



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
16 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0016

Janet T. Mills
GOVERNOR

Bruce A. Van Note
COMMISSIONER

June 1, 2021
Subject: Truck Storage & Crew Quarters
Building
State WIN: 027323.00
Location: **Fort Fairfield**
Amendment No. 2

Dear Sir/Ms.:

Please make the following changes to the Bid Documents:

In the Bid Book:

ADD the attached SPECIAL PROVISION - SECTION 22 11 23 - FUEL GAS PIPING, 14 pages, dated March 31, 2021.

In the Plan Set:

On Sheet S1.2 titled: "Structural Details" **REMOVE** Sections B, E, F & H, and **REPLACE** with the attached Sheet SK1 and SK2 sections B, E, F & H

On sheet A3.1 Building Section 1 **REMOVE** A3.5 Typical, and **REPLACE** with the attached Sheet ASK.01 Partial Building Section

On sheet A3.2 Building Sections 2 **REMOVE** partial section @ concrete apron, and **REPLACE** with the attached ASK.02 Partial Building Section @ Concrete Apron

Consider these changes and information prior to submitting your bid on **June 2, 2021**.

Sincerely,

A handwritten signature in blue ink that reads "George Macdougall".

George M. A. Macdougall P.E.
Contracts & Specifications Engineer

SPECIAL PROVISION
SECTION 22 11 23

FUEL GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipes, tubes, and fittings.
 - 2. Piping specialties.
 - 3. Piping and tubing joining materials.
 - 4. Valves.
 - 5. Pressure regulators.
 - 6. Concrete bases.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. NG : Natural Gas
- E. LPG: Liquefied Petroleum Gas

1.4 PERFORMANCE REQUIREMENTS

- A. Minimum Operating Pressure Ratings for piping containing only vapor:
 - 1. Piping and Valves: 125 psig minimum unless otherwise indicated.
 - 2. Service Regulators: 125 psig minimum unless otherwise indicated.
- B. Natural Gas System Pressures within Buildings: Two pressure ranges. Primary pressure is more than 0.5 psig but not more than 2.0 psig and is reduced to secondary pressure of 0.5 psig or less.
- C. LPG System Pressures within Buildings: Two pressure ranges. Primary pressure is more than 0.5 psig but not more than 2.0 psig and is reduced to secondary pressure of 0.5 psig or less.

1.5 SUBMITTALS

- A. Product Data: For each type of the following:
 - 1. Pipe & piping specialties.
 - 2. Corrugated, stainless steel tubing with associated components.
 - 3. Valves. Include pressure rating, capacity, settings, and electrical connection data.

4. Pressure regulators. Indicate pressure ratings and capacities.
 - B. Shop Drawings: For fuel gas piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.
 1. Shop Drawing Scale: 1/4 inch per foot.
 2. Detail mounting, supports, and valve arrangements for service meter assembly and pressure regulator assembly.
 - C. Coordination Drawings: Plans and details, drawn to scale, on which fuel gas piping is shown and coordinated with other installations, using input from installers.
 - D. Site Survey: Plans, drawn to scale, on which fuel gas piping is shown and coordinated with other services and utilities.
 - E. Welding certificates.
 - F. Field quality control reports.
 - G. Operation and Maintenance Data: For gas valves, pressure regulators, and service meters to include in emergency, operation, and maintenance manuals.
- 1.6 QUALITY ASSURANCE
- A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, Structural Welding Code - Steel.
 - B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
 - C. Electrical Components, Devices, & Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Deliver pipes and tubes with factory applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
 - B. Store and handle pipes and tubes having factory applied protective coatings to avoid damaging coating and protect from direct sunlight.
 - C. Protect stored PE pipes and valves from direct sunlight.
 - D. Handling Flammable Liquids: Remove and dispose of liquids from existing LPG piping according to requirements of authorities having jurisdiction.
- 1.8 PROJECT CONDITIONS
- A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility locating service for area where Project is located.
 - B. Interruption of Existing Fuel Gas Service: Do not interrupt fuel gas service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of fuel gas supply according to requirements indicated:
 1. Notify Architect, Construction Manager, & Owner no fewer than two days in advance of proposed interruption of natural gas service.

2. Do not proceed with interruption of fuel gas service without Architect's, Construction Manager's, and Owner's written permission.

1.9 COORDINATION

- A. Coordinate requirements for access panels and doors for valves installed concealed behind finished surfaces. Comply with requirements in Section 083113 - Access Doors and Frames.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
 1. Malleable Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
 2. Wrought Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
 3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
 4. Forged Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - a. Material Group: 1.1.
 - b. End Connections: Threaded or butt welding to match pipe.
 - c. Lapped Face: Not permitted underground.
 - d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum O-rings, and spiral wound metal gaskets.
 - e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.
 5. Protective Coating for Underground Piping: Factory applied, three-layer coating of epoxy, adhesive, and PE.
 - a. Joint Cover Kits: Epoxy paint, adhesive, and heat shrink PE sleeves.
 6. Mechanical Couplings:
 - a. Stainless steel flanges and tube with epoxy finish.
 - b. Buna-nitrile seals.
 - c. Stainless steel bolts, washers, and nuts.
 - d. Coupling shall be capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
 - e. Steel body couplings installed underground on plastic pipe shall be factory equipped with anode.
- B. Annealed Temper Copper Tube: Comply with ASTM B 88 / B837, Type L-G Gas.
 1. Copper Fittings: ASME B16.22, wrought copper, and streamlined pattern.
 2. Flare Fittings: Comply with ASME B16.26 and SAE J513.
 - a. Copper fittings with long nuts.
 - b. Metal-to-metal compression seal without gasket.
 - c. Dryseal threads complying with ASME B1.20.3.
 3. Protective Coating for Underground Tubing: Factory applied, extruded PE a minimum of 0.022 inch thick.
- C. PE Pipe: ASTM D 2513, SDR 11.

