University of Connecticut Health Center

WATER HEATER No. 9 REPLACEMENT
PROJECT NO. 13–021

PREPARED BY:

THE DEPARTMENT OF CAMPUS PLANNING, DESIGN AND CONSTRUCTION
UNIVERSITY OF CONNECTICUT HEALTH CENTER
263 FARMINGTON AVENUE
FARMINGTON, CONNECTICUT 06030

CONSULTING ENGINEERS:

ADAJIAN ENGINEERING, INC.
50 ALBANY TNPK.
CANTON, CT 06019
860–693–0269

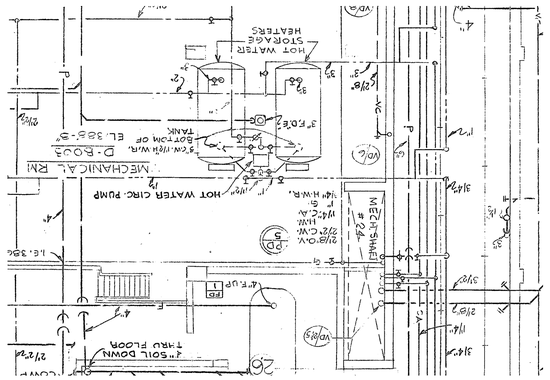
DRAWING INDEX

DRAWING TITLE

1 BUILDING PART PLANS
2 SPECIFICATIONS

NO	SYM	DESCRIPTION	DATE	APPV'D
0	--	SCHEMATIC DESIGN FOR REVIEW	07–26–2013	EA

ISSUE DATE: xx–xx–2013



BUILDING C BASEMENT PARTIAL PLAN

APPROXIMATE SCALE: 1/8" = 1'-0"
EXCERPT FROM ORIGINAL BUILDING PROJECT
DRAWING P-2, 4-26-68 (UCHC ARCHIVE FILE P-2.TIF)
FOR REFERENCE ONLY

NORTH

SCOPE OF WORK AND GENERAL NOTES

Refer to the Piping Schematic for all piping details.

DEMOLITION

1. Remove existing electric domestic water heater No. 9. Remove portions of the related H&CW piping as indicated (shown dashed). Remove related power feed (wire and conduit) from the water heater back to the pull box nearby as indicated.

2. Remove two existing heat exchangers and CRU and related steam, condensate return, H&CW piping, CRU pump discharge and vent as indicated (shown dashed). Remove CRU power feed (wire and conduit) back to disconnect – retain disconnect for the replacement CRU. Remove existing control panel and all related devices, wiring, and pneumatic tubing.

DOMESTIC WATER HEATER REPLACEMENT

1. Install a new 24"x24"x12" high concrete housekeeping pad for the new water heater and a new 24"x36"x4" high concrete housekeeping pad for the new condensate return unit as indicated. Reinforce with 4"x4" WWF and dowel to the existing floor slab. Coordinate the exact size and location with the water heater and condensate return unit provided.

2. Install the new water heater and condensate return unit on the new housekeeping pads and secure with Kwik bolts per the manufacturer's recommendations.

3. Connect the new water heater to the existing CW/HWR (and pipe through a new backflow preventer) and HW as indicated. Pipe the T&P relief valve and pressure relief valve to the floor.

4. Connect a new 3" steam to the existing 3" steam main in the area and pipe to the new water heater as indicated.

5. Pipe the condensate return from the new water heater to the new CRU as indicated. Pipe a new 1 1/4" pump discharge from the new condensate return unit to the existing condensate main in the area as indicated.

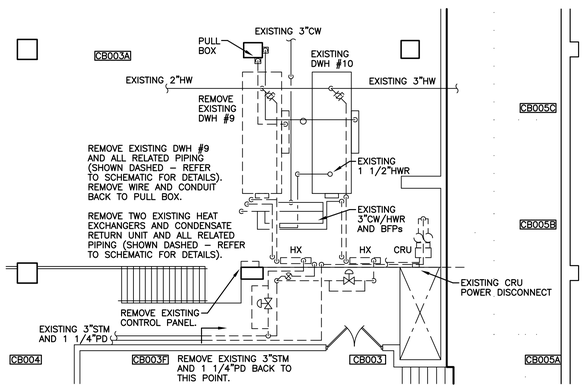
6. Pressure test and clean all new piping as specified.

