WET PIPE SPRINKLER SYSTEM CHECKLIST
ENGINEERED PLANS FOR DOD FACILITIES

I. GENERAL INFORMATION			
Base/Post:		Building Name:	
Using component:	☐ Army ☐ Airforce* ☐ Marines* ☐ Navy* ☐ Other DoD component* (DLA, NGA, NRO, WHS, etc.) * For use of this checklist on non-Army reviews, the reviewer is advised to carefully check submittal against all service exceptions contained in UFC 3-600-01. For Navy projects, also check against UFC 3-600-10N. These requirements are not covered by this checklist.		
Description of Building:			

II. APPLICABILITY AND REQUIREMENT FOR SPRINKLERS	
1) Is project at a Department of Defense owned facility? If no: This review checklist, which is based on UFC 3-600-01, should not be used. (Note 2-1)	☐ Yes ☐ No If no: This checklist is not applicable.
☐ New construction and project documents include sprinklers throughout: Skip to section III.	
2) If this is a renovation or addition, does the project involve any of the following changes? ☐ Additional sprinkler coverage in a partially sprinklered building ☐ Change of use/occupancy that increases fire hazard of existing sprinklered area ☐ Building additions onto any building (non, partial, or fully sprinklered) ☐ Any other activities other than like-kind replacement of sprinkler heads, minor relocation of sprinkler heads, or rerouting of piping If no: A fire protection engineer is not required to be involved. The only design requirement is that submittal drawings used for sprinkler installation shall show the name and NICET license number of an individual certified to NICET Level III or IV for fire suppression systems. Ensure this is stated within the bid package or design documents (specifications).	☐ Yes ☐ No ☐ N/A If yes: This checklist is applicable, continue to 3. If no: This checklist is not applicable. No engineered plans required.
3) For newly constructed or completely renovated buildings that are shown as being designed without sprinklers, does the facility meet one of the exceptions to the requirement for sprinklers? The following do not require automatic sprinklers: a. Non-mission essential buildings of IBC Type I or II construction less than 15,000 sq ft (1,394 sq m) gross floor area. Unless sprinklers are required by UFC 3-600-01 ch.6 special occupancies and hazards b. Non-mission essential buildings of IBC Type III, IV, or V construction less than 5,000 sq ft (465 sq m) gross floor area. Unless sprinklers are required by UFC 3-600-01 ch.6 special occupancies and hazards For a general definition of “mission essential” see Note 2-3	☐ Yes ☐ No ☐ N/A If yes: This checklist is not applicable, as sprinklers are neither provided nor required. If no: continue to 4
4) For mission essential buildings or buildings that exceed the above non-mission essential sq ft limits (>=5,000 sq ft for Type III, IV, V bldgs, or >=15,000 sq ft for Type I, II bldgs), are any of the following situations applicable? Check all which apply to this scope of work:	☐ Yes ☐ No ☐ N/A If yes: This checklist is applicable, as sprinklers are

☐ New building or new addition of any size: For all new buildings and new additions to an existing building, the new building or new building addition must be fully sprinklered. ☐ New addition >=50% of the existing building's floor area: The existing building must comply with the criteria for new construction to maximum extent possible, and therefore requires addition of sprinklers throughout the existing areas. ☐ Major renovations costing >=50% of the replacement value of the building: the existing building must also be renovated to comply completely with the criteria for new construction. (50% cost is exclusive of bringing the building into full compliance). ☐ Renovation work <50% of replacement value of the building: Must comply with criteria for new construction to the "maximum extent practical." This is open to interpretation depending on the level of the renovation. Replacing carpet and painting clearly does not require sprinklers. Demolition back to the bare structure for multiple rooms would clearly require sprinklers using a reasonable interpretation. For situations between those extremes use judgment based on the extent of the renovation work, the proximity of water supplies, and relevant costs, to decide when sprinklers would be warranted. It is strongly encouraged to include retrofit of sprinklers in all projects. ☐ Change of occupancy: When area has a change of occupancy, it must meet all the criteria for new construction, and therefore must be sprinklered, regardless of the extent or scope of the renovation ☐ Renovations for which NFPA 101 Chapter 43 "Building Rehabilitation" requires sprinklers in the area: Note that NFPA 101 Chapter 43 has lower threshold triggers than the UFC, and should be carefully checked. For example, touching more than 50% of the area of the building will trigger "reconstruction" requirements which may require new sprinklers depending on the governing NFPA 101 occupancy.	required If no: This checklist is not applicable, as sprinklers are not required.
5) Underground and limited access (formerly termed "window-less") structures: For non-mission essential buildings (below the above sq ft thresholds) that would not otherwise normally require sprinklers, is either of the following situations applicable? ☐ Major renovation to a portion of a structure that is considered either underground or limited access, and is not exempt from sprinkler requirements (see Note 2-5), with the extent of the renovation such that renovated area is required to meet all the requirements for new construction. ☐ Project is for a new building, or an addition to an existing building, that is considered either underground or limited access, and is not exempt from sprinkler requirements (see Note 2-5).	☐ Yes ☐ No ☐ N/A If yes: This checklist is applicable, as sprinklers are required If no: This checklist is not applicable, as sprinklers are not required

III. FIRE PROTECTION ENGINEERING	
1) Is there a qualified "Fire Protection Engineer" (FPE) documented as being on the project design team? (Note 3-1)	☐ Yes ☐ No If no: comment 301
2) Is there a fire protection design analysis included which addresses fire protection related requirements, for all areas appropriate to the scope of work? (Note 3-2)	☐ Yes ☐ No If no: comment 302

3) If this is the 100% design submittal, did the project Fire Protection Engineer (FPE) provide a letter/statement certifying that the plans and specifications are in compliance with UFC 3-600-01 and all applicable criteria?	☐ Yes ☐ No ☐ N/A If no: comment 303
4) If the project involves changes to building walls and arrangement, is there a life safety plan included in the drawing package (stamped by the FPE if 100% submittal), which shows at a minimum the following features? • Occupant load • Travel distance to exit • Common path of travel distance • Fire barriers (where required) • Fire walls (where required) • Non-rated smoke partitions around any area with storage (sprinklered bldg) • Exit capacity calculation results • Location of fire extinguishers • Smoke barriers (if hospital)	☐ Yes ☐ No ☐ N/A If no: comment 304

IV. SPRINKLER DESIGN	
1) Is the sprinkler system designed using the density/area method? Note: special design approach per NFPA 13 section 11.3 using residential "4-head" method is not allowed. Exception to area/density requirement: high-piled storage areas (>12 ft in storage height) are designed per the requirements of applicable NFPA 13 storage chapters.	☐ Yes ☐ No If no: comment 401
2) Do the sprinkler densities comply with UFC 3-600-01? Light Hazard.....0.10 gpm/sq ft (4.1 l/min/sq m) Ordinary Hazard Group 1 .....0.15 gpm/sq ft (6.1 l/min/sq m) Ordinary Hazard Group 2.....0.20 gpm/sq ft (8.2 l/min/sq m) Extra Hazard Group 1 .....0.30 gpm/sq ft (12.2 l/min/sq m) Extra Hazard Group 2 .....0.40 gpm/sq ft (16.3 l/min/sq m)	☐ Yes ☐ No If no: comment 402
3) Does the sprinkler design area comply with UFC 3-600-01 and NFPA 13? Required design area: 3,000 sq ft (280 sq m) + increases Design area increases: +30% for dry pipe system, and +30% for > 2 in 12 ceiling slope. Example: A vaulted ceiling protected using a dry system is 3,000 * 1.3 * 1.3 = 5,070 sq ft. Exception: the design area may be reduced if the quick response sprinkler reduction is used (see below)	☐ Yes ☐ No If no: comment 403
4) If the design area was reduced taking credit for use of quick response heads, were all requirements satisfied to allow the reduction? • Wet pipe system • Light or ordinary hazard occupancy • 20 ft maximum ceiling height • No unprotected ceiling pockets as allowed by NFPA 13 8.6.7 and 8.8.7 exceeding 32 sq ft	☐ Yes ☐ No ☐ N/A If no: comment 404

