

### ADDENDUM NO. 1

November 25, 2025

This Addendum contains changes to the requirements of the Contract Documents and Specifications. Such changes are to be incorporated into the Construction Documents and shall apply to the work with the same meaning and force as if they had been included in the original document. Wherever this Addendum modifies a portion of a paragraph of the specifications or a portion of any Drawing, the remainder of the Paragraph or Drawing shall remain in force.

NOTE: Provisions of all Contract Documents apply.

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Item 1. General Requirements, Section 01 11 00 Summary of Work, 1.2 Work Under Other Contracts, B. Concurrent/Future Work, 1.

**DELETE** in its entirety.

**REPLACE** with:

1. This is an enabling project for the installation of the anerobic digester equipment. The digester equipment is being **furnished** by an outside vendor (CHOMP), **but installation of all buried tanks is the responsibility of this contract.**

Item 2. **ADD** General Requirements Section 012300 – Alternates, attached.

Item 3. Technical Specifications:

**ADD** Specification Section 099113 – Exterior Painting, attached.

**ADD** Specification Section 099123 – Interior Painting, attached.

**ADD** Specification Section 262923 – Variable-Frequency Motor Controllers, attached.

Item 4. Drawings:

**ADD** Drawing S-104 – Manure Building Mezzanine Roof Framing Plan, Details, and Notes

**ADD** Drawing S-105 – Manure Building Mezzanine Ladder and Guard Details and Notes.

**ADD** Drawing M-401 – Mechanical Enlarged Plans.

Item 5. Drawing M-101

**DELETE** M-101 in its entirety.

**REPLACE** with revised Drawing M-101R, attached.

Item 6. Drawing M-102

**DELETE** M102 in its entirety.

**REPLACE** with revised Drawing M-102R, attached.

Item 7. Drawing M-500

**DELETE** M-500 in its entirety.

**REPLACE** with revised Drawing M-500R, attached.

Item 8. Drawing M-601

**DELETE** M-601 in its entirety.

**REPLACE** with revised Drawing M-601R, attached.

Item 9. Drawing E-101

**DELETE** E-101 in its entirety.

**REPLACE** with revised Drawing E-101R, attached.

Item 10. Drawing E-500

**DELETE** E-500 in its entirety.

**REPLACE** with revised Drawing E-500R, attached.

Item 11. **ADD** Appendix A Digestate Storage Tank 6000-gal Precast, attached.

Item 12. **ADD** Appendix B Food Waste Receiving Tanks 1 & 2, attached.

Item 13. RFI Questions and Clarifications

See attached RFI Log (Items 1 – 14)

Attachments: Appendix A - Digestate Storage Tank 6000-gal Precast.pdf

Appendix B - Food Waste Receiving Tanks 1 & 2.pdf

Section 012300 – Alternates.

Section 099113 – Exterior Painting.

Section 099123 – Interior Painting

Section 262923 – Variable-Frequency Motor Controllers

Drawing S-104

Drawing M-102R

Drawing M-601R

Drawing S-105

Drawing M-401

Drawing. E-101R

Drawing M-101R

Drawing M-500R

Drawing E-500R

\*\*\*\***END OF ADDENDUM**\*\*\*\*

**SECTION 01 23 00 ALTERNATES**

**1.0 GENERAL**

**1.1 RELATED DOCUMENTS**

- A. This Section describes the changes to be made under each Alternative.
- B. The Specification Section containing the pertinent requirements of materials and methods to achieve the Work described herein.

**1.2 DESCRIPTION OF REQUIREMENTS**

- A. Definition: An alternate is an amount proposed by Bidders and stated on the Bid Proposal Submission Form and in the electronic Bid Module for certain items that may be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the product, materials, equipment, systems or installation methods described in the Contract Documents. Alternates shall include all overhead, profit and other expenses, including bond costs, in connection therewith.
- B. Coordination: Coordinate related Work and modify or adjust adjacent Work as necessary to ensure that Work affected by each accepted alternate is complete and fully integrated into the Project.
- C. Notification: Immediately following Contract award, prepare and distribute to each party involved, notification of the status of each alternate. Indicate whether alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to alternates.
- D. Schedule: A "Schedule of Alternates" is included at the end of this Section. Include as part of each alternate, miscellaneous devices, accessory objects or similar items incidental to or required for a complete installation whether or not mentioned as part of the alternate.

**2.0 PRODUCTS – NOT USED**

**3.0 EXECUTION**

**3.1 SCHEDULE OF ALTERNATES**

**A. ALTERNATE NO. 1 (DEDUCT)**

Provide a deduct amount for removing work specifically related to the dairy barn, as noted on Drawing M-101R. This includes, but is not limited to:

1. Domestic water heaters located within the Dairy Barn mechanical room.
2. The extension of underground piping for Glycol HWS and Glycol HWR to the Dairy Barn.
3. Piping within the Dairy Barn.

**\*\*\*END OF SECTION 01 23 00\*\*\***



## EXTERIOR PAINTING

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### SECTION 09 91 13 – EXTERIOR PAINTING

#### 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. Primers.
  - 2. Finish coatings.

##### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include preparation requirements and application instructions.
  - 2. Indicate VOC content.
- B. Color Samples for Initial Selection: For each type of topcoat product.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Apply coats on Samples in steps to show each coat required for system.
  - 3. Label each coat of each Sample.
  - 4. Label each Sample for location and application area.

##### 1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

##### 1.5 DELIVERY, STORAGE, AND HANDLING

## EXTERIOR PAINTING

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- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

### 1.6 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Sherwin-Williams Company (The).
  - 2. Behr Paint Company.
  - 3. Benjamin Moore.
- B. Source Limitations: Obtain each paint product from single source from single manufacturer.

### 2.2 PAINT PRODUCTS, GENERAL

- A. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by topcoat manufacturer for use in paint system and on substrate indicated.
- B. Colors: Match existing.

## EXTERIOR PAINTING

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### 2.3 PRIMERS

- A. Zinc-Rich, Inorganic Primer: Corrosion-resistant, inorganic-based, zinc-rich primer formulated for use on prepared steel subject to severe industrial or marine environments.
- B. Water-Based, Galvanized-Metal Primer: Corrosion-resistant, pigmented, acrylic primer; formulated for use on cleaned/etched, exterior, galvanized metal to prepare it for subsequent water-based coatings.

### 2.4 FINISH COATINGS

- A. Exterior Latex Paint, Low Sheen: Water-based, pigmented coating; formulated for alkali, mold, microbial, and water resistance and for use on exterior surfaces, such as portland cement plaster, concrete, and primed wood.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Sherwin-Williams Company (The).
    - b. Behr Paint Company.
    - c. Benjamin Moore.
  - 2. Gloss and Sheen Level: Manufacturer's standard low-sheen finish.
- B. Exterior, Water-Based, Light Industrial Coating, Low Sheen: Corrosion-resistant, water-based, pigmented, emulsion coating formulated for resistance to blocking (sticking of two painted surfaces), water, alkalis, moderate abrasion, and mild chemical exposure and for use on exterior, primed, wood and metal surfaces.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Sherwin-Williams Company (The).
    - b. Behr Paint Company.
    - c. Benjamin Moore.
  - 2. Gloss and Sheen Level: Manufacturer's standard low-sheen finish.

## EXTERIOR PAINTING

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### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

#### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated and for re-painting, touch up painting.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems specified in this Section.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

## EXTERIOR PAINTING

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### 3.3 INSTALLATION

- A. Apply paints in accordance with manufacturer's written instructions.
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
  - 3. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  - 4. Primers specified in the Exterior Painting Schedule may be omitted on items that are factory primed or factory finished if compatible with intermediate and topcoat coatings and acceptable to intermediate and topcoat paint manufacturers.
- B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
  - 1. Paint the following work where exposed to view:
    - a. Uninsulated metal piping.
    - b. Pipe hangers and supports, except for threads.
    - c. Touch-Up exterior metal wall panels at new penetrations.

### 3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
  - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
  - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written instructions, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written instructions.

### 3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
  - 1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.

## EXTERIOR PAINTING

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2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
  3. Allow empty paint cans to dry before disposal.
  4. Collect waste paint by type and deliver to recycling or collection facility.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.6 EXTERIOR PAINTING SCHEDULE, METAL SUBSTRATES

- A. For re-painting and touch up painting contractor shall match existing paint system and color.
- B. Steel and Iron Substrates:
1. Water-Based, Light Industrial Coating System:
    - a. Prime Coat: Zinc-rich, inorganic primer or Epoxy metal primer.
    - b. Intermediate Coat: Matching topcoat.
    - c. Topcoat: Exterior, water-based, light industrial coating, low sheen.
- C. Galvanized-Metal Substrates:
1. Latex System:
    - a. Prime Coat: Water-based, galvanized-metal primer.
    - b. Intermediate Coat: Matching topcoat.
    - c. Topcoat: Exterior latex paint, low sheen.

END OF SECTION 09 91 13

## INTERIOR PAINTING

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### SECTION 09 91 23 – INTERIOR PAINTING

#### 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. Primers.
  - 2. Water-based finish coatings.

##### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  - 1. Include preparation requirements and application instructions.
  - 2. Indicate VOC content.
- B. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

##### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

##### 1.5 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

## INTERIOR PAINTING

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- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F above the dew point; or to damp or wet surfaces.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Sherwin-Williams Company (The).
  - 2. Behr Paint Company (The).
  - 3. Benjamin Moore
- B. Source Limitations: Obtain each paint product from single source from single manufacturer.

#### 2.2 PAINT PRODUCTS, GENERAL

- A. Material Compatibility:
  - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- B. Colors: As selected by Engineer from manufacturer's full range.

#### 2.3 PRIMERS

- A. Alkali-Resistant, Water-Based Primer: Water-based primer formulated for use on alkaline surfaces, such as plaster, vertical concrete, and masonry.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Behr Paint Company (Behr Process LLC).
    - b. Benjamin Moore & Co.
    - c. Sherwin-Williams Company (The).



