

**21 00 00. FIRE SUPPRESSION****21 00 03. GENERAL PROVISIONS****.1 PREPARATION AND COORDINATION OF CONTRACT DOCUMENTS**

.1.1 **PLUMBING CONTRACT:** Include work related to Fire Suppression within the scope of the Plumbing Contract. The Architect/Engineer shall consult with The Ohio State University Department of Public Safety (DPS) and Facilities Design and Construction Technical Services Group during the early planning phase and prior to any meetings with the Authority Having Jurisdiction.

.1.1.1 Specify that the contractor performing the fire suppression work shall be licensed and certified by the Department of Commerce Division of State Fire Marshal to perform work on the fire suppression system.

.1.1.2 **CUTTING AND PATCHING:** Division 01 should contain the article covering this item of work; however, mention should be made of special items of work that are not adequately covered in the General Conditions. Clearly indicate that responsibility and cost is to be borne by the fire suppression contractor.

.1.1.3 **UTILITY CONNECTIONS:** Include the following instructions in the specifications:

"Procedure for making connections to existing utilities shall be planned at least two weeks in advance of the work and the work shall be executed in a manner to provide reasonably continuous service throughout the construction period. **Connections shall be made only at times approved by the University Construction Manager.** For interruption of service in major utility systems, the Contractor must submit to the A/E an impairment plan with step-by-step sequence of operations planned to accomplish the work. Outline must show tentative dates and times of day for shut-off and restoration of services." Contractor to arrange and pay for temporary utilities if required by project conditions. Submit drawing of proposed temporary connections for approval.

The A/E will review the information given with the University Construction Manager, who, upon approval of the planned operations, will make arrangements with appropriate University personnel for interruption of services. Refer to Division 01 of the Building Design Standards. The A/E shall also specify and refer to the university Utility Outage Procedure found on Facility Operations



and Development's (FOD's) website under the Vendor Resources, Utilities tabs with the following link: <http://fod.osu.edu/resources>.

Caution to Bidders: Bidders are cautioned that the University will probably schedule interruption of services at times other than the contractors' normal working hours and that only designated University personnel are authorized to interrupt services. Frequently, outages are scheduled between semesters to reduce disruption of classes.”

- .1.1.3.1 PERMANENT UTILITY CONNECTIONS: On projects where connections to existing utilities (i.e., fire suppression lines) are proposed, the A/E shall contact Facilities Operations and Development (FOD) (through the University Project Manager) to ascertain the actual operating conditions and limitations of such systems to confirm that ample capacity, both present and future, will be available for project loads. The A/E shall also complete and submit for approval the Utilities Request Form found on the FOD website at <http://fod.osu.edu/resources>. The A/E shall submit proposed modifications to the University's utility connection requirements to the University Engineer through University Project Manager for prior approval. This is mandatory in order to obtain approval for connection and/or extension of any utilities. Instructions in the specifications must be provided to insure proper bidding, planning, coordination and minimal utility outages. Also see Division 33, Utilities.
- .1.1.3.2 Fire suppression piping shall not be run under buildings.
- .1.1.4 CONCRETE PADS, BASES, AND CURBS: Concrete pads, bases, and curbs are provided in Division 03; however, the Fire Suppression Contractor shall furnish and install sleeves, anchors, and other items which require embedment in concrete. These installations must be coordinated with the work specified to be performed by the General Contractor.
 - .1.1.4.1 CURBS: Pipe shafts and similar openings in slabs shall be curbed in HVAC equipment rooms, pump rooms, kitchens, and other areas which are subject to flooding. Curbs shall be not less than 4 inches high. The General Contract drawings shall show required curbs.
- .1.1.5 PENETRATION OF FLOORS AND OF FIRE RATED WALLS by fire suppression piping and related equipment is prohibited, unless openings are appropriately fire-stopped by sealing of voids with fireproof materials. Fire-rated walls or floors must not have the rating reduced by penetrations or reduction of thickness. Precautions must be used by contractors when coring or making

penetrations to ensure that the cored material does not drop to the floor below and cause an accident or injury. See Division 07 for requirements.

.1.1.6 SLEEVES:

- .1.1.6.1 **PROTECTION FOR INSULATED PIPES:** When insulated pipes penetrate floors that will be covered with finish flooring, specify that a sheet metal protective covering be installed around the insulation jacket. Sheet metal jacket shall extend through and above the pipe sleeve far enough to protect the insulation from bumping by floor polishing machines and vacuum sweepers. Space between the pipe sleeve and the sheet metal must be sealed. Where insulated pipes pass through wall sleeves, cover insulation with sheet metal and seal both ends of the space between the sleeve and sheet metal with non-combustible packing.
- .1.1.6.2 **CLEARANCE:** Provide not less than 1/4 inch clearance on all sides for both insulated and non-insulated pipes which penetrate walls and slabs.
- .1.1.6.3 **LENGTHS:** Except where greater lengths are required for penetrations through floors, sleeves shall be fabricated to a length equal to the thickness of construction through which they pass. See below.
 - .1.1.6.3.1 **SLEEVES THROUGH WATERPROOFED FLOORS** shall project a minimum of 4-inches above the floor.
 - .1.1.6.3.2 **SLEEVES IN HVAC AND PLUMBING EQUIPMENT ROOMS** shall extend no less than 1-1/4 inches above the curbs.
 - .1.1.6.3.3 **SLEEVES IN ALL OTHER FLOORS** shall extend 3/4 inch above the finish material on the floor.
 - .1.1.6.3.4 **SEALS:** Special wall sleeve fittings with soft rubber seals shall be specified for water service piping. In other installations, the void between pipe and sleeve shall be sealed with mineral wool or other non-combustible material to prevent passage of flame and smoke. In locations exposed to public view, the packing materials shall be concealed with sheet metal cover plates or split type, chromium plated brass escutcheons.



