

Development Services

From Concept to Construction

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More Contact Info (<http://www.portlandoregon.gov/bds/article/519984>)



APPEAL SUMMARY

Status: Decision Rendered

Appeal ID: 22208	Project Address: 900 SW Washington St
Hearing Date: 1/8/20	Appellant Name: Dan Murray
Case No.: B-003	Appellant Phone: 360-699-4403
Appeal Type: Building	Plans Examiner/Inspector: Wendy Colmone, Kathy Aulwes
Project Type: commercial	Stories: 36 Occupancy: S, A, B, M, R Construction Type: I-A
Building/Business Name: Block 216	Fire Sprinklers: Yes - throughout
Appeal Involves: other: Alternative Method	LUR or Permit Application No.: 19-130673-STR-01-MG
Plan Submitted Option: pdf [File 1]	Proposed use: Mixed use

APPEAL INFORMATION SHEET

Appeal item 1

Code Section	2009 IBC 403.3.2 & 903.3.5.2, OSSC 403.3.2 & 903.3.5.2, Portland Fire Design Manual
Requires	<p>Section 403.3.2 of the 2009 IBC and 2010 OSSC require two water mains, located in different streets with the exception that, with valve requirements, they may come from the same street. (see attachment)</p> <p>Section 903.3.5.2 of the 2009 IBC and 2010 OSSC require a secondary on-site water supply equal to the calculated sprinkler demand plus hose. (see attachment)</p> <p>The result is the requirement for a tank sized for the calculated demand of the fire protection system with two separate supplies to the tank from the public water.</p>
Code Modification or Alternate Requested	
Proposed Design	I am proposing to provide a tank, sized in accordance with the Portland Fire Design Manual (see attachment), with one supply to the tank from the public water, designed to refill the tank at a rate at least equal to the standpipe supply requirement, also per the Portland Fire Design Manual.
Reason for alternative	<p>The language in chapter 4 of the IBC section 403.3.2 and subsequently the OSSC section 403.3.2, was intended to be applicable to buildings over 420 feet tall. This is verified, if by implication only, in the ICC Opinion (see attachment) and account of the proposal and adoption of the chapter 4 language.</p> <p>The Portland Fire Manual specifies how tanks need to be sized and only that the "connection to the public water supply be designed to refill the tank at a rate at least equal to the standpipe supply requirement." In this case the flow test provided by the Portland Water Bureau provides an estimated flow of 5000 gpm. (see attachment)</p> <p>In the past it has been the policy of Portland Fire to allow a tank, sized to comply with the Portland</p>

Fire Design Manual, and a single supply to the tank from the public water (also per the manual) to provide a sufficient amount of redundancy to provide reasonable protection.

APPEAL DECISION

**Single connection to water main with onsite water supply tank in lieu of connection to 2 water mains:
Granted as proposed.**

Note: Appeal is not granting the tank capacity shown on the provided section drawing. The capacity of the secondary on-site water supply will be reviewed under the building permit submittal.

Appellant may contact Nate Takara at (503-823-3724) for more information.

The Administrative Appeal Board finds that the information submitted by the appellant demonstrates that the approved modifications or alternate methods are consistent with the intent of the code; do not lessen health, safety, accessibility, life, fire safety or structural requirements; and that special conditions unique to this project make strict application of those code sections impractical.

Pursuant to City Code Chapter 24.10, you may appeal this decision to the Building Code Board of Appeal within 90 calendar days of the date this decision is published. For information on the appeals process, go to www.portlandoregon.gov/bds/appealsinfo, call (503) 823-7300 or come in to the Development Services Center.

1. *Open parking garages* in accordance with [Section 406.3](#).
2. Telecommunications equipment buildings used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries and standby engines, provided that those spaces or areas are equipped throughout with an automatic fire detection system in accordance with [Section 907.2](#) and are separated from the remainder of the building by not less than 1-hour *fire barriers* constructed in accordance with [Section 707](#) or not less than 2-hour *horizontal assemblies* constructed in accordance with [Section 712](#), or both.