## INTERIOR PAINTING

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### 2.4 WATER-BASED FINISH COATS

- A. Interior, Water-Based Light-Industrial Coating, Semigloss: Pigmented, water-based emulsion coating for interior primed wood and metal surfaces (e.g., walls, doors, frames, trim, and sash), providing resistance to moderate abrasion and mild chemical exposure and corrosive conditions.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Behr Paint Company (Behr Process LLC).
    - b. Benjamin Moore & Co.
    - c. Sherwin-Williams Company (The).
  - 2. Gloss Level: Manufacturer's standard semigloss finish.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
- C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

## INTERIOR PAINTING

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1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

### 3.3 INSTALLATION

- A. Apply paints according to manufacturer's written instructions.
  1. Use applicators and techniques suited for paint and substrate indicated.
  2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
  1. Paint the following work where exposed:
    - a. Metal ladders and guards.

### 3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

## INTERIOR PAINTING

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1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
  2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
  3. Allow empty paint cans to dry before disposal.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.5 INTERIOR PAINTING SCHEDULE

- A. Steel Substrates:
1. Water-Based Light-Industrial Coating System:
    - a. Prime Coat: Primer, rust-inhibitive, water based.
    - b. Intermediate Coat: Matching topcoat.
    - c. Topcoat: Interior, water-based, light-industrial coating, semigloss.

END OF SECTION 09 91 23

## VARIABLE-FREQUENCY MOTOR CONTROLLERS

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### SECTION 26 29 23 - VARIABLE-FREQUENCY MOTOR CONTROLLERS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section includes separately enclosed, preassembled, combination VFCs, rated 600 V and less, for speed control of three-phase, squirrel-cage induction motors.

##### 1.2 DEFINITIONS

- A. CE: Conformance Europeene (European Compliance).
- B. CPT: Control power transformer.
- C. DDC: Direct digital control.
- D. EMI: Electromagnetic interference.
- E. LED: Light-emitting diode.
- F. NC: Normally closed.
- G. NO: Normally open.
- H. OCPD: Overcurrent protective device.
- I. PID: Control action, proportional plus integral plus derivative.
- J. RFI: Radio-frequency interference.
- K. VFC: Variable-frequency motor controller.

##### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type and rating of VFC indicated.
  - 1. Include dimensions and finishes for VFCs.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For each VFC indicated.
  - 1. Include mounting and attachment details.

## VARIABLE-FREQUENCY MOTOR CONTROLLERS

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2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each VFC from manufacturer.
- B. Field quality-control reports.

### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For VFCs to include in emergency, operation, and maintenance manuals.
  1. In addition to items specified in Section "Operation and Maintenance Data," include the following:
    - a. Manufacturer's written instructions for testing and adjusting thermal-magnetic circuit breaker and motor-circuit protector trip settings.
    - b. Manufacturer's written instructions for setting field-adjustable overload relays.
    - c. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
    - d. Manufacturer's written instructions for setting field-adjustable timers, controls, and status and alarm points.

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. If stored in space that is not permanently enclosed and air conditioned, remove loose packing and flammable materials from inside controllers.
- B. Product Selection for Restricted Space: Drawings indicate clearances between VFCs, and adjacent surfaces and other items.

### 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace VFCs that fail in materials or workmanship within specified warranty period.
  1. Warranty Period: Five years from date of Substantial Completion.

## VARIABLE-FREQUENCY MOTOR CONTROLLERS

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### PART 2 - PRODUCTS

#### 2.1 VARIABLE-FREQUENCY MOTOR CONTROLLERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. ABB.
  2. Yaskawa.
  3. Eaton/Cutler Hammer

#### 2.2 SYSTEM DESCRIPTION

- A. General Requirements for VFCs:
1. VFCs and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  2. Comply with NEMA ICS 7, NEMA ICS 61800-2, and UL 508C .
- B. Application: Variable torque.
- C. VFC Description: Variable-frequency motor controller, consisting of power converter that employs pulse-width-modulated inverter, factory built and tested in an enclosure, with integral disconnecting means and overcurrent and overload protection; listed and labeled by an NRTL as a complete unit; arranged to provide self-protection, protection, and variable-speed control of one or more three-phase induction motors by adjusting output voltage and frequency.
1. Units suitable for operation of inverter-duty motors as defined by NEMA MG 1, Section IV, Part 31, "Definite-Purpose Inverter-Fed Polyphase Motors."
  2. Listed and labeled for integrated short-circuit current (withstand) rating by an NRTL acceptable to authorities having jurisdiction.
- D. Design and Rating: Match load type, such as fans, blowers, and pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.
- E. Output Rating: Three phase; 10 to 60 Hz, with voltage proportional to frequency throughout voltage range; maximum voltage equals input voltage.
- F. Unit Operating Requirements:
1. Input AC Voltage Tolerance: Plus 10 and minus 15 percent of VFC input voltage rating.
  2. Input AC Voltage Unbalance: Not exceeding 3 percent.
  3. Input Frequency Tolerance: Plus or minus 3 percent of VFC frequency rating.
  4. Minimum Efficiency: 97 percent at 60 Hz, full load.

## VARIABLE-FREQUENCY MOTOR CONTROLLERS

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5. Minimum Displacement Primary-Side Power Factor: 98 percent under any load or speed condition.
  6. Minimum Short-Circuit Current (Withstand) Rating: 100 kA.
  7. Ambient Temperature Rating: Not less than 32 deg F (0 deg C) and not exceeding 104 deg F (40 deg C).
  8. Humidity Rating: Less than 95 percent (noncondensing).
  9. Altitude Rating: Not exceeding 3300 feet (1000 m).
  10. Vibration Withstand: Comply with NEMA ICS 61800-2.
  11. Overload Capability: 1.1 times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.
  12. Starting Torque: Minimum 100 percent of rated torque from 3 to 60 Hz.
  13. Speed Regulation: Plus or minus 5 percent.
  14. Output Carrier Frequency: Selectable; 0.5 to 15 kHz.
  15. Stop Modes: Programmable; includes fast, free-wheel, and dc injection braking.
- G. Inverter Logic: Microprocessor based, 16 bit, isolated from all power circuits.
- H. Isolated Control Interface: Allows VFCs to follow remote-control signal over a minimum 40:1 speed range.
1. Signal: Electrical.
- I. Internal Adjustability Capabilities:
1. Minimum Speed: 5 to 25 percent of maximum rpm.
  2. Maximum Speed: 80 to 100 percent of maximum rpm.
  3. Acceleration: 0.1 to 999.9 seconds.
  4. Deceleration: 0.1 to 999.9 seconds.
  5. Current Limit: 30 to minimum of 150 percent of maximum rating.
- J. Self-Protection and Reliability Features:
1. Surge Suppression: Factory installed as an integral part of the VFC, complying with UL 1449 SPD, Type 1 or Type 2.
  2. Loss of Input Signal Protection: Selectable response strategy, including speed default to a percent of the most recent speed, a preset speed, or stop; with alarm.
  3. Under- and overvoltage trips.
  4. Inverter overcurrent trips.
  5. VFC and Motor-Overload/Overtemperature Protection: Microprocessor-based thermal protection system for monitoring VFCs and motor thermal characteristics, and for providing VFC overtemperature and motor-overload alarm and trip; settings selectable via the keypad.
  6. Critical frequency rejection, with three selectable, adjustable deadbands.
  7. Instantaneous line-to-line and line-to-ground overcurrent trips.
  8. Loss-of-phase protection.
  9. Reverse-phase protection.

## VARIABLE-FREQUENCY MOTOR CONTROLLERS

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- 10. Short-circuit protection.
- 11. Motor-overtemperature fault.
- K. Automatic Reset/Restart: Attempt three restarts after drive fault or on return of power after an interruption and before shutting down for manual reset or fault correction; adjustable delay time between restart attempts.
- L. Bidirectional Autospeed Search: Capable of starting VFC into rotating loads spinning in either direction and returning motor to set speed in proper direction, without causing damage to drive, motor, or load.
- M. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.
- N. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.
- O. Integral Input Disconnecting Means and OCPD: UL 489, thermal-magnetic circuit breaker with pad-lockable, door-mounted handle mechanism.
  - 1. Disconnect Rating: Not less than 115 percent of VFC input current rating.
  - 2. Auxiliary Contacts: NO or NC, arranged to activate before switch blades open.
  - 3. NC alarm contact that operates only when circuit breaker has tripped.
- P. .

### 2.3 CONTROLS AND INDICATION

- A. Status Lights: Door-mounted LED indicators displaying the following conditions:
  - 1. Power on.
  - 2. Run.
  - 3. Overvoltage.
  - 4. Line fault.
  - 5. Overcurrent.
  - 6. External fault.
- B. Panel-Mounted Operator Station: Manufacturer's standard front-accessible, sealed keypad and plain-English-language digital display; allows complete programming, program copying, operating, monitoring, and diagnostic capability.
  - 1. Keypad: In addition to required programming and control keys, include keys for HAND, OFF, and AUTO modes.



## VARIABLE-FREQUENCY MOTOR CONTROLLERS

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2. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: View only; view and operate; and view, operate, and service.
  - a. Control Authority: Supports at least four conditions: Off, local manual control at VFC, local automatic control at VFC, and automatic control through a remote source.
- C. Historical Logging Information and Displays:
  1. Real-time clock with current time and date.
  2. Running log of total power versus time.
  3. Total run time.
  4. Fault log, maintaining last four faults with time and date stamp for each.
- D. Indicating Devices: Digital display mounted flush in VFC door and connected to display VFC parameters including, but not limited to:
  1. Output frequency (Hz).
  2. Motor speed (rpm).
  3. Motor status (running, stop, fault).
  4. Motor current (amperes).
  5. Motor torque (percent).
  6. Fault or alarming status (code).
  7. PID feedback signal (percent).
  8. DC-link voltage (V dc).
  9. Set point frequency (Hz).
  10. Motor output voltage (V ac).
- E. Control Signal Interfaces:
  1. Electric Input Signal Interface:
    - a. A minimum of two programmable analog inputs: 0- to 10-V dc.
    - b. A minimum of six multifunction programmable digital inputs.
  2. Pneumatic Input Signal Interface: 3 to 15 psig (20 to 104 kPa).
  3. Remote Signal Inputs: Capability to accept any of the following speed-setting input signals from the DDC system for HVAC or other control systems:
    - a. 0- to 10-V dc.
    - b. 4- to 20-mA dc.
    - c. Potentiometer using up/down digital inputs.
    - d. Fixed frequencies using digital inputs.
  4. Output Signal Interface: A minimum of one programmable analog output signal(s) ( 4- to 20-mA dc), which can be configured for any of the following:

## VARIABLE-FREQUENCY MOTOR CONTROLLERS

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- a. Output frequency (Hz).
    - b. Output current (load).
    - c. DC-link voltage (V dc).
    - d. Motor torque (percent).
    - e. Motor speed (rpm).
    - f. Set point frequency (Hz).
  - 5. Remote Indication Interface: A minimum of two programmable dry-circuit relay outputs (120-V ac, 1 A) for remote indication of the following:
    - a. Motor running.
    - b. Set point speed reached.
    - c. Fault and warning indication (overtemperature or overcurrent).
    - d. PID high- or low-speed limits reached.
  - F. PID Control Interface: Provides closed-loop set point, differential feedback control in response to dual feedback signals. Allows for closed-loop control of fans and pumps for pressure, flow, or temperature regulation.
    - 1. Number of Loops: One.
  - G. Interface with DDC System for HVAC: Factory-installed hardware and software shall interface with DDC system via BACnet for HVAC to monitor, control, display, and record data for use in processing reports. VFC settings shall be retained within VFC's nonvolatile memory.
    - 1. Hardwired Points:
      - a. Monitoring: On-off status,.
      - b. Control: On-off operation,.
- ### 2.4 LINE CONDITIONING AND FILTERING
- A. Input Line Conditioning: Based on the manufacturer's harmonic analysis study and report, provide input filtering, as required, to limit total demand (harmonic current) distortion and total harmonic voltage demand at the defined point of common coupling to meet IEEE 519 recommendations.
  - B. EMI/RFI Filtering:
    - 1. CE marked; certify compliance with IEC 61800-3 for Category C2.
- ### 2.5 BYPASS SYSTEMS
- A. Bypass Operation: Safely transfers motor between power converter output and bypass circuit, manually, automatically, or both. Selector switches set modes and indicator

## VARIABLE-FREQUENCY MOTOR CONTROLLERS

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lights indicate mode selected. Unit is capable of stable operation (starting, stopping, and running) with motor completely disconnected from power converter.

B. Bypass Mode:

1. Manual operation only; requires local operator selection at VFC. Transfer between power converter and bypass contactor, and retransfer shall only be allowed with the motor at zero speed.
2. Field-selectable automatic or manual, allows local and remote transfer between power converter and bypass contactor and retransfer, either via manual operator interface or automatic-control system feedback.

C. Bypass Controller:

1. Two-Contactor-Style Bypass: Two-contactor-style bypass allows motor operation via the power converter or the bypass controller; with input isolating switch and barrier arranged to isolate the power converter and permit safe troubleshooting and testing, both energized and de-energized, while motor is operating in bypass mode.
  - a. Bypass Contactor: Load-break, IEC-rated contactor.
  - b. Output Isolating Contactor: Non-load-break, IEC-rated contactor.
  - c. Isolating Switch: Non-load-break switch arranged to isolate power converter and permit safe troubleshooting and testing of the power converter, both energized and de-energized, while motor is operating in bypass mode; pad-lockable, door-mounted handle mechanism.

D. Bypass Contactor Configuration: Full-voltage (across-the-line) type.

1. NORMAL/BYPASS selector switch.
2. HAND/OFF/AUTO selector switch.
3. NORMAL/TEST Selector Switch: Allows testing and adjusting of VFC while the motor is running in the bypass mode.
4. Contactor Coils: Pressure-encapsulated type with coil transient suppressors.
  - a. Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.
  - b. Power Contacts: Totally enclosed, double break, and silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.
5. Control Circuits: 120-V ac; obtained from integral CPT, with primary and secondary fuses, with CPT of sufficient capacity to operate all integral devices and remotely located pilot, indicating, and control devices.
6. Overload Relays: NEMA ICS 2.
  - a. Solid-State Overload Relays:

## VARIABLE-FREQUENCY MOTOR CONTROLLERS

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- 1) Switch or dial selectable for motor-running overload protection.
  - 2) Sensors in each phase.
  - 3) Class 10/20 selectable tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
  - 4) Class II ground-fault protection, with start and run delays to prevent nuisance trip on starting.
  - 5) Analog communication module.
- b. External overload, reset push button.

### 2.6 OPTIONAL FEATURES

- A. Multiple-Motor Capability: VFC suitable for variable-speed service to multiple motors. Overload protection shuts down VFC and motors served by it, and generates fault indications when overload protection activates.
1. Configure to allow two or more motors to operate simultaneously at the same speed; separate overload relay for each controlled motor.
  2. Configure to allow two motors to operate separately; operator selectable via local or remote switch or contact closures; single overload relay for both motors; separate output magnetic contactors for each motor.
  3. Configure to allow two motors to operate simultaneously and in a lead/lag mode, with one motor operated at variable speed via the power converter and the other at constant speed via the bypass controller; separate overload relay for each controlled motor.
- B. Damper control circuit with end-of-travel feedback capability.
- C. Sleep Function: Senses a minimal deviation of a feedback signal and stops the motor. On an increase in speed-command signal deviation, VFC resumes normal operation.
- D. Motor Preheat Function: Preheats motor when idle to prevent moisture accumulation in the motor.
- E. Firefighter's Override (Smoke Purge) Input: On a remote contact closure from **[the firefighter's control station] [smoke-control fan controller] <Insert location>**, this password-protected input:
1. Overrides all other local and external inputs (analog/digital, serial communication, and all keypad commands).
  2. Forces VFC to operate motor, without any other run or speed command, at a field-adjustable, preset speed.
  3. Forces VFC to transfer to bypass mode and operate motor at full speed.
  4. Causes display of override mode on the VFC display.
  5. Reset VFC to normal operation on removal of override signal **[automatically] [manually]**.

## VARIABLE-FREQUENCY MOTOR CONTROLLERS

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- F. Remote Indicating Circuit Terminals: Mode selection, controller status, and controller fault.
- G. Remote digital operator kit.
- H. Communication Port: RS-232 port, USB 2.0 port, or equivalent connection capable of connecting a printer[ **and a notebook computer**].
- I. **<Insert feature>**.

### 2.7 ENCLOSURES

- A. VFC Enclosures: NEMA 250, to comply with environmental conditions at installed location.
  - 1. Dry and Clean Indoor Locations: Type 1.
  - 2. Outdoor Locations: Type 3R.
  - 3. Kitchen Areas: Type 4X, stainless steel.
  - 4. Other Wet or Damp Indoor Locations: Type 4.
  - 5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: Type 12.
- B. Plenum Rating: UL 1995; NRTL certification label on enclosure, clearly identifying VFC as "Plenum Rated."

### 2.8 ACCESSORIES

- A. General Requirements for Control-Circuit and Pilot Devices: NEMA ICS 5; factory installed in VFC enclosure cover unless otherwise indicated.
  - 1. Push Buttons: **[Covered]** **[Lockable]** **[Shielded]** **[Unguarded]**.
  - 2. Pilot Lights: Push to test.
  - 3. Selector Switches: **[Rotary]** **<Insert description>** type.
  - 4. Stop and Lockout Push-Button Station: Momentary-break, push-button station with a factory-applied hasp arranged so padlock can be used to lock push button in depressed position with control circuit open.
- B. **[NC]** **[NO]** **[Reversible NC/NO]** bypass contactor auxiliary contact(s).
- C. Control Relays: Auxiliary and adjustable **[pneumatic]** **[solid-state]** time-delay relays.
- D. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections. Provide adjustable undervoltage, overvoltage, and time-delay settings.

## VARIABLE-FREQUENCY MOTOR CONTROLLERS

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1. Current Transformers: Continuous current rating, basic impulse insulating level (BIL) rating, burden, and accuracy class suitable for connected circuitry. Comply with IEEE C57.13.
  - E. Supplemental Digital Meters:
    1. Elapsed-time meter.
    2. Kilowatt meter.
    3. Kilowatt-hour meter.
  - F. Breather and drain assemblies, to maintain interior pressure and release condensation in NEMA 250, **[Type 4]** **[Type 4X]** **[Type 12]** **<Insert type>** enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.
  - G. Space heaters, with NC auxiliary contacts, to mitigate condensation in NEMA 250, **[Type 3R]** **[Type 4X]** **[Type 12]** **<Insert type>** enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.
  - H. Cooling Fan and Exhaust System: For NEMA 250, **[Type 1]** **[Type 12]** **<Insert enclosure type>**; UL 508 component recognized: Supply fan, with **[composite]** **[stainless steel]** **<Insert material>** intake and exhaust grills **[and filters]**; **[120]** **<Insert number>**-V ac; obtained from **[integral CPT]** **<Insert source of control power>**.
  - I. Sun shields installed on fronts, sides, and tops of enclosures installed outdoors and subject to direct and extended sun exposure.
  - J. Spare control-wiring terminal blocks[; **unwired**][; **wired**].
  - K. **<Insert accessory>**.
- ### 2.9 SOURCE QUALITY CONTROL
- A. Testing: Test and inspect VFCs according to requirements in NEMA ICS 61800-2.
    1. Test each VFC while connected to a motor that is comparable to that for which the VFC is rated.
    2. Verification of Performance: Rate VFCs according to operation of functions and features specified.
  - B. VFCs will be considered defective if they do not pass tests and inspections.
  - C. Prepare test and inspection reports.

## VARIABLE-FREQUENCY MOTOR CONTROLLERS

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### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas, surfaces, and substrates to receive VFCs, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.
- B. Examine VFC before installation. Reject VFCs that are wet, moisture damaged, or mold damaged.
- C. Examine roughing-in for conduit systems to verify actual locations of conduit connections before VFC installation.
- D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Wall-Mounting Controllers: Install with tops at uniform height and with disconnect operating handles not higher than 79 inches (2000 mm) above finished floor, unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not on walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems."
- B. Floor-Mounting Controllers: Install VFCs on 4-inch (100-mm) nominal thickness concrete base. Comply with requirements for concrete base specified in Section "Cast-in-Place Concrete."
  - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
  - 2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
  - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Comply with NECA 1.

## VARIABLE-FREQUENCY MOTOR CONTROLLERS

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### 3.3 CONTROL WIRING INSTALLATION

- A. Install wiring between VFCs and remote devices and facility's central-control system. Comply with requirements in Section 260523 "Control-Voltage Electrical Power Cables."
- B. Bundle, train, and support wiring in enclosures.
- C. Connect selector switches and other automatic-control devices where applicable.
  - 1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switches are in manual-control position.
  - 2. Connect selector switches with control circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor-overload protectors.