1. PE Fittings: ASTM D 2683, socket-fusion type or ASTM D 3261, butt-fusion type with dimensions matching PE pipe.
2. PE Transition Fittings: Factory-fabricated fittings with PE pipe complying with ASTM D 2513, SDR 11; and steel pipe complying with ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
3. Anode-less Service Line Risers: Factory fabricated and leak tested.
 - a. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet.
 - b. Casing: Steel pipe complying with ASTM A 53, Schedule 40, black steel, Type E or S, Grade B, with corrosion protective covering. Vent casing aboveground.
 - c. Aboveground Portion: PE transition fitting.
 - d. Outlet shall be threaded or flanged or suitable for welded connection.
 - e. Tracer wire connection.
 - f. Ultraviolet shield.
 - g. Stake supports with factory finish to match steel pipe casing or carrier pipe.
4. Plastic Mechanical Couplings, NPS 1-1/2 and Smaller: Capable of joining PE pipe to PE pipe.
 - a. PE body with molded-in, stainless steel support ring.
 - b. Buna-nitrile seals.
 - c. Acetal collets.
 - d. Electro-zinc plated steel stiffener.
5. Plastic Mechanical Couplings, NPS 2 and Larger: Capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
 - a. Fiber reinforced plastic body.
 - b. PE body tube.
 - c. Buna-nitrile seals.
 - d. Acetal collets.
 - e. Stainless steel bolts, nuts, and washers.
6. Steel Mechanical Couplings: Capable of joining plain end PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
 - a. Stainless steel flanges and tube with epoxy finish.
 - b. Buna-nitrile seals.
 - c. Stainless steel bolts, washers, and nuts.
 - d. Factory installed anode for steel body couplings installed underground.

2.2 PIPING SPECIALTIES

A. Coated Fuel Gas Appliance Connectors, Flexible:

1. Indoor, Fixed Appliance Flexible Connectors: Comply with ANSI Z21.24/CSA 6.10.
2. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75/CSA 6.27.
3. Material: Corrugated stainless steel tubing with polymer coating, Type 304 stainless steel, ASTM 240.
4. Operating Pressure Rating: 0.5 psig.
5. Temperature rating of connector with adapters: -40F to 150F
6. Certified factory leak tested.
7. End Fittings: Brass or zinc electro-plated steel.
8. Threaded Ends: Comply with ASME B1.20.1.
9. Maximum Length: 48 inches.

- B. Quick Disconnect Devices: Comply with ANSI Z21.41.
 - 1. Copper alloy convenience outlet and matching plug connector.
 - 2. Nitrile seals.
 - 3. Hand operated with automatic shutoff when disconnected.
 - 4. For indoor or outdoor applications.
 - 5. Adjustable, retractable restraining cable.
- C. Y-Pattern Strainers:
 - 1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
 - 2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
 - 3. Strainer Screen: 40 mesh startup strainer, and perforated stainless steel basket with 50 percent free area.
 - 4. CWP Rating: 125 psig.
- D. Weatherproof Vent Cap: Cast or malleable iron increaser fitting with corrosion resistant wire screen, with free area at least equal to cross sectional area of connecting pipe and thread connection.

2.3 JOINING MATERIALS

- A. Joint Compound and Tape: Suitable for natural gas or LPG.
- B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

2.4 MANUAL GAS SHUTOFF VALVES

- A. See Aboveground Manual Gas Shutoff Valve Schedule articles for where each valve type is applied in various services.
- B. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.
 - 1. CWP Rating: 125 psig.
 - 2. Threaded Ends: Comply with ASME B1.20.1.
 - 3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
 - 4. Tamperproof Feature: Locking feature for valves indicated in Aboveground Manual Gas Shutoff Valve Schedule articles.
 - 5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves NPS 1 and smaller.
 - 6. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.
- C. General Requirements for Metallic Valves, NPS 2-1/2 and Larger: Comply with ASME B16.38.
 - 1. CWP Rating: 125 psig.
 - 2. Flanged Ends: Comply with ASME B16.5 for steel flanges.
 - 3. Tamperproof Feature: Locking feature for valves indicated in Aboveground Manual Gas Shutoff Valve Schedule articles.
 - 4. Service Mark: Initials "WOG" shall be permanently marked on valve body.
- D. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Body: Bronze, complying with ASTM B 584.
 2. Ball: Chrome-plated bronze.
 3. Stem: Bronze; blowout proof.
 4. Seats: Reinforced TFE; blowout proof.
 5. Packing: Threaded-body pack nut design with adjustable stem packing.
 6. Ends: Threaded, flared, or socket as indicated in Aboveground Manual Gas Shutoff Valve Schedule articles.
 7. CWP Rating: 600 psig.
 8. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 9. Service: Suitable for natural gas service with "WOG" indicated on valve body.
- E. Bronze Plug Valves: MSS SP-78.
1. Body: Bronze, complying with ASTM B 584.
 2. Plug: Bronze.
 3. Ends: Threaded, socket, or flanged as indicated in Aboveground Manual Gas Shutoff Valve Schedule articles.
 4. Operator: Square head or lug type with tamperproof feature where indicated.
 5. Pressure Class: 125 psig.
 6. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 7. Service: Suitable for natural gas service with "WOG" indicated on valve body.
- F. Cast Iron, Lubricated Plug Valves: MSS SP-78.
1. Body: Cast iron, complying with ASTM A 126, Class B.
 2. Plug: Bronze or nickel-plated cast iron.
 3. Seat: Coated with thermoplastic.
 4. Stem Seal: Compatible with natural gas.
 5. Ends: Threaded or flanged as indicated in Aboveground Manual Gas Shutoff Valve Schedule articles.
 6. Operator: Square head or lug type with tamperproof feature where indicated.
 7. Pressure Class: 125 psig.
 8. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 9. Service: Suitable for natural gas service with "WOG" indicated on valve body.

