

**Contract To Install Boilers at
191 Joralemon Street
Brooklyn, New York**

Contractor agrees to install two boilers at 191 Joralemon Street in Brooklyn, New York for the sum shown below, to be paid by the Owner. (Note: these prices will hold for thirty days from the date of the Contractor's signature). Prices given are inclusive of any applicable sales tax.

The work is specified in the attached pages of this Contract. The Work does not include asbestos abatement. Any changes to the Work resulting in extra costs will require a change order, to be signed by both the Owner and the Contractor. No substitution of specified equipment or materials shall be allowed without the prior written approval of the Construction Manager. Contractor shall have general-liability and workman's compensation insurance. The Owner and Jonathan Flothow shall each be named as additionally insured parties. All labor and materials will be warranted for a period of one year commencing with receipt of all signoffs. All equipment shall be installed in strict conformance with the manufacturers' recommendations, requirements, and instructions. The work shall conform to all applicable laws, codes, and standards. Contractor is responsible for confirming all site conditions, and for immediately reporting all problems, discrepancies, errors, or omissions relating to the site or this specification to the Construction Manager.

A COPY OF THE ATTACHED SPECIFICATION SHALL BE MAINTAINED ON THE JOBSITE AT ALL TIMES THAT WORK IS BEING PERFORMED!

COST FOR ALL WORK:

\$ _____

Offered By:

Accepted By:

Date

Date

("Contractor")

("Owner")

Revisions

Exclusions

Boiler Room Preparation

Correcting boiler-room conditions to conform with code, except as detailed in this specification, is excluded.

Asbestos

Asbestos abatement is excluded.

Miscellaneous

Filing

Contractor is responsible for all engineering and filing fees, except for Progress and/or Special Inspections as mandated by the NYC DOB. ACP5 is excluded.

Pipe Insulation

In the boiler room, insulate all new and existing steam and hot-water piping as per code, using molded-fiberglass pipe-insulation. Tees and elbows shall be insulated with insulated fitting covers or with Smoothkote and gauze. Minimum thicknesses are as follows:

- Steam piping: 3" insulation on all piping 2" and above; 1½" insulation on smaller pipes.
- Hot Water: 2" insulation on all piping 2" and above; 1" insulation on smaller pipes.

Debris

Remove and cart from the premises the old boilers and all debris generated by the work.

Isolation-Valves and Drain-Valves

All isolation-valves and drain-valves shall be domestic-quality full-port ball-valves. **Install no gate-valves!**

Piping

- Copper can be used for steam and condensate piping **ONLY IF** water-soluble flux is used. If standard flux is used, Contractor shall replace all copper piping with steel piping, and shall boil-out both boilers, all at no additional charge to Owner.
- All fresh water piping shall be Type L copper.

Boilers

Boiler Make & Model

- Boilers shall be Supreme D3-80-5.
- Boiler steam outlets shall be 10" (not the standard 6")
- Boilers shall **NOT** have drypans.

Boiler Insulation

- Boiler shall have 3" insulation jacket (rather than the standard 2").
- Boiler shall have poured refractory on burner plate.

Non-Standard Boiler Connections

- Boilers shall have 4" IPS threaded outlet on top near the front, so that Neutrochem anode bars can be installed into them.
- Near the front, each boiler shall have a 2" skim-port with centerline 64" above bottom of saddle.
- Near the front, each boiler shall have a 2" detergent-port with centerline 48" above bottom of saddle.

Shop Drawings

Before boiler installation, Contractor shall provide shop drawings showing location of all boiler connections.

Heater Opening

Each boiler shall have an opening for a tankless heater, but no heater. Install plates and gaskets over the heater openings.

Burner Mounting Plate

Each boiler shall have a burner mounting plate covered with poured refractory, for a Webster JB2-10 burner.

Anode Bars

In each boiler, install a Neutro-Chem sacrificial anode bar.

