

**ITEM 10599.2720 M - PLUMBING, HEATING, AND AIR CONDITIONING SYSTEMS**  
**AT LONG BEACH BRIDGE**

**DESCRIPTION.** Work under this item shall include removal and replacement of plumbing fixtures, hot and cold water systems; installation of packaged terminal air conditioning units, electric baseboard; installation of wash system; and other incidentals and related work.

The Contractor shall provide all plumbing inside the Operator's House and make connections to existing building drain and water service, including furnishing all labor, equipment, tools, scaffolding, services, supplies and materials, and perform all operations necessary or incidental to a finished job, in conformity with the Drawings, Specifications, and applicable codes.

Work under this item shall include, but not necessarily be limited to, the following:

1. Removal and replacement of existing plumbing fixtures, including related piping.
2. Furnishing and installation of two packaged terminal air conditioning units.
3. Furnishing and installation of an electric hot water heater.
4. Furnishing and installation of electric baseboard.
5. Removal and replacement of domestic hot and cold water piping and sanitary and vent piping.
6. Installation of new backflow preventer, including associated gauges and valves.
7. Installation of new bridge wash system, including all related piping, disconnects, and flexible connectors.
8. Relocation of existing sanitary pump basin and alteration to sanitary piping.
9. Removal of existing boiler, pumps, hydronic piping, radiators, valves, and accessories.

**MATERIALS.**

**Pipe and Fittings.** Pipe and fittings shall conform to the Specifications and standards of the following: American National Standards Institute (ANSI); American Society of Testing Materials (ASTM); Commercial Standards (CS); Federal Standards (FS); and/or American Water Works Association (AWWA); National Sanitation Foundation (NSF).

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1. Underground building connections and storm drains from rain leaders pipe shall be extra heavy bell and spigot cast iron soil or PVC gravity sewer pipe extra strength conforming to ASTM D 3034 (SDR35).
2. Waste and vent piping systems shall be rated at 30 kPa head of water. Piping shall be PVC plastic pipe conforming to ASTM D 2665, Schedule 40. Fittings shall be PVC socket type conforming to ASTM D 2665 and made to ASTM D 3311 drain, waste, and vent pipe patterns, with solvent-cemented joints.
3. The water distribution system shall be copper pipe or copper tube. Copper tube shall have a weight of not less than copper water tube Type L.
4. Vent piping above floor shall be either service weight cast iron, copper tube DWV or PVC-DWV Schedule 40, all in accordance with Nassau County Plumbing Code.
5. Nipples shall be same material, quality, and coating as the pipe in which installed and when treated and when threaded shall be extra heavy weight.

**Joints.** Threaded pipe joints shall be made with teflon tape or pipe joint cement on male threads only.

Cast iron pipe joints above ground shall be: threaded; bell and spigot, caulked with jute packing and 0.45 kg of virgin soft pig lead for each diameter of pipe; or no-hub made with an approved elastomeric sealing sleeve and stainless steel clamp, clamping screw, and housing.

Joints in storm drainage piping underground outside and building drain piping underground and inside shall be bell and spigot with elastomeric compression gasket.

Soldered joints for copper tubing shall be made with approved cast bronze or wrought copper fittings and 95-5 tin-antimony solder.

Joints for PVC pipe shall be socket type conforming to ASTM D 2665 and ASTM D 3311.

**Hangers, Anchors, and Guides.** Hangers shall be adjustable clevis hangers. Hanger rods shall have machine threads. Malleable iron brackets of approved type shall be used along the walls.

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Hangers shall be as manufactured by Grinnell Company, Carpenter and Patterson, F&S Corporation, or equal as approved by the Engineer.

Wire and strap hangers will not be permitted in this installation.

**Valves.** Furnish and install valves where indicated on Drawings or specified, so located that they may be operated, repaired, or replaced with a minimum of effort and repacked under pressure.

Valves shall be as manufactured by Crane, Jenkins, Walworth, or equal as approved by the Engineer. The following list is intended only as a guide for type and quality:

<u>Type Valve</u>	<u>Example</u>
Gate Valves	Jenkins Fig. 1240
Ball Valves	Jenkins Fig. 1200C

Soft solder shall be used to install all solder end valves and shall be 95-5 Tin/Antimony Solder.

**Cleanouts and Access Covers.** Cleanout plugs shall be of heavy cast brass of the screwed type. Plugs shall be full size up to 100 mm.

Furnish and install floor-type cleanouts, Josam Manufacturing Company Series 56030, nickaloy top or similar as manufactured by Zurn Company or J. R. Smith Company or equal as approved by the Engineer.