5) If the design area was reduced taking credit for use of quick response heads, was the correct % reduction taken? For ceiling height <10 ft: design area % reduction = 40%, (1,800 sq ft design area) For ceiling height 10 to 20 ft, design area % reduction = 55 - 1.5*[height in feet]	☐ Yes ☐ No ☐ N/A If no: comment 405
6) If the project involves miscellaneous storage, does the density meet the requirements of table 13.2.1 in NFPA 13? (Note 4-6)	☐ Yes ☐ No ☐ N/A If no: comment 406
7) Are the miscellaneous storage areas which are used for paper product storage (such as paper files or general boxed good storage), designed for Ordinary Hazard Group 2 density (0.20 gpm/sq ft)? Note: Paper and cardboard items are class III commodities.	☐ Yes ☐ No ☐ N/A If no: comment 407
8) Are mechanical rooms designed as Ordinary Hazard Group 2? Note: Ordinary Group 1 is ok for rooms with non-fuel fired mechanical equipment at reviewer's discretion. See comment 408 for OH2 justification.	☐ Yes ☐ No ☐ N/A If no: comment 408
9) Are all occupancies listed in UFC 3-600-01 section B-1.2 (page 102) designed as Ordinary Group 1? Some examples: kitchens, maintenance areas, laundries	☐ Yes ☐ No ☐ N/A If no: comment 409
10) Are all occupancies listed in UFC 3-600-01 section B-1.3 (page 102) designed as Ordinary Group 2? Some examples: laboratories, chiller rooms, compressor rooms, switchgear rooms, libraries, repair garages, generator rooms, commissaries, exchanges	☐ Yes ☐ No ☐ N/A If no: comment 410
11) Are all special occupancies listed in UFC 3-600-01 section B-1.4 (page 101) designed in accordance with their applicable standard(s)? Some examples: storage of flammable or combustible liquids in excess of allowables, ordnance plants, high piled storage (>12 ft, 3.7 m) of any type, and warehouse type storage areas. (Note 4-11)	☐ Yes ☐ No ☐ N/A If no: comment as appropriate to the deficiency
12) If the project involves NFPA 13 definition "hi-piled storage" (>12 ft, 3.7 m) of Class I through IV commodities, is the storage designed for Class IV commodities at the maximum possible storage height for the area? Max. storage height is 18" below the sprinkler deflector for standard spray heads and 36" below for ESFR. Area must be designed for Class IV commodities regardless of the commodity type expected or planned to be stored.	☐ Yes ☐ No ☐ N/A If no: comment 412
13) If the project involves the design of hi-piled storage (warehouse), are all the other additional (above NFPA 13) requirements of UFC incorporated? 1) In-rack sprinklers must be supplied from risers separate from the ceiling sprinklers. 2) Racks with solid shelves over 12 ft (3.7 m) in height must have in-rack sprinklers at every tier or shelf level. 3) sprinkler riser control valves must be readily accessible to the fire department from the exterior. 4) water supply duration is 120 minutes 5) Hose stream allowance is 500 gpm (1900 l/min) Note: Consult with fire protection lead when reviewing hi-piled storage	☐ Yes ☐ No ☐ N/A If no: comment 413
14) Is the sprinkler system hose stream allowance per UFC 3-600-01? Light hazard ..... 250 gpm (950 l/min) Ordinary hazard groups 1 and 2 ..... 500 gpm (1900 l/min) Extra hazard groups 1 and 2 ..... 750 gpm (2840 l/min) Note: Where multiple occupancy hazards exist, the hose stream shall meet one of the following: a) hose stream of the highest hazard, b) each hose stream for each hazard class shall be used in the calcs for the design area for that hazard, or c) where higher class is in rooms not greater than 400 sq ft, with no such	☐ Yes ☐ No If no: comment 414

rooms adjacent, the class of the principal occupancy may be used.	
15) Is the sprinkler and hose stream duration per UFC 3-600-01? Light hazard ..... 60 minutes Ordinary Hazard Group 1 ..... 60 minutes Ordinary Hazard Group 2 ..... 90 minutes Extra Hazard Groups 1 and 2 ..... 120 minutes Note: Duration is only applicable where the system has a storage tank.	☐ Yes ☐ No ☐ N/A If no: comment 415
16) Do specs indicate the coverage areas per sprinkler meet UFC 3-600-01 requirements (as listed below)? Light hazard: Max 225 sq ft (21 sq m) per sprinkler Ordinary hazards: Max 130 sq ft (12.1 sq m) per sprinkler Note: Extended Coverage (EC) heads are allowed by NFPA 13, but not allowed per the UFC due to the above limits and NFPA 13 section 8.8.2.1.1, except for the very rare case of Extra Hazard EC heads spaced such that the covered area per sprinkler is a thin rectangle.	☐ Yes ☐ No If no: comment 416

V. WATER SUPPLY	
1) For sprinkler supplied from existing water supplies, was there a hydrant water flow test performed in accordance with NFPA 291, and the test results included with the first design submission of the project? Note: historical water supply information must not be accepted	☐ Yes ☐ No ☐ N/A If no: comment 501
2) Do the water flow test results sheet and/or the project documents include all information required for the flow test data to be useful for the installer's hydraulic calculations? (Note 5-2)	☐ Yes ☐ No ☐ N/A If no: comment 502
3) Did the preparer of the contract documents (a fire protection engineer or an engineer experienced in water flow testing) perform or witness the required water flow testing?	☐ Yes ☐ No ☐ N/A If no: comment 503
4) Did the fire protection engineer provide preliminary estimated flow and pressure demand calculations demonstrating that the water supply selected is capable of meeting the sprinkler system demand? Typical approach is to include a calculation summary table or paragraph on the drawings or in the design analysis, documenting the results of this preliminary calculation. (See Note 5-4, and Note 5-6)	☐ Yes ☐ No ☐ N/A If no: comment 504
5) Where the water source can supply the sprinkler and hose stream flowrate but is unable to meet pressure demand, was a booster pump specified? Note: consult with fire protection lead for review of all fire pump designs	☐ Yes ☐ No ☐ N/A If no: comment 505
6) Where the water supply cannot supply the sprinkler and hose stream flowrate while maintaining all portions of the underground firewater lines above 20 psig, was both a storage tank and pump specified? Consult with fire protection lead for all fire pump and tank designs. (Note 5-6)	☐ Yes ☐ No ☐ N/A If no: comment 506