Smokebox Thermometers

- At each boiler, weld on a ½" IPS coupling just below the vent connection, or drill and tap a ½" tapping.
- Install 0°-800° smokebox thermometers. Dials shall be minimum 5" diameter, stems shall be 8"-9".
- Provide combustion efficiency test hole as per DAR requirements.

Breech

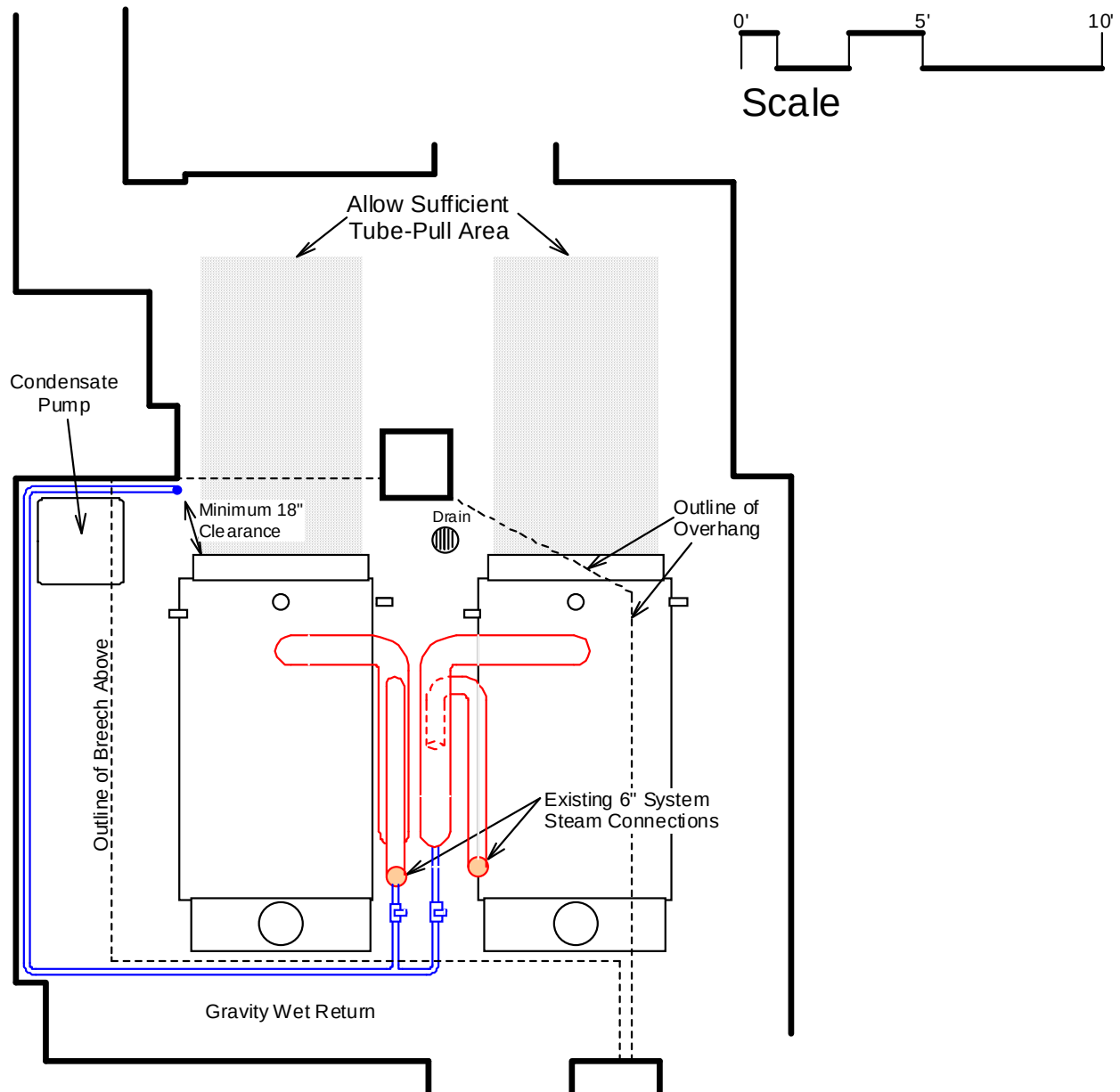
- Install 14"-diameter breeches from each boiler to the existing overhead common breech. Patch holes where the old breeches were removed.
- Insulate new breeching, and repair damage to the existing breech insulation.
- No new barometric dampers are needed.