Wall cleanouts shall have stainless steel access covers, Josam Manufacturing Company Series 58710 or similar as manufactured by Zurn Company, J. R. Smith Company, or equal as approved by the Engineer.

Cleanouts at the base of rainleaders shall be Josam Series 85810 or similar as manufactured by Zurn Company, J. R. Smith Company, or equal as approved by the Engineer.

**Shock Absorbers.** Shock absorbers on the hot and cold water piping where required to prevent water hammer shall be equal to Josam Manufacturing Company Series 75000, Zurn,

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J. R. Smith Company or equal as approved by the Engineer. Installation shall be per manufacturer's recommendations.

**Backflow Preventer.** Backflow preventer shall be reduced-pressure-principle type, American Society of Safety Engineers (ASSE) 1013, suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet; test cocks; and pressure-differential relief valve with ASME A112.1.2 air-gap fitting located between two positive-seating check valves. Pressure loss shall be 83 kPA maximum, through middle one-third of flow range.

Backflow preventer shall be sized for maximum flow rate and maximum pressure loss indicated.

A 50 mm NPS and smaller shall be bronze body with threaded ends. Interior components shall be of corrosion resistant materials. Supply strainer on inlet.

**Wash Station.** Wash station shall consist of hose bibb, drain valve, rubber flexible connector, and quick hose disconnect.

**Hose Bibbs.** Hose bibbs shall be bronze body, with renewable composition disc, 13 mm or 19 mm NPS (DN15 or DN20) threaded or solder joint inlet. Provide ASME B1.20.7 garden-hose threads on outlet or field installed, nonremovable, drainable, hose connection vacuum breaker. Finish shall be rough brass with wheel handle operation.

**Drain Valve.** Drain valve shall be MSS SP-110, 19 mm NPS (DN20) ball valve, rated for 2.8 MPa minimum CWP. Include two piece, ASTM B 62 bronze body with standard port, chrome plated brass ball, replaceable seats and seals, blowout-proof stem, and vinyl covered steel handle. Inlet shall be threaded or solder joint.

**Outlet.** Outlet shall be short-threaded nipple with ASME B1.20.7 garden hose thread and cap.

**Rubber Flexible Connector.** Rubber flexible connector shall be CR or EPDM elastomer rubber construction, with multiple plies of NP fabric, molded and cure in hydraulic presses. Include 860 kPA minimum working pressure rating at 104 degrees C. Units may be straight or elbow type, unless otherwise indicated.

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**Quick Disconnect Hose Coupling.** Quick disconnect hose coupling shall consist of adapter and coupler each with hose shank. System shall be manufactured to meet Specification MIL-C-27487. Coupler and adapter shall have heavy duty construction and provide a leak-proof seal once connected. Hose coupling shall be manufactured by OPW, Swagelok, Instant-Loc, or as approved by the Engineer.

**Exhaust Fan.** Exhaust fan shall be rated for 17M<sup>3</sup>/min at 31 Pa water gauge static pressure, with wall collar, fan guard, and gravity damper. Fan shall be Greenheck SDE-12-32-B or equal by Loren Cook or Penn Ventilator, or as approved by the Engineer.

**Plumbing Fixtures.** The Contractor shall furnish and install all fixtures, including supports, connections, fittings, and any incidentals to make a complete installation in accordance with the Drawings and Specifications. Where escutcheons are not furnished with plumbing fixtures, the Contractor shall supply them. Unless internally trapped, each fixture shall be separately trapped, using the type and size of trap required by the Plumbing Code. Unless otherwise specified, faucets and all exposed pipe and fittings shall be chromium plated. All fixtures shall have the manufacturer's guarantee label or trademark indicating first quality.

Fixtures shall be as manufactured by American Standard, Crane, Kohler, Gerber or equal as approved by the Engineer. Toilet seat shall be as manufactured by Church, Olsonite, Beneke, or equal as approved by the Engineer. The following list is intended only as a guide for style and quality of fixtures and accessories:

1. Water Closet - American Standard, "Cadet" No. 2164.135, vitreous china, close coupled closet combination with flush tank, front siphon jet bowl with extended rear shelf, with tank and cover. Complete with water control with backflow preventer, trip lever flush valve, and 13 mm supply pipe with water stop.
2. Lavatory - American Standard Lucerne 0356.015 vitreous china, acid-resisting enamel, with front overflow, cast-in soap dish, 508 x 457 mm, with wall hanger. With combination hot and cold water supply and pop-up drain, Heritage Fittings Model 6801.000. With 32 mm P-trap and chrome plated water stops.

**Water Heater.** A 45 L water heater shall be installed where shown on the Drawings.

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The water heater shall be Model M-1-12UT 55 of Bradford-White or similar by Slate or Ruud, or equal as approved by the Engineer. The heater shall be capable of supplying 1500 watts at 110 volts, single phase.

The unit shall operate with an adjustable aquastat and be fully insulated.

**Packaged Terminal Air Conditioning Unit.** A wall mounted, ductless packaged terminal air conditioning unit shall be installed in the Operator's House as indicated on the Drawings.

The unit shall be packaged, self-contained, through the wall terminal units with room cabinet, electric refrigeration system, heating, and temperature controls; fully charged with refrigerant and filled with oil.

Cabinet shall be 1.3 mm thick, galvanized steel with removable front panel and concealed latches. Finish shall be epoxy coating.

Refrigeration system shall be direct-expansion indoor coil with apillary restrictor, hermetically sealed compressor with internal spring isolation, external isolation, permanent-split-capacitor motor, and overload protection.

Air system shall be forward-curved, centrifugal, indoor fans with permanent-split-capacitor motor, permanent washable filters, and positive-pressure ventilation damper with concealed manual operator.

Electric-resistance heating coils shall be nickel-chromium wire, electric-resistance heating elements with contactor and high temperature limit switch.

Control module shall be a unit mounted adjustable thermostat with heat anticipator, off-heat-auto-cool switch and high-low fan switch.

Packaged terminal air conditioning unit shall be manufactured by Carrier Corporation or similar by Climate Master or McQuay as approved by the Engineer.

**Electric Baseboards.** Electric baseboard shall have electric heating elements enclosed in a metallic sheath mechanically expanded into aluminum fins, with high temperature cutoff. Accessories included shall be integral disconnect switch and convenience receptacles in blank sections where indicated.

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Enclosure shall be sheet metal, with appropriate allowances for linear expansion to eliminate operating noise. Finish shall be manufacturer's Standard Finish White (or substitute as approved by the Engineer).

Electric baseboard units shall be manufactured by Markel or similar by Marley or Rezner or as approved by the Engineer.

**Insulation.** Insulation shall be installed under this Section but not until piping has passed all tests as required by the Engineer.

All hot water and cold water piping above floor level except exposed chromium-plated fixture riser, shall be insulated with 13 mm thick fiberglass pipe insulation with flame-resistant all service jacket insulation, Gustin Bacon, Owens-Corning, Johns Manville, CGS, or equal as approved by the Engineer, which shall be installed with lateral joint at bottom of pipe.

Water service along bridge and terminating into the lower level of the Control Building shall be insulated with 38 mm thick fiberglass pipe insulation with flame-resistant all service jacket, as above, after heat tracing wire is applied.

**CONSTRUCTION DETAILS.**

**Drawings.** All work shown on the Drawings is approximately to scale, but is diagrammatic only. Size of pipes and general location is shown, but it is not the intent to show every offset and fitting, or every conflict that may be encountered. All necessary fittings and parts to make complete working systems ready for use shall be provided.

The Drawings and Specifications are intended to supplement each other so that any work shown on the Drawings and not mentioned in the Specifications or vice versa shall be provided as if mentioned in the Specifications and shown on the Drawings.

The Contractor shall refer to the architectural, structural, electrical, and other Contract Drawings which indicate the construction in which this work will be installed. Locations shown on the Drawings shall be checked against the general and detailed drawings of the overall construction. All measurements must be taken at the building.

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**Codes, Ordinances, and Permits.** All work shall be performed in strict accordance with all applicable conditions and regulations as set forth in the Plumbing Code for Nassau County and the requirements of any other local or governing body having jurisdiction.

Any material or workmanship called for in the above mentioned conditions and regulations, which is not specified or shown on the Drawings, shall be furnished and installed by the Contractor as though same has been specifically mentioned or indicated. If the Drawings and Specifications are at variance with any regulations, the Bidder shall notify the Engineer at the time of submitting his bid.

If the Contractor fails to notify the Engineer at this time and installs work in variance with the above mentioned codes and regulations, he shall assume full responsibility and expense to correct the installation.

Secure all permits necessary in connection with the installation of this equipment.

**Coordination.** Furnish full information to all trades relative to the work which they are to do in connection with work under this section, which includes data for wiring, openings for pipes, equipment foundations, pipe chases, etc.