403.3.1 Number of sprinkler risers and system design. Each sprinkler system zone in buildings that are more than 420 feet (128 m) in *building height* shall be supplied by a minimum of two risers. Each riser shall supply sprinklers on alternate floors. If more than two risers are provided for a zone, sprinklers on adjacent floors shall not be supplied from the same riser. [F]

403.3.1.1 Riser location. Sprinkler risers shall be placed in *exit enclosures* that are remotely located in accordance with [Section 1015.2](#). [F]

403.3.2 Water supply to required fire pumps. Required fire pumps shall be supplied by connections to a minimum of two water mains located in different streets. Separate supply piping shall be provided between each connection to the water main and the pumps. Each connection and the supply piping between the connection and the pumps shall be sized to supply the flow and pressure required for the pumps to operate. [F]

Exception: Two connections to the same main shall be permitted provided the main is valved such that an interruption can be isolated so that the water supply will continue without interruption through at least one of the connections.

403.4 Emergency systems. The detection, alarm and emergency systems of high-rise buildings shall comply with [Sections 403.4.1](#) through [403.4.8](#).

403.4.1 Smoke detection. Smoke detection shall be provided in accordance with [Section 907.2.13.1](#). [F]

403.4.2 Fire alarm system. A fire alarm system shall be provided in accordance with [Section 907.2.13](#). [F]

403.4.3 Emergency voice/alarm communication system. An emergency voice/alarm communication system shall be provided in accordance with [Section 907.5.2.2](#). [F]

403.4.4 Emergency responder radio coverage. Emergency responder radio coverage shall be provided in accordance with Section 510 of the *International Fire Code*. [F]

403.4.5 Fire command. A fire command center complying with [Section 911](#) shall be provided in a location *approved* by the fire department. [F]

403.4.6 Smoke removal. To facilitate smoke removal in post-fire salvage and overhaul operations, buildings and structures shall be equipped with natural or mechanical ventilation for removal of products of combustion in accordance with one of the following:

sprinklers shall be installed in or under covered kiosks, displays, booths, concession stands, or equipment that exceeds 4 feet (1219 mm) in width. Not less than a 3-foot (914 mm) clearance shall be maintained between automatic sprinklers and the top of piles of combustible fibers. [F]

Exception: Kitchen equipment under exhaust hoods protected with a fire-extinguishing system in accordance with [Section 904](#).

903.3.4 Actuation. *Automatic sprinkler systems* shall be automatically actuated unless specifically provided for in this code. [F]

903.3.5 Water supplies. Water supplies for *automatic sprinkler systems* shall comply with this section and the standards referenced in [Section 903.3.1](#). The potable water supply shall be protected against backflow in accordance with the requirements of this section and the *International Plumbing Code*. [F]

903.3.5.1 Domestic services. Where the domestic service provides the water supply for the *automatic sprinkler system*, the supply shall be in accordance with this section. [F]

903.3.5.1.1 Limited area sprinkler systems. Limited area sprinkler systems serving fewer than 20 sprinklers on any single connection are permitted to be connected to the domestic service where a wet automatic standpipe is not available. Limited area sprinkler systems connected to domestic water supplies shall comply with each of the following requirements: [F]

1. Valves shall not be installed between the domestic water riser control valve and the sprinklers.

Exception: An *approved* indicating control valve supervised in the open position in accordance with [Section 903.4](#).

2. The domestic service shall be capable of supplying the simultaneous domestic demand and the sprinkler demand required to be hydraulically calculated by NFPA 13, NFPA 13R or NFPA 13D.

903.3.5.1.2 Residential combination services. A single combination water supply shall be allowed provided that the domestic demand is added to the sprinkler demand as required by NFPA 13R. [F]

903.3.5.2 Secondary water supply. A secondary on-site water supply equal to the hydraulically calculated sprinkler demand, including the hose stream requirement, shall be provided for high-rise buildings assigned to Seismic Design Category C, D, E or F as determined by this code. The secondary water supply shall have a duration of not less than 30 minutes as determined by the occupancy hazard classification in accordance with NFPA 13. [F]

Exception: Existing buildings.

903.3.6 Hose threads. Fire hose threads and fittings used in connection with *automatic sprinkler systems* shall be as prescribed by the fire code official. [F]

or areas are equipped throughout with an automatic fire detection system in accordance with Section 907.2 and are separated from the remainder of the building by not less than 1-hour *fire barriers* constructed in accordance with Section 707 or not less than 2-hour *horizontal assemblies* constructed in accordance with Section 712, or both.