- .1.1.6.4 FIRE-STOPPING: Specify and show fire stopping at all penetrations of fire-rated assemblies.
- .1.1.6.5 Sleeves for copper pipe shall be fabricated of copper pipe for up to 4 inches in diameter.
- .1.1.7 STRUCTURAL SYSTEMS: Lintels for openings to accommodate fire suppression installations should be provided in Division 05. Refer to paragraph 05 50 00. Any other structural steel required for support of equipment can be specified by making reference to applicable portions of Division 05.
- .1.1.8 ANCHORAGES AND SUSPENSION SYSTEMS: Each utility system, including fire suppression piping, and the ceiling grid system shall be a separate installation and each shall be independently supported from the building structure. Where interference occurs, provide trapeze type hangers or other suitable supports for each system. Locate hangers and supports where they will not interfere with access to mixing boxes, fire dampers, valves, and other appurtenances requiring servicing. Attention to this prohibition must be included in every section when there is the possibility that other than the independent suspensions systems would be used, together with prohibitions against use of perforated steel strap, power actuated anchors and plug anchorage (using wood, lead or plastic).
- .1.1.9 ROOF MOUNTED EQUIPMENT, FLASHING AND ROOF PENETRATIONS: Specifications should alert the Fire Suppression Contractor that installation must be coordinated with work specified to be performed by the roofer. Refer to paragraphs 07 50 10.3 and 07 60 10.4. All roof mounted equipment shall be provided with pre-fabricated mounting curbs at least 12-inches high. Curb shall be fabricated of double dipped galvanized steel, copper or stainless steel. Any installation design must facilitate roof repair and maintenance. Protrusions through roof (standpipe hose connection piping, etc.) shall be located to as not to disrupt flow of water to roof drain. Maintain a minimum clearance of 10-feet from parapet walls or change in elevation and from roof sumps or drains. Note that pitch pans or pitch pockets are prohibited. Additionally, establish architectural acceptability with only projections approved by the Project Manager.
- .1.1.10 PAINTING: Cleaning and painting Fire Suppression and equipment exposed to view should be specified in Division 09. If concealed installations require painting before being concealed, list the installations and specify that materials and application be as specified in Division 09. Do not specify painting of the same surface



under more than one Division except shop prime coats, where protection is needed, color banding and flow arrows. See 09 91 23.1. **USE OF INK MARKING PENS ON ANY SURFACE IS PROHIBITED.** Marks bleed through paint or other finishes.

.1.1.10.1 **COLOR CODING OF PIPING:** Specify that, after piping has been finish painted, the installer of the piping identify the type of service lines and direction of flow with pre-printed, color-coded self-adhesive or pre-coiled plastic pipe labels. Lettering shall be at least 1-1/2 inches high. Specify that indicators be applied at connections to pumps and other equipment; at entrances to spaces; adjacent to valves; near access doors to pipe spaces; and at 30-foot maximum intervals on long pipe runs. Specify that letters be positioned to be easily read from a normal standing position.

.1.1.10.2 Use ASME A13.1 color schedule and identify piping service using the same designations or abbreviations as used on the Drawings.

.1.1.11 **PIPING:** Since the Fire Suppression contract is required to be separate from the Plumbing and HVAC contracts, provide independent and complete documents for each contract. The documents shall clearly indicate the scope of work included in each contract and shall call attention to areas of work that require coordination between contractors. For those common areas where the two contractors meet, on each document state which contractor is responsible for which work. Do not use the words 'Not in Contract', and do not use the acronym 'N.I.C.' If related work is required, then show and state the contractor by Division (i.e., Plumbing, or HVAC, etc.).

To avoid duplicate costs for identical work, these notations are necessary. Be sure to indicate the extent of related work and which contractor makes the interconnection.

.1.1.11.1 **PIPING DETAILS,** which are applicable to any or all of these three Divisions of the work, follow; details, which are applicable only to particular divisions, are stipulated in the guides for the particular division.

.1.1.11.2 **SUPPORTING DEVICES:** Perforated strap hangers are prohibited.

.1.1.11.2.1 **HANGERS:** Trapeze hangers and other hangers permitted by NFPA 13 are acceptable.

.1.1.11.3 **THREADING** cast iron or ductile iron pipe is prohibited.