7. Insulate all new piping as specified.

8. Wire the new water heater from a new 20 amp 1 pole C/B in a local panel and through a new local disconnect. 3/4"C, 2#12 + 1 #12 ground.

9. Wire the new CRU from the existing CRU disconnect. 3/4"C, 2#12 + 1 #12 ground.

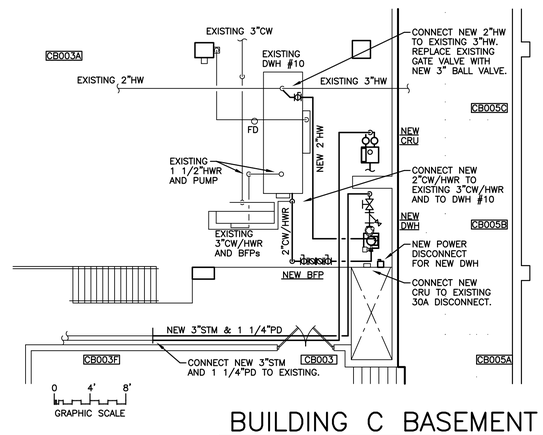
10. Connect the new water heater overtemperature alarm (dry contacts) to the existing Energy Management System (EMS). Program the existing EMS for the alarm.



BUILDING C BASEMENT PARTIAL DEMO PLAN

SCALE: 1/8" = 1'-0"

