfere with the new installation after completion of new work or of existing installations to be demolished. Store equipment and materials on the premises as directed by the Owner.
- .3 All usable salvaged equipment and materials shall remain the property of the Owner unless specifically noted otherwise. Such material shall be removed from the building and be safely and neatly stored on the site for removal by the Owner. The Contractor shall remove all rejected salvage from the site and legally dispose of it off site.
- .4 Reuse existing equipment in new work after first repairing and reconditioning any defective items where noted. Safely cap and seal disconnected mechanical services within finished surfaces.
- .5 The abandonment of existing equipment and material in place is not acceptable. All redundant services are to be removed back to active mains, which shall then be capped at existing point of connection.
- .6 All mechanical equipment conflicting with new equipment being installed shall be moved or disconnected, without damage, by Contractor and shall remain property of the Owner. Remove ducts and piping not required in revised systems and interfering with new installation. This material shall become property of Contractor.
- .7 Disconnect existing equipment indicated, intended to be reused, rough-in in new position, and after replacement connect fully, ready for use.
- .8 Removal and relocation of mechanical equipment by relevant Mechanical Sections.

1.40 LOCATION OF FIXTURES

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
- .2 Inform Consultant of conflicting installation. Install as directed.

1.41 FASTENINGS

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.

- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.42 FASTENINGS - EQUIPMENT

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use Type 304 or 316 stainless steel for exterior areas.
- .3 Bolts may not project more than one diameter beyond nuts.
- .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.43 TEMPORARY USE OF EQUIPMENT

- .1 No portion of any mechanical system or equipment provided under Mechanical Sections may be used for temporary heating without Consultant's written permission and observance of the following procedure:
 - .1 Oil and grease motor, fan and pump bearings, etc. check on a regular basis and maintain as recommended by manufacturer.
 - .2 Maintain and clean when necessary cleanable type filters and clean and oil just prior to take-over of building by Owner. Replace throwaway type filters.
 - .3 Ensure that mechanical air handling equipment is not operated during painting.
 - .4 Employ equipment manufacturers and subtrades to ensure and certify that all systems and equipment are in proper condition, and guarantee all work used prior to take-over as for new work, from date of acceptance of building by Owner.
 - .5 If permission for temporary use of mechanical equipment is granted, use Canadian Plumbing and Mechanical Contractors Association standard form of agreement as basis of responsibilities. Guarantee on complete installation shall not start until acceptance of building by Owner.
- .2 All return air grilles/openings shall be equipped with MERV 8 filters to keep return air system clean of dust and dirt if air handling equipment is being used before turnover to the Owner.

1.44 PROTECTION OF WORK IN PROGRESS

- .1 Prevent overloading of any part of the Project.
- .2 Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated, without written approval of Consultant.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Pipe, fittings, valves, and connections for modifying existing sprinkler systems.

1.2 RELATED SECTIONS

- .1 Submittal Procedures.
- .2 Product Requirements.
- .3 Closeout Submittals.
- .4 Painting: Preparation and painting of fire protection piping systems.
- .5 Section 21 13 00 - Sprinklers.
- .6 Section 23 05 53 - Mechanical Identification.
- .7 Section 21 11 05 - Supports and Anchors – Fire Protection.

1.3 REFERENCES

- .1 ASME Boiler and Pressure Vessel Code Section IX - Welding and Brazing Qualifications.
- .2 ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
- .3 ASME B16.3 - Malleable Iron Threaded Fittings.
- .4 ASME B16.4 - Cast Iron Threaded Fittings.
- .5 ASME B16.5 - Pipe Flanges and Flanged Fittings.
- .6 ASME B16.9 - Factory-made Wrought Steel Buttwelding Fittings.
- .7 ASME B16.11 - Forged Fittings Socket Welding and Threaded.
- .8 ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
- .9 ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- .10 ASME B16.25 - Buttwelding Ends.
- .11 ASME B36.10 - Welded and Seamless Wrought Steel Pipe.
- .12 ASTM A135 - Electric-Resistance-Welded Steel Pipe.
- .13 ASTM A47/A47M - Ferritic Malleable Iron Castings.
- .14 ASTM A53/A53M - Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless.
- .15 ASTM A234/A234M - Piping Fittings of Wrought-Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
- .16 ASTM A795 - Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.
- .17 ASTM B32 - Solder Metal.
- .18 ASTM B75/B75M - Seamless Copper Tube.

- .19 ASTM B88 - Seamless Copper Water Tube.
- .20 ASTM B251 - General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.
- .21 AWS A5.8 - Filler Metal for Brazing and Braze Welding.
- .22 AWS D10.10 - Recommended Practices for Local Heating of Welds in Piping and Tubing.
- .23 AWWA C110 - Ductile-Iron and Gray-Iron Fittings 76 mm through 1219 mm (3 Inch through 48 inch) for Welder.
- .24 AWWA C151 - Ductile Iron Pipe, Centrifugally Cast, for Water.
- .25 NFPA 13 (2016) - Installation of Sprinkler Systems.
- .26 NFPA 14 (2016) - Installation of Standpipe, Private Hydrants, and Hose Systems.
- .27 NFPA 24 - Installation of Private Fire Service Mains and Their Appurtenances
- .28 UL - Fire Resistance Directory.
- .29 UL 262 - Gate Valves for Fire-Protection Service.
- .30 UL 312 - Check Valves for Fire-Protection Service.
- .31 UL 405 - Fire Department Connections.
- .32 Underwriters Laboratories of Canada (ULC)
- .33 NSF/ANSI 61 – Drinking Water System Components – Health Effects
- .34 AWWA C220 – Stainless Steel Pipe 1/2In. (13 mm) and Larger.
- .35 ASTM A312 – Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
- .36 ASTM A779 – Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products

1.4 SUBMITTALS FOR REVIEW

- .1 Section: Procedures for submittals.
- .2 Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings.
- .3 Shop Drawings:
 - .1 Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
 - .2 Indicate hazard levels, and NFPA codes that are applicable to the system.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

- .1 Section: Procedures for submittals.
- .2 Project Record Documents: Record actual locations of components and tag numbering.
- .3 Operation and Maintenance Data: Include installation instructions and spare parts lists.

1.6 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- .2 All carbon steel pipe and fittings shall be manufactured in Canada or the United States of America. This does not include stainless steel.
- .3 Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience, licensed in the Province of Manitoba, member in good standing with the Canadian Automatic Sprinkler Association, and approved by manufacturer.

1.7 REGULATORY REQUIREMENTS

- .1 Fire protection system changes to be to the 2015 National Building Code requirements.
- .2 Conform to ULC., UL., FM.
- .3 Sprinkler Systems: Conform to NFPA 13 (2016).
- .4 Standpipe and Hose Systems: Conform to NFPA 14 (2016).
- .5 Welding Materials and Procedures: Conform to Manitoba Department of Labour and ASME Code requirements.
- .6 Valves: Bear UL/ULC label or marking. Provide manufacturer's name and pressure rating marked on valve body.
- .7 Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND PROTECTION

- .1 Section: Transport, handle, store, and protect products.
- .2 Deliver and store valves in shipping containers, with labelling in place.
- .3 Provide temporary protective coating on cast iron and steel valves.
- .4 Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.9 EXTRA MATERIALS

- .1 Section: Operation and Maintenance Data.
- .2 Provide two of valve stem packings for each size and type of valve installed.

1.10 DESIGN CALCULATIONS

- .1 The contractor shall carry out all necessary calculations and shall submit all calculations, data, and drawings in conformance with the requirements of NFPA 13 and the local authority having jurisdiction for Consultant's review prior to proceeding with work. All design calculations are to be sealed by a Professional Engineer and shall be stamped reviewed by the authority having jurisdiction. Calculations shall be completed based on direction and restrictions given on drawings.
- .2 The design shall be based on hazard occupancy as scheduled in Section 21 13 00.

- .3 The contractor shall be responsible to obtain water supply flow and pressure from the local municipal authority. If this information is not available, the contractor shall include all costs necessary for the testing.

1.11 INSPECTION AND TESTS

- .1 All inspections and tests required by the above mentioned authorities and agencies shall be arranged for and performed by this contractor.
- .2 Carry out any necessary flow tests without extra compensation.
- .3 All piping and fittings added to the sprinkler systems shall be hydrostatically tested at a pressure of 1380 kPa (200psi) for 2 hours without evidence of loss or leakage or as per NFPA 13.

Part 2 Products

2.1 ABOVE GROUND PIPING AND FITTINGS

- .1 Steel Pipe: ASTM A53; ASTM A135; ASTM A135 UL listed, threadable, light wall; ASTM A795; or ASME B36.10; Schedule 10 black; or ASME B36.10; Schedule 40 black; or ASME B36.10; Schedule 10 galvanized; or ASME B36.10; Schedule 40 galvanized as scheduled below.
 - .1 Steel Fittings: ASME B16.9, wrought steel, butt welded; ASME B16.25, butt weld ends; ASTM A234, wrought carbon steel and alloy steel; ASME B16.5, steel flanges and fittings; ASME B16.11, forged steel socket welded and threaded.
 - .2 Cast Iron Fittings: ASME B16.1, flanges and flanged fittings; ASME B16.4, threaded fittings.
 - .3 Malleable Iron Fittings: ASME B16.3, threaded fittings ASTM A47.
 - .4 Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
 - .5 Mechanical Formed Fittings: Carbon steel housing with integral pipe stop and O-ring pocked and O-ring, uniformly compressed into permanent mechanical engagement onto pipe.
- .2 Plastic piping systems are not permitted.
- .3 Pipe 38mm (1-1/2") and smaller shall be joined by threaded connections.
- .4 Pipe 50mm (2") and larger may be joined by roll groove mechanical joints. Provide galvanized pipe and fittings for dry and preaction sprinkler systems.
- .5 All pipe installed so as to be inaccessible shall be joined by welded fittings. Piping in bulkheads or behind drywall shall be considered accessible. Piping in shaft walls or behind fire-rated drywall shall be considered inaccessible.
- .6 Welded pipe sections shall be shop fabricated as far as possible to minimize field welding required.
- .7 Fittings: ULC approved for use in wet and/or dry pipe sprinkler systems.
- .8 Ferrous: screwed, welded, flanged or roll grooved.

- .9 Copper tube: screwed, soldered, brazed.
- .10 Ensure fittings, mechanical couplings, and rubber gaskets are supplied by same manufacturer.

2.2 BALL VALVES

- .1 Up to and including 50 mm (2 Inches):
 - .1 Bronze two piece body, brass, chrome plated bronze, or stainless steel ball, teflon seats and stuffing box ring, lever handle and balancing stops, threaded ends with union.
- .2 Over 50 mm (2 Inches):
 - .1 Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle or gear drive handwheel for sizes 250 mm (10 inches) and over, flanged.

Part 3 Execution

3.1 PREPARATION

- .1 Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- .2 Remove scale and foreign material, from inside and outside, before assembly.
- .3 Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

- .1 Use grooved mechanical couplings and fasteners only in accessible locations.
- .2 Install piping to NFPA 13 for sprinkler systems.
- .3 Route piping in orderly manner, plumb and parallel to building structure and as instructed on drawings. Maintain gradient.
- .4 Install piping to conserve building space, to not interfere with use of space and other work.
- .5 Group piping whenever practical at common elevations.
- .6 Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- .7 Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- .8 Do not penetrate building structural members.
- .9 When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- .10 Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.
- .11 Provide ball valves for shut-off or isolating service.
- .12 Provide drain valves at main shut-off valves, low points of piping and apparatus. Obtain written approval from Consultant for final locations of all drain valves not shown on drawings.

- .13 All drains shall be routed to sanitary drainage points. Draining to the storm sewer system or sump pits is not allowed.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Pipe and equipment hangers and supports.

1.2 RELATED SECTIONS

- .1 Section 07 84 00 - Firestopping: Joint seals for piping and duct penetration of fire rated assemblies.
- .2 Section 09 91 23 - Painting.
- .3 Section 21 11 00 - Fire Protection Piping.

1.3 REFERENCES

- .1 ASME B31.9 - Building Services Piping.
- .2 ASTM F708 - Design and Installation of Rigid Pipe Hangers.
- .3 MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
- .4 MSS SP69 - Pipe Hangers and Supports - Selection and Application.
- .5 MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
- .6 NFPA 13 (2016) - Installation of Sprinkler Systems.
- .7 UL 203 - Pipe Hanger Equipment for Fire protection Service.

1.4 SUBMITTALS

- .1 Section 21 05 00: Procedures for submittals.
- .2 Shop Drawings: Indicate system layout with location and detail of trapeze hangers.
- .3 Product Data: Provide manufacturers catalogue data including load capacity.
- .4 Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- .5 Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

1.5 REGULATORY REQUIREMENTS

- .1 Supports for Sprinkler Piping: To NFPA 13 (2016).

Part 2 Products

2.1 PIPE HANGERS AND SUPPORTS

- .1 Fire Protection Piping:
 - .1 Conform to NFPA 13 (2016).
 - .2 Hangers for Pipe Sizes 13 to 38 mm (1/2 to 1-1/2 inch): Carbon steel, adjustable swivel, split ring.
 - .3 Hangers for Pipe Sizes 50 mm (2 inches) and over: Carbon steel, adjustable, clevis.
 - .4 Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - .5 Wall Support for Pipe Sizes to 75 mm (3 inches): Cast iron hook.
 - .6 Wall Support for Pipe Sizes 100 mm (4 inches) and over: Welded steel bracket and wrought steel clamp.
 - .7 Vertical Support: Steel riser clamp.
 - .8 Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - .9 Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.2 ACCESSORIES

- .1 Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

2.3 INSERTS

- .1 Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 FLASHING

- .1 Metal Flashing: 0.5 mm thick (26 gauge) galvanized steel.
- .2 Metal Counterflashing: 0.8 mm thick (22gauge) galvanized steel.

Part 3 Execution

3.1 INSTALLATION

- .1 Install to manufacturer's written instructions.

3.2 INSERTS

- .1 Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- .2 Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 100 mm (4 inches).

- .3 Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut flush with top of slab.

3.3 PIPE HANGERS AND SUPPORTS

- .1 Install to manufacturer's written instructions.
- .2 Perforated strap or wire hangers will not be permitted.
- .3 Support horizontal piping as scheduled.
- .4 Where hangers must be installed in existing concrete slabs, approved expansion type inserts shall be used, or if heavy weights must be supported, a hole shall be drilled through the slab and a 50 mm x 50 mm (2" x 2") washer and nut installed above rough slab before the floor finish is poured.
- .5 Where the structural system is open web steel joists, piping shall be supported by means of angles spanning the top chords of adjacent joists. The number of joists to be spanned in this way shall be determined by the incident load of piping.
- .6 In no case shall the hanging of piping directly from roof or ceiling decking be allowed, unless special permission is obtained from the Consultant.
- .7 Install hangers to provide minimum 13 mm (1/2 inch) space between finished covering and adjacent work.
- .8 Place hangers within 300 mm (12 inches) of each horizontal elbow.
- .9 Use hangers with 38 mm (1-1/2 inch) minimum vertical adjustment.
- .10 Support vertical piping at every floor.
- .11 Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- .12 Support riser piping independently of connected horizontal piping.
- .13 Provide copper plated hangers and supports for copper piping.
- .14 Design hangers for pipe movement without disengagement of supported pipe.
- .15 All hanger rods shall have sufficient threaded length to allow for vertical adjustment of hangers after pipe is in place. Use 2 nuts on each rod, one above the clevis or angle iron and one below.
- .16 Where pipes or equipment are supported from floors or walls, structural steel supports shall be fabricated, using welded joints except where provision is made for adjustment. Where details of construction are not indicated, drawings shall be submitted to Consultant for approval before fabrication.
- .17 Clamps should be located immediately below a coupling if possible. Risers up to 50 mm (2") size shall be braced at intervals not over 2100 mm (7').

- .18 Vertical piping other than risers through floors shall be provided with suitable supports, sway braces, etc.
- .19 Vertical piping shall be supported at the base in an approved manner.
- .20 Prime coat exposed steel hangers and supports. Refer to Section 09 91 10. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.4 EQUIPMENT SUPPORTS

- .1 Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- .2 Construct supports of steel members. Brace and fasten with flanges bolted to structure.
- .3 Provide rigid anchors for pipes after vibration isolation components are installed.

3.5 SCHEDULES

- .1 Maximum spacing between pipe supports:
 - .1 Hangers shall be installed not more than 12" (300mm) from each change in direction of pipes.
 - .2 Where there are concentrations of valves and fittings, closer spacing will be necessary.
 - .3 Steel Pipe:

.1	Up to 50mm (2")	2.4m (8 ft.)
.2	65mm (2½") to 150mm (6")	3.6m (12 ft.)
.3	200mm (8") to 300mm (12")	5.4m (18 ft.)
.4	350mm (14") to 450mm (18")	7.2m (24 ft.)
.5	500mm (20") to 600mm (24")	9.0m (30 ft.)

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Wet-pipe sprinkler assembly.
- .2 System design, installation, and certification.

1.2 RELATED SECTIONS

- .1 Section - Mechanical Identification.

1.3 REFERENCES

- .1 NFPA 13 – 2016 Edition - Installation of Sprinkler Systems.
- .2 FM - Factory Mutual Approval Guide.
- .3 NFPA 70 - National Electrical Code.
- .4 UL - Fire Resistance Directory.
- .5 UL 199 - Automatic Sprinklers for Fire-Protection Service.
- .6 Underwriters Laboratories of Canada (ULC)
- .7 National Building Code of Canada – 2015 Edition

1.4 SYSTEM DESCRIPTION

- .1 System to provide coverage for renovated areas of building as noted. Existing sprinkler system to be adjusted to suit changes. Provide new sprinkler heads in areas indicated on drawings.
- .2 Provide system to NFPA 13 (2016) requirements based on the National Building Code of Canada 2015 ed.
- .3 Interface system with existing building fire and smoke alarm system if applicable.

1.5 SUBMITTALS FOR REVIEW

- .1 Section: Procedures for submittals.
- .2 Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalogue information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- .3 Shop Drawings:
 - .1 Submit working plans for sprinkler systems in accordance with requirements of NFPA 13 and this specification. Plans shall include sprinkler locations coordinated with the architectural reflected ceiling plan. All plans shall be sealed by a

professional engineer prior to submission to the Consultant for review, regardless of the size of the project.

- .2 Submit calculations in accordance with NFPA 13 requirements. Hydraulic calculations are required for all projects, subject to the following exception:
 - .1 Subject to the approval of the fire protection contractor's engineer of record, hydraulic calculations may be waived for renovation projects that affect 12 sprinkler or less, or with total renovated areas of 140 m² (1500 ft²) or less, that are limited to relocation and/or conversion of sprinkler heads from upright to pendant (or vice versa), in which hazard classification(s) has not changed.
 - .2 Should the fire protection contractor's engineer of record be satisfied that design conditions have not changed enough to warrant updated hydraulic calculations, submit a letter under seal stating as such along with the rationale for the assessment. Alternatively, include a note on the sealed working drawings indicating same as above.

- 1.6 Submit to authority having jurisdiction for review and approval prior to submission to Consultant. Submit proof of approval to Consultant.

1.7 SUBMITTALS AT PROJECT CLOSEOUT

- .1 Section: Procedures for submittals.
- .2 Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.
- .3 Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements and code requirements.
- .4 Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.
- .5 Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.8 QUALITY ASSURANCE

- .1 Perform Work to NFPA 13 (2016).
- .2 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- .3 Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience.
- .4 Design system under direct supervision of a Professional Engineer experienced in design of this Work and licensed at the place where the Project is located.

1.9 REGULATORY REQUIREMENTS

- .1 Conform to ULC and FM.

- .2 Perform Work to NFPA 13 (2016).
- .3 Equipment and Components: Bear ULC, UL, FM label or marking.
- .4 Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.10 DELIVERY, STORAGE, AND PROTECTION

- .1 Section: Transport, handle, store, and protect products.
- .2 Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.11 EXTRA MATERIALS

- .1 Section: Operation and maintenance data.
- .2 Provide extra sprinklers to NFPA 13 (2016).
- .3 Provide suitable wrenches for each sprinkler type.

Part 2 Products

2.1 SPRINKLERS

- .1 Suspended Ceiling:
 - .1 Type: Standard pendant type with matching push on escutcheon plate.
 - .2 Finish: Chrome plated.
 - .3 Escutcheon Plate Finish: To match sprinkler body.
 - .4 Fusible Link: Glass bulb type temperature rated for specific area hazard unless otherwise noted.
- .2 Sidewall Type:
 - .1 Type: Standard horizontal sidewall type with matching push on escutcheon plate.
 - .2 Finish: Chrome plated.
 - .3 Escutcheon Plate Finish: To match sprinkler body.
 - .4 Fusible Link: Glass bulb type temperature rated for specific area hazard unless otherwise noted.
- .3 All sprinkler shall be permanently marked so as to identify each sprinkler based on type, orifice size, shape, deflector characteristic, pressure rating and thermal sensitivity.
- .4 Provide lead solder fusible link as required to meet specific application requirements and as required by the local authority having jurisdiction.

Part 3 Execution

3.1 INSTALLATION

- .1 Install to NFPA 13 (2016).
- .2 Install equipment to manufacturers written instructions.
- .3 Place pipe runs to minimize obstruction to other work.
- .4 Place piping in concealed spaces above finished ceilings.
- .5 Centre sprinklers in one direction only in ceiling tile with location in other direction at $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$ of the ceiling tile length, dependent upon spacing and coordination with ceiling elements. Layout instructions provided on the architectural and mechanical drawings override spacing instruction given above.
- .6 Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
- .7 Flush new piping system of foreign matter.
- .8 Install guards on sprinklers where indicated and as per NFPA 13 (2016).
- .9 Hydrostatically test entire system. Test shall be witnessed by authority having jurisdiction.
- .10 System drains and test connections: run to the nearest open drain in the building or to outdoors through wall away from paved areas. Seal and caulk around piping through wall and provide escutcheon and prime paint all metal surfaces exposed to outdoors.
- .11 Before commencement of any work, examine work of other trades and make immediate report to Consultants of any defect or interference affecting work or guarantee of this work.
- .12 If drilling of structural beams or other load bearing members is required by site conditions for passage of piping, obtain Consultants approval for location and proposed drilling procedure before drilling. Drill only in locations previously approved by Consultant. Where drilling is required by design or existing site conditions, be responsible for carrying out same to approved procedure.
- .13 Allow for expansion and contraction when installing pipe hangers.
- .14 Install horizontal valves with stems upright where space allows.
- .15 Carefully coordinate work with other trades so that unnecessary offsets and revisions to the approved drawings are avoided. Failure to coordinate does not relieve Contractor from meeting performance standards.
- .16 The Project Coordinator shall approve any shutdowns of existing water distribution systems, fire sprinkler systems, domestic water systems or fire alarm systems. Provide advance written notice at least 14 days prior to the shutdown to the Construction Coordinator.

3.2 SCHEDULES

	Location	System Type/Hazard
	Offices and Training Rooms	Light Hazard

END OF SECTION