- .1.1.12 **MOTORIZED EQUIPMENT:** Basic requirements for electrical work and equipment are covered in Division 26 of these standards. The requirements included herein cover specific items that have been troublesome in the past and require that the specifications incorporate adequate provisions for electrical work and equipment furnished by the Fire Suppression Contractor. The A/E shall specify motors, drives, and equipment to meet all operating requirements for the installation. Consideration for motors should be for voltage, phase, frequency, frame size, temperature rise, and sufficient starting torque to start loads with high inertia. Performance requirements should include capability to make multiple starts per day to meet energy conservation control requirements. Where necessary, non-recycling shall be specified to protect the equipment from short time recycling.
- .1.1.12.1 **WIRING:** Specifications shall clearly point out the responsibility for wiring related to fire suppression and fire alarm equipment. In general, it is required that power wiring is provided by the Electrical Contractor and control wiring is provided by Fire Suppression Contractor.
- .1.1.12.2 **STARTERS:** Specifications shall require that motor starters be provided by the Electrical Contractor. Exceptions to this requirement will require the approval of the A/E and his review is necessary to ascertain that standards stipulated in the electrical specifications are followed.
- .1.1.12.3 **MOTORS** shall be sized in accordance with applicable NEMA standards for the operating conditions of each specific items of equipment with a 1.5 service factor. Motors must be selected to operate within nameplate HP and shall not operate on the service factor. Short shaft motors shall not be used for belt drives. In general, motors one-half horsepower or smaller shall be single phase; larger motors larger than ½ horsepower shall be three phase. Motors shall be provided with electrical overload protection to prevent burn-out under operating conditions. Single phase motors shall have internal thermal overload protection which automatically resets. Large motors shall have adequate internal overload and thermal protection in addition to the overload elements in the motor starter.
- .2 **NFPA:** Installation must comply with all applicable codes and standards, including Ohio Building Code (OBC), Ohio Fire Code (OFC) and referenced standards, including specific editions of NFPA referenced unless noted otherwise. Whenever referring to materials and installations by National Fire Protection Association (NFPA) Publications use the OBC and/or OFC referenced editions, unless noted



otherwise, and include the date of each referenced publication in the specifications.

- .2.1 All Fire Suppression floor plans shall include column lines, room numbers, Key Plan, and a north arrow.
- .3 EXISTING FIRE PUMPS: In remodeling or alteration projects where an existing fire pump will be used, consult the University Architect regarding desirability to updating systems to comply with the standards stipulated herein.
 - .3.1 Existing fire pumps shall be flow and pressure tested by the fire protection contractor to confirm actual availability of water.
- .4 The Architect/Engineer should note that the Department of Commerce Division of State Fire Marshal is the Authority Having Jurisdiction (AHJ) on the Columbus Campus.
- .5 **Wexner Medical Center:** Areas under renovation not currently having sprinklers shall be added as part of the project. Floor piping shall be sized such that provisions for future extension of sprinklers to all non-sprinkled areas of the floor and/or zone can be made. Areas of renovation having any sprinkler head type but concealed shall be replaced as part of the renovation by a concealed sprinkler head.
- .6 FIXED EQUIPMENT required by the program will be furnished by the project unless written exception is given by the University Engineer for the omission. Also, See Division 11.
- .7 RELOCATING EXISTING EQUIPMENT
 - .7.1 Relocation of existing equipment must include disconnecting and moving to new location as well as restoration and capping utilities at the old location.
 - .7.2 Require the contractor to be responsible for recording existing wiring and piping to facilitate reinstallation.
 - .7.3 Require the contractors to replace unsalvageable piping and wiring and to furnish any new piping and wiring to complete proper reinstallation.
- .8 RESTRICTED LOCATION: Operating equipment other than sump pumps shall not be located below the published 500 year FEMA floodplain elevation for hydraulically connected facilities.

Commentary: "hydraulically connected" is intended to mean facilities that are connected to other buildings/facilities or the Olentangy River by tunnels, drainpipes, conduit, etc.
- .9 FIRE PROTECTION SYSTEM IMPAIRMENT FORM: A/E and PM shall identify how the project's scope of work will cause an impairment to existing fire protection or



detection system, fire alarm system or other system designated to maintain the fire resistance of the building elements or structure is taken out of service, either wholly or in part, planned or unplanned. PM shall complete the Fire Protection System Impairment form and e-mail the completed document to emergencymanagement@osu.edu

.9.1 Link to form: <https://dps.osu.edu/sites/default/files/impairment.doc>

21 00 05. SUBMITTALS

- .1 GENERAL: Refer to Division 01 for the list of submittals required to ensure quality control of materials and workmanship. Submittals required for specific items may be stipulated in articles in which the items are specified (as is done in these standards) or may be listed under this heading. The A/E shall stipulate additional submittals that he deems necessary for the prosecution of the work.
- .2 SAMPLES AND SHOP DRAWINGS: Reference should be made to Division 01 for instructions for making these submittals.
 - .2.1 Submittals shall be specified to be provided within 90-days of Notification to Proceed.
 - .2.2 PERFORMANCE CURVES: Specify that these be submitted with shop drawings.
- .3 RECORD DRAWINGS: The A/E is directly responsible for the accuracy of these records. In addition to notes made in the field by the A/E's representative, Article 11 of the General Conditions requires Division Contractors to accurately record all deviations from Contract Documents during construction and to furnish this information to the A/E. When writing specifications, avoid wording that might suggest to contractors that changes can be made without prior approval. See 01 78 39.2.
 - .3.1 Building Information Modeling (BIM): The Architect/Engineer, or Contractor shall meet, for projects four million dollars or greater, the BIM Project Delivery Standards (BIM PDS).
- .4 WARRANTIES, OPERATION AND MAINTENANCE MANUALS: Within 60 days after (Temporary or Permanent/Final) Certificate of Occupancy, submit warranties, instruction sheets, catalog data, and final shop drawings electronically following the university's Project Closeout Standards. Also see 01 78 23. Provide full information defining all conditions, quantities, pressures, temperatures, etc. during the testing operations of each piece of equipment.
- .5 POWER AND CONTROL DRAWINGS: Electrical power and control drawings for large, complex electrical equipment shall be supplied and posted at, on, or near the equipment. Provide framed clear acrylic plastic protection.