VI. UNDERGROUND AND BACKFLOW PREVENTER	
☐ This section N/A (no work affecting UG or BFP)	
1) Does the fire protection engineer's plans show a detail for the underground pipe (lead-in) supplying the sprinkler system? (Note 6-1)	☐ Yes ☐ No ☐ N/A If no: comment 601
2) Where the lead-in piping passes through a foundation wall (grade beam), is it protected from settling of the wall? Sleeve with clearance, oversized opening with flexible material (foam) on top of the pipe, etc.	☐ Yes ☐ No ☐ N/A If no: comment 602
3) Are pipe joints in the lead-in located such that they are not located directly underneath foundation footings?	☐ Yes ☐ No ☐ N/A If no: comment 603
4) For joints under the building (under slab), is the type of restrained joint system specified on the detail and in specifications? (Note 6-4)	☐ Yes ☐ No ☐ N/A If no: comment 604
5) If the building is Seismic Design Category C, D, E, or F (per IBC and UFC definition 3-310-04 definition), does the supply piping penetrate the slab through a hole that is 4" larger in diameter than the pipe? Note: This should be called out on the appropriate plans. A pipe sleeve through the slab is the preferred method.	☐ Yes ☐ No ☐ N/A If no: comment 605
6) For a new sprinkler supplied from a potable water source, is there a backflow preventer included in the design documents (plans and specs)? A backflow preventer must be installed, unless a new portion of the sprinkler system is connected to an existing above-ground firewater main within an existing building, which does not have a backflow preventer.	☐ Yes ☐ No ☐ N/A If no: comment 606
7) If the backflow preventer is installed outdoors, is it located either in an enclosed pit or an above-ground insulated and heated enclosure (hot box)? Exceptions: tropical areas where freeze protection is not required by NFPA 24	☐ Yes ☐ No ☐ N/A If no: comment 607
8) Is the backflow preventer specified to be UL listed or FM approved for use in fire-service systems? (Note 6-8)	☐ Yes ☐ No ☐ N/A If no: comment 608
9) Are both the upstream and downstream shutoff valves on the backflow preventer equipped with tamper switches (electrically supervised)?	☐ Yes ☐ No ☐ N/A If no: comment 609
10) Is there a permanently installed test connection that allows for forward flow testing of the backflow preventer at full system demand? Note: This should connect downstream of the backflow preventer and flow water through piping and a block valve to hose test connections on the exterior of the building. The hoses will allow water to be directed to an appropriate location.	☐ Yes ☐ No ☐ N/A If no: comment 610
11) If the building underground lead-in pipe has a velocity >8 ft/sec (2.4 m/sec) or water conditions warrant, is there a strainer installed on the sprinkler system? Note: The approximate limits for various size schedule 40 piping, to stay under 8 ft/sec, is as follows: 4"=590 gpm, 6"=725 gpm, 8"=1250 gpm, 10"=1950 gpm	☐ Yes ☐ No ☐ N/A If no: comment 611

12) For new building lead-in, is there an outside control valve provided? Acceptable types are listed below, in the following order of preference: a. Listed indicating valve (post indicating valve preferred) at least 40 ft or the building wall height away from the building where space permits b. Control valves installed in cut-off stair tower or valve room accessible from outside c. Wall post indicator valve in riser with valve hand wheel located for outside operation, not adjacent to building openings d. Key-operated valve (such underground gate valve with valve box, and T-wrench, preferably located 40 ft or building wall height away from the building). Note: coordinate this with checklist item no. 39 (inside control valve)	☐ Yes ☐ No ☐ N/A If no: comment 612
13) Where a backflow preventor is not installed, and there is a fire department connection (FDC), is there a check valve in the water supply upstream of the FDC point of connection to the system? Note: for single system risers an alarm check may act as the water supply check valve. For multiple systems, a separate check valve is required in the automatic supply, such that the sprinklers can be fed from the highest pressure source.	☐ Yes ☐ No ☐ N/A If no: comment 613

VII. SYSTEM RISER	
☐ This section N/A (no work affecting system riser)	
1) Do the engineered plans show a schematic diagram or detail of the sprinkler system riser?	☐ Yes ☐ No If no: comment 701
2) Is there at least one supervised shutoff valve shown in the supply piping at the system riser location?	☐ Yes ☐ No If no: comment 702
3) Is there a means of detecting flow which is located downstream of the system block valve(s), which connects via a fire alarm control panel to a base fire reporting system (where a base-wide system exists)? Examples: combination alarm-check valve with pressure switch, or a paddle (vane) type flow switch	☐ Yes ☐ No If no: comment 703
4) If there was no outside indicating control valve included in the building lead-in (item 34) because lead-in is existing, is there a supervised valve shown in the riser, that meets one of the following two requirements: a. Valve is in a cut-off stair, or dedicated valve room accessible from exterior b. Valve is a wall post indicating valve, where the handle is arranged for outside operation and is not adjacent to building openings.	☐ Yes ☐ No ☐ N/A If no: comment 704
5) Is there a main drain valve shown, capable of draining the system, which discharges to the exterior of the building?	☐ Yes ☐ No If no: comment 705
6) Is there a pressure gauge shown, which is located on the sprinkler side of any block valves or check valves (capable of reading pressure during main drain test), and where there is a check valve in the riser, is there also a gauge both upstream and downstream of the check valve? Note: The downstream pressure gauge must not be connected into the branch	☐ Yes ☐ No If no: comment 706

line used for the main drain. It must be connected off the riser, or connected to a pressure gauge port on an alarm-check valve	
7) Is there a fire department connection (FDC) shown, with all required features? Required: a. 4" dia. (min.) supply pipe with 4x2-1/2"x2-1/2" wye (Siamese) connection mounted outside in location accessible to fire dept. and within 150 ft of a hydrant b. Check valve in the supply piping, with ball drip which drains any check valve leakage to the outside of the building c. For single system risers: FDC supply connects on the downstream (system) side of the check and block valves d. For multiple system risers arranged in a header configuration: FDC supply connects downstream of the backflow preventer, but upstream of each system's control valve and flow detection (into the header). FDC not required: - where the building is in remote areas inaccessible for fire dept. support - large capacity deluge systems exceeding the pumping capacity of the fire dept. - single-story buildings not exceeding 2000 sq ft in area	☐ Yes ☐ No If no: comment 707
8) If the building is classified as seismic design category C, D, E, or F as defined by the International Building Code, as modified by UFC 3-310-04, are all the following features shown on the system riser detail? a. flexible couplings within 2 ft of the top and bottom of the riser b. four-way brace on the feed main (downstream of the flexible couplings) c. enlarged opening (or sleeve) where the water supply piping penetrates the floor slab (see also checklist item Section 5, no. 5).	☐ Yes ☐ No ☐ N/A If no: comment 708
9) Does the riser detail show a pressure relief valve downstream of the control and check valves, on the sprinkler side? A listed 1/2 inch (12 mm) relief valve is required, and shall be set to operate at 175 psig or 10 psig in excess of system pressure, whichever is greater	☐ Yes ☐ No If no: comment 709

VIII. ALARM TEST CONNECTION	
☐ This section N/A (no work affecting alarm test)	
1) Is there a detail showing the flow alarm test connection, and is its location shown on the plan drawings?	☐ Yes ☐ No If no: comment 801
2) Does the alarm test connection detail show all required features? - minimum 1 in. (25 mm) diameter - test valve in readily accessible location - pipe is routed to the building exterior - terminates in a smooth bore corrosion resistant orifice which gives flow equal to or less than one sprinkler of a type having the smallest orifice on the system - Alarm test connection is installed anywhere downstream of the waterflow alarm device* *Note: The preferred (but not required) location is at the highest, most-remote branch line, so that air may be vented from the test connection, and any obstructions in the system would be noticed.	☐ Yes ☐ No If no: comment 802

