

Chapter 9 - Design Guides

9.19 PLUMBING AND FIRE PROTECTION GUIDE

A. GENERAL

1. The purpose of this guide is to convey general “basis-of-design”, standard of quality, and OGS preferences as they relate to building Plumbing and Fire Protection system design. Specific Client Agency and facility preferences shall be revealed through each Consultant/Designer’s investigations on the project. Agency-specific requirements may be found elsewhere in this manual.
2. The Consultant/Designer shall acquire at the project’s outset a minimum working knowledge of the project intent, scope and extent of Plumbing and Fire Protection work. This activity may also require coordination with Consultant/Designers from one or more trades.
3. The initial scope and extent of Plumbing and Fire Protection work shall be verified by visiting the project site and further communicating with the designated project OGS Team Leader (TL).
4. The Consultant/Designer shall identify the Plumbing and Fire Protection systems, equipment, materials, and any specialized professional services or systems required to execute the project.
5. All applicable New York State and industry codes and standards invoked by the codes must be recognized early in the design stage so that they can be referred to whenever required throughout the project’s design phases. Plumbing and Fire Protection design rely heavily on the current editions of the New York State Building Codes (NYSBC) and the National Fire Protection Association (NFPA). These codes should be used as strict guidelines during design.
6. The Consultant/Designer shall show that the latest “green building” solutions have been incorporated and/or considered in the design consistent with the project’s established LEED / sustainability goals or requirements.
7. Required metering is coordinated with the Client to comply with Executive Order 088.
8. Review the requirements included in the applicable design forms (BDC-401, BDC-402, BDC-26, BDC-188, etc.).
9. The Plumbing and/or Fire Protection Consultant/Designer shall coordinate with the project structural engineer in the Program phase to determine the seismic design requirements for the project.
10. All piping penetrations into different fire or smoke zones shall be protected with appropriately rated firestopping materials or systems. Each trade should be

responsible for firestopping work. See Chapter 9.10 Firestopping Guide for more detailed information.

11. Coordinate Plumbing and Fire Protection equipment locations with all architectural and engineering trades from the project outset. Ensure that all chases, structural components such as footings and structural steel will allow for proper installation of Plumbing and Fire Protection components. Work closely with the Architect and Structural Engineers to allow for proper pipe support, proper piping pitch, ample room in chases and space within Mechanical Equipment Rooms.
12. Identify through testing the existence of asbestos, and other hazardous materials in the work area during the Program Phase. Coordinate abatement scope of work and procedures with project Certified Asbestos Designer. See Chapter 9.8 Hazardous Materials Guide for more detailed information.
13. Generally, use the standard OGS symbols, nomenclature and abbreviations listed within this guide for all sketch and drawing representations.
14. Follow OGS guidelines for drawing layout and presentation of materials and equipment whenever applicable.
15. Final equipment choice shall be the result of a best value assessment which takes into account function, materials, features, O&M issues, costs and project budget. Equipment should be non-proprietary unless approved by the TL or BUL. See Chapter 5.2 Project Manual – 012100 Allowances section for more detailed information.
16. For most standard equipment, systems and materials the OGS Master Specifications sections provide additional prompts and selection/editing directions based on established preferences. See Chapter 5.2 Project Manual for more detailed information.
17. Utilize Plumbing and Fire Protection Design Guide checklists where applicable.
18. Chases containing equipment such as valves, air hammer arrestors, concealed flush valves etc. are accessible

B. DRAWING LAYOUT AND PRESENTATION FOR PLUMBING

1. OGS Plumbing design has a very distinct method for presentation of work. Whenever practical, follow the OGS standards to ensure that the level of quality and presentation is kept consistent for every OGS project.
2. Floor Plans, ¼” scale details and elevations are all used to show specific piping and equipment information. Avoid duplication of information to minimize margin for error and change orders.

3. Floor Plans: Generally floor plans are drawn at a scale of $1/8" = 1'-0"$ unless unusual circumstances dictate otherwise. All plans are provided on 24" x 36" sheets. Changes to these standards need to be brought to the attention of the PM or TL for approval. Floor Plans are part of the drawing series labeled as P-101, P-102, P-103 etc. See Chapter 5.3 Project Drawings for more detailed information.
4. The following information is included on all $1/8"$ scale floor plans:
 - Finish Floor Elevation.
 - North Arrow.
 - Columns with column numbers.
 - Room numbers and names.
 - Access panels labeled as "AP NIC"; (typically provided by the Construction contract with exceptions for small or single trade Plumbing contracts). Coordinate with Architect.
 - Building service piping to 5'-0" beyond the building footprint; unless the project does not have a site design component. All building service piping is labeled with an invert elevation at the building edge.
 - Building fixtures labeled including floor and roof drains.
 - All piping (waste, storm, vent, domestic water, gas, medical etc.) from service entrance to point of penetration of floor or ceiling or to continuation point for $1/4"$ scale plans and elevations.
 - All sections of piping are noted with size.
 - All piping penetrations are shown.
 - All penetrations are sized and labeled as "Up", "Down" or "Riser" (pipe penetrating both floor and ceiling/roof).
 - ADA symbols for designated fixtures.
 - Chases do not generally show piping (see $1/4"$ scale drawing presentation), but chase penetrations, drops and rises are labeled.
 - Notes labeling multiple fixtures or piping penetrations list the fixtures or penetrations from top to bottom or left to right according to their placement on the plans.

**Note that the use of fixture schedules in lieu of labeling is not recommended. OGS has found that the time savings normally leaves the plans prone to mistakes.
5. Details of floor plans are typically drawn at a scale of $1/4" = 1'-0"$. Except on smaller projects, OGS generally provides $1/4"$ scale details for all groups of 3 or more fixtures on the floor plans. Details of floor plans drawn at $1/4"$ scale are part of the drawing series labeled as P-401, P-402, P-403 etc.
6. The following information is included on all $1/4"$ scale floor plan details:
 - Horizontal waste piping within chase. All sections sized.
 - Repeat of any penetrations shown on $1/8"$ scale floor plans labeled.
 - Waste and Vent risers shown as circle and labeled.
 - Fixtures (not labeled to avoid discrepancies with floor plans).
 - Fixture accessories such as stop valves, flush valves etc.
 - Cut lines for elevations.

7. Elevations are typically drawn at a scale of $\frac{1}{4}'' = 1'-0''$. OGS generally provides elevations for any group of 2 or more fixtures, side by side. Make use of similar elevations and multi floor elevations for stacked fixtures to reduce number of elevations required. Elevations drawn at $\frac{1}{4}''$ scale are typically placed on and directly near the $\frac{1}{4}''$ scale floor plan detail showing the elevation cut line.
8. The following information is included on all $\frac{1}{4}''$ scale elevations:
 - Fixtures at proper elevation (standard or ADA).
 - Domestic water piping, showing valves, water hammer arrestors etc. and all sections sized.
 - Waste and vent risers, connections and penetrations of floor or ceiling.
 - Fixtures (not labeled to avoid discrepancies with floor plans).
 - Fixture accessories such as stop valves, flush valves etc.
9. Details of equipment are typically drawn at a scale of $\frac{1}{4}'' = 1'-0''$. OGS generally provides details for the following equipment (not all inclusive); sump pumps, booster pumps, recirculation pumps, domestic hot water heaters, showers, water coolers, equipment pads, master mixing valve stations, dental and/or medical vacuum etc. Details of equipment are shown as part of the drawing series labeled as P-501, P-502, P-503 etc.

C. MECHANICAL EQUIPMENT ROOMS (MER's)

1. When practical, Domestic Water and Fire Protection Service piping should enter the building at an MER. Coordinate closely with the Architect and Engineering trades to allow proper spacing for backflow preventers and Fire Alarm valves. All clearances required by the Plumbing Code of New York State (PCNYS), NFPA and the equipment manufacturers' printed recommendations must be adhered to.
2. Coordinate with HVAC Consultant/Designer for proper placement of floor drains, hose bibs and valved outlets to service their equipment. Floor drains are required for pumps, pressure relief valves, backflow preventer discharge, equipment drainage and general maintenance/good housekeeping. Make efforts to combine drains where practical.
3. Consultant/Designer prepares and files NY State department of health application for Approval of Backflow Prevention Devices DOH-347 where required.
4. Avoid routing piping above electrical equipment/panels in the MER.
5. All floor-mounted or supported equipment shall be on concrete housekeeping pads provided in the Plumbing work that are (min. 4'') longer and wider than the equipment base. The pad shall be lagged to the floor with (min. 4) steel anchoring devices and chamfered all around. Its height (min. 4'') and reinforcement requirements may vary depending on the weight and dynamic forces produced by the equipment.

6. The final sizing and layout of equipment should also consider a possible future expansion of the facility's requirements.

D. SANITARY WASTE EQUIPMENT

1. Floor drains must be provided at each piece of dishwashing and kitchen equipment where accidental spillage is anticipated and to facilitate floor-cleaning procedures. Drains to receive indirect wastes for equipment must be of the floor sink type of acid resistant porcelain enamel or stainless steel construction with a sediment bucket and removable grate.
2. Venting methods interceptors must be provided for all waste piping serving sinks used for pot washing or food preparation and floor drains or floor sinks serving the immediate area of the equipment.
3. Floor drains and/or trench drains in vehicle repair / maintenance garages must discharge to a sand / oil separator before discharging to the sanitary sewer per the Plumbing Code of New York State.
4. Floor drains with sanitary connections are provided for all emergency showers.
5. Floor drains with sanitary connections are provided in all multiple user public restrooms.

E. VENTING METHODS

1. Venting methods used are according to the Plumbing Code of New York State (PCNYS).
2. Vent connections on floor plans are shown as drops when connecting to horizontal drain pipes. This method of drawing presentation is in reference to the PCNYS mandating this connection be made above the centerline of the drain pipe.
3. Vent terminals are shown as offset at the roof and increased one pipe size prior to penetrating the building roof. This method of design is for frost control.
4. Every dry vent shall rise vertically to a minimum of 6 inches above the flood rim of the highest trap or trapped fixture being vented. For example, a common mistake made during design is to combine individual vent pipes from floor drain traps below the floor level the drains are located at. These vents cannot combine until penetrating the floor level of the floor drains and rising 6 inches. See PCNYS for further explanation and exceptions.
5. Fixtures located within bathroom groups are individually vented. This does not include floor drains and floor sinks. For floor drains and floor sinks, OGS encourages the use of PCNYS rules for wet venting to eliminate costly individual

venting of floor drains. The distance of a floor drain trap from the wet vent can not exceed the maximum distances of “fixture trap from vent” published by the PCNYS.

F. MATERIAL, EQUIPMENT AND DESIGN PREFERENCES

1. Whenever practical, shut off valves are shown and specified as ball valves.
2. Use water hammer arrestors in lieu of air chambers in all accessible area.
3. Vents discharge to atmosphere. The use of air admittance valves is discouraged unless all possible avenues to atmosphere have been found to be impractical.
4. Use of building (house) traps is encouraged based on OGS being the code enforcement official for many NYS buildings. Where local jurisdiction must be considered, the use of building traps is prohibited based on the PCNYS in conjunction with local ordinance.
5. Choose the size, shape, fitting/accessories, material composition, and layout of piping that best fits the application, minimizes piping cost, building penetrations and minimizes friction loss. Layout of piping for domestic water systems should not use “bull head” tees and branch piping must show by symbol on the drawings as coming from the top half the piping main.
6. As a general guide, see the OGS master specification section 221100 for piping materials. The following notes are not shown in the master specifications but should be considered by all Consultant/Designers:
 - Grooved type and hydraulic press joints can offer considerable cost savings. OGS encourages the Consultant/Designer to consider them as options on each project.
 - The use or substitution of plastic or PVC piping is discouraged in secure type facilities. TL / PM approval must be obtained for its use.
 - This listing does not intend to exclude an engineer from using an alternative material where conditions dictate or a cost savings can be incurred. TL / PM approval must be obtained for an alternatives use.
7. Vandal proof fasteners are common on many public and secure buildings owned by New York State. Take note of their inclusion within the OGS master spec.

G. DOMESTIC HOT WATER

1. There are many types of commercial domestic hot water heaters available for use. Consultant/Designers should inquire as to individual client preferences prior to design. This statement does not intend to limit the designer’s choice or obligation to recommend the best type for the application at hand. Work closely with the TL or PM when choosing a method for production of domestic hot water.

2. OGS encourages domestic hot water be stored at a minimum of 140 degrees F with distribution at a minimum of 110 degrees F. Operation at these temperatures is part of good design practice to limit the possibility of Legionella within the domestic hot water system.
3. OGS encourages scald protection by use of a master mixing valve of the thermostatic type prior to local mixing at the end using fixture.

H. SECURE DESIGN

1. Many of the clients OGS performs work for have secure buildings or areas of buildings. Many of the requirements for secure areas are standardized but not published in this design guide. For individual client standards for security design issues, coordinate closely with the TL or PM.

I. FIRE PROTECTION

1. The Consultant/Designer fire protection engineer shall assess the adequacy of the existing water supply and shall perform water supply flow testing of fire hydrants and/or fire pumps. Request a flow test or obtain results of a recent flow test prior to start of design of any sprinkler or stand pipe system.
2. Provide documentation listed in NFPA 13 Chapter “Plans and Calculations” with the 100% Submission which includes, but is not limited to, the hydraulic calculations and hydrant flow test.
3. Show results of flow test and hazard classification used for design on drawings for purpose of having installing contractor perform hydraulic calculations.
4. Show service and location of nearest main for purpose of allowing installing contractor to perform hydraulic calculations.
5. In general, fire protection design drawings are produced as a guideline for bidding purposes. OGS recognizes that the fire protection installer will perform hydraulic calculations and may revise system piping and head layout. All fire protection projects require shop drawing submission and approval.
6. At a minimum, fire protection drawings show a proposed piping layout, pipe sizes, locations of ancillary equipment such as alarm valves and devices, inspector and fire department connections, fire pumps, main drains, anti-freeze loops and hose cabinets. Sprinklers are shown in a pattern meeting all room coverage and requirements of NFPA.
7. Closely coordinate sprinkler locations with lights, HVAC outlets, architectural configurations, structural steel and ductwork. Coordinate location of alarm devices with the electrical designer.
8. Consideration is given to shutdown of existing systems; i.e. – plan is in place for continuous service, firewatch, etc. and local fire department is notified.



9. Confirm the location, type, thread of the fire department connection, post indicator valve and the stairway standpipe hose connection locations with the first responders.

J. PLUMBING DESIGN CHECKLIST

Drawing/Design Checklist:

Yes	No	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pipe chases are of adequate size?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fixtures are located where structural steel will not interfere with piping penetrations?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Structural steel locations is noted to determine best way to run piping systems?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Access is available for all cleanouts, valves and equipment?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chases with valves, flush valves, water hammer arrestors etc. are accessible?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Domestic water, waste, storm and fire protection services are shown to 5'-0" outside of building perimeter?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Service piping inverts are notes and coordinated with site designer?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Waste and storm piping have cleanouts per PCNYS?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All piping systems are sized?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All piping penetrations are labeled with size and direction?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All fixtures are shown and labeled?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Floor drains are labeled, sized and connected to waste system?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Floor drains are provided in all multiple user public bathrooms where appropriate?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Traps are shown on floor plans?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proper venting techniques are employed?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Individual fixtures are vented?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	House trap with fresh air intake is shown?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hose bibs are located and coordinated with site designer?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Secondary roof drain system is required?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All roof penetrations are shown and labeled? Vents are offset and increased one pipe size prior to penetrating roof?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fixtures are properly labeled and spaced?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Correct number of fixtures provided per BCNYS?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Vents connect to top half of waste piping?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Branch piping for domestic water piping is shown connecting to top half of main?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No bull head tees are used in domestic water piping system?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Recirculation system is designed per PCNYS?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Domestic hot water heaters are sized and shown on plans?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Required pads, floor drains and service spacing is available for domestic water heaters?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Type of domestic hot water heater is communicated to client?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Scalding protection is in place?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proper domestic hot water temperatures are used?

- | | | | |
|--------------------------|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Balancing valves are shown on recirculation piping? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | GPM is shown for each balancing valve? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Motor sizes are coordinated with electrical designer? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Water cooler or fountains are shown? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Emergency eyewash or showers are shown for hazardous areas? |
| Yes | No | N/A | |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Floor drains with a sanitary connection are provided for emergency showers? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Shut off valves are shown on each branch of the domestic water piping? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Key plan with work area and staging area if applicable is shown? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | North arrow is on all plans? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Piping does not run above or within code limits of electrical panels? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Roof drains are coordinated with Architect and properly sized? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Multiple fixtures are not shown as directly dropping down into main? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Connection to main is made by T-Wye and 90 ell combination up to fixture? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | All penetrations are located correctly on corresponding floor plans above and below? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | The word "new" is not used on drawings? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Stop valves and flush valves are shown on appropriate fixtures? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ADA handicapped symbols are shown for appropriate fixtures? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Appropriate areas or bathroom groups are shown on 1/4" scale details? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Cut lines are placed for all elevations? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Elevations are shown for all groups of two or more fixtures? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | All symbols and abbreviations are listed? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Details of equipment are shown? |

Removal Checklists:

- | | | | |
|--------------------------|--------------------------|--------------------------|--|
| Yes | No | N/A | |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Does phasing need to be set up or can the unit be replaced during off hours/seasons? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Sizes of large pipes or mains to be removed are shown? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Key Reference drawings are included? |

Coordination Checklist:

- | | | | |
|--------------------------|--------------------------|--------------------------|---|
| Yes | No | N/A | |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Coordinated with Electrical Engineer all electrical data and locations. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Coordinated with Structural Engineer all structural data and locations. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Coordinated with HVAC Engineer all HVAC data and locations. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Coordinated with Architect all visible PLUMBING locations. |

K. FIRE PROTECTION DESIGN CHECKLIST

- | | | | |
|--------------------------|--------------------------|--------------------------|---------------------------------|
| Yes | No | N/A | |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Hydraulic information is shown? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Hazard classification is shown? |

- | | | | |
|--------------------------|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | All rooms have sprinkler head coverage? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Inspectors test connection is located? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Main drain is shown and adequate floor drain is in place? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Sufficient main to street is shown to allow for hydraulic calculations? |
| Yes | No | N/A | |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Fire department connection is shown and coordinated with local authority? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Location, type and thread of standpipe stairway hose connections are coordinated with the first responders? <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Fire pump is located? On/Off pressure requirements are listed for jockey? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Alarm devices are located? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Alarm points coordinated with electrical designer? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Sprinkler head location coordinated with reflected ceiling plan? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Hose cabinets are located for proper coverage per NFPA? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | All symbols and abbreviations are listed? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Details of equipment are shown? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Hydraulic calculations and hydrant flow test information is complete and provided to the TL / PM for review? |

Removal Checklists:

- | | | | |
|--------------------------|--------------------------|--------------------------|--|
| Yes | No | N/A | |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Does phasing need to be set up or can the unit be replaced during off hours/seasons? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Sizes of large pipes or mains to be removed are shown? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Key Reference drawings are included? |