Pressure-Test

The boiler shall pass the hydrostatic tests as prescribed by A.S.M.E., Code Section IV.

Boiler Pads

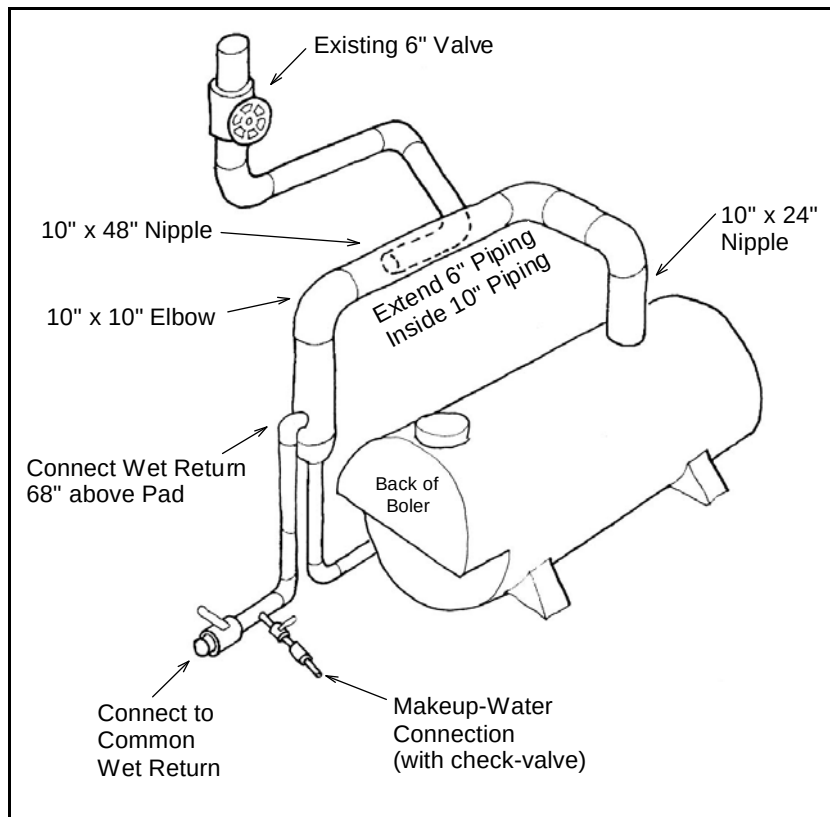
- Break up and remove the existing boiler pads.
- Under the pads, drill the slab to determine its thickness.
- If the slab is less than 4", break it and remove it where the boilers will stand, excavate to undisturbed dirt, remove loose concrete and loose soil, and back-fill with gravel if needed (this will be extra work not-in-contract).
- Install new min. 5½" deep concrete pads. Pad shall incorporate 4" x 4" welded mesh reinforcing steel.
- In the wet concrete, lift the mesh so that it is ±1" off the bottom of the slab, to ensure proper embedment.
- Ensure sufficient tube-pull area.
- Maintain minimum 18" clearance around the boilers.