2.5 FUEL GAS VALVES

- A. Automatic Gas Valves: Comply with ANSI Z21.21.
1. Body: Brass or aluminum.
 2. Seats and Disc: Nitrile rubber.
 3. Springs and Valve Trim: Stainless steel.
 4. Normally closed.
 5. Visual position indicator.
 6. Electrical or mechanical operator for actuation by appliance automatic shutoff device.
- B. Electrically Operated Valves: Comply with UL 429.
1. Pilot operated.
 2. Body: Brass or aluminum.
 3. Seats and Disc: Nitrile rubber.

4. Springs and Valve Trim: Stainless steel.
5. 120-V ac, 60 Hz, Class B, continuous duty molded coil, and replaceable.
6. NEMA ICS 6, Type 4, coil enclosure.
7. Normally closed.
8. Visual position indicator.

2.6 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 and smaller; flanged for regulators NPS 2-1/2 and larger.

B. Service Pressure Regulators: Comply with ANSI Z21.80.

1. Body and Diaphragm Case: Cast iron or die-cast aluminum.
2. Springs: Zinc-plated steel; interchangeable.
3. Diaphragm Plate: Zinc-plated steel.
4. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
5. Orifice: Aluminum; interchangeable.
6. Seal Plug: Ultraviolet stabilized, mineral filled nylon.
7. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
8. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
9. Overpressure Protection Device: Factory mounted on pressure regulator.
10. Atmospheric Vent: Factory or field installed, stainless steel screen in opening if not connected to vent piping.
11. Maximum Inlet Pressure: 100 psig.

C. Line Pressure Regulators: Comply with ANSI Z21.80.

1. Body and Diaphragm Case: Cast iron or die-cast aluminum.
2. Springs: Zinc-plated steel; interchangeable.
3. Diaphragm Plate: Zinc-plated steel.
4. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
5. Orifice: Aluminum; interchangeable.
6. Seal Plug: Ultraviolet stabilized, mineral filled nylon.
7. Single port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
8. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
9. Overpressure Protection Device: Factory mounted on pressure regulator.
10. Atmospheric Vent: Factory or field installed, stainless steel screen in opening if not connected to vent piping.
11. Maximum Inlet Pressure: 2 psig 5 psig 10 psig.

D. Appliance Pressure Regulators: Comply with ANSI Z21.18.

1. Body and Diaphragm Case: Die-cast aluminum.
2. Springs: Zinc-plated steel; interchangeable.
3. Diaphragm Plate: Zinc-plated steel.
4. Seat Disc: Nitrile rubber.
5. Seal Plug: Ultraviolet stabilized, mineral filled nylon.
6. Factory Applied Finish: Minimum three-layer polyester and polyurethane paint.
7. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
8. Maximum Inlet Pressure: 1.0 psig 2.0 psig 5 psig.

2.7 LABELING AND IDENTIFYING

- A. Detectable Warning Tape: Acid and alkali resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine rough-in for fuel gas piping system to verify actual locations of piping connections before equipment installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Close equipment shutoff valves before turning off fuel gas to premises or piping section.
- B. Inspect fuel gas piping according to NFPA 54, the International Fuel Gas Code to determine that fuel gas utilization devices are turned off in piping section affected.
- C. Comply with NFPA 54, the International Fuel Gas Code requirements for prevention of accidental ignition.

3.3 OUTDOOR PIPING INSTALLATION

- A. Comply with NFPA 58 and NFPA 54, the International Fuel Gas Code for installation and purging of fuel gas piping.
- B. Install underground fuel gas piping buried at least 36 inches below finished grade. Comply with requirements in Section 312000 - Earth Moving for excavating, trenching, and backfilling.
 1. If fuel gas piping is installed less than 36 inches below finished grade, install it in containment conduit.
- C. Install underground PE natural gas piping according to ASTM D 2774.
- D. Steel Piping with Protective Coating:
 1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
 2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
 3. Replace pipe having damaged PE coating with new pipe.
- E. Copper Tubing with Protective Coating:

1. Apply joint cover kits over tubing to cover, seal, and protect joints.
 2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
- F. Install fittings for changes in direction and branch connections.
- G. Install pressure gage upstream and downstream from each service regulator. Pressure gages are specified in Section 220519 - Meters and Gages for HVAC Piping.

3.4 INDOOR PIPING INSTALLATION

- A. Comply with NFPA 54, the International Fuel Gas Code for installation and purging of natural gas piping.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.
- D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- G. Locate valves for easy access.
- H. Install fuel gas piping at uniform grade of 1/4" per foot (2.0 percent) down toward drip and sediment traps.
- I. Install piping free of sags and bends.
- J. Install fittings for changes in direction and branch connections.
- K. Verify final equipment locations for rough-in.
- L. Comply with requirements in Sections specifying gas fired appliances and equipment for rough-in requirements.
- M. Drips and Sediment Traps: Install drips at points where condensate may collect, including service meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.
1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of three pipe diameters, but not less than 3.0 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.
- N. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.
- O. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.