IX. SPECIAL SITUATIONS	
☐ This section N/A (no work involving special situations)	
1) Are sprinklers provided in all concealed spaces having any exposed combustible construction, with the following exceptions? a. Concealed spaces of non-combustible and limited combustible (<25 flame spread index) construction with minimal combustible loading (some data cables and PVC plumbing is ok), and having no access. Typical example: above ceiling spaces in buildings with non-combustible construction. b. Concealed spaces of non-combustible and limited combustible construction with limited access (non-standard size door, or locked door) and not permitting occupancy or storage of combustibles. Typical example: crawl space in a building with non-combustible construction, where there is a limited access (reduced size) door/opening, and perhaps having a sign stating no storage allowed. c. Concealed spaces in which the exposed materials are constructed entirely of fire retardant-treated wood as defined by NFPA 703. Note: this exception requires a pressure-treated application. Wood treated with fire-retardant coatings do NOT meet this exception, and must be sprinklered. d. Various exceptions where installation of sprinklers are not practical and other precautions are taken, such as filling in the voids with non-combustible insulation. See NFPA 13, section 8.15.1.2.1 through 16 for exceptions.	☐ Yes ☐ No If no: comment 901
2) If there are combustible overhangs, soffits, eaves, or decorative frame elements, and the elements are not shown as requiring sprinklers are all the following requirements met? Max. 4 ft (1.2 m) in width, elements are draft-stopped into max. 160 cu ft (4.5 cu m) volumes, separated from the interior by walls or roofs of non or limited combustible construction, and have no openings or unprotected penetrations into building	☐ Yes ☐ No ☐ N/A If no: comment 902
3) If there are exterior roofs, canopies, car ports (drive thru), balconies, decks or similar projections, do the plans show that sprinklers are required? Exceptions: a. Where projections are constructed entirely with non-combustible, limited combustible, or fire retardant-treated wood b. Where projections have exposed finish materials of non-combustible, limited combustible, or fire retardant-treated wood and contain only sprinklered concealed spaces or meet one of the 8.15.7.3 exceptions	☐ Yes ☐ No ☐ N/A If no: comment 903
4) If there are exterior roofs, canopies, car ports (drive thru), balconies, decks or similar projections greater than 2 ft (0.6 m) and where combustibles will be stored, do the plans show that sprinklers are required? Example: loading docks, exterior storage canopies. Note: applies even where projection is of non-combustible construction	☐ Yes ☐ No ☐ N/A If no: comment 904
5) If there are exterior corridors or stair towers, sprinklers may be omitted with walls min. 50% open and corridor/stair tower is of non-combustible construction. If the areas are <50% open or have combustible construction, are sprinklers provided?	☐ Yes ☐ No ☐ N/A If no: comment 905
6) Are sprinklers installed in stairways as required by NFPA 13? For rated exit stairs (non-combustible): Sprinkler(s) required at the top of the	☐ Yes ☐ No ☐ N/A If no: comment 906

shaft, and under the first accessible landing above the bottom of the shaft. For stairways of combustible construction: complete sprinkler coverage is required. Sprinklers beneath all stairs.	

X. ELEVATORS	
☐ This section N/A (no work involving elevators)	
1) Where elevators are new, or are being retro-fit to meet new construction standards as part of a renovation*, does the sprinkler design meet the requirements of UFC 3-600-01, section 6-30? * example: an elevator on a portion of a floor that is being upgraded to have full sprinkler coverage Note: Reviewer is cautioned to closely review for compliance with UFC 3-600-01 section 6-30 and figures 6-8 through 6-11. Depending on the elevator type, there are specific flow switches and control valves required by the UFC that are not required by NFPA standards, which are often missed by A/E firms. Note that hole-less hydraulic are the most common type elevators, and figure 6-11 in the UFC shows their requirements.	☐ Yes ☐ No ☐ N/A If no: comment as appropriate for the deficiency found

END OF CHECKLIST ITEMS

ADDITIONAL NOTES TO REVIEWER

SECTION 2 - NOTES

2-1. If project is at a VA Hospital or some guard projects not on federal property, this checklist, which is based on UFC 3-600-01 requirements, will not apply. For VA projects, refer to the VA Fire Protection Design Manual, available from FP lead. For National Guard or other projects on state property, use the project's applicable building and fire codes (typically International Building Code and International Fire Code).

2-2. Section 1-5 of UFC 3-600-01 requires that projects involving "design or modification of..fire suppression, or life safety systems require the services and review of a qualified fire protection engineer."

2-3. Mission essential building: a facility that contains operations, equipment, records, etc. that is considered essential to the mission of the installation or to the mission of the user/tenant. The installation commander or the tenant command responsible for activities in the facility determines the mission-essential nature of the facility.

If command determination is not available, the Corps of Engineers (or the appropriate government entity administering the contract) may advise the end user on making a determination. A property protection threshold to use is $5 million combined facility and content replacement value. If the facility is irreplaceable and essential to the mission, and a complete loss would result in complete inability to perform an important mission, then it should be fully sprinklered regardless of potential monetary loss. Note this is an arbitrary interpretation, and requiring sprinklers is un-enforceable by government reviewers commenting on design-build projects where the buildings are under the above sq ft limits and no specific direction was given in the design-build RFP. However, careful consideration should be given on design-bid projects to ensure the RFP and bid package conforms completely to the UFC.

2-5. Underground structure: A structure or portion of a structure that is underground, and does not have at least the following emergency openings; openings on not less than two sides of the story, of not less than 20 sq ft of opening per 50 lineal ft of exterior wall, located entirely above grade. Any underground structure or portion of a structure meeting or exceeding this sq ft of opening requirements shall not be considered "underground".
Limited access (formerly termed windowless) structure: A structure or portion of a structure that does not have openings (doors, windows, hatch panels) in compliance with the following:

> One-Story structures: finished ground level doors or emergency access openings (see definition below) on a minimum of two sides of the building, spaced not more than 125 ft apart on the exterior walls
> Multiple-Story structures: The story at finished ground level shall comply with one-story requirements. The other stories shall be provided with emergency access openings (see definition below) on two sides of the building, spaced not more than 30 ft apart on the exterior walls
>
> Emergency opening:
> (1) The opening shall have dimensions of not less than 22 in. (560 mm) in width and 24 in. (610 mm) in height and shall be unobstructed to allow for ventilation and rescue operations from the exterior.
> (2) The bottom of the opening shall be not more than 44 in.(1120 mm) above the floor.
> (3) The opening shall be readily identifiable from both the exterior and interior.
> (4) The opening shall be readily openable from the interior, and must be capable of being opened from the exterior, either by operator, or by using fire department equipment. Note that AT/FP compliant windows are ok, per testing conducted by GSA, they can be removed using pike poles and axes.

Sprinkler requirements in underground or limited access structures: all areas and floor levels traversed in the traveling to the exit discharge (the street or public way), shall be protected by automatic sprinkler system.

> Exception: Sprinklers not required where any of the following are met (1) They have an occupant load of 50 or fewer persons in new underground or limited access portions of the structure. (2) They have an occupant load of 100 or fewer persons in existing underground or limited access portions of the structure. (3) The structure is a one-story underground or limited access structure that is permitted to have a single exit per NFPA 101 Chapters 12 through 43, with a common path of travel not greater than 50 ft (15 m).

Return to section 2

SECTION 3 - NOTES

3-1. The services of a fire protection engineer (FPE) as defined by UFC 3-600-01 section 1-5 are required.