Plan of Boiler Room

Boiler Steam & Condensate Piping

Steam Header

- The steam headers will be the "pipe in a pipe" configuration.
- From the boiler's 10" steam outlet, pipe a 10" x min 24" nipple, then elbow towards the side.
- Elbow back, pipe a 10" x min 48" nipple, then pipe on a 10" x 10" elbow facing down.
- From the elbow, pipe down to below the boiler waterline before reducing.
- Below the boiler waterline, reduce from 10" to min 2", then pipe to the boiler's return connection.
- From the existing overhead 6" system steam connection, pipe down, and pipe right into the 10" piping. Extend the 6" piping halfway into the 48" nipple, running down the center of it, as shown. Pitch very slightly to drain.
- Note: for the West boiler, the 6" piping will probably end up running directly above the 10" piping (as shown in plan), but the overall configuration will be the same as shown in the sketch at right.



Gravity Return Connection

- Weld a 2" outlet onto the side of the header drip, with the centerline 68" above the boiler pad. This will be the Hartford Loop. It will be slightly above the boiler's waterline, stabilizing the waterline and enhancing the Loop's safety function.
- From the outlet, pipe a close nipple, street elbow, or weld elbow. Pipe down to the floor, then pipe in a valve. Pipe from the valve to the new gravity wet return (see page 12).
- Piping shall be minimum 2".
- Before the valve, pipe a 3/4" feed connection, with a check-valve and a shutoff.

Pumped Return Connection

- The condensate-pump has a single, common discharge. It will be piped to both boilers, through a Tee.
- Near the pump, in the common piping, pipe in a check-valve and a Bell & Gosset CB1½ Circuit-Setter. Slightly throttle the Circuit-Setter to increase the pump run time.
- At each boiler, connect the pumped return to one of the front drain connections. Do **NOT** connect it to the gravity return or the side return connection.
- Include a valve and a Circuit-Setter in each boiler connection. At first leave these circuit-setters fully open.
- If the boiler waterlines go back and forth, throttle the Circuit-Setters as needed.

Burners

Make and Model

Burners shall be dual-fuel, full-modulation Webster #JB2C-10-RM7840L-M-.25-VGD-MP-UL/CSD-1

Burners shall have the following equipment and configuration:

- Low-gas-pressure burner combustion head.
- Remote-mounted fuel-oil pump-set, wired to operate only when the burner fires on oil.
- Direct spark ignition on oil.
- Complete 2½" Siemens VG-SKP ventless gas train.
- Gas train shall be piped vertically, to reduce possibility of flood damage.
- Honeywell RM7840L flame safeguard relay with S7800A-1142 keyboard display.
- Ultraviolet scanner.
- Automatic fuel-changeover circuitry as per utility requirements.
- Additional, non-manual-reset low gas-pressure switch (to be connected directly to the automatic fuel changeover circuitry).
- Burner package shall be burner UL-listed and approved, and shall meet all NYC/DAR requirements.

Oil Piping

- Locate new down-legs so that the flexible-copper runs to the burners are no longer than five feet.
- Pipe in General 2A-700B strainers.
- Pipe in vacuum (not compound) gauges before and after the strainers.
- Pipe in ball-valves (with an adjustable packing-nut) before the first vacuum gauges.
- Replace the burner OEM oil-pressure-gauges with liquid-filled 0-400 PSI pressure-gauges.
- Install threaded-connection swing check-valves into the return-lines only, in the steel pipe. Install no other valves into the return-lines.
- Provide two 2A-710 replacement filter elements.
- Use no teflon tape or teflon paste in oil piping.

Slide Damper and Draft Adjustments

- Adjust the boiler choke-damper until a back-pressure of +.10" W.C. is measured at the boiler smoke-outlet (upstream of the slide-damper) with the burner on.
- Adjust overfire draft in conformance with Webster's requirements
- Adjust the barometric draft regulator to be mostly open in the coldest weather and mostly closed in the warmest weather.

Burner Setup and Operation

- Ensure that low fire is 10 GPH, by matching the low-fire oil-pressure stated on the burner cabinet.
- Tune the burner throughout its firing range.
- Tune the burner with the boiler-room door closed.

Other Boiler Piping

Drain Manifold

Pipe a 2" drain manifold. Pipe it to the floor drain between the boilers.

Primary Cutoff/Feeder

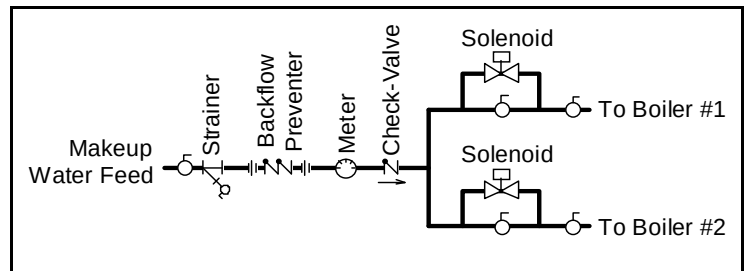
- Primary cutoffs shall be McDonnell-Miller #157 or #157S
- Install them with their casting-lines 61" above the boiler-pad.
- All cutoff piping shall be min. 1" IPS, piped like the control-tree.

Secondary Cutoffs

Each boiler shall have a secondary cutoff with manual-reset switch.

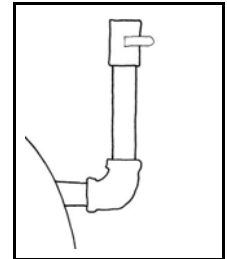
Feed Lines

- Pipe new $\frac{3}{4}$ " feed-lines as follows (refer to drawing at right):
- Replace the backflow preventer. Install it higher than the boilers' waterlines.
- Upstream of the backflow preventer, pipe in a strainer, and pipe a valve from the blowoff.
- After the backflow preventer, pipe in a soft-seated check-valve.
- Also pipe in a water meter, that reads in gallons. Locate it where it is easily read.
- For each boiler, pipe an Asco #8221G5 120VAC $\frac{3}{4}$ " slow-closing solenoid.
- Pipe valved bypasses around each solenoid. Pipe in valves after.
- Supply and leave on-site an Asco solenoid rebuild kit #310388.



Detergent Ports

From the 2" detergent ports (which are slightly below the waterline), elbow up, pipe to a few inches above the water line, and install a 2" valve. See sketch at right.



Skim Drains

From the skim drains (which are slightly above the water line), pipe 2" to the drain manifold. Include 2" valves.

Drain and Blowoff piping

This work can be done in copper or steel.

- Pipe the front and bottom drains through 2" valves to the drain manifold.
- Pipe the low-water cutoff blowoffs through 1" valves and high air-gaps to the drain manifold.
- Pipe the backflow-preventer blowoff to the drain manifold.

Domestic Hot Water Piping

- Between the old boilers, remove the sidearm water heater, the mixing valve, and associated piping.
- A pair of $1\frac{1}{4}$ " copper hot- and cold- water mains runs overhead. Redirect both mains up, and tie into the 2" copper downcomers.
- Leave $1\frac{1}{2}$ " valved takeoffs from each main. Also leave a $\frac{3}{4}$ " cold-water takeoff for the boiler makeup-water connection.
- Install a $\frac{3}{4}$ " water-meter into the cold water-feed to the water-heater. Disregard the existing pipe size.

Boiler Room Return Piping

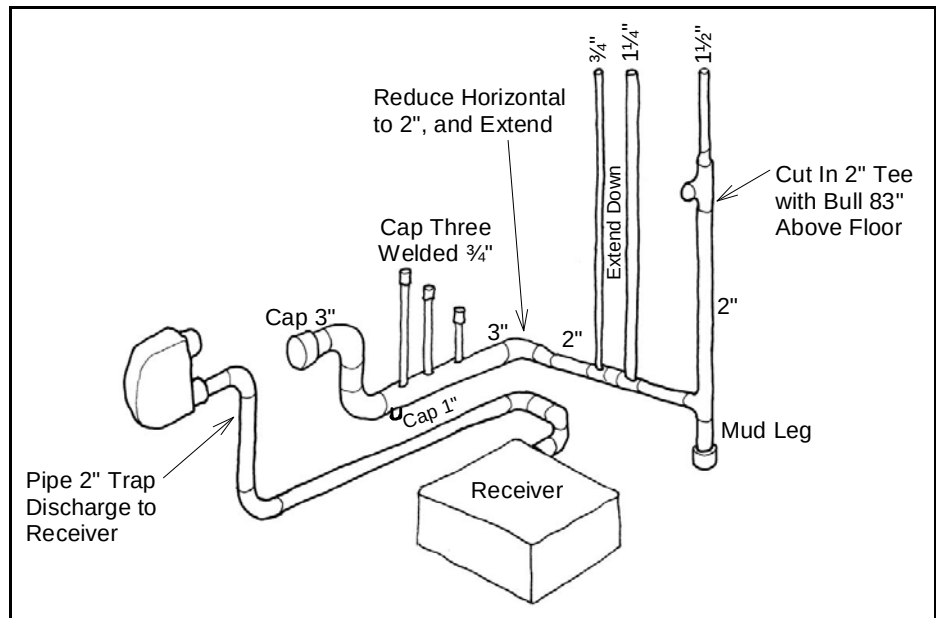
Color Coding of Pipes

To facilitate the work, pipes have been marked as follows:

- Remove yellow pipes.
- Cap red pipes.
- Connect to blue pipes.

Receiver Piping

- Remove the existing 3" piping at the receiver inlet, including the valve and flange set.
- Disconnect the 2" trap's discharge from the 3" piping, and cap the 3" connection. Reroute the trap's discharge, and pipe it directly to the receiver inlet.
- Remove the receiver vent piping, all the way to the chimney. Plug the hole in the chimney. Pipe up from the receiver vent tapping to a point higher than the boilers, then pipe back down to the floor.



Extend 3" Horizontal Return

- In the corner, reduce the 3" horizontal (which used to connect to the receiver) to 2", then continue it along the wall.
- Three drips come down next to the barometric damper ($\frac{3}{4}$ ", $1\frac{1}{4}$ ", & $1\frac{1}{2}$ "). Eliminate the traps, valves, strainers, and unions, and cap the welded $\frac{3}{4}$ " nipples that the traps discharged into.
- Extend the $\frac{3}{4}$ " and $1\frac{1}{4}$ " drips straight down to the extended horizontal, and connect them.
- Enlarge the $1\frac{1}{2}$ " drip to 2", and cut in a 2" Tee ± 83 " above the floor. (This is a false water line.) Face the bull into the room. From the Tee's bottom port, pipe down and connect to the extended horizontal. Pipe on a mud leg.

New Wet Return

- Remove the existing $1\frac{1}{4}$ " wet return. Cap the 1" connection to the 3" return that runs above it.
- Pipe a 2" wet return around the perimeter of the boiler room, and pipe up to the bull of the new Tee (the false waterline).

Remove Traps

Remove the two 1" traps next to the West wall, along with their valves and strainers. Pipe the inlets to the outlets. One trap is in the corner behind the boiler, one is next to the 3" downcomer next to the boiler.

Fill Basement & Boiler Room Wet Returns

- Add water into the upper basement return until it can be heard trickling through the false water line.
- Add water into the boiler-room return until it can be heard trickling through the Hartford loops.
- **Failure to fill both wet returns will result in severe hammer!**

Controls & Wiring

Multi-Mod

Install a Heat-Timer Multi-Mod modulating pressure control. Install a #904310-00 0-30 PSI pressure transducer into common steam piping (after the king valves). Set *Lag Delay* to 40 minutes, to prevent both boilers from firing simultaneously.

Automatic Feeders

In each #157, use terminals #1 & #2 to energize the feed-line solenoid, and terminals #3 & #4 to cut off the burner on low water. Ensure that the switches are secure and operating properly.

Miscellaneous

- Wire the sail switch in series with the main boiler shutoff switch.
- Install a GFI outlet onto the control panel.

Conductors

- Temperature-sensor wiring shall be shielded. Do not run sensor-wiring in conduit carrying line-voltage wiring. Ground sensor-wire shielding to the electrical enclosure.
- Color code all wiring. Use as many colors as needed to facilitate tracing of wiring. Hot leads shall be black, neutral leads shall be white, and ground wires shall be green.

Boiler Cleaning

Skim Boiler

Skim the boilers for a minimum of four hours, as follows:

Fully open the skim valve. Slightly open the solenoid-bypass so that water flows steadily out of the skim-drain. Fire the boiler until it just makes steam, then shut off the burner.

At the end of the skim, lower the boiler's water line to the normal level.

Detergent

After skimming, add a large box of Cascade powdered dishwasher detergent into each boiler.

Remove Detergent

After a week, drain the boilers, then fill and drain the boilers to rinse out all traces of detergent. Immediately fire both boilers until they just make steam.

Basement Work

Description

The system has a dry return overhead, which picks up the radiator returns, and a wet return on the floor, which picks up drips from the steam mains. The F & T traps will be removed from the drips, and the wet return will be run directly back to the boilers, bypassing the condensate pump. The drips will return by gravity. The dry return will still go into the condensate pump.

Remove Drip-Traps

In the basement, sixteen $\pm 1\frac{1}{4}$ " drip-traps discharge into wet returns. At each one, remove the trap and all associated valves, strainers, and unions. Pipe the inlet directly to the outlet, with no trap, so that the steam piping drips directly into the wet return. All new piping shall be minimum $\frac{3}{4}$ ". When removing drip-traps, report any clogged piping to the Construction Manager.

Remove Crossover Trap

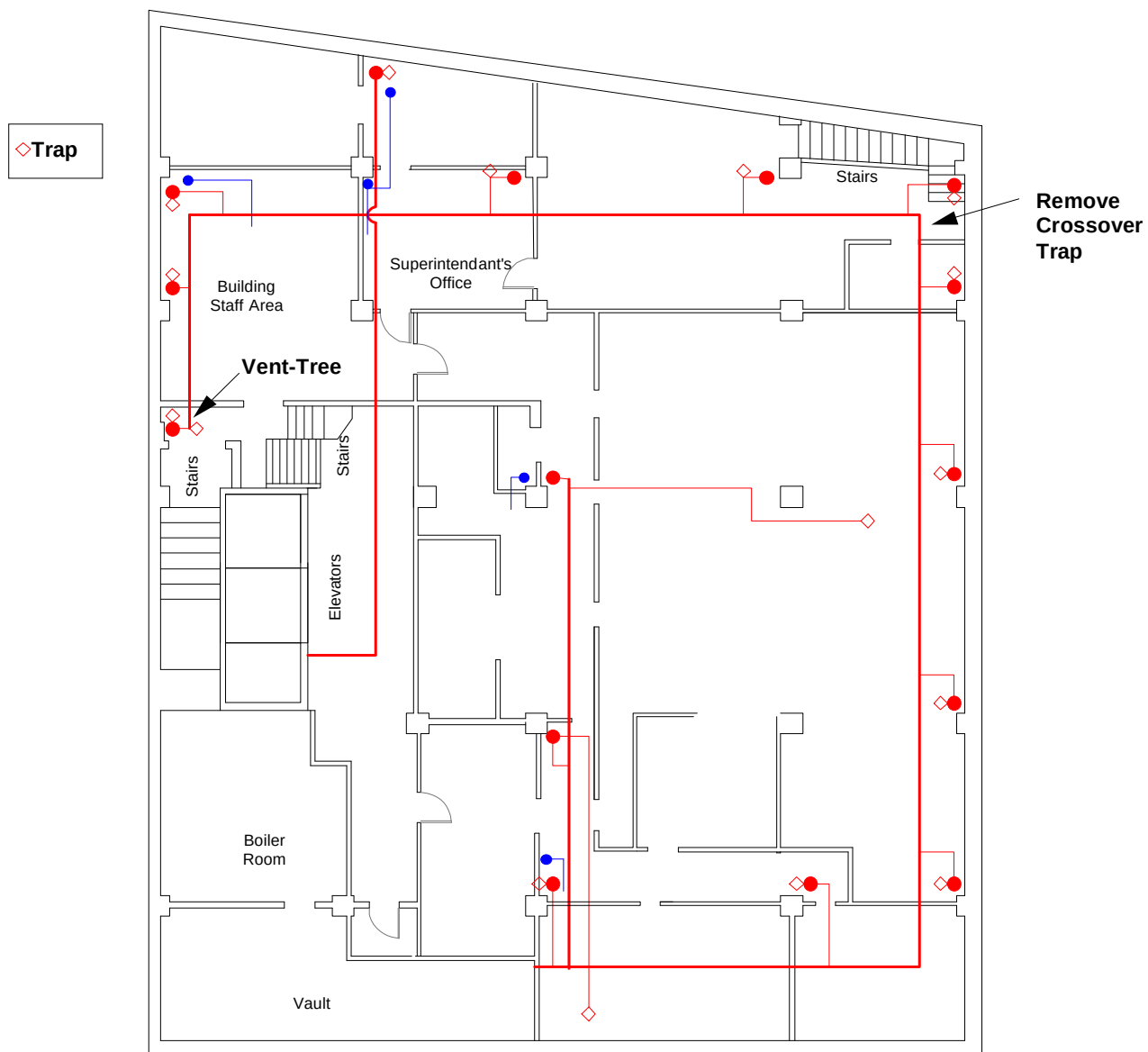
In the Northeast corner, near the stairs, a small "crossover trap" runs directly from the steam main to the dry return (photo at right). Remove the trap, and cap both ends.



Vent-Tree

- In the basement stairwell landing area, install a vent-tree onto the capped 1" takeoff near the end of the steam main (photo at near right).
- Build the tree as shown in the photo at far right. Nipples and fittings shall be $\frac{3}{4}$ ". Install the vents into $\frac{3}{4}$ "x $\frac{1}{2}$ " bushings. For compactness, use a cross-Tee and street-elbows as shown. Elevate the tree as high as possible.
- Tree shall have four Gorton #2 vents. It shall also have a 0-10 PSI pressure gauge with $3\frac{1}{2}$ " dial.



Basement Plan

Equipment Takeoff

This information is given to assist the Contractor in bidding, and is not to be considered a comprehensive list of contractually required materials. Pipe, tubing, fittings, ball-valves, wire, conduit, paint, and general supplies are not included.

<u>Count</u>	<u>Item</u>	<u>Make</u>	<u>Model</u>	
1	Multi-Mod Pressure Controller	Heat-Timer	926650-135	_____
1	0-30 PSI Pressure Transducer	Heat-Timer	904310-00	_____
2	LWCO w/ water column	McDonnell-Miller	157 or 157S	_____
2	Secondary LWCO		with manual reset	_____
1	Backflow Preventer	Watts		_____
2	Slow-closing solenoid	Asco	8221G5 120VAC ¾"	_____
1	Solenoid Rebuild Kit	Asco	310388	_____
1	¾" Water Meter		Gallons, not Ft³	_____
3	Circuit-Setters	Bell & Gosset	CB1½	_____
2	Oil Strainers	General	2A-700B	_____
2	Replacement Strainer element	General	2A-710	_____
2	Smokebox Thermometer	Weiss or equal	5" dial, 8"-9" stem	_____
2	Liquid-Filled Vacuum-Gauges	Weiss or equal	0-30"hg	_____
2	Liquid-Filled Pressure-Gauges	Weiss or equal	0-400 PSI	_____
1	Pressure-Gauge	Weiss or Equal	0-10 PSI	_____
4	Main line vents	Gorton	#2 vents	_____
2	Anode Bars	Rock-Mills	NeutroChem	_____
1	¾" Water meter		Gallons, not Ft³	_____