- P. Concealed Location Installations: Except as specified below, install concealed fuel gas piping and piping installed under the building in containment conduit constructed of steel pipe with welded joints as described in Part 2. Install a vent pipe from containment conduit to outdoors and terminate with weatherproof vent cap.
1. Above Accessible Ceilings: Fuel gas piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.
 2. In Floors: Install fuel gas piping with welded or brazed joints and protective coating in cast-in-place concrete floors. Cover piping to be cast in concrete slabs with minimum of 1-1/2 inches of concrete. Piping may not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. Do not embed piping in concrete slabs containing quick-set additives or cinder aggregate.
 3. In Floor Channels: Install fuel gas piping in floor channels. Channels must have cover and be open to space above cover for ventilation.
 4. In Walls or Partitions: Protect tubing installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.
 - a. Exception: Tubing passing through partitions or walls does not require striker barriers.
 5. Prohibited Locations:
 - a. Do not install natural gas piping in or through circulating air ducts, clothes or trash chutes, chimneys, or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
 - b. Do not install natural gas piping in solid walls or partitions.
- Q. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- R. Connect branch piping from top or side of horizontal piping.
- S. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.
- T. Do not use fuel gas piping as grounding electrode.
- U. Install strainer on inlet of each line pressure regulator and automatic or electrically operated valve.
- V. Install pressure gage upstream and downstream from each line regulator. Pressure gages are specified in Section 220519 - Meters and Gages for HVAC Piping.
- W. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 - Sleeves and Sleeve Seals for HVAC Piping.
- X. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 - Sleeves and Sleeve Seals for HVAC Piping.
- Y. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 - Escutcheons for HVAC Piping.

3.5 VALVE INSTALLATION

- A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless steel tubing, or copper connector.
- B. Install underground valves with valve boxes.

- C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.
- D. Install anode for metallic valves in underground PE piping.

3.6 PIPING JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints:
 - 1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
 - 2. Cut threads full and clean using sharp dies.
 - 3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
 - 4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
 - 5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Welded Joints:
 - 1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
 - 2. Bevel plain ends of steel pipe.
 - 3. Patch factory applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.
- F. Flanged Joints: Install gasket material, size, type, and thickness appropriate for fuel gas service. Install gasket concentrically positioned.
- G. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtighten.
- H. PE Piping Heat Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 - 1. Plain End Pipe and Fittings: Use butt fusion.
 - 2. Plain End Pipe and Socket Fittings: Use socket fusion.

3.7 HANGER AND SUPPORT INSTALLATION

- A. Install seismic restraints on piping. Comply with requirements for seismic restraint devices specified in Section 230548 - Vibration and Seismic Controls for HVAC Piping and Equipment.
- B. Comply with requirements for pipe hangers and supports specified in Section 230529 - Hangers and Supports for HVAC Piping and Equipment.
- C. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
 - 1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - 2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
 - 3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.

4. NPS 2-1/2 to NPS 3-1/2: Maximum span, 10 feet; minimum rod size, 1/2 inch.
 5. NPS 4 and Larger: Maximum span, 10 feet; minimum rod size, 5/8 inch.
- D. Install hangers for horizontal drawn temper copper tubing with the following maximum spacing and minimum rod sizes:
1. NPS 3/8: Maximum span, 48 inches; minimum rod size, 3/8 inch.
 2. NPS 1/2 and NPS 5/8: Maximum span, 72 inches; minimum rod size, 3/8 inch.
 3. NPS 3/4 and NPS 7/8: Maximum span, 84 inches; minimum rod size, 3/8 inch.
 4. NPS 1: Maximum span, 96 inches; minimum rod size, 3/8 inch.

3.8 CONNECTIONS

- A. Connect to utility's gas main according to utility's procedures and requirements.
- B. Install fuel gas piping electrically continuous and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.
- C. Install piping adjacent to appliances to allow service and maintenance of appliances.
- D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas fired appliance and equipment. Install union between valve and appliances or equipment.
- E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.9 LABELING AND IDENTIFYING

- A. Comply with requirements in Section 230553 - Identification for Plumbing Piping and Equipment for piping and valve identification.
- B. Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 PAINTING

- A. Comply with requirements in Section 099113 - Exterior Painting and Section 099123 Interior Painting for painting interior and exterior natural gas piping.
- B. Paint exposed, exterior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory applied paint or protective coating.
 1. Alkyd System: MPI EXT 5.1D.
 - a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Exterior alkyd enamel gloss.
 - d. Color: Gray.
- C. Paint exposed, interior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.
 1. Alkyd System: MPI INT 5.1E.
 - a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Interior alkyd matching topcoat.
 - c. Topcoat: Interior alkyd gloss.

d. Color: Gray.

D. Damage and Touchup: Repair marred and damaged factory applied finishes with materials and by procedures to match original factory finish.

3.11 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Test, inspect, and purge natural gas according to NFPA 54, the International Fuel Gas Code and authorities having jurisdiction.

C. Fuel gas piping will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.12 OUTDOOR PIPING SCHEDULE

A. Underground fuel gas piping shall be one of the following:

1. PE pipe and fittings joined by heat fusion, or mechanical couplings; service line risers with tracer wire terminated in an accessible location.
2. Steel pipe with wrought steel fittings and welded joints, or mechanical couplings. Coat pipe and fittings with protective coating for steel piping.
3. Annealed temper copper tube with wrought copper fittings and brazed joints. Coat pipe and fittings with protective coating for copper tubing.

B. Aboveground fuel gas piping shall be one of the following:

1. Steel pipe with malleable iron fittings and threaded joints.
2. Steel pipe with wrought steel fittings and welded joints.
3. Annealed temper copper tube with wrought copper fittings and brazed joints.

C. Containment Conduit: Steel pipe with wrought steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.

3.13 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 0.5 PSIG

A. Aboveground, appliance connectors NPS 1 and smaller shall be one of the following:

1. Coated corrugated stainless steel tubing with mechanical fittings having socket or threaded ends to match adjacent piping.
2. Annealed temper, copper tube with wrought copper fittings and flared joints.
3. Steel pipe with malleable iron fittings and threaded joints.

B. Aboveground, distribution piping shall be one of the following:

1. Steel pipe with malleable iron fittings and threaded joints.
2. Steel pipe with wrought steel fittings and welded joints.