For Navy projects, this is required to be a PE who has passed the NCEES written PE examination for fire protection engineering. For Army projects this may be a registered PE in a related discipline with a minimum of 5 years experience, dedicated to fire protection engineering that can be verified with documentation. It is a good idea to ask for documentation of FPE qualifications, particularly when the submitted designs are of poor quality, not coordinated between disciplines, and appear to be created by a mechanical engineer and an architect versus a true 'FPE'.

Return to section 3

3-2. A fire protection design analysis shall address all topics appropriate to the project scope, such as the following:

1. General Description of Building(s)
2. Occupancy Classification (per both IBC and NFPA 101)
3. Building Construction Type (per both IBC and NFPA 101)
4. Allowable Floor Area and Height (per IBC)
5. Building Separation and Exposure (per IBC)
6. Fire barriers; load bearing and exterior walls per IBC, non-load bearing per NFPA 101
7. Special Hazards (potential leaks of flammable/combustibles, etc.)
8. Interior Finish (per NFPA 101)
9. Means of Egress (per NFPA 101)
   -Cover all NFPA 101 Chapter X.2._ topics where X is occupancy chapter no.

   -Capacity, number of exits, travel distance, lighting, etc.
10. Fire Detection and Alarm Systems
11. Automatic Sprinkler Systems

    -Include preliminary hydraulic analysis of required water demand
12. Water Supply (source, riser location, accessibility, etc.)

    -Include results of hydrant flow test
13. Portable Fire Extinguishers, Standpipes
14. Fire Department vehicle access
15. Hydrants (location, type, maximum hose lay, etc.)
16. Coordination with security and anti-terrorism requirements
17. Smoke control methods and systems (for in-patient medical facilities and multi-story atriums)

Where the project is related to ONLY sprinkler piping work, and does not involve other items affecting fire protection, means of egress, or general life safety, then a detailed fire protection design analysis may not be required, at the reviewer's discretion. There should be sufficient detail and notes on the plan drawings to verify the design without needing additional clarification. Even where a full fire protection design analysis is not warranted, a FPE must be involved and responsible for the work.

Return to section 3

SECTION 4 - NOTES

4-6. Misc storage definition:
1) storage height <12 ft, and
2) Incidental to another occupancy use group, and
3) Max. 10% of the area of the building or 4,000 sq ft of the sprinklered area, and
4) Max 1000 sq ft in each storage pile, with 25 ft separation between other storage areas.
This includes any form of storage including palletized, bin box, shelf, back to back shelf, and rack type storage. Refer to NFPA 13 section 5.6.3 to determine commodity class.

4-11. These hazards cannot be designed by selecting a light/ordinary/extra occupancy hazard classification. For example warehouses must be designed per the appropriate NFPA 13 storage chapters, such as Chapters 12 and 16 for rack storage of commodities. Any storage area over 10% of the building area or over 4,000 sq ft cannot be protected per Chapter 13 (Misc. storage) regardless of storage height.. It must be protected per Ch.12 and the appropriate storage chapter (Ch.14 through 20).

Return to Section 4

SECTION 5 - NOTES

5-2. All of the following is required for complete documentation of the flow test:

1) Location and elevation of residual hydrant (where pressure gauge is read)

2) Location and elevation of flow hydrant (where pitot tube flow device is used)

3) Sketch, copy, or drawing of the existing underground piping and valves, from the test hydrants to the proposed tie-in location, showing pipe type, size, age, and lengths

4) Proposed new underground piping configuration

5) Static pressure, residual pressure, and flowrate.

Note: the flowrate should be measured coincident with the residual pressure reading and should be calculated based on the measured pitot pressure, coefficient of discharge, and diameter of the outlet.

5-4. Designer should include, either on the drawings or in the design calculations section, the following information for estimated flow demand:
1) Area of coverage for which design area is based on
2) Adjustments to area of coverage (e.g. add 30% due to dry pipe or sloped ceiling)
3) Allowance (estimate) for flow overage due to over pressure at upstream heads..

Note regarding overpressure factor: Rule of thumb is 20 to 50% additional flow demand due to this over-pressure. The last sprinkler is designed for NFPA 13 minimum flow, all others will flow greater than design flow because they will see a higher supply pressure. In open warehouses, use 20% overpressure factor. For buildings with many small rooms, use 50%.

4) Any additional flow required for in-rack sprinklers in warehouses, etc.
5) Hose stream
6) Total Demand (sprinklers + hose stream)
Include the following information for estimated pressure demand:
1) Sprinkler K-factor, and losses
2) Elevation losses
3) Line and valve losses*

*This requires preliminary sizing of the system riser, mains, and branches, and other components adding to pressure demand.

Note: where the water supply is very strong, reviewer is advised not to demand these preliminary design calculations. For example, if water supply test results show a 60 psi static and 50 psi@1200 gpm residual supplying a single story light hazard occupancy, the water supply will very obviously not require a booster pump.

Important note regarding using flow test data: the pressures and flows are tied to the residual hydrant location. Friction losses and elevation differences between the residual hydrant and the sprinkler system must be considered in the calculations unless negligible.

5-6. To determine the available water supply FLOWRATE at a given supply pressure, use the following formula:
$Q = Qt * (H^{0.54})/(Ht^{0.54})$
Qt = total flow measured during test
Ht = pressure drop measured during test (static minus residual test press.)
H = pressure drop to desired residual pressure (static less desired press.)
Q = flow available at desired pressure

To determine the available water supply PRESSURE at a given flowrate, use the following formula:
$P=S – Ht*(Q/Qt)^{1.85}$
Qt = total flow measured during test
Ht = pressure drop measured during test (static minus residual test press.)
S = Static pressure
Q = desired flowrate
P = pressure available at desired flowrate

Important note regarding using flow test data: the pressures and flows are tied to the residual hydrant location. Friction losses and elevation differences between the residual hydrant and the sprinkler system must be considered in the calculations unless negligible. 20 psig available at the residual hydrant will not be adequate even with a booster pump applications, because friction losses will reduce downstream pressures in the underground piping below 20 psig.

Return to Section 5

SECTION 6 - NOTES

6-1. Note: Typically the civil contractor scope for underground piping stops at ~5 ft outside of the building, and another contractor installs the piping from this point up to the flange (~1'0" AFF) at the base of the sprinkler riser. Sometimes they may also install the piping all the way up through the backflow preventer. The base of the sprinkler system riser is the beginning of NFPA 13 piping, which is the piping within the sprinkler installer's scope of work. The engineered plans (either civil, fire protection, or mechanical) must fully detail and specify all piping upstream of this point (upstream of the base of the sprinkler system riser).

6-4. Note: the engineer should specify that some type of restrained joint must be used, as thrust blocks are not allowed under buildings. Example of restrained joints: Locking mechanical or push-on joints, mechanical joints utilizing setscrew retainer glands, bolted flange joints, heat-fused or welded joints, other approved methods or devices. Where this is not detailed on the plans or in details, it must be in the specifications.

6-8. Note: The backflow preventers must be specifically UL listed or FM approved for use in fire protection systems. This is not the same as simply having a UL or FM stamp, which could indicate compliance with AWWA, ASME or similar standards. The special listing certifies the pressure drop across the backflow preventer, to ensure it does not create excess pressure drop.

The fire protection specific UL listings for backflow preventors can be found easily by internet searching for "BAEU.GuideInfo". Click 'view listings' at the top of the page. The test for the listing is UL 1469. FM Global's "Approval Guide" for Fire Protection can be found at www.fmglobalcatalog.com, which requires a brief registration. Go to fire protection, automatic sprinkler systems, backflow preventers to see the list of FM approved devices.