[F] 403.3.1 Number of sprinkler risers and system design. Each sprinkler system zone in buildings that are more than 420 feet (128 m) in *building height* shall be supplied by a minimum of two risers. Each riser shall supply sprinklers on alternate floors. If more than two risers are provided for a zone, sprinklers on adjacent floors shall not be supplied from the same riser.

[F] 403.3.1.1 Riser location. Sprinkler risers shall be placed in *exit enclosures* that are remotely located in accordance with Section 1015.2.

[F] 403.3.2 Water supply to required fire pumps. Required fire pumps shall be supplied by connections to a minimum of two water mains located in different streets. Separate supply piping shall be provided between each connection to the water main and the pumps. Each connection and the supply piping between the connection and the pumps shall be sized to supply the flow and pressure required for the pumps to operate.

Exception: Two connections to the same main shall be permitted provided the main is valved such that an interruption can be isolated so that the water supply will continue without interruption through at least one of the connections.

403.4 Emergency systems. The detection, alarm and emergency systems of high-rise buildings shall comply with Sections 403.4.1 through 403.4.8.

[F] 403.4.1 Smoke detection. Smoke detection shall be provided in accordance with Section 907.2.13.1.

[F] 403.4.2 Fire alarms systems. A fire alarm system shall be provided in accordance with Section 907.2.13.

[F] 403.4.3 Emergency voice/alarm communication system. An emergency voice/alarm communication system shall be provided in accordance with Section 907.5.2.2.

[F] 403.4.4 Emergency responder radio coverage. Emergency responder radio coverage shall be provided in accordance with Section 510 of the *Fire Code*.

[F] 403.4.5 Fire command. A fire command center complying with Section 911 shall be provided in a location *approved* by the fire department.

403.4.6 Smoke removal. To facilitate smoke removal in post-fire salvage and overhaul operations, buildings and structures shall be equipped with natural or mechanical ventilation for removal of products of combustion in accordance with one of the following:

1. Easily identifiable, manually operable windows or panels shall be distributed around the perimeter of each floor at not more than 50-foot (15 240 mm) intervals. The area of operable windows or panels shall not

be less than 40 square feet (3.7 m²) per 50 linear feet (15 240 mm) of perimeter.

Exceptions:

1. In Group R-1 occupancies, each *sleeping unit* or suite having an *exterior wall* shall be permitted to be provided with 2 square feet (0.19 m²) of venting area in lieu of the area specified in Item 1.
2. Windows shall be permitted to be fixed provided that glazing can be cleared by fire fighters.
2. Mechanical air-handling equipment providing one exhaust air change every 15 minutes for the area involved. Return and exhaust air shall be moved directly to the outside without recirculation to other portions of the building.
3. Any other *approved* design that will produce equivalent results.

[F] 403.4.7 Standby power. A standby power system complying with Chapter 27 shall be provided for standby power loads specified in Section 403.4.7.2.

[F] 403.4.7.1 Special requirements for standby power systems. If the standby system is a generator set inside a building, the system shall be located in a separate room enclosed with 2-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 712, or both. System supervision with manual start and transfer features shall be provided at the fire command center.

[F] 403.4.7.2 Standby power loads. The following are classified as standby power loads:

1. Power and lighting for the fire command center required by Section 403.4.5;
2. Ventilation and automatic fire detection equipment for smokeproof enclosures; and
3. Standby power shall be provided for elevators in accordance with Sections 1007.4, 3003, 3007 and 3008.

[F] 403.4.8 Emergency power systems. An emergency power system complying with Chapter 27 shall be provided for emergency power loads specified in Section 403.4.8.1.

[F] 403.4.8.1 Emergency power loads. The following are classified as emergency power loads:

1. Exit signs and *means of egress* illumination required by Chapter 10;
2. Elevator car lighting;
3. Emergency voice/alarm communications systems;
4. Automatic fire detection systems;
5. Fire alarm systems; and
6. Electrically powered fire pumps.

403.5 Means of egress and evacuation. The *means of egress* in high-rise buildings shall comply with Sections 403.5.1 through 403.5.6.

[F] 903.3.1.3 NFPA 13D sprinkler systems. Where allowed, *automatic sprinkler systems* installed in one- and two-family *dwelling*s and *townhouses* shall be installed throughout in accordance with NFPA 13D.

