

CENTRAL INTELLIGENCE AGENCY

PROPOSED OFFICE BUILDING

N-182

LANGLEY, VIRGINIA

TENTATIVE SUBMISSION

OUTLINE SPECIFICATIONS

for

HEATING, VENTILATING AND AIR CONDITIONING WORK

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TENTATIVE SUBMISSION
OUTLINE SPECIFICATIONS

for

HEATING, VENTILATING AND AIR CONDITIONING WORK

H-01 SCOPE OF WORK

a. All required labor, materials, equipment, and Contractor's services necessary for complete installation of Heating, Ventilating and Air Conditioning Work in full conformity with requirements of all Authorities having jurisdiction; all as indicated on drawings and/or herein specified, including in general the following:

1. Central Boiler Plant (Located as indicated):

(a) Boilers shall supply steam at reduced pressures to the several direct heating systems, ventilating and air conditioning system preheaters and reheaters, air conditioning system converters, domestic hot water heaters, cafeteria and kitchen equipment, and miscellaneous equipment.

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|-----|----------------------------------|--------------|--------------------|
| (1) | Direct heating systems, | 5 psi. | |
| (2) | Preheaters and reheaters, | 10 psi. | |
| (3) | Domestic hot water heaters, | 45 psi. | <i>5 to 10 psi</i> |
| (4) | Cafeteria and kitchen equipment, | 45 psi. | |
| (5) | Miscellaneous equipment, | As required. | |

2. Central Refrigeration Plant (Located as indicated): Electric driven centrifugal refrigeration compressors supplying chilled water to Main Building. Central cooling tower to provide condenser water for refrigeration machines.

3. Air Conditioning: Year-round automatic control of temperature and humidity. All systems, provide 100% outside air when outdoor conditions permit.

4. Mechanical Ventilation.

5. Heating:

(a) Entrance Lobbies: Combination panel heating in floor and forced warm air.

(b) Fire tower stairs: Direct radiation.

MC, VAB-MC

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(c) Truck Docks and Loading Platforms: Steam unit heaters.

(d) Mechanical Equipment Rooms: Steam unit heaters.

(e) Ground Floor: Direct radiation forced hot water.

6. Steam Systems:

(a) Service: Underground from Boiler Plant at 150 psig.

(b) Reduced pressure steam to heating stacks, direct heating, hot water heating system converters, domestic water heaters (45#), and as indicated.

7. Automatic Temperature Control Systems.

8. Alarms.

9. Water Treatment.

10. Snow Melting System.

11. Heating plant for Elevated Storage Tank.

12. Excavation and backfill for steam and return conduits and buried chilled water mains.

b. Except where otherwise indicated or noted, all work covered by these specifications is located in a new central power plant, a new 7 story office building, cafeteria and auditorium building, to be erected in accordance with architectural diagrammatic sketches.

c. Material and equipment shall be as required by Standards of General Services Administration, Public Buildings Service, Construction Division.

H-02 WORK NOT INCLUDED

a. Electrical wiring and mounting of starting equipment.

b. Motor controllers, except for refrigeration compressors.

c. Water supply and drain connections to within approximately 10 feet of equipment requiring same.

d. Rough cutting and finished patching, except for correcting Contractor's own mistakes.

- e. Louvres in doors and undercutting of doors.
- f. Louvres and screens set in masonry work.
- g. Setting of access doors.
- h. Concrete for foundations.
- i. Finished painting of piping and equipment.
- j. Flashing except cap flashing.
- k. Domestic hot water heater.

H-03 GENERAL ITEMS

- a. Motor Controllers: Except for refrigeration compressors, furnished under Electrical Specifications.
- b. Motors: NEMA; 3/4 hp and larger (except for refrigeration compressor motors), 460 volt, 3 phase, 60 cycle AC. 1/2 hp and smaller, 120 volt, 1 phase, 60 cycle AC.
- c. Foundations: Except for refrigeration compressors, concrete block enclosed in #18 ga galv welded steel form for all rotating machinery. Foundations, twice weight of machinery.
- d. Vibration Isolation Bases for each piece of rotating machinery.
- e. As-Built Drawings: Record all deviations from contract drawings and deliver to Owner cloth tracings showing work as actually installed.
- f. Valve Tags and Charts: 2" diam aluminum numbered tags on all valves and controls, except radiator valves and valves at equipment. Approved metal framed charts, diagrams and lists showing operation of each system, and location and purpose of all valves and controls.
- g. Access Doors: Provide concealed valves, controls, dampers and equipment requiring access with adequate sized access doors.
- h. Painting:
 - 1. Hangers and supports, and exposed piping and black steel and iron work: One coat zinc chromate primer.
 - 2. Interior of all ductwork as far back as visible from outside: Flat black.
 - 3. All fans, motors, machinery, etc.: Factory prime coat.

H-04 BOILER PLANT AND STEAM DISTRIBUTION

a. Equipment: Boiler plant shall be complete including following:

1. Boilers: Three (3) 50,000 lbs per hour at 200% of normal rating, 250 psi design pressure, water wall integral furnace field erected type with approximately 7,600 sq ft heating surface per boiler, oil fired, with setting suitable for future stoker installation, with forced and induced draft, including insulated casing.

2. Burners: No. 6 oil steam atomizing, semi-automatic control.

3. Open storage type deaerating feedwater heater.

4. Complete boiler feedwater system: Steam and electric motor driven pumps.

5. Complete feedwater treatment system.

6. Automatic combustion control system.

7. Complete fuel oil storage system: 4 - 60,000 gallon underground storage tanks.

8. Fuel oil heating system: Hot water for oil tanks; steam heaters for oil to boilers.

b. Steam Distribution System:

1. Complete steam, return and drip systems from boiler plant to mechanical equipment rooms in Main building.

2. Steam: 150 psi.

3. Return: Pumped return from condensate or vacuum return pumps in mechanical equipment rooms.

4. Piping: Generally run at Basement ceiling; where underground, in presealed or tile conduit.

5. Necessary drip traps shall be furnished.

6. Pressure reducing valve stations located in mechanical equipment rooms.

H-05 CENTRAL REFRIGERATION PLANT AND DISTRIBUTION

a. Equipment:

1. 4 - 1500 ton centrifugal type Freon compressors including condensers and coolers; 54 F to 42 F chilled water.

Compressor drive: 4160 volt constant speed synchronous motor with manual suction damper control.

2. Cooling tower: Multiple-cell induced draft type, steel fans, transite casing, wood fill, steel basin, vertical or cross flow as required. Capacity, 3 gpm per ton.

3. Condenser water pumps: Horizontally split case.

4. Main chilled water circulating pumps: Horizontally split case. Capacity, 2.0 gpm per ton.

5. Provide water treatment for condenser water and chilled water piping systems.

6. Appurtenances: Expansion tank, converters and accessories, automatic air vents, chilled water fill connection, relief valves, cooling tower basin, high and low water alarms, cooling tower makeup water connections.

b. Chilled Water Distribution:

1. From refrigeration plant to local pumps in mechanical equipment rooms.

2. Piping, generally run at Basement ceilings. Where underground, wrapped. Material, steel.

3. Provide drain points as required.

H-06 AIR CONDITIONING (MAIN BUILDING)

a. Conditions to be Maintained:

1. Summer: Inside, 78 F, 45% RH.
Outside, 95 F DBT, 78 F WBT.

2. Winter: Inside, 70 F.
Outside, 0 F.

b. Outside Air:

1. In general, 2 air changes per hour, except in Auditorium and Cafeteria 10 cfm per person.

2. 100% when outdoor conditions permit without use of refrigeration.

c. Systems:

1. Exterior Zones (Ground to 7th Floor):

(a) Approximately 15 ft from exterior walls.

- (b) Primary air induction type window unit systems, employing secondary air combination hot and chilled water coil.
- (c) Units under windows as indicated.
- (d) Primary air and combination hot and chilled water piping zoned according to exposure.
- (e) Vertical air and water distribution.
- (f) Manual chilled water valve at each unit.

2. Interior Zones (Ground to 7th Floors):

- (a) Conventional single duct central systems, risers in shafts, conventional velocity horizontal ceiling distribution, ceiling diffusers or sidewall supply grilles.
- (b) Centrally located return grilles where possible. Supply air diffusers and grilles, suitable for operation at 25% in excess and 25% less than indicated capacity.
- (c) Individual branch ducts, or diffusers or grilles to be provided with manual control (Young Regulator).
- (d) In general, not less than six air changes per hour of supply air.

3. Lobbies and Public Areas: Single duct, conventional velocity individual steam reheat coils for each space.

4. Return Air (Ground thru 7th Floors): Conventional velocity risers in shafts and ceiling returns.

H-07 MECHANICAL VENTILATION

- ✓ a. Kitchen, toilet rooms, locker rooms, slop sink closets, wire closets: Exhaust - conventional velocity shaft risers.
- b. Elevator machine rooms: Supply and exhaust.
- c. Switchgear rooms: Supply and exhaust.
- d. Custodial spaces: Supply and exhaust.
- e. Garage: Supply and exhaust.

*Provide
Air Conditioning
As per
12/19/57*

- f. Steam room: Supply and exhaust.
- g. Storage areas: Supply and exhaust.
- h. Mechanical equipment rooms: Supply and exhaust.

H-08 DIRECT HEATING SYSTEMS

a. Entrance vestibules and non-air conditioned spaces shall be provided with forced flow convectors, unit heaters, or direct radiation of fin-tube type as required.

b. Forced flow convectors and unit heater motors shall be thermostatically controlled.

c. Direct radiation, where applicable, shall be zone controlled from outdoor temperature.

H-09 DOMESTIC HOT WATER HEATERS

Furnished under Plumbing Work. Automatic steam valves installed by HVAC Contractor.

H-10 AIR HANDLING EQUIPMENT AND DISTRIBUTION

a. Location:

1. For 2nd to 7th Floors: Located in Penthouse fan rooms.
2. For Ground to 1st Floor: Located in Basement fan rooms.

b. Equipment:

1. In general, site erected.
2. Primary air (Exterior) system dehumidifiers: Dry chilled water coil type.
3. Conventional (Interior) system dehumidifiers: Dry chilled water coil type.

4. Filters:

(a) Outside and recirculated air: Renewable dry medium type for less than 10,000 cfm. For above 10,000 cfm, continuous automatic type.

5. Fans: Centrifugal, backward curved blading. Airfoil blading for systems with static pressure 5" and above. Inlet vane control, and access door in scroll. Sturtevant, American Blower, Buffalo Forge.

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6. Cooling Coils: Copper fin, copper tube, drainable, galv steel casing. Similar to Nesbitt.

7. Heating Coils: Construction, same as cooling coils. Similar to Nesbitt "Trombone".

8. Eliminators: After cooling coils; easily removable; coated steel.

9. Humidifiers: Pan type, copper float.

10. Drain Pans: Coated steel.

11. Casings: High velocity systems, heavy construction; conventional systems, conventional construction.

12. Draft Gauges: At each filter bank and fan inlet vane control damper.

13. Provide automatic by-pass dampers at cooling coils for single duct Interior Systems.

14. Window Units:

(a) Induction type, secondary coil, including discharge grille in window stool.

(b) Enclosures: Continuous enclosure by others.

(c) Number of units per bay as indicated; unit length such that stop valves are contained within individual module width.

(d) Primary air per unit: As indicated.

(e) Carrier, York, Worthington.

15. Diffusers and Grilles:

(a) Diffusers: Induction type, in general similar to Anemostat type C-2.

(b) Supply grilles: Double deflection type with multi-shutter opposed blade damper. Titus, Barber-Colman.

(c) Return grilles: Fixed deflection type with multi-shutter opposed blade damper. Titus, Barber-Colman.

H-11 EQUIPMENT - STEAM SYSTEMS

- a. Boiler Plant: Plant.
- b. Approximately 150 psi to Steam Service Rooms.
- c. Reduced to serve heating stacks for air conditioning and ventilating systems, direct heating, panel heating, and domestic hot water.
- d. Pressure Reducing Valves: 3-valve by-pass for each PRV. Foster, Kieley-Muller.
- e. Stop Valves: Jenkins, Crane, Walworth.
- f. Heating Specialties: Dunham, Sarco, Warren Webster.
- g. Vacuum and Return Pumps: Dunham or Nash.
- h. Converters: Patterson-Kelley, Alberger.

H-12 MATERIALS AND WORKMANSHIP - PIPING SYSTEMS

- a. Piping: Pipe, fittings, flanges, valves, controls, hangers, traps, drains, insulation and items necessary or required in connection with or relating to such piping.
- b. Condenser Water: Standard weight black steel; base elbows reinforced; all welded. Standard weight gate valves for refrigeration plant.
- c. Chilled Water (except Window Unit System): Standard weight black steel; base elbows reinforced; all welded. Valves, Jenkins for Refrigeration Plant and Office Building.
 1. All chilled water piping hammered free of scale and dirt.
 2. Provide drain valve after shut-off valve on all cooling coil connections.
- d. Chilled Water - Window Unit System: Standard weight black steel including horizontal branches to window units. Individual connections between branch and window unit, soft copper tubing.
- e. Refrigerant Relief Piping: Standard weight black steel.
- f. Hot Water Heating System: Standard weight steel.
- g. Panel Heating System Piping and Coils: Wrought iron.
- h. Snow Melting System: Wrought iron.

1. Drain and Overflow Piping: Standard weight galv steel. No condensate drain piping from window unit systems.

2. City Water Makeup Piping: Standard weight red brass.

3. Steam Piping:

1. Steam and return piping (15-150 psi): Standard weight black steel, 1-1/4" and over; extra heavy, 1" and smaller.

2. Steam piping (0-15 psi): Standard weight steel, 1-1/4" and over; extra heavy, 1" and smaller.

3. Return piping (0-15 psi): Standard weight black steel, 1-1/4" and over; extra heavy, 1" and smaller.

H-13 MATERIALS AND WORKMANSHIP - SHEET METAL WORK

a. Ductwork: Ducts, dampers, access doors, joints, hangers, stiffeners, fire dampers, and fire retarding material in accordance with PBS requirements.

b. Circular High Velocity Ductwork:

1. To 8" diam: #24 ga duct, #22 ga fittings.

2. Over 8" diam: #22 ga duct, #20 ga fittings.

3. Locked seams, taped and sealed; joints taped and sealed.

c. Connection to Window Units: Approximately #30 ga zinc coated steel flexible tubing, lock seam construction, similar to Wiremold. Collars on branch ducts: Joints made up with sealing compound.

d. Conventional Velocity Ductwork: Galvanized sheet steel, ASHAE gauges, joints and stiffening.

e. Access Openings: Sufficient to permit cleaning of entire interior of ductwork. On underside of duct, 1/8" thickness neoprene gaskets.

f. Cleaning: Entire installation dust-free after completion of installation.

H-14 MATERIALS - INSULATION

a. Boiler Pressure Steam and 100 psi Steam Piping: Double standard thickness magnesia.

b. All Other Steam and Return Piping: Standard thickness magnesia.

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c. Chilled Water Piping in Office Building: Fiberglas equivalent to light duty thickness cork. Piping conveying chilled and hot water: Fiberglas, dual-temp. Copper connections to window units: Sponge rubber.

d. Boiler Feed, Hot Water and Panel Heating Piping: Standard thickness Fiberglas.

e. Condensate and Vacuum Return Piping: Standard thickness Fiberglas.

f. Refrigerant Suction and Air Conditioner Drain Piping: 1" thickness sectional wool felt.

g. Induced Draft Fans and Connections to Boilers and Stacks: 2" thickness magnesia block.

h. Makeup Water: 1/2" thickness sectional wool felt.

i. 1" Thickness Fiberglas (Vapor-Seal brand type):

1. Conditioned air supply ducts and fans, where not provided with sound-absorptive duct lining.

2. Return air ducts in roof spaces and equipment rooms, other than fan rooms.

3. Air conditioner casings and supply fans.

4. Fresh air intake chambers and ducts.

j. Air Conditioner Drain Pans: 2" thickness cork.

k. Water Chillers: 2" thickness cork, wired on.

l. Chilled Water Pumps: Copper encased with Fiberglas fill.

m. Hot Water Converters, Flash Tanks, and Heating System Expansion Tanks: 1" thickness magnesia block covering, wired on.

n. Recanvassing: Exposed pipe insulation in Mechanical Rooms, and all exposed piping in Power Plant and Main Building.

o. Plaster Finish:

1. Expansion tanks.

2. Converters and fuel oil heaters.

3. Water chillers.

4. Air conditioners including supply fan, and supply ventilation units, from fresh air intake duct and chambers to fan.

5. Feedwater heater.

6. Boiler breeching.

p. Exposed Insulated Ductwork: Flood coat similar to Insulcolor, 8-oz canvas with metal corner angles, finish coat Insulcolor.