- .6 DIAGRAMS AND OPERATING INSTRUCTIONS: Complete diagrams and operating instructions for all control systems shall be posted near the related equipment. Provide framed clear acrylic plastic protection. When multiple equipment rooms exist in a building, these diagrams will be required at each piece of equipment. Additionally, a complete set of diagrams will be posted or made available in the main equipment room and shall be included in the O & M manuals submitted as part of the project closeout.
- .7 SUBMITTALS: Require that shop drawings for systems be sent to the Architect/Engineer (A/E) for review and, after approval, be submitted by the (A/E) to the Department of Commerce Division of State Fire Marshal for review. Require that informational and/or operating manuals be provided for all fire protection equipment. Specify that all fire protection products and equipment must be manufactured in the USA.
- .7.1 List of required submittals shall include backflow preventers, fire pump, fire pump controller, jockey pump, piping, pipe fittings, sprinkler heads, flow switches, tamper switches, any additional required submittals shall also be provided.
- .7.2 A water flow test report shall be submitted based on a water test conducted in accordance with NFPA 291. The fire suppression contractor shall be responsible for conducting a new water flow test for use in his design.
- .7.2.1 The water supply data used for design shall include safety factors for daily and seasonal fluctuations, which can be significant.
- .7.3 Specify three unique stages of design submittals for any fire suppression system, as follows:
- .7.3.1 Materials and Equipment List (Product Data): Include all materials, equipment and accessories required for the work. Include catalog ID numbers, drawings, cut sheets as necessary to define the work. If cut sheets include multiple selections, and or optional selections, then clearly label the included selections and the included options. Submit to the Architect/Engineer (A/E) for review.
- .7.3.2 Preliminary Shop Drawings: Include sprinkler head locations only. Include full-size detail representation of each style of sprinkler head to be used. Submit to the Architect/Engineer (A/E) for review.
- Commentary:** Preliminary shop drawings shall be prepared by the fire suppression contractor and shall be reviewed and accepted by the university in coordination with the University Project Manager prior to installation.
- .7.3.3 Detailed Shop Drawings: Drawings that conform to the “Working Plans” section of NFPA 13. Include pipe layout and sizing, sprinkler

head locations coordinated onto reflected ceiling drawings, hydraulic calculations, system controls, and all equipment cut sheets, zone valves, zone drain valves, and zone test stations. Submit to the Architect/Engineer (A/E) who, after review and approval, shall submit to all required parties identified in 21 00 05, Authority Having Jurisdiction (AHJ), the Department of Commerce Division of State Fire Marshal, and the University's Office of Financial Services Insurance Administrator, for review and approval by all.

21 00 07. TESTING

- .1 TESTING OF FIRE PUMPS: Include in the specifications the requirement that the contractor and the pump manufacturer perform an acceptance test of the system in the presence of the A/E and designated University personnel. Prior to the acceptance test, the fire pump will be tested for proper operation. The fire suppression contractor shall be required to protect landscaping, property, and personnel from water discharge. Water discharge is prohibited over sidewalks and parking lots where temperatures are below freezing. Scheduling and other arrangements for the demonstration shall be made through the A/E and the University Project Representative.

21 00 09. RELATED WORK IN GENERAL CONSTRUCTION

- .1 FIRE EXTINGUISHERS AND NON-VALVED CABINETS: Specify these in Division 10 SPECIALTIES as part of the General Contract.
- .2 FIRE CABINETS shall include fire department standpipe valve connection, fire extinguishers, and space for them. Make certain that extinguisher is specified in General Contract Division 10.

Wexner Medical Center: Fire Hose Cabinets are not required.

21 05 05. FIRE SUPPRESSION MATERIALS AND METHODS

21 05 25. VALVES

- .1 GATE VALVES: Use UL listed O.S.& Y., 175 lb., except hose cabinet valves.
 - .1.1 2-1/2 in and smaller, brass or bronze body, trim and stem, solid wedge, rising stem, union bonnet, screwed or flanged ends.
 - .1.2 3 in. and larger, iron body, bronze trimmed, O.S.& Y., flanged and rigid grooved ends.



- .1.3 Consider specification of minimum 250 psi valves (together with piping, sprinklers, and other components) in high rise buildings to prevent specification of pressure reducing valves.
- .1.4 All post indicating valves (PIVs), where provided, and located in areas subject to damage by vehicular traffic shall be protected by bollards. All PIV shall be installed so that the base is flush with grade or pavement.

