21 00 00. FIRE SUPPRESSION

21 00 03. GENERAL PROVISIONS

.1 PREPARATION OF CONTRACT DOCUMENTS

.1.1 PLUMBING CONTRACT: Include work related to Fire Protection within the scope of the Plumbing Contract. The Architect/Engineer shall consult with the Ohio State University’s Division of Emergency Management and Fire Prevention 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 protection work shall be licensed and certified by the Department of Commerce Division of State Fire Marshal to perform work on the fire protection system.

.2 NFPA: Installation must comply with all current editions of the NFPA as referenced in the current edition of the Ohio Building Code (OBC), unless noted otherwise. Whenever referring to materials and installations by National Fire Protection Association Publications use the OBC referenced edition, unless noted otherwise, and include the date of each referenced publication in the specifications.

.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.

.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.

21 00 05. SUBMITTALS

.1 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.

.1.1 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.

.1.2 Specify three unique stages of design submittals for any fire suppression system, as follows:

.1.2.1 Materials and Equipment List: 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.

.1.2.2 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.
.1.2.3 Detailed Shop Drawings: 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. 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.

21 05 05. FIRE SUPPRESSION MATERIALS AND METHODS

21 05 25. VALVES

.1 GATE VALVES: Use UL approved 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 ends.

.1.3 All post indicating valves located in areas subject to damage by vehicular traffic shall be protected by bollards.

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) 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 the current edition of NFPA Publication 24 and specifications of both The Ohio State University and governing Authorities Having Jurisdiction (AHJ). Locate one fire hydrant near 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. 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 the current edition of NFPA Publication 24.

.2.6.5 Install fire hydrant so centerline of all hose outlets are a minimum of twelve inches above finish grade. Hydrants are to be secured with ¾" 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 The Ohio State University Division of Emergency Management and Fire Prevention, and FOD’s Utility Services.

.2.7 Testing: FOD’s Utility Services and Division of Emergency Management & Fire Prevention shall witness and approve all hydrostatic pressure tests.

.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.
21.7.5 Thrust blocks shall be sufficiently hardened before hydrostatic testing is begun.

21.7.6 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 OSU 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 The Ohio State University Division of Emergency Management & Fire Prevention, 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.

21 12 00. FIRE-SUPPRESSION STANDPIPES

.1 DESIGN, INSTALLATION, AND TESTING: Comply with the Ohio Building Code, the Ohio Fire Code: Ohio Administrative Code - Fire Protection Systems, the Authority Having Jurisdiction (AHJ): Department of Commerce Division of State Fire Marshal, and the requirements of NFPA Publication 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. Provide a copy of the flow and pressure test to the University’s Project Representative and FOD’s Utility Services.

.1.2 When the Ohio Administrative Code requirements 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.

21 12 20. FIRE STANDPIPE CABINETS AND ACCESSORIES:

.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 60 psig, orifices shall be required on hose cabinet valve-discharges. The orifices shall be the
21 3 00. FIRE-SUPPRESSION SPRINKLER SYSTEMS

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

.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.

.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.
.2.1.4 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.
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.4 DRY SPRINKLER SYSTEMS: Provide a low pressure switch on all systems to detect a gradual loss of air pressure. Connect switch to fire alarm system as a distinct zone.

.4.1 Air Compressor shall be on a dedicated electrical circuit.
.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 the University’s Division of Emergency Management and Fire Prevention.

.6 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 Electrical Contractor, as distinct zone annunciation. Specify and show which devices are to be furnished and installed by the Fire Protection Contractor.

.6.1 Cord type tamper switches are prohibited.

.7 All pressure switches, pumps, valves and similar devices shall be installed with isolating valves to facilitate replacement of devices.

.8 All pumps, valves and similar devices shall be painted red. All piping shall be painted red or permanently banded red.

.9 System shall include back flow protection on the domestic water line as required to be consistent with the requirements of the local water department.

.10 The fire suppression system piping requirement shall meet or exceed the 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.

.11 Fittings Materials and Dimensions: Cast Iron Threaded Fittings, Class 250 ASME B16.4; Malleable Iron Threaded Fittings, Class 300 ASME B16.3; Malleable Iron Threaded Pipe Unions, Class 250 ASME B16.39

.12 Braided stainless steel flexible fire sprinkler drop hose that are U.L. Listed/FM Approved are allowed.

21 30 00. FIRE PUMPS

.1 CENTRIFUGAL TYPE PUMPS shall be provided; turbine vane pumps are prohibited. Installation shall comply with the Ohio Building Code (OBC), and NFPA Publication 20, STANDARD FOR THE INSTALLATION OF STATIONARY PUMPS for FIRE PROTECTION.

.2 CONTROLLER: Specify the following, all factory prewired and enclosed 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 coordinate 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.

.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.

21 31 00 SIGNAGE

.1 The Architect/Engineer (A/E) shall specify the SIGNAGE REQUIREMENTS PER OHIO FIRE CODE. A/E shall also review APPENDIX S of the Building Design Standards and list the signage requirements in Division 10 Signage as part of the General Contract.

.2 FIRE DEPARTMENT CONNECTION

.2.1 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 the University Project Representative and the Division of Emergency Management and Fire Prevention and the AHJ.

.3 STANDPIPE CONNECTION CABINETS

.3.1 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

.4.1 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
.5.1 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

.6.1 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”.

END OF DIVISION 21 – FIRE SUPPRESSION