PROJECT

CONVERT VARIOUS HEATING SYSTEMS TO NATURAL GAS

(W. R. # 83-02-543)

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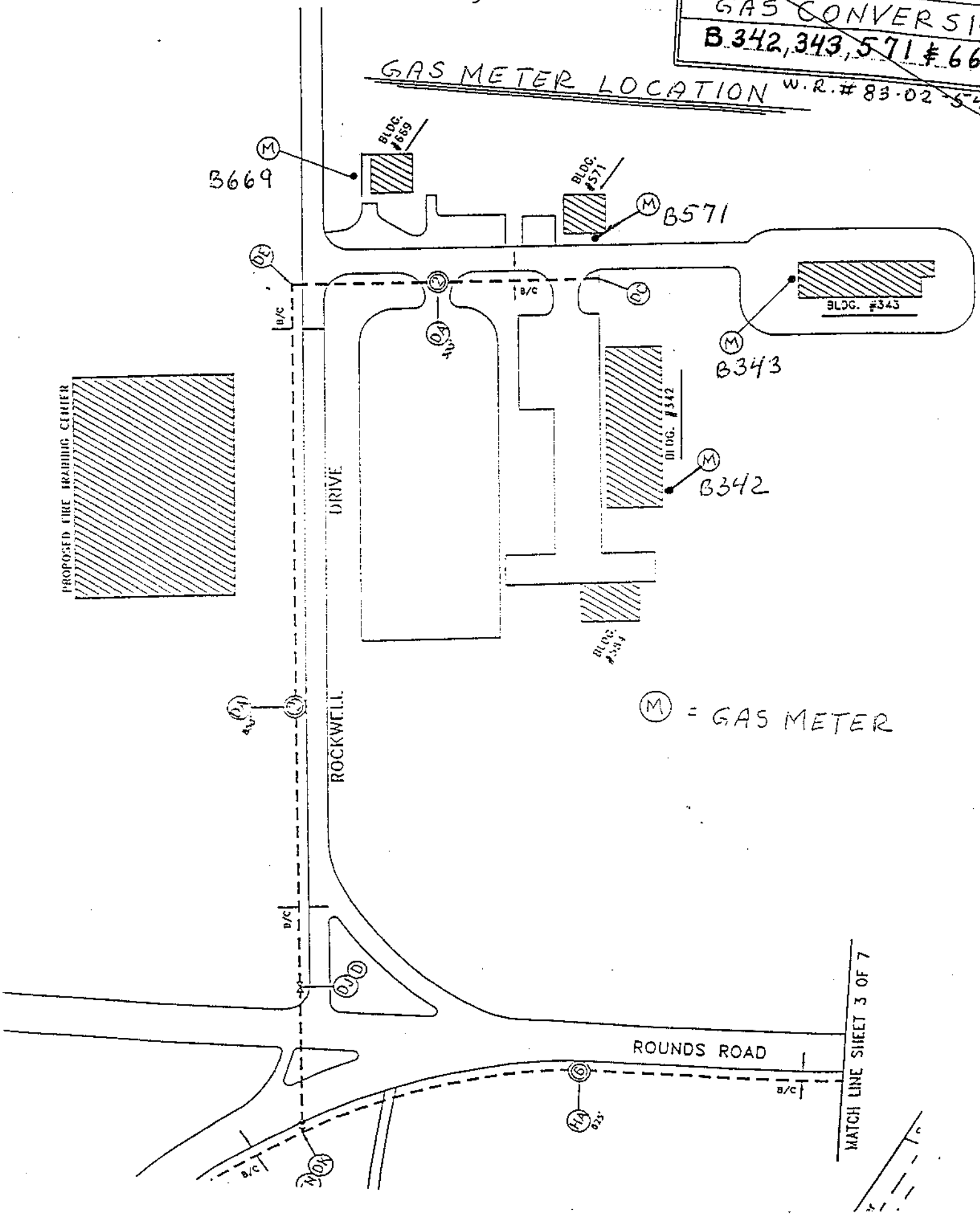
B342, B343, B571, B669
(GAS CONVERSION)

Pg. 2

DWG#: SK-1
GAS CONVERSION
B342, 343, 571 & 669
W.R.# 83-02-543

GAS METER LOCATION

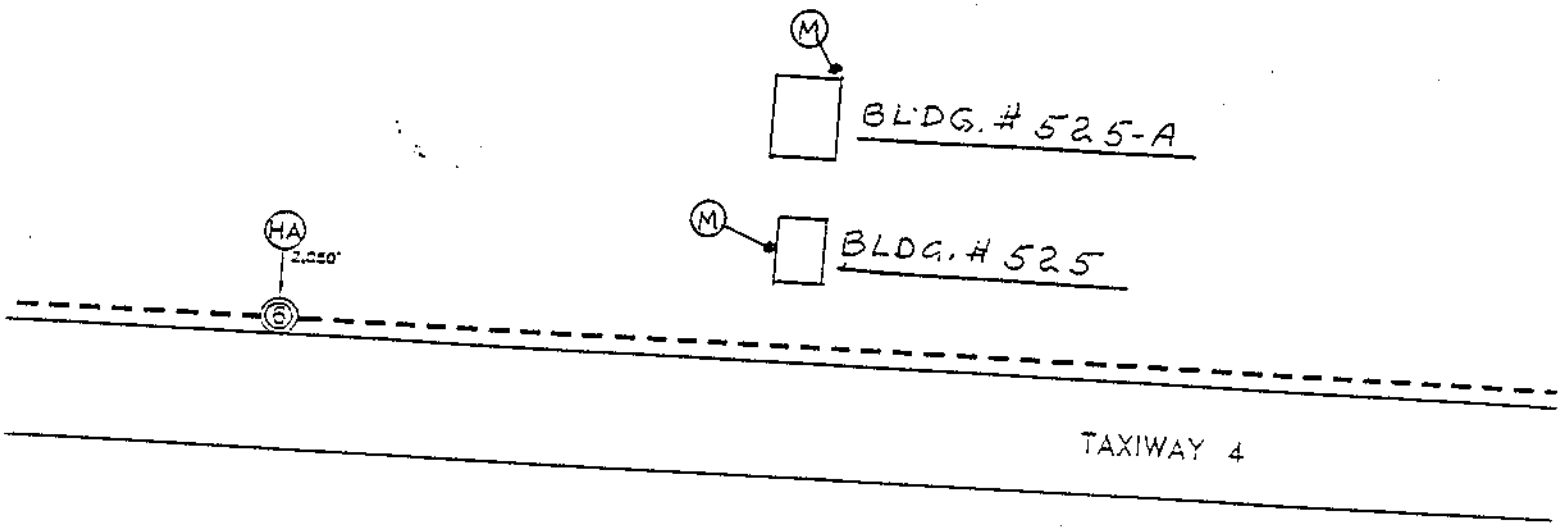


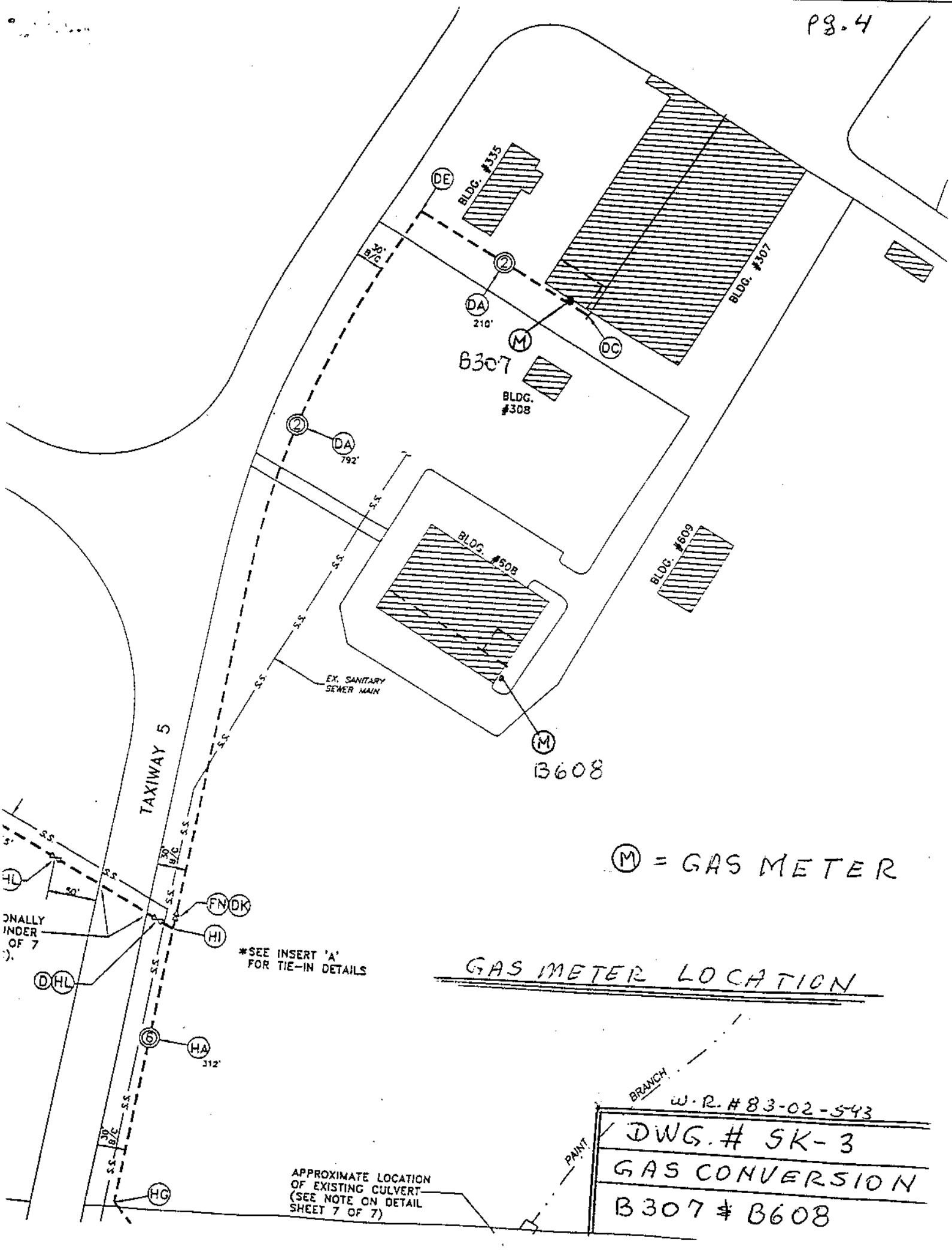
B525 & 525-A

GAS METER LOCATION

DWG. # SK-2
GAS CONVERSION
B525 & 525-A
W.R. # 83-02-543

(M) = GAS METER




BLDG. #335
DE
30' B/C
2
DA
210'
M
B307
DC
BLDG. #307
BLDG. #308
2
DA
792'
S.S.
BLDG. #608
BLDG. #609
EX. SANITARY SEWER MAIN
M
B608
TAXIWAY 5
30' B/C
HL
50'
FN DK
HI
ONALLY
INDER
OF 7
D HL
*SEE INSERT 'A' FOR TIE-IN DETAILS
6
HA
312'
30' B/C
HG
APPROXIMATE LOCATION OF EXISTING CULVERT (SEE NOTE ON DETAIL SHEET 7 OF 7)
PAINT BRANCH
M = GAS METER
GAS METER LOCATION
W.R. #83-02-543
DWG. # SK-3
GAS CONVERSION
B307 & B608

-----SCOPE OF WORK-----

PROJECT TITLE:

CONVERT VARIOUS HEATING SYSTEMS FROM PROPANE TO NATURAL-GAS.

1. **THE CONVERSION PROJECT INVALVES THE FOLLOWING BLDGS:**
   a. BLDG NO. 307----- (existing equipment: oil, & propane)
   b. BLDG NO. 342----- (existing equipment: propane)
   c. BLDG NO. 343----- (existing equipment: propane)
   d. BLDG NO. 525----- (existing equipment: propane)
   e. BLDG NO. 525-A-- (existing equipment: propane)
   f. BLDG NO. 571----- (existing equipment: propane)
   g. BLDG NO. 608----- (existing equipment: oil, & electric)
   h. BLDG NO. 669----- (existing equipment: propane)

2. **BASIC SCOPE OF THE PROJECT** : Contractor shall provide all the required material, conversion kits, and labor to convert existing boilers, furnaces, unit heaters, and hot-water heaters from propane or oil to natural-gas as indicated, and replacement in kind of electrical hot water heaters where indicated. Also, all related demolition and provision of new hot-water heaters for natural-gas where indicated. Provide all applicable electrical work and controls where required. Provide all equipment calibration. Provide a general modification manual with a dedicated section for each building. The manual should include all the field-data obtained by the contractor for the conversion work, conversion-kits data, controls data, calibration data, submittals, necessary maintenance, and pertinent information related to conversion work.

3. **EXISTING CONDITIONS:** All existing heating equipment is fueled with propane gas, oil, or electric as indicated. All existing gas-fuel-lines, regulators, and controls of propane equipment are applicable only for the propane fuel.
   Note: Some of the existing piping might be reused as indicated in paragraph-4.6 "GAS PIPING".

4. NEW WORK:

4.1 See existing equipment breakdown per bldg : see paragraph 5.

4.2 EXISTING PROPANE TANKS, TANK-PADS, BALLARDS: All tanks shall be removed by the propane-supplier. All tank-pads and tank-fences shall be removed by the contractor. All ballards shall be removed by contractor from locations not reused for new gas-meters and the holes finished to existing conditions. Provide new ballards at all meters where there are no existing ballards.

4.3 **CONVERSION REQUIREMENTS :** Contractor shall gather all the necessary data for each heating equipment for proper evaluation before performing conversion work. Contractor shall contact and work jointly with the equipment manufacturers. Only manufacturer's approved conversion kits (including software) shall be used; no generic conversion kits shall be used. All model numbers of the approved conversion kits and equipment shall be included in the maintenance manual. All mechanical (including gas-trains), electrical, and software schematics shall be approved and provided by the equipment manufacturer; all shall be included in the manual.

4.4 NATURAL-GAS PRESSURE REQUIREMENT AT EACH EQUIPMENT : Provide manufacturer recommended gas pressure requirement on a nameplate affixed to each equipment.

4.5 SUPPLY NATURAL-GAS PRESSURE:
Natural-gas pressure at the outlet of each gas-meter shall be **0.5psig (13inch WC) unless otherwise noted.**

4.6 **GAS PIPING: SEE SPECIFICATION 15195N.**

a. Provide natural-gas lines from the gas meters (**all meters provided by GAS COMPANY unless otherwise noted**) to the heating equipment.

b. **NATURAL-GAS LINES SIZES:** SIZES shall be as indicated. If the existing line sizes are equal to or greater than the indicated sizes and the piping **material** is black steel (**not galvanized**) then reuse the existing lines; but, **if the existing lines are galvanized then DO NOT REUSE**, provide **NEW** piping. If the existing piping sizes are smaller than indicated, then provide new piping sizes as indicated. Wherever the existing line(s) shall be reused, the line(s) shall be pressure tested and purged with inert gas in accordance with NFPA prior to charging with the natural gas.
Note: **<u>DO NOT</u> REUSE ANY EXISTING OIL-LINES.**
All piping shall be black steel standard (SCH. 40) complying with ASTM A 53, Grade B.
All existing propane lines shall be safely vented of propane prior to starting work and or charging them with natural gas in accordance with NFPA. All lines shall be installed in compliance with NFPA Code. All safety measures shall be exercised during the removal of the existing propane lines and the installation of the new natural-gas lines.

c. **NATURAL-GAS SHUTOFF VALVES :** See specification.

d. **GAS PRESSURE REGULATORS:** See specification. Provide all new gas regulators appropriate

for each piece of the equipment as recommended by manufacturer. All regulators shall be vented to the outdoors.

4.7 **CONVERSION KIT: PRIOR** to any conversion actions taken, contractor shall verify with equipment manufacturer the capacity of each existing propane-gas train operating on **natural-gas** and the possibility of reusing them if they are in good condition. If the existing gas train(s) can not be reused, provide new gas train(s) as recommended by the equipment manufacturer. Obtain from manufacturers the **maximum** and the **minimum** natural-gas pressure requirement for each equipment. Indicate these pressures on the units and in the maintenance manuals. Contractor shall obtain from the equipment **manufacturers** the **original** recommended conversion kits for each specific brand and unit, and perform the conversions in accordance with manufacturers recommendations.
Submit submittals for all conversion kits.
Contractor shall be totally responsible for providing correct material and conversion kits as recommended by the equipment manufacturer(s).

4.8 **VENTING (EXHAUST) SYSTEMS:**

a. ADEQUACY OF THE EXISTING VENTING SYSTEMS OF PROPANE-FIRED EQUIPMENT: Contractor shall field measure the existing venting-pipe sizes, and verify their construction type adequacy (CODE COMPLIANCE) with each equipment manufacturer and NFPA to insure proper and safe venting operation. If new venting system(s) shall be required due to size change and/or construction CODE COMPLIANCE , provide new venting system(s) in compliance with NFPA and equipment manufacturer. The new venting piping shall be of stainless steel, double wall, and in compliance with NFPA. Contractor **shall clean** all existing vent systems if reused.
Document all this information and include in the maintenance manual. **Submit** submittals of all new vent-piping. All roof penetrations and/or enlargements shall be flashed and patched water tight.

b. ADEQUACY OF THE EXISTING VENTING SYSTEMS OF OIL-FIRED EQUIPMENT: The requirements of the paragraph 4.8a are applicable to this paragraph. In addition, contractor shall examine the inside of the vent-piping systems for any deterioration, oil soot buildup and inform the ROICC in writing of the inspection findings and recommendations. Contractor **shall clean** all existing vent systems if reused.

4.9 **ELECTRICAL WORK :** Provide all necessary work as required by the conversions.
Ground all metallic gas lines. All electrical work shall be in compliance with the National Electrical Code 2002.

4.10 **CONTROLS:**

a. **Electrical:** Modify, upgrade or provide new controls (combustion, safety, and alarm) as mandated by the conversion requirements and recommended by the existing equipment manufacturer.

b. **Mechanical**: Provide all necessary operating and safety controls as mandated by the conversion requirements and recommended by the existing equipment manufacturers.

c. **Boiler Efficiency:** All controls and converted equipment shall be calibrated for maximum efficiency on natural-gas.
The **overall boiler efficiency can not be less than 80% operating on natural gas.** Equipment shall operate within the NJDEP air discharge limits.
Contractor shall perform efficiency tests and submit all documented test results to the government as part of the maintenance manual.

d. **Ignition System: Electronic Spark Ignition System.** Contractor shall verify and **ensure** that all converted equipment shall be **provided** with **Electronic Spark Ignition System.**

4.11 **EQUIPMENT TESTING :** All converted equipment shall be tested for output performance, efficiency, and emissions. The testing shall be performed by a certified Testing technician approved by the state of New Jersey, equipment manufacturer **and as indicated**. Certified test-report for each converted equipment shall be submitted to the Government.
Boilers in B307, B342, and B608 shall be inspected by the NAVY inspector only. Contractor shall inform the Government when the NAVY inspector can perform the testing.

4.12 HOT-WATER HEATERS : Contractor shall remove and discard all the existing water-heaters (propane, oil, electric) where indicated. Provide all new **heavy-duty (minimum 6-Year Warranty)** water-heaters fueled by natural-gas in place of discarded propane and oil water heaters, and the existing electric water heater(s) shall be replaced with an electric type in kind where indicated. All new water-heaters shall be of capacity in kind as the existing: **same water volume, same temperature range, same recovery or greater, same electric power requirement, and with spark ignition system (for natural-gas fueled water heaters).** Contractor shall evaluate the existing vent systems and reuse if adequate, otherwise provide new systems in compliance with NFPA and equipment manufacturer recommendation . All vent pipes must be stainless steel, double wall type.
The units shall be provided with all the required mechanical components, and safety and operating controls. If power vent-packages shall be required, contractor shall provide as recommended by the hot-water heater manufacturer with proper vent-system. All shall comply with NFPA and UL.
The operating voltage shall be 115V-1 phase – 60 Hz. All electrical work shall comply with the National Electrical Code 2002.
Provide diaphragm expansion tanks with water heaters.
All of the requirements of section 4.0 are applicable to this paragraph (4.12).
Acceptable water heater **manufacturer** : **A.O.SMITH** or equal.

4.13 EXISTING EXPANSION-TANKS: Contractor shall evaluate the **volumetric** size of existing tank(s) for each system serving and inform ROICC of their adequacy.
All tanks shall be serviced by total draining, flushing of dirt, charging with proper amount of air, providing the required expansion volume for the system, and miscellaneous related work as required.

4.14 MATERIAL DISPOSAL : All the material removed or created due to the conversion work shall be the property of the contractor and the contractor shall dispose of it properly in accordance with state regulations.

4.15 **FIELD DATA :** Contractor shall field verify the existing name-plates data, existing propane piping material (no galvanized piping allowed) and sizes, venting systems, all controls, and electrical supply of all the existing equipment to be converted prior to ordering the required conversion-kits, materials, and starting work.

4.16 **BUILDING ACCESSIBILY SCHEDULE:** Contractor shall schedule accessibility to each building with ROICC prior to the start of work.

4.17SAFETY REQUIREMENTS: Contractor is solely responsible for the safety of his workers and other personnel near the work areas. All work shall be in compliance with OSHA Safety Regulations. Contractor is responsible for providing safety equipment to the workers. Any hot-work required requires a permit obtained from the ROICC by submitting a permit-request for approval.
Contractor shall take proper measures to prevent any damage to the work area. Any damage incurred by the contractor shall be repaired at no cost to the government.

4.18 CLEANING WORK AREA: All areas of work shall be cleaned of work generated rubbish after each conversion is completed .

5.0 EXISTING EQUIPMENT BREAKDOWN AND REQUIREMENTS PER BUILDING:

Note: contractor shall field verify all the required equipment data prior to ordering required material and starting conversion work.

5.1 BLDG NO. 307 :

5.1.1 Existing equipment and location:

a. One (1) **HOT-WATER OIL-BOILER** in mechanical room. The boiler has a dual-fuel (oil / gas) burner. Presently, boiler is operating on oil.

Weil-McLain : model # 1994, serial # 3
Input capacity : Oil, GPH = 45
Gas, MBH = 6,495
Output capacity : BTU/H = 5,230,000
Min. Relief Valve Cap. = 5,230 #/hr or MBH
Oil lines : 2" dia.
Burner: INDUSTRIAL COMBUSTION, MODEL # MP-LG-63, SERIAL # 33641-1.
Electric Panel : I-C Industrial Combustion, model MPLG-63.

b. Two (2) identical capacities **PACKAGED HOT-AIR ROOF-TOP UNITS** roof mounted, propane fueled.

CARRIER : model # 48TJF006-611, serial # 1600g24148
Input capacity : 115MBH each.

c. Existing propane lines are galvanized; **replace with black steel, see specification.**

5.1.2 NEW WORK:

Notes:

a. **GAS-METERS: Two (2) meters shall be provided by gas company; one for boiler; one for roof-units.**

b. **BOILER TESTING: See 4.10**

5.1.2.1 Natural-gas pressure: Two meters (both
a. **TO BOILER**: pressure at the gas-meter outlet **2.0 psig.**
b. **TO ROOF UNITS**: pressure at the gas-meter outlet **0.50 psig.**

5.1,2.2 Required New Natural-Gas Lines:

a. **SUPPLY LINE TO BOILER (gas pressure = 2.0 psig.)**
Line size = 4 - inch dia.
The 4-inch line shall run from the gas-meter into the mechanical-room terminating by the boiler gas-train.
Approximate (conservative) linear requirement of gas piping = 40 feet.
Approximate number of fittings = 6
Provide a full port opening shut-off valve at the gas-train, same size as the train connection.
The 4-inch dia. gas-header inside the mechanical room shall have two (2) 2-inch dia. take-offs with shut off valves capped for future use. Provide an air-bleed valve(3/8") at the highest point of the gas-header; valve to be capped after use.

b. **SUPPLY LINE TO ROOF UNITS (gas pressure = 0.50 psig.).**
Line size = 2-inch dia.
Approximate (conservative) linear requirement of gas piping = 220 feet.
Approximate number of fittings = 6
The 2-inch line shall run above the lower roof (as the existing propane-line) pass the roof-unit nearest the mechanical room.

c. **BRANCH LINES TO ROOF UNITS (gas pressure = 0.50 psig.).**
Line size = 1 ½ -inch dia.
Approximate (conservative) linear requirement of gas piping = 130 feet.
Approximate number of fittings = 6

The 2-inch line shall run above the lower roof (as the existing propane-line) pass the roof-unit nearest the mechanical room.

c. **BRANCH LINES TO ROOF UNITS (gas pressure = 0.50 psig.).**
Line size = 1 ½ -inch dia.
Approximate (conservative) linear requirement of gas piping = 130 feet.
Approximate number of fittings = 6

The 2-inch line shall run above the lower roof (as the existing propane-line) pass the roof-unit

5.1.2.2 ADDITIONAL WORK REQUIRED :

a. All oil related equipment and piping shall be drained and removed. Lines shall be removed to the outdoors next to wall and capped water-tight. Oil shall be removed in accordance with EPA regulations.

b. The condition of the existing dual-fuel burner and gas-train shall be evaluated, as well as, the burner capacity operating on natural-gas shall be confirmed with the boiler manufacturer. The information shall be documented and presented to the government before starting the work.

c. Existing Pressure Regulator at the Boiler : **MAXITROL # RV111.**
The burner manufacturer (Industrial Combustion) advises to change the existing regulator to a new model. Contractor shall contact the burner manufacturer and provide the recommended pressure regulator model. Regulator shall be of adjustable type.

Suggested Point of Contact:
Industrial Combustion
(908) 964-6161; Attn: Milton

d. Evaluate the existing software, controls, and electrical supply with manufacturer. If required, upgrade, modify, or provide new.

e. **Emission levels :** the gas burner shall comply with the N.J.D.E.P. allowable emission levels (Title Five of Air Permit).

Ref.#	Applicable Requirements	
1	CO<= 0.52 lb/hr. [N.J.A.C. 7:27-22.16(a)]	CO--carbon monoxide
2	TSP< 0.05 LB/HR. [N.J.A.C. 7:27-22.16(a)]	TSP--total suspended particulates
3	PM-10(Total),0.05 lb/hr. [N.J.A.C. 7:27-22.16(a)]	PM-10-- particulate matter ≤ 10 micrometers
4	NOx (Total) <=0.619 lb/hr. [N.J.A.C. 7:27-22.16(a)]	NOx--nitrogen oxides

The oil-fired burner has burner-manufacturer's initial guaranteed emission levels for CO and NOx. These initial emission levels can not be exceeded since they are incorporated into our (NAES, Lakehurst) Air-Permit. The burner manufacturer shall provide the existing guaranteed levels and the new conversion levels for the CO and Nox. All existing emission controls shall be evaluated and recommendation submitted of their need, upgrade or deletion.

f. Provide Start-up, Operating, and Maintenance instruction manual and training to government operators (4 hrs.).

g. ELECTRICAL : evaluate the existing electrical and control panel. **Perform the following if required:**
Modify existing oil-fired boiler electrical connections to suit the gas-fired boiler burner. The gas burner controls shall be integrated with the existing control panel. All new controls shall be compatible with existing controls. All electrical work shall conform to CODE. Grounding of all equipment (mechanical and electrical) and system components shall be provided.

h. Burner/Boiler--- START-UP:
Contractor shall provide burner-manufacturer local technical representative to perform the burner **SET-UP and START-UP** when conversion is completed.

5.2 BLDG NO. 342:

5.2.1 **Existing equipment and location**:

a. One (1) **HOT-WATER PROPANE BOILER** in mechanical-room.
SMITH CAST IRON BOILER : MODEL # 19 SERIES – 8, SERIAL # F93-678
Input capacity = 1,082MBH

b. Existing propane line is 2" dia. black steel. **Delete this line.**

5.2.2 NEW WORK

5.2.2.1 Convert propane hot-water boiler to natural-gas fuel.

5.2.2.2 Required New Gas Line (gas pressure 0.50 psig.) :
New natural-gas line size: **2 ½ inch** black steel.
Approximate (conservative) linear requirement of gas piping = 45 feet
Approximate number of fittings = 6

5.2.2.3 Emission levels: see 5.1.2.3-e.

5.2.2.4 Provide Start-up, Operating, and Maintenance instruction manual and training to government operators (4 hrs.).

5.3 BLDG NO. 343 :

5.3.1 Existing equipment and location :

a. One (1) **HOT-WATER PROPANE BOILER** in mechanical-room.
WEIL McLAIN: MODEL # PFG-8-PIN, SERIAL # 5.
Input capacity = 427MBH.

b. Existing propane line size 1-inch black steel. **Delete this line.**

5.3.2 NEW WORK:

5.3.2.1 Convert propane hot-water boiler to natural-gas fuel.

5.3.2.2 Required New Gas Line (gas pressure 0.50 psig.) :
Required **new natural-gas** line size: **1 1/2 inch** black steel.
Approximate (conservative) linear requirement of gas piping = 30 feet
Approximate number of fittings = 6

5.4 BLDG NO. 525 :

5.4.1 **Existing equipment and location:**

a. North-side (back of bldg.). One(1) **HOT-AIR UNIT HEATER.**
Input capacity = 105MBH (propane fueled).
MODINE Model # PA105A, Serial # 03011011078

b. South-side (front of bldg.). One(1) **HOT-AIR UNIT HEATER.**
Input capacity = 75MBH (propane fueled).
MODINE Model # PAE 75AC, Serial # 30081010692.

c. Existing propane line sizes: ¾ -inch galvanized-steel. **Delete this line.**

5.4.2 NEW WORK:

5.4.2.1 Convert both unit heaters from propane to natural-gas fuel.

5.4.2.2 Required New Gas Line(gas pressure 0.50 psig.) :

a. Branch Lines to both unit heaters:
Required **new natural-gas** line size: ¾ - inch black steel.
Approximate (conservative) linear requirement of gas piping = 80 feet
Approximate number of fittings = 14

b. MAIN LINE FROM GAS-METER:
Required **new natural-gas** line size: 1 - inch black steel.
Approximate (conservative) linear requirement of gas piping = 20 feet
Approximate number of fittings = 4

5.5 BLDG 525-A :

5.5.1 Existing equipment and location:

a. North-side (back of bldg.). One(1) hot-air furnace. Input capacity = 80MBH (propane fueled).
LEAR SIEGLER INC., Model # AGC-80, Serial # 12F3032, 115V.

b. Existing propane line size ¾ -inch galvanized-steel. **Delete this line.**

5.5.2 NEW WORK:

5.5.2.1 Provide new natural-gas furnace of same capacity as existing with all necessary components.

5.5.2.2 Required New Gas Line (gas pressure 0.50 psig.):
Required **new natural-gas** line size: ¾ inch black steel.
Approximate (conservative) linear requirement of gas piping = 20 feet
Approximate number of fittings = 6

5.6 BLDG 571 :

5.6.1 Equipment location:

a. One (1) hot-air furnace. Input capacity = 126MBH (propane fueled).
CARRIER Model # 58GFA100-JC
One (1) hot-water heater. Input capacity = 34MBH (propane fueled).

b. Existing propane line sizes:
MAIN SUPPLY LINE = 1 ½ inch, black steel.
BRANCH LINE TO FURNACE = 1 ¼ inch, black steel.
BRANCH LINE TO HOT-WATER HEATER = ¾ inch, black steel.

5.6.2 NEW WORK:

5.6.2.1 Convert the furnace and the hot-water heater from propane to natural-gas.

5.6.2.2 Required New Gas Line Sizes (gas pressure 0.50 psig.) :

a. MAIN SUPPLY LINE SIZE = **1 1/2 inch** black steel.
Approximate (conservative) linear requirement of gas piping = 40 feet (if required).
Approximate number of fittings = 6

b. BRANCH LINE TO FURNACE = **1 ¼ inch** black steel.
Approximate (conservative) linear requirement of gas piping = 20 feet (if required).
Approximate number of fittings = 6

c. BRANCH LINE TO HOT-WATER HEATER = **¾ inch**, black steel.
Approximate (conservative) linear requirement of gas piping = 30 feet (if required).
Approximate number of fittings = 6

5.7 Bldg 608 :

5.7.1 Existing equipment and location:

a. All the indicated equipment is located in same mechanical room.

b. One (1) **hot-water oil-boiler**.

H P SMITH: series: 19 series-10, serial # F92 23
Burner Input capacity : Light Oil, GPH = 9.5
Gas, MBH = 1,364
Output capacity (water) : BTU/H = 963,000
Oil lines : 1-inch dia.

c. One (1) **hot water heater oil-fueled**.

A.O. SMITH: model # COF 125-400, serial # SD92-42610-Y3
Cap. U.S. Gal = 129
Type of oil #2 GPH = 2.86
Recovery cap. (GPH = 387 @ 100° F rise)
Voltage : 115 – 1 phase

d. One (1) **electrical hot water heater.**
Note: **replace** existing electric water heater with **new electric water heater** in kind.
A. O. SMITH: model EES 52, serial # MD95-0053543-913
Cap. = 50 gal
220-240 VAC

5.7.2 NEW WORK :

5.7.2.1 PROVIDE THE FOLLOWING:

a. Convert the existing oil-boiler to natural-gas.

b. Provide one (1) new hot-water heater capacity in-kind fueled by natural-gas.

c. Provide one (1) new electric hot-water heater capacity in-kind.

5.7.2.2 Natural-gas pressure:

a. At the gas-meter : **2.0 psig.**
b. Main Supply and at the boiler gas-train: **2.0 psig.; adjust gas to the required boiler pressure.**
c. At the new Gas Hot-Water Heater : **0.50 psig.**
Provide pressure-regulator (2.0 psig. down to 0.50 psig.) on the branch line to the

water heater. Regulator must be easily accessible and adjustable.

5.7.2.3 Required New Natural-Gas Lines :

a. MAIN SUPPLY HEADER (**gas pressure = 2.0 psig.**, total gas supply to the boiler and the new hot-water heater.).
Line size = 2-inch dia.
The 2-inch line shall run from the gas-meter into the mechanical-room terminating by the boiler gas-train.
Approximate (conservative) linear requirement of gas piping = 100 feet.
Approximate number of fittings = 9
Provide a full port opening shut-off valve at the gas-train, same size as the train connection.
The 2-inch dia. gas-header inside the mechanical room shall have two (2) 1 1/2-inch dia. take-offs with shut off valves capped for future use. Provide an air-bleed valve (3/8") at the highest point of the gas-header; valve to be capped after use.

b. BRANCH LINES FROM THE MAIN-SUPPLY TO THE HOT WATER HEATER
(**gas pressure = 0.50 psig.**).
Line size = 1 ½ -inch dia.
Approximate (conservative) linear requirement of gas piping = 40 feet.
Approximate number of fittings = 6
The line shall branch off the 2-inch main supply line via pressure regulator (see 5.7.2.2-c). The line shall be provided with full port opening shut-off valve.

5.7.2.4 **ADDITIONAL WORK REQUIRED** :

a. All oil related equipment and piping shall be drained and removed. Lines shall be removed at the wall-penetrations in the mechanical room and capped leak-tight. Oil shall be removed in accordance with EPA regulations.

b. Contractor shall contact the boiler manufacturer and provide the recommended gas-burner and controls that will provide the required capacity.

c. **PRESSURE REGULATOR :** Provide regulators to obtain required gas pressures at the equipment. Regulators shall be adjustable type. Regulators shall be part of the conversion kit(s).

d. Evaluate the existing software, controls, and electrical supply with manufacturer. If required, upgrade, modify, or provide new.

e. **Emission levels :** the gas burner shall comply with the N.J.D.E.P. allowable emission levels (Title Five of Air Permit).

Ref. #	Applicable Requirements	
1	CO <= 0.108 lb/hr. [N.J.A.C. 7:27-22.16(a)]	CO—carbon monoxide
2	NOx (Total) <=0.129 lb/hr. [N.J.A.C. 7:27-22.16(a)]	NOx—nitrogen oxides

The oil-fired burner has burner-manufacturer's initial guaranteed emission levels for CO and NOx. These initial emission levels can not be exceeded since they are incorporated into our (NAES, Lakehurst) Air-Permit. The burner manufacturer shall provide the existing guaranteed levels and the new conversion levels for the CO and Nox. All existing emission controls shall be evaluated and recommendation submitted of their need, upgrade or deletion.

f. Provide Start-up, Operating, and Maintenance instruction manual and training to government operator (4 hrs.)

g. ELECTRICAL : evaluate the existing electrical and control panel. **Perform the following if required:**

Modify existing oil-fired boiler electrical connections to suit the gas-fired boiler burner. The gas burner controls shall be integrated with the existing control panel. All new controls shall be compatible with existing controls. All electrical work shall conform to NFPA. Grounding of all equipment (mechanical and electrical) and system components shall be provided.

h. Burner/Boiler START-UP:

Contractor shall provide burner-manufacturer local technical representative to perform the burner **SET-UP and START-UP** when conversion is completed.

5.8 BLDG 669 :

5.8.1 Existing equipment and location:

a. One (1) hot-air furnace in furnace-room.. Input capacity = 125MBH (propane fueled).
DUCANE: Model # MPGA12585, Serial # 5488109811

b. One (1) hot-air furnace in furnace-room. Input capacity = 75MBH (propane fueled).
COMFOR MAKER: Model # GNE075F16A1, Serial # L974341010.

c. Existing propane line sizes:
MAIN SUPPLY LINE = 1 ½ inch, black steel (underground).
BRANCH LINE TO DUCANE FURNACE = ½ inch, black steel.
BRANCH LINE TO COMFOR FURNACE = ½ inch, black steel.

5.8.2 NEW WORK

5.8.2.1 Convert both furnaces from propane to natural-gas fuel.

5.8.2.2 Required New Gas Line Sizes (gas pressure 0.50 psig.):

a. MAIN SUPPLY LINE SIZE = **1 ½ inch** black steel (reuse existing line if possible, pressure test it).
Approximate (conservative) linear requirement of gas piping = 20 feet (if required).
Approximate number of fittings = 3

b. BRANCH LINE TO DUCANE-FURNACE = **1 inch** black steel.
Approximate (conservative) linear requirement of gas piping = 20feet
Approximate number of fittings = 6

c. BRANCH LINE TO COMFORT-FURNACE = **¾ inch black steel.**
Approximate (conservative) linear requirement of gas piping = 10feet
Approximate number of fittings = 6

5.8.3 Gas Meter Safety Barricade: Provide a rectangular-shaped barricade around the gas-line protruding from the ground and the gas meter. The barricade shall be made of 6" x 6" pressure-treated beams and secured to the ground. Cover the inside ground area of the barricade with heavy gauge polyethylene sheet and fill to the top with smooth round stones. The barricade shall be large enough to protect from lawn and garden equipment collisions. Paint wood beams amber-safety color.

---------- END OF SCOPE ----------

SPECIFICATION

SECTION	TITLE
01000	**GENERAL PARAGRAPHS**
01301	**SUBMITTALS**
15050N	**BASIC MECHANICAL MATERIALS AND METHODS**
15195N	**NATURAL GAS AND LIQUID PETROLEUM PIPING**
15400N	**PLUMBING SYSTEMS**
15532N	**WARM AIR HEATING SYSTEMS**

SECTION 00002

COVER PAGE (Small Purchase)

NAVFAC
Specification
No. 83-02-543

CONVERT VARIOUS HEATING SYSTEMS

TO NATURAL GAS

AT THE

NAVAL AIR ENGINEERING STATION

LAKEHURST, NEW JERSEY

All inquiries concerning any phase of this specification, prior to bid opening, shall be made to the Officer in Charge of Construction, Building 5, Naval Air Engineering Station, Lakehurst, N.J. 08733-5011, Telephone (732) 323-5201/7550.

	Signature	Date
Customer		
Design Manager		
Branch Head		
Dir of Production Planning		
Deputy Public Works Officer		

Contract Number N62472-01-M-
Work Request Number 83-02-543

Contract Number N62472-01-M-
Work Request Number 83-02-543

DOCUMENT 00002 Page 1

Contract Number N62472-01-M-

TABLE OF CONTENTS

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01301	SUBMITTALS (Small Purchase)
15050	BASIC MECHANICAL MATERIALS AND METHODS
15195	NATURAL GAS AND LIQUID PETROLEUM PIPING
15400	PLUMBING SYSTEMS
15532	WARM AIR HEATING SYSTEMS

-- End of Master Table of Contents --

SECTION 01000

GENERAL PARAGRAPHS (Small Purchase)

PART 1 GENERAL

1.1 GENERAL DESCRIPTION

The work includes all the provisions to convert several existing heating equipment from propane-gas to natural-gas, all related electrical work, and incidental related work at the Naval Air Engineering Station, Lakehurst, NJ (NAES).

1.2 LOCATION

The work shall be located at the NAES. The exact location will be indicated by the Officer in Charge of Construction herein referred to as the Contracting Officer.

1.3 TERM OF CONTRACT

The time of the work shall be 90 calendar days after award has been issued. All conversions shall be totally completed, operational, and accepted by the Government prior to the start of the HEATING SEASON (October 1, of this Year.

1.4 LIQUIDATED DAMAGES

If the Contractor fails to complete the work within the time specified in the contract, or any extension, the Contractor shall pay to the Government as liquidated damages, the sum of $ 50.00 for each day of delay.

1.5 Working Hours

Regular working hours shall consist of any period between 7 a.m. and 5 p.m., Monday through Fridays. The base is closed on Government Holidays. The Contractor shall make application for work outside regular working hours 15 calendar days prior to such work in accordance with the paragraph entitled "Work Outside Regular Hours." Making an application to work outside regular hours does not guarantee approval. The contractor shall base his bid on performing all work during regular hours unless otherwise specified.

1.6 EXAMINATION OF PREMISES

Bidders shall visit the work site to review the extent of the work and the existing layout. To arrange for site visitation, contact the Facilities Support Contract Office, NAES, Telephone (732) 323-2250. It is the responsibility of the Contractor to make sufficient site inspection to insure that all costs of the entire completed project have been included in the proposal.

1.7 UTILITIES

Reasonable amounts of the following utilities will be made available to the Contractor without charge.

Electricity
Potable Water

The Contractor shall pay all costs incurred in connecting, converting, and transferring the utilities to the work. The Contractor shall make connections, including providing backflow-preventing devices on connections to domestic water lines, and make disconnections.

1.8 DEBRIS REMOVAL

All debris resulting from this work shall be removed from the Station at the Contractor's expense and the work site shall be left in a clean and presentable condition.

1.9 DAMAGE AND BREAKAGE

The Contractor shall be responsible for all damage and breakage to property (real or personal) that may occur as a result of fault or negligence on the part of his personnel in connection with the prosecution of the work herein specified.

1.10 DRAWINGS/SKETCHES ACCOMPANYING SPECIFICATION

Drawings are the property of the Government and shall not be used for any purpose other than that contemplated by the specification. The following drawings accompanying this specification are a part thereof.

DRAWING NO:	TITLE
SK-1	CONVERT VARIOUS HEATING SYSTEMS TO NATURAL GAS (Location of Project Bldg: 342, 343, 571, 669 and Gas Meters)
SK-2	CONVERT VARIOUS HEATING SYSTEMS TO NATURAL GAS (Location of Project Bldg: 525, 525A-A, and Gas Meters)
SK-3	CONVERT VARIOUS HEATING SYSTEMS TO NATURAL GAS (Location of Project Bldg: 307, 608, and Gas Meters)

1.11 SAFETY REQUIREMENTS

This contract shall be governed by the requirements set fourth in the US Army, Corps of Engineers Manual (EM 385-1-1, Oct. 1992) entitled "General Safety and Health Requirements". A copy may be examined on application to the Officer in Charge of Construction, NAES, Lakehurst, NJ 08733-5011.

1.12 POWER TOOLS AND PORTABLE CORDS

All power tools and portable cords shall be properly grounded in accordance with the National Electric Code. Taping and splicing of cords for any reason shall not be permitted (National Electric Code Requirements). All temporary lights shall have a grounded metal lamp guard. All single phase power equipment used by the Contractor shall be connected to an approved ground fault circuit interrupter. The Center's 110V electrical outlets are of the straight blade duplex type (crows feet). The Contractor shall provide an approved adoption for the proper operation of his equipment.

1.13 FIRE WATCH

Welding, burning, and open flame work (hot work) will be permitted, but only subject to the following conditions:

a. The Contractor shall comply with all fire regulations currently in force at the NAES,

b. The Contractor shall inform the Contracting Officer definitely when "Hot Work" will be performed, procure a written hot work permit daily from the fire department, and

c. The Contractor shall provide an adequate fire watch and the required fire extinguishing equipment.

"Hot Work" permits can be obtained from the Fire Department at (732) 323-4000

1.14 INTERRUPTION OF EXISTING UTILITIES

If interruptions are required, they shall be at the convenience of the Government only and shall occur during other than regular working hours at NAES, unless otherwise specified in the contract. All tie-ins shall be made with the approval of the Contracting Officer. The Contractor shall submit notice at least 24 hours in advance to the Contracting Officer prior to such proposed tie-ins.

1.15 PRE-CONSTRUCTION CONFERENCE

Prior to commencement of the work the Contractor will be required to meet in conference with representatives of the Contracting Office to discuss and develop mutual understandings pertaining to administration of the contract, safety and security requirements.

1.16 CENTER REGULATIONS

The Contractor and all his employees shall follow the Station regulations. Equipment, tools and other materials (which are not the property of the contractor) shall not be removed from the Center without a properly executed property pass. Property passes can only be issued by the Contracting Officer or his authorized representative.

1.17 INSPECTION AND ACCEPTANCE

Inspection and acceptance of the completed work shall be made at the work site by the Contracting Officer, the NAES, Public Works Officer, or their authorized representatives.

1.18 INVOICE INSTRUCTION

Payment will be made in one lump sum upon satisfactory completion and acceptance of the work. Forward six copies of the Contractor's invoice to the Officer in Charge of Construction, NAES, Lakehurst, NJ 08723-5011

1.19 STORM PROTECTION

If a warning of gale force winds is issued, take precautions to minimize any danger to persons, and protect the work and any nearby Government property. Precautions shall include, but are not limited to, closing

openings, removing loose materials, tools and equipment from exposed locations, and removing or securing scaffolding and other temporary work. Close openings in the work if storms of lesser intensity pose a threat to the work or any nearby Government property.

1.20 SECURITY REQUIREMENTS

No employee or representative of the Contractor will be admitted to the site of the work unless they furnish satisfactory proof that they are a citizen of the United States and are specifically authorized admittance to the work site work by the Contracting Officer. Identification passes are available at the Office of the Contracting Officer, and if issued, it shall be the Contractor's responsibility to collect and account for all identification passes to his personnel at the expiration of the contract or when no longer required. Contractor personnel shall use the commercial gate, located on Route 547, for all ingress to and egress from the NAES. The Contractor shall comply with all security regulations currently in force at the NAES.

1.21 INSURANCE

In the event the dollar value of this award exceeds $2,500.00, the Contractor (and any sub-contractors) shall furnish a certificate of insurance in accordance with the following provisions prior to the commencement of work:

a. The Contractor shall procure and maintain during the entire period of performance under this contract the following minimum insurance coverage:

(1) Comprehensive General Liability: $500,000 per occurrence.

(2) Automobile Liability: $200,000 per person, $500,000 per occurrence, $20,000 per occurrence for property damage.

(3) Workmen's Compensation: As required by Federal and State worker's compensation and occupational disease statutes.

(4) Employer's Liability Coverage: $100,000 except in states where worker's compensation may not be written by private carriers.

(5) Other as required by state law.

b. Before commencing work under this contract, the Contractor shall certify to the Contracting Officer in writing that the required insurance has been obtained. The policies evidencing required insurance shall contain an endorsement to the effect that any cancellation or any material change adversely affecting the Government's interest shall not be effective (1) for such period as the laws of the State in which this contract is to be performed prescribe or (2) until 30 days after the insurer or the Contractor gives written notice to the Contracting Officer, whichever period is longer. Wording such as "will endeavor to mail notice" or "failure to mail such notice shall impose no obligation or liability" does not comply with the contract requirements and therefore are not acceptable.

c. The Contractor agrees to insert the substance of this clause, including this paragraph (c), in all subcontracts hereunder.

d. Insurance Certificates shall be submitted within five (5) days after contract award.

1.22 SMOKING REGULATIONS

The use of tobacco products within NAES, work spaces is prohibited.

1.23 ENVIRONMENTAL PROTECTION

1.23.1 Environmental contract clauses

The Contractor is advised that his operations and the Station's are subject to Federal, State, and local regulations and agency inspections. The Contractor shall fully cooperate with any representative from any Federal, State or local regulatory agency who may visit the job site and shall provide immediate notification to the Contracting Officer, who shall accompany them on any subsequent site inspections.

a. Use of Hazardous Materials. The Contractor shall submit a Material Safety Data Sheet (MSDS) and a list of each for each toxic or hazardous material item with its estimated quantity to the Contracting Officer for approval prior to bringing the material on base. Toxic and hazardous substances are defined in CFR 29 Part 1910 Subpart Z. Typical materials requiring MSDS and quantity reporting include, but are not limited to: oil and latex based painting and caulking products, solvents, adhesives, aerosol, and petroleum products. All approved toxic and hazardous substances must be labeled in accordance with CFR 29 Part 1910.1200.

b. Recycled Content Materials: In accordance with FAR clause 52.223-10 (Waste Reduction Program), the Contractor shall establish a program to promote cost-effective waste reduction in all operations and facilities covered by this contract. Waste reduction is defined as preventing or decreasing the amount of waste being generated through waste prevention, recycling or purchasing recycled-content and environmentally preferable products.

Under Executive Order 12873, Contractor bought items on behalf of the Government must contain the highest available percentage of recovered materials within the following categories:

· Paper and paper products
· Re-refined lubricating oil
· Retread tires
· Building insulation
· Concrete and cement containing fly ash
· Reclaimed engine coolants
· Construction Products: Structural fiberboard, laminated paperboard, carpet, floor tiles, patio blocks, consolidated or reprocessed latex paint, and shower and restroom dividers and partitions.
· Transportation Products: Traffic barricades, traffic cones, channelizers, delineators, flexible delineators, and parking stops.
· Park and Recreation Products: Playground surfaces, running tracks, and plastic fencing
· Landscaping Products: Hydraulic mulch, yard trimmings compost, garden and soaker hoses, and lawn and garden edging

· Non-Paper Office Products: Office recycling containers, office waste receptacles, plastic desktop accessories, remanufactured toner cartridges, binders, plastic trash bags, plastic envelopes, and printer ribbons.
· Pallets

In accordance with FAR clause 52.223-9 (Certification of Percentage of Recovered Material Content for EPA Designated Items), the Contractor shall submit in writing to the Contracting Officer a list of the types and quantities of recycled-content materials used to perform the contract work, with an estimate of each items percentage of recycled content. This certification and estimate shall be signed by the contractor and submitted upon completion of the contract.

c. Spill Prevention: Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water. Place oily and hazardous materials in locked indoor or covered storage areas when not in use. No material (hazardous or non-hazardous) may be left outdoors or uncovered unless first approved by the Contracting Officer. Containers shall be sealed properly when not in use. Inspect containers daily for leaks.

Vehicles and equipment containing fuel, hydraulic oil, or other hazardous liquids shall be parked on asphalt or concrete paved areas when not in use. All vehicles and equipment shall be labeled with the Contractor's name and phone number to be called in case of a spill. Vehicles or equipment found to leak fluids shall be removed from the Station and/or repaired immediately. Conduct the fueling and lubricating of equipment and motor vehicles in a manner that protects against spills and evaporation. All fuel tanks shall be stored in an approved secondary containment.

d. Spill Reporting: In the case of a hazardous material or waste spill, verbally notify the Contracting Officer and ALSO call the Spill Hotline at X7800 or X7500 immediately. For spills after business hours, call the Officer of the Day at X2308. The Navy shall be reimbursed by the Contractor for time, material and disposal costs incurred by the Navy in response to a Contractor spill.

e. Disposal of Hazardous Waste. Hazardous waste/debris shall be identified, labeled, handled, stored, and disposed of in accordance with all Federal, State, and local regulations including 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, and 40 CFR 268. Store hazardous wastes in approved containers in accordance with 49 CFR 173. Hazardous waste generated within the confines of Government facilities shall be identified as being generated by the Government. Prior to removal of any hazardous waste from Government property, all hazardous waste manifests must be signed by activity personnel from the Station Environmental Office. Appointments for manifest signature must be made with the environmental branch at least 24 in advance by calling x2612 or x7500. No hazardous waste shall be brought onto Government property.

f. Solid Waste Management. Pick up solid wastes, and place in covered containers that are regularly emptied. Do not prepare or cook food on the project site. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean. Recycling is encouraged and can be coordinated with the Contracting Officer and the activity

recycling coordinator at extension x7500. Remove all non-recyclable solid waste (including non-hazardous debris) from Government property and dispose off-site at an approved landfill. Solid waste disposal off-site must comply with the most stringent local, State, and Federal requirements including 40 CFR 241, 40 CFR 243, and 40 CFR 258.

g. Recycling: All concrete and asphalt removed from the construction site shall be segregated from other debris and sent to a licensed recycling facility. Weight receipts from the recycling facility shall be submitted to the Contracting Officer.

The contractor shall dispose of all trees, brush, stumps, roots and other vegetation generated under this contract at the Naval Air Engineering Station Compost Facility. The exact location of this compost drop-off area can be obtained from the Station's Solid Waste Manager, x7500.
The following demolition materials may be recycled through drop-off at the Station's Recycling Facility. The contractor shall call the Station's Solid Waste Manager at x7500 for permission and instructions prior to drop-off.

- Nylon Carpet
- Small quantities of asphalt and concrete
- Non-ferrous metal
- Ferrous metal
- Flattened corrugated cardboard

h. Class 1 ODS Prohibition: Class I ODS as defined and identified herein shall not be used in the performance of this contract, nor be provided as part of the equipment. This prohibition shall be considered to prevail over any other provision, specification, drawing, or referenced documents. Class I ODS is defined in Section 602(a) of The Clean Air Act and includes the following chemicals:

chlorofluorocarbon-11 (CFC-11)	chlorofluorocarbon-213 (CFC-213)
chlorofluorocarbon-12 (CFC-12)	chlorofluorocarbon-214 (CFC-214)
chlorofluorocarbon-13 (CFC-13)	chlorofluorocarbon-215 (CFC-215)
chlorofluorocarbon-111 (CFC-111)	chlorofluorocarbon-216 (CFC-216)
chlorofluorocarbon-112 (CFC-112)	chlorofluorocarbon-217 (CFC-217)
chlorofluorocarbon-113 (CFC-113)	halon-1211
chlorofluorocarbon-114 (CFC-114)	halon-1301
chlorofluorocarbon-115 (CFC-115)	halon-2402
chlorofluorocarbon-211 (CFC-211)	carbon tetrachloride
chlorofluorocarbon-212 (CFC-212)	methyl chloroform

1.23.2 DIGGING PERMIT

Digging permits are required in accordance with Station Instruction 11300.1A prior to the start of any construction or landscaping (tree planting, fence post installation, satellite dish, etc.) activity which involves excavation or digging to a depth of greater than six inches. This is required to prevent striking underground utility lines.
Contractors shall formally request a digging permit utilizing NAES 11300/1A (Rev 3-98), enclosure (1). Approval will be granted by the Public Works Utilities Division Head, (Code 8.3.4). Requests shall be submitted in advance to allow for routing and review. This will require that request be submitted at least two (2) weeks prior to the requested digging date.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not Used.

-- End of Section --

SECTION 01301

SUBMITTAL (SMALL PURCHASE)

PART 1 GENERAL

1.1 SUBMITTAL REGISTER

For each submittal, state the Contractor's planned submittal date. Submit on copies of the "Submittal Register," attached, at the time of the Notice to proceed. The specification section number; schedule number; description of item for which the submittal is required will be listed by the Government. Submit the log within ten (10) days after notice to proceed.

1.2 CONTRACTOR'S RESPONSIBILITIES

a. Determine and verify field measurements, materials, field construction criteria; review each submittal; and check and coordinate each submittal with requirements of the work and Contract documents.

b. Ensure that material is clearly legible. Ensure required specialty stamps are affixed and signed.

c. Stamp each sheet of each submittal with the Contractor's certificating stamp.

I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated into Contract Number N62472-_____, is in compliance with the Contract drawings and specification, can be installed in the allocated spaces, and is submitted for Government approval.

_____ _____

Certified by (Contractor) Date

d. Sign the Contractor's certification. The person signing the certification shall be one designated in writing by the Contractor as having that authority.

e. Correct and resubmit submittal as directed by the approving authority.

1.3 VARIATIONS

Variations from contract requirements require Government approval. Where variations are proposed for consideration, submit a written request, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to the Government. The proposed variation shall be identified separately and included along with the required submittal for the item. When a variation is submitted for approval, the Contractor warrants the following.

a. Variation Is Compatible: The Contract has been reviewed to establish that the variation, when incorporated, will be

compatible with other elements of the work. If the submittal show variations from the contract requirements, the Contractor shall so indicate at the time of submission. If the Contracting Officer approves any such variation, the Contracting Officer shall issue a contract modification, except that, if the variation is minor or does not invlove a change in price or in time of performance, a modification need not be issued.

b. Contractor Is Responsible: The Contractor shall take actions and bear the additional costs, including review costs by the Government, necessary because of the proposed variation.

1.4 SCHEDULE OF SUBMITTAL DESCRIPTIONS (SD)

SD-01, Data: Submittals which provide calculations, descriptions, or other documentation regarding the work.

SD-02, Manufacturer's Catalog Data: Data composed of catalog cuts, brochures, circulars, specifications and product data, and printed information in sufficient detail and scope to verify compliance with requirements of the contract documents. A type of product data.

SD-03, Manufacturer's Standard Color Charts: Preprinted illustrations displaying choices of color and finish for a material or product. A type of product data.

SD-04, Drawings: Submittals which graphically show relationship of various components of the work, schematic diagrams of systems, detail of fabrications, layout of particular elements, connections, and other relational aspects of the work. A type of shop drawing.

SD-05, Design Data: Design calculations, mix designs, analyses, or other data, written in nature and pertaining to a part of the work. A type of shop drawing.

SD-06, Instructions: Preprinted material describing installation of a product, system, or material, including special notices and Material Safety Data Sheets, if any, concerning impedances, hazards, and safety precautions. A type of product data.

SD-07, Schedules: A tabular list of data or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work. A type of shop drawing.

SD-08, Statements: A document, required of the Contractor, or through the Contractor by way of a supplier, installer, manufacturer, or other lower tier contractor, the purpose of which is to further the quality or orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel, qualifications, or other verification of quality. A type of shop drawing.

SD-09, Reports: Reports of inspection and laboratory test, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

SD-10, Test Reports: A report signed by an authorized official of a testing laboratory that a material, product, or system identical to the

material, product or system to be provided has been tested in accordance with requirements specified by naming the test method and material. The test report must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product, or system has passed or failed the test. Testing must have been within three years of the date of award of this Contract. A type of product data.

SD-11, Factory Test Reports: A written report which includes the findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for this project before it is shipped to the job site. The report must be signed by an authorized official of a testing laboratory and must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product, or system has passed or failed the test. A type of shop drawing.

SD-12, Field Test Reports: A written report which includes the findings of a test made at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation. The report must be signed by an authorized official of a testing laboratory or agency and must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product, or system has passed or failed the test. A type of shop drawing.

SD-13, Certificates: Statements signed by responsible officials of a manufacturer of a product, system, or material attesting that the product, system, or material meet specified requirements. The statements must be dated after the award of this contract, name the project, and list the specific requirements which it is intended to address. A type of shop drawing.

SD-14, Samples: Samples, including both fabricated and unfabricated physical examples of materials, products, and units of work as complete units or as portions of units of work. A type of sample.

SD-15, Color Selection Samples: Samples of the available choice of colors, textures, and finishes of a product or material, presented over a substrates identical in texture to that proposed for the work. A type of sample.

SD-16, Sample Panels: An assembly constructed at the project site in a location acceptable to the Contracting Officer and using materials and methods to be employed in the work; completely finished; maintained during construction; and removed at the conclusion of the work or when authorized by the Contracting Officer. A type of sample.

SD-17, Sample Installations: A portion of an assembly or material constructed where directed and, if approved, retained as a part of the work. A type of sample.

SD-18, Records: Documentation to ensure compliance with an administrative requirement or to establish an administrative mechanism. A type of administrative and closeout submittal.

SD-19, Operation and Maintenance Manuals: Data intended to be incorporated in an Operations and Maintenance Manual. A type of administrative and closeout submittal.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

-- End of Section --

SUBMITTAL REGISTER
INSTRUCTIONS

1. Use Submittal Register Form for the project's Submittal Register and to track progress of submittals as they are processed. Users may arrange Parts "A" and "B" side-by-side in a 3-ring notebook.

2. The Government will supply submittal register forms, with columns (a) through (c) completed to the extent that will be required by the Government. Consider these forms as being for convenience only. Correct variations from requirements shown in specification sections; ensure Submittal Register conforms to specification sections.

a. Column (a): List each specification section in which a submittal is required.

b. Column (b): List each submittal description (SD No. and type, e.g. SD-04, Drawings) required in each specification section. Follow each submittal description with the list of material or products to be addressed in each submittal description.

c. Column (c): List one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate submittal reviews. Do not consider entries in column (c) as limiting project requirements; do not consider that a blank must be filled in by Contractor or the Government.

d. Column (d): As submittals are processed, list a consecutive number assigned by Contractor for each group of submittals. Place this same number in the appropriate block of "Submittal Transmittal Form." For a resubmission, repeat transmittal control number of the original submittal with a suffix, e.g. No. "100B" is second resubmission of material originally transmitted under No. "100."

e. Column (e): List dates scheduled for approving authority to receive submittals. These dates are the scheduled beginnings of submittal review periods. The Contractor proposes these dates and the Contracting Officer approves them to establish the approved Submittal Register.

3. Column f and column g will be used by Contractor, and the Government on their own copies.

f. Columns h through k: When approving authority is Contracting Officer, enter the Government action and date of action.

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
CONVERT VARIOUS HEATING SYSTEMS TO NAT. GAS

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		15195N	SD-03 Product Data															
			Valve box															
			Pressure regulator	2.4.3														
			Gas equipment connectors	2.5														
			Valves	2.4														
			Warning and identification tape	2.7														
			Risers	2.3.2														
			Transition fittings	2.3.3														
			Gas meter															
			SD-07 Certificates															
			Welder's qualifications	1.5.1														
			Welder's identification symbols	1.5.1														
			Year 2000 (Y2K) Compliance	1.7.1														
			Warranty															
		15400N	SD-03 Product Data															
			Pipe and fittings															
			Valves	2.1.2														
			Water heaters															
			Pipe hangers and supports	2.2.4														
			Pressure gages	2.1.4														
			Strainers	2.1.3														
			Drains															
			Water hammer arresters	2.1.7														
			Backflow preventers	2.1.8														
			Thermometers	2.1.5														
			SD-06 Test Reports															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
CONVERT VARIOUS HEATING SYSTEMS TO NAT. GAS

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAG# RAPH	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		15400N	Backflow Preventers Test Report	3.4.2.2														
			SD-10 Operation and Maintenance															
			Data															
			Water heaters															
		15532N	SD-03 Product Data															
			Central furnaces	2.1.1														
			Air filters	2.2.1														
			SD-06 Test Reports															
			Operating tests	3.3.2														
			Firing tests	3.3.3														
			SD-07 Certificates															
			Central furnaces	2.1.1														
			SD-10 Operation and Maintenance															
			Data															
			Central furnaces	2.1.1														
			SD-11 Closeout Submittals															
			Posted operating instructions	1.4														

SECTION 15050

BASIC MECHANICAL MATERIALS AND METHODS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 117	(1997) Operating Salt Spray (Fog) Apparatus

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(1997) National Electrical Safety Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(1999) National Electrical Code

1.2 RELATED REQUIREMENTS

This section applies to all sections of Division 15, "Mechanical" of this project specification, unless specified otherwise in the individual section.

1.3 QUALITY ASSURANCE

1.3.1 Material and Equipment Qualifications

Provide materials and equipment that are standard products of manufacturers regularly engaged in the manufacture of such products, which are of a similar material, design and workmanship. Standard products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year use shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2 year period.

1.3.2 Alternative Qualifications

Products having less than a two-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturer's factory or laboratory tests, can be shown.

1.3.3 Service Support

The equipment items shall be supported by service organizations. Submit a certified list of qualified permanent service organizations for support of the equipment which includes their addresses and qualifications. These service organizations shall be reasonably convenient to the equipment

installation and able to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.3.4 Manufacturer's Nameplate

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.3.5 Modification of References

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction", or words of similar meaning, to mean the Contracting Officer.

1.3.5.1 Definitions

For the International Code Council (ICC) Codes referenced in the contract documents, advisory provisions shall be considered mandatory, the word "should" shall be interpreted as "shall." Reference to the "code official" shall be interpreted to mean the "Contracting Officer." For Navy owned property, references to the "owner" shall be interpreted to mean the "Contracting Officer." For leased facilities, references to the "owner" shall be interpreted to mean the "lessor." References to the "permit holder" shall be interpreted to mean the "Contractor."

1.3.5.2 Administrative Interpretations

For ICC Codes referenced in the contract documents, the provisions of Chapter 1, "Administrator," do not apply. These administrative requirements are covered by the applicable Federal Acquisition Regulations (FAR) included in this contract and by the authority granted to the Officer in Charge of Construction to administer the construction of this project. References in the ICC Codes to sections of Chapter 1, shall be applied appropriately by the Contracting Officer as authorized by his administrative cognizance and the FAR.

1.4 DELIVERY, STORAGE, AND HANDLING

Handle, store, and protect equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations, and as approved by the Contracting Officer. Replace damaged or defective items.

1.5 ELECTRICAL REQUIREMENTS

Furnish motors, controllers, disconnects and contactors with their respective pieces of equipment. Motors, controllers, disconnects and contactors shall conform to and have electrical connections provided. Furnish internal wiring for components of packaged equipment as an integral part of the equipment. Extended voltage range motors will not be permitted. Controllers and contactors shall have a maximum of 120 volt control circuits, and shall have auxiliary contacts for use with the controls furnished. When motors and equipment furnished are larger than sizes indicated, the cost of additional electrical service and related work shall be included under the section that specified that motor or equipment.

Power wiring and conduit for field installed equipment shall be provided under and conform to the requirements of electrical code.

1.6 ELECTRICAL INSTALLATION REQUIREMENTS

Electrical installations shall conform to IEEE C2, NFPA 70, and requirements specified herein.

1.6.1 New Work

Provide electrical components of mechanical equipment, such as motors, motor starters (except starters/controllers which are indicated as part of a motor control center), control or push-button stations, float or pressure switches, solenoid valves, integral disconnects, and other devices functioning to control mechanical equipment, as well as control wiring and conduit for circuits rated 100 volts or less, to conform with the requirements of the section covering the mechanical equipment. Extended voltage range motors shall not be permitted. The interconnecting power wiring and conduit, control wiring rated 120 volts (nominal) and conduit, the motor control equipment forming a part of motor control centers, and the electrical power circuits shall be provided under Division 16, except internal wiring for components of package equipment shall be provided as an integral part of the equipment. When motors and equipment furnished are larger than sizes indicated, provide any required changes to the electrical service as may be necessary and related work as a part of the work for the section specifying that motor or equipment.

1.6.2 Modifications to Existing Systems

Where existing mechanical systems and motor-operated equipment require modifications, provide electrical components.

1.7 INSTRUCTION TO GOVERNMENT PERSONNEL

When specified in other sections, furnish the services of competent instructors to give full instruction to the designated Government personnel in the adjustment, operation, and maintenance, including pertinent safety requirements, of the specified equipment or system. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work.

Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. The number of man-days (8 hours per day) of instruction furnished shall be as specified in the individual section. When more than 4 man-days of instruction are specified, use approximately half of the time for classroom instruction. Use other time for instruction with the equipment or system.

When significant changes or modifications in the equipment or system are made under the terms of the contract, provide additional instruction to acquaint the operating personnel with the changes or modifications.

1.8 ACCESSIBILITY

Install all work so that parts requiring periodic inspection, operation, maintenance, and repair are readily accessible. Install concealed valves, expansion joints, controls, dampers, and equipment requiring access, in locations freely accessible through access doors.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PAINTING OF NEW EQUIPMENT

New equipment painting shall be factory applied or shop applied, and shall be as specified herein, and provided under each individual section.

3.1.1 Factory Painting Systems

Manufacturer's standard factory painting systems may be provided subject to certification that the factory painting system applied will withstand 125 hours in a salt-spray fog test, except that equipment located outdoors shall withstand 500 hours in a salt-spray fog test. Salt-spray fog test shall be in accordance with ASTM B 117, and for that test the acceptance criteria shall be as follows: immediately after completion of the test, the paint shall show no signs of blistering, wrinkling, or cracking, and no loss of adhesion; and the specimen shall show no signs of rust creepage beyond 0.125 inch on either side of the scratch mark.

The film thickness of the factory painting system applied on the equipment shall not be less than the film thickness used on the test specimen. If manufacturer's standard factory painting system is being proposed for use on surfaces subject to temperatures above 120 degrees F, the factory painting system shall be designed for the temperature service.

3.1.2 Shop Painting Systems for Metal Surfaces

Clean, pretreat, prime and paint metal surfaces; except aluminum surfaces need not be painted. Apply coatings to clean dry surfaces. Clean the surfaces to remove dust, dirt, rust, oil and grease by wire brushing and solvent degreasing prior to application of paint, except metal surfaces subject to temperatures in excess of 120 degrees F shall be cleaned to bare metal.

Where more than one coat of paint is specified, apply the second coat after the preceding coat is thoroughly dry. Lightly sand damaged painting and retouch before applying the succeeding coat. Color of finish coat shall be aluminum or light gray.

a. Temperatures Less Than 120 Degrees F: Immediately after cleaning, the metal surfaces subject to temperatures less than 120 degrees F shall receive one coat of pretreatment primer applied to a minimum dry film thickness of 0.3 mil, one coat of primer applied to a minimum dry film thickness of one mil; and two coats of enamel applied to a minimum dry film thickness of one mil per coat.

b. Temperatures Between 120 and 400 Degrees F: Metal surfaces subject to temperatures between 120 and 400 degrees F shall receive two coats of 400 degrees F heat-resisting enamel applied to a total minimum thickness of 2 mils.

c. Temperatures Greater Than 400 Degrees F: Metal surfaces subject to temperatures greater than 400 degrees F shall receive two coats of 600 degrees F heat-resisting paint applied to a total minimum dry

film thickness of 2 mils.
-- End of Section --

SECTION 15195N

NATURAL GAS AND LIQUID PETROLEUM PIPING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B16.33	(1990) Manually Operated Metallic Gas Valves for Use in Gas Piping Systems up to 125 psig (Sizes 1/2 Through 2)
ANSI B18.2.1	(1996) Square and Hex Bolts and Screws Inch Series
ANSI Z21.41	(1989; Addenda 1990 and 1992) Quick-Disconnect Devices for Use with Gas Fuel

ASME INTERNATIONAL (ASME)

ASME B1.1	(1989) Unified Inch Screw Threads (UN and UNR Thread Form)
ASME B1.20.1	(1983; R 1992) Pipe Threads, General Purpose (Inch)
ASME B16.3	(1992) Malleable Iron Threaded Fittings
ASME B16.5	(1996) Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24
ASME B16.9	(1993) Factory-Made Wrought Steel Buttwelding Fittings
ASME B16.11	(1996) Forged Fittings, Socket-Welding and Threaded
ASME B16.38	(1985; R 1994) Large Metallic Valves for Gas Distribution (Manually Operated, NPS 2 1/2 to 12, 125 psig Maximum)
ASME B16.39	(1986; R 1994) Malleable Iron Threaded Pipe Unions Classes 150, 250, and 300
ASME B18.2.2	(1987; R 1993) Square and Hex Nuts (Inch Series)
ASME B31.8	(1995) Gas Transmission and Distribution Piping Systems

ASME BPVC VIII D1	(1995; Addenda 1995, 1996, and 1997) Boiler and Pressure Vessel Code: Section VIII Pressure Vessels, Division 1

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53	(1997) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM A 193/A 193M	(1997; Rev. A) Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
ASTM A 194/A 194M	(1997) Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

49 CFR PT 192	Transportation of Natural and Other Gas by Pipeline: Minimum Federal Supply Standards
49 CFR PT 195	Transportation of Hazardous Liquids by Pipeline

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

MIL-STD-101	(Rev. B) Color Code for Pipelines and for Compressed Gas Cylinders

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-58	(1993) Pipe Hangers and Supports - Materials, Design and Manufacture
MSS SP-69	(1996) Pipe Hangers and Supports - Selection and Application
MSS SP-89	(1998) Pipe Hangers and Supports - Fabrication and Installation Practices

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 54	(1996) National Fuel Gas Code

1.2 DEFINITION

a. Year 2000 compliant - means computer controlled facility components that accurately process date and time data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries, and the years 1999 and 2000 and leap year calculations.

1.3 RELATED REQUIREMENTS

Section 15050N, "Basic Mechanical Materials and Methods," applies to this

section, with additions and modifications specified herein.

1.4 SUBMITTALS

Submit the following in accordance with Section 01301, "Submittal Procedures."

SD-03 Product Data

Valve box

Pressure regulator

Gas equipment connectors

Valves

Warning and identification tape

Risers

Transition fittings

Gas meter

SD-07 Certificates

Welder's qualifications

Welder's identification symbols

Year 2000 (Y2K) Compliance Warranty

Submit a copy of a certified ASME B31.8 qualification test report for each welder and welding operator. Submit the assigned number, letter, or symbol that will be used in identifying the work of each welder.

1.5 QUALITY ASSURANCE

1.5.1 Welder's Qualifications

Comply with ASME B31.8. The steel welder shall have a copy of a certified ASME B31.8 qualification test report. Contractor shall also conduct a qualification test. Submit each welder's identification symbols, assigned number, or letter, used to identify work of the welder. Affix symbols immediately upon completion of welds. Welders making defective welds after passing a qualification test shall be given a requalification test and, upon failing to pass this test, shall not be permitted to work this contract.

1.5.2 PE Welder's Qualifications

Prior to installation, Contractor shall have supervising and installing personnel trained by a PE pipe manufacturer's sponsored course of not less than one week duration, or present proof satisfactory to the Contracting Officer that personnel are currently working in the installation of PE gas distribution lines.

1.5.3 Safety Standards

49 CFR PT 192 and 49 CFR PT 195.

1.6 DELIVERY, STORAGE, AND HANDLING

Handle, transport, and store pipe and fittings carefully. Plug or cap pipe ends during transportation or storage to minimize dirt and moisture entry. Do not subject to abrasion or concentrated external loads. Discard pipe sections and fittings that have been damaged.

1.7 WARRANTY

1.7.1 Year 2000 (Y2K) Compliance Warranty

For each product, component and system specified in this section as a "computer controlled facility component" provide a statement of Y2K compliance warranty for the specific equipment. The contractor warrants that each hardware, software, and firmware product delivered under this contract and listed below shall be able to accurately process date and time data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries, and the years 1999 and 2000 and leap year calculations to the extent that other computer controlled components, used in combination with the computer controlled component being acquired, properly exchange data and time data with it. If the contract requires that specific listed products must perform as a system in accordance with the foregoing warranty, then that warranty shall apply to those listed products as a system. The duration of this warranty and the remedies available to the Government for breach of this warranty shall be defined in, and subject to, the terms and limitations of the contractor's standard commercial warranty or warranties contained in this contract, provided that, notwithstanding any provisions to the contrary, in such commercial warranty or warranties, the remedies available to the Government under this warranty shall include repair or replacement of any listed product whose non-compliance is discovered and made known to the contractor in writing within one year (365 days) after acceptance. Nothing in this warranty shall be construed to limit any rights or remedies the Government may otherwise have under this contract, with respect to defects other that Year 2000 performance.

PART 2 PRODUCTS

2.1 Y2K COMPLIANT PRODUCTS

Provide computer controlled facility components, specified in this section, that are Year 2000 compliant (Y2K). Computer controlled facility components refers to software driven technology and embedded microchip technology. This includes, but in not limited to, telecommunications switches, utility monitoring and control systems, fire detection and suppression systems, alarms, security systems, and other facilities control systems utilizing microcomputer, minicomputer, or programmable logic controllers.

2.2 MATERIALS AND EQUIPMENT

Conform to NFPA 54 and with requirements specified herein. Supply piping to appliances or equipment shall be at least as large as the inlets thereof.

2.3 PIPE AND FITTINGS

2.3.1 Aboveground and Within Buildings and Vaults

a. Pipe: Black steel in accordance with ASTM A 53, Schedule 40, threaded ends for sizes 2 inches and smaller; otherwise, plain end beveled for butt welding.

b. Threaded Fittings: ASME B16.3, black malleable iron.

c. Socket-Welding Fittings: ASME B16.11, forged steel.

d. Butt-Welding Fittings: ASME B16.9, with backing rings of compatible material.

e. Unions: ASME B16.39, black malleable iron.

f. Flanges and Flanged Fittings: ASME B16.5 steel flanges or convoluted steel flanges conforming to ASME BPVC VIII D1. Flange faces shall have integral grooves of rectangular cross sections which afford containment for self-energizing gasket material.

2.3.2 Risers

Manufacturer's standard riser, transition from plastic to steel pipe with 7 to 12 mil thick epoxy coating. Use swaged gas-tight construction with O-ring seals, metal insert, and protective sleeve. Provide remote bolt-on or bracket or wall-mounted riser supports as required.

2.3.3 Transition Fittings

a. Steel to Plastic (PE): As specified for "riser" except designed for steel-to-plastic with tapping tee or sleeve. Coat or wrap exposed steel pipe with heavy plastic coating.

2.4 VALVES, ABOVEGROUND

2.4.1 Shutoff Valves, Sizes Larger Than 2 Inches

Cast-iron or steel body ball valve with flanged ends in accordance with ASME B16.38. Provide PTFE seats.

Cast-iron body plug valve in accordance with ASME B16.38, nonlubricated, wedge-mechanism or tapered lift plug, and flanged ends.

2.4.2 Shutoff Valves, Sizes 2 Inches and Smaller

Bronze or Steel body ball valve in accordance with ANSI B16.33, full port pattern, reinforced PTFE seals, threaded ends, and PTFE seat.

Bronze or Steel body plug valve in accordance with ANSI B16.33, straightway, taper plug, regular pattern with a port opening at least equal to the internal pipe area or round port full bore pattern, non-lubricated, PTFE packing, flat or square head stem with lever operator, 125 psig rating, threaded ends.

2.4.3 Pressure Regulator

Self-contained with spring-loaded diaphragm pressure regulator, psig to inches water reduction, pressure operating range as required for the

pressure reduction indicated, volume capacity not less than indicated, and threaded ends for sizes 2 inches and smaller, otherwise flanged.

2.5 GAS EQUIPMENT CONNECTORS

a. Quick Disconnect Couplings: ANSI Z21.41.

2.6 CASING

Where indicated at railroad or other crossing, provide ASTM A 53, galvanized pipe, Schedule 40 , with extruded polyethylene coating.

2.7 BURIED UTILITY WARNING AND IDENTIFICATION TAPE

Provide detectable aluminum-foil plastic-backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 3 inch minimum width, color-coded yellow for natural gas, with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be "CAUTION BURIED GAS PIPING BELOW" or similar wording. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material.

2.8 HANGERS AND SUPPORTS

MSS SP-58, as required by MSS SP-69.

2.9 WELDING FILLER METAL

ASME B31.8.

2.10 PIPE-THREAD TAPE

Antiseize and sealant tape of polytetrafluoroethylene (PTFE).

2.11 BOLTING (BOLTS AND NUTS)

Stainless steel bolting; ASTM A 193/A 193M, Grade B8M or B8MA, Type 316, for bolts; and ASTM A 194/A 194M, Grade 8M, Type 316, for nuts. Dimensions of bolts, studs, and nuts shall conform with ANSI B18.2.1and ASME B18.2.2 with coarse threads conforming to ASME B1.1, with Class 2A fit for bolts and studs and Class 2B fit for nuts. Bolts or bolt-studs shall extend through the nuts and may have reduced shanks of a diameter not less than the diameter at root of threads. Bolts shall have American Standard regular square or heavy hexagon heads; nuts shall be American Standard heavy semifinished hexagonal.

2.12 GASKETS

Fluorinated elastomer, compatible with flange faces.

2.13 IDENTIFICATION FOR ABOVEGROUND PIPING

MIL-STD-101 for legends and type and size of characters. For pipes 3/4 inch od and larger, provide printed legends to identify contents of pipes and arrows to show direction of flow. Color code label backgrounds to signify levels of hazard. Make labels of plastic sheet with pressure-sensitive adhesive suitable for the intended application. For pipes smaller than3/4

inch od, provide brass identification tags 1 1/2 inches in diameter with legends in depressed black-filled characters.

PART 3 EXECUTION

3.1 INSTALLATION

Install gas piping, appliances, and equipment in accordance with NFPA 54.

3.1.1 Piping

Cut pipe to actual dimensions and assemble to prevent residual stress. Provide supply connections entering the buildings as required. Within buildings, run piping parallel to structure lines and conceal in finished spaces. Terminate each vertical supply pipe to burner or appliance with tee, nipple and cap to form a sediment trap. To supply multiple items of gas-burning equipment, provide manifold with inlet connections at both ends.

3.1.1.1 Cleanliness

Clean inside of pipe and fittings before installation. Blow lines clear using 80 to 100 psig clean dry compressed air. Rap steel lines sharply along entire pipe length before blowing clear. Cap or plug pipe ends to maintain cleanliness throughout installation.

3.1.1.2 Aboveground Steel Piping

Determine and establish measurements for piping at the job site and accurately cut pipe lengths accordingly. For 2 inch diameter and smaller, use threaded or socket-welded joints. For 2 1/2 inch diameter and larger, use flanged or butt-welded joints.

a. Threaded Joints: Where possible use pipe with factory-cut threads, otherwise cut pipe ends square, remove fins and burrs, and cut taper pipe threads in accordance with ASME B1.20.1. Provide threads smooth, clean, and full-cut. Apply anti-seize paste or tape to male threads portion. Work piping into place without springing or forcing. Backing off to permit alignment of threaded joints will not be permitted. Engage threads so that not more than three threads remain exposed. Use unions for connections to valves or meters for which a means of disconnection is not otherwise provided.

b. Welded Joints: Weld by the shielded metal-arc process, using covered electrodes and in accordance with procedures established and qualified in accordance with ASME B31.8.

c. Flanged Joints: Use flanged joints for connecting welded joint pipe and fittings to valves to provide for disconnection. Install joints so that flange faces bear uniformly on gaskets. Engage bolts so that there is complete threading through the nuts and tighten so that bolts are uniformly stressed and equally torqued.

d. Pipe Size Changes: Use reducing fittings for changes in pipe size. Size changes made with bushings will not be accepted.

e. Painting: Paint new ferrous metal piping, including supports, in accordance with Section 09900, "Paints and Coatings." Do not apply paint until piping tests have been completed.

f. Identification of Piping: Identify piping aboveground in accordance with MIL-STD-101, using adhesive-backed or snap-on plastic labels and arrows. In lieu of labels, identification tags may be used. Apply labels or tags to finished paint at intervals of not more than 50 feet. Provide two copies of the piping identification code framed under glass and install where directed.

3.1.1.3 Connections to Existing Pipeline

When making connections to live gas mains, use pressure tight installation equipment operated by workmen trained and experienced in making hot taps.

3.1.2 Valves

Install valves approximately at locations indicated or logical locations. Orient stems vertically, with operators on top, or horizontally. Provide support for valves to resist operating torque pipes.

3.1.2.1 Pressure Regulator

Provide plug cock or ball valve ahead of regulator. Install regulator outside of building and 18 inches aboveground on riser. Install regulator inside building and extend a full-size vent line from relief outlet on regulator to a point outside of building. On outlet side of regulator provide a union and a 3/8 inch gage tap with plug.

3.1.2.2 Stop Valve and Shutoff Valve

Provide stop valve on service branch at connection to main and shut-off valve on riser outside of building.

3.1.3 Pipe Sleeves

Where piping penetrates concrete or masonry wall, floor or firewall, provide pipe sleeve poured or grouted in place. Make sleeve of steel or cast-iron pipe of such size to provide 1/4 inch or more annular clearance around pipe. Extend sleeve through wall or slab and terminate flush with both surfaces. Pack annular space with oakum, and caulk at ends with silicone construction sealant.

3.1.4 Piping Hangers and Supports

Selection, fabrication, and installation of piping hangers and supports shall conform with MSS SP-69 and MSS SP-89, unless otherwise indicated.

3.1.5 Final Connections

Make final connections to equipment and appliances using rigid pipe and fittings.

3.1.5.1 Domestic Water Heaters

Connect with AGA-Approved semi-rigid tubing and fittings.

3.2 FIELD QUALITY CONTROL

3.2.1 Metal Welding Inspection

Inspect for compliance with NFPA 54. Replace, repair, and then re-inspect defective welds.

3.2.2 Pressure Tests

Use test pressure of 1 1/2 times maximum working pressure, but in no case less than 50 psig. Do not test until every joint has set and cooled at least 8 hours at temperatures above 50 degrees F. Conduct testing before backfilling; however, place sufficient backfill material between fittings to hold pipe in place during tests. Test system gas tight in accordance with NFPA 54 or ASME B31.8. Use clean dry air or inert gas, such as nitrogen or carbon dioxide, for testing. Systems which may be contaminated by gas shall first be purged as specified. Make tests on entire system or on sections that can be isolated by valves. After pressurization, isolate entire piping system from sources of air during test period. Maintain test pressure for at least 8 hours between times of first and last reading of pressure and temperature. Take first reading at least one hour after test pressure has been applied. Do not take test readings during rapid weather changes. Provide temperature same as actual trench conditions. There shall be no reduction in the applied test pressure other than that due to a change in ambient temperature. Allow for ambient temperature change in accordance with the relationship PF + 14.7 = (P1 + 14.7) (T2 + 460) / T1 + 460), in which "T" and "PF" represent Fahrenheit temperature and gage pressure, respectively, subscripts "1" and "2" denote initial and final readings, and "PF" is the calculated final pressure. If "PF" exceeds the measured final pressure (final gage reading) by 1/2 psi or more, isolate sections of the piping system, retest each section individually, and apply a solution of warm soapy water to joints of each section for which a reduction in pressure occurs after allowing for ambient temperature change. Repair leaking joints and repeat test until no reduction in pressure occurs. In performing tests, use a test gage calibrated in one psi increments and readable to 1/2 psi.

3.2.3 System Purging

After completing pressure tests, and before testing a gas contaminated line, purge line with nitrogen at junction with main line to remove all air and gas. Clear completed line by attaching a test pilot fixture at capped stub-in line at building location and let gas flow until test pilot ignites. Procedures shall conform to NFPA 54 and ASME B31.8.

-CAUTION-

Failure to purge may result in explosion within line when air-to-gas is at correct mixture.

-- End of Section --

-- END OF SPECIFICATION --

SECTION 15400N

PLUMBING SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B16.18	(1984; R 1994) Cast Copper Alloy Solder Joint Pressure Fittings
ANSI B16.24	(1991; Errata 1991) Cast Copper Alloy Pipe Flanges and Flanged Fittings Class 150, 300, 400, 600, 900, 1500, and 2500
ANSI Z21.10.3	(1993) Gas Water Heaters Volume III Storage, with Input Ratings Above 75,000 Btu per Hour, Circulating and Instantaneous Water Heaters
ANSI Z21.22	(1986) Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 90A	(1980; Addendum 1987) Energy Conservation in New Building Design (Section 1 through 3)

ASME INTERNATIONAL (ASME)

ASME B16.1	(1989) Cast Iron Pipe Flanges and Flanged Fittings
ASME B16.3	(1992) Malleable Iron Threaded Fittings
ASME B16.22	(1995) Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
ASME B16.26	(1988) Cast Copper Alloy Fittings for Flared Copper Tubes
ASME BPVC IV	(1995; Addenda 1995, 1996, and 1997) Boiler and Pressure Vessel Code Section IV Part HLW Potable-Water Heaters

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE 1003	(1993; Errata 1993) Water Pressure

Reducing Valves

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53	(1997) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM B 32	(1996) Solder Metal
ASTM B 42	(1996) Seamless Copper Pipe, Standard Sizes
ASTM F 441/F 441M	(1997) Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C500	(1993; Addendum 1995) Metal-Seated Gate Valves for Water Supply Service
AWWA C651	(1992) Disinfecting Water Mains

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)

FCCCHR-USC	List of Approved Backflow Prevention Assemblies

INTERNATIONAL CODE COUNCIL (ICC)

ICC Plumbing Code	(1996) International Plumbing Code

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-R-6855	(Rev. E; Supp. 1) Rubber, Synthetic, Sheets, Strips, Molded or Extruded Shapes

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-58	(1993) Pipe Hangers and Supports - Materials, Design and Manufacture
MSS SP-69	(1996) Pipe Hangers and Supports - Selection and Application
MSS SP-70	(1990) Cast Iron Gate Valves, Flanged and Threaded Ends
MSS SP-71	(1997) Cast Iron Swing Check Valves, Flanged and Threaded Ends
MSS SP-80	(1997) Bronze Gate, Globe, Angle and Check Valves
MSS SP-85	(1994) Cast Iron Globe & Angle Valves Flanged and Threaded Ends

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 54	(1996) National Fuel Gas Code
NFPA 211	(1996) Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances

PLUMBING AND DRAINAGE INSTITUTE (PDI)

PDI WH 201	(1992) Water Hammer Arrestors

UNDERWRITERS LABORATORIES (UL)

UL 1453	(1995; R 1997) Electric Booster and Commercial Storage Tank Water Heaters

1.2 RELATED REQUIREMENTS

Section 15050N, "Basic Mechanical Materials and Methods," applies to this section with the additions and modifications specified herein.

1.3 SYSTEM DESCRIPTION

Provide new and modify existing plumbing systems, complete and ready for operation. Plumbing systems including manufacturer's products shall be in accordance with the required and advisory provisions of the ICC Plumbing Code. Plumbing systems include piping less than 5 feet outside of building walls and piping beyond 5 feet outside of building walls including connections to existing exterior distribution systems.

1.4 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-03 Product Data

Pipe and fittings

Valves

Water heaters

Pipe hangers and supports

Pressure gages

Strainers

Drains

Water hammer arresters

Backflow preventers

Thermometers

SD-06 Test Reports

Backflow Preventers Test Report

SD-10 Operation and Maintenance Data

Water heaters, Data Package 2

Submit operation and maintenance data.

1.5 QUALITY ASSURANCE

Plumbing systems including fixtures, equipment, materials, installation, and workmanship shall be in accordance with the Plumbing Code except as modified herein. In the Plumbing Code referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for the word "should" wherever it appears; reference to the "authority having jurisdiction," the Administrative Authority, the Plumbing Official, and the Design Engineer shall be interpreted to mean the Contracting Officer. Capacity of equipment shall be not less than that indicated.

PART 2 PRODUCTS

2.1 DOMESTIC WATER PIPING

2.1.1 Buried Piping and Aboveground Piping

2.1.1.1 Copper Tubing

ASTM B 88, Type L for aboveground piping, Type K for buried piping, with ANSI B16.18 or ASME B16.22 solder joint fittings; or with ASME B16.26 flared joint fittings. Provide ASTM B 42 copper pipe nipples with threaded end connections. Provide ASTM B 32, 95-5 tin-antimony solder, or provide Plumbing Code approved lead-free solder. Provide copper tubing for pipe sizes 4 inches or smaller.

2.1.2 Water Valves

Provide valves suitable for minimum of 125 psig and minimum of 180 degrees F hot water. Valves shall have flanged end connections, except sizes smaller than 2.5 inches may have threaded end connections with a union on all but one side of the valve, or solder end connections for connections between bronze valves and copper tubing. Ball valves may be provided in lieu of gate valves. Provide blue finish and red finish on handwheels for valves in cold domestic water piping and hot domestic water piping, respectively.

2.1.2.1 Gate Valves

MSS SP-80, Class 125, except sizes 2.5 inches and larger shall conform to MSS SP-70, Class 125.

2.1.2.2 Globe and Angle Valves

MSS SP-80, Class 125, except sizes 2.5 inches and larger shall conform to MSS SP-85, Class 125.

2.1.2.3 Check Valves

MSS SP-80, Class 125, swing check, except sizes 2.5 inches and larger shall conform to MSS SP-71, Class 125, swing check, cast-iron or bronze body.

2.1.2.4 Ball Valves

Full port design, copper alloy, except sizes 2.5 inches and larger shall be ductile-iron body or cast-iron body. Valves shall have two-position lever handles.

2.1.2.5 Hose Bibbs

Provide angle type copper alloy hose bibb with lockshield and handwheel. Inlet shall have internal threads. Outlet shall have vacuum breaker with 0.75 inch external hose threads.

2.1.2.6 Combination Pressure and Temperature Relief Valves

ANSI Z21.22 copper alloy body, automatic reseating, test lever, and discharge capacity based on AGA temperature steam rating.

2.1.2.7 Pressure Relief Valves

ANSI Z21.22 copper alloy body, automatic reseating with test lever.

2.1.2.8 Water Pressure Reducing Valves

ASSE 1003.

2.1.3 Strainers

Strainers shall have blow off outlet with pipe nipple and gate valve and discharge pipe nipple. Copper alloy or cast-iron body. Provide stainless steel strainer element with perforations of 0.047 inch.

2.1.4 Pressure Gages

Provide single style pressure gage for water with 4.5 inch dial, brass or aluminum case, bronze tube, gage cock, pressure snubber, and syphon. Provide scale range suitable for the intended service.

2.1.5 Thermometers

Provide bi-metal dial type thermometers with stainless steel case, stem, and fixed thread connection; 5 inch diameter dial with glass face gasketed within the case; accuracy within 2 percent of scale range. Provide scale range suitable for the intended service.

2.1.6 Dielectric Connections

Provide at connections between copper and ferrous metal piping materials. ASTM F 441/F 441M, Schedule 80, CPVC threaded pipe nipples, 4 inch minimum length, may be provided for dielectric connections in pipe sizes 2 inches and smaller.

2.1.7 Water Hammer Arresters

PDI WH 201.

2.1.8 Backflow Preventers

Reduced pressure principle assemblies, double check valve assemblies,

atmospheric (nonpressure) type vacuum breakers, and pressure type vacuum breakers shal be listed in the current FCCCHR-USC.

2.2 MISCELLANEOUS PIPING MATERIALS

2.2.1 Flanges

ASME B16.1, Class 125, for use in ferrous piping; ASME B16.22 or ANSI B16.24 for use in copper tubing; with MIL-R-6855 full face flat type synthetic rubber gaskets.

2.2.2 Pipe Sleeves

2.2.2.1 Sleeves in Masonry and Concrete Walls, Floors, Roofs

ASTM A 53, Schedule 40 or Standard Weight, hot-dip galvanized steel , ductile-iron or cast-iron pipe sleeves.

2.2.2.2 Sleeves in Non-Masonry or -Concrete Walls, Floors, and Roofs

Provide 26 gage hot-dip galvanized steel sheet.

2.2.3 Pipe Sleeves

Provide where piping passes entirely through walls, ceilings, roofs, and floors. Secure sleeves in position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, ceilings, roofs, and floors. Provide one inch minimum clearance between exterior of piping or pipe insulation, and interior of sleeve or core-drilled hole. Firmly pack space with mineral wool insulation. Seal space at both ends of sleeve or core-drilled hole with plastic waterproof cement which will dry to a firm but pliable mass, or provide a mechanically adjustable segmented elastomeric seal. In fire walls and fire floors, seal both ends of sleeves or core-drilled holes with UL listed fill, void, or cavity material.

a. Sleeves in masonry and concrete walls, floors, and roofs: Provide steel pipe sleeves. Sleeves are not required where drain, waste, and vent (DWV) piping passes through concrete floor slabs located on grade. Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in the core-drilled hole are completely grouted smooth.

b. Sleeves in other than masonry and concrete walls, floors, and roofs: Provide 26 gage galvanized steel sheet.

2.2.4 Pipe Hangers and Supports

Provide MSS SP-58 and MSS SP-69, Type 1 with adjustable type steel support rods, except as specified or indicated otherwise. Attach to steel joists with Type 19 or 23 clamps and retaining straps. Attach to Steel W or S beams with Type 21, 28, 29, or 30 clamps. Attach to steel angles and vertical web steel channels with Type 20 clamp with beam clamp channel adapter. Attach to horizontal web steel channel and wood with drilled hole on centerline and double nut and washer. Attach to concrete with Type 18 insert or drilled expansion anchor. Provide Type 40 insulation protection shield for insulated piping.

2.3 ELECTRIC AND GAS WATER HEATERS, COMMERCIAL TYPE

ASME BPVC IV and UL 1453 for electric heaters and ANSI Z21.10.3 for gas heaters with heat input, recovery, and storage capacity as indicated. Tank shall be rated for a working pressure of 150 psi, ASME stamped, and nickel lined glass lined or cement lined. Provide thermometer in thermometer well. Insulate water heater with fiberglass insulation and trim with baked enamel finished steel sheet jacket. Standby heat loss shall conform to ASHRAE 90A high efficiency requirements. Water temperature shall be adjustable between 110 and 180 degrees F. Provide ASME temperature and pressure relief valve. Water heater shall bear UL Label Service Listing and National Board of Boiler and Pressure Vessel Inspection (NBBPVI) registration and stamp.

2.3.1 Gas Vents

NFPA 211, Type B, of the prefabricated multi-wall UL listed type.

2.3.2 Gas Piping System

NFPA 54. Provide threaded fittings and end connections.

2.3.2.1 Steel Pipe

ASTM A 53. Schedule 40, black steel.

2.3.2.2 Threaded Fittings

ASME B16.3, Class 150.

2.3.2.3 Gas Valves

Provide cast-iron or bronze body valves, with bronze plug or ball and two position lever handles. Valves shall be suitable for 125 psig working pressure. UL listed ball valves may be provided in lieu of plug valves.

PART 3 EXECUTION

3.1 INSTALLATION

Installation of plumbing systems including fixtures, backflow preventers, equipment, materials, and workmanship shall be in accordance with the Plumbing Code, except as modified herein. When fixtures require both hot water and cold water supplies, provide the hot water supply to the left of the cold water supply.

3.1.1 Threaded Connections

Jointing compound for pipe threads shall be polytetrafluoroethylene (PTFE) pipe thread paste, pipe cement and oil, or PTFE powder and oil; apply only on male threads. Provide exposed ferrous pipe threads with one coat of primer applied to a minimum dry film thickness of 1.0 mil.

3.1.2 Solder End Valves

Remove stems and washers and other item subject to damage by heat during installation. Reassemble valve after soldering is completed. Valves without heat sensitive parts do not require disassembly but shall be opened at least two turns during soldering.

3.1.3 Pipe Supports (Hangers)

Provide additional supports at the concentrated loads in piping between supports, such as for inline water pumps and flanged valves. Maximum of 5 foot apart at valves and pumps.

3.1.3.1 Maximum Spacing Between Supports

a. Vertical Piping: Support metal piping at each floor, but at not more than 10 foot intervals, with pipe riser clamps or offset pipe clamps.

b. Horizontal Piping: Support steel piping and copper tubing as follows:

MAXIMUM SPACING (FEET)

Nominal Pipe Size (inches)	One and under	1.25	1.5	2	2.5	3	3.5	4	5	6
Steel Pipe	7	8	9	10	11	12	13	14	16	17
Copper Tube	6	7	8	8	9	10	11	12	13	14

3.1.4 Ductile Iron Pipe Aboveground

Provide flanged joints.

3.1.5 Installation of Pipe Sleeves

Provide pipe sleeves where piping passes through walls, floors, roofs, and partitions. Secure sleeves in proper position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, floors, roofs, and partitions. Provide not less than 0.25 inch space between exterior of piping or pipe insulation and interior of sleeve or core-drilled hole. Firmly pack space with mineral wool insulation. Seal at both ends of the sleeve or core-drilled hole with plastic waterproof cement which will dry to a firm but pliable mass, or provide a mechanically adjustable segmented elastomeric seal. Seal both ends of penetrations through fire walls and fire floors to maintain fire resistive integrity with UL listed fill, void, or cavity material.

3.2 NAMEPLATES

Provide laminated plastic nameplates for equipment, gages, thermometers, and valves; stop valves in supplies to fixtures will not require nameplates. Laminated plastic shall be 0.125 inch thick melamine plastic, black with white center core. Surface shall be a matte finish. Corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 by 2.5 inches. Lettering shall be minimum of 0.25 inch high normal block lettering. Key nameplates to a chart and schedule for each system. Frame charts and schedules under glass and place where directed near each system. Furnish two copies of each chart and schedule. Each inscription shall identify its function. Equipment nameplates shall show the following information:

a. Manufacturer, type, and model number

b. Contract number and accepted date

c. Capacity or size

d. System in which installed

e. System which it controls

3.3 CONNECTIONS TO EXISTING WATER SUPPLY SYSTEMS

Use tapping or drilling machine valve and mechanical joint type sleeves for connections to be made under pressure. Bolt sleeves around mains; bolt valve conforming to AWWA C500 to the branch. Open valve, attach drilling machine, make tap, close valve, and remove drilling machine, without interruption of service. Notify the Contracting Officer in writing at least 15 days prior to the date the connections are required; receive approval before any service is interrupted. Provide materials required to make connections into the existing water supply systems and perform excavating, backfilling, and other incidental labor as required. Furnish Government will furnish only the labor and the tapping or drilling machine for making the actual connections to the existing systems.

3.4 FIELD QUALITY CONTROL

3.4.1 Inspections

Prior to initial operation, inspect piping system for compliance with drawings, specifications, and manufacturer's submittals.

3.4.2 Field Testing

Before final acceptance of the work, test each system as in service to demonstrate compliance with the contract requirements. Perform the following tests in addition to the tests specified in the Plumbing Code, except as modified herein. Correct defects in the work provided by the Contractor, and repeat tests until work is in compliance with contract requirements. Furnish water, electricity, instruments, connecting devices, and personnel for performing tests.

3.4.2.1 Domestic Water Piping

Before applying insulation, hydrostatically test each piping system at not less than 120 psig with no leakage or reduction in gage pressure for 2 hours.

3.4.2.2 Backflow Preventers Test Report

Backflow preventers shall be tested by a locally approved and certified backflow assembly tester. A copy of the test report shall be provided to the Contracting Officer prior to placing the domestic water system into operation, or no later than 5 days after the test.

3.5 OPTIONAL DISINFECTION METHOD

Disinfect new potable water lines and affected portions of existing potable water lines with geothermal water. Geothermal water shall be not less than

194 degrees F and contact time shall be not less than 30 minutes. After disinfection, thoroughly flush new potable water lines and affected portions of existing potable water lines with the chlorinated base water supply for a minimum of two hours.

3.6 DISINFECTION

Disinfect new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C651. Fill piping systems with solution containing minimum of 50 parts per million (ppm) of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with domestic water until maximum residual chlorine content is within the range of 0.2 to 0.5 ppm, or the residual chlorine content of domestic water supply. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit the results prior to the new water piping being placed into service. Disinfection of systems supplied by nonportable water is not required.

-- End of Section --

SECTION 15532N

WARM AIR HEATING SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z21.66	(1996) Automatic Vent Damper Devices for Use with Gas-Fired Appliances

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM F 1040	(1987; R 1993) Filter Units, Air Conditioning: Viscous-Impingement and Dry Types, Replaceable

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS WW-F-2743	Furnaces, Warm Air and Heaters, Unit, Forced Air Circulation, Oil- and Gas - Fired

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA DC 3	(1989) Residential Controls - Electrical Wall-Mounted Room Thermostats

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 31	(1997) Installation of Oil Burning Equipment
NFPA 54	(1996) National Fuel Gas Code
NFPA 90A	(1996) Installation of Air Conditioning and Ventilating Systems
NFPA 90B	(1996) Installation of Warm Air Heating and Air Conditioning Systems
NFPA 211	(1996) Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances

SHEET METAL & AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA TAB HVAC Sys	(1993) HVAC Systems Testing, Adjusting and Balancing

UNDERWRITERS LABORATORIES (UL)

UL 103	(1995) Chimneys, Factory-Built, Residential Type and Building Heating Appliance
UL 441	(1996; R 1997) Gas Vents

1.2 RELATED REQUIREMENTS

Section 15050N, "Basic Mechanical Materials and Methods" applies to this section with additions and modifications specified herein.

1.3 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-03 Product Data

Central furnaces

Air filters

Include types and ratings of utilities required, efficiency of item under installed conditions, and size and mounting requirements.

SD-06 Test Reports

Operating tests

Firing tests

Submit field test reports in accordance with the paragraph entitled "Field Quality Control."

SD-07 Certificates

Central furnaces

SD-10 Operation and Maintenance Data

Central furnaces, Data Package 3

SD-11 Closeout Submittals

Posted operating instructions

1.4 POSTED OPERATING INSTRUCTIONS

Provide instructions for start-up, normal operating, shutdown, and emergency shutdown procedures.

PART 2 PRODUCTS

2.1 HEATING EQUIPMENT

Provide self-contained, indirect, gas-fired, forced-air, furnaces conforming to FS WW-F-2743. Heating equipment shall consist of a heat

exchanger; burner; centrifugal blower, a sheet metal cabinet-type casing with provisions for duct, or louvered connection; and all required operating, limit, and safety controls. Equipment shall be suitable for burning natural gas (1,000 Btu's per cubic foot). Provide a 24 volt control transformers, high limit, and fan time delay relay. Minimum annual fuel utilization efficiency (AFUE) shall be 78 percent for 22,000 to 225,000 Btu/hr input capacities gas-fired units. The steady state efficiencies for gas-fired units shall not be less than 80 percent at maximum rated capacity and not less than 78 percent at minimum rated capacity that is provided and allowed by the controls.

2.1.1 Central Furnaces

FS WW-F-2743 Type I of the upflow, high-boy or upflow, low-boy style which ever best suited for the application designed to supply heated air through a duct system.

2.1.2 Burners

Do not provide manually ignited type burners. Burners shall always return to low fire for ignition. Provide control system for on-off operation. Provide electronic spark ignition system.

2.1.2.1 Gas Burners

The gas burners shall include ignition equipment, gas-control valve, gas piping, gas-pressure regulating valve, gas shut-off cocks, when applicable, and accessories necessary for a fully automatic system that conforms to FS WW-F-2743. Furnish both high and low gas supply pressure switches in the fuel supply piping for gas-fired units equipped with programming controls.

2.2 ACCESSORY EQUIPMENT

2.2.1 Air Filters

2.2.1.1 Replaceable Units

a. Provide ASTM F 1040 Type 1, throw-away frames and media, Grade A, B, C and 1 inches thick. Form frames to provide positive support for the media pad and sufficient structural rigidity for normal handling and installation.

b. Provide ASTM F 1040 Type 2, permanent frames with replaceable media, Grade A, B, C, and 1 inches thick. Provide aluminum or steel frames designed to permit ready removal of the soiled media pad and replacement with a clean pad.

2.2.2 Automatic Vent Dampers

Provide in the vents of all gas burning equipment that uses indoor air for combustion. Vent dampers shall conform to ANSI Z21.66.

2.2.3 Thermostat

Provide wall mounted, low voltage type conforming to NEMA DC 3 with an operating range from 55 to 90 degrees F. Housing shall have exposed adjustment covers with visible thermometers for family housing. The mounting plate or base shall be made of thermal insulating material or shall support the thermal element not less than 1/4 inch from the wall.

The control unit of the thermostat shall consist of a temperature sensing element, control switch, and anticipating heater. The control switch shall be a hermetically-sealed switch. Thermostat shall have provisions for calibrating the unit to the accuracy specified in NEMA DC 3. The design shall preclude calibration adjustment with ordinary tools, such as screwdriver or pliers. Mercury switches shall not be used in the control unit. Unless otherwise specified, a system selector switch having "heat" and "off" positions, and a fan selector switch having "auto" and "on" positions shall be provided integral to or mounted on a subbase of the thermostat.

2.3 FLUE CONNECTIONS

Flue connections shall be furnished as specified in FS WW-F-2743. Provide a vent system as recommended by manufacturer. Flue connections, including pipe and fittings, shall conform to NFPA 211 and shall be galvanized sheet steel having a nominal thickness not less than that required by NFPA 211. The weight of zinc-coating shall not be less than 1.25 ounces per square foot commercial. If the standard flue connection on the furnace is other than the size specified for the furnace pipe, provide a suitable adapter. Provide suitable cleanouts to permit cleaning of the entire flue connection without dismantling. Provide a resilient mount induced draft fan with an integral sail switch to sense flow, in the exhaust system. Provide double-wall metal chimneys.

2.3.1 Chimneys

Design and construct to safely convey flue gases to the outside atmosphere. Provide parts and accessories designed for firm attachment to ensure strength, rigidity, and durability. Provide chimney connectors formed of not lighter than 20-gage zinc-coated steel sheets between chimneys and appliances and between chimneys and heating plants. Fire stops, thimbles, and support assemblies shall conform to the NFPA 211, UL Gas and Oil Equipment Directory, UL 103, UL 441, as applicable.

2.3.1.1 Chimneys

Shall be factory built, conforming to UL 103, UL 441 and installed in accordance with NFPA 211. The listing in the UL Gas and Oil Equipment Directory will be acceptable evidence that the chimneys conform. In lieu of such listing, the Contractor may submit a written certificate from any nationally recognized testing agency, that the chimneys have been tested in accordance with methods of testing of the UL and conform to UL 103, UL 441. Provide the inside diameter and other required dimensions as indicated. Install weather hood or roof housing weathertight.

2.4 WARM AIR CONNECTIONS

For central furnaces, provide appropriate flex-connections at the discharge and return air ductwork connections.

2.5 FUEL-GAS SYSTEM

Provide as specified in Section 15195N, "Natural Gas and Liquid Petroleum Piping."

2.6 ELECTRICAL EQUIPMENT

Provide complete with motors, motor starters, thermal overload protection,

and controls. Equipment and wiring shall be in accordance with Natural Electrical Code 2002 "Interior Distribution System."

2.7 INSULATION

Provide shop and field applied insulation where required.

2.8 ASBESTOS PROHIBITION

Asbestos and asbestos containing products are prohibited.

PART 3 EXECUTION

3.1 PREPARATION

Provide storage for equipment and material at the project site. All parts shall be readily accessible for inspection, repair, and renewal. Protect materials and equipment from the weather.

3.2 INSTALLATION

Warm air heating system installation shall conform to the requirements contained in NFPA 90A or NFPA 90B, as applicable. Combustion air supply and ventilation shall be in accordance with NFPA 31 or NFPA 54, as applicable.

3.2.1 Furnace

Provide foundations, settings, or suspensions for mounting equipment and accessories, including but not limited to supports, vibration isolators, stands, guides, anchors, clamps, and brackets. Foundations and suspension for equipment shall conform to the recommendations of the manufacturer, unless otherwise indicated. Set anchor bolts and sleeves accurately using templates. Provide anchor bolts and lag screws with welded-on plates on the head end and guard against damage until equipment is installed. Level bases using jacks or steel wedges, and when resting on concrete, neatly grout-in with a non-shrinking grout. Locate equipment as indicated and in such a manner that working space is available for all servicing, such as shaft removal, replacing or adjusting drives, motors or shaft seals, air filters, access to automatic controls, humidifiers, and lubrication. Provide electrical isolation between dissimilar metals to minimize galvanic corrosion. Clean the interior of cabinets or casings before completion of installation. Prime all uncoated ferrous-metal work and apply a finish coat of paint.

3.2.2 Flue Connections

Connect furnace to the stack with the specified flue connections, draft regulators, draft hoods, and induced draft fans, as applicable, in accordance with NFPA 211.

3.2.3 Air Filters

Provide air filters where indicated. Do not operate fans or blowers until filters are installed. After completion of tests and before the building is accepted by the Government, provide a new set of throwaway filters, where utilized, or clean the permanent type filters.

3.3 FIELD QUALITY CONTROL

Inspect equipment when it is delivered to the job site. The right is reserved to inspect any equipment at the plant of the manufacturer, during or after manufacture. Inspect and repair all refractory after installation and prior to startup. Continually inspect equipment during installation, after installation, and during the tests. Upon completion and prior to acceptance, perform tests and furnish all necessary equipment and materials required for the tests as specified herein to demonstrate that warm air heating system is in compliance with contract requirements. Make all tests under the direction of the Contracting Officer. Read all indicating instruments at half-hour intervals.

3.3.1 Start-Up

Prior to start up, clean all equipment, adjust belts to proper tension, lubricate motors and pulley bearings, and install air filters. Adjust safety and operating controls as necessary to place them in proper operation and sequence.

3.3.2 Operating Tests

Perform the following operating tests to demonstrate satisfactory furnace operation. Check burner safety controls by simulating flame failure in accordance with the manufacturer's instructions. Operate furnace for a period sufficient to make the following observations and record the following data but in no case less than one hour. These tests may be run concurrent with fire tests specified below to the extent practical. Demonstrate satisfactory operation of all heat-regulating controls and safety controls. Record temperature rise across the heat exchanger under all firing rates after equilibrium conditions have been reached at each firing rate. Record ammeter and voltmeter readings for the furnace motor, circulating blower motor, and induced draft fan motor.

3.3.3 Firing Tests

Test combustion controls and equipment with specified fuel at 100 percent rated load. Demonstrate satisfactory smoke-count numbers and combustion efficiency. Maintain firing for at least 4 hours. During tests, verify proper operation of controls. Adjust burners for maximum efficiency using Orsat or similar apparatus. Record temperature rises across heat exchangers. Minimum requirements for satisfactory combustion efficiency shall be 8.5 percent carbon dioxide for gas burners. Minimum temperatures of flue gas at the stack shall be 100 degrees F above the flue-gas dew points. The observed smoke at all firing rates during the prescribed tests shall not exceed that indicated by a number 2 spot for the burners firing a distillate fuel or gas and a number 4 spot for burners firing a residual type fuel on the Shell-Bacharach scale.

3.4 TESTING, ADJUSTING, AND BALANCING

Perform in accordance with SMACNA TAB HVAC Sys, Chapter VII, "Air System TAB Procedures," prepare complete report of final test results.

3.4.1 Markings of Settings

Following final acceptance of the balancing report, the settings of all valves, splitters, dampers, and other adjustment devices shall be permanently marked so that adjustment can be restored if disturbed at anytime.

-- End of Section --
-- END of SPECIFICATION --