### 3.4 IDENTIFICATION

- A. Identify VFCs, components, and control wiring. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
  - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
  - 2. Label each VFC with engraved nameplate.
  - 3. Label each enclosure-mounted control and pilot device.
- B. Operating Instructions: Frame printed operating instructions for VFCs, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of VFC units.

### 3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections with the assistance of a factory-authorized service representative.
- C. Acceptance Testing Preparation:
  - 1. Test insulation resistance for each VFC element, bus, component, connecting supply, feeder, and control circuit.
  - 2. Test continuity of each circuit.



## VARIABLE-FREQUENCY MOTOR CONTROLLERS

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### D. Tests and Inspections:

1. Inspect VFC, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
2. Test insulation resistance for each VFC element, component, connecting motor supply, feeder, and control circuits.
3. Test continuity of each circuit.
4. Verify that voltages at VFC locations are within 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Architect before starting the motor(s).
5. Test each motor for proper phase rotation.
6. Perform tests according to the Inspection and Test Procedures for Adjustable Speed Drives stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
8. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

E. VFCs will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports, including a certified report that identifies the VFC and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

### 3.6 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

### 3.7 ADJUSTING

- A. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.
- B. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.
- C. Adjust the trip settings of instantaneous-only circuit breakers and thermal-magnetic circuit breakers with adjustable, instantaneous trip elements. Initially adjust to 6 times the motor nameplate full-load amperes and attempt to start motors several times, allowing for motor cool-down between starts. If tripping occurs on motor inrush, adjust

## VARIABLE-FREQUENCY MOTOR CONTROLLERS

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settings in increments until motors start without tripping. Do not exceed 8 times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Architect before increasing settings.

- D. Set the taps on reduced-voltage autotransformer controllers.
- E. Set field-adjustable circuit-breaker trip ranges as specified in Section 260573.16 "Coordination Studies."

### 3.8 PROTECTION

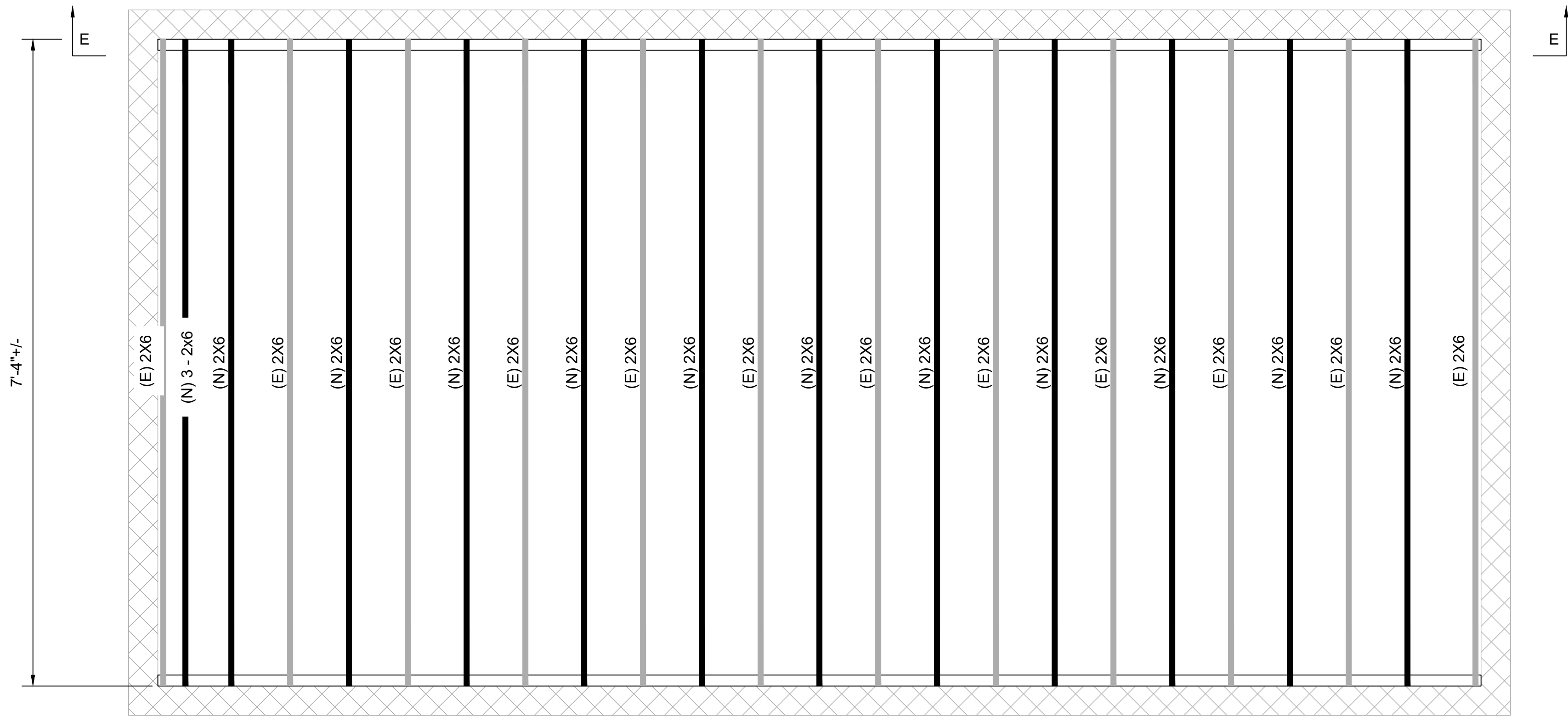
- A. Replace VFCs whose interiors have been exposed to water or other liquids prior to Substantial Completion.

### 3.9 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, reprogram, and maintain VFCs.

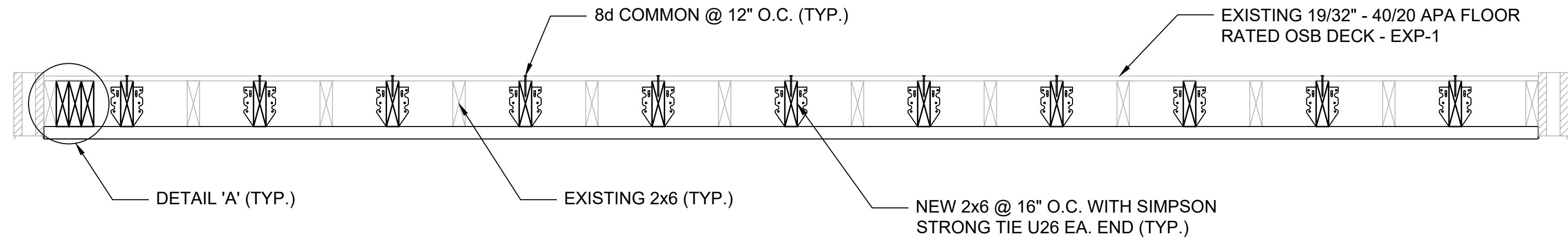
END OF SECTION 26 29 23

A

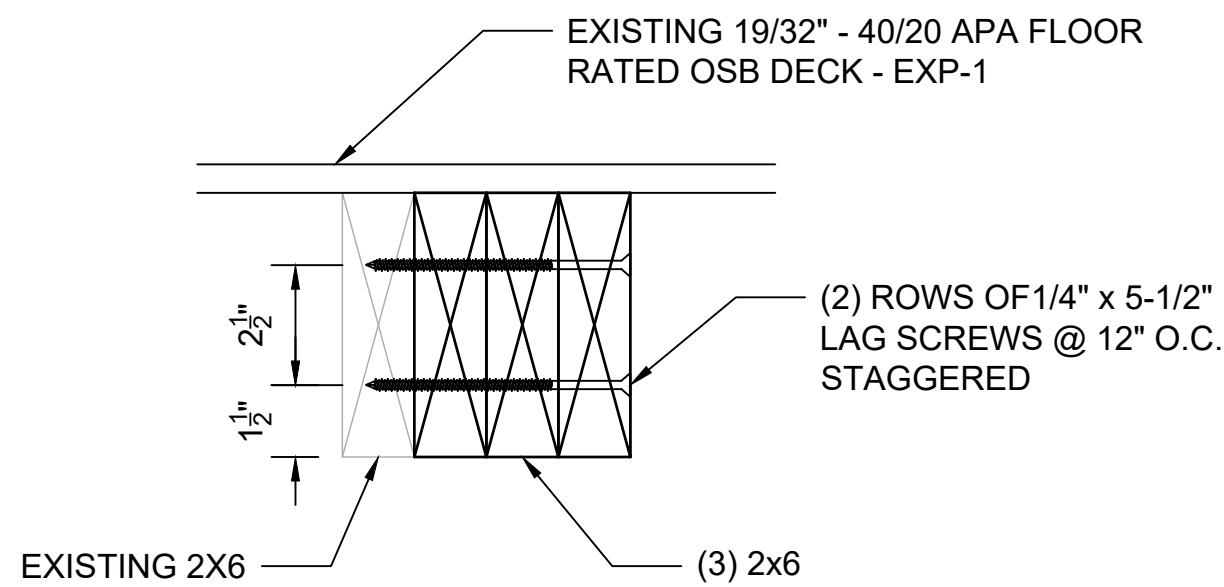


LEGEND:  
(E) = EXISTING  
(N) = NEW

① MEZZANINE ROOF FRAMING PLAN  
1" = 1'-0"



② SECTION E-E  
1" = 1'-0"



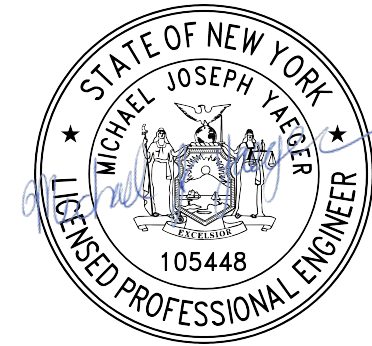
③ DETAIL 'A'  
1" = 1'-0"

NOTES:

- SEE DRAWING S-101 FOR GENERAL STRUCTURAL NOTES

TIMBER FRAMING NOTES:

- SAWN LUMBER SHALL BE DOUGLAS FIR-LARCH NO. 2 OR BETTER.
- NAILS SHALL BE COMMON WIRE NAILS (NAILS (0.131"Øx2-1/2" FOR 8d; 0.148"Øx3" FOR 10d; 0.148"Øx3-1/4" FOR 12d; 0.162"Øx3-1/2" FOR 16d) OR ACCESSORIES OF HARDWARE CONNECTORS.
- HARDWARE CONNECTORS AND ACCESSORIES SHALL BE SIMPSON STRONG-TIE CONNECTORS OR APPROVED EQUAL.
- LAG SCREWS SHALL BE SCREWED, NOT DRIVEN, INTO WOOD MEMBERS WITH PRE-DRILLED HOLES. PRE-DRILLED HOLE DIAMETER IN SOFT STRUCTURAL WOODS SHALL EQUAL SCREW SHANK DIAMETER AT THE SCREW SHANK, AND SHALL BE UNDERSIZED BY 25% OF SCREW DIAMETER AT THE SCREW THREADS. FOR EXAMPLE, FOR A 3/8" SCREW, THE PRE-DRILLED HOLE SHALL BE 3/8" OVER THE LENGTH OF THE SCREW SHANK, AND SHALL BE 9/32" OVER THE LENGTH OF THE SCREW THREADS. FOR HARD WOODS USED IN A STRUCTURAL APPLICATION, PRE-DRILLED HOLE DIAMETER AT THE SHANK SHALL MATCH THE SCREW DIAMETER, AND THE HOLE DIAMETER OVER THE LENGTH OF THE SCREW THREADS SHALL BE UNDERSIZED BY 12.5% OF THE SCREW DIAMETER.