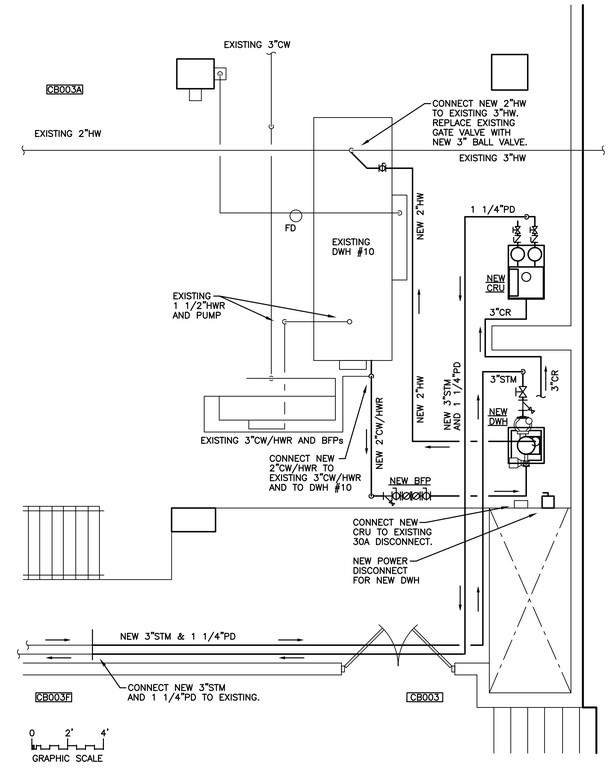
NORTH

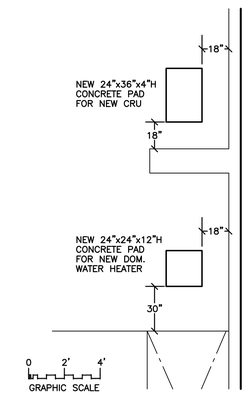


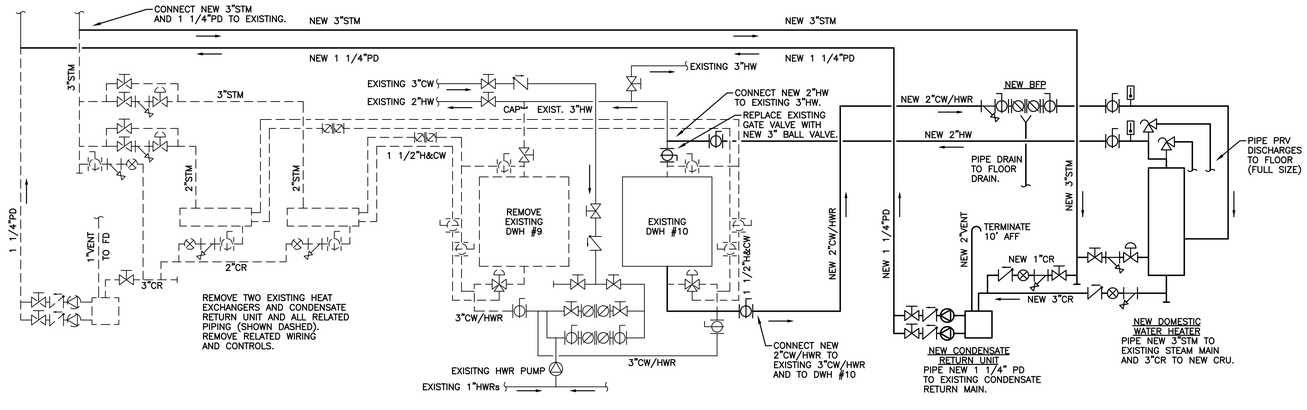
BUILDING C BASEMENT PARTIAL RENOVATION PLANS

SCALE: 1/8" = 1'-0" AND 1/4" = 1'0"

NORTH







PIPING SCHEMATIC

NOT TO SCALE

LEGEND

- GATE VALVE
- BALL VALVE
- CHECK VALVE
- PRESSURE RELIEF VALVE (PROVIDED WITH THE WATER HEATER)
- CONTROL VALVE (STEAM VALVE PROVIDED WITH THE WATER HEATER)
- STRAINER (WITH BLOWDOWN VALVE)
- STEAM TRAP
- PUMP
- THERMOMETER (RANGE: 0–200°F.)
- BACK FLOW PREVENTER

NOTE: PROVIDE UNIONS THROUGHOUT AS REQUIRED TO FACILITATE FUTURE SERVICE. (NOT SHOWN)

BUILDING INFORMATION

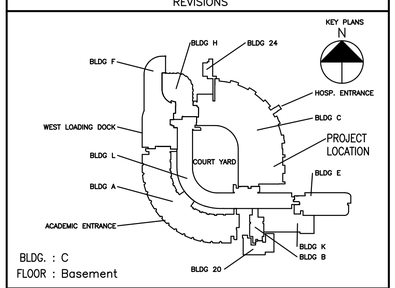
PROJECT LOCATION: BUILDING C BASEMENT

BUILDING CONSTRUCTION CLASSIFICATION:
TYPE 1A–PROTECTED NON–COMBUSTABLE, FULLY SPRINKLERED

BUILDING AREA USE CLASSIFICATION:
I–1 – INSTITUTIONAL

NO	SYM	DESCRIPTION	DATE	APPV'D
0	–	SCHEMATIC DESIGN FOR REVIEW	07–26–2013	EA

REVISIONS



BLDG. : C
FLOOR : Basement

University of Connecticut Health Center
Campus Planning, Design and Construction

PROJECT NAME	PROJECT NO.
WATER HEATER No. 9 REPLACEMENT	13–021
DRAWING TITLE	DRAWING NO.
BUILDING PART PLANS	1

SCALE	CHECKED BY	PROJECT MGR.	ISSUE DATE
AS NOTED	E.A.	R.T.	xx–xx–2013

SPECIFICATIONS

GENERAL

1. Related documents: The General Conditions and Supplementary General Conditions for this project shall apply to the work specified herein.

2. Provide all materials and labor as required for the construction, cleaning, and testing of the systems as shown on the drawings and as described herein. All materials and equipment shall be new unless specified otherwise. All work shall be in compliance with all state and local codes and shall be performed in accordance with good industry practice. The work shall include, but not be limited to the following:

   a. Hot and cold water, steam, condensate return, and pump discharge piping including valves and accessories.
   b. Backflow preventer.
   c. Condensate return unit.
   d. Instantaneous steam water heater.
   e. Pipe insulation.
   f. Electrical devices and wiring.
   g. Selective demolition of existing systems.
   h. Cutting and patching associated with the new work.
   i. Anchors, sleeves, and supports for the new work.
   j. Cleaning, testing, balancing, and startup of the specified systems.
   k. Building permits as required for the work specified herein.
   l. Shop drawings and as-built drawings.
   m. Guarantees.
   n. Operating instructions to the Owner.