[F] 903.3.2 Quick-response and residential sprinklers. Where automatic sprinkler systems are required by this code, quick-response or residential automatic sprinklers shall be installed in the following areas in accordance with Section 903.3.1 and their listings:

1. Throughout all spaces within a smoke compartment containing patient sleeping units in Group I-2 in accordance with this code.
2. *Dwelling units*, and *sleeping units* in Group R and I-1 occupancies.
3. Light-hazard occupancies as defined in NFPA 13.

[F] 903.3.3 Obstructed locations. Automatic sprinklers shall be installed with due regard to obstructions that will delay activation or obstruct the water distribution pattern. Automatic sprinklers shall be installed in or under covered kiosks, displays, booths, concession stands, or equipment that exceeds 4 feet (1219 mm) in width. Not less than a 3-foot (914 mm) clearance shall be maintained between automatic sprinklers and the top of piles of combustible fibers.

Exception: Kitchen equipment under exhaust hoods protected with a fire-extinguishing system in accordance with Section 904.

[F] 903.3.4 Actuation. *Automatic sprinkler systems* shall be automatically actuated unless specifically provided for in this code.

[F] 903.3.5 Water supplies. Water supplies for *automatic sprinkler systems* shall comply with this section and the standards referenced in Section 903.3.1. The potable water supply shall be protected against backflow in accordance with the requirements of this section and the *Plumbing Code*.

[F] 903.3.5.1 Domestic services. Where the domestic service provides the water supply for the *automatic sprinkler system*, the supply shall be in accordance with this section.

[F] 903.3.5.1.1 Limited area sprinkler systems. Limited area sprinkler systems serving fewer than 20 sprinklers on any single connection are permitted to be connected to the domestic service where a wet automatic standpipe is not available. Limited area sprinkler systems connected to domestic water supplies shall comply with each of the following requirements:

1. Valves shall not be installed between the domestic water riser control valve and the sprinklers.

Exception: An *approved* indicating control valve supervised in the open position in accordance with Section 903.4.

2. The domestic service shall be capable of supplying the simultaneous domestic demand and the sprinkler demand required to be hydraulically

calculated by NFPA 13, NFPA 13R or NFPA 13D.

[F] 903.3.5.1.2 Residential combination services. A single combination water supply shall be allowed provided that the domestic demand is added to the sprinkler demand as required by NFPA 13R.

[F] 903.3.5.2 Secondary water supply. A secondary on-site water supply equal to the hydraulically calculated sprinkler demand, including the hose stream requirement, shall be provided for high-rise buildings assigned to Seismic Design Category C, D, E or F as determined by this code. The secondary water supply shall have a duration of not less than 30 minutes as determined by the occupancy hazard classification in accordance with NFPA 13.

Exception: Existing buildings.

[F] 903.3.6 Hose threads. Fire hose threads and fittings used in connection with *automatic sprinkler systems* shall be as prescribed by the fire code official.

[F] 903.4 Sprinkler system supervision and alarms. All valves controlling the water supply for *automatic sprinkler systems*, pumps, tanks, water levels and temperatures, critical air pressures and waterflow switches on all sprinkler systems shall be electrically supervised by a *listed* fire alarm control unit.

Exceptions:

1. *Automatic sprinkler systems* protecting one- and two-family *dwelling*s.
2. Limited area systems serving fewer than 20 sprinklers.
3. *Automatic sprinkler systems* installed in accordance with NFPA 13R where a common supply main is used to supply both domestic water and the *automatic sprinkler system*, and a separate shutoff valve for the *automatic sprinkler system* is not provided.
4. Jockey pump control valves that are sealed or locked in the open position.
5. Control valves to commercial kitchen hoods, paint spray booths or dip tanks that are sealed or locked in the open position.
6. Valves controlling the fuel supply to fire pump engines that are sealed or locked in the open position.
7. Trim valves to pressure switches in dry, preaction and deluge sprinkler systems that are sealed or locked in the open position.

[F] 903.4.1 Monitoring. Alarm, supervisory and trouble signals shall be distinctly different and shall be automatically transmitted to an *approved* supervising station or, when *approved* by the building official, shall sound an audible signal at a *constantly attended location*.

Exceptions:

1. Underground key or hub valves in roadway boxes provided by the municipality or public utility are not required to be monitored.