21 10 00. WATER-BASED FIRE SUPPRESSION SYSTEMS

21 11 16. FACILITY FIRE HYDRANTS

- .1 SCOPE OF WORK: The Contractor shall furnish all labor, tools, material and equipment necessary to furnish and install new fire hydrants at the locations shown on the plans or as ordered and specified.
 - .1.1 Architect/Engineer (A/E) shall require the Contractor to include all excavation, furnishing and installing the new fire hydrant complete with proper jointing, blocking, backfilling, and all other incidental work necessary to complete this item of work. Hydrant watch valves and 6-inch ductile iron hydrant leads are to be installed where necessary.
 - .1.2 Remove the existing hydrants, any shut-off (auxiliary) valves (when necessary) and associated piping. Do not remove shut-off valves that are more than five feet from the hydrants they serve, that are in roads.
 - .1.3 Remove the lengths of piping necessary to maintain five feet maximum depth at the auxiliary valves and hydrant bases.
 - .1.4 Architect/Engineer (A/E) shall require the Contractor to be responsible for backfilling to the extent required to accomplish the required testing, providing suitable barricades around openings and providing the A/E and the University Project Representative a schedule of when the various hydrants are ready for inspection, testing, and site restoration.
 - .1.5 **Architect/Engineer (A/E) shall require the Contractor to notify Facilities Operations and Development's (FOD's) Manager of Utility Services (614-292-6383) and DPS no less than ten working days prior to taking any fire hydrant out of service.**
- .2 ALL FIRE HYDRANTS shall be post type made of cast iron and shall conform in all respects to the American Water Works Association Standard for "Fire Hydrants for Ordinary Water Works Service", AWWA - C502-80 except as herein after specified.



- .2.1 Type of Hydrant: Fire hydrants shall be Clow-Eddy model F-2640 break flange/compression type (AWWA C502-80) with 7/8-inch tapered to 1-inch operating nut (turning clockwise to open and counter-clockwise to close), rising center stem, safety coupling, compression type valve, 4-1/2 inch minimum valve opening, factory sealed drain opening, and a 4-inch pumper nozzle. Nozzle thread and finish shall comply with local fire department's standards. Hydrant shall be designed for 150 pounds working pressure and tested to 200 pounds hydrostatic pressure. Hydrants inlet connection shall be 6-inch mechanical joint type.
- .2.2 Valves: Auxiliary shut-off valves shall be Clow #F-5065 with mechanical joints, cast iron body, bronze wedges; non-rising bronze stem and O-ring packing.
- .2.3 Piping: Piping shall be Clow mechanical joint ductile iron (AWWA C106) 250 pounds working pressure with cement-lining, class 52 thickness bitumastic enamel coating, and rubber ring gasket.
- .2.4 Valve Boxes: Auxiliary valve boxes shall be Clow #F-2450 cast iron three piece screw extension type with labeled lid as required by local code.
- .2.5 Design: The design shall be such that the stresses generated by a smashing blow will be localized and concentrated at a predetermined point in the couplings, straining the metal at this point beyond its ultimate tensile strength before a similar condition develops in the adjacent sections of the standpipe and stem. This design must assure that the upper and lower sections of the hydrant will break apart cleanly without bending the stem and without damage to the working parts of the hydrant, or the abutting parts of the standpipe sections; also, that there will be no leaking or flooding. The upper section of the standpipe which carries the nozzle shall be secured to the lower section in such a manner that the upper section may be revolved, thus permitting the relocation of the nozzle to any desired direction. The hydrant shall be so designed that, if broken at the joint, repairs may be made by the use of simple tools and the minimum number of parts, and without the necessity of excavating or shutting off the water supply to the hydrant. It shall be designed so that the stem and main valve may be removed through the top of the standpipe without excavating.
- .2.6 Installation: Installation and locations of fire hydrants must conform to NFPA 24 and specifications of both university and governing Authorities Having Jurisdiction (AHJ). Locate one fire hydrant within 100 feet of the exterior siamese pumper connection.
 - .2.6.1 All new fire hydrants, auxiliary valves and portion of water lines connected to them shall be a minimum of 4'-6" below grade, but not more than 5'-0" below grade, where possible.
 - .2.6.2 New fire hydrants and their auxiliary valves shall be placed four feet away from sidewalks and roads where possible, and the valves two



- feet minimum from fire hydrants. Valve box to be accessible. Where fire hydrants valves are covered with sidewalks or roads paving (unable to be located) they are to remain as is.
- .2.6.3 Pipe buried in ground shall have firm bearing along entire length of undisturbed earth. Pipe on fill or loose soil shall be supported every six feet on brick or concrete piers and then firmly embedded in sand. Pipe trenches shall be evenly graded.
 - .2.6.4 Securely anchor each mechanical joint, tee, plug, cap, and bend using pipe clamps, tie-rods and concrete thrust blocks conforming to the requirements of NFPA 24.
 - .2.6.5 Install fire hydrant so centerline of all hose outlets is a minimum of twelve inches above finish grade. Hydrants are to be secured with $\frac{3}{4}$ " tie-rods. Use concrete thrust blocks at bases.
 - .2.6.6 Valve boxes are to be installed so tops are flush with grade or pavement.
 - .2.6.7 All fire hydrants shall be installed with Class "C" concrete backing poured against undisturbed earth, as approved by the University.
 - .2.6.8 When main water lines' valves have to be closed for hydrant installation due to fire hydrants valve not being located, this closing shall be coordinated with DPS and FOD's Utility Services.
- .2.7 Testing: FOD's Utility Services and DPS shall witness and approve all hydrostatic pressure tests. The fire suppression contractor must use calibrated pressure gauges for all pressure tests and present the calibration certificate to university personnel prior to testing.
- .2.7.1 Test at 200 PSIG for two hours.
 - .2.7.2 Provide Contractor's Material and Test Certificate according to requirements of NFPA 13.
 - .2.7.3 The trench shall be backfilled between joints after inspection and before testing to prevent movement of pipe.
 - .2.7.4 Hydrostatic tests shall be made before the joints are covered in order that any leaks may be detected.
 - .2.7.5 Thrust blocks shall be sufficiently hardened before hydrostatic testing is begun.
 - .2.7.6 Flush lines prior to testing.