3. Related work contracted separately by the Owner:

   a. Asbestos management, if required, will be performed by the Owner. Whenever asbestos is encountered where it may interfere with the work of this contract, the Contractor shall notify the Owner immediately. Asbestos testing, abatement, remediation, and related work will be performed by others under separate contract to the Owner.

4. Quality assurance, codes, and standards: all equipment shall be in compliance with all state and local codes as well as national testing standards as applicable. Refer to product specifications herein for additional requirements.

5. Substitutions: use only materials and equipment of manufacturers listed in this specification. Where the term "or equal" is used, obtain approval from the Owner before the substitution is made.

6. Provide shop drawings (6 copies) for the approval of all equipment being furnished prior to the release for manufacturing. Submittals shall include outline drawings of the equipment (including plan and elevation views, dimensions, weights, and clearances), catalogue cut sheets and descriptive material, performance data, shipping date (calendar days following receipt of order), statement of warranty, and installation operation and maintenance manuals and as further specified herein.

   Provide as-built drawings for the equipment and piping layouts.

7. Shipping: equipment shall be purchased F.O.B. manufacturer's location with freight included. Equipment shall be packaged for shipment by common carrier in accordance with industry standards. Delivery shall be made to the contractor, their rigging subcontractor, or the job site, as directed by the contractor.

8. Guarantee all work in writing to be free of defective work, materials or parts for a period of one year after acceptance of work by Owner (except where specified otherwise herein). Repair, revise or replace defects, failures or inoperativeness at no cost to Owner.

9. Job conditions: coordinate all work with all trades and with the Owner to insure timely and efficient completion of the work. The schedule of work shall be approved by the Owner.

PRODUCTS

Products shall be equal to the following:

1. Domestic hot and cold water piping shall be type 'L' hard drawn copper tubing with cast or wrought fittings. Joints shall be made using 95/5 solder.

2. Steam, condensate return, pump discharge, and vent piping shall be welded or seamless carbon steel pipe, Schedule 40, with threaded ends up to 2", beveled ends in sizes 2-1/2" and over, and conforming to ASTM A-53. Installation shall be in conformance with ANSI B31.1 standards. Fittings 2" and under shall be 150 lb. malleable iron, screwed. Fittings 2-1/2" and over shall be standard weight butt weld carbon steel as manufactured by Weld Bend or equal. Flanges shall be Class 150 socket or welding neck type with raised face, and spiral serrated finish. Provide all unions, valves, vents, strainers, thermometers, pressure gauges, etc. as required to complete the system.

3. Valves for water and steam service:

   a. Ball valves: Apollo 70-100 Series (with threaded or socket ends) full port, two piece bronze construction.

   b. Gate valves 2" and smaller – Jenkins Figure 47CU (or Crane Figure 431UB); 2-1/2" and larger Jenkins Figure 651J (or Crane Figure 465 1/2).

   c. Check valves 2" and smaller – Jenkins Figure 4092 (or Crane Figure 137); 2-1/2" and larger Jenkins Figure 624C (or Crane Figure 373).

4. Low pressure steam traps: Sarco Type FT-15 float and thermostatic, suitable for inlet pressures to 15 PSIG. Trap sizes shall be selected for twice the maximum equipment discharge rate at 1/2 PSI pressure differential.

5. Strainers: 2" and smaller – Sarco Type IT; 2-1/2" and larger – Sarco Type CI-125. Strainers shall be suitable for pressures to 125 PSIG. Provide with stainless steel screens and blow down valves with hose end connections.

6. Thermometers: Trerice No. A40602 with 138-0016.1 separable brass socket, 9" aluminum case, adjustable angle, and 5" insertion length. Scale range: 0-200°F.