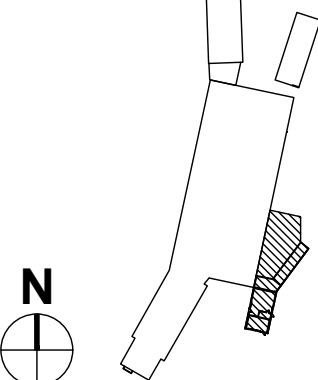
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REVISIONS		
#	DESCRIPTION	DATE
1	ADDENDUM NO. 1	11/24/25

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KEY PLAN



DATE:	11/24/2025
PROJECT #:	19640.08
DRAWN BY:	MJY
CHECKED BY:	CGS
SCALE:	AS NOTED

VERIFY SCALE

BAR IS ONE (1) INCH LONG ON ORIGINAL DRAWING:

0 1

IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

MANURE BUILDING  
MEZZANINE  
ROOF FRAMING PLAN,  
DETAILS, AND NOTES





NOTE: UNAUTHORIZED ALTERATION OR ADDITION TO THIS DRAWING IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW ARTICLE 145, SECTION 7209.

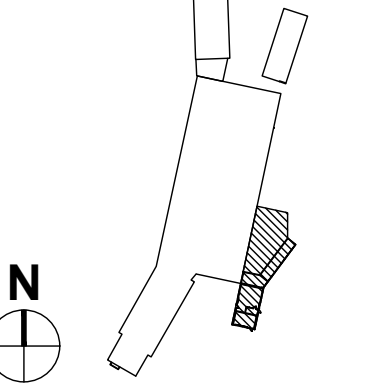
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CONSTRUCTION DOCUMENTS  
**TEACHING DAIRY BARN EXPERIMENTAL ANAEROBIC DIGESTER ENABLING**  
CORNELL UNIVERSITY  
ITHACA, NY 14850

KEY PLAN



DATE:	11/24/2025
PROJECT #:	19640.08
DRAWN BY:	MJY
CHECKED BY:	CGS
SCALE:	AS NOTED

**VERIFY SCALE**

BAR IS ONE (1) INCH LONG ON ORIGINAL DRAWING:

0 1

IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

MANURE BUILDING  
MEZZANINE  
LADDER AND GUARD  
DETAILS AND NOTES

**S-105**

**NOTES:**

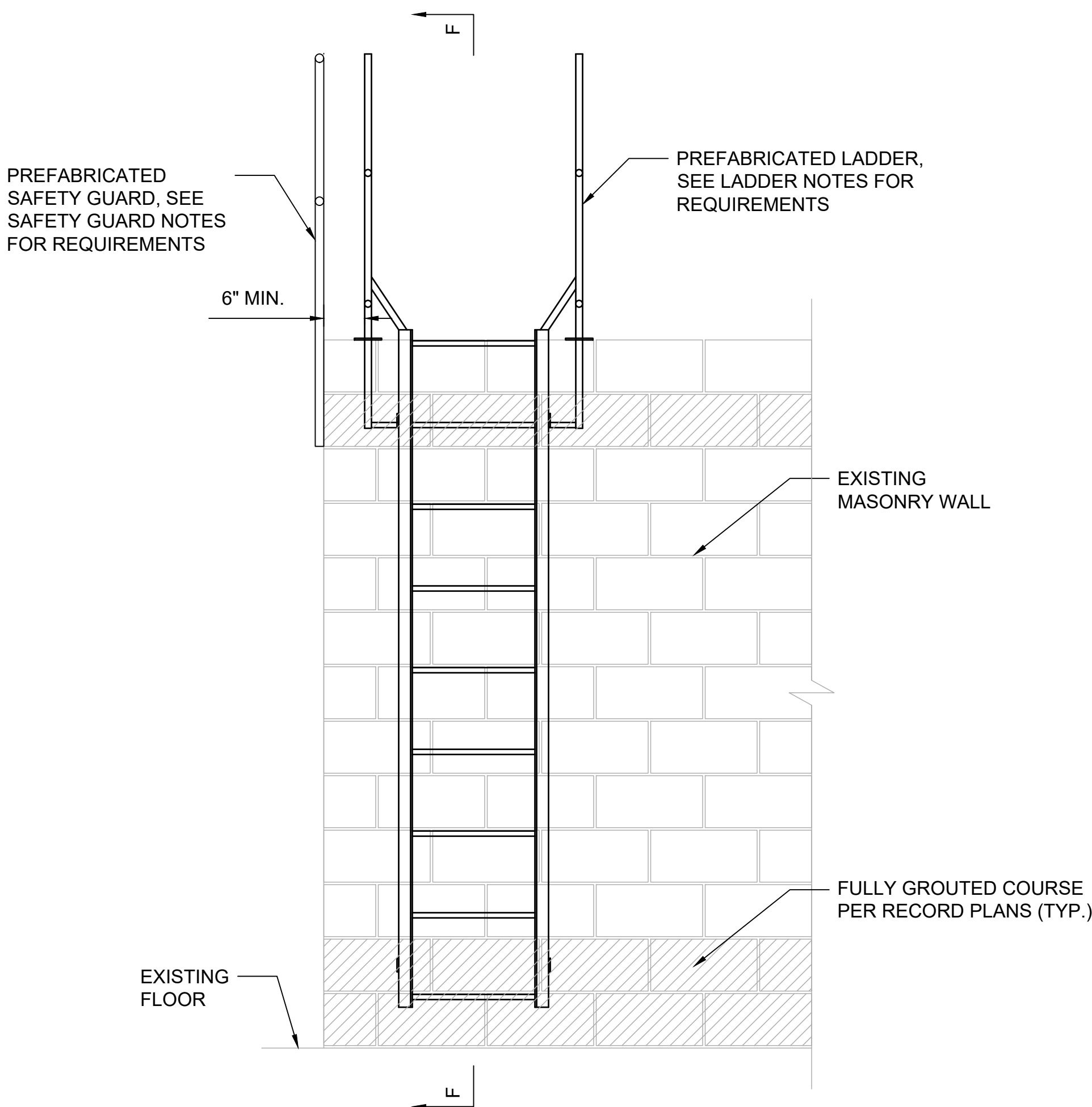
- SEE DRAWING S-101 FOR GENERAL STRUCTURAL NOTES

**SAFETY GUARD NOTES:**

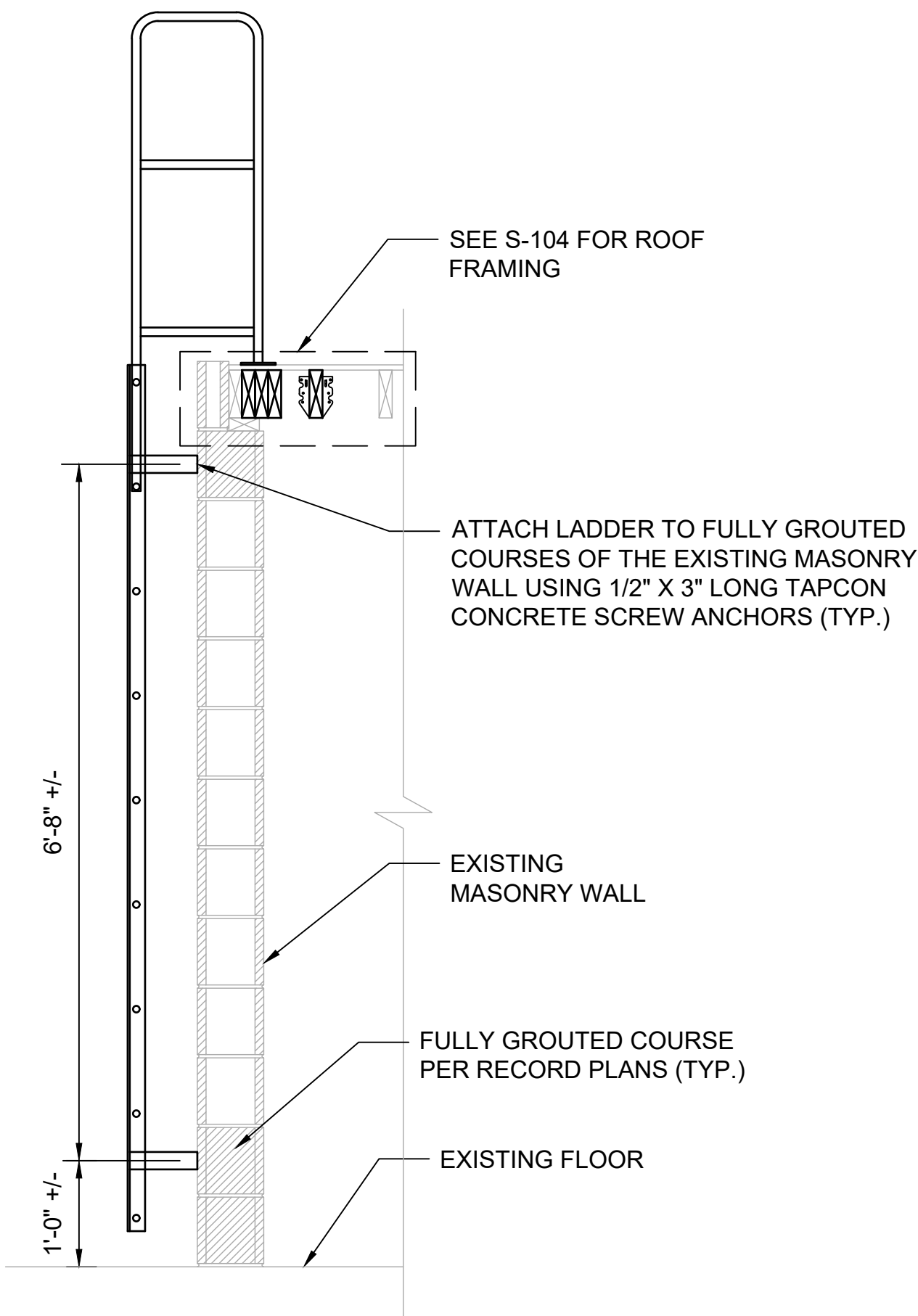
- THE PROPOSED SAFETY GUARD SHALL MEET THE FOLLOWING REQUIREMENTS:
  - SAFETY GUARDS SHALL BE MADE OF STEEL.
  - SAFETY GUARDS SHALL HAVE A MINIMUM HEIGHT OF 42".
  - SAFETY GUARDS SHALL NOT HAVE OPENINGS THAT ALLOW THE PASSAGE OF A SPHERE 21" IN DIAMETER.
  - SAFETY GUARDS SHALL HAVE A MAXIMUM POST SPACING OF 72".
  - SAFETY GUARD SHALL HAVE A CIRCULAR CROSS-SECTION WITH A MINIMUM OUTSIDE DIAMETER EQUAL TO 1 1/4" AND A MAXIMUM OUTSIDE DIAMETER EQUAL TO 2".
  - SAFETY GUARD SHALL BE PROTECTED AGAINST CORROSION BY APPROVED MEANS.
  - ALL SAFETY GUARD METAL SHALL BE PAINTED TO MATCH THE FINAL COLOR OF THE PROPOSED LADDER.
- PROPOSED SAFETY GUARD SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR APPROVAL PRIOR TO FABRICATION.