C. Underground, below building, piping shall be one of the following:

1. Steel pipe with malleable iron fittings and threaded joints.
2. Steel pipe with wrought steel fittings and welded joints.

D. Containment Conduit: Steel pipe with wrought steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.

E. Containment Conduit Vent Piping: Steel pipe with malleable iron fittings and threaded or wrought steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.

3.14 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES MORE THAN 0.5 PSIG AND LESS THAN 2.0 PSIG

A. Aboveground, appliance connectors NPS 1 and smaller shall be one of the following:

1. Annealed temper, copper tube with wrought copper fittings and flared joints.
2. Steel pipe with malleable iron fittings and threaded joints.

B. Aboveground, distribution piping shall be one of the following:

1. Steel pipe with malleable iron fittings and threaded joints.
2. Steel pipe with steel welding fittings and welded joints.
3. Annealed temper copper tube with wrought copper fittings and brazed joints.

C. Underground, below building, piping shall be one of the following:

1. Steel pipe with malleable iron fittings and threaded joints.
2. Steel pipe with wrought steel fittings and welded joints.

D. Containment Conduit: Steel pipe with wrought steel fittings and welded joints. Coat underground pipe and fittings with protective coating for steel piping.

E. Containment Conduit Vent Piping: Steel pipe with malleable iron fittings and threaded or wrought steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.

3.15 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Valves for pipe sizes NPS 2 and smaller at service meter shall be one of the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, full regular port, bronze ball valves with bronze trim.
3. Bronze plug valve.

B. Valves for pipe sizes NPS 2-1/2 and larger at service meter shall be one of the following:

1. Two-piece, full port, bronze ball valves with bronze trim.
2. Bronze plug valve.

C. Distribution piping valves for pipe sizes NPS 2 and smaller shall be one of the following:

1. Two-piece, full port, bronze ball valves with bronze trim.
2. Bronze plug valve.

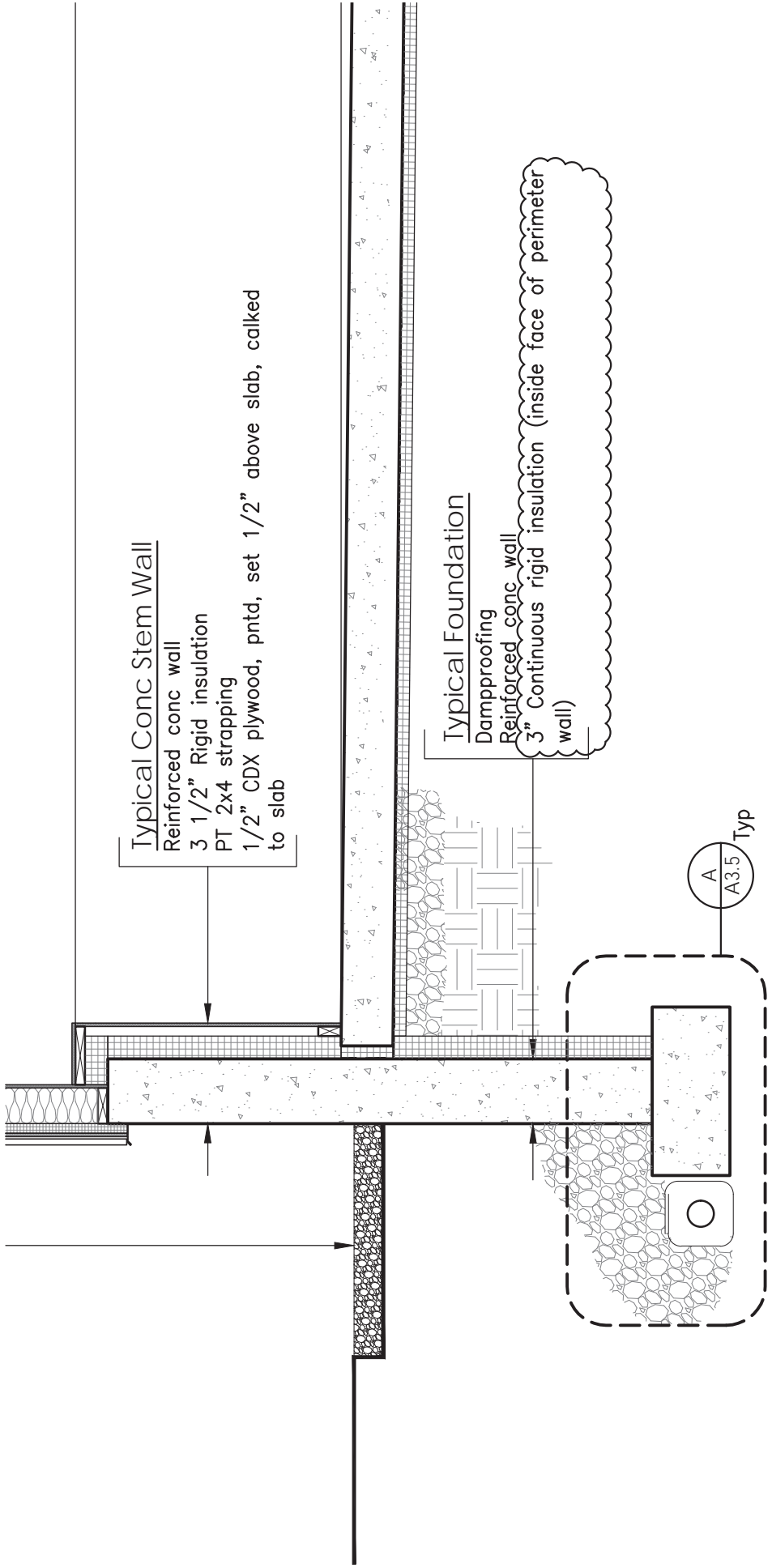
D. Distribution piping valves for pipe sizes NPS 2-1/2 and larger shall be one of the following:

1. Two-piece, full port, bronze ball valves with bronze trim.
2. Bronze plug valve.
3. Cast iron, lubricated plug valve.

E. Valves in branch piping for single appliance shall be one of the following:

1. Two-piece, full port, bronze ball valves with bronze trim.
2. Bronze plug valve.

END OF SECTION 231123



Building Section

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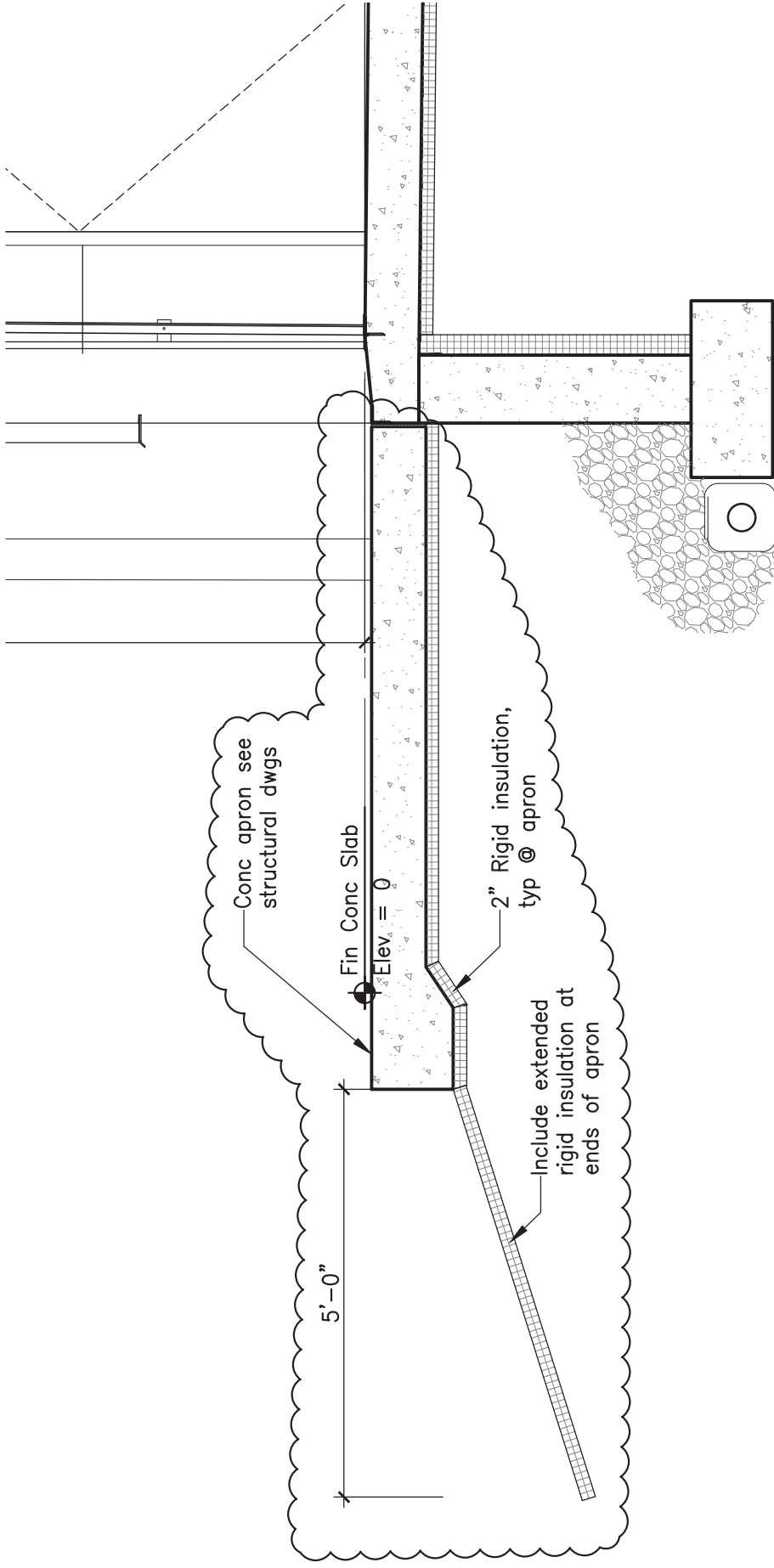
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ASK.01



Building Section

2

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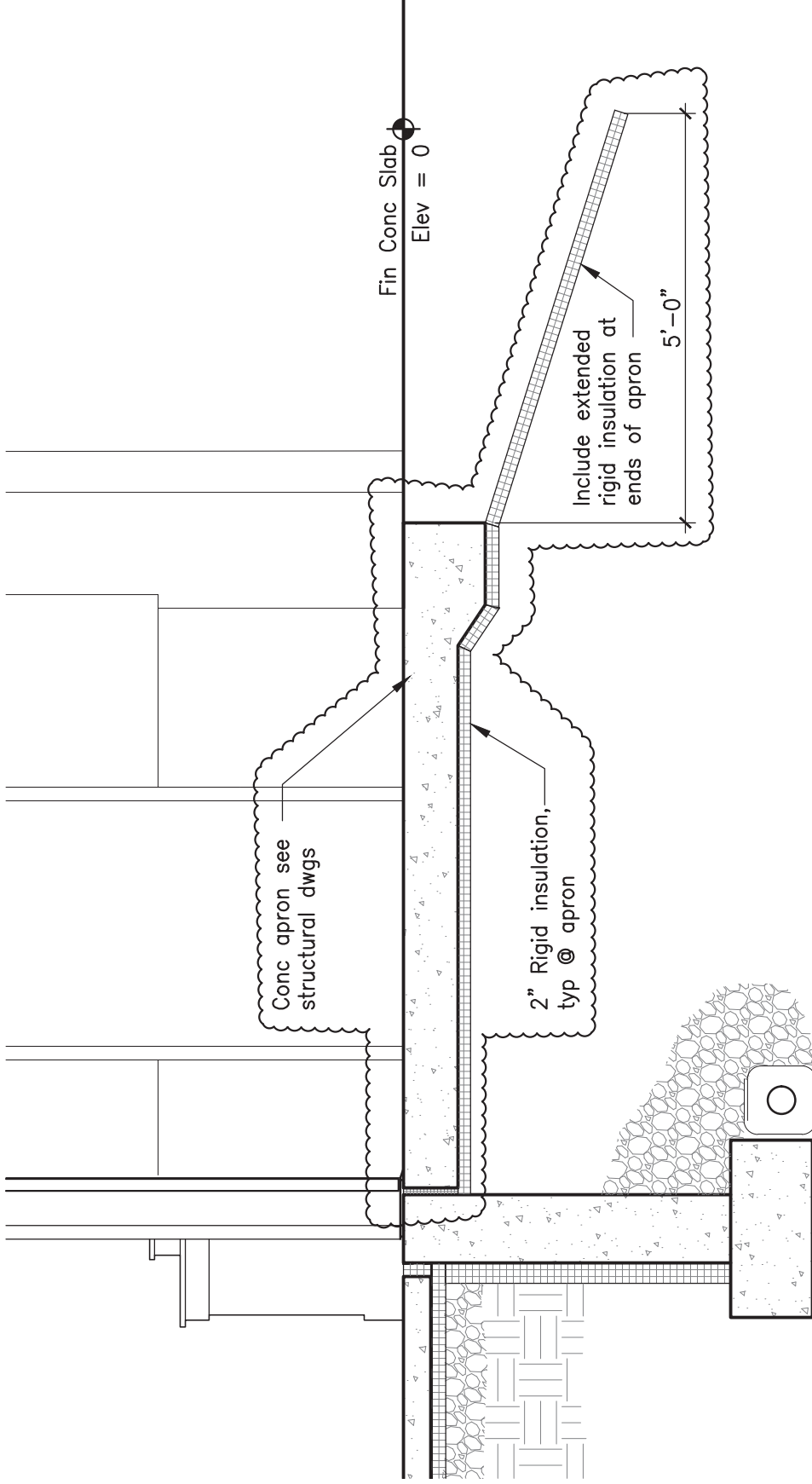
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3 Building Section

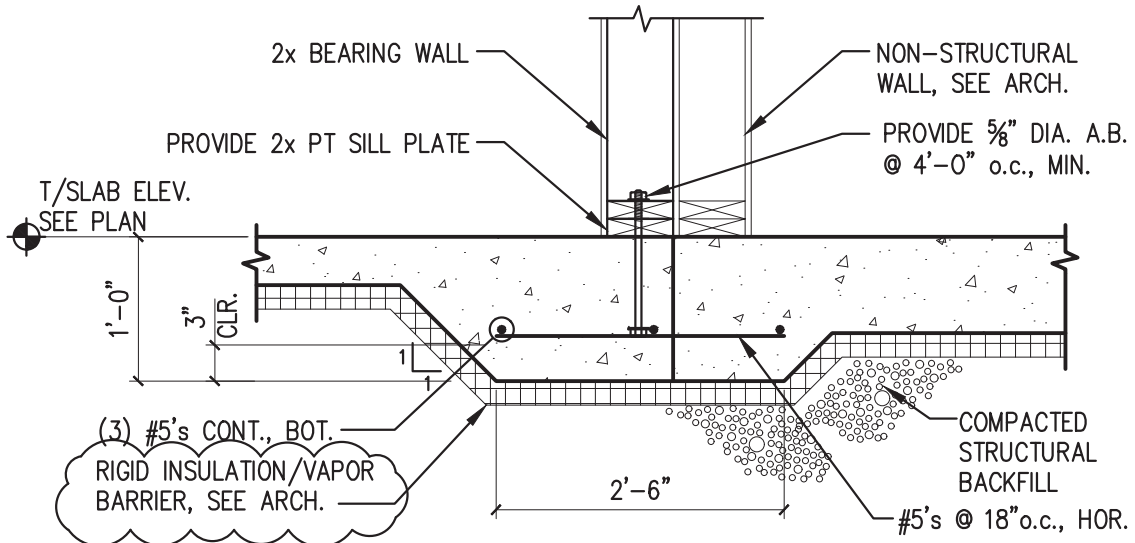
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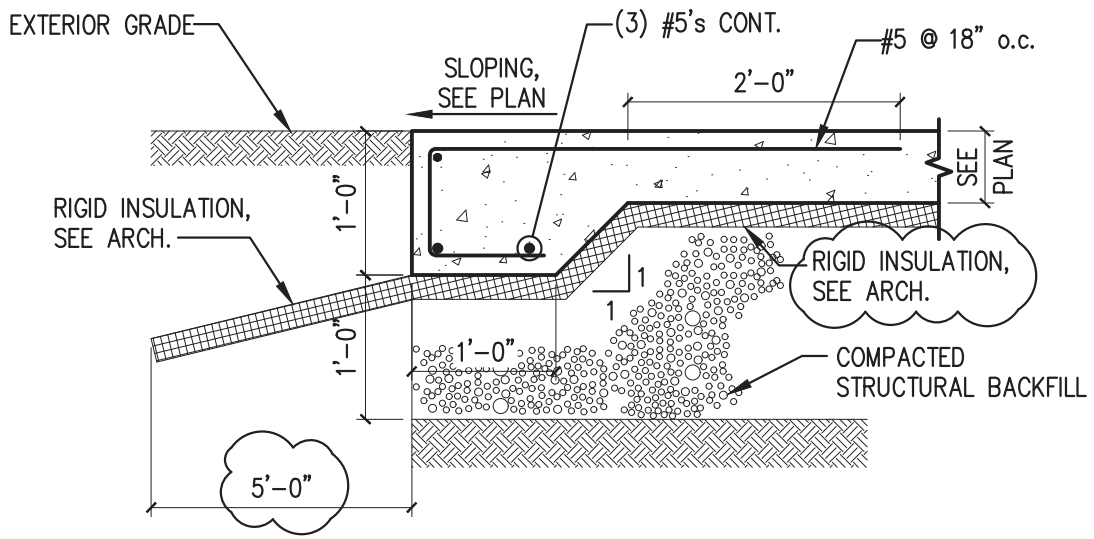
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 Fort Fairfield, Maine