Return to Section 6

LIST OF STANDARD/TEMPLATE COMMENTS

Checklist Section-Item	Comment Number	Comment Text (copy/paste into comments form, edit as required for the actual deficiency found)
III-1	301	All fire protection design other than simple like-kind sprinkler head replacement shall be performed by a qualified Fire Protection Engineer. Code Reference: UFC 3-600-01, section 1-5, 7/14/2009 version. Resolution: Documentation was not sufficient to demonstrate a qualified PE meeting the UFC requirements was utilized. Document name, title, and credentials. In addition, note that the final design submission will require a written certification letter from the registered Fire Protection Engineer stating that the design is in accordance with UFC 3-600-01 and all applicable criteria.
III-2	302	A comprehensive Fire Protection Design Analysis is required for all designs, and must document all relevant topics as outlined in the UFC. Code Reference: UFC 3-600-01, section 1-4, 7/14/2009 version. Resolution: Provide comprehensive Fire Protection Design Analysis that covers all areas, as applicable, per the UFC. A suggested partial list of topics for typical buildings is as follows: 1. General Description of Building(s) 2. Occupancy Classification (per both IBC and NFPA 101) 3. Building Construction Type (per both IBC and NFPA 101) 4. Allowable Floor Area and Height (per IBC) 5. Building Separation and Exposure (per IBC) 6. Fire Walls; load bearing and exterior walls per IBC, non-load bearing per NFPA 101 7. Special Hazards (potential leaks of flammable/combustibles, etc.) 8. Interior Finish (NFPA 101 / 255) 9. Means of Egress (NFPA 101) -Cover all NFPA 101 Chapter X.2._ topics where X is occupancy chapter no. 10. Fire Detection and Alarm Systems 11. Automatic Sprinkler Systems (per UFC) 12. Water Supply (source, riser location, accessibility, etc.) 13. Portable Fire Extinguishers 14. Fire Department Access 15. Hydrants (location, type, maximum hose lay, etc.) When writing the design analysis, describe both the code requirements and the actuals. For example maximum allowable area of occupancy XX is XX ft2 per table XX of IBC, and actual building area is XX ft2.
III-3	303	The project fire protection engineer (FPE) must review the 100% design submission and certify in writing that the design is in compliance with UFC 3-600-01 and all applicable criteria. The certification letter must be submitted with the 100% submission. Code Reference: UFC 3-600-01, section 1-4, 7/14/2009 version. Resolution: Submit the FPE certification letter.
III-4	304	A life safety plan is required to demonstrate compliance with applicable criteria, standards, and codes, and to document design decisions made regarding fire protection features. The life safety shall include such items as: Occupant load, Travel distance to exit, common path of travel distance, fire barriers (where required), fire walls (where required), non-rated smoke partitions around any area with storage (sprinklered bldg), exit capacity calculation results, Location of fire extinguishers, and smoke barriers (if hospital).
IV-1	401	All sprinklers designed using the occupancy hazard approach must use the density/area method of NFPA 13. Residential sprinkler (4-head method) or room design methods are not allowed in NFPA 13 systems. Reference: UFC 3-600-01, section 4-2.3.1, 7/14/2009 version Resolution: Design using the density/area method.
IV-2	402	The sprinkler design density must be designed per the requirements UFC 3-600-01, which

Checklist Section-Item	Comment Number	Comment Text (copy/paste into comments form, edit as required for the actual deficiency found)
		are greater than NFPA 13 requirements. Reference: UFC 3-600-01, section 4-2.3.1 and Table 4-1, 7/14/2009 version. Resolution: Revise design density to meet the UFC.
IV-3	403	The sprinkler design area must be designed per the requirements UFC 3-600-01, which are greater than NFPA 13 requirements, including any applicable area increases. Reference: UFC 3-600-01, section 4-2.3.1 and Table 4-1, 7/14/2009 version. Resolution: Revise design density to meet the UFC area plus applicable area adjustments.
IV-4	404	A reduction in design area taken for use of quick response heads can only be taken where allowed by NFPA 13. Reference: NFPA 13, section 11.2.3.2.3.1, 2010 version. Resolution: Delete the quick response reduction or redesign to meet the pre-requisite requirements.
IV-5	405	The % reduction in design area allowed for quick response sprinklers does not meet NFPA 13. Reference: NFPA 13, 2010 version, figure 11.2.3.2.3.1. Resolution: Revise the % reduction in design area.
IV-6	406	Storage meeting the NFPA 13 definition of miscellaneous storage must be designed per the requirements of Chapter 13 of NFPA 13. Reference NFPA 13, 2010 version, section 3.9.1.18 and Chapter 13. Resolution: Revise design according the correct occupancy classification, and using the density, area, hose stream, and duration per UFC 3-600-01, section 4-2.3.1.
IV-7	407	Miscellaneous storage areas containing paper must be designed with Ordinary Hazard Group 2 sprinkler coverage. Paper and cardboard items typically stored in these areas are class III commodities. Reference NFPA 13, 2010 version, section 3.9.1.18 and Chapter 13 Table 13.2.1. Resolution: Revise design to meet Ordinary Hazard Group 2, and using the density, area, hose stream, and duration per UFC 3-600-01, section 4-2.3.1.
IV-8	408	Mechanical rooms will often contain combustibles as they are used for miscellaneous storage of items such as filters, boxed mechanical parts, etc. Paper and cardboard items are class III commodities and storage of Class III commodities <12 ft in height must be protected as Ordinary Hazard Group 2 occupancy. Reference NFPA 13, 2010 version, section 3.9.1.18 and Chapter 13 Table 13.2.1. Resolution: Revise design to meet Ordinary Hazard Group 2, and using the density, area, hose stream, and duration per UFC 3-600-01, section 4-2.3.1.
IV-9	409	Occupancies specifically listed in Appendix B of the UFC 3-600-01 must at a minimum be designed per the occupancy hazard classification shown. Reference: UFC 3-600-01, 7/14/2009 version, Appendix B. Resolution: Revise the design to meet the correct occupancy hazard classification, which for _____ is Ordinary Group 1.
IV-10	410	Occupancies specifically listed in Appendix B of the UFC 3-600-01 must at a minimum be designed per the occupancy hazard classification shown. Reference: UFC 3-600-01, 7/14/2009 version, Appendix B. Resolution: Revise the design to meet the correct occupancy hazard classification, which for _____ is Ordinary Group 2.
IV-12	412	Area must be designed for Class IV commodities regardless of the commodity type expected or planned to be stored. Additionally the storage height used for the design must the maximum possible storage height for the building, which is typically 18" below the sprinkler deflector for standard spray heads and 36" below for ESFR. Reference: UFC 3-600-01, 7/14/2009 version, section 6-11.1.
IV-13	413	For warehouse areas, in addition to NFPA 13 storage chapter requirements, the UFC has additional requirements including: 1) In-rack sprinklers must be supplied from risers separate from the ceiling sprinklers. 2) Racks with solid shelves over 12 ft (3.7 m) in height must have in-rack sprinklers at every tier or shelf level. 3) sprinkler riser control valves must be readily accessible to the fire department from the exterior. 4) water supply duration is 120 minutes 5) Hose stream allowance is 500 gpm (1900 l/min) Reference: UFC 3-600-01, 7/14/2009 version, section 6-11.1. Resolution: Revise to meet UFC