Darren Englert

From: Samir Mokashi <samir.mokashi@codeul.com>
Sent: Monday, March 11, 2013 9:55 AM
To: Boyles, Gary
Subject: FW: 09 IBC 403.3.2 (KR)

Gary,

There is a code change proposal for the 2015 code to clarify the secondary water requirement, see comments from ICC and the proposed change following it. Current code as written doesn't have that but wanted to share with you what I discovered as I dug deeper into this question. Thanks for your prompt response and explanation of how the City enforces the current requirements.

Samir Mokashi
Principal

T: 503.488.5651

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C: 503.679.6344

CODE UNLIMITED

BEAVERTON OFFICE:
12655 SW Center Street,
Suite 350,
Beaverton, Oregon 97005

From: Kermit Robinson [mailto:krobinson@iccsafe.org]
Sent: Friday, March 08, 2013 8:42 AM
To: Lis Valdemarsen
Cc: Samir Mokashi
Subject: RE: 09 IBC 403.3.2 (KR)

March 8, 2013

Samir

Re: 2009 IBC, Section 403.3.2.

Code opinions issued by ICC staff are based on ICC published codes and do not include local, state or federal codes, policies or amendments. This opinion is based on the information which you have provided. We have made no independent effort to verify the accuracy of this information nor have we conducted a review beyond the scope of your question. This opinion does not imply approval of an equivalency, specific product, specific design, or specific installation and cannot be published in any form implying such approval by the International Code Council. As this opinion is only advisory, the final decision is the responsibility of the designated authority charged with the administration and enforcement of this code.

Questions: We have interpreted that the code change, "to allow dual main to a fire water pump", adopted in 2009 IBC to this section allows an alternate to the on-site storage tank. Some others are interpreting that these are in addition to the storage tank. Reviewing the code change proposal (2007-2008 code change final hearing agenda G46 including Public Comment) it appears that the intent for water storage tank and dual feeds applies to very tall buildings but was not intended for all high-rise building. The building we are looking at is 7 stories and just 120 feet to the top of penthouse roof. This is not an urban setting as well, there aren't any other high rises in this jurisdiction.

Answer: Section 403.3.2 as proposed did not contain text which limited it to taller high-rise buildings. Nor, as proposed, was Section 403.3.2 shown as a subset of a section which did limit application to taller high-rise buildings. It was very clear in the proposal that Section 403.3.2 was an equal provision to Section 403.3.1 which contained the specific limitation. While we are aware of the content of the reason statement, the proponent is responsible for the content of the text. The text proceeded through the process of Committee review and approval and final action by the full membership. The Text was not changed. There were no proposals during the development of the 2012 IBC which would have amended the text. The requirements of Section 403 have many provisions which only apply to high-rise buildings of a specific height. In each location, the height is specified. Short of specific language in Section 403.3.2, staff must provide the interpretation that Section 403.3.2 applies to all high-rise buildings.

Local enforcing jurisdictions are responsible for the interpretation of the code in their jurisdiction.

For your information a proposal has been submitted for consideration for the 2015 IBC which would clearly add the 420 foot threshold to this requirement. This proposal will be considered by the Fire Code Change Review/Development Committee in hearings at the end of April in Dallas. I have copied the proposal below my signature block.

Kermit

Kermit C. Robinson, CBO

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G4 – 13

IBC [F] 403.3.2 (IFC 914.3.1.2)

Proponent: Jeffrey M. Shapiro, International Institute of Ammonia Refrigeration (jeff.shapiro@intlcodeconsultants.com)

Revise as follows:

IBC [F] 403.3.2 (IFC 914.3.1.2) Water supply to required fire pumps. In buildings that are more than 420 feet (128 m) in building height, required fire pumps shall be supplied by connections to no fewer than two water mains located in different streets. Separate supply piping shall be provided between each connection to the water main and the pumps. Each connection and the supply piping between the connection and the pumps shall be sized to supply the flow and pressure required for the pumps to operate.

Exception: Two connections to the same main shall be permitted provided the main is valved such that an interruption can be isolated so that the water supply will continue without interruption through no fewer than one of the connections.