7. Back flow preventer (reduced pressure zone valve assembly): Watts Series LF009-QT, 2", lead free. The valve shall be a complete assembly with ball isolation valves; check valve body with bronze seats, stainless steel trim, and rubber check valve discs; relief valve (located between the two check valves); and bronze ball valve test cocks. The assembly shall be UL classified and meet the requirements of the AWWA. Provide with inlet strainer and Model 909AG-F air gap drain connection.

8. Condensate return unit: Lockwood Products, Inc. Model VCS-87 1/2 Duplex Condensate Unit suitable for 460 volt 3 phase power. The CRU shall be a packaged unit pre-piped and wired complete with cast iron receiver, duplex pumps, and controls. The controls shall include float switches, combination magnetic starter disconnects (for each pump), on-off-auto selector switch (for each pump), mechanical alternator, pilot lights, and control transformer. Controls shall be housed in a NEMA 1 enclosure. Receiver capacity: 21 gallons. Pump capacity (each): 12 GPM at 75 PSIG with a 3 HP motor.

SPECIFICATIONS (continued)

PRODUCTS (continued)

9. Water heater: Harsco, Patterson-Kelley Compact Semi-Instantaneous Water Heater Steam to Water Model PKOBS/4.0/S. The packaged unit shall be suitable for 15 PSIG steam and 120 volt 60 hertz 1 phase power and shall be completely prepiped and prewired.

   a. The water heater shall be rated to provide 40 GPM of domestic hot water from 50°F. to 140°F. and control the domestic fixture outlet temperature to within +/- 4°F. of the selected temperature when supplied with 15 PSIG saturated steam in the line before the control valve at a rate of 2,000 LBS/HR.

   b. The water heater shall be provided with the following materials of construction: shell – solid copper-nickel, ASME Code Section VIII Div 1, rated for 155 PSIG; tube bundle – 90/10 copper-nickel tubing, ASME rated for 150 psi working pressure, single wall; tube sheet – solid naval brass, full diameter threaded with studs baffles – teflon; and shell connections – solid copper alloy.

   c. The water heater shall consist of and be supplied with the following features and components:

      1. Vertical support made to meet seismic-restraint requirements, making the heater earthquake resistant.

      2. 1" bronze ASME rated temperature and pressure relief valve preset from the factory at 210°F. and 150 PSIG, and a 1" pressure only relief valve also set at 150 PSIG.

      3. All bronze circulation loop with bronze 1/12 HP circulator pump pre-wired with pilot lighted ON/OFF switch operating at 115/1/60. (The purpose of the pumps is to prevent scale.)

      4. Double solenoid temperature limit system in prewired control panel with lighted overtemperature indication auxiliary alarm dry contacts and audio alarm.

      5. Insulation in accordance with current ASHRAE standards – a flexible foam insulation laminated to a durable reinforced flexible jacket.

      6. Integral Anticipator temperature control system guaranteeing +/- 4°F. tolerance.

      7. 2 1/2" steam control valve (Spence E2T14 self-contained steam pilot operated).

      8. 1 1/4" float and thermostatic trap.

      9. 3" inlet steam strainer.

      10. Domestic water Thermometer (3 1/2" diameter dial minimum) direct mounted with separable thermowell.

      11. Steam pressure Gauge (3 1/2" diameter dial minimum) with shut-off cock.

      12. Manufacturer's installation and maintenance manuals.

   d. Each water heater shall be capable of being disassembled and the heat exchanger section removed for inspection and service without breaking the domestic water connections. The heater's support shall provide ample clearance for tube bundle removal. A full diameter tube sheet shall be provided with drilled and tapped bolt holes for independent bolting, enabling the bonnet to be removed without disturbing the domestic water side gaskets.

   e. The water heater manufacturer shall guarantee all components and workmanship for one year from date of start-up. The manufacturer shall also guarantee that the heater will perform at rated capacity as verified by an independent testing laboratory. In addition, the following components shall carry an extended, unconditional, non-prorated guarantee as follows:

      1. Tube bundle – the entire tube bundle assembly, from steam inlet to condensate outlet, shall be guaranteed for 10 years against failure from thermal shock, mechanical failure or erosion.