Checklist Section-Item	Comment Number	Comment Text (copy/paste into comments form, edit as required for the actual deficiency found)
		requirements.
IV-14	414	The sprinkler system hose stream allowance must be designed per the requirements UFC 3-600-01, which are greater than NFPA 13 requirements. Reference: UFC 3-600-01, section 4-2.3.1 and Table 4-1, 7/14/2009 version. Resolution: Revise hose stream allowance to meet the UFC.
IV-15	415	The sprinkler system design flow duration must be designed per the requirements UFC 3-600-01, which are greater than NFPA 13 requirements. Reference: UFC 3-600-01, section 4-2.3.1 and Table 4-1, 7/14/2009 version. Resolution: Revise design flow duration to meet the UFC.
IV-16	416	The coverage areas per sprinkler must meet UFC 3-600-01 requirements. Light hazard: Max 225 sq ft (21 sq m) per sprinkler. Ordinary hazards: Max 130 sq ft (12.1 sq m) per sprinkler. Extended coverage heads are not allowed. Reference: UFC 3-600-01, 7/14/2009 version, section 4-2.3.6. Resolution: Specify that coverage area per sprinkler head shall not exceed these UFC values.
V-1	501	For sprinkler supplied from existing water supplies a hydrant water flow test performed in accordance with NFPA 291 must be performed, and the test results included with the first design submission of the project. Historical water supply information must not be accepted. Reference: UFC 3-600-01, 7/14/2009 version, section 4-1.3. Resolution: Submit hydrant flow test data.
V-2	502	Water flow test results shall include all information required for the flow test data to be useful for the installer's hydraulic calculations. All of the following is required for complete documentation of the flow test: 1) Location and elevation of residual hydrant (where pressure gauge is read) 2) Location and elevation of flow hydrant (where pitot tube flow measuring device is used) 3) Sketch, copy, or drawing of the existing underground piping and valves, from the test hydrants to the proposed tie-in location, showing pipe type, size, mat'l, age, and lengths 4) Proposed new underground piping configuration 5) Static pressure, residual pressure, and flowrate at the residual pressure Reference: UFC 3-600-01, 7/14/2009 version, section 4-1.3. Resolution: Re-submit with a complete set of all data required for hydraulic calculations to be performed accurately without requiring guesses, assumptions, or re-testing of the hydrant.
V-3	503	The preparer of the contract documents (a fire protection engineer or an engineer experienced in water flow testing) must perform or witness the required water flow testing. The testing is required prior to the first design submission of the project. Reference: UFC 3-600-01, 7/14/2009 version, section 4-1.3. Resolution: Submit hydrant flow test that was performed or witnessed by the preparer of the contract documents.
V-4	504	The fire protection engineer must provide preliminary estimated flow and pressure demand calculations demonstrating that the water supply selected is capable of meeting the sprinkler system demand. Reference: UFC 3-600-01, 7/14/2009 version, section 4-2.3.5.1. Typical approach is to include a calculation summary table or paragraph on the drawings or in the design analysis, documenting the results of this preliminary calculation. All factors affecting flow and pressure demands must be considered and documented.
V-5	505	According to the preliminary estimated flow and pressure demand calculations, a booster pump appears to be require because at the expected design flowrate the residual pressure available from the water supply is less than the required pressue. Resolution: Resolve by re-designing the area to require less flow/pressure demand, or re-design to include a booster pump.
V-6	506	According to the preliminary estimated flow and pressure demand calculations, a storage tank and fire pump appears to be required because at design conditions the water supply

Checklist Section-Item	Comment Number	Comment Text (copy/paste into comments form, edit as required for the actual deficiency found)
		cannot deliver the required flowrate. Resolution: Resolve by re-designing for less flow/pressure demand, or re-design to include a firewater storage tank and booster pump.
VI-1	601	A detail of the underground fire protection lead-in components was not included in the project documents. The fire protection engineer must provide sufficient detail to consist of an engineered system capable of being installed by the various subcontractors without requiring major design decisions to be made by the installer. Resolution: Provide a schematic detail showing the required underground piping components, shown in the proper arrangement. Also show connection to the water main, or refer to civil drawing where this information can be found.
VI-2	602	Where the lead-in piping passes through a foundation wall (grade beam), it must be protected from settling of the wall. Typical approaches are a pipe sleeve with clearance, oversized opening with flexible material (foam) on top of the pipe, arching the foundation wall over the pipe. Reference: NFPA 24, 2010 edition, section 10.6. Resolution: On riser detail or another location in the project documents, indicate required protection of the building lead-in piping.
VI-3	603	Pipe joints in the lead-in must be located such that they are not located directly underneath foundation footings. Reference: NFPA 24, 2010 edition, section 10.6.5. Resolution: Revise [riser detail] [_____], so that pipe joints are not underneath the foundation footings.
VI-4	604	For joints under the building (under slab), specify the desired type of restrained joint system on the detail and in specifications. Note that thrust blocks are not allowed.
VI-5	605	This building has a Seismic Design Category of C or greater, and the water supply piping must penetrate the slab through a hole that is 4" larger in diameter than the pipe. Reference: NFPA 13, 2010 version, section 9.3.4.2. Resolution: This should be called out on the appropriate plans, such as the sprinkler riser detail and slab/foundation plan(s). A pipe sleeve through the slab is the preferred method.
VI-6	606	This is a new sprinkler service connection to an existing potable water supply, and therefore requires the installation of a listed backflow preventer. Reference: International Plumbing Code, 2006 version. Resolution: Revise design to include a double-check or reduced pressure type backflow preventer which has been specifically UL listed or FM approved for use in fire sprinkler systems.
VI-7	607	A backflow preventer installed outdoors must be located in either an enclosed pit or an above-ground insulated and heated enclosure (hot box).
VI-8	608	The backflow preventers must be specifically UL listed or FM approved for use in fire protection systems. This is not the same as simply having any type UL listing or FM approval, which can indicate compliance with AWWA, ASME or similar standards. The fire protection listing certifies the pressure drop across the backflow preventer, to ensure it does not create excess pressure drop and compromise the design. Reference: UFC 3-600-01, 7/14/2009 version, section 3-7.5.1 and NFPA 13. Resolution: Specify backflow preventers that are UL listed or FM approved for fire protection use.
VI-9	609	The indicating valves on the upstream and downstream sides of the backflow preventer must be equipped with tamper switches (electrically supervised). Resolution: Revise detail and/or specifications to require tamper switches on these valves.
VI-10	610	A permanently installed test connection shall be installed, which allows for forward flow testing of the backflow preventer at full system demand. This piping should connect downstream of the backflow preventer and flow water through piping and a block valve to a hose valve header located on the exterior of the building. The hoses will allow water to be directed to an appropriate location. Reference: UFC 3-600-01, 7/14/2009, section 3-7.5.3.