Reason: The text in this section originated with Proposal G46-07/08. That proposal was accepted based on a public comment that had a reason statement that began with "The purpose of this public comment is to increase the reliability of fire sprinkler systems in very tall buildings, those that exceed 420 feet in height, by requiring a minimum of two risers for each sprinkler zone and pumps to be supplied by a minimum of two connections to the municipal distribution system." Although Section 403.3.1, which was also created by the same public comment included the 420 foot threshold, the threshold was clearly overlooked in the text of 403.3.2. The text as written technically applies to any high-rise building, which comes at very significant cost, yet there is no documented justification as a basis for applying the code in that manner. The proposed revision resolves the apparent oversight in the current code text.

Highrise Buildings – Sprinklers and Standpipes

(21) When will a single fire pump design be acceptable?

In buildings 16 stories or less, where the pump takes suction from an onsite water supply tank a single pump may be used. When a single pump is provided, backup pump capacity shall be designed such that a single engine can deliver the design flow from the municipal supply.

(22) What is the design capacity for a single pump?

The pump shall be sized to meet the greater of standpipe demand or maximum hazard class sprinkler design plus 100 gpm inside hose (at 100 psi), which ever is greater.

(23) If two pumps are required or provided, must their rated capacities be the same?

No. At least one pump shall be sized to the greatest of standpipe demand or sprinkler demand plus 100 gpm inside hose. The second pump shall be sized to at least provide sprinkler demand plus 100 gpm inside hose (at 100 psi).

(24) Can one pump take suction from a tank and the other take suction from the public water supply?

No. Both pumps must take suction from the onsite water supply.

(25) Can the maximum sprinkler demand be based on design densities of upper floors when calculating the size of onsite water supply?

Normally, the design densities for upper floors are lower than the basement or first floors based on use of these areas. Onsite water supply shall serve all portions of the system, including parking and ground floor retail spaces. Therefore, the maximum system demand must be based on the maximum hazard class regardless of where it is located.

(26) When are PRV's required on hose outlets?

PRV's are required on hose outlets whenever the static pressure exceeds 175 psi static. When PRV's are installed, the outlet residual pressure shall be set at between 125 and 150 psi. (NFPA 14: 7.2.1)

(27) *What is the minimum size drain? Are there any special requirements associated with the drain?*

Where PRV's are installed the minimum drain size shall be 3". A 2" drain is sufficient in systems without PRV's. Discharge at the base of the drain shall accommodate the full flow required to test the system.

(28) *Does the designer have the choice to specify a dry standpipe?*

No. The Oregon Structural Specialty Code specifically prohibits dry standpipes in highrise buildings unless allowed by the building official or fire marshal. In Portland, where areas served by standpipes are subject to freezing, an automatic dry system must be used.

(29) *How is the minimum capacity of the tank determined?*

The tank shall supply the maximum sprinkler demand including 100 gpm inside hose. The minimum water supply shall be available for the duration specified in Table 11.2.3.1.1 of NFPA 13 based on the highest hazard protected by the system. Sufficient tank depth to meet the pump manufactures minimum submergence for pump impellers shall be considered in sizing the tank.

(30) *Does the tank need to be connected to the public water supply?*

Yes, the public water supply connection shall be designed to refill the tank at a rate at least equal to the standpipe supply requirement.

(31) *Are there changes in tank monitoring requirements?*

A low level alarm for the tank is frequently missed in the design. The standard (see NFPA 72) requires a supervisory alarm when the water level drops 12 inches from normal.

Water Based System - INSPECTION Requirements

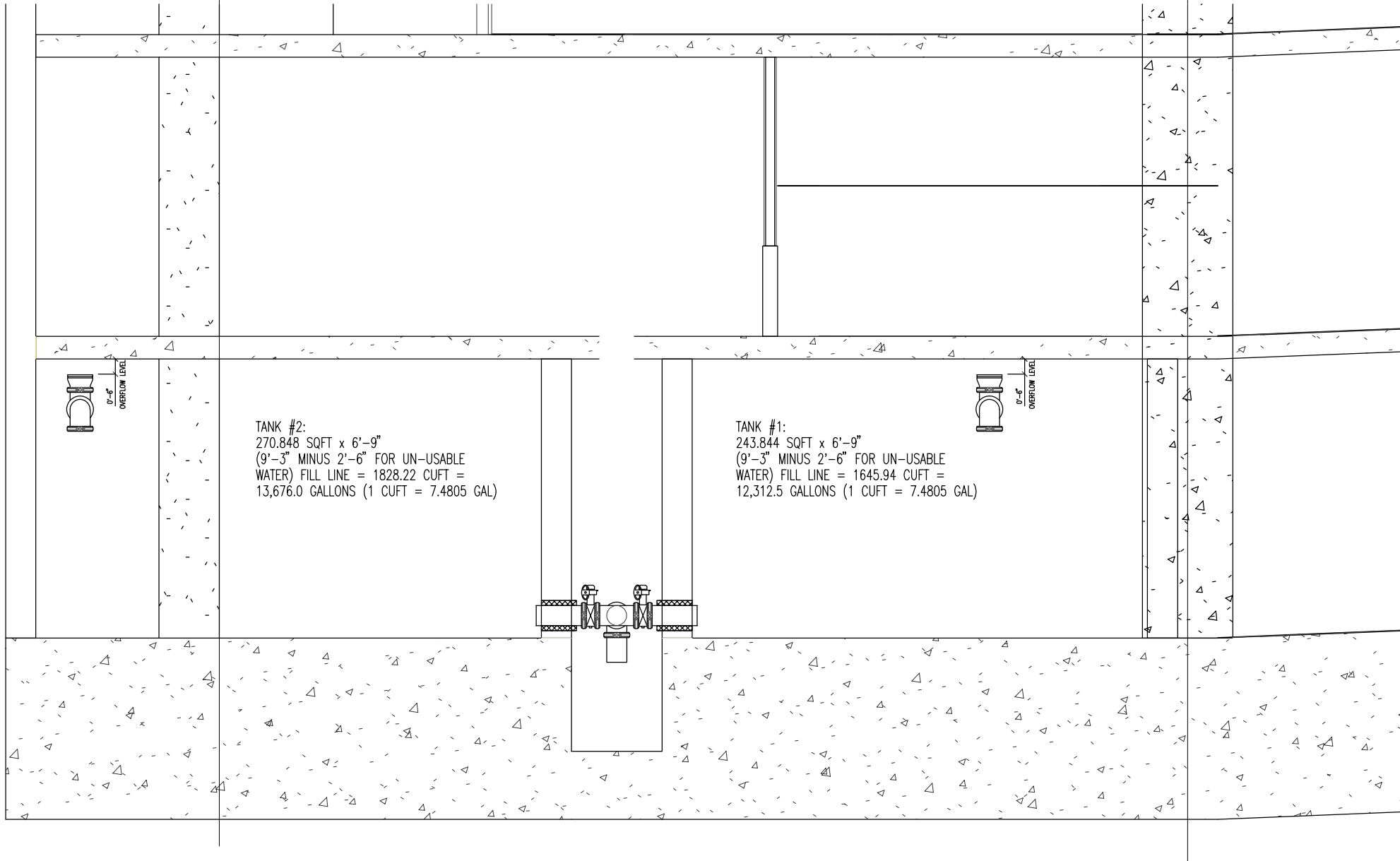
c) Frequently Asked INSPECTION Questions regarding Water Based Systems

(1) *When are Hydrostatic Pressure Tests required to be witnessed?*

All hydro-tests (underground and above ground) shall be witnessed by PF&R Inspector unless the inspector has approved other arrangements.

1

2



Portland Water Bureau

FROM: wbfireflow@portlandoregon.gov

Fire Service/ Sprinkler Design Flow Availability Estimate

This estimate is intended to assist fire service/ sprinkler system design. This is an estimated flow obtained using a hydraulic model.

Simulation on 20-inch main in SW 10th Avenue.

Simulation ID Number:	4057
Simulation Date:	3/6/2019
Assumed fire service location:	585 SW 10th Avenue
Map Number (quartersection):	3029
Pressure Zone:	WASHINGTON PARK 229
Main size:	20 inch
Assumed fire service elevation:	69 feet
Maximum Static Hydraulic Grade Line:	229 feet
Maximum Static Pressure:	69 psi
STATIC PRESSURE to use for design: (80% of the nominal max static pressure)	55 psi
ESTIMATED FLOW:	5000 gpm
ESTIMATED RESIDUAL PRESSURE: (in the system, with the simulated flow)	53 psi

NOTE: The Water Bureau reserves the right to make future operational changes that may affect flow available at this location. The reported flow is available in the main before any service pipe, backflow prevention device, or meter. This is not an indication of fire flow available at the nearest hydrant.