Confer with other trades as to the location of their work before beginning work and install pipes in such manner as to avoid interference with other trades.

Contractor shall provide at his expense any changes in the location of pipe chases or additional pipe chases as may be required because of interferences with other trades. Approval for such changes must be made by the Engineer.

**Shop Drawings.** Shop drawings shall include descriptive data and/or catalog cuts which shall be submitted for all equipment, plumbing fixtures, floor drains, cleanouts, valves and hydrants and other accessories of the mechanical systems that may be required by the Engineer.

**Cleaning and Protection.** All materials and equipment shall be carefully protected during shipment and protected during installation and properly handled and stored at the job site so as to prevent damage. The Contractor shall assume full responsibility for protection of the plumbing, heating, and air conditioning systems and equipment until its completion and final acceptance.

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Upon completion of the work, the Contractor shall clean all fixtures and equipment and replace damaged parts.

**General Procedures.** No plumbing fixture or device shall be installed in such a manner as to make a cross-connection between the potable supply and any polluted water system or drainage system.

All plumbing fixtures or devices requiring hot or cold water, drainage or electrical connections shall have such connections made, complete in all respects.

The work shall be carefully laid out in advance, and any excess cutting or construction will not be permitted. Damage to buildings, piping, wiring or equipment as a result of cutting for installation shall be repaired by mechanics skilled in the trade involved, at no additional cost.

Fixtures and devices shall be tightly covered and protected against dirt, water, and chemical or mechanical injury. Upon completion of the work, all fixtures and devices shall be cleaned, adjusted, and operated.

In the execution of the work, the Contractor shall comply with the National Plumbing Code and/or the local Plumbing Code, as directed by the Engineer.

The Contractor shall give the required notice relative to the work when inspections are required, shall obtain and pay for all permits, and shall make all deposits necessary for the work to be performed.

All electrical connections will be made and specified under the section entitled "Bridge Electrical System."

**Removal of Existing Mechanical Systems.** The Contractor shall store all items, earmarked for removal, at the site and shall turn over material to the Nassau County Department of Public Improvements storage yard or shall dispose of any items upon notification.

**Sanitary and Storm Systems.** Furnish and install a complete system of building drains to take soil or wastes from all soil and waste stacks, fixtures, equipment, floor drains, and rain conductors as indicated and/or described on the Drawings and in the Specifications.

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No piping smaller than 75 mm shall be used under floors or below grade. The use of double Y's in the horizontal shall not be permitted.

All 100 mm and larger diameter horizontal drain pipes within the building shall be pitched at least 1 percent in the direction of flow. Smaller drains shall be sloped at 2 percent.

All changes in direction of drainage lines shall be made with 0.785 R (45 degree) wyes, long-turn wyes, or sweep bands. Install cleanouts at all changes in direction.

**Vent System.** Furnish and install a complete system of vent piping to vent all stacks, fixtures, traps, and appliances, as indicated on Drawings or required to meet the Plumbing Code. All horizontal vent piping shall pitch back toward fixtures, to allow condensation to drain.

**Water Supply System.** Furnish and install a complete cold water system to service all fixtures and equipment where indicated on the Drawings, or specified as requiring cold water. Piping shall connect to the existing water main in the Operator's House and extend to all fixtures and equipment, including piping, fittings, and valves. In general, piping shall pitch upward in the direction of flow with each branch separately valved and with 13 mm hose bibb drain on the outlet side of the valve and at all low points in the system. Install gate valves for each branch to the fixtures and to each piece of equipment and other valves as necessary to isolate any part of this system.

Install shock absorbers in the hot and cold water piping to each branch of fixtures.

**Hot Water Supply System.** Furnish and install complete hot water system from and including the hot water heater to service all fixtures and equipment where indicated on the Drawings. Piping shall run parallel to the cold water piping where possible with branches separately valved and drained as specified for cold water. Expansion compensators shall be provided where required in the piping system.

**Pipe Sleeves, Escutcheons, and Inserts.** Pipe sleeves for all piping shall be furnished and set by the Contractor, who shall be responsible for their proper and permanent location.

Pipe sleeves of galvanized steel shall be installed and properly secured at all points where pipes pass through masonry or concrete walls and floors. Pipe sleeves shall be of sufficient diameter to provide approximately 6 mm clearance around pipe except as otherwise shown, and in the case of insulated pipes, approximately 6 mm clearance around the insulation. Where

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pipes pass under footings and through exterior walls, sleeves shall be of cast iron and shall be not less than 100 mm larger than the pipe being sleeved. Sleeves in floor shall extend 25 mm maximum above floor and after installation of pipe shall be packed and made watertight. Provide factory-made metal escutcheons where pipes pass through walls and ceilings, 38 mm minimum larger diameter than pipe, firmly secured to pipe with non-corrosive spring or set screw.

Install inserts or other anchoring devices in concrete and masonry construction as required to support piping and equipment. Inserts shall be of the adjustable type as manufactured by Phillips Red Head, Grinnell Company, Star Expansion Company, or equal as approved by the Engineer.

**Hangers, Anchors and Guides.** All piping shall be supported from the building structure by means of approved hangers and supports. Piping shall be supported to maintain required grading and pitching of lines, to prevent vibration and to secure piping in place, and shall be so arranged as to provide for expansion and contraction.

Hanger spacing for cast iron pipe shall be at the joints with the spacing not exceeding 1.5 m. Copper tube 32 mm or less, 1.8 m spacing and 38 mm and over, 3.0 m intervals. PVC piping shall be supported at intervals not greater than 1.2 m.

Vertical lines shall be adequately supported at their bases by a suitable hanger placed in the horizontal line near the riser and by supports at not less than 3.0 m intervals.

Piping shall not be hung from the hangers of other trades.

**Valves.** Valves on branch lines near the ceiling shall be grouped as close as possible to each other for accessibility.

**Traps.** Traps shall be provided in the sanitary drainage system at every fixture or fixture connection.

**Cleanouts and Access Covers.** Furnish and install all cleanouts indicated on the Drawings and/or where required in soil, waste, and storm pipes. Cleanouts shall be installed at the base of all risers and at each change of direction.

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Cleanouts for piping running under floor slab shall be brought up to just under the floor slab level.

**Floor Drains.** An S-trap shall be installed on floor drains as shown on the Drawings.

All drain bodies must be sealed in the floor slab to prevent leakage into space below the floor slab.

**Testing and Adjusting.** The Contractor shall provide all labor, equipment, and materials and make all arrangements for testing the completed plumbing work. Tests may be applied to a system either in its entirety or in sections. No part of the plumbing system shall be covered or concealed until it has been approved and tested. The drainage system shall be tested in accordance with the local codes and in no case less than the following:

1. The entire system of piping shall be thoroughly blown out for the purpose of removing dirt and grease. This shall be continued for as long a period of time as is necessary to thoroughly clean the installations.
2. The entire interior and exterior plumbing, drainage, venting, and storm drainage system shall be tested by the Contractor under a water test. The water test shall include the entire system from the lowest point to the high pipes above the roofs. Water test shall be made in accordance with all the local requirements. Every portion of the system shall be tested to a hydrostatic pressure equivalent to at least a 30 kPA head of water. After filling, the Contractor shall shut off water supply and shall allow it to stand 4 hours under test, during which time there shall be no loss or leakage. Any defects in materials or workmanship found to exist and cause leakage shall be repaired or replaced with new material as may be required by inspectors or the Engineer and the test repeated until work is shown to be watertight.
3. The domestic water supply system shall be subjected to a hydraulic test at a pressure equal to 1½ times the normal operating pressure before covering any part of the system. Testing may be conducted on various sections of the system for convenience; however, no pipes or joints shall be left untested. All leaks or defects indicated by tests shall be repaired or replaced with new material as directed by the Engineer, and test repeated until all defects are removed.
4. The Contractor shall furnish all equipment, labor, and materials required for these tests.

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**Chlorination of System.** Upon completion of the plumbing work, the Contractor shall thoroughly chlorinate the water system by filling it with a strong solution of chlorine and allowing the chlorine to remain in the piping for 24 hours. The solution shall be prepared from High Test Hypochlorite, or the equivalent High Test Powder, in the proper proportion to produce 10 ppm (parts per million) of chlorine.

**METHOD OF MEASUREMENT.** Payment will be made at the lump sum price bid.

Progress payments will be made in accordance with the following: The Contractor shall submit a schedule of work outlining each work phase, with a percentage figure assigned to each phase. The percentages assigned to each phase are subject to the approval of the Engineer. The Engineer will use this schedule to set progress payments. The Engineer may request a revised work schedule at any time. Failure by the Contractor to supply a revised work schedule upon request will cause the progress payment process to be immediately terminated.

**BASIS OF PAYMENT.** The lump sum price bid for this item shall include the cost of all labor, material, and equipment necessary to complete the work outlined herein.

Electrical work is included under item "Bridge Electrical Equipment Rehabilitation."