ASK.03



B SECTION

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E SECTION

SCALE: 3/4" = 1'-0"

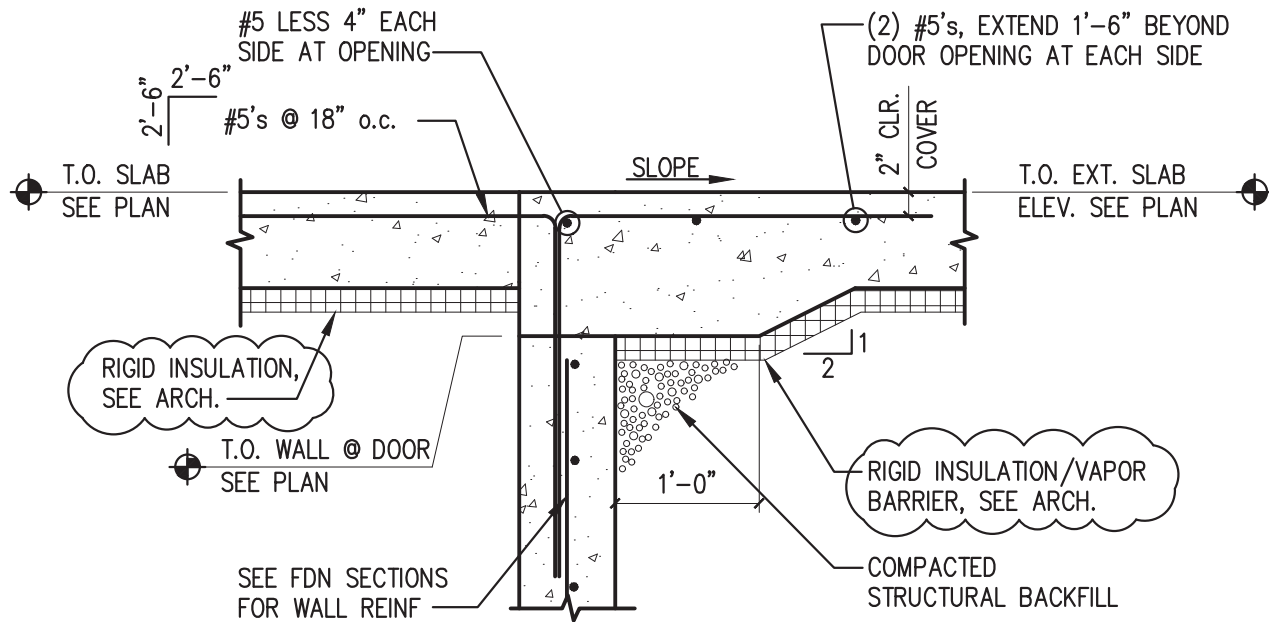
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 FORT FAIRFIELD, ME
REVISED DETAILS

CLIENT:
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 FORT FAIRFIELD, ME

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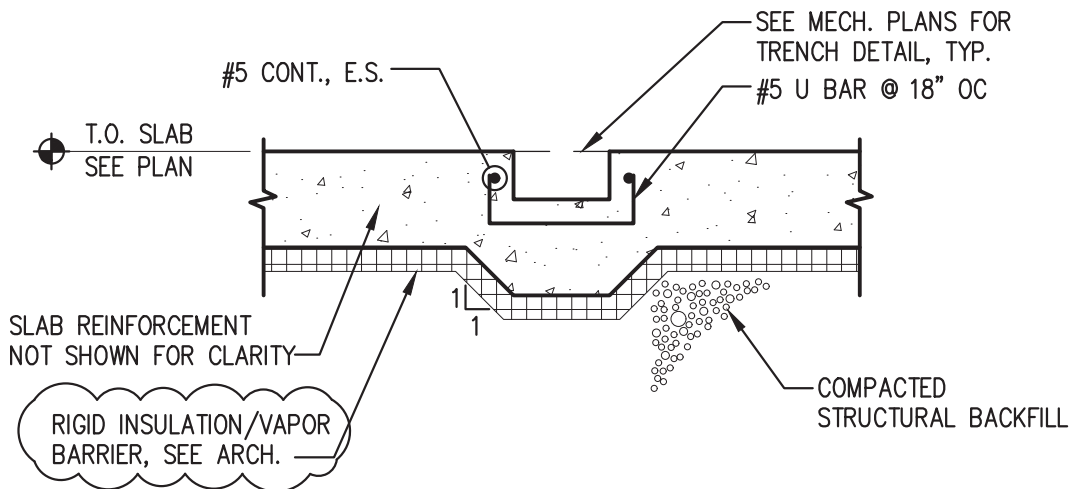
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PROJECT NUMBER:	XX-XXX

SK1



F SECTION

SCALE: 3/4" = 1'-0"



H SECTION

SCALE: 3/4" = 1'-0"

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SK2