- .2.8 Painting: University Fire Hydrants and valve box lids are to be RED with the hydrant caps painted GRAY, similar to existing university fire hydrants.
 - .2.8.1 Factory painted fire hydrants which have been damaged shall be cleaned, primed, and repainted to comply with these standards.
 - .2.8.2 Gray fire hydrant caps and Red valve box lids are to be painted after the fire hydrants and valve boxes are installed.
- .2.9 Inspection: Backfilling will not be permitted until hydrant drain holes are plugged and DPS, and FOD Utility Services has inspected the installation and found it acceptable. Note that existing water lines supplying new hydrants shall be modified by the contractor to bring water line up.
- .3 Refer to Division 33 for Coordination of Underground Utilities Recording during Construction.

21 12 00. FIRE-SUPPRESSION STANDPIPES

- .1 DESIGN, INSTALLATION, AND TESTING: Comply with the Ohio Building Code (OBC), the Ohio Fire Code (OFC), Ohio Administrative Code (OAC) - Fire Protection Systems, the Authority Having Jurisdiction (AHJ) Department of Commerce Division of State Fire Marshal, and the applicable edition referenced by OBC and OFC of NFPA 14, STANDARD FOR INSTALLATION OF STANDPIPE AND HOSE SYSTEMS. Wherever standpipes are installed, siamese pumper connections shall be provided as required.
 - .1.1 At the start of design, the design Architect/Engineer remains responsible to perform a flow test and pressure test, to be performed by a service agency licensed and certified by the AHJ to perform such tests. Water flow test data used for design shall be less than 12 months old. Provide a copy of the flow and pressure test to the University's Project Representative and FOD's Utility Services.
 - .1.2 When the OAC for Fire Protection Systems requires standpipe hose connections at the roof level the Architect/Engineer shall coordinate the requirements of the roof access and fall protection system with the Fire Protection System.
 - .1.3 The Architect/Engineer shall coordinate the specified metal finish of the standpipe's exterior drain pipes with the building's finish materials.
- .2 STANDPIPES: In buildings where standpipes are installed, all fire department (2-1/2 in.) valves shall be in a stairwell. Where pressure reducing type hose valves are installed, the drain riser shall be a minimum of 3 inches and include connections for testing pressure reducing type hose valves.



21 12 20. FIRE STANDPIPE CABINETS AND ACCESSORIES:

Wexner Medical Center: FIRE HOSE CABINETS are not required.

- .1 STANDPIPE CABINETS shall be painted steel, flanged, flush mounted type (similar to extinguisher cabinets), large enough to accommodate a fire extinguisher. Each fire extinguisher and fire valve cabinet may have a break-glass type door with full flat glass in the door. A break-glass tool must be provided attached to cabinet.
- .2 ORIFICES: Whenever necessary to ensure that hose pressure does not exceed the pressure limitation required by applicable codes and standards or the local fire department, orifices shall be required on hose cabinet valve-discharges. The orifices shall be the adjustable type and shall be properly adjusted by the contractor on the job so that hose pressure does not exceed the pressure limitation of applicable codes and standards or local fire department. The Columbus Division of Fire, Fire Prevention Bureau should be consulted on the proper pressure reducing devices. The Architect/Engineer (A/E) is to contact the University's DPS prior to contacting the Columbus Division of Fire.
- .3 LOCATIONS: Standpipe and valve cabinets shall be located so that the centerline of the hose valve is in accordance with NFPA 14 recommendations. The full fire rating and acoustical rating of the walls shall be maintained.
- .4 HOSE CONNECTION: Where possible, all valves and fittings for fire department connections shall be rotated approximately 22-1/2° down from vertical to facilitate easy hose connection. Within the City of Columbus, threads shall be Columbus fire threads.
- .5 External to the City of Columbus, threads must be compatible with the equipment of the local fire department.
- .6 RENOVATION PROJECTS: Require that the FOD's Operations **and/or Wexner Medical Center Facilities Operations** Fire System Shop be advised to take possession, before construction begins, of existing fire extinguishers for safe keeping.

21 13 00. FIRE-SUPPRESSION SPRINKLER SYSTEMS

- .1 SPRINKLER SYSTEMS shall be automatic systems designed, installed, and tested according to the Ohio Building Code (OBC), Ohio Fire Code (OFC), the Authority Having Jurisdiction (AHJ): Department of Commerce Division of State Fire Marshal, and the requirements of the applicable edition of NFPA 13, STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS, as referenced by OBC and OFC.