Coordination Checklist:

- | | | | |
|--------------------------|--------------------------|--------------------------|---|
| Yes | No | N/A | |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Coordinated with Electrical Engineer all electrical data and locations. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Coordinated with Structural Engineer all structural data and locations. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Coordinated with HVAC Engineer all HVAC data and locations. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Coordinated with Architect all visible PLUMBING locations. |

L. FIRE PUMP CHECKLIST

Drawing/Design Checklist:

- | | | | |
|--------------------------|--------------------------|--------------------------|---|
| Yes | No | N/A | |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Include flow rate (gpm) on the one-line diagram. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Are pump inlet/outlet size correct? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Is the equipment scheduled and included with the project documents? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Are the pump curves included in the project files? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Are the head pressure calculations included in the project documents? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Are all PLUMBING pumps located on floor plan? |

- Will isolation valves need to be installed for future maintenance and are they included in the project scope?
- Is there adequate space for the replacement and electrical equipment clearances?
- Are domestic hot water recirculation pumps of all bronze construction?

M. HOT WATER HEATER CHECKLIST

Drawing/Design Checklist:

- | Yes | No | N/A | |
|--------------------------|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Are the equipment room's code requirements up to date? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Has the designer chosen the optimum boiler for the application? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Do the plans include new housekeeping pads for the unit (if required)? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Are there permits required and if so are they noted on drawings or in project folders? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Is the equipment accessible via manufacturer specified clearances? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Is there adequate space for the replacement and electrical equipment? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Is the correct size of wire and starter used per contract? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Have all flow (gpm, velocity, and pressure drop) values for hot water and steam been noted on correct diagram? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Is the electrical scope of the boiler identified? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Will the unit require emergency power? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Do the documents include motor amperage and voltage? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Does the system include a valve for preventing backflow? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Are the correct pipe sizes and exhaust vents used per manufacture specification, building code and OGS specifications? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Are the temperature controls complete and points confirmed? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Is the piping supported independently of the boiler? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Has insulation been used per code? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Is the direction of the flow designated on the drawing with arrows? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Are all details completed, correct, and applicable on drawings? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Are notes for a special shut down drain of the system included if the current system does not have isolation valves? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Is there need for temporary boilers to be used during the current removal? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Will the provided unit require assembly (unable to install as one unit)? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Will isolation valves need to be installed for future maintenance and are they included in the project scope? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Schedule and drawings do not include specific product name, number or vendor? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Is an equipment schedule with specifications included? |

Removal Checklist:

- | Yes | No | N/A | |
|--------------------------|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Is disassembly of the current Boiler required for removal? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Are special installation and removal details noted on the drawings? |



- Are overhead and/or floor structures able to hold structures used in the removal and disposal of existing units?
- Does the removal scope include all pertinent information for fuel tank removal (if required)?
- Is the electrical scope identified for removing the boiler?
- Can the unit be replaced during off hours/seasons?
- Does the facility/client wish to retain any of the removed equipment?

Coordination Checklist:

- | Yes | No | N/A | |
|--------------------------|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Coordinated with Electrical Engineer all electrical data and locations including: motor control and emergency interlocks? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Coordinated with Structural Engineer all structural data and locations including: weights, housekeeping pads and inertia pads. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Coordinated with Plumbing Engineer all Plumbing data and locations including: floor drains, gas load, gas pressure and water makeup. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Coordinated sequence of operation and schedule with one-line diagram. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Coordinated all equipment, piping and structures with one-line diagram. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Coordinated with Fire Protection Engineer all fire protection data and locations. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Coordinated air intakes with discharges according to code. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Coordinated with Architect all visible PLUMBING locations. |

Revision History:

<i>Rev</i>	<i>Date</i>	<i>Description</i>	<i>Reviewed by:</i>	<i>Approved by:</i>
0	12/26/13	Initial issue	Esperti	Parnett