H-15 MATERIALS - SOUNDPROOFING

a. Furnish complete sound-absorptive duct lining.

1. For approximately 25 feet from each conventional velocity supply fan discharge and return fan inlet.

2. Sound-Absorptive Duct Lining: 1" thickness, similar to 3# density coated Ultralite, applied as recommended by manufacturer to 4 walls of ducts and interior panels.

3. Omit exterior insulation on ducts acoustically lined.

b. Sound Traps: In discharge of each high velocity supply fan; manufactured or site-fabricated type.

H-16 AUTOMATIC TEMPERATURE CONTROL

a. General:

1. Pneumatic type.

2. Automatic Dampers: In each fan system intake and discharge. Open when fan starts, close when fan stops.

3. Preheat Coils: In each Ventilating and Air Conditioning Supply System; under control of thermostat on leaving air side of coil.

b. Hot Water and Panel Heating Systems: Outdoor master thermostat resets respective immersion thermostats in hot water supply line leaving converters.

c. Mechanical Supply Ventilating Systems: Thermostat in fan discharge to maintain adjustable predetermined temperature.

d. Unit Heaters: Electric thermostat stops and starts fan motor. Shut-off control for cold return pipe.

e. Warm Air Systems: Day operation, return air thermostat controls steam valve; night operation, steam valve open, thermostat controls motor operation.

f. Air Conditioning Systems:

1. Summer Cooling Conditions: Peak, 78 F DB, 45% RH max, at 95 F DB, 78 F WB. Off-peak, 76 F, 45% RH max. Winter, 72 F with humidification control to prevent condensation.

2. Exterior Systems:

(a) Secondary Water:

(1) Summer: Outdoor master zone thermostat controls mixture of primary water supply and secondary water return to maintain adjustable zone water temperature. Individual manual control valves on induction units throttle water supply to maintain required space temperature.

(2) Other than Summer: Outdoor master zone thermostat controls submaster thermostat and converter steam valve to maintain adjustable zone water temperature. Individual control same as summer.

(b) Primary Air:

(1) Summer: Outdoor master zone thermostat controls chilled water valve to cooling coil, and zone reheater steam valve to maintain adjustable discharge temperature.

(2) Other than Summer: Thermostat in fan discharge shall operate in sequence maximum outdoor air, relief and return air damper and preheater steam valve to maintain adjustable supply air temperature. Maximum outdoor air dampers shall remain fully open when outdoor temperature is above 40 F. Thermostat on leaving side of preheater shall operate steam valve to maintain leaving air of approximately 40 F. Pan humidifier steam valve shall be under control of submaster humidistat controlled by outdoor master.

3. Interior Systems:

(a) Summer: Return air thermostat shall control cooling coil water valve, and reheater steam valve to maintain adjustable discharge temperature.

(b) Other than Summer: Return air thermostat and thermostat in fan discharge shall control fresh air, return air, relief dampers, and reheater and preheater steam valves, to maintain adjustable supply air temperature. Pan humidifier steam valve controlled by submaster humidistat controlled by outdoor master.

H-17 SMOKE ALARM SYSTEM

Furnish in each return and exhaust fan inlet and common fresh air intake plenums, smoke detecting devices similar to Acme Fire Alarm Co. Passage of smoke at predetermined density shall give alarm indication on main control and alarm panel in basement and shall cause both air conditioning supply and exhaust fans and refrigeration cycle to stop, in accordance with PBS requirements. Electrical wiring, by Electrical Contractor.

H-18 WATER TREATMENT

- a. Complete, for cooling tower.
- b. Complete, for primary and secondary chilled water systems.
- c. Metropolitan Refining, Water Service Labs.

H-19 SNOW MELTING SYSTEM

- a. Complete for Main Entrance and Parking Garage Entrance Ramp.
- b. Grid type, 1" pipe, 12" on centers, top of pipe 2-1/2" below sidewalk. Pipe protected from ground by polyethylene waterproof membrane.
- c. Oil as heating medium, approximately 170 F average temperature, 200 Btu per square foot heating effect.
- d. Converter: Suitable for heat transfer oil similar to Socony Mobil.