Checklist Section-Item	Comment Number	Comment Text (copy/paste into comments form, edit as required for the actual deficiency found)
		Resolution: Revise design to include the required test connection.
VI-11	611	Buildings where the underground lead-in pipe has a velocity >8 ft/sec (2.4 m/sec) or where water conditions warrant require a strainer to be installed in the sprinkler system supply. Reference: UFC 3-600-01, 7/14/2009 version, section 4-2.3.7. Resolution: Revise design to provide for a strainer in the supply piping downstream of the underground lead-in.
VI-12	612	For new building lead-ins an outside control valve must be provided. Acceptable types are listed below, in the following order of preference: a. Listed indicating valve (post indicating valve preferred) at least 40 ft or the building wall height away from the building where space permits b. Control valves installed in cut-off stair tower or valve room accessible from outside c. Wall post indicator valve in riser with valve hand wheel located for outside operation, not adjacent to building openings d. Key-operated valve (such as an underground gate valve with valve box, and T-wrench, preferably located 40 ft or building wall height away from the building). Resolution: Revise design to include an outside control valve, capable of isolating the building fire sprinkler system during a fire event without having to enter the building.
VI-13	613	Where a fire department connection (FDC) line and check valve is installed, a check valve must also be installed in the automatic water supply to allow the FDC to function. Code Reference: NFPA 13, 2010 version, section 8.16.1.1.3.1, see also 8.17.2.4.1. Resolution: Revise design to meet the standard and include a check valve in each source of supply, such that the system will take water from the highest pressure source. This will allow the FDC to function, and the fire department pump truck can boost pressure to the sprinkler system, rather than pumping water back to itself.
VII-1	701	A detail of the system riser components was not included in the project documents. The fire protection engineer must provide sufficient detail to consist of an engineered system capable of being installed by the various subcontractors without requiring major design decisions to be made by the sprinkler system installer. Resolution: Provide a schematic detail showing all required wet pipe riser components, in the proper arrangement.
VII-2	702	A supervised control valve is required at the system riser. Resolution: Revise to include a supervised control valve.
VII-3	703	A means of detecting flow is required, located downstream of the system block valve(s). It must activate both local and remote alarms via a fire alarm control panel to the base fire reporting system (where a base-wide system exists). Code Reference: UFC 3-600-01, 7/14/2009 version, section 4-1.1, 4-2.1. Resolution: Install either a combination alarm-check valve with pressure switch, or a paddle (vane) type flow switch, which activates both local and remote alarms.
VII-4	704	The existing underground firewater lead-in does not show an outside indicating control valve. Therefore a supervised valve should be installed in the system supply, which meets one of the following two requirements: a) Valve is in a cut-off stair, or dedicated valve room accessible from exterior, b) Valve is a wall post indicating valve, where the handle is arranged for outside operation and is not adjacent to building openings. Resolution: Revise design to include a control valve capable of isolating the building fire sprinkler system during a fire event without having to enter the building.
VII-5	705	A main drain valve, capable of draining the system, which discharges to the exterior of the building, is required. The drain pipe exiting the building must have min. 4ft of length in a heated area downstream of the drain valve prior to exiting the building (to protect against freezing). Resolution: Provide main drain in accordance with NFPA 13 which discharges to the exterior.

Checklist Section-Item	**Comment Number**	**Comment Text** **(copy/paste into comments form, edit as required for the actual deficiency found)**
VII-6	706	Provide pressure gauge on system riser, connected on the system side of any block/check valves. Include a shutoff valve and provisions for draining. Reference: NFPA 13, 2010 version, section 8.17.3. Where there is an alarm check valve or system riser check valve, pressure gauges shall be
VII-7	707	A fire department connection (FDC) is required, and must have all these required features: a. 4" dia. (min.) supply pipe with 4x2-1/2"x2-1/2" wye (Siamese) connection mounted outside in a location accessible to fire dept. and within 150 ft of a hydrant b. Check valve in the FDC supply piping, with ball drip located at the piping low point, which drains any check valve leakage/bypass to the outside of the building c. For single system risers: FDC supply connects on the downstream (system) side of the check and block valves d. For multiple system risers arranged in a header configuration: FDC supply connects downstream of the backflow preventer (or building lead-in), but upstream of each system's control valve and flow detection. In other words, it connects to the header that supplies the separate sprinkler systems. Reference: NFPA 13, 2010 version, section 8.17.2.4.3. Resolution: Provide FDC meeting all requirements.
VII-8	708	This building is classified as seismic design category C, D, E, or F as defined by the International Building Code, as modified by UFC 3-310-04. Therefore, all the following features should be shown on the system riser detail: a. flexible couplings within 2 ft of the top and bottom of the riser b. four-way brace on the feed main (downstream of the flexible coupling on the riser) c. enlarged opening (or sleeve) where the water supply piping penetrates the floor slab. Code Reference: NFPA 13, 2010 version, Section 9.3, various subsections.
VII-9	709	The riser detail must show a pressure relief valve downstream of the control and check valves, on the sprinkler side. A listed 1/2 inch (12 mm) relief valve is required, and shall be set to operate at 175 psig or 10 psig in excess of system pressure, whichever is greater. Reference: NFPA 13, 2010 version, section 7.1.2. Resolution: Include relief valve in the detail and the specifications.
VIII-1	801	Provide detail showing the flow alarm test connection (inspectors test) and its location. Preferred location is at the highest branch line to allow the system to be vented.
VIII-2	802	The alarm test connection detail must show all required features: a) minimum 1 in. (25 mm) diameter b) test valve in readily accessible location, c) pipe is routed to the building exterior, d) terminates in a smooth bore corrosion resistant orifice which gives flow equal to or less than one sprinkler of a type having the smallest orifice on the system, e) Alarm test connection downstream of the waterflow alarm device. Resolution: Revise detail.
IX-1	901	Provide sprinklers in all concealed spaces having any exposed combustible construction that do not meet NFPA 13 exceptions. This must include sprinklers for.. [describe space that is not exempt]. Reference: NFPA 13, 2010 version, section 8.15.1.2. Resolution: Revise design to show sprinklers for these areas, or revise construction to be non-combustible.
IX-2	902	The project drawings show combustible overhangs, soffits, eaves, or decorative frame elements, and the elements are not shown as being protected by sprinklers as required by NFPA 13. Sprinkler are required unless all of the following are true of the elements: Max. 4 ft (1.2 m) in width, elements are draft-stopped into max. 160 cu ft (4.5 cu m) volumes, separated from the interior by walls or roofs of non or limited combustible construction, and have no openings or unprotected penetrations into building. Reference: NFPA 13, 2010 version, section 8.15.1.2.18 Resolution: Provide sprinklers for these areas or revise their

Checklist Section-Item	Comment Number	Comment Text (copy/paste into comments form, edit as required for the actual deficiency found)
		design to meet the exception.
IX-3	903	Exterior roofs, canopies, car ports (drive thru), balconies, decks or similar projections required sprinklers unless one of the following exceptions are met: a) where projections are constructed entirely with non-combustible, limited combustible, or fire retardant-treated wood, b) where projections have exposed finish materials of non-combustible, limited combustible, or fire retardant-treated wood and contain only sprinklered concealed spaces or meet one of the 8.15.7.3 exceptions. Reference: NFPA 13, 2010 version, section 8.15.7. Resolution: Provide sprinklers for [describe deficiency] or revise design to meet one of the exceptions.
IX-4	904	Exterior roofs, canopies, car ports (drive thru), balconies, decks or similar projections greater than 2 ft (0.6 m) where combustibles will be stored require sprinklers. Reference: NFPA 13, 2010 version, section 8.15.7.5 Resolution: Revise design to include sprinklers for these areas.
IX-5	905	There are exterior corridors or stair towers that are either less than 50% or constructed of combustible or limited combustible materials, therefore sprinklers are required for these areas. Reference: NFPA 13, 2010 version, section 8.15.7.4. Resolution: Revise design to include sprinklers for these areas.
IX-6	906	Sprinklers must be installed in stairways as required by NFPA 13. For rated exit stairs (non-combustible): Sprinkler(s) required at the top of the shaft, and under the first accessible landing above the bottom of the shaft. For stairways of combustible construction: complete sprinkler coverage is required, therefore install sprinklers beneath all stairs. Reference: NFPA 13, 2010 version, section 8.15.3. Resolution: Provide sprinklers for stairways in accordance with NFPA 13.