- .2 SPECIAL INSTALLATIONS: Suppression systems for electrical equipment rooms, elevator equipment rooms, computer equipment rooms or similar spaces shall be designed so as not to present a hazard to occupants or equipment. Sprinkler piping shall not be routed over electrical equipment.
- .2.1 Alternate fire protection systems permitted for these rooms are: (Note: A variance may be required for plan approval by the State of Ohio, Division of Industrial Compliance.)
- .2.1.1 Foam, NFPA 11.
 - .2.1.2 Carbon Dioxide, NFPA 12.
 - .2.1.3 Water Spray, current edition of NFPA 15.
 - .2.1.4 Dry Chemical, NFPA 17.
 - .2.1.5 Clean Agent Fire Extinguishing Systems, NFPA 2001.
 - .2.1.6 Installation of new NFPA 12A – HALON 1301 FIRE EXTINGUISHING SYSTEMS are prohibited.
- COMMENTARY:** *Existing University HALON 1301 FIRE EXTINGUISHING SYSTEMS are recommended to be removed in lieu of upgrading the equipment, because other substitutes are available for the same uses that pose lower risk overall to human health and the environment. As described in the signed September 16, 1987 Montreal Protocol on Substances That Deplete the Ozone Layer.*
- .3 ALTERNATE CONSTRUCTION: If occupancy permits, a firewall separation may be provided. If this construction is used, sprinklers are not required, but a smoke detector connected to the building fire alarm system must be provided.
- .4 DRY SPRINKLER SYSTEMS: Provide a high-low-pressure switch on all systems to detect a gradual loss of air pressure. Connect switch to fire alarm system as a distinct zone. Dry sprinkler systems shall be specified for areas susceptible to freezing temperatures, including but not limited to; dock areas, garage connectors, overhead building connectors, building overhangs/canopies, etc.
- .4.1 Air Compressor with air dryer or nitrogen generator shall be specified for dry systems and shall be on a dedicated electrical circuit. Air compressor shall be a dedicated tank for fire protection service and include an air maintenance device.
 - .4.2 The electrical switch shall be secured by a common keyed padlock.
- .5 INSPECTOR TEST VALVES: Test valves shall be as remote as possible for each zone, have piped-in drainage to allow for testing without the use of hoses or special adapters, be located in stairwells or some common, easily accessible location and contain a sight glass for visual inspection of the flow. Each sprinkler zone shall include one drain and one test station. The locations shall be coordinated with the Architect/Engineer and DPS Drains near an exterior wall shall be piped to building exterior within 12 inches of grade over a splash block at locations to prevent damage to property, including landscaping, and hazards to circulation paths.



Interior drains shall be terminated near a floor drain sized to handle the maximum flow of the drain.

- .6 ZONING (ZONE VALVE ASSEMBLIES): A minimum of one zone shall be provided per floor. Drains shall be routed to an exterior wall and shall be piped to building exterior within 12 inches of grade over a splash block at locations to prevent damage to property, including landscaping, and hazards to circulation paths.
- 6.1 No zone shall be dependent upon another zone. Each zone shall be capable of being drained and filled without draining another zone or the remainder of the sprinkler riser to facilitate repairs, etc.
- .7 All actual devices for low suction pressure, fire pump interruption, tamper switches, and pump room flow switches shall be wired into the main fire alarm panel, by the Fire Alarm Contractor, as distinct zone annunciation. Specify and show which devices are to be furnished and installed by the Fire Protection Contractor.
- .7.1 Cord type tamper switches are prohibited. Weatherproof tamper switches shall be installed in wet or humid locations, including pits.
- .8 All pressure switches, pumps, valves and similar devices shall be installed with isolating valves to facilitate replacement of devices.
- .9 All piping shall be painted red or permanently banded red. See Division 09 for painting requirements.
- .10 **Wexner Medical Center: SPRINKLERS:** Sprinklers shall be concealed and be installed center-of-tile in finished ceiling areas. Areas of renovation not having concealed heads shall have the heads replaced with concealed as part of the project.
- .10.1 Manufacturers: Tyco, Reliable, Viking
- .10.2 UL listed guards shall be provided on all exposed sprinklers subject to damage, including, but not limited to, gymnasiums, electrical rooms, mechanical rooms, storage rooms, and all sprinklers less than 7 feet 6 inches above finished floor.
- 10.3 Stainless steel sprinklers and escutcheons shall be installed in all areas subject to corrosion, including, but not limited to, swimming pools, storage areas with corrosive materials, and all outdoor areas.
- .11 System shall include back flow protection on the domestic water line as required to be consistent with the requirements of the local water department.
- .12 The fire suppression system piping requirement shall meet or exceed NFPA 13 Standard for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use and be not less than schedule 40.



- .12.1 Externally galvanized piping shall be considered for areas subject to corrosion and outdoor areas only.

.13 Wexter Medical Center: Operating rooms shall be suppressed with a pre-action fire suppression system.

Commentary: Consider a nontoxic antimicrobial water additive to the fire sprinklers system to prevent microbiologically influenced corrosion (MIC).