      2. Pressure vessel – 20 year guarantee against leakage.

      3. Anticipator temperature control – 20 year guarantee against any failure.

   f. Heater manufacturer shall provide the services of a factory trained representative to assist the Contractor in the startup of the domestic water heating system. A letter of compliance with all manufacturers instructions shall be submitted as part of operation and maintenance instructions.

10. Pipe insulation: all insulation shall have composite (insulation, jacket, and adhesives) fire and smoke ratings, as tested per ASTM E84, NFPA 255 or UL 723, not exceeding flame spread 25 and smoke developed 50. Accessories, such as adhesives, mastics, cements etc., shall have the same component ratings.

    a. Insulation for hot and cold water piping shall be 1" thick, rigid, heavy density, preformed glass fiber with all-service jacket. Jacket shall have pressure sensitive tape closure.

    b. Insulation for steam, condensate return, and pump discharge piping shall be 1 1/2" thick, rigid, heavy density, preformed glass fiber with all-service jacket. Jacket shall have pressure sensitive tape closure.

11. Electrical material schedule:

    a. Raceways: rigid metal conduit, zinc coated galvanized. Sizing as required by the NEC (minimum) with oversized raceways as indicated and where required for ease of pulling cable. Minimum conduit size: 3/4-inch, unless indicated otherwise.

    b. Flexible metal conduit: galvanized steel strip, spiral wound into interlocked flexible metal conduit with polyvinyl chloride (PVC) jacket (Sealtite).

    c. Pull and junction boxes: NEMA 4 (weatherproof) for exterior use and NEMA 12 for interior use.

    d. Wire: 600 volt class, single-conductor, 98% conductivity, annealed, uncoated copper conductors with 600-volt rated type "THHN/THWN" insulation.

12. Temperature controls: refer to other paragraphs of this Section for temperature control products which are specified as part of packaged equipment. Refer to the execution section for sequences of controls. Provide all necessary miscellaneous control components, wiring, and system programming as required to complete the system as shown on the drawings and as specified herein. All control wiring shall be installed in EMT conduit and shall comply with the requirements of the National Electric Code. All controls shall be connected to and become an extension of the existing Energy Management System.

SPECIFICATIONS (continued)

EXECUTION

1. General piping requirements:

   a. All piping shall be installed in a neat manner, and concealed in all finished areas. Drainage piping shall be laid out to maintain a minimum pitch of 1/4" per foot, unless otherwise shown. Pitch of lines shall be uniform and true with no sags, pockets or traps. Provide unions, cleanouts, isolation, drain, and vent valves throughout as required to facilitate future service. All piping shall be adequately supported. Piping shall be insulated as described below.

   b. All threaded joints in steel pipe and fittings shall be made with an approved type pipe joint compound or Teflon tape pipe joint sealer, used only on male thread. All burrs shall be removed, pipe ends reamed or filed out to size of bore and all chips removed.

   c. All welded joints shall comply with the ANSI codes for pressure piping. Welds shall be made by either the electric arc fusion or the oxyacetylene method, using welding rod of analysis to match the pipe. Welds must be thoroughly fused into the ends of the pipe to the bottom of the vee (formed by the beveled pipe ends), and shall be built up in excess of pipe wall thickness to additionally reinforce the joint.

   d. All piping systems installed under this contract shall be pressure tested to insure tightness. The Contractor shall be responsible for furnishing all plugs, piping, valves, hoses and pumps as necessary for the required tests and for proper disposal of the water upon completion of the tests.

      Tests shall be performed in accordance with the following:

      1. Hot and cold water piping shall be tested at 150 PSIG.

      2. Steam, condensate return, and pump discharge piping shall be tested at 150 PSIG.

   e. Upon completion of all work and satisfactory testing, all piping systems shall be flushed with water to remove dirt, grit, chips and foreign matter. Water for flushing shall be used in sufficient quantity to produce a velocity of at least 2.5 feet per second. After cleaning, the domestic hot and cold water piping systems shall be disinfected.

2. General insulation requirements: all insulation shall be wrapped tightly around the pipe and sealed to achieve a continuous vapor barrier. Pipe insulation shall be applied on clean, dry surfaces after inspection, tests, heat tracing, and release for insulation. Where new piping connects to existing piping, the existing insulation shall be patched. Installation shall strictly follow insulation manufacturers' recommendations. Scope of insulation work shall be as follows:

   a. Insulate all new hot and cold water piping.

   b. Insulate all new steam, condensate return, and pump discharge piping.

3. Piping, conduit, and equipment supports: all new work shall be adequately supported. Supports shall be in accordance with the 2005 State of CT Building code (2003 International Building Code Chapter 16 Section 1613 and following, Earthquake Loads); SMACNA Seismic Restraint Manual: Guidelines for Mechanical Systems; ASHRAE Guide to Seismic Restraint; and industry standards.

4. General Demolition Requirements: removals shall be performed without damage to adjacent work, however, where such work is damaged, the Contractor shall patch, repair or otherwise restore same to its original condition. All existing materials and equipment which have been removed or disconnected but are not indicated or specified for reuse in the new work shall become the property of the Contractor and shall be removed from the site by the Contractor at his expense unless specifically indicated otherwise. Removals shall be as indicated and as specified herein, and shall be performed in a neat and workmanlike manner to the limits indicated or specified, or to the minimum extent necessary or required for the proper installation of new work.

5. Rigging: The new equipment is specified to be shipped fully assembled as complete units, although disassembly into smaller sections to facilitate rigging and installation will be permitted. Special care must be taken to adequately protect the existing building surfaces during all rigging and hauling operations. The methods and scheduling of all rigging and hauling operations proposed by the Contractor shall be approved by the Owner.

6. Utilities: maintain existing utilities, keep in operation, and protect against damage during renovation operations. Do not interrupt existing utilities serving occupied or used facilities except when authorized in writing by the Owner.

7. Tags and identification: piping, valves, controls, and equipment installed under this Contract shall be tagged, labeled or stenciled.

8. Sequences of temperature controls:

   a. The control sequence for the existing electric domestic water heater No. 10 shall remain as is. Existing EMS monitoring to remain unchanged.

   b. New water heater control:

      1. The new water heater shall run in parallel with the existing electric water heater No. 10, and can be isolated manually.

      2. On startup the new water recirculation shall start and run continuously.

      3. The new water heater hot water supply temperature shall be maintained by its packaged controls (self contained steam control valve) at 140°F. Final supply temperature to the various building circuits shall be maintained by the existing controls.

      4. The new water heater's overtemperature alarm will annunciate locally (light and horn), additionally the alarm shall be connected to alarm at the existing Energy Management System (EMS).

   c. Condensate return unit control:

      1. The packaged controls shall cycle and alternate the pumps as required to maintain receiver water level.

9. Startup: The Contractor shall furnish the services of a qualified engineer or technician to aid in the checkout, installation and start-up of all systems specified herein. A final functional test of all systems shall be performed to verify their operation and demonstrate to the Owner the performance and operating procedures for the systems.

BUILDING INFORMATION

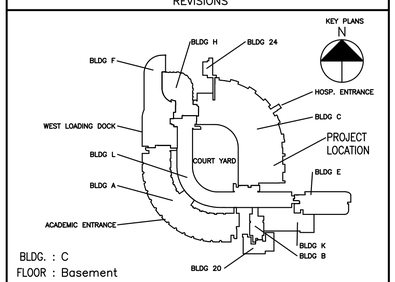
PROJECT LOCATION: BUILDING C BASEMENT

BUILDING CONSTRUCTION CLASSIFICATION:
TYPE 1A-PROTECTED NON-COMBUSTABLE, FULLY SPRINKLERED

BUILDING AREA USE CLASSIFICATION:
I-1 – INSTITUTIONAL

NO	SYM	DESCRIPTION	DATE	APPV'D
0	–	SCHEMATIC DESIGN FOR REVIEW	07-26-2013	EA

REVISIONS



BLDG. : C
FLOOR : Basement

University of Connecticut Health Center
Campus Planning, Design and Construction

PROJECT NAME	PROJECT NO.
WATER HEATER No. 9 REPLACEMENT	13-021
DRAWING TITLE: SPECIFICATIONS	DRAWING NO. 2

SCALE	CHECKED BY	PROJECT MGR.	ISSUE DATE
AS NOTED	E.A.	R.T.	xx-xx-2013