

Meeting Minutes: Plumbing Board

Date: July 21, 2020
Time: 9:30 a.m.
Minutes by: Lyndy Logan
Location: WebEx Event

Members

1. Richard Becker (Secretary)
2. Michael Dryke
3. Kent Erickson
4. Mike Herman (Vice Chair)
5. Rick Jacobs (Chair)
6. Natasha Lawrence
7. Troy Seitz
8. Scott Stewart
9. Cathy Tran (DLI Commissioner's Designee)
10. Rick Wahlen
11. David Weum (MDH Commissioner's Designee)

Members Absent

Justin Parizek

DLI Staff & Visitors

Suzanne Todnem (Gen. Counsel, DLI)
Lyndy Logan (DLI)
Brad Jensen (DLI)
Chad Payment (DLI)
Adam Hanson (ABC)
Bryan Miko (ADS)

DLI Staff & Visitors continued

Jeff Keogh (City of Chanhassen)
Gary Schick (City of Rochester)
Brad Siebenaler (Dunham)
Dan Weiss (Dunham)
Ryan Folin (Dunham)
Joel Hipp (Hobart)
Nick Erickson (Housing First)
Mike Johnson (J-Berd)
Larry Justin (KFI Engineers)
Stephanie Manning (MUCA)
Trevor Ogilvie (City of Mpls)
Jeff Hill (MWQA)
Scott Thompson (My Plumbing Training)
Gary Thaden (MMCA)
Trevor Sorensen (Prinsco)
Brian Soderholm (Water Control Corp)
Chris Soderholm (Soderholm & Assoc.)
Rich Davison (Soderholm & Assoc.)
Tom Pahkala (UA Plumbers Local 15)

1. Call to Order, Chair Presiding

- A. The meeting was called to order by Chair Jacobs at 9:31 a.m. Roll call was taken by the Secretary and a quorum was declared with 10 of 11 voting members, and one non-voting member, present via WebEx. The Chair welcomed new members Natasha Lawrence, Scott Stewart, Rich Wahlen, and Troy Seitz.
- B. The Chair made the following statement: Today's meeting is being held electronically via the WebEx format due to the current status of the State of Minnesota operating under the peacetime emergency due to the COVID-19 health pandemic. Per Minnesota Statutes, section 13D.021, electronic meetings are acceptable when holding an in-person meeting is "not practical or prudent because of a health pandemic or an emergency declared under Chapter 12." All votes will be taken by roll call.

2. Approval of meeting agenda

A motion was made by Herman, seconded by Becker, to approve the agenda as presented. The roll call vote was unanimous with 10 votes in favor; the motion carried.

3. Approval of previous meeting minutes

A motion was made by Becker, seconded by Herman, to approve the March 16, 2020, special meeting minutes as presented (April 21, 2020, meeting was cancelled due to COVID-19). The roll call vote was unanimous with 6 votes in favor and four abstention; the motion carried.

4. Regular Business

Approval of expense reports – Jacobs approved.

5. Committee Reports

A. Department Updates

- Tran stated that all plan review staff are working remotely, and contact information is available on the department's website.
- Todnem said the department resumed on-site testing and is following CDC guidelines.

B. Construction Codes Advisory Council (CCAC)

The CCAC has not met – no discussion.

6. Special Business

A. RFI PB0152 – Ryan Folin (Dunham Associates) and Brian Soderholm (Water Control Corporation) – see Attachment A (presentation) and B (RFI PB0152)

- Brian Soderholm, Water Control Corporation
- Rich Davison, Soderholm (under Water Control Corp umbrella)
- Ryan Folin, Dunham Associates (mechanical and electrical engineering)
- Dan Weiss, Dunham Associates

Brian Soderholm presented “RFI: Backflow Prevention Requirements on High-Purity Water Systems” – **Attachment A** – regarding the current 2015 Minnesota Plumbing Code, sections 602.2 Cross-Contamination, 602.3 Backflow Prevention, 603.1 General, 603.5.19 Pure Water Process Systems, and 603.5.19.1 Dialysis Water Systems – added for reference only, not part of their design. Soderholm summarized the Buffalo Hospital Sterilizer and DI Tank Replacement project and noted points of potential stagnation in the test cocks (highlighted in yellow) and pressure sensing line (highlighted in red), page 15, “Our Concerns” – **Attachment A**.

Jacobs asked Soderholm to present the Request for Interpretation – **Attachment B** – and provide a specific question for the Board to interpret.

Soderholm said his question is regarding backflow prevention on pure water systems, whether for healthcare or any other application: Is there a need to provide, beyond the initial code mandated containment of a pure water system, a requirement for additional backflow prevention downstream on individual fixtures or pieces of equipment that are on a pure water process system? They are already isolated and contained from the domestic water loop.

Soderholm said there are three relevant codes sections involved: section 602.2 addresses cross-contamination protection of domestic water supply, section 602.3 specifically addresses backflow prevention of the domestic water supply, and section 603.1 calls out the requirement for cross-connection control to be provided, either an air-gap or an RPZ approved device, to be provided to protect from cross-contamination of the domestic water supply. Do these clauses apply to pure water process systems or are they limited to the domestic water supply?

Todnem reminded Board members that they are to interpret code language when reviewing a Request for Interpretation, not make an enforcement decision.

The Chair asked the Board members to provide input or ask questions. Tran asked if the request for interpretation also included the other code sections mentioned and she asked if Soderholm's question is whether additional backflow preventers are required at connections downstream of the centralized pure water system that are already protected by the centralized system and if additional backflow preventers would be required at points of use. Soderholm said yes, this is another way of asking the question, and section 603.5.19 is the other clause Tran referred to, and he posed the question again – Is there additional backflow prevention required beyond what is called out in section 603.5.19. Tran said she doesn't think there is any dispute about the backflow prevention requirement at the entry to the centralized system and Soderholm said this is correct.

Tran said the department's standpoint is that typically backflow preventers are always required on ultrapure water systems at the point of entry because of the potential of corrosion and also at each sterilizer regardless if there is a centralized water purification system or backflow protection, as shown in Soderholm's presentation. The intent is to protect cross-connection from one unit (sterilizer) to the next or in this case to the faucet on the three-compartment sink. It appears Soderholm is asking if additional backflow protection is required downstream of the centralized system. Tran clarified the other code provision the department reviewed and enforced was section 602.2 Cross-Contamination and she said it requires protection at each point of use; therefore, the department's position is that because this is medical equipment, then it must be protected so there isn't cross-connection or contamination between devices (sterilizers). Tran added that this would also apply to pure water systems in a grocery store but may not be for manufacturing. Point of use backflow protection may be on a case-by-case situation depending on the application. The department's point of view section 603.5.19 is that protection is required at each point of use application or sterilizer or for backflow protection after the centralized pure water system. Tran asked Jensen if this is enforced by the department's inspectors and Jensen said yes, due to multiple points of use.

Tran said there is validity to Soderholm's concerns; however, the department has not seen any new studies in relation to water stagnation from point of use protection to justify clarification on administration of this provision. The department continues to require backflow preventers at each sterilizer.

The Chair said there has been discussion about dialysis equipment and different terms are being used – pure water process systems and RO (Reverse Osmosis) systems – and he asked that the Board fully understand the question(s) to be interpreted. The system Soderholm addresses does not have any dialysis equipment connected to it and Soderholm confirmed this. The Chair said it appears there are three devices – a sterilizer, a pass-through dish machine and a three-compartment sink, and the Board is still asking questions about which codes are in question and what the specific question is.

Ryan Folin said section 602.2 Cross-Contamination applies to any pipes or conduits carrying domestic water – would a pure water system be defined as domestic water and would this code apply? How do designers draw the line of what does and does not need to be protected since Tran mentioned that equipment in a grocery store wouldn't qualify but in a healthcare facility it would.

Further discussion from board members included concerns of water stagnation due to additional backflow devices downstream of the centralized pure water containment backflow protection creating opportunity for growth of bacteria, contamination between each medical equipment, and assurance of addressing proper backflow protection in relation to protection at point of use for potable water

applications such as food equipment versus nonpotable water application for medical equipment. The code is prescriptive on the protection requirement on pure water system for dialysis equipment from the potable water system, and therefore, this request is to address for other medical devices.

Weum asked if the question is “if the pure water system is not part of the domestic water supply, then must not meet the same cross-contamination requirements? Is this correct?” Soderholm said yes, this is the question they are trying to figure out.

The Board and Soderholm further discussed the exact question to be interpreted.

A motion was made by Becker, seconded by Herman, to authorize the Chair to post the question and answer to the RFI as shown below. The roll call vote was unanimous with 10 votes in favor of the Question and Answer; the motion passed.

- **RFI Question:**

Is additional backflow prevention required after the reduced-pressure principle backflow preventer required in section 603.5.19 for pure water process systems?

- **RFI Answer:**

It depends. After the reduced-pressure principle backflow preventer required in section 603.5.19, if the water from a pure water system is intended for potable use, point of use backflow prevention is required in section 602.2. After the reduced-pressure principle backflow preventer required in section 603.5.19, if the water is intended for non-potable use, then additional backflow prevention is not required at each point of use. Piping is required to be labeled as in section 601.2. All other code provisions still apply.

B. Board members can review/view Open Meeting Law and Data Practices videos on Dept. of Admin website: <https://mn.gov/admin/data-practices/news/events/webinars/>

C. [Review revised draft of possible proposed amendments to chapter 4714, proposed adoption of 2018 UPC with amendments](#)

Todnem reviewed minor changes, none were substantive, and said that in order to adopt the amendments as presented there would need to be 8 votes in favor.

A motion was made by Herman, seconded by Becker, to approve the rule draft as presented. The roll call vote was unanimous with 9 votes in favor; the motion carried (could not hear a response from Rick Wahlen).

D. Officer elections (Turn meeting over to Commissioner’s Designee)

a. Board Chair

Herman nominated Rick Jacobs. No other nominations were given. The roll call vote was unanimous with 10 votes in favor; the nomination passed. Jacobs was re-elected as Chair.

b. Board Vice Chair

Jacobs nominated Mike Herman. No other nominations were given. The roll call vote was unanimous with 10 votes in favor; the nomination passed. Herman was elected as Vice-Chair.

c. Board Secretary

Jacobs nominated Richard Becker as Secretary. No other nominations were given. The roll call vote was unanimous with 10 votes in favor; the nomination passed. Becker was elected as Secretary.

(Turn meeting over to Board Chair)

E. Committees and Committee appointments

The Chair appointed Mike Herman as the representative to the Construction Codes Advisory Council and Richard Becker was appointed as the alternate.

7. Complaints

Nothing to report.

8. Open Forum

Nothing to report.

9. Correspondence

The Chair received correspondence from an individual interested in obtaining his master license but there was a discrepancy with his [continuing education] hours. The Chair advised him to contact the department; the Board has no authority on continuing education discrepancies.

10. Board Discussion

None

11. Announcements

Next regularly scheduled meeting in 2020, 9:30 a.m., in-person or via WebEx TBD

- October 20, 2020

12. Adjournment

A motion was made by Herman, seconded by Becker, to adjourn the meeting at 2:17 p.m. The roll call vote was unanimous with 8 votes in favor of the motion; the motion passed (Natasha Lawrence and Rick Wahlen did not respond).

Respectfully submitted,

Richard Becker

Richard Becker, Board Secretary

MN Plumbing Board

RFI: Backflow Prevention Requirements on High-Purity Water Systems

7/21/2020

Submitted by Ryan Folin, Dunham Associates & Brian Soderholm, Water Control, Inc.

Common/Shared Goal of All Parties:

- **Protect the health of the public**

Thank you to DOLI Staff and to the Plumbing Board for helping us to clarify this issue.

Current Code Language

602.2 Cross-Contamination. Unless there is provided a backflow prevention device approved for the potential hazard and maintained in accordance with this code, no person shall make a connection or allow one to exist between pipes or conduits carrying **domestic water** supplied by a public or private building supply system, and (1) pipes, conduits, or fixtures containing or carrying water from any other source or containing or carrying water that has been used for any purpose whatsoever, or (2) any piping carrying chemicals, liquids, gases, or substances whatsoever. Each point of use shall be separately protected where potential cross-contamination of individual units exists.

Current Code Language

602.3 Backflow Prevention. No plumbing fixture, device, or construction shall be installed or maintained, or shall be connected to a **domestic water supply**, where such installation or connection provides a possibility of polluting such water supply or cross-connection between a distributing system of **water for drinking and domestic purposes** and water that becomes contaminated by such plumbing fixture, device, or construction unless there is provided a backflow prevention device approved for the potential hazard.

Current Code Language

603.1 General. Cross-connection control shall be provided in accordance with the provisions of this chapter.

No person shall install a water-operated equipment or mechanism, or use a water-treating chemical or substance, where it is found that such equipment, mechanism, chemical, or substance causes pollution or contamination of the **domestic water supply**. Such equipment or mechanism shall be permitted where equipped with an approved backflow prevention device or assembly.

Current Code Language

603.5.19 Pure Water Process Systems. The water supply to a **pure water process system**, such as dialysis water systems, semiconductor washing systems, and similar process piping systems, shall be protected from backpressure and backsiphonage by a reduced-pressure principle backflow preventer.

603.5.19.1 Dialysis Water Systems. The individual connections of the dialysis related equipment to the dialysis pure water system shall not require additional backflow prevention.

2020 Buffalo Hospital Sterilizer and DI Tank Replacement (Project Completed)

STERIS

AMSCO® 600 SERIES STEAM STERILIZERS
(HEALTHCARE) — NORTH AMERICA USE ONLY

APPLICATION

AMSCO 600 Series Steam Sterilizers are configured for prevacuum and gravity sterilization of heat and moisture-stable medical devices and their accessories used in healthcare facilities.

DESCRIPTION

AMSCO 600 Series Steam Sterilizers are equipped with the latest features in both state-of-the-art technology and ease of use. Sterilizer is designed to be completely serviced from the front of the sterilizer, minimizing the footprint.

Chamber sizes – AMSCO 600 medium steam sterilizers are available in three sizes, with interior chamber dimensions (W x H x L) and capacities as follows:

- 26.5 x 26.5 x 39" (673 x 673 x 990 mm); 450L
- 26.5 x 26.5 x 51" (673 x 673 x 1296 mm); 598L
- 26.5 x 26.5 x 63" (673 x 673 x 1600 mm); 724L

Clean steam-ready – All AMSCO 600 series sterilizers include a fully-jacketed chamber with stainless piping for steam delivery.

Vertical-sliding door(s) – Pneumatically-driven doors are operated from a button on the touch screen; and travel down vertically to open.

Control – includes a STERIS micro-processor based control system featuring a touch-sensitive screen. See pages 2 and 3 for details.

STANDARDS

Each AMSCO 600 sterilizer meets applicable requirements of the following listings and standards, and carries the appropriate symbols:

- **Underwriters Laboratory (UL) Standard 61010-1** as certified by Intertek (ETL Registered).
- **ASME Code, Section VIII, Division 1** for unfired pressure vessels. The pressure vessel is so stamped; ASME Form



AMSCO 600 Series Steam Sterilizer
(Typical - details may vary)

U-1 is furnished. The shell and door are constructed to withstand a working pressure of 45 psig (3.1 bar).

FEATURES

Chamber and Jacket

The AMSCO 600 series sterilizer chamber has a 26.5 x 26.5" (673 x 673 mm) cross section and is sized to allow for efficient high-volume processing of sterilization containers, trays and packs.

Fully jacketed chamber construction reduces internal condensation. The chamber is manufactured from AISI 316L stainless steel, as is the chamber door; and the full structural jacket is manufactured from AISI 304 stainless steel.

Pressure Vessel

All pressure vessels are designed and manufactured in accordance to the required pressure vessel standards. An identification nameplate is permanently mounted on each pressure vessel. Features include:

- Chamber steam baffle provides uniform steam distribution to the chamber.
- Chamber and jacket are provided with safety relief devices.



RPZ Valves Added to Individual Sterilizers per DOLI Concerns about RO Faucet Contamination

ES-SS009

For Health Hazard Applications

Job Name _____	Contractor _____
Job Location _____	Approval _____
Engineer _____	Contractor's P.O. No. _____
Approval _____	Representative _____

LEAD FREE*

Series SS009
Stainless Steel Reduced Pressure Zone Assemblies

Sizes: 1/2" - 1"

Series SS009QT Stainless Steel Reduced Pressure Zone Assemblies provide protection of the potable water supply in accordance with national plumbing codes and water authority requirements. Series SS009 can be used in a variety of health hazard installations whenever the downstream liquid is of a composition which may damage bronze material or it is desirable to eliminate trace elements of lead and copper. Typical applications are: industrial or plant use, medical/diagnostic equipment, reverse osmosis systems, carbonated beverage machines, breweries/distillers, paper and pulp industry, chemical plants and aggressive atmospheres. The SS009 series feature two in-line independent check valves, captured springs, replaceable check seats, corrosion resistant internal parts and a hydraulically operated differential pressure relief valve. All sizes are constructed with NPT body connections and are standardly furnished with vandal resistant Test Cocks. Series SS009QT's are furnished with 316 Stainless Steel, full port, investment cast, quarter turn ball valve shutoffs with 304 Stainless Steel tie handles.

Features

- Investment Cast 316 Stainless Steel Assembly for corrosion resistance
- All welded valve components - test cocks, ball valve shutoffs, pipe nipples, body and cover, check module and relief valve assembly are made from "Lead Free" Stainless Steel or Plastic construction
- Bolted on, top entry single access cover for ease of maintenance
- Modular check construction featuring nonwearable checks with captured springs for simplified servicing
- Top mounted vandal resistant test cocks provide easy access for testing
- True line sized check modules open further allowing dirt and debris to pass freely through the valve reducing fouling problems
- Check and Relief Valve Seats are replaceable without the use of special tools
- Internal relief valve for right and left hand installations

Specifications

A reduced pressure zone assembly shall be installed at each noted potential health hazard location to prevent backflow due to back-siphonage and/or backpressure. The assembly shall consist of an internal pressure differential relief valve located in a zone between two independently operating positive sealing check modules with captured springs and silicone seal discs. Seats and seal discs shall be replaceable in both check modules and the relief valve, without the use of special tools. There shall be no threads or screws, in the waterway, exposed to line fluids. Service of all internal components shall be through a single access cover secured with stainless steel bolts. The assembly shall include two resilient seated isolation valves, four top mounted vandal resistant test cocks with dust covers, a protective stainless steel wye strainer with a 20 mesh screen and an air gap fitting. The assembly shall consist of an investment cast 316 Stainless Steel body and cover with Series 300 Stainless Steel test cocks, 316 Stainless Steel Ball Valve Shutoffs with PTFE Seat blowout proof 304 Stainless Steel Stems, and 304 Stainless Steel Tee Handles. The assembly shall meet the requirements of ASSE Standard 1013, AWWA Standard C611. Assembly shall be a Watts Series SS009QT.

NOTICE

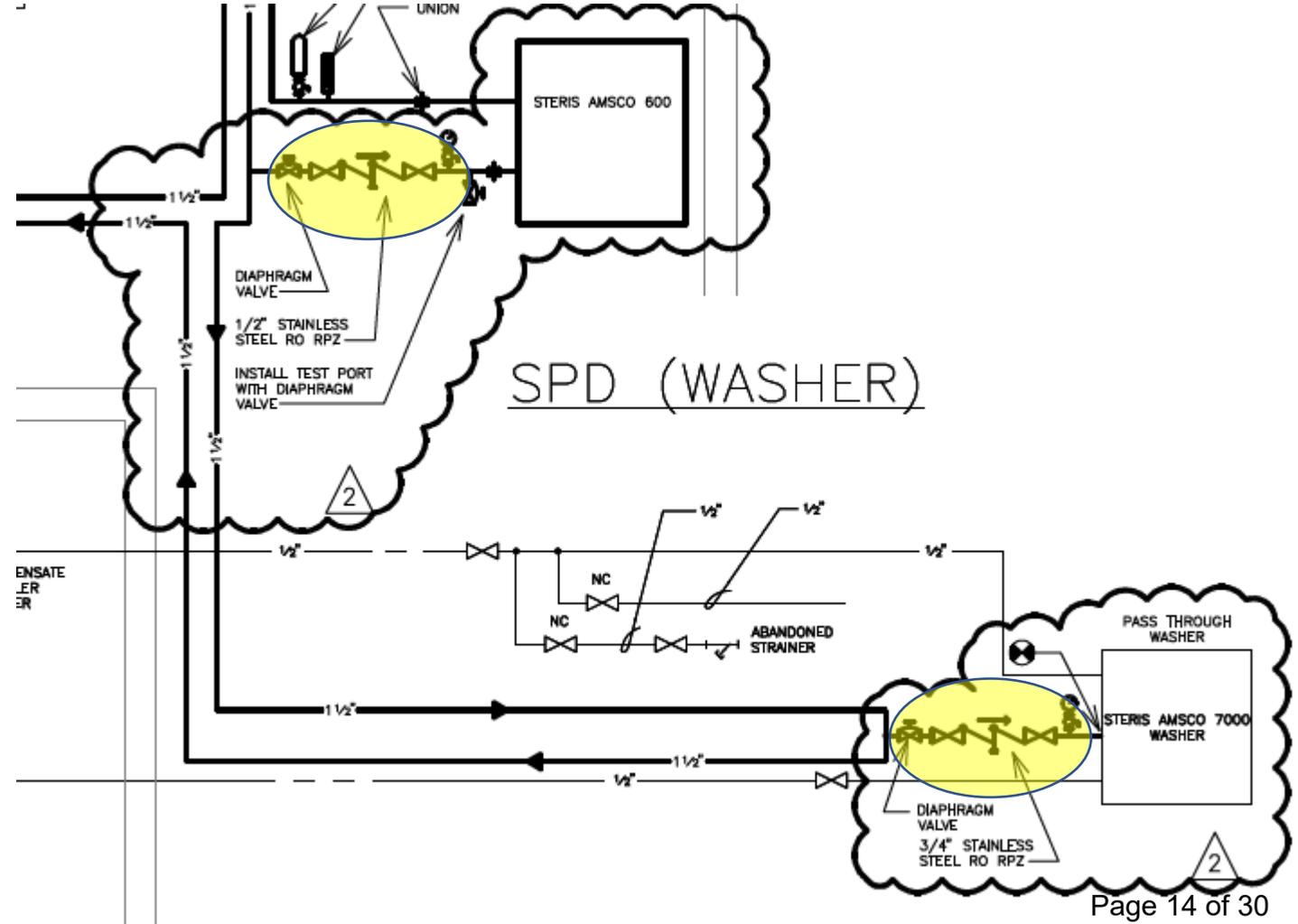
The information contained herein is not intended to replace the full product installation and safety information available or the experience of a trained product installer. You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product.

*The welded surface of this product contacted by consumable water contains less than 0.25% of lead by weight.

Now Available
WattsBox Insulated Enclosures.
For more information, send for literature ES-WB.

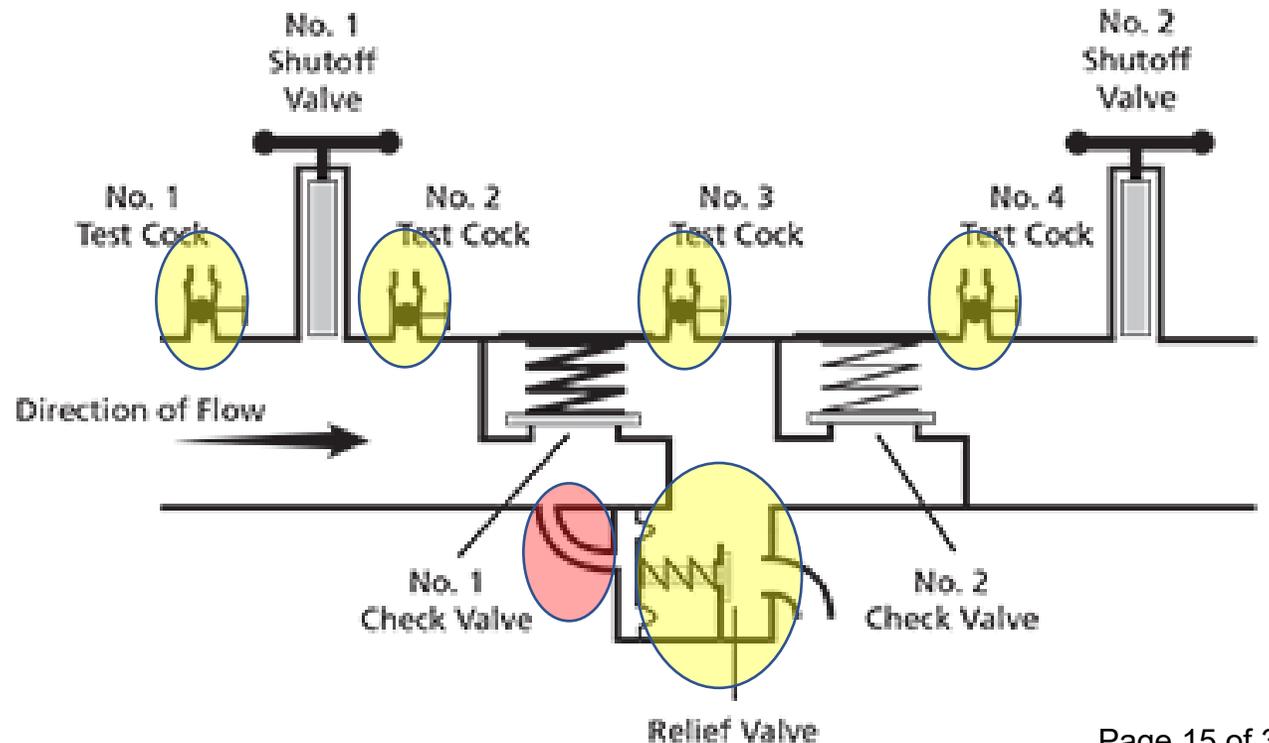
NOTICE
Inquire with governing authorities for local installation requirements

WATTS



Our Concerns:

- Stagnation of water inside RPZ valve test ports, **pressure sensing line**, relief valve
- Bacterial growth
- Endotoxin contamination



Questions for Plumbing Board

- Does an RPZ-contained Pure Water Process System fall under the same cross-contamination protection requirements as a Domestic water system?
- Is RPZ backflow (isolation) protection for the sterilizers warranted in this situation?
- If the RO faucet were not in the design, would RPZ backflow (Isolation) protection for the sterilizers still be warranted?
- How will this affect other school, laboratory, and industrial projects?
- Does this mean that all existing facilities will need to add RPZ's anytime they modify their high-purity water systems? (most facilities currently do NOT have RPZ's on individual pure water fixtures/equipment).

THANK YOU AGAIN FOR YOUR CONSIDERATION

Plumbing Board Request for Interpretation

Attachment B

PRINT IN INK or TYPE

NAME OF SUBMITTER

Rule(s) to be interpreted (e.g., 4714.0330)

The Minnesota Plumbing Code (MN Rules, Chapter 4714) is available at www.dli.mn.gov/CCLD/PlumbingCode.asp

Has a request for interpretation been submitted to Department of Labor and Industry (DLI) staff, either as a verbal request or a written request? Yes No

If "No," contact DLI staff at 651-284-5187. The DLI is responsible for administration and interpretation of the Minnesota Plumbing Code, and all requests must be processed and provided a DLI interpretation before being referred to the Plumbing Board. This form is intended to be used to request an interpretation from the Plumbing Board only as a resolution of dispute with DLI interpretation.

CODE/RULE to be interpreted:

NAME OF DLI employee gave interpretation:

DATE interpretation originally requested:

Provide a copy of the DLI interpretation with this request (a copy must be provided as reference).

Is there a local dispute with an Inspector of other official?

If Yes, state the name or type of official

Yes No

State the circumstances of the initial dispute:

Explain why you disagree with the interpretation given to you by DLI staff:

What is your interpretation of the language:

List any other information you would like the Board to consider:

Information regarding submitting this form:

- Submit any supporting documentation to be considered electronically to DLI.CCLDBOARDS@state.mn.us. Once your Request For Interpretation form has been received, it will be assigned a file number. Please reference this file number on any correspondence and supplemental submissions.

Information for presentation to the Board.

- You will be notified with the date of the Board Meeting in which your Request For Interpretation will be heard.
- Limit presentations to 5 minutes or less.
- Be prepared to answer questions regarding the Code, the circumstances that led to the dispute and please bring copies of any documentation.

What you can do if you disagree with the Board's determination:

- You may appeal the Board's determination pursuant to Minn. Stat. Chapter 14.

RFI File No. PB0152	Date Received by DLI 6.25.2020	Dated Received by Board	Date of Board Meeting 7.21.2020
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Title of RFI	By:
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This material can be made available in different forms, such as large print, Braille or on a tape. To request, call 1-800-342-5354 (DIAL-DLI) Voice or TDD (651) 297-4198.

Submitted by:

NAME		FIRM NAME	
ADDRESS		CITY	STATE ZIP CODE
PHONE	SIGNATURE (original or electronic)	DATE	

For assistance or questions on completing this form, please call 651-284-5898 or 651-284-5889.

Mailing address:

**Plumbing Board
c/o Department of Labor and Industry
443 Lafayette Road North
St. Paul, MN 55155-4344**

*** Please remember to attach all necessary explanations and supporting documentation*** Page 2 of 2

For Health Hazard Applications

Job Name _____

Contractor _____

Job Location _____

Approval _____

Engineer _____

Contractor's P.O. No. _____

Approval _____

Representative _____

LEAD FREE*

Series SS009 Stainless Steel Reduced Pressure Zone Assemblies

Sizes: ½" – 1"

Series SS009QT Stainless Steel Reduced Pressure Zone Assemblies provide protection of the potable water supply in accordance with national plumbing codes and water authority requirements. Series SS009 can be used in a variety of health hazard installations whenever the downstream liquid is of a composition which may damage bronze material or it is desirable to eliminate trace elements of lead and copper. Typical applications are: Industrial or plant use, medical/diagnostic equipment, reverse osmosis systems, carbonated beverage machines, breweries/distillers, paper and pulp industry, chemical plants and aggressive atmospheres. The SS009 series features two in-line independent check valves, captured springs, replaceable check seats, corrosion resistant internal parts and a hydraulically operated differential pressure relief valve. All sizes are constructed with NPT body connections and are standardly furnished with vandal resistant Test Cocks. Series SS009QT's are furnished with 316 Stainless Steel, full port, investment cast, quarter turn ball valve shutoffs with 304 Stainless Steel tee handles.

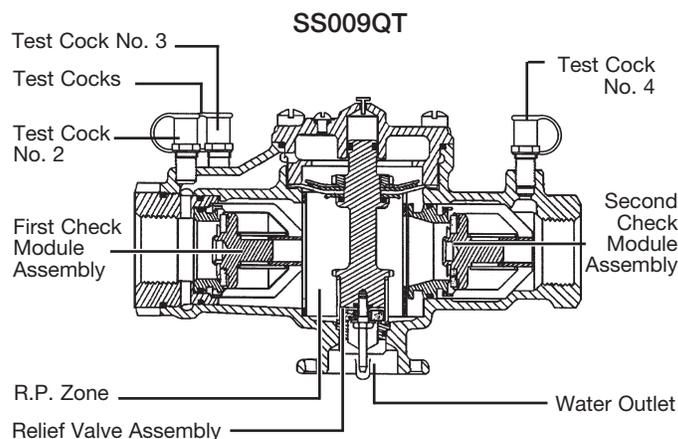
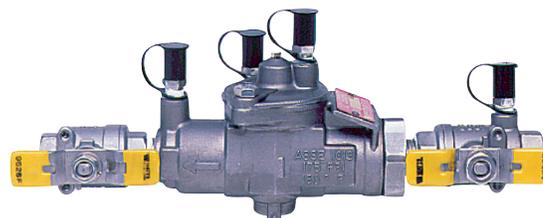
Features

- Investment Cast 316 Stainless Steel Assembly for corrosion resistance
- All wetted valve components — test cocks, ball valve shutoffs, pipe nipples, body and cover, check modules and relief valve assembly are made from "Lead Free" Stainless Steel or Plastic construction
- Bolted on, top entry single access cover for ease of maintenance
- Modular check construction featuring nonreversible checks with captured springs for simplified servicing
- Top mounted vandal resistant test cocks provide easy access for testing
- True line sized check modules open further allowing dirt and debris to pass freely through the valve reducing fouling problems
- Check and Relief Valve Seats are replaceable without the use of special tools
- Internal relief valve for right and left hand installations

NOTICE

The information contained herein is not intended to replace the full product installation and safety information available or the experience of a trained product installer. You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product.

*The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.



Specifications

A reduced pressure zone assembly shall be installed at each noted potential health hazard location to prevent backflow due to back-siphonage and/or backpressure. The assembly shall consist of an internal pressure differential relief valve located in a zone between two independently operating positive seating check modules with captured springs and silicone seat discs. Seats and seat discs shall be replaceable in both check modules and the relief valve, without the use of special tools. There shall be no threads or screws, in the waterway, exposed to line fluids. Service of all internal components shall be through a single access cover secured with stainless steel bolts. The assembly shall include two resilient seated isolation valves, four top mounted vandal resistant test cocks with dust covers, a protective stainless steel wye strainer with a 20 mesh screen and an air gap fitting. The assembly shall consist of an investment cast 316 Stainless Steel body and cover with Series 300 Stainless Steel test cocks, 316 Stainless Steel Ball Valve Shutoffs with PTFE Seat blowout proof 304 Stainless Steel Stems, and 304 Stainless Steel Tee Handles. The assembly shall meet the requirements of ASSE Standard 1013, AWWA Standard C511. Assembly shall be a Watts Series SS009QT.

Now Available WattsBox Insulated Enclosures.

For more information, send for literature ES-WB.

NOTICE

Inquire with governing authorities for local installation requirements

Watts product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Watts Technical Service. Watts reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Watts products previously or subsequently sold.



Available Models

Suffix:

QT – quarter-turn ball valves

S – stainless steel strainer

Note: The installation of a drain line is recommended. When installing a drain line, an air gap is necessary (see ES-AG/EL/TC).

Materials

Body: 316 stainless steel

Disc and Relief Valve: Silicone rubber

Check Seats: Replaceable polymer

Relief Valve Seat: Removable Relief valve seats

Cover Bolts: Stainless steel

Pressure – Temperature

Temperature Range: 33°F – 180°F (0.5°C – 82°C) continuous

Maximum Working Pressure: 175psi (12.1 bar)

Standards

USC Manual 9th Edition

AWWA C511-92

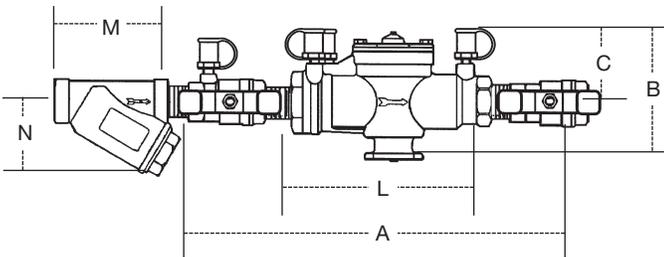


Approvals

ASSE, AWWA, USC

CSA – ½" and ¾" horizontal

Dimensions – Weight



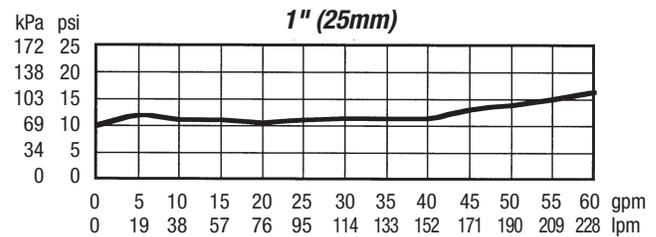
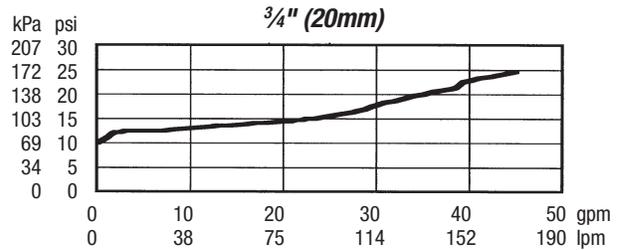
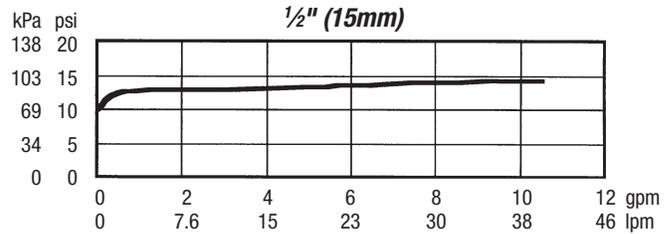
Capacity

MODEL	SIZE	DIMENSIONS (APPROX.)										WEIGHT					
		A		B		C		L		M		N		Width		lbs.	kgs.
	in.	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		
SS009M3QT	½	10	250	4⅝	117	3⅞	86	5½	140	–	–	–	–	5	127	4.50	2.0
SS009M3QT	¾	10¾	273	5	127	3½	89	6¾	171	–	–	–	–	6¼	159	5.75	2.6
SS009QT	1	16¾	425	5½	140	3	76	9½	241	–	–	–	–	8¼	210	12.25	5.6
SS009M3QT-S	½	10	250	6	150	3⅞	86	5½	140	3⅛	97	2⅝	67	5	127	7.25	3.3
SS009M3QT-S	¾	10¾	273	6¼	159	3½	89	6¾	171	4⅞	111	3⅛	81	6¼	159	9.25	4.2
SS009QT-S	1	16¾	425	7¾	197	3	76	9½	241	5⅛	132	¾	95	8¼	210	17.00	7.7



Performance as established by an independent testing laboratory.

*Typical maximum system flow rate (7.5 feet/sec.)



March 5, 2020

Dunham Associates Inc.
50 S 6th St.
Minneapolis, MN 55402

Gentlemen/Ladies:

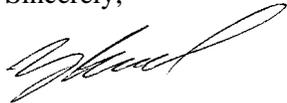
Subject: **REQUEST FOR ADDITIONAL INFORMATION** regarding plumbing at Buffalo Sterilizer Replacement, 303 Catlin St., Buffalo, Wright County, Minnesota, Plan No. PB-R2002-0138

We are NOT able to grant approval at this time of the plans and specifications submitted for the above-designated project. The following comment(s) outline the changes and/or additional information that must be submitted so that we can further evaluate the plans and specifications for compliance with the standards of this department:

1. The three-compartment sink RO outlet appears to be downstream of the RPZ within the contamination of a cross-connection due to supply connection to the medical washer(s) (see Section 603.1). Please revise the plans to show the three-compartment sink outlet not in-line with the cross-connection of the washers.
2. The supply connection to each individual medical washer or other such sterilant processing equipment shall be protected by an air gap or reduced pressure principle backflow preventer (see Section 603.1 and Table 603.2). Each individual equipment must be protected and may not share a non-potable line or have cross-connections downstream of the RPZ as the backflow from one equipment may contaminate another. Please revise the plans which now show multiple such washers with cross-connections downstream of the RPZs.

Please submit the requested information promptly so we may complete our plan review. No plumbing installation related to the above-referenced plans shall begin until approval is provided by our office. When submitting additional information, please refer to Plan No. PB-R2002-0138.

Sincerely,



Zachary D. Barnaal
Public Health Engineer
Plumbing Plan Review and Inspections Unit
651/284-5888
Zachary.Barnaal@state.mn.us

cc: Todd Geske, Building Official
Allina c/o John Lockstad
File

Division of Construction Codes and Licensing
REPORT ON PLUMBING PLANS

PROJECT: Buffalo Sterilizer Replacement, 303 Catlin St., Buffalo, Wright County, Minnesota
Plan No. PB-R2002-0138

OWNERSHIP: Allina c/o John Lockstad, 303 Catlin St., Buffalo, MN 55313
SUBMITTER: Dunham Associates Inc., 50 S 6th St., Minneapolis, MN 55402

Plans Dated: February 14, 2020; Revisions Dated: March 5, 2020
Initial Date Received: February 18, 2020
Last Date Received: March 5, 2020
Date Approved: March 5, 2020

This review is limited to the provisions of the Minnesota Plumbing Code, Minnesota Rules, Chapter 4714 and assumes the data on which the design is based are correct. Approval is contingent upon meeting the requirements listed below. **A copy of the approved plans and this report must be retained at the project location.**

INSPECTIONS: The Minnesota Department of Labor and Industry (DLI) will be inspecting the plumbing for this project. Please contact Charles Olson at 651/308-0786 for all plumbing inspections. No plumbing work may be covered prior to inspection. The installer must verify that the required inspection fee has been submitted before scheduling. For additional information, visit our website at: <http://www.dli.mn.gov/business/plumbing-contractors/plumbing-inspections>

REQUIREMENT(S):

1. All plumbing shall be installed in accordance with the 2015 Minnesota Plumbing Code, Chapter 4714. Unless prior authorization is granted by this office, all pipe, pipe fittings, traps, fixtures, material, and devices used in the plumbing system shall meet Sections 301.1 and 1401.1 and:
 - a. Be listed or labeled (third party certified) by a listing agency;
 - b. Comply with the approved applicable recognized standards referenced in this code;
 - c. Be free from defects.
2. Verify that the existing water supply and waste systems are sized for the added fixtures and equipment (see Sections 610.7 through 610.12 and 703.0).
3. Potable and nonpotable water distribution systems and outlets must be identified per Section 601.2.
4. All sanitary drainage pipe within the building must be installed with a uniform slope of at least ¼-inch per foot (see Section 708.1). Where the conditions preclude this slope, pipes 4-inch and larger may be sloped at ⅛-inch per foot if approved by this office, in accordance with Table 703.2.
5. Indirect waste pipes 5 to 15 feet in length from appliances, devices, or equipment not regularly classed as plumbing fixtures, but which are equipped with drainage outlets, must be trapped, but the traps need not be vented (see Section 803.1). Traps on indirect wastes longer than 15 feet must be vented and such vents may not combine with sewer-connected vents. Indirect wastes less than 15 feet in length may not be smaller than the equipment outlet or ½-inch, whichever is larger.
6. Stills, sterilizers, and similar equipment used for sterile materials must drain by air gap to a receptor located in the same room (see Sections 801.5 and 806.1).

7. Unions shall be installed not more than 12 inches from water heating or regulating equipment, water conditioning tanks, and similar equipment requiring service by removal or replacement (see Section 609.5).
8. Readily accessible isolation valves installed by a licensed plumber are required for all water conditioning installations. Water conditioning contractors may not install isolation valves, pipes larger than 2-inch, or any connection to the existing drainage system without an air gap (see Minnesota Statutes, Chapter 326B.50).
9. Water conditioning equipment including the reverse osmosis system must discharge to the drainage system by an air gap per Table 603.3.1, or an air gap device per Table 603.2, NSF 58, or IAPMO PS 65 (see Section 611.2 and Sections 801.4). The receptor must be individually vented.
10. Tubing used in water conditioning installations must comply with NSF Standard 14, 42, 44, 53, 55, 58, 62, or the appropriate material standard in Table 1401.1 (see Section 611.3). All materials used in potable water systems must meet the requirements of NSF 61 (see Section 604.1). Pipe and fittings with lead content must not exceed 0.25 percent lead in the wetted surface material (see Section 604.11). Solder and flux shall contain less than 0.2 percent lead. Joints must use ASTM B813 non-corrosive non-toxic paste-type flux (see Section 605.3.4).
11. Cast iron drain, waste, and vent pipe must comply with ASTM A74, CISPI 301, or ASTM A888 (see Table 701.1, Section 701.1(6), and Installation Standard 6). Hubless pipe and fittings shall be marked with country of origin, identification of the original manufacturer, and markings required by referenced standards.
12. Pipe hangers and supports shall comply with Section 313.0, Table 313.1, and the installation standard.
13. Each horizontal drain branch, including the floor sink branches, shall be provided with a cleanout at its upper terminal (see Section 707.4). A cleanout is not required if the drain branch line is less than five feet, unless it serves sinks or urinals. A cleanout is not required on a drain that is within 72 degrees from the vertical. A cleanout should be provided where new waste and vent piping connects with existing for testing.
14. The plumbing system shall be tested in accordance with Sections 609.4 and 712.0.
15. The water distribution system shall be disinfected per Section 609.9.

NOTE(S):

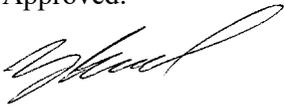
1. The scope of this project includes remodeling an existing building. The plumbing installation includes water conditioning equipment with an RO system, a floor sink, a new medical sterilizer and connections to existing medical sterilizers each with backflow prevention of an RPZ.
2. The building is served by existing municipal sewer and water services.
3. The installation of reduced pressure principle assemblies, double check valve assemblies, pressure vacuum breakers, or spill-proof vacuum breakers is permitted only when a testing and inspection program acceptable to the administrative authority is provided (see Section 603.5.23). The administrative authority and water purveyor must be notified prior to installation. Devices must be tested upon initial installation and not less than annually, and records must be kept. Installations must be at least 12 inches and not more than 5 feet above the finished floor or ground level unless a permanent platform for access is provided. Potable and nonpotable water distribution systems and outlets must be identified per Section 601.2. A backflow prevention fact sheet may be viewed at: http://www.dli.mn.gov/sites/default/files/pdf/fs_backflow.pdf

Buffalo Sterilizer Replacement
Plumbing
Plan No. PB-R2002-0138
Page 3 of 3
March 5, 2020

4. **Prior to the start of any construction, complete plans and specifications must be approved by the Minnesota Department of Health (MDH), Division of Compliance Monitoring.** Please visit for information necessary for plan review and licensing:
<https://www.health.state.mn.us/facilities/regulation/engineering/index.html>
Any changes to the plumbing system must be approved by this office prior to installation.

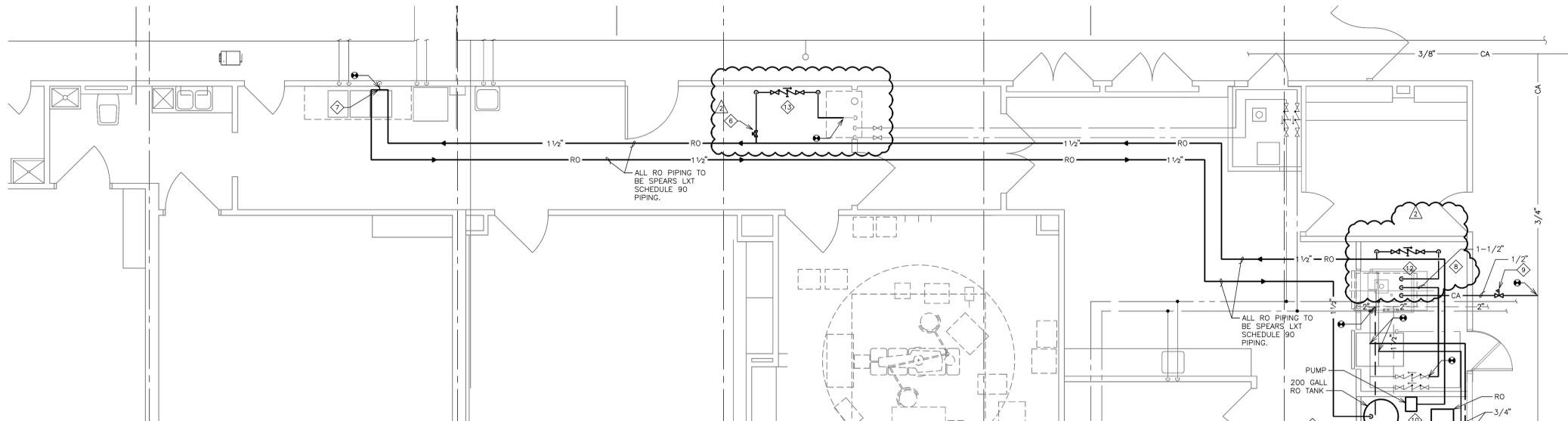
Authorization may be withdrawn if installation does not begin within one year. Additional requirements may result from changed conditions or additional information.

Approved:

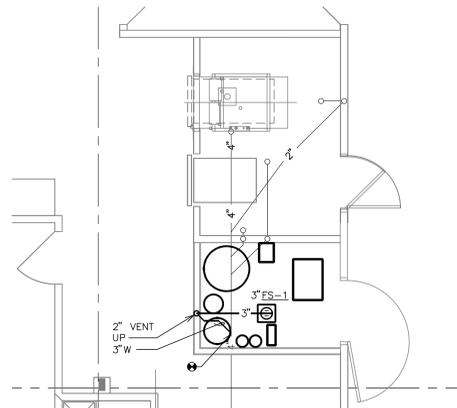


Zachary D. Barnaal
Public Health Engineer
Plumbing Plan Review and Inspections Unit
651/284-5888
Zachary.Barnaal@state.mn.us

cc: Dunham Associates Inc.
Allina c/o John Lockstad
Todd Geske, Building Official
File



1 FIRST LEVEL PLUMBING PLAN
1/4" = 1'-0"



2 UNDER FLOOR PLUMBING PLAN
1/4" = 1'-0"

DEPARTMENT OF LABOR AND INDUSTRY
THIS PLAN REVIEWED FOR COMPLIANCE WITH THE MINNESOTA PLUMBING CODE, CHAPTER 4714.
DATE APPROVED: 03/05/20
PLAN REVIEW NO. PB-R2002-0138
REFER TO THE REPORT ISSUED BY THIS DEPARTMENT FOR ADDITIONAL REQUIREMENTS.

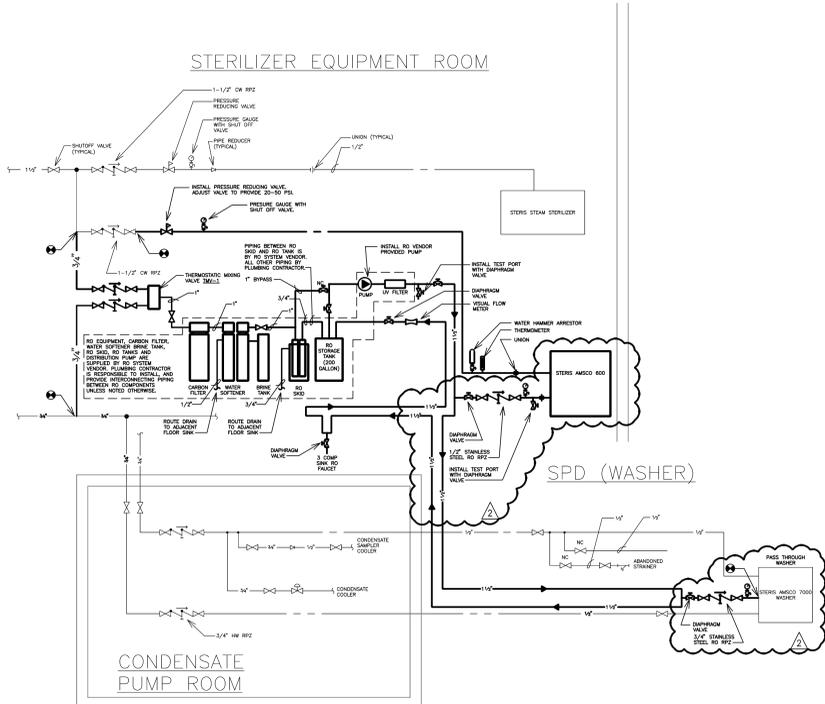
- GENERAL NOTES:**
- PROVIDE LABELS ON CEILING GRID SUPPORT BELOW ALL DOMESTIC WATER VALVES. LABEL TO BE CLEAR WITH BLACK LETTERING AND FONT TO MATCH HEATING VALVE LABELS. LABELS TO MATCH VALVE SCHEDULE.
 - PLUMBING CONTRACTOR TO VERIFY RATINGS OF ALL WALLS WITH ARCHITECTURAL DRAWINGS AND SEAL PIPE PENETRATIONS TO MATCH WALL RATINGS.
 - PLUMBING CONTRACTOR WILL BE RESPONSIBLE TO REVIEW ACCESSIBILITY TO AREAS OUTSIDE THE CONSTRUCTION LIMITS TO DETERMINE APPROXIMATE AMOUNT OF OVERTIME REQUIRED TO PERFORM ALL MECHANICAL WORK INDICATED. COORDINATION OF SCHEDULES WITH ADJACENT DEPARTMENTS AND CLEANING OF ALL DEBRIS AFTER EACH WORK SHIFT SHOULD BE ASSUMED IN THE BASE BID SCOPE.
 - ALL OUTAGES INDICATED ON THESE DRAWINGS SHALL BE SCHEDULED TO BE PERFORMED AFTER NORMAL BUSINESS HOURS OR DURING WEEKEND PERIODS TO MINIMIZE DISRUPTION. FACILITIES WILL REQUIRE A MINIMUM OF TWO (2) WEEKS NOTICE PRIOR TO ANY SUCH OUTAGE AFFECTING MORE THAN ON ADJACENT FLOOR.
 - THE EXACT LOCATION OF EQUIPMENT ROUGH-INS SHALL BE VERIFIED WITH THE STAMPED APPROVED SHOP DRAWINGS PRIOR TO ANY FIELD INSTALLATION. SUPPORT ALL PIPING DIRECTLY TO STRUCTURE.
 - DO NOT SUPPORT ANY PIPING FROM DUCTWORK, CONDUIT OR OTHER PIPING ENCOUNTERED.
 - WHERE MECHANICAL SYSTEMS TO REMAIN ARE DAMAGED OR DISTURBED DURING THE COURSE OF CONSTRUCTION, THE CONTRACTOR WILL BE RESPONSIBLE TO REMOVE DAMAGED PORTIONS AND INSTALL NEW PRODUCTS OF EQUAL QUALITY AND FUNCTIONALITY.
 - ALL EXISTING PIPING THROUGH NEW FIRE RATED WALLS SHALL BE ADEQUATELY FIRE SEALED AS REQUIRED.
 - ALL CORE DRILLING OR ANY ACTIVITIES CAUSING EXTREME VIBRATION OR NOISE SHALL BE COORDINATED TO BE PERFORMED AFTER BUSINESS HOURS TO NOT AFFECT CRITICAL HOSPITAL FUNCTIONS WITHIN ADJACENT AREAS. COORDINATE WITH FACILITIES REPRESENTATIVE AS REQUIRED.
 - THE PLUMBING CONTRACTOR SHALL MAINTAIN ACCURATE RECORD DRAWINGS SHOWING ALL DISCREPANCIES WITH ANY EXISTING PIPING INDICATED OR REVISIONS TO THE NEW PLUMBING LAYOUTS. ALL CHANGES WILL BE UPDATED WITHIN THE FINAL RECORD DRAWING SET. ALL WALL CLEANOUTS TO BE INSTALLED 18" AFF UNLESS NOTED OTHERWISE.
 - FIRE PROTECTION CONTRACTOR TO PROVIDE FIRE PROTECTION COVERAGE TO COMPLY WITH CURRENT IBC AND NFPA 13 FOR A FULLY SPRINKLERED BUILDING.
 - FIRE PROTECTION CONTRACTOR SHALL COORDINATE PIPING ROUTING AND SPRINKLER HEAD LAYOUT.
 - THE FIRE PROTECTION CONTRACTOR WILL BE RESPONSIBLE FOR ANY GENERAL CONSTRUCTION WORK AS DIRECTLY IMPACTED BY THE SPRINKLER SYSTEM INSTALLATION. EXAMPLES OF WORK DIRECTLY TIED INTO THE FIRE PROTECTION CONTRACTORS WORK WOULD INCLUDE, BUT NOT LIMITED TO: FIRE SEALING OF ALL RATED WALL PENETRATIONS, CEILING ACCESS PANELS, ETC.
 - COORDINATE ALL NEW SPRINKLER PIPE ROUTING WITH OTHER TRADES TO INSURE ADEQUATE CLEARANCES FOR DUCTWORK, ELECTRICAL CONDUIT, STRUCTURAL SUPPORTS, PIPING, ETC. ANY UNAVOIDABLE CONFLICTS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER OF RECORD. PROVIDE ALL OFFSETS AND TRANSITIONS AS REQUIRED FOR A CLEAN INSTALLATION. ADDITIONAL COMPENSATION WILL NOT BE REWARDED DUE TO LACK OF COORDINATION WITH OTHER SUBCONTRACTORS.
 - SUPPORT ALL PIPING DIRECTLY TO STRUCTURE. DO NOT SUPPORT ANY PIPING FROM DUCTWORK, CONDUIT OR OTHER PIPING ENCOUNTERED. ALL PIPING ROUTED THROUGH FIRE RATED WALLS/FLOORS SHALL BE ADEQUATELY FIRE SEALED AS REQUIRED TO MAINTAIN THE LISTED WALL/FLOOR RATING.
 - ALL NEW SPRINKLER HEADS SHALL BE INSTALLED AT THE CENTER OF ALL LAY-IN CEILING TILES. COORDINATE WITH CEILING SUBCONTRACTOR AS REQUIRED.
 - THE FIRE PROTECTION CONTRACTOR WILL BE RESPONSIBLE TO COORDINATE AND PERFORM ALL TESTING OF PIPING SYSTEMS IN ACCORDANCE WITH NFPA GUIDELINES. UPON COMPLETION OF WORK, SUBMIT FINAL TESTING REPORT TO THE LOCAL AUTHORITY HAVING JURISDICTION, ENGINEER, INSURANCE UNDERWRITER AND OWNER UPON COMPLETION.

- KEY NOTES:**
- INSTALL 3/4" COLD WATER RPZ ON UNISTRUT ON WALL. ROUTE DRAIN TO ADJACENT FLOOR SINK WITH AIR GAP.
 - INSTALL 3/4" HOT WATER RPS ON UNISTRUT ON WALL. ROUTE DRAIN TO ADJACENT FLOOR SINK WITH AIR GAP.
 - INSTALL THERMOSTATIC MIXING VALVE ON WALL.
 - INSTALL FLOOR SINK. COORDINATE LOCATION WITH FINAL RO EQUIPMENT LOCATIONS.
 - SEE 3/P101 FOR RO SYSTEM PIPING.
 - 3/4" RO TO PASS THROUGH WASHER.
 - ROUTE 1-1/2" RO LOOP DOWN IN WALL TO FAUCET. 3/4" TAP OFF OF RO LOOP TO FAUCET CONNECTION.
 - ROUTE SAFETY RELIEF VALVES FROM CHAMBER, JACKET, AND ELECTRIC STEAM GENERATOR THROUGH ROOF.
 - INSTALL PRESSURE REDUCING VALVE. REDUCE COMPRESSED AIR TO 100 PSI.
 - INSTALL NEW UPRIGHT HEAD IN RO ROOM. MODIFY EXISTING BRANCH PIPING AS REQUIRED FOR NEW ROOM LAYOUT.
 - RELOCATE HEAD LOCATIONS AS REQUIRED FOR NEW ROOM LAYOUT. MODIFY EXISTING BRANCH PIPING AS REQUIRED. ALL RELOCATED HEADS TO BE NEW. MATCH EXISTING HEAD RESPONSE TIME AND MOUNTING TYPE. NEW HEAD LOCATIONS TO BE LOCATED IN CENTER OF CEILING TILE.
 - INSTALL 1/2" RO STAINLESS STEEL RPZ ON WALL. ROUTE RPZ DRAIN TO ADJACENT FLOOR SINK.
 - INSTALL 3/4" RO STAINLESS STEEL RPZ ON WALL. ROUTE RPZ DRAIN TO ADJACENT FLOOR SINK.

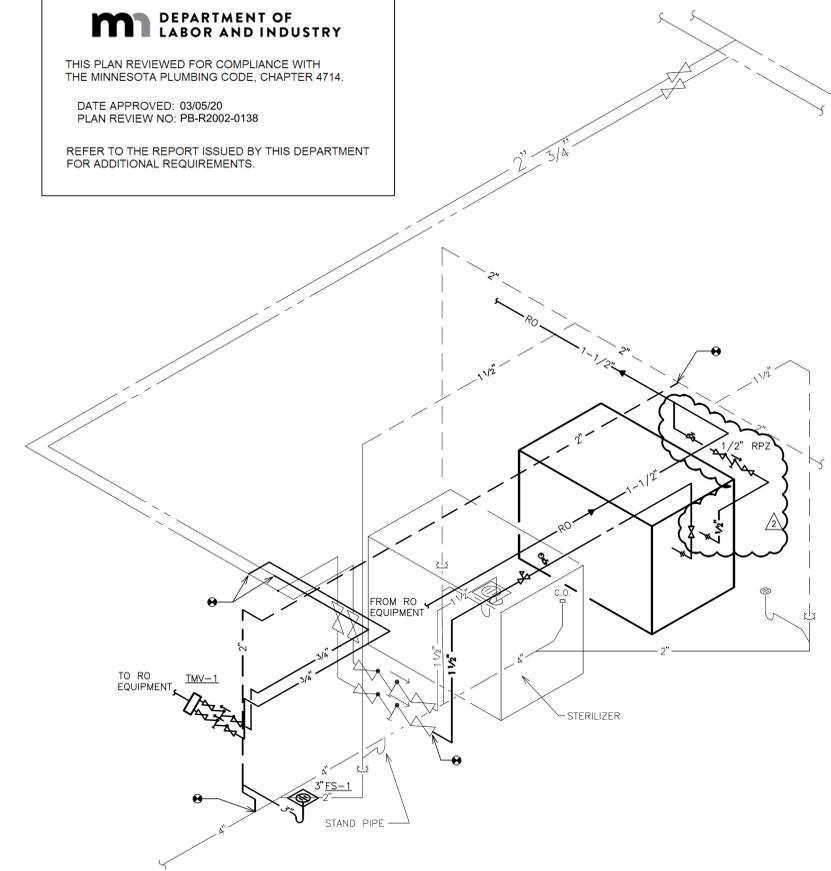
FLOOR SINK SCHEDULE
MECHANICAL (221319)

EQUIPMENT TAG	SIZE (IN)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
FS-1	SEE PLAN	JOSAM	49300	1

MECHANICAL NOTES:
1. PROVIDE 1/2" GRATE TOP.



3 PLUMBING FLOW DIAGRAM
NO SCALE



4 PLUMBING RISER DIAGRAM
NO SCALE

THERMOSTATIC MIXING VALVE SCHEDULE
MECHANICAL (224500)

EQUIPMENT TAG	MINIMUM FLOW (GPM)	MAXIMUM FLOW (GPM)	COLD WATER BYPASS AT MAXIMUM FLOW (PSI)	INLET TEMPERATURE (F)	OUTLET TEMPERATURE (F)	CW INLET (IN)	HW INLET (IN)	OUTLET (IN)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES	
TMV-1	3	10	10	5	120	77	3/4"	3/4"	1"	WATTS	LFMM431	

MECHANICAL NOTES:
1.

STERILIZER EQUIPMENT UTILITY SCHEDULE

EQUIPMENT	QUANTITY	DOMESTIC COLD WATER		COMPRESSED AIR		RO WATER	
		FLOW (GPM)	PRESSURE RANGE (PSI)	FLOW (SCFM)	PRESSURE RANGE (PSIG)	FLOW (GPM)	PRESSURE RANGE (PSI)
AMSCO 600 SERIES STEAM STERILIZER - 1251V-1	1	12	20-50	3 SCFM	80-100	5.4 GAL/CYCLE	-

POPE ARCHITECTS
POPE ARCHITECTS, INC.
1295 BANDANA BLVD N, SUITE 200
ST. PAUL, MN 55108-2735
(651) 642-9200 | FAX (651) 642-1101
www.popearch.com

Alina Health
BUFFALO HOSPITAL

BUFFALO STERILIZER REPLACEMENT
303 CATLIN STREET
BUFFALO, MN 55313

DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550
FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
DUNHAM: 0420600-059-00

UNDERFLOOR AND FIRST LEVEL PLUMBING PLANS

Issues and Revisions:

NO.	DESCRIPTION	DATE
1	CD ISSUE	02/14/2020
2	PR 01	03/05/2020

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.
RYAN J. FOLIN
Date: 02/14/2020 Lic. No: 54.305

Commission No: 27531-20013
Drawn by: RFOLIN
Checked by: DMAY

SHEET
P101
TRUE SHEET SCALE
Page 26 of 30

BUFFALO STERILIZER REPLACEMENT

303 CATLIN STREET
 BUFFALO, MN 55313



DUNHAM
 50 South Sixth Street / Suite 1100
 Minneapolis, Minnesota 55402-1540
 PHONE 612.465.7550
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 WEB dunhameng.com
 mechanical + electrical
 consulting engineering
 DUNHAM: 0420600-059-00

MECHANICAL TITLE SHEET

Issues and Revisions:
 1 CD ISSUE 02/14/2020

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Ryan J. Folin
 RYAN J. FOLIN
 Date: 02/14/2020 Lic. No: 54.305

Commission No: 27531-20013
 Drawn by: RFOLIN
 Checked by: DMAY

SHEET

M000

SHEET INDEX	
M000	MECHANICAL TITLE SHEET
P100	FIRST LEVEL PLUMBING DEMOLITION PLANS
P101	UNDERFLOOR AND FIRST LEVEL PLUMBING PLANS
M100	FIRST LEVEL MECHANICAL PLANS
M200	MECHANICAL SPECIFICATIONS

FIRE PROTECTION	
F	FIRE PROTECTION
DFP	FIRE PROTECTION (DRY SYSTEM)
PIV	POST INDICATOR VALVE (PIV)
SHV	FIRE HYDRANT WITH SHUTOFF VALVE
EDVC	RECESSED FIRE DEPT CABINET
EDVC	SURFACE MTD FIRE DEPT CABINET
FR	FIRE PROTECTION RISER
US	UPRIGHT SPRINKLER HEAD W/GUARD
US	PENDANT SPRINKLER HEAD
US	UPRIGHT SPRINKLER HEAD
SS	SIDEWALL SPRINKLER HEAD
BS	BUTTERFLY VALVE W/TAMPER SWITCH
DC	DETECTOR CHECK W/BYPASS METER
GF	GRADE FIRE DEPT CONNECTION
FL	FLUSH FIRE DEPT CONNECTION
FDV	FIRE DEPT VALVE W/CAP AND CHAIN
BS	O. S. & Y VALVE W/ TAMPER SWITCH
DPV	DRYPIPE VALVE
PRV	PREACTION VALVE

MECHANICAL SYMBOLS LEGEND		
PLUMBING	PLUMBING/PIPING	DUCTWORK
<ul style="list-style-type: none"> AV ACID VENT - BELOW GRADE AV ACID VENT - ABOVE GRADE AW ACID WASTE - BELOW GRADE AW ACID WASTE - ABOVE GRADE DI DEIONIZED WATER DC DOMESTIC COLD WATER DC DOMESTIC HOT WATER 180 DOMESTIC HOT WATER (TEMP. INDICATED) DC DOMESTIC RECIRCULATING HOT WATER HARD HARD COLD WATER NPCW NON-POTABLE COLD WATER NPHW NON-POTABLE HOT WATER OSD OVERFLOW STORM DRAIN - BELOW GRADE OSD OVERFLOW STORM DRAIN - ABOVE GRADE RO REVERSE OSMOSIS WATER V SANITARY VENT - BELOW GRADE V SANITARY VENT - ABOVE GRADE W SANITARY WASTE - BELOW GRADE W SANITARY WASTE - ABOVE GRADE SDT SOIL DRAINAGE TILE SOFT SOFTENED COLD WATER (SCW) SHW SOFTENED HOT WATER TW TEMPERED WATER SD STORM DRAIN - BELOW GRADE SD STORM DRAIN - ABOVE GRADE WW WELL WATER EXISTING PLUMBING TO REMAIN EXISTING PLUMBING TO REMOVED 	<ul style="list-style-type: none"> ELBOW DOWN CLEANOUT PIPE CAP ELBOW UP TEE, OUTLET UP TEE, OUTLET DOWN CONNECTION, BOTTOM CONNECTION, TOP ECCENTRIC REDUCER CONCENTRIC REDUCER FLEXIBLE CONNECTION EXPANSION JOINT PIPE ANCHOR ALIGNMENT GUIDE CHECK VALVE SHUTOFF VALVE PLUG VALVE COMBINATION BALANCE VALVE AND AND FLOW METER STRAINER STRAINER W/BLOWDOWN VALVE AND CAP PRESSURE REDUCING VALVE (SETTING AS NOTED, PSI) AUTOMATIC CONTROL VALVE, 2-WAY AUTOMATIC CONTROL VALVE, 3-WAY AUTOMATIC AIR VENT MANUAL AIR VENT PRESSURE RELIEF/SAFETY VALVE (SETTING AS NOTED, PSI) DRAIN VALVE BALL VALVE BUTTERFLY VALVE DIAPHRAGM VALVE GLOBE ANGLE VALVE O. S. & Y. VALVE REDUCED PRESSURE ZONE BACKFLOW PREVENTER SOLENOID VALVE FLOW LIMITING VALVE REFRIGERANT SIGHT GLASS GLOBE VALVE GAS PRESSURE REGULATOR VALVE BACKWATER VALVE REFRIGERANT DRYER FLOW DIRECTION FLOW DIRECTION WITH PITCH DUPLEX STRAINER PIPE UNION PIPE FLANGE PUMP PRESSURE GAUGE W/ PIGTAIL & PETCOCK THERMOMETER PRESSURE/TEMPERATURE TEST PORT STEAM TRAP (TYPE INDICATED) FLOW MEASURING STATION (FLOW INDICATED) GPM FLOW SWITCH PS PRESSURE SWITCH SHOCK ABSORBER ELBOW TEE FLOOR DRAIN FLOOR SINK WH WALL HYDRANT HB HOSE BIBB FLOOR CLEANOUT GRADE CLEANOUT WALL CLEANOUT CEILING CLEANOUT GAS COCK VALVE ROOF DRAIN DRAIN ABOVE CATCH BASIN MANHOLE 	<ul style="list-style-type: none"> SUPPLY AIR RETURN AIR EXHAUST AIR STANDARD BRANCH, NO SPLITTER - SUPPLY FLOW TO RIGHT - RETURN/EXHAUST FLOW TO LEFT BELLMOUTH WITH BALANCING DAMPER FLEXIBLE DUCT TURNING VANES FLEXIBLE CONNECTION MANUAL VOLUME DAMPER MOTORIZED DAMPER FIRE DAMPER & ACCESS PANEL SMOKE DAMPER & ACCESS PANEL COMBINATION FIRE/SMOKE DAMPER & ACCESS PANEL SUPPLY GRILLE OR REGISTER RETURN OR EXHAUST GRILLE OR REGISTER SUPPLY DUCT UP, POSITIVE PRESSURE RETURN DUCT UP, NEGATIVE PRESSURE EXHAUST DUCT UP, NEGATIVE PRESSURE SUPPLY DUCT DOWN, POSITIVE PRESSURE RETURN DUCT DOWN, NEGATIVE PRESSURE EXHAUST DUCT DOWN, NEGATIVE PRESSURE SUPPLY DIFFUSER/REGISTER BLANKOFF INDICATED DARK RETURN GRILLE/REGISTER EXHAUST GRILLE/REGISTER LINEAR DIFFUSER CONCENTRIC DUCT TRANSITION ECCENTRIC DUCT TRANSITION DUCT CONSTRUCTION PRESSURE CLASSIFICATION (INCHES WATER AS NOTED) "N" INDICATES NEGATIVE PRESSURE RECTANGULAR-TO-ROUND DUCT TRANSITION EXISTING DUCT TO REMAIN EXISTING DUCT TO BE REMOVED SUPPLY TROFFER VAV BOX VAV BOX W/ REHEAT COIL REHEAT COIL DUCT OFFSETS
MECHANICAL PIPING		
<ul style="list-style-type: none"> BF BOILER FEED CWS CHILLED WATER SUPPLY CWR CHILLED WATER RETURN 10#A COMPRESSED AIR (PSI INDICATED) CD CONDENSATE DRAIN CS CONDENSER WATER SUPPLY CR CONDENSER WATER RETURN FOS FUEL OIL SUPPLY FOR FUEL OIL RETURN FOV FUEL OIL VENT FOF FUEL OIL FILL GS GLYCOL SUPPLY GR GLYCOL RETURN HRS HEAT RECOVERY SUPPLY HRR HEAT RECOVERY RETURN HWS HEATING WATER SUPPLY HWR HEATING WATER RETURN LV LABORATORY VACUUM LA LABORATORY AIR LPG LIQUIFIED PETROLEUM GAS 2#G NATURAL GAS (PSI INDICATED) PV PLANT VACUUM PC PUMPED CONDENSATE RADS RADIATION WATER SUPPLY RADR RADIATION WATER RETURN RL REFRIGERANT LIQUID RS REFRIGERANT SUCTION RHG REFRIGERANT HOT GAS BYPASS RHS REHEAT WATER SUPPLY RHR REHEAT WATER RETURN RRS REMOTE RADIATOR SUPPLY RRR REMOTE RADIATOR RETURN SHWS SECONDARY HEATING WATER SUPPLY SHWR SECONDARY HEATING WATER RETURN SMS SNOW MELT SUPPLY SMR SNOW MELT RETURN 10#STM STEAM SUPPLY (PSI INDICATED) 10#R STEAM RETURN (PSI INDICATED) EXISTING PIPING TO REMAIN EXISTING PIPING TO REMOVED 		
MEDICAL		
<ul style="list-style-type: none"> MV MEDICAL VACUUM WAGD WASTE ANESTHETIC GAS DISPOSAL CO2 CARBON DIOXIDE O OXYGEN N NITROGEN N2O NITROUS OXIDE MA MEDICAL AIR 		
CONTROLS		
<ul style="list-style-type: none"> AQUA STAT HUMIDISTAT OR SPACE R.H. SENSOR REFRIGERANT SENSOR SMOKE DETECTOR SPACE TEMPERATURE SENSOR STATIC PRESSURE SENSOR THERMOSTAT THERMOSTAT W/GUARD TAMPER PROOF THERMOSTAT CARBON MONOXIDE SENSOR 		
	ANNOTATION	
	<ul style="list-style-type: none"> QUANTITY TYPE SIZE CFM DETAIL NUMBER SHEET NUMBER SECTION NUMBER SHEET NUMBER EQUIPMENT DESIGNATION EQUIPMENT NUMBER POINT OF CONNECTION, NEW TO EXISTING POINT OF DISCONNECTION 	

MECHANICAL ABBREVIATIONS			
AD	AREA DRAIN	INSUL	INSULATION
A.F.F.	ABOVE FINISHED FLOOR	INV	INVERT
AFMS	AIR FLOW MEASURING STATION	KW	KILOWATT
AHU	AIR HANDLING UNIT	LAT	LEAVING AIR TEMPERATURE
ANB	ACID NEUTRALIZING BASIN	LAV	LAVATORY
AP	ACCESS PANEL	LWT	LEAVING WATER TEMPERATURE
ARCH	ARCHITECT	MBH	BTU PER HOUR (THOUSANDS)
AS	AIR SEPARATOR	MCF	THOUSAND CUBIC FEET
BD	BUTTERFLY DAMPER	MH	MANHOLE
B/G	BELOW GRADE	NC	NOISE CRITERIA OR NORMALLY CLOSED
BTU	BRITISH THERMAL UNIT	NEG	NEGATIVE
BWV	BACKWATER VALVE	NIC	NOT IN CONTRACT
CCF	HUNDRED CUBIC FEET	NO	NORMALLY OPEN
CFH	CUBIC FEET PER HOUR	NTS	NOT TO SCALE
CFM	CUBIC FEET PER MINUTE	OA	OUTSIDE AIR
CL	CENTER LINE	OB	OPPOSED BLADE DAMPER
CLG	CEILING	ORD	OVERFLOW ROOF DRAIN
CO	CLEAN OUT	PD	PRESSURE DROP OR DIFFERENCE
CONTR	CONTRACTOR	PE	PNEUMATIC-ELECTRIC
CONV	CONVECTOR	PLBG	PLUMBING
CUH	CABINET UNIT HEATER	PRV	PRESSURE REDUCING VALVE OR POWER ROOF VENTILATOR
CW	COLD WATER	PSIA	POUNDS/SQ INCH ABSOLUTE
DB	DECIBEL	PSIG	POUNDS/SQ INCH GAUGE
DF	DRINKING FOUNTAIN	PVC	POLY VINYL CHLORIDE
DIA	DIAMETER	RA	RETURN AIR
DIFF	DIFFUSER	RCP	REINFORCED CONCRETE PIPE
DISCH	DISCHARGE	RD	ROOF DRAIN
DMPR	DAMPER	RECIRC	RECIRCULATING
DN	DOWN	REG	REGISTER
DR	DRAIN	RET	RETURN
DS	DOWNSPOUT	RH	RELATIVE HUMIDITY
DWG	DRAWING	RHT	REHEAT
EAT	ENTERING AIR TEMPERATURE	RHC	REHEAT COIL
EDR	EQUIVALENT DIRECT RADIATION	RHW	RECIRCULATED HOT WATER
EP	ELECTRIC-PNEUMATIC	RM	ROOM
EWC	ELECTRIC WATER COOLER	RP	REVOLUTIONS PER MINUTE
EWT	ENTERING WATER TEMPERATURE	RPZ	REDUCED ZONE BACKFLOW PREVENTER
EXH	EXHAUST	SA	SUPPLY AIR
EXP	EXPANSION	SAN	SANITARY
F	FAHRENHEIT	SCFM	CFM, STANDARD CONDITIONS
FC	FAN COIL	SD	SMOKE DAMPER
FCO	FLOOR CLEAN OUT	SP	STATIC PRESSURE
FD	FIRE DAMPER OR FLOOR DRAIN	SPECS	SPECIFICATIONS
FHC	FIRE HOSE CABINET	SUP	SUPPLY
FHR	FIRE HOSE RACK	SQ	SQUARE
FLR	FLOOR	STM	STEAM
FLEX	FLEXIBLE	TD	TEMPERATURE DIFFERENCE
FM	FIRE MAIN	TEMP	TEMPERATURE
FBM	FEET PER MINUTE	TONS	TONS OF REFRIGERATION
FPS	FEET PER SECOND	T-STAT	THERMOSTAT
FT	FEET OR FOOT	TYP	TYPICAL
F&T	FLOAT AND THERMOSTATIC	UB	UP-BLAST
FTG	FOOTING	UG	UNDERGROUND
FTR	FINNED TUBE RADIATION	UH	UNIT HEATER
FV	FACE VELOCITY	UR	URINAL
GA	GAUGE	V	SANITARY VENT
GAL	GALLON	VAV	VARIABLE AIR VOLUME
GPH	GALLONS PER HOUR	VD	VOLUME DAMPER
GPM	GALLONS PER MINUTE	VEL	VELOCITY
GR	GRILLE	VFD	VARIABLE FREQUENCY DRIVE
HB	HOSE BIBB	VOL	VOLUME
HD	HEAD	W	SANITARY WASTE
HOA	HANDS-OFF-AUTOMATIC	W/	WITH
HTG	HEATING	W/O	WITHOUT
HTR	HEATER	WC	WATER CLOSET
HVAC	HEATING, VENTILATING AND AIR CONDITIONING	WCO	WALL CLEAN OUT
HYD	HYDRANT	WH	WALL HYDRANT
HW	HOT WATER	WTR	WATER
GCO	GRADE CLEANOUT		

FIRE PROTECTION, PLUMBING AND HEATING, VENTILATION AND AIR CONDITIONING

PART 1 - GENERAL CONDITIONS

- 1.1 Scope of Work
 - A. The General, Special, and Other Conditions of the Architectural, Mechanical and Vendor documents shall be considered an integral part of these Mechanical Specifications.
 - B. Reference to "Contractor" in this specification shall mean "Mechanical Contractor (MC)", unless otherwise noted. Work specified herein is the responsibility of the Mechanical Contractor unless specifically noted otherwise.
 - C. Furnish labor, materials, equipment, tools, and other items necessary for, or incidental to, installation of a complete mechanical system as required for this project.
 - D. Also include other work and miscellaneous equipment not specifically mentioned, but reasonably inferred, that are required for a fully functional and tested system.
- 1.2 Drawings and Documents
 - A. The Drawings and Specifications form a complete set of plans for the mechanical work for this project. What is required by either shall be as binding as if required by both. In the event the Drawings and Specifications are in conflict, the greater quantity, quality and cost shall be included in bid, or if time permits, a clarification will be issued.
 - B. Bidders shall examine other trade and equipment Vendor Drawings and Specifications to avoid omissions, duplications, and to insure complete installation of mechanical work.
 - C. The Mechanical Drawings are diagrammatic and are intended to show approximate location only. Placement of mechanical equipment and devices shall not interfere with locations or clearances of other trades' materials or equipment. Coordinate the placement of mechanical devices with architectural plans, elevations and details.
 - D. The direct routing of ductwork and piping is not assured. Exact requirements shall be governed by the conditions of the project site. Extra lengths of ductwork, piping and associated elbows, etc., necessitated by such conditions, shall be included in the Bid.
- 1.3 Conditions at the Site
 - A. Examine the site and be familiar with existing building conditions and limitations prior to submitting bid. No extra payment will be allowed for work required because of these conditions, or if information is visible or readily attainable, for any limitation or misunderstanding of existing conditions.
 - B. Any discrepancies from these documents should be reported to the Architect/Engineer prior to bid.
- 1.4 Job Site Safety
 - A. The Mechanical Contractor is responsible for mechanical job site safety, including safety of workers and property during performance of work. This requirement will apply continuously and not be limited to normal working hours.
 - B. No act, drawing review or construction review by the Owner, the Engineers or their Consultants, is intended to include review of the adequacy of the Contractor's safety measures in, on, or near the construction site.

PART 2 - GENERAL REQUIREMENTS

- 2.1 Codes, Inspections, and Fees
 - A. The completed mechanical installation shall comply with the latest edition of all applicable Federal, State, and Local Codes, Regulations, and standards including interpretations by appropriate Authorities Having Jurisdiction. Where the Drawings and Specifications call for workmanship or materials in excess of code or regulatory requirements, the Drawings and Specifications shall govern.
 - B. The work specified herein shall be subject to inspection and approval by State and Local Authorities Having Jurisdiction and the Engineer. The Contractor shall make the necessary arrangements to have the mechanical work inspected by appropriate inspector(s) and shall provide two (2) copies of final signed "Certificate of Inspection" to the Owner.
 - C. Obtain and pay for licenses, permits, fees and charges for work installed by the Contractor. Contractor is responsible to pay fees and charges levied by the Utility Company for connection to mechanical services.
- 2.2 Workmanship and Contractor Qualifications
 - A. Install mechanical equipment and materials in a neat and workmanlike manner by persons experienced and skilled in the trade. Haphazard or poor installation will be cause for rejection of work. Exposed components of the mechanical systems shall be square and true with building lines and surfaces.
 - B. Contractor shall be licensed in the state in which the project is located.
- 2.3 Coordination of Work
 - A. Give careful consideration to the work of the General, Mechanical and Other Contractors/Subcontractors on the project. Organize and phase the mechanical work so that it will not interfere with the work of other trades.
 - B. Drawings and Specifications for other trades and general construction drawings shall be consulted for coordination information, details, dimensions, etc. Coordinate shafts, chases, furred spaces, suspended ceiling, locations of equipment, etc.
 - C. The location of equipment roughing shall be verified with the actual equipment or approved Shop Drawings prior to any rough in work. Notify Engineer of any discrepancies.
 - D. Dimensions given on the Drawings shall take precedence over scaled dimensions. Dimensions, when called for or scaled, shall be verified in the field.
 - E. Check actual job conditions before fabricating work. Coordinate with other trades to avoid rework due to field conditions. Changes or additions, subject to additional compensation, which are made without written authorization and an agreed price, shall be at the Contractor's risk and expense.
 - F. Furnish the Owner with a written guarantee of parts and labor for the period of one (1) year against the failure of any part of the mechanical systems installed due to faulty material or workmanship, without any charges, to the Owner. Guarantee period to start upon substantial completion or as specified under general and special conditions.
 - G. Verify items such as door swings, window locations, casework, etc., before installing any mechanical equipment or devices.
 - H. Make minor adjustments to work where requested by the Owner or the Owner's representative when adjustments are necessary for proper operation and within the intent of the contract.

PART 3 - GENERAL PRODUCTS

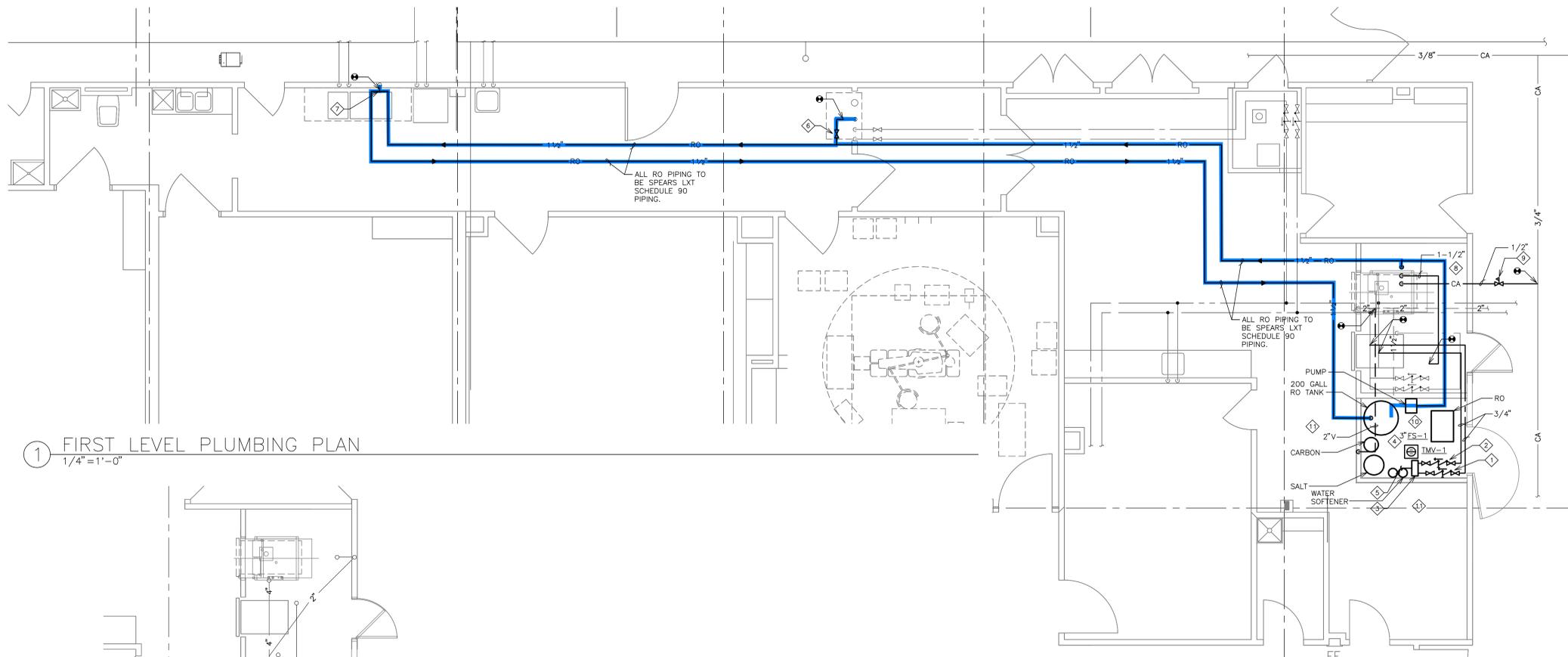
- 3.1 210517, 220517 and 230517 Sleeves
 - A. Provide sleeves at all floor, wall or partition flush with the surface except sleeve through the floor shall extend 2" above the floor.
 - B. Sleeves in finishing and masonry walls, floors and partitions shall be standard weight steel pipe beared with smooth edges. All other sleeves shall be a minimum 22 gauge galvanized steel.
- 3.2 210518, 220518 AND 230518 Escutcheons
 - A. Install escutcheon at all penetrations of walls and ceilings.
 - B. Install with ID to closely fit around pipe, tube and insulation and that OD completely covers the opening.
 - C. Provide the following escutcheon type:
 - 1. New Piping in Unfinished Spaces; One piece cast brass type with polished chrome finish.
 - 2. New Piping in Unfinished Spaces; One piece cast brass or split casting brass type with polished chrome plated finish.
 - 3. Existing Piping in Remodeled Spaces; One piece stamped steel type or split plate, stamped steel type with concealed hinge or split plate, stamped steel type with exposed rivet hinge. All polished chrome finishes.
- 3.3 211313, 220519, 230519 Meters and Gauges
 - A. Thermometers
 - 1. As a minimum install thermometers readable from the floor at inlet of each water circuit with references to type designations or other identifiers noted on Drawings.
 - 2. Submit to the Engineer shall be via the General Contractor and, where required, the Architect. Do not submit incomplete shop drawings. Shop Drawings that are incomplete or not signed by both the Contractor and the General Contractor shall be returned without review.
 - B. Cross out any information or options not being provided or does not apply to the project. Failure to do so assumes that equipment, options and accessories shown in the Shop Drawing submit are included.
 - C. If the Contractor uses materials other than those specified the Contractor shall be responsible for replacement, at no additional cost to the Owner.
 - D. Provide approval stamp on the Shop Drawings does not relieve the Contractor or the supplier of responsibility for full contract compliance.
- 2.6 Maintenance Manual and Record Drawings
 - A. Furnish the Owner with a minimum of two (2) printed copies and two (2) digital data DVD's of a manual covering the operation and maintenance of equipment provided under this contract. Submit additional copies as required by the General Contractor. The manuals shall be in a 3-ring, loose leaf, heavy duty binder and submitted to the Architect/Engineer for approval. Each manual shall contain the following:
 - 1. Complete manufacturer catalog data, manufacturer's literature, wiring diagrams, control/ diagnostic, sequence of operations, piped system diagrams, detailed operating instructions, and a complete listing of suppliers and distributors where replacement parts and maintenance services are available for installed equipment. Include all mechanical shop drawings.
 - 2. Physical description and installation instructions, user's manual and operating instructions.
 - 3. Replaceable parts list.
 - 4. Inspection certificates, signed by the appropriate inspector.
 - 5. Full listing of product warranties and extended warranties with registration and contact information.
 - 6. Data DVD with indexed PDF documents of all items in the manual.
 - B. Mark up a set of construction documents as work progresses. Show actual routing with dimensioned information, locations of concealed pipes, valves or ducts, sizes, types,

- k. Ring Stainless Steel.
 - 1. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.
 - 4. Scale Range:
 - a. Compressed air: 0-200 psi.
 - b. Domestic Water: 0-100 psi.
- C. Test Plugs: Test station made for insertion into piping by fitting.
 - 1. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units with insulated piping.
 - 2. Thread Size: NPS 1/4 or NPS 1/2 ASME #10.0 pipe thread.
 - 3. Minimum Pressure and Temperature: 500 psig at 200 deg. F.
 - 4. Core Inserts: EPDM self-sealing rubber.
 - 5. Furnish one test plug kit containing thermometer, pressure gauge and adaptor with metal or plastic carrying case. Small bimetallic insertion type, 2 inch diameter dia. tapered end sensing element with 0 to 220 deg. F range; small, Bourdon tube insertion type, 3 inch diameter dial and probe with 0 to 200 psig range.
- 3.4 211313, 220523, 230523 Plumbing and HVAC Common Requirements
 - A. See individual fire protection, plumbing and HVAC sections for specific valve requirements.
 - B. Examine all valve components for corrosion, cleanliness, full movement, flange faces and all components for proper condition. Replace all defective valves.
 - C. Locate valves for easy access and provide separate support where required.
 - D. Locate valves in horizontal position with stem at or above center of pipe.
 - E. Install valves in position to allow full stem movement.
 - F. Install swing check valves in horizontal position with hinge pin level.
 - G. Install valves with unions or flanges at each piece of equipment to allow service, maintenance and equipment removal without system shutdown.
- 3.5 220529, 230529 Hangers and Supports
 - A. See 211312 for Hanger and Support requirements for Natural Gas systems.
 - B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - a. Pressure Rating: 175 psig minimum.
 - b. Closures: AWWA C606 and UL 213, rigid pattern for steel pipe dimensions. Include ferrous housing sections, EPDM rubber gasket, nuts and bolts.
 - C. Pipe Schedule:
 - 1. Sizes 3" and Smaller: Schedule 40, black steel with threaded ends; uncoated gray-iron threaded fittings and threaded joints.
 - 2. Sizes 4" and Larger: Schedule 10, black steel with roll grooved ends, uncoated, grooved end fittings for steel pipe; grooved end couplings for steel pipe; and grooved joints.
 - D. Comply with MSS SP-69 for pipe hanger selection and applications.
 - E. Hangers shall be fastened to building steel, concrete or masonry. Hangers must be attached to the upper support of bar joists. Piping and ductwork is not to be supported from other piping or ductwork. Hanging from metal deck is not permitted.
 - F. Where interferences occur, and in order to support ductwork or piping, the contractor must install trapeze type hangers or supports which shall be located where they do not interfere with access to fire dampers, valves and other equipment.
 - G. Provide copper clad hangers and supports for hangers and supports in direct contact with copper piping.
 - H. Hangers for all insulated piping shall be sized and installed for the outer diameter of insulation. Install 6" long split circle galvanized saddle between pipe insulation and hanger.
 - I. Provide copper clad hangers and supports for hangers and supports in direct contact with copper piping. Hangers and piping of dissimilar metals shall be die-electrically separated from one another.
 - J. Install hangers for cast iron hubless piping with the following spacing and minimum rod sizes:
 - 1. Spacing:
 - a. All pipe sizes: support at every other joint, unless over 4-feet, then support at each joint.
 - 2. Rod Sizes:
 - a. NPS 1 1/2 and 2: 3/8 inch, minimum.
 - b. NPS 3: 1/2 inch, minimum.
 - K. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:
 - 1. NPS 3/4 and Smaller: Maximum span, 60 inches; minimum rod size, 3/8 inch.
 - 2. NPS 1 and 1 1/4: Maximum span, 72 inches; minimum rod size, 3/8 inch.
 - 3. NPS 1 1/2 and 2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - L. Provide steel cables for galvanized steel ducts complying with ASTM A 603 with galvanized steel shapes and plates for trapeze and riser supports. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible", Chapter 5, hangers and supports for ductwork and hanger sizing and spacing requirements.
- 3.6 210553, 220553 and 230553 Identification
 - A. Equipment Labels: 1/8 inch thick white plastic engraved labels with black letters and pre-drilled holes for attachment hardware.
 - B. Pipe Labels: Self-adhesive, preprinted plastic with permanent adhesive backing, color coded, with lettering and flow direction. Labels shall be:
 - 1. Color scheme shall be in accordance with ANSI A13.1 Standard for Pipe Identification NFPA 13, and Plumbing Code requirements.
 - 2. Verify pipe, equipment and valve tag labeling format with owner.
 - C. Install all labels and tags for easy identification and visibility.
 - D. Locate pipe labels:
 - 1. Maximum 25 foot runs.
 - 2. Near each valve or control device.
 - 3. Near penetrations through walls and floors.
 - 4. Near major equipment items and other points of termination.
 - 5. Where flow pattern is not obvious, mark each pipe branch.
 - E. Provide valve tags at each valve and control device. Valve tags shall be stamped or engraved brass with 1/4 inch letters for piping system above and below and 1/2 inch numbers, predrilled or stamped holes for attachment hardware.
 - 1. Provide list of tagged valves to owner.
 - F. Equipment Labels: Install or permanently fasten label to each piece of equipment.
- 3.7 220700 AND 230700 Piping Insulation
 - A. See individual plumbing and HVAC sections for specific pipe insulation requirements.
 - B. All insulation shall have a flame spread rating of not more than 25 and a smoke developed rating of no higher than 50 per NFPA.
 - C. Mineral Fiber Preformed Pipe: Mineral or glass fibers bonded with thermosetting resin. Comply with ASTM C 547, Type I, Grade A, 850 degree F with factory applied ASJ. Factory applied jacket is white kraft paper, fiberglass reinforced scrim with aluminum foil backing, complying with ASTM C 1126, Type II.
 - D. Flexible Elastomeric Pipe: Closed cell, sponge or expanded rubber flexible elastomeric. Comply with ASTM C 534, Type I for tubular material and Type II for sheet material.
 - E. Mineral Fiber Pipe and Tank: Mineral or glass fibers bonded with thermosetting resin. Comply with factory ASJ jacket complying with ASTM C 1093, Type II or pipe IIA Category 2 or with properties similar to ASTM C 612, Type 1B. Nominal density is 2.5 lb/cu. Ft. or more. Thermal conductivity (K value) at 100 deg F = 0.29 Btu in x in h sq. Ft. x deg. F or less. Factory applied jacket is white kraft paper, fiberglass reinforced scrim with aluminum foil backing, complying with ASTM C 1126, Type II.
 - F. Fitting and Elbow Covers: One piece pre-molded PVC covers.
 - 1. Description: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming.
 - a. Subject to compliance with requirements, provide one of the following:
 - 1. Johns Manville
 - 2. Zeston Prots Corporation
 - 3. LoSmoke Speedline Corporation
 - b. Adhesive: As recommended by jacket material manufacturer
 - 2. Color: White. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricated. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints.
 - G. Extend piping insulation without interruptions through walls, floors and similar penetrations.
 - H. Install insulation with longitudinal seams at top and end seams staggered. Bond seams and joints with adhesive recommended by insulation manufacturer.
 - I. Insulate elbows and tee fittings with preformed fitting insulation of same material and thickness as used for adjacent pipe. Where PVC-elbow covers are installed, fill voids with fiberglass insulation and tape joints.
 - J. Duct attachments to be sheet metal screws, blind rivets or self-tapping metal screws.
- 3.8 211313, 221116, 221316, 221413, 221413 Piping Common Requirements
 - A. See individual fire protection, plumbing and HVAC sections for specific pipe requirements.
 - B. Install piping to permit valve servicing.
 - C. Ream ends of pipe and remove burrs. Bevel plain ends of pipes.
 - D. Remove scale, slag, dirt and debris from inside and outside of pipe and fitting before assembly.
 - E. Install piping free of sags and bends.
 - F. Install piping to allow application of insulation.
 - G. Threaded Joints: Thread pipe with tapered threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Apply appropriate tape or thread compound to external pipe threads. Do not use pipe or pipe fittings with threads that are corroded or damaged.
 - H. Grooved Joints: Assemble joints with couplings and gasket, lubricant and bolts.

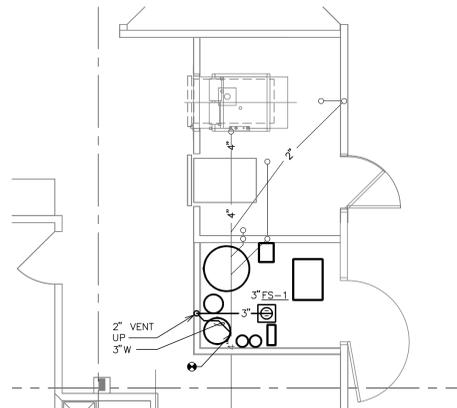
- 3.9 211313 General
 - A. Provide a complete fire protection system in accordance with NFPA 13, Underwriters Laboratories (UL), UL's American Carrier and Authorities Having Jurisdiction.
 - B. Fire protection systems to be designed, signed and sealed by a qualified professional engineer or NICET Level IV Designer.
 - C. The Fire Protection Contractor is responsible for all authorities coordinated drawings, hydraulic calculations, head types and colors to all submissions having jurisdiction for approval. No work shall commence until all approvals have been received.
- 3.2 211313 Pipe and Fittings
 - A. Comply with requirements for installation of sprinkler piping in NFPA 13.
 - B. Install alarm devices in piping in accordance with NFPA 13.
 - C. Materials:
 - 1. Schedule 40 Black Steel Pipe: ASTM A 53/A 53M Type E, Grade B.
 - 2. Schedule 10 Black Steel Pipe: ASTM A 135 or ASTM A 795A 795B.
 - 3. Galvanized and Uncoated, Grey Iron and Cast Iron Threaded Fittings: ASTM B16.4, Class 125, standard pattern.
 - 4. Grooved Mechanical Joint Fitting and Couplings:
 - a. Pressure Rating: 175 psig minimum.
 - b. Closures: AWWA C606 and UL 213, rigid pattern for steel pipe dimensions. Include ferrous housing sections, EPDM rubber gasket, nuts and bolts.
 - D. Pipe Schedule:
 - 1. Sizes 3" and Smaller: Schedule 40, black steel with threaded ends; uncoated gray-iron threaded fittings and threaded joints.
 - 2. Sizes 4" and Larger: Schedule 10, black steel with roll grooved ends, uncoated, grooved end fittings for steel pipe; grooved end couplings for steel pipe; and grooved joints.
 - E. Comply with MSS SP-69 for pipe hanger selection and applications.
 - A. Adjustable Fire Nozzles:
 - 1. Standard: UL 474.
 - 2. Pressure Rating: 250 psig minimum.
 - 3. Body Material: Steel pipe with EPDM rubber O-ring seals.
 - 4. Size: Same as connected pipe.
 - 5. Length: Adjustable.
 - 6. End Connections: Threaded.
 - B. Flexible Sprinkler Hose Fittings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by FlexHead Industries, Inc.
 - 2. Standard: UL 474.
 - 3. Type: Flexible corrugated hose with stainless steel braided covering, fully welded without unions or O-rings, for connection to sprinkler, and with zinc-plated carbon steel back-ends and hose ends, as indicated.
 - a. Bracket shall have a minimum 4" wide base connection to the ceiling grid, and permit location of the head in the center and 1/4 points of the ceiling line.
 - 4. Pressure Rating: 175 psig minimum.
 - 5. Size: Same as connected piping, for sprinkler head.
 - C. Sprinklers
 - A. General Requirements:
 - 1. UL's "Fire Protection Equipment Directory" listing or "Approval Guide", published by FM Global.
 - 2. Pressure Rating: 175 psig minimum.
 - B. Automatic Sprinklers with Heat Responsive Elements: Nominal 1/2 inch orifice with discharge coefficient K of 5.6 and and for "Ordinary" temperature classifications ratings unless otherwise indicated or required by application.
 - C. All sprinkler heads to be quick response.
 - D. Install sprinkler heads in center of acoustical tile ceilings.
 - E. Where flexible, sprinkler hose fittings are utilized, install hose into bracket on ceiling grid.
 - F. Sprinkler Guards:
 - 1. Water Hammer Arrestors: Install in accordance to PDI-WH-201. Install at all plumbing fixture groups containing equipment with automatic fills.
 - 2. Backflow Preventers:
 - a. Standard: ASSE 1010 or PDI-WH-201.
 - 2. Type: Metal/UL 474.
 - 3. Sizes: ASSE 1010, Sizes AA and A through F, PDI-WH-201, sizes A through F.
 - B. Backflow Preventers
 - 1. Reduced Pressure Principle: Standard: ASSE 1013, continuous pressure application, 12 psig maximum pressure loss, bronze body 2" and less, ductile iron body with approved stainless lining over 2" threaded or flanged connections, straight through horizontal configuration with inlet and outlet isolation valves and air gap fitting.
 - 2. Air Gap:
 - a. NPS 2" and Smaller: threaded.
 - b. NPS 2 1/2 and Larger: flanged.
 - 3. End Connections:
 - a. NPS 2" and Smaller: threaded.
 - b. NPS 2 1/2 and Larger: flanged.
 - 4. Performance Size:
 - a. Strainers NPS 2 and Smaller: 0.033 inch.
 - b. Strainers NPS 2 1/2 to NPS 4: 0.045 inch.
 - D. Piping Specialties Installation
 - 1. Water Hammer Arrestors: Install in accordance to PDI-WH-201. Install at all plumbing fixture groups containing equipment with automatic fills.
 - 2. Backflow Preventers:
 - a. Standard: ASSE 1010 or PDI-WH-201. Install in accordance to PDI-WH-201. Install at all plumbing fixture groups containing equipment with automatic fills.
 - b. Locations in same room as equipment.
 - c. Install air gap piped to floor drain.
 - 3. Rooms with Suspended Ceilings: match existing surrounding heads.
 - a. Finish: Chrome-plated.
 - 3.5 Cleanouts, Floor Drains and Floor Sinks
 - A. Install floor drains at low points of surface to be drained, where indicated on the drawings. See floor drain and floor sink schedules for product information.
 - 1. Set grades flush with floor.
 - 2. Install traps with floor flange so no leakage occurs between drain and floor.
 - 3. Install individual traps for floor drains connected to sanitary building drains.
 - B. Install cleanouts, where indicated on the drawings and at the following locations:
 - 1. Locate at each change of direction greater than 45 degrees.
 - 2. Locate at base of each vertical soil or waste stack.
 - C. Cleanout Size: same size as drainage pipe up to 4". 4" cleanout on pipes larger than 4".
 - D. Install floor cleanout deck plates flush with floor and wall cleanout wall plates flush with wall.
 - E. Description:
 - 1. Exposed Metal Cleanouts:
 - a. Standard: ASME A112.36.2M for cast iron test tees.
 - b. Size: Same size as connected drainage pipe.
 - c. Body Material: Hub and spigot, cast iron soil pipe T branch or Hubless cast iron soil pipe test tee.
 - d. Closure: Raised head with brass plug.
 - 2. Metal Floor Cleanouts:
 - a. Standard: ASME A112.36.2M for coated adjustable housing cleanout.
 - b. Size: Same size as connected drainage piping.
 - c. Type: Threaded, cast iron adjustable housing.
 - d. Body or Ferrule: Cast iron.
 - e. Body Design: Horizontal floor.
 - f. Closure: Brass plug with straight threads and gasket.
 - g. Frame and Cover Material: Aluminum; Finish: round nickel bronze, copper alloy.
 - h. Top Loading Classification: Medium duty.
 - i. Riser: ASTM A 74. Service class, cast iron drainage pipe fitting and riser.
 - 3. Cast Iron Wall Cleanouts:
 - a. Standard: ASME A112.36.2M, include wall drainage pipe fitting and riser.
 - b. Size: Same size as connected drainage piping.
 - c. Body: Hub and spigot, cast iron soil pipe T branch or Hubless cast iron soil pipe test tee.
 - d. Closure: Countersunk, drilled and threaded brass plug.
 - e. Wall Access: 6-inch, round, flat, stainless steel cover plate with vandal resistant screws.
 - 3.6 22400 Plumbing Fixtures
 - A. See schedule on drawings.
 - B. Install fixtures level and plumb. Install supports affixed to substrate with waste fittings and seals where applicable.
 - C. Attach water piping to supports or substrate within pipe spaces behind fixtures.
 - D. Install protective shielding pipe covers and enclosures on exposed water and waste piping of accessible lavatories.
 - 3.7 Division 22 - Field Quality Control
 - A. Perform the following tests and inspections:
 - 1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - 2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 3. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - 4. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 - B. Water Piping Tests:
 - 1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 - 2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
 - 3. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 - 4. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
 - C. Sanitary drainage and vent piping tests:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Roughing-in Plumbing Test Procedure: Test drainage and vent piping system outside building on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection, complete inspection of inspection, water level must not drop. Inspect joints for leaks.
 - 3. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gas-tight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure the pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
 - 4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - D. Sanitize the entire domestic water system with solution permitted by Authorities Having Jurisdiction for duration of 24 hour minimum. Flush system with clean city water until solution residue is no longer present.
 - E. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
 - 3.8 230503 Testing and Balancing
 - A. Certification: Membership in and fully certified by the AABC, NEBB or TABB.
 - B. CERTAB field data reports and perform the following:
 - 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 - 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
 - C. TAB Report Forms: Use standard TAB contractor's forms.
 - D. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and time.
 - E. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.
 - F. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
 - G. Perform testing and balancing procedures on each system according to the procedures contained in AIBCA's "National Standards for Total System Balance" and in this Section.
 - H. Air Systems:
 - 1. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer. Make final measurements of fan airflow, fan pressure, voltage, rpm, static pressure and temperatures at each component.
 - 2. Provide adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 - 3. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
 - 4. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated volumes. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
 - I. Tolerances:
 - 1. Air Outlets and Inlets: Plus or minus 10 percent.
 - 3.9 233113 Metal Ductwork
 - A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" standard for materials, material thickness, duct construction methods, static pressure class, sealing and leakage class requirements, duct support intervals and fitting construction.
 - B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1.4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select type and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - E. Sheet Metal Materials:
 - 1. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M with G90 galvanized coating designation. G90 is prohibited. Mill finish prohibited on exposed to view surfaces.
 - F. Sealants and Gaskets: Surface-burning characteristics for sealants and gaskets shall be a maximum flame spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723, certified by an NRTL.
 - G. Duct Installation:
 - 1. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible".
 - a. Standard: ASME A112.36.2M for coated adjustable housing cleanout.
 - b. Size: Same size as connected drainage piping.
 - c. Type: Threaded, cast iron adjustable housing.
 - d. Body or Ferrule: Cast iron.
 - e. Body Design: Horizontal floor.
 - f. Closure: Brass plug with straight threads and gasket.
 - g. Frame and Cover Material: Aluminum; Finish: round nickel bronze, copper alloy.
 - h. Top Loading Classification: Medium duty.
 - i. Riser: ASTM A 74. Service class, cast iron drainage pipe fitting and riser.
 - 2. Standard: ASME A112.36.2M for coated adjustable housing cleanout.
 - b. Size: Same size as connected drainage piping.
 - c. Type: Threaded, cast iron adjustable housing.
 - d. Body or Ferrule: Cast iron.
 - e. Body Design: Horizontal floor.
 - f. Closure: Brass plug with straight threads and gasket.
 - g. Frame and Cover Material: Aluminum; Finish: round nickel bronze, copper alloy.
 - h. Top Loading Classification: Medium duty.
 - i. Riser: ASTM A 74. Service class, cast iron drainage pipe fitting and riser.
 - 3. Cast Iron Wall Cleanouts:
 - a. Standard: ASME A112.36.2M, include wall drainage pipe fitting and riser.
 - b. Size: Same size as connected drainage piping.
 - c. Body: Hub and spigot, cast iron soil pipe T branch or Hubless cast iron soil pipe test tee.
 - d. Closure: Countersunk, drilled and threaded brass plug.
 - e. Wall Access: 6-inch, round, flat, stainless steel cover plate with vandal resistant screws.
 - 3.10 233300 Air Duct Accessories
 - A. General: Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
 - B. Manual Volume Dampers: Galvanized steel construction.
 - 1. Standard: length rating, with linkage outside airstream.
 - 2. Suitable for horizontal or vertical applications.
 - 3. Frames: Hat-shaped, galvanized steel sheet 0.064-inch minimum thickness, milled and welded to form a wide-open action in sizes 3 through 18 inches.
 - 4. Insulation R-value: Comply with ASHRAE/IESNA 90.1.
 - 5. Flexible Duct Clamps: Stainless steel band with cadmium-plated hex screw to tighten. Maximum working pressure 1.0-inch wg negative.
 - 6. Connect diffusers to ducts with maximum [48] [60] inch lengths of flexible duct clamped or strapped in place.
 - 7. Connect flexible ducts to metal ducts with draw bands.
 - C. Flange Connectors: Galvanized steel odd- or r-d formed, factory-fabricated, slide-on transverse flange connectors, gaskets and components.
 - 1. UL 181, Class 1, 2-ply vinyl film supported by helical woven, spring-steel wire; fibrous-glass insulation; aluminum vapor-barrier film.
 - 2. Pressure Rating: 15-inch wg positive and 1.0-inch wg negative.
 - 3. Temperature Range: Minus 10 to plus 160 deg F.
 - 4. Insulation R-value: Comply with ASHRAE/IESNA 90.1.
 - 5. Flexible Duct Clamps: Stainless steel band with cadmium-plated hex screw to tighten. Maximum working pressure 1.0-inch wg negative.
 - 6. Connect diffusers to ducts with maximum [48] [60] inch lengths of flexible duct clamped or strapped in place.
 - 7. Connect flexible ducts to metal ducts with draw bands.
 - D. Incomplete Flexible Ducts:
 - 1. UL 181, Class 1, 2-ply vinyl film supported by helical woven, spring-steel wire; fibrous-glass insulation; aluminum vapor-barrier film.
 - 2. Pressure Rating: 15-inch wg positive and 1.0-inch wg negative.
 - 3. Temperature Range: Minus 10 to plus 160 deg F.
 - 4. Insulation R-value: Comply with ASHRAE/IESNA 90.1.
 - 5. Flexible Duct Clamps: Stainless steel band with cadmium-plated hex screw to tighten. Maximum working pressure 1.0-inch wg negative.
 - 6. Connect diffusers to ducts with maximum [48] [60] inch lengths of flexible duct clamped or strapped in place.
 - 7. Connect flexible ducts to metal ducts with draw bands.

- 3.11 233713 Grilles, Registers and Diffusers
 - A. See Schedule on drawings for specific product information.
 - B. Grille, Register and Diffuser Installation:
 - 1. Install all diffusers, registers, and grilles level and plumb.
 - 2. Ceiling-Air Outlet and Inlet: Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. For units installed in air-celling panels, locate joints in the middle of the panel.
 - 3. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers.
- 3.12 Division 23 - Field Quality Control
 - A. Prepare test and inspection reports.
 - B. Perform the following before operating the system:
 - 1. Visually inspect duct system to ensure that no visible contaminants are

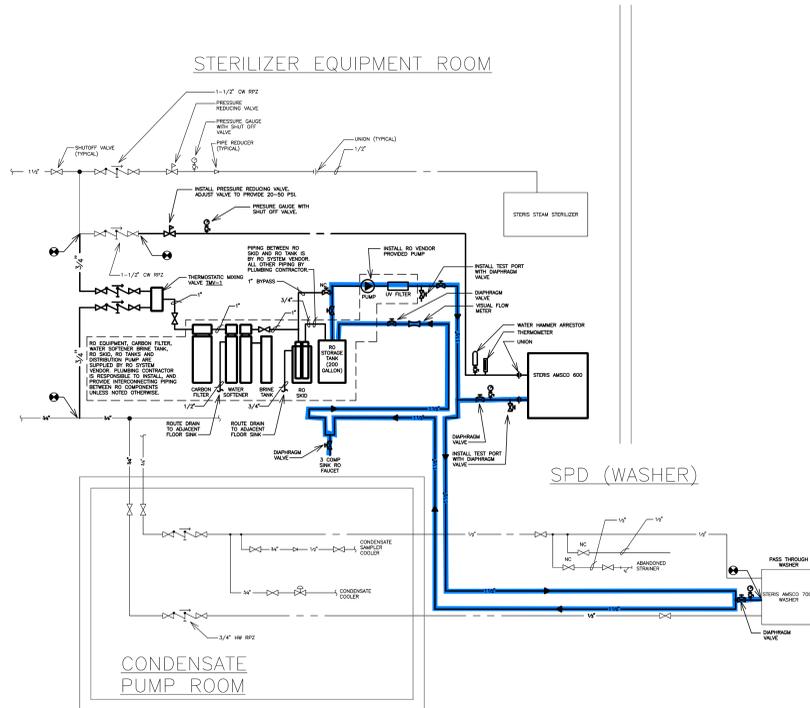
- 3.13 233713 Grilles, Registers and Diffusers
 - A. Prepare reports for tests and for corrective action required.
 - B. Sanitary drainage and vent piping tests:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Roughing-in Plumbing Test Procedure: Test drainage and vent piping system outside building on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection, complete inspection of inspection, water level must not drop. Inspect joints for leaks.
 - 3. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gas-tight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure the pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
 - 4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - C. Sanitize the entire domestic water system with solution permitted by Authorities Having Jurisdiction for duration of 24 hour minimum. Flush system with clean city water until solution residue is no longer present.
 - D. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- 3.14 230503 Testing and Balancing
 - A. Certification: Membership in and fully certified by the AABC, NEBB or TABB.
 - B. CERTAB field data reports and perform the following:
 - 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 - 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
 - C. TAB Report Forms: Use standard TAB contractor's forms.
 - D. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and time.
 - E. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.
 - F. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
 - G. Perform testing and balancing procedures on each system according to the procedures contained in AIBCA's "National Standards for Total System Balance" and in this Section.
 - H. Air Systems:
 - 1. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer. Make final measurements of fan airflow, fan pressure, voltage, rpm, static pressure and temperatures at each component.
 - 2. Provide adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 - 3. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
 - 4. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated volumes. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
 - I. Tolerances:
 - 1. Air Outlets and Inlets: Plus or minus 10 percent.
- 3.9 233113 Metal Ductwork
 - A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" standard for materials, material thickness, duct construction methods, static pressure class, sealing and leakage class requirements, duct support intervals and fitting construction.
 - B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1.4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select type and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - E. Sheet Metal Materials:
 - 1. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M with G90 galvanized coating designation. G90 is prohibited. Mill finish prohibited on exposed to view surfaces.
 - F. Sealants and Gaskets: Surface-burning characteristics for sealants and gaskets shall be a maximum flame spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723, certified by an NRTL.
 - G. Duct Installation:
 - 1. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible".
 - a. Standard: ASME A112.36.2M for coated adjustable housing cleanout.
 - b. Size: Same size as connected drainage piping.
 - c. Type: Threaded, cast iron adjustable housing.
 - d. Body or Ferrule: Cast iron.
 - e. Body Design: Horizontal floor.
 - f. Closure: Brass plug with straight threads and gasket.
 - g. Frame and Cover Material: Aluminum; Finish: round nickel bronze, copper alloy.
 - h. Top Loading Classification: Medium duty.
 - i. Riser: ASTM A 74. Service class, cast iron drainage pipe fitting and riser.
 - 2. Standard: ASME A112.36.2M for coated adjustable housing cleanout.
 - b. Size: Same size as connected drainage piping.
 - c. Type: Threaded, cast iron adjustable housing.
 - d. Body or Ferrule: Cast iron.
 - e. Body Design: Horizontal floor.
 - f. Closure: Brass plug with straight threads and gasket.
 - g. Frame and Cover Material: Aluminum; Finish: round nickel bronze, copper alloy.
 - h. Top Loading Classification: Medium duty.
 - i. Riser: ASTM A 74. Service class, cast iron drainage pipe fitting and riser.
 - 3. Cast Iron Wall Cleanouts:
 - a. Standard: ASME A112.36.2M, include wall drainage pipe fitting and riser.
 - b. Size: Same size as connected drainage piping.
 - c. Body: Hub and spigot, cast iron soil pipe T branch or Hubless cast iron soil pipe test tee.
 - d. Closure: Countersunk, drilled and threaded brass plug.
 - e. Wall Access: 6-inch, round, flat, stainless steel cover plate with vandal resistant screws.
- 3.10 233300 Air Duct Accessories
 - A. General: Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
 - B. Manual Volume Dampers: Galvanized steel construction.
 - 1. Standard: length rating, with linkage outside airstream.
 - 2. Suitable for horizontal or vertical applications.
 - 3



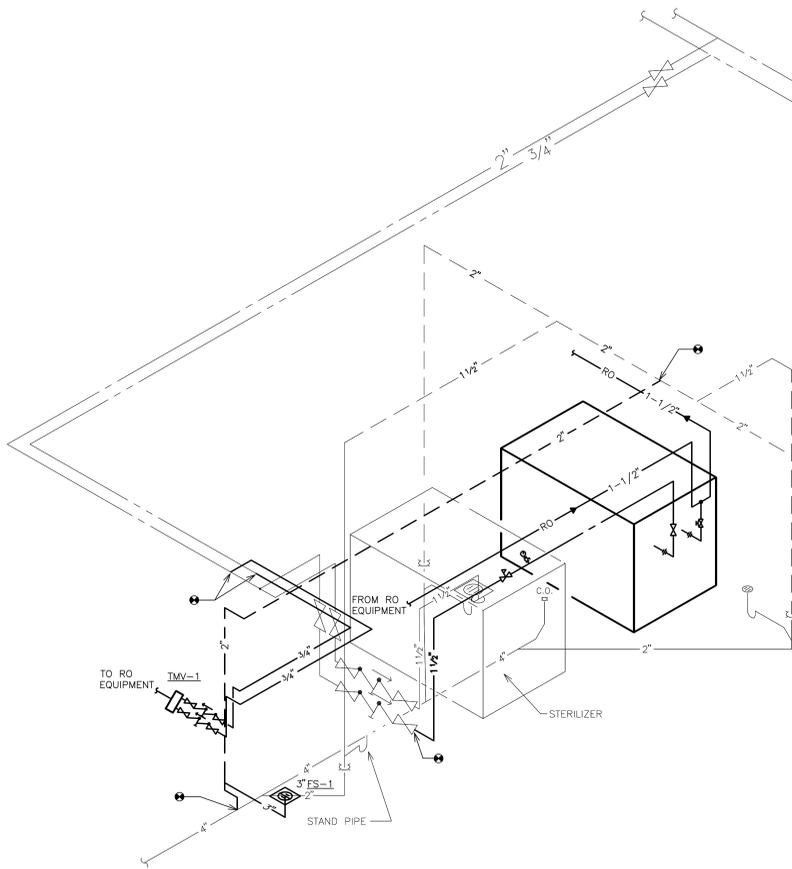
1 FIRST LEVEL PLUMBING PLAN
1/4" = 1'-0"



2 UNDER FLOOR PLUMBING PLAN
1/4" = 1'-0"



3 PLUMBING FLOW DIAGRAM Original Design
NO SCALE



4 PLUMBING RISER DIAGRAM
NO SCALE

THERMOSTATIC MIXING VALVE SCHEDULE												
MECHANICAL (224500)												
EQUIPMENT TAG	MINIMUM FLOW (GPM)	MAXIMUM FLOW (GPM)	COLD WATER BYPASS AT MAXIMUM FLOW (PSI)	INLET TEMPERATURE (F)	OUTLET TEMPERATURE (F)	CW INLET (IN)	HW INLET (IN)	OUTLET (IN)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES	
TMV-1	3	10	10	5	120	77	3/4"	3/4"	1"	WATTS	LFMM431	
MECHANICAL NOTES: 1. PROVIDE 1/2" GRATE TOP.												

STERILIZER EQUIPMENT UTILITY SCHEDULE						
EQUIPMENT	QUANTITY	DOMESTIC FLOW (GPM)	COLD WATER RANGE (PSI)	COMPRESSED AIR (SCFM)	PRESSURE RANGE (PSIG)	RO WATER FLOW (GPM) PRESSURE RANGE (PSI)
AMSCO 600 SERIES STEAM STERILIZER - 1251V-1	1	12	20-50	3	80-100	5.4 GAL/CYCLE

GENERAL NOTES:

- PROVIDE LABELS ON CEILING GRID SUPPORT BELOW ALL DOMESTIC WATER VALVES. LABEL TO BE CLEAR WITH BLACK LETTERING AND FONT TO MATCH HEATING VALVE LABELS. LABELS TO MATCH VALVE SCHEDULE.
- PLUMBING CONTRACTOR TO VERIFY RATINGS OF ALL WALLS WITH ARCHITECTURAL DRAWINGS AND SEAL PIPE PENETRATIONS TO MATCH WALL RATINGS.
- PLUMBING CONTRACTOR WILL BE RESPONSIBLE TO REVIEW ACCESSIBILITY TO AREAS OUTSIDE THE CONSTRUCTION LIMITS TO DETERMINE APPROXIMATE AMOUNT OF OVERTIME REQUIRED TO PERFORM ALL MECHANICAL WORK INDICATED. COORDINATION OF SCHEDULES WITH ADJACENT DEPARTMENTS AND CLEANING OF ALL DEBRIS AFTER EACH WORK SHIFT SHOULD BE ASSUMED IN THE BASE BID SCOPE.
- ALL OUTAGES INDICATED ON THESE DRAWINGS SHALL BE SCHEDULED TO BE PERFORMED AFTER NORMAL BUSINESS HOURS OR DURING WEEKEND PERIODS TO MINIMIZE DISRUPTION. FACILITIES WILL REQUIRE A MINIMUM OF TWO (2) WEEKS NOTICE PRIOR TO ANY SUCH OUTAGE AFFECTING MORE THAN ON ADJACENT FLOOR.
- THE EXACT LOCATION OF EQUIPMENT ROUGH-INS SHALL BE VERIFIED WITH THE STAMPED APPROVED SHOP DRAWINGS PRIOR TO ANY FIELD INSTALLATION. SUPPORT ALL PIPING DIRECTLY TO STRUCTURE.
- DO NOT SUPPORT ANY PIPING FROM DUCTWORK, CONDUIT OR OTHER PIPING ENCOUNTERED.
- WHERE MECHANICAL SYSTEMS TO REMAIN ARE DAMAGED OR DISTURBED DURING THE COURSE OF CONSTRUCTION, THE CONTRACTOR WILL BE RESPONSIBLE TO REMOVE DAMAGED PORTIONS AND INSTALL NEW PRODUCTS OF EQUAL QUALITY AND FUNCTIONALITY.
- ALL EXISTING PIPING THROUGH NEW FIRE RATED WALLS SHALL BE ADEQUATELY FIRE SEALED AS REQUIRED.
- ALL CORE DRILLING OR ANY ACTIVITIES CAUSING EXTREME VIBRATION OR NOISE SHALL BE COORDINATED TO BE PERFORMED AFTER BUSINESS HOURS TO NOT AFFECT CRITICAL HOSPITAL FUNCTIONS WITHIN ADJACENT AREAS. COORDINATE WITH FACILITIES REPRESENTATIVE AS REQUIRED.
- THE PLUMBING CONTRACTOR SHALL MAINTAIN ACCURATE RECORD DRAWINGS SHOWING ALL DISCREPANCIES WITH ANY EXISTING PIPING INDICATED OR REVISIONS TO THE NEW PLUMBING LAYOUTS. ALL CHANGES WILL BE UPDATED WITHIN THE FINAL RECORD DRAWING SET. ALL WALL CLEANOUTS TO BE INSTALLED 18" AFF UNLESS NOTED OTHERWISE.
- FIRE PROTECTION CONTRACTOR TO PROVIDE FIRE PROTECTION COVERAGE TO COMPLY WITH CURRENT IBC AND NFPA 13 FOR A FULLY SPRINKLERED BUILDING.
- FIRE PROTECTION CONTRACTOR SHALL COORDINATE PIPING ROUTING AND SPRINKLER HEAD LAYOUT.
- THE FIRE PROTECTION CONTRACTOR WILL BE RESPONSIBLE FOR ANY GENERAL CONSTRUCTION WORK AS DIRECTLY IMPACTED BY THE SPRINKLER SYSTEM INSTALLATION. EXAMPLES OF WORK DIRECTLY TIED INTO THE FIRE PROTECTION CONTRACTORS WORK WOULD INCLUDE, BUT NOT LIMITED TO: FIRE SEALING OF ALL RATED WALL PENETRATIONS, CEILING ACCESS PANELS, ETC.
- COORDINATE ALL NEW SPRINKLER PIPE ROUTING WITH OTHER TRADES TO INSURE ADEQUATE CLEARANCES FOR DUCTWORK, ELECTRICAL CONDUIT, STRUCTURAL SUPPORTS, PIPING, ETC. ANY UNAVOIDABLE CONFLICTS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER OF RECORD. PROVIDE ALL OFFSETS AND TRANSITIONS AS REQUIRED FOR A CLEAN INSTALLATION. ADDITIONAL COMPENSATION WILL NOT BE REWARDED DUE TO LACK OF COORDINATION WITH OTHER SUBCONTRACTORS.
- SUPPORT ALL PIPING DIRECTLY TO STRUCTURE. DO NOT SUPPORT ANY PIPING FROM DUCTWORK, CONDUIT OR OTHER PIPING ENCOUNTERED. ALL PIPING ROUTED THROUGH FIRE RATED WALLS/FLOORS SHALL BE ADEQUATELY FIRE SEALED AS REQUIRED TO MAINTAIN THE LISTED WALL/FLOOR RATING.
- ALL NEW SPRINKLER HEADS SHALL BE INSTALLED AT THE CENTER OF ALL LAY-IN CEILING TILES. COORDINATE WITH CEILING SUBCONTRACTOR AS REQUIRED.
- THE FIRE PROTECTION CONTRACTOR WILL BE RESPONSIBLE TO COORDINATE AND PERFORM ALL TESTING OF PIPING SYSTEMS IN ACCORDANCE WITH NFPA GUIDELINES UPON COMPLETION OF WORK. SUBMIT FINAL TESTING REPORT TO THE LOCAL AUTHORITY HAVING JURISDICTION, ENGINEER, INSURANCE UNDERWRITER AND OWNER UPON COMPLETION.

KEY NOTES:

- INSTALL 3/4" COLD WATER RPZ ON UNISTRUT ON WALL. ROUTE DRAIN TO ADJACENT FLOOR SINK WITH AIR GAP.
- INSTALL 3/4" HOT WATER RPS ON UNISTRUT ON WALL. ROUTE DRAIN TO ADJACENT FLOOR SINK WITH AIR GAP.
- INSTALL THERMOSTATIC MIXING VALVE ON WALL.
- INSTALL FLOOR SINK. COORDINATE LOCATION WITH FINAL RO EQUIPMENT LOCATIONS.
- SEE 3/P101 FOR RO SYSTEM PIPING.
- 3/4" RO TO PASS THROUGH WASHER.
- ROUTE 1-1/2" RO LOOP DOWN IN WALL TO FAUCET. 3/4" TAP OFF OF RO LOOP TO FAUCET CONNECTION.
- ROUTE SAFETY RELIEF VALVES FROM CHAMBER, JACKET, AND ELECTRIC STEAM GENERATOR THROUGH ROOF.
- INSTALL PRESSURE REDUCING VALVE. REDUCE COMPRESSED AIR TO 100 PSI.
- INSTALL NEW UPRIGHT HEAD IN RO ROOM. MODIFY EXISTING BRANCH PIPING AS REQUIRED FOR NEW ROOM LAYOUT.
- RELOCATE HEAD LOCATIONS AS REQUIRED FOR NEW ROOM LAYOUT. MODIFY EXISTING BRANCH PIPING AS REQUIRED. ALL RELOCATED HEADS TO BE NEW. MATCH EXISTING HEAD RESPONSE TIME AND MOUNTING TYPE. NEW HEAD LOCATIONS TO BE LOCATED IN CENTER OF CEILING TILE.

FLOOR SINK SCHEDULE

EQUIPMENT TAG	SIZE (IN)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
FS-1	SEE PLAN	JOSAM	49300	1
MECHANICAL NOTES: 1. PROVIDE 1/2" GRATE TOP.				

POPE ARCHITECTS
POPE ARCHITECTS, INC.
1295 BANDANA BLVD N, SUITE 200
ST. PAUL, MN 55108-2735
(651) 642-9200 | FAX (651) 642-1101
www.popearch.com

Alina Health
BUFFALO HOSPITAL

BUFFALO STERILIZER REPLACEMENT

303 CATLIN STREET
BUFFALO, MN 55313

DUNHAM

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PHONE 612.465.7550
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WEB dunhameng.com
mechanical + electrical
consulting engineering
DUNHAM: 0420600-059-00

UNDERFLOOR AND FIRST LEVEL PLUMBING PLANS

Issues and Revisions:

NO.	DESCRIPTION	DATE
1	CD ISSUE	02/14/2020

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.
Ryan J. Folin
RYAN J. FOLIN
Date: 02/14/2020 Lic. No: 54305

Commission No: 27531-20013
Drawn by: RFOLIN
Checked by: DMAY

SHEET
P101
TRUE SHEET SCALE
1" = 12"