- .14 Fittings Materials and Dimensions: Cast Iron Threaded Fittings, Class 125 and 250 ASME B16.4;
Malleable Iron Treaded Fittings, Class 300 ASME B16.3;
Malleable Iron Threaded Pipe Unions, Class 250 ASME B16.39
- .15 Braided and welded stainless steel flexible fire sprinkler drop hose that are UL Listed/FM Approved are allowed. Limit the number of bends and bend radius to the limitations in the manufacturer's technical data.

21 30 00. FIRE PUMPS

- .1 CENTRIFUGAL TYPE PUMPS shall be provided; turbine vane pumps are prohibited. Installation shall comply with applicable codes and standards, including the Ohio Building Code (OBC), Ohio Fire Code (OFC) and the applicable edition of NFPA 20, STANDARD FOR THE INSTALLATION OF STATIONARY PUMPS for FIRE PROTECTION.
- .2 CONTROLLER: Specify the following, all factory prewired and enclosed with integral transfer switch in a NEMA II floor mounted enclosure: One excess pressure controller containing magnetic starter, disconnect switch, dual pressure switch, three position selector switch, and an alarm bell to sound when the pressure drops below the second control point of the dual pressure switch.
- .2.1 Coordination of Electrical Connections: Stipulate that the pump supplier coordinates the electrical connection lugs with the cable size being provided by the electrical contractor or provide junction boxes and terminal strips to match wire sizes indicated in the motor schedule on the electrical drawings.
- .2.2 All electric fire pumps shall be connected to a reliable source of power per the local municipality and NFPA 70.
- .3 BEARINGS: Wherever practical, equipment shall be furnished with sealed ball or roller bearings. Specify that the contractor shall not lubricate sealed bearings.
- .4 RELIEF VALVE AND DRAIN: The fire pump shall have a temperature relief valve integral with the casing. A valved discharge line to a test header located outside the building shall be provided for demonstration and operating tests. Provide an



automatic ball check and drain line, piped to drain from the discharge line and test header system

- .5 FIRE PUMP TEST CONNECTIONS: The test connection cluster, with 2-1/2 in. valves; shall be located on the building exterior adjacent to the fire department siamese connection for the purpose of performing proper testing of the fire pump for initial acceptance and annual testing. Include piped drainage. Test valves shall have piped in drainage. The Architect/Engineer shall coordinate the site requirements for the test vehicle/trailer and water discharge to prevent damage to the landscape and building.

.5.1 All Fire Department Siamese Connections (FDC) shall require locking caps that accept KNOX key wrench.

- .6 WATER SUPPLY: Design shall be based on a water flow test within 12 months of design and shall consider daily and seasonal fluctuations in the water supply when sizing and selecting pumps. Specify that the installing contractor conduct another water supply test prior to ordering fire pumps as part of shop drawing submittal process.

21 31 00 SIGNAGE

- .1 The Architect/Engineer (A/E) shall specify the SIGNAGE REQUIREMENTS PER OHIO FIRE CODE. A/E shall also review and list the signage requirements in Division 10 Signage as part of the General Contract.
- .2 FIRE DEPARTMENT CONNECTION: The location of the fire department connection shall be indicated by the permanent installation of a readily visible sign. Such sign shall have the letters "FDC" at least 6 inches (152 mm) high and words in letters at least 2 inches (51mm) high or an arrow to indicate the location. The color of the letters is to contrast with the background color, e.g., white letters on red background. The Architect/Engineer shall coordinate the location of the sign with DPS and the AHJ.
- .3 STANDPIPE CONNECTION CABINETS: The location of the fire department standpipe connection cabinets shall be identified with a permanently installed sign with letters at least 1 inch high in a color that contrasts with the background color, to read "Standpipes".
- .4 FIRE EXTINGUISHERS: The location of installed fire extinguishers within a cabinet shall be properly identified by the labeling above the cabinet with dimensional signage using proper wording and/or pictorials.
- .5 FIRE PUMP ROOM: Fire protection equipment shall be identified in an approved manner. Rooms containing controls for fire suppression pumps shall be identified for the use of the fire department. Signage shall be constructed of durable materials permanently installed and readily visible to read, "FIRE PUMP".



- .6 **SPRINKLER RISERS AND VALVES ROOM:** Fire protection equipment shall be identified in an approved manner. Rooms containing controls for all fire suppression sprinkler risers and valves, including dry and pre-action suppression systems shall be identified for the use of the fire department. Signage shall be constructed of durable materials permanently installed and readily visible to read, "SPRINKLER ROOM".

21 32 00 TRAINING

The following training shall be provided:

- .1 The sufficient number of hours of training as determined by AE, University Project Manager and the affected university departments to train the university staff. The training shall be strictly provided by the OEM (Original Equipment Manufacturer). Training shall be provided independent of and in addition to "start up and check out" of installed systems and equipment. Training shall be provided on-site during normal working hours and scheduled through the university, Facilities Operations and Development Training Coordinator at (614) 688-3289 or other university department as appropriate.
- .2 Each OEM shall provide hourly rates to be used for miscellaneous support. The OEM shall provide this additional support during the warranty term.
- .3 Contractor and/or OEM shall provide all necessary training materials, including, but not limited to: books, brochures, pamphlets, audio and video tapes, on-site support manuals, logging sheets, and system documentation materials.

END OF DIVISION 21 – FIRE SUPPRESSION