**LADDER NOTES:**

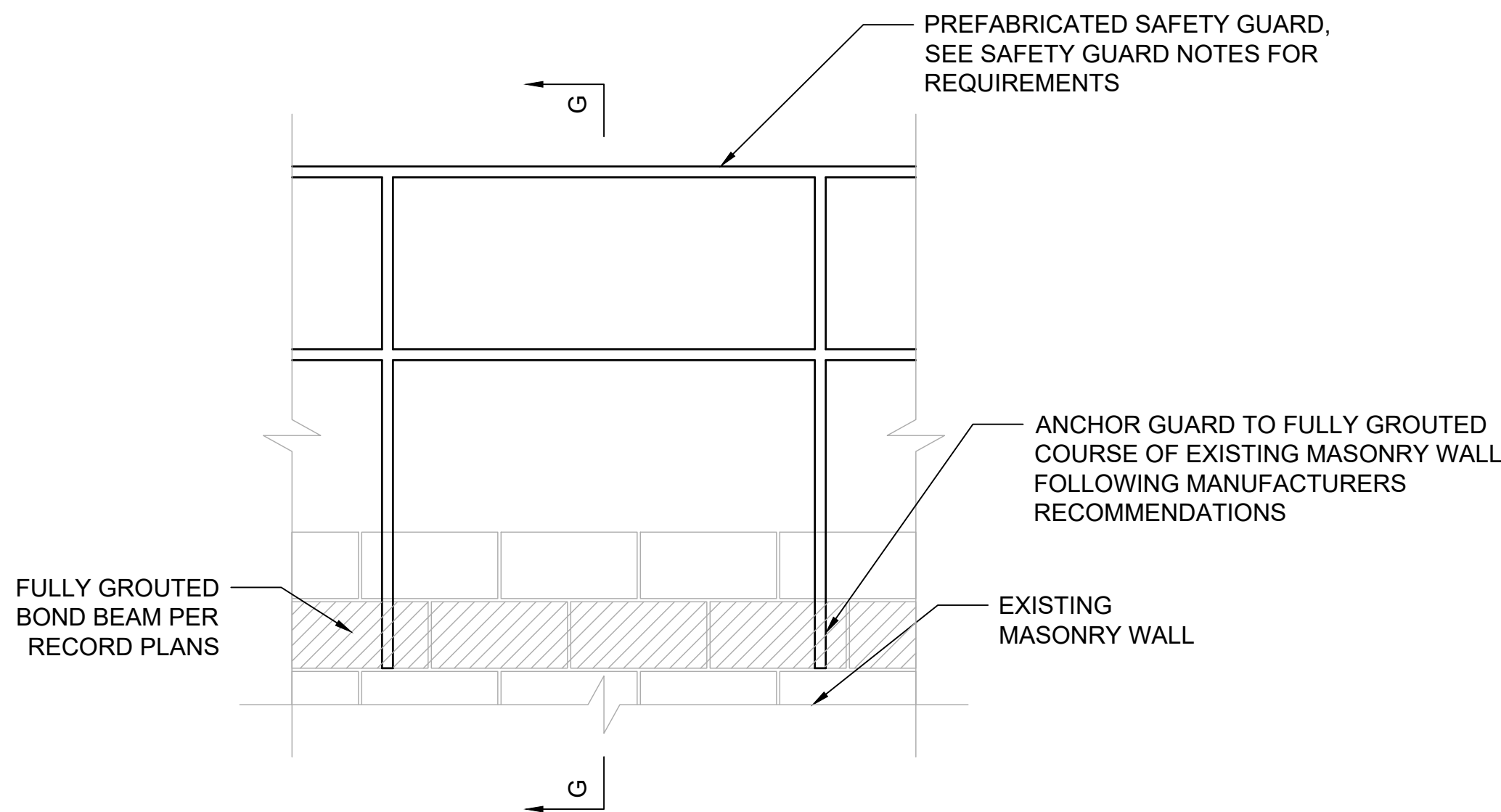
- PROPOSED LADDER SHALL BE A COTTERMAN FIXED LADDER WITH WALK-THRU HANDRAILS, OR EQUAL.
- THE PROPOSED LADDER SHALL MEET THE FOLLOWING REQUIREMENTS:
  - SIDE RAILING SHALL EXTEND ABOVE THE UPPER EDGE OF THE MECHANICAL UNIT PLATFORM NOT LESS THAN 30".
  - LADDER RUNG SPACING SHALL NOT BE GREATER THAN 14" ON CENTER.
  - THE UPPERMOST RUNG SHALL NOT BE GREATER THAN 24" BELOW THE UPPER EDGE OF THE MEZZANINE.
  - LADDERS SHALL HAVE A TOE SPACING NOT LESS THAN 6".
  - THERE SHALL BE NOT LESS THAN 18" BETWEEN RAILS.
  - RUNGS SHALL HAVE A DIAMETER NOT LESS THAN 3/4" AND BE CAPABLE OF WITHSTANDING A 300-LB LOAD.
  - LADDERS SHALL BE PROTECTED AGAINST CORROSION BY APPROVED MEANS.
- PROPOSED LADDER SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR APPROVAL PRIOR TO FABRICATION.



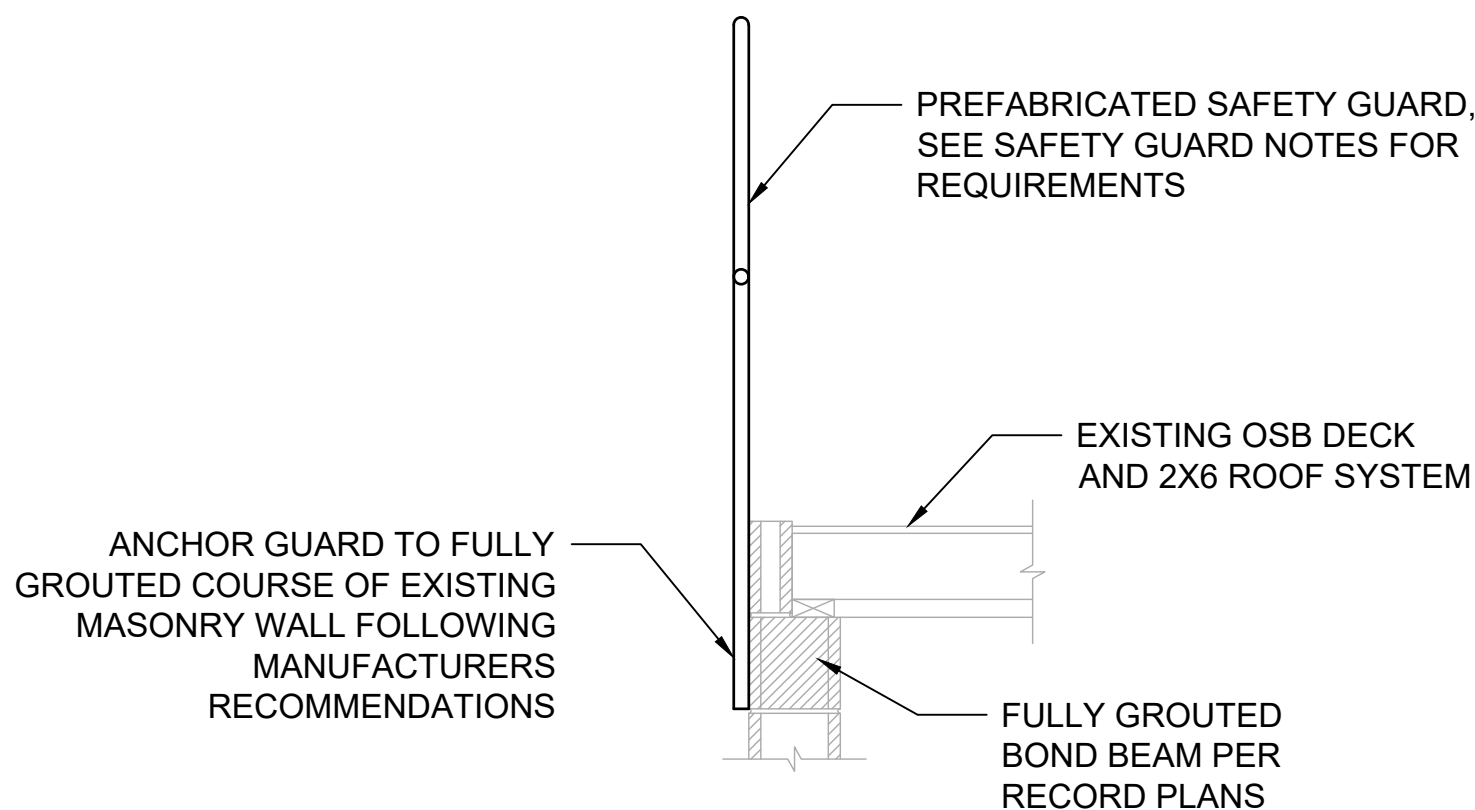
**1 PROPOSED LADDER DETAIL**  
3/4" = 1'-0"



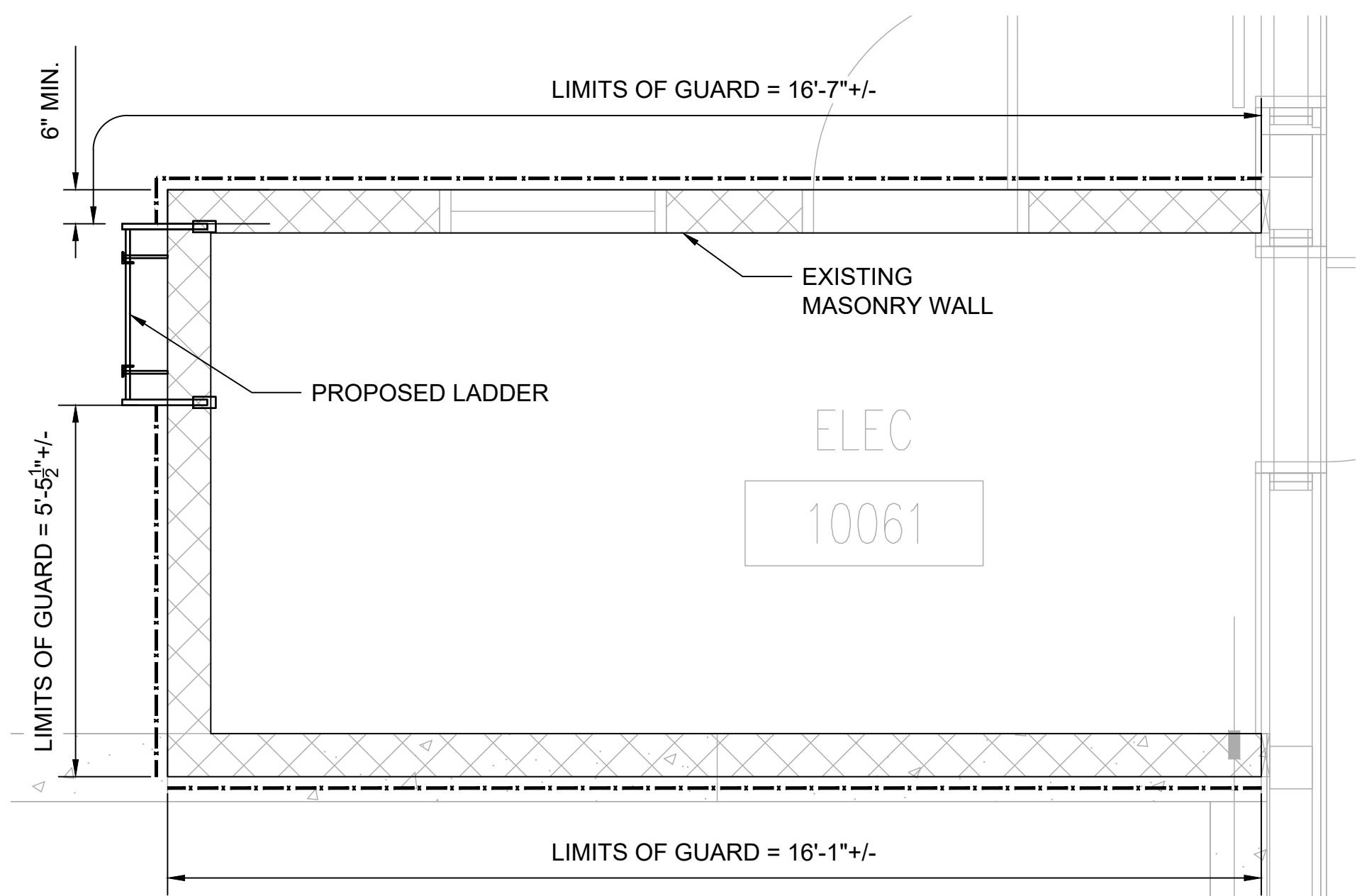
**2 SECTION F-F**  
3/4" = 1'-0"



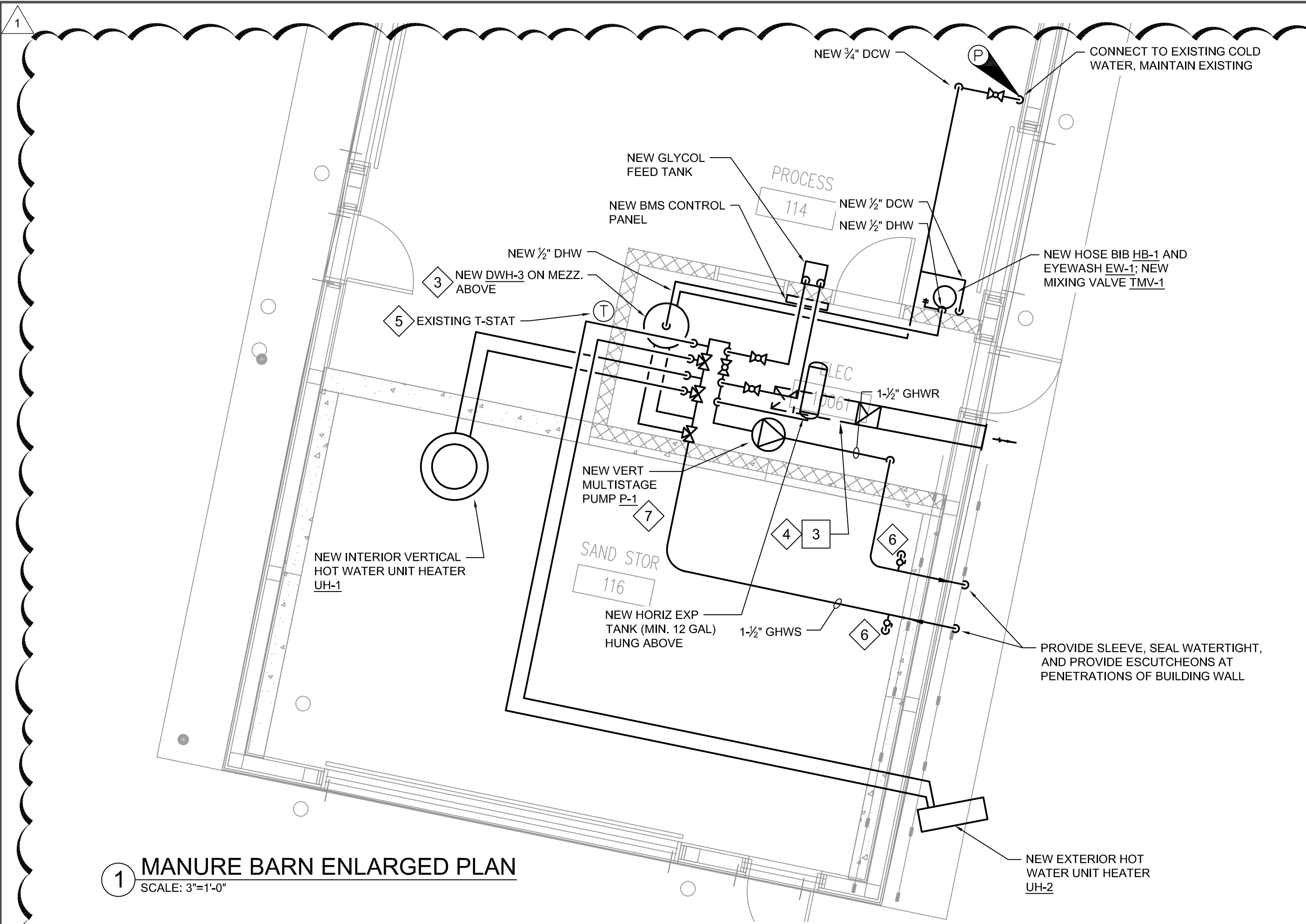
**3 TYPICAL SAFETY GUARD**  
3/4" = 1'-0"



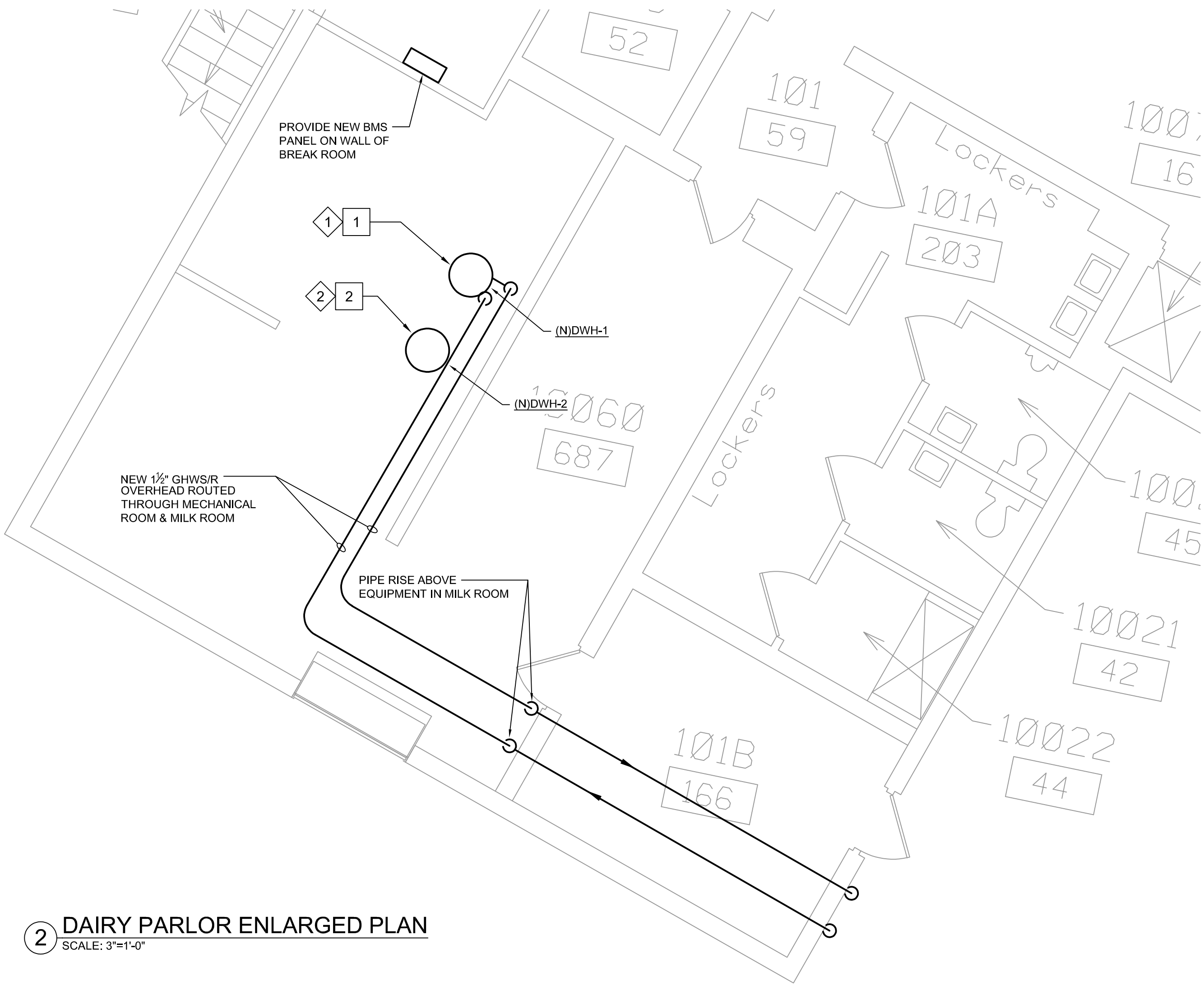
**4 SECTION G-G**  
3/4" = 1'-0"



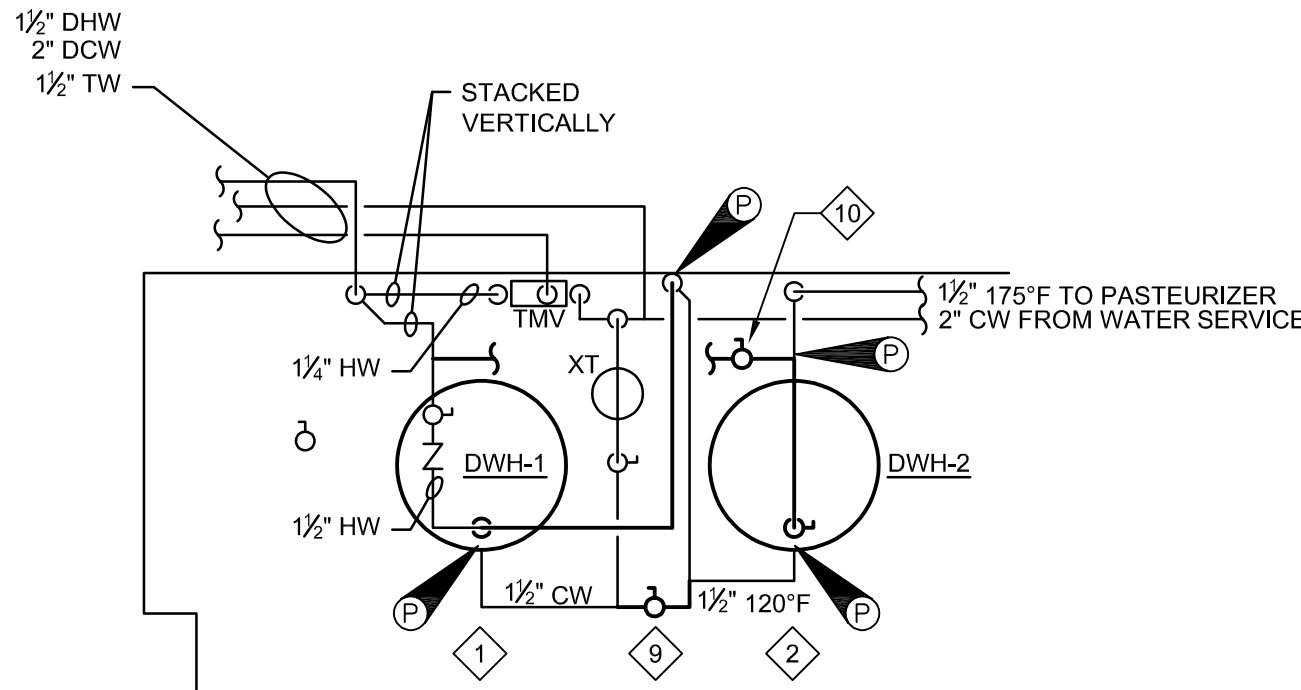
**5 SAFETY GUARD AND LADDER LAYOUT PLAN**  
3/4" = 1'-0"



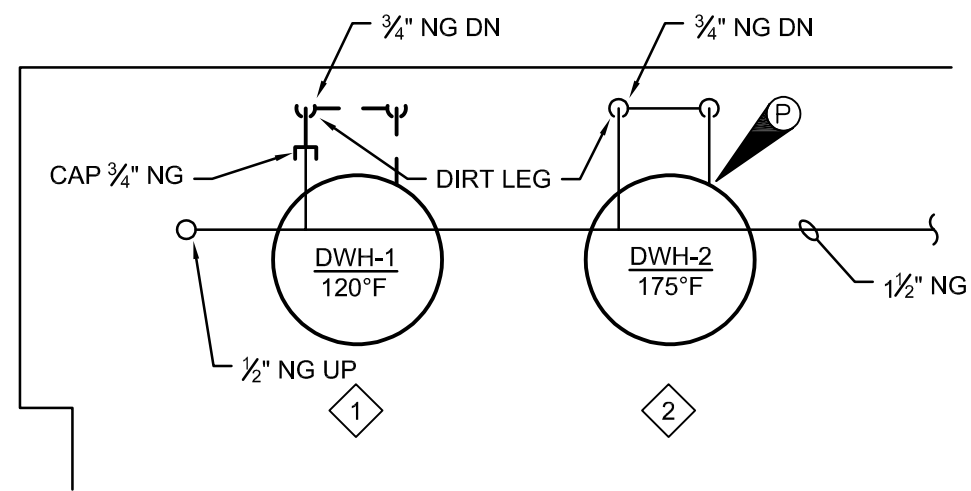
1 MANURE BARN ENLARGED PLAN  
SCALE: 3"=1'-0"



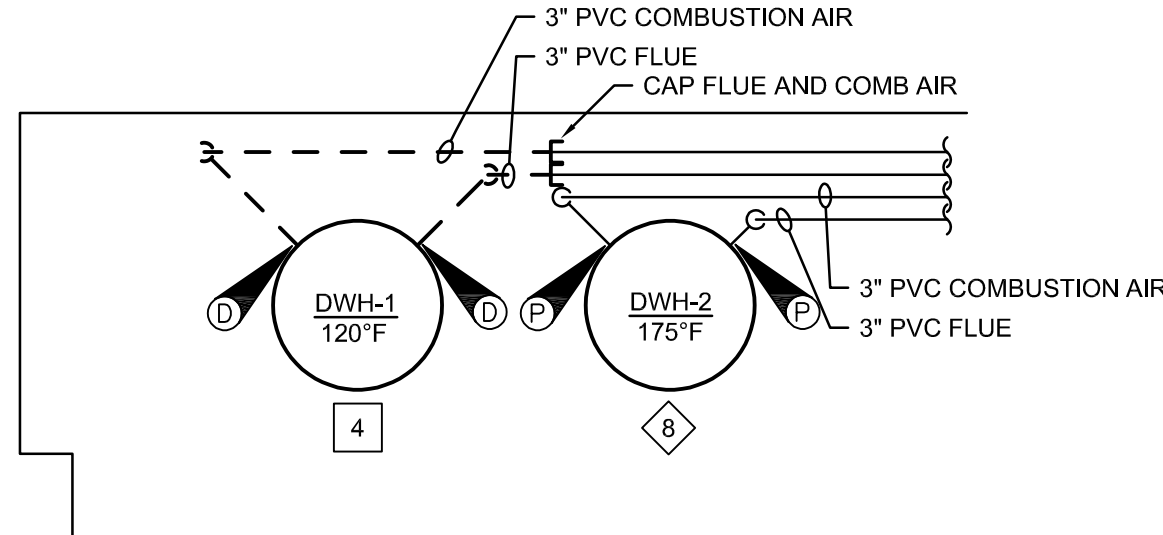
2 DAIRY PARLOR ENLARGED PLAN  
SCALE: 3"=1'-0"



3 CASCADING DWH'S DOMESTIC WATER PIPING DIAGRAM  
NO SCALE



4 CASCADING DWH'S NATURAL GAS PIPING DIAGRAM  
NO SCALE



5 CASCADING DWH'S EXHAUST FLUE DIAGRAM  
NO SCALE

DEMO NOTES:

- DEMOLISH AND REMOVE EXISTING GAS-FIRED DOMESTIC HOT WATER HEATER AND PREP WATER CONNECTIONS FOR RECONNECTION TO NEW, CAP NATURAL GAS AND VENT.
- DEMOLISH AND REMOVE EXISTING GAS-FIRED DOMESTIC HOT WATER HEATER AND PREP WATER CONNECTIONS, NATURAL GAS, AND VENT FOR RECONNECTION TO NEW, ACCESSORIES AND TRIM TO REMAIN AND BE RECONNECTED.
- REMOVE EXISTING EXHAUST GRILLE BELOW MEZZANINE AND CUT DUCