



DIVISION OF  
FIRE AND LIFE SAFETY

**CITY OF SCOTTSDALE**

**SCOTTSDALE FIRE DEPARTMENT**

**Interpretations  
And  
Applications  
Of**

**NFPA 13D (2013 edition)**

**EFFECTIVE: January 7, 2013**

# CONTENTS

## 2013 NFPA 13D

<b>Chapter 4</b>	<b>General Requirements</b>
4.5.1	Working Plans
4.5.2	Submittal Requirements
4.5.3	Remodel/Additions Submittal
4.5.4	Remodel/Additions Information
4.5.5	Remodel/Additions
4.6.1	CPVC Certification
<b>Chapter 6</b>	<b>Water Supply</b>
6.2.2.1	Pump System Criteria from City Water Supply
6.2.2.2	Pump System Criteria from Well and/or Stored Water Supply
6.3	Multipurpose Piping System
<b>Chapter 7</b>	<b>Installation</b>
7.1.5	Fire Riser Components
7.1.5.1	Fire Riser Assembly Location and Access
7.2.1	Drain
7.2.4	Inspector's Test Connection
7.2.5	Inspector's Test Orifice Size and Location
7.2.6.1	Pressure Reducing Valve
7.3.3	Pressure Gauge
7.5.5.1.1	Temperature Ratings
7.6	Alarms
7.7.1	Thermal Protection
<b>Chapter 8</b>	<b>System Design</b>
8.1	Design Criteria
8.1.1.3	Big Box Single Family Home
8.1.5	Residential Barns
8.1.6	Detached Structures
8.1.7	Extending Existing Systems to New Additions
8.3.1.1	Location of Sprinklers
8.3.5	Location of Sprinklers
<b>Chapter 10</b>	
10.4.3(8)(d)	Flow Switch Loss
10.4.2.3	Network Systems
10.4.3 (13)	Pressure Safety Margin
10.4.3 (14)	Common Water Supply Connections
10.4.3 (15)	Domestic Water Supply
<b>Chapter 11</b>	<b>System Acceptance</b>
11.1.3	Rough-in Inspection
11.1.4	Final Inspection
11.1.5	Re-inspection Fees
<b>13D APPENDIX</b>	
Appendix A	– 13D Riser Diagram Detail
Appendix B	– 13D Hydraulic Sticker Detail
Appendix C	– 13D Domestic Pump Detail
Appendix D	– 13D Pump Tank Detail



## **INTERPRETATIONS & APPLICATIONS**

### **OF THE 2013 MODIFIED NFPA 13-D**

Revised: 01/07/13

**“The following are additions or amendments to the NFPA 13D”**

## **CHAPTER 4 – GENERAL REQUIREMENTS**

### **4.5.1 WORKING PLANS *added***

A scaled drawing shall show the following:

- (12) Head symbol legend
- (13) Room names
- (14) Ceiling heights, ceiling height changes
- (15) Sloped ceilings exceeding 3:12 degrees of slope, indicate degree of slope. For ceilings of 3:12 degree of slope indicate or less indicate “No Slope”.
- (16) Beam sizes and soffit depths
- (17) Dimensioning of heads as necessary for determining proper head spacing
- (18) Pipe lengths, center to center
- (19) Clearly identified calculated areas (On plans & calculations)
- (20) Inspectors test
- (21) Riser location
- (22) Electric bell location
- (23) General notes as required
- (24) All sheets shall be sized the same

### **4.5.2 SUBMITTAL REQUIREMENTS *added***

New construction and remodel plans submitted to the City shall comply with the following:

- (1) Submit a minimum of 3 sets of all working drawings
- (2) Submit one set of hydraulic calculations and manufacturer data sheets
  - a. If piping in inaccessible (i.e. flat roof), the following will be an acceptable means of proving adequate water flow for system:
    - i. Perform “Bucket Test” proving hydraulic flow.
    - ii. Calculate system at worst case scenario using  $\frac{3}{4}$ ” CPVC piping.
- (3) Acceptable paper size shall be limited to 24 x 36 or 30 x 42, minimum scale shall be 1/8”
- (4) All submittals shall bear a dated review certification and signature of a minimum level III NICET certified engineering technician (CET) automatic sprinkler systems or an Arizona Registered Professional Engineer (PE).
- (5) All CET or PE stamps shall show certification expiration date
- (6) An approved set of plans shall be at the structure at the time of scheduled inspections. Deviations from approved plans will require approval of the Fire Chief.

#### **4.5.3 REMODEL/ADDITIONS SUBMITTAL *added***

Remodel and additions submitted to the City when calculations are not required:

- (1) Scope of work must be clear & demonstrate that no calculations are necessary
- (2) Submittals shall be paper or digital (DWF.) format only on a scaled floor plan (3/16" min.) 8 1/2x11 paper size.
- (3) No NICET or P.E. stamp is required

#### **4.5.3.1 3 HEAD ADDITION/RELOCATION OR LESS *added***

No submittal required for adding/relocating 3 heads or less as long as following is met:

- (1) Shall not be in calculated area
- (2) Shall not make a new remote point requiring calculation's
- (3) Field Inspection shall be required

#### **4.5.4 REMODEL/ADDITIONS INFORMATION *added***

Information provided on remodel and/or addition submittals shall include but not be limited to:

- (1) Project information
- (2) Meter size
- (3) Underground size and length
- (4) Current static PSI
- (5) Existing and new head type

**Note:** If the original sprinkler system was installed at less than a .05 density, calculations will be required when using other than an approved replacement head, unless it is obviously close to the riser.

For digital plan submittals; see the City of Scottsdale website at:  
<http://www.scottsdaleaz.gov/bldgresources/digital.asp>

#### **4.5.5 REMODEL/ADDITIONS *added***

Existing systems (no change of riser or underground) shall be allowed to be remodeled or extended at existing density designs with use of listed heads as long as remodel/addition does not exceed 50% of square footage of existing home.

#### **4.6.1 CPVC CERTIFICATION**

When installing CPVC piping, the factory issued certification card must be carried by pipe fitter during installation and is to be made available to an inspector upon request.

## **CHAPTER 6 – WATER SUPPLY**

#### **6.2.2.1 PUMP SYSTEM CRITERIA FROM CITY WATER SUPPLY *added***

- (1) A combination pump system supplying both domestic water and fire sprinkler system shall be required.
- (2) A bypass line shall be installed.

- (3) Submit manufacturer's specifications for pump, including pump curve.
- (4) See Appendix "C" for example of pump system from city water supply.

#### **6.2.2.2 PUMP SYSTEM CRITERIA FROM WELL AND/OR STORED WATER SUPPLY**

*added*

- (1) A combination pump system supplying both domestic and fire sprinkler system shall be required.
- (2) A low water alarm shall be actuated when water level drops to minimum quantity specified for fire sprinkler system. Low water alarm shall be audible and installed in a central location of normally occupied livable structure. The alarm shall produce a sound pressure of 15 decibels above ambient noise levels.
- (3) An FDC shall be installed below electric bell, accessible to Fire Department. (National Standard Hose thread with an 1-1/2" snoot)
- (4) Submit manufacturer's specifications for pump, including pump curve.
- (5) See Appendix "D" for example of pump system from well water supply.

#### **6.3 MULTIPURPOSE PIPING SYSTEM** *added*

**6.3.5** Multi-purpose systems shall be pressure tested to 130 psi for 2 hrs. before being connected to any residential fixtures.

**6.3.6** Multi-purpose systems shall be hydraulically calculated proving pressure demand is met at most demanding head(s) on all plan submittals.

- a. An additional 20% will be added to total pipe length for factoring friction loss due to curving/bending of pipe for hydraulic calculations.

**6.3.7** All multi-purpose systems shall have an Inspectors Test Valve installed.

## **CHAPTER 7 – INSTALLATION**

#### **7.1.5 FIRE RISER COMPONENTS** *added*

The components of a riser assembly include the following:

- (1) Aboveground horizontal or vertical pipe between water supply, cross mains or feed mains
- (2) A combination control valve installed prior to fire sprinkler and domestic supply tee (See Appendix "A" for Residential Riser Detail)
- (3) Rubber faced check valve
- (4) Pressure gauge
- (5) Main drain with a pressure relief valve
- (6) Supervisory capable electric flow switch

#### **7.1.5.1 FIRE RISER ASSEMBLY LOCATION AND ACCESS** *added*

- (1) The riser shall be constructed within a garage or other secured location as approved by fire code official or within a wall cabinet or other acceptable enclosure with an access panel or door suitable for access to all riser components.
- (2) All riser assemblies shall be braced and secured.
- (3) Plastic systems shall be protected from damage up to 7' (feet) from floor level.

## **7.2.1 DRAIN *added***

**7.2.1.1** The main drain shall be 1/2 inch or larger, located above check valve and flow switch.

**7.2.1.2** There shall be a fixed non-adjustable pressure relief valve branched off of main drain that will activate at pressures no lower than 150 PSI and no higher than 175 PSI.

## **7.2.4 INSPECTOR'S TEST CONNECTION *amended***

- (1) Each sprinkler system shall have an inspector's test valve and drain connected at the highest most remote possible point in the system.
- (2) Piping shall be same size as the piping to the most remote sprinkler head.
- (3) Underground sprinkler supply pipe servicing detached structures, shall be provided with an inspector's test. This may be used as the only inspector's test if it is a remote location.

## **7.2.5 INSPECTOR'S TEST ORIFICE SIZE AND LOCATION *amended***

- (1) The test valve shall have an orifice the same size as the remote sprinkler head.
- (2) The test valve may be located on exterior wall in an accessible area or within a wall cabinet or other acceptable enclosure with an access panel or door.
- (3) The test valve shall be accessible to the fire department in such a place where it will not sustain damage and where water can be flowed without damage to the structure or contents.
- (4) Discharge shall be above grade and unobstructed.
- (5) Discharge from the orifice shall be confined to the property.

## **7.2.6.1 PRESSURE REDUCING VALVE *added***

Pressure reducing valve installations shall be installed on domestic side of tee.

## **7.3.3 PRESSURE GAUGE *added***

The gauge shall be installed on the system side of any system of all systems.

## **7.5.5.1.1 TEMPERATURE RATING**

- (1) Ordinary temperature rated residential sprinkler (155°F) min. shall be installed.

## **7.6 ALARMS *amended***

Local water flow alarms shall be provided on all sprinkler systems as follows:

- (1) A 110 volt AC 6 inch minimum size electric bell shall be supplied by house current
- (2) A dedicated circuit or GFI is not permitted
- (3) The bell shall be mounted on the exterior of the structure, visible from street and not more than 3 feet from front
- (4) The bell must be at a height to view easily from street or drive and no higher than plane made by the bottom of the eaves
- (5) The alarm shall receive its' signal from a UL listed local water flow switch
- (6) Bell Color shall be Red

### 7.7.1 THERMAL PROTECTION *added*

Nonmetallic pipe may be installed in a vertical and/or horizontal position to protect mechanical units in open attic spaces. It shall be protected with a noncombustible insulation molded to fit the pipe diameter. Insulation shall be compatible with nonmetallic pipe.

Surface burning characteristics shall be in accordance with the following specifications:

Shall not exceed 25 Flame Spread, 50 Smoke Developed when tested in accordance with ASTM E 84, CAN/ULC S102-M88.

**Note:** Copper pipe may be installed in the same manner as CPVC in open attic spaces and unfinished garages.  
Insulation products used for either copper or nonmetallic piping shall be rated to protect from freezing down to minimum temperatures of 0° F.

## CHAPTER 8 – SYSTEM DESIGN

### 8.1 DESIGN CRITERIA

#### 8.1.1.3 Big Box Single Residential Home *added*

Single family homes over 12,000 sq. ft. in area (under roof) shall be provided with attic sprinkler protection in accordance with the following modified 13D requirements:

- (1) Minimum 1.5" domestic meter
- (2) Minimum 2" (ID) domestic line
- (3) Attic design area of 500 sq. ft. at .1 coverage density
- (4) Interior space design area, 4 heads calculated at .05 coverage density

#### **EXCEPTION:**

Single family homes with additional challenges including, but not limited to, access and/or size, as determined by fire code official, shall be required to have sprinkler protection in accordance with NFPA 13 standards.

#### 8.1.5 RESIDENTIAL BARNES

- (1) 1501-5000 square foot barns may be piped from the domestic service. Calculate a minimum of two commercial QR heads using .1 density per NFPA 13. Install in accordance with NFPA 13 Standards.
- (2) 5001 square foot barns and above shall require a separate fire line service connected to a city water main. Install in accordance with the City of Scottsdale Interpretations and Applications and NFPA 13. Calculate 4 heads.

#### 8.1.6 DETACHED STRUCTURES

Detached (as determined by the Building Code and Zoning Ordinance) garages, guest houses, and similar structures exceeding 1500 square feet, shall require a separate water supply, fire sprinkler riser, inspector's test and electric bell.

### 8.1.7 EXTENDING EXISTING SYSTEMS TO NEW ADDITIONS

Extending an existing fire sprinkler system to an attached new addition may be done in the following manner:

- (1) Connect into existing piping system.
- (2) Connect new supply line at top of existing fire sprinkler riser and run pipe overhead or underground to point of connection.
- (3) Other proposals will be considered on a case by case basis.

**Note:** See sections 4.5.3, 4.5.3.1, 4.5.4, 4.5.5 for submittal requirements.

### 8.3.1.1 LOCATION OF SPRINKLERS

Sprinklers shall be installed in all areas including, but not limited to:

- (1) Garages
- (2) Attached carports
- (3) Bathrooms
- (4) Entrance foyers
- (5) Water heater closets
- (6) Utility and mechanical closets
- (7) Washer-dryer closets
- (8) All accessible areas under stairs and landings
- (9) Closets under stairways
- (10) Area beneath stairway when open to the room
- (11) Covered patios when there is livable space above the patio (Entire patio)
- (12) Where an attached built-in barbeque with open attic space is constructed, a 200° QR 7/16 orifice commercial head shall be provided in an approved location in close proximity to where the flue passes through roof structure.

### 8.3.5 LOCATION OF SPRINKLERS

Sprinklers shall not be required in:

- (1) Elevator machine rooms
- (2) Floor/ceiling spaces
- (3) Elevator shafts
- (4) Crawl spaces and other concealed spaces that are not used or intended for living purposes and do not contain fuel-fired equipment

## Chapter 10 Discharge and Hydraulic Calculation

### 10.4.3 (8)(d) FLOW SWITCH LOSS *added*

Pipe sizes 2" or less shall include 3 PSI fixed loss for the flow switch, or per manufacturer specifications.

### 10.4.2.3 NETWORK SYSTEMS *added*

- (11) In common water supply connections, 5 gpm per dwelling unit shall be added to sprinkler system demand to determine size of common piping.

- (12) Piping runs shall be installed per manufacturer's color coding for ease of inspection
- (13) Where water treatment and filtration are installed, one of the following conditions shall be met:
  - (a) Flow restriction and pressure loss through water treatment equipment shall be taken into account in hydraulic calculations.
  - (b) An automatic listed bypass valve shall be installed around water treatment equipment that directs all water directly to system.

#### **10.4.3 (13) PRESSURE SAFETY MARGIN** *added*

- (13) Calculations shall maintain a 10% pressure safety margin from field water pressure tests. Pressure used for hydraulic calculations shall not exceed 72 psi. Purpose for this practice is to account for water pressure fluctuations. When additional fittings have been installed in a sprinkler system not accounted for in design, revised drawings may be required with new calculations.

#### **10.4.3 (14) COMMON WATER SUPPLY CONNECTIONS** *added*

- (14) In common water supply connections, 5 gpm per dwelling unit shall be added to sprinkler system demand to determine size of common piping and size of total water supply requirements.

#### **10.4.3 (15) DOMESTIC WATER SUPPLY** *added*

- (15) Domestic water lines shall be 1" minimum size in **NEW** construction.
  - (a) Water meters shall be size to meet calculated demands.
  - (b) Additions and alterations to existing R-3 occupancies may use existing 5/8" or 3/4 inch meter if hydraulic calculations support water supply capability for fire sprinkler system.

## **CHAPTER 11 - SYSTEM ACCEPTANCE**

#### **11.1.3 ROUGH INSPECTION** *added*

- (1) All components of the system shall be in place, secured and connected to water supply at the time of test.
- (2) All new systems shall be tested using a cold water test / minimum of 200 PSI for 2 hours. System must show adequate pressure per approved plans. No visible leakage or pressure reduction is permitted.
- (3) When adding/relocating 4 or more heads to an existing system, it shall be tested using a cold water test / minimum of 140 PSI for 2 hours. 3 heads or less shall be connected to the permanent water supply for 2 hours prior to inspection.
- (4) All fire penetrations should be filled with approved material and nail plates shall be in place at the time of the pressure test. Where metal studs are used piping shall be protected with either a sleeve or grommet.
- (5) Systems tested with sprinkler heads installed at time of test may have up to 10% of the heads removed for orifice obstruction inspection. If solvent glue or other foreign objects are found within sprinkler head at time of inspection, then system shall be tested using plugs in lieu of sprinkler heads. The sprinkler contractor will then be required to install all sprinkler systems using plugs in lieu of sprinkler heads for a period of one year from that date for each inspection.
- (6) An approved stamped set of sprinkler plans shall be on the job site at time of inspection.

#### **11.1.4 FINAL INSPECTION** *added*

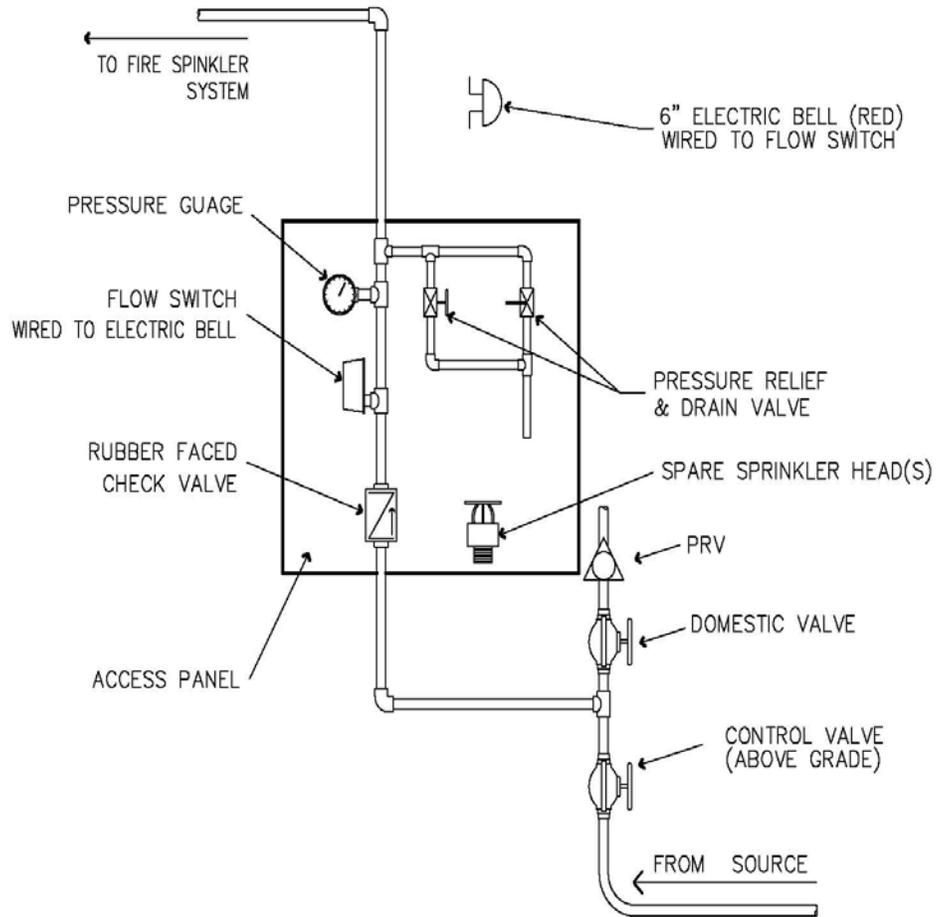
- (1) At final inspection all sprinkler system components shall be in place, system shall be flowed with activation of flow switch and bell.
- (2) All risers shall have a calculation sticker and appropriate spare heads installed in riser compartment. See Appendix "B" for calculation sticker detail.
- (3) Fire Department Inspection form from rough-in inspection must be on job site at time of test if there was a stipulation for rough-in approval.
- (4) Verify manufacturers head tolerance with the escutcheon in place and check for paint, obstructions, plaster, etc.

#### **11.1.5 RE-INSPECTION FEES** *added*

A re-inspection fee may be assessed for each inspection or re-inspection, not limited to the following:

- (1) When installation is not complete.
- (2) When corrections from previous inspection are not complete.
- (3) When two or more appointments have been cancelled at same address.
- (4) Late notice of cancellation (less than 2 hrs prior).

# RISER DIAGRAM



NOT TO SCALE

## APPENDIX "A"

# CALCULATION DESIGN STICKER FOR 13-D

ABC SPRINKLER CO.  
1234 N. SCOTTSDALE RD.  
SCOTTSDALE, AZ.

PHONE: 000-000-0000

## HYDRAULIC CALCULATION DATA

BASED ON WATER PRESSURE OF  
\_\_\_\_\_ @ RISER

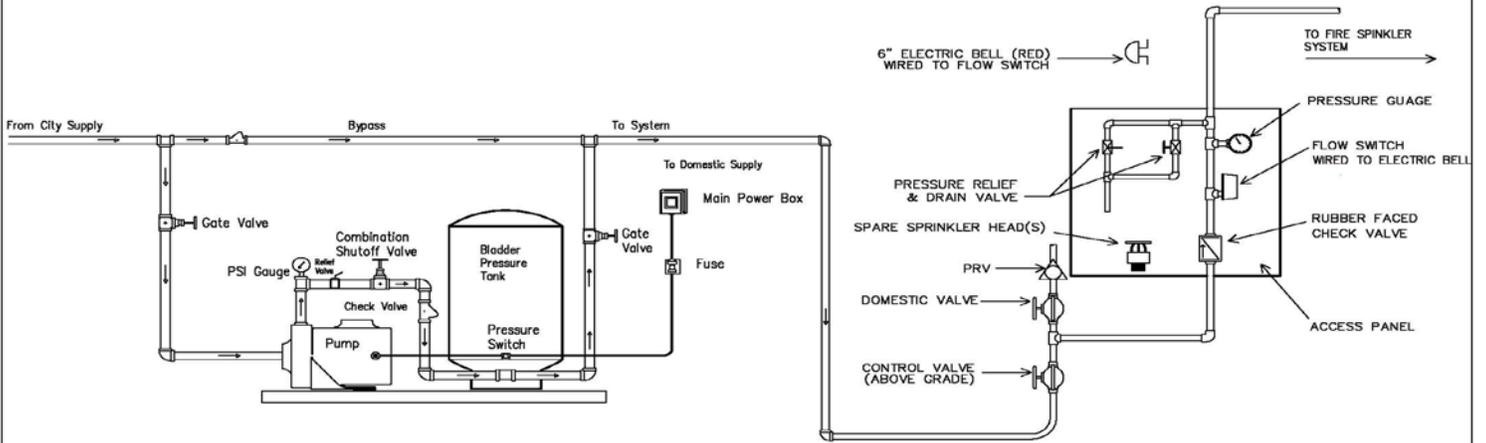
TWO HEAD CALCULATION:  
\_\_\_\_\_ GPM @ \_\_\_\_\_ PSI

ONE HEAD CALCULATION:  
\_\_\_\_\_ GPM @ \_\_\_\_\_ PSI

MINIMUM SIZE: 3" X 5"

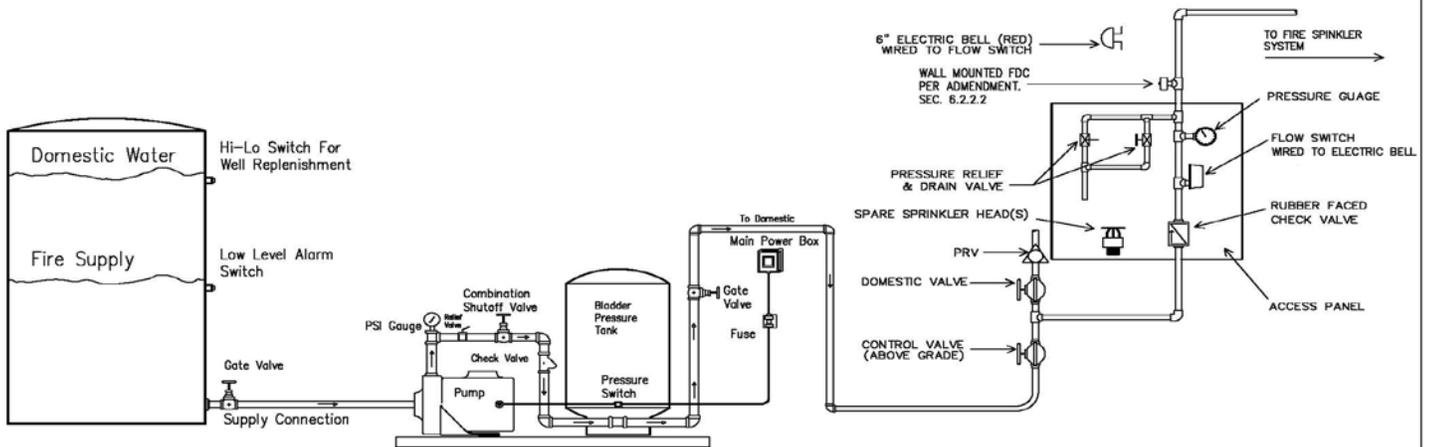
## APPENDIX "B"

## EXAMPLE OF A COMBINATION FIRE/DOMESTIC PUMP SYSTEM FOR CITY WATER SUPPLY



## APPENDIX "C"

## EXAMPLE OF A COMBINATION FIRE/DOMESTIC PUMP SYSTEM FOR WATER STORAGE TANK



Sprinkler System Design using Tyco LF II  
 16 X 16 spacing 14 GPM @ 11.1 PSI  
 33 GPM (2 Heads flowing)  
 X 15 minutes = 495 Gallons  
 X 1.1 (10% buffer) = 545 Gallons  
 600 gallons required for sprinkler system.

The tank size shall be determined by the fire  
 sprinkler requirement, in addition to domestic use.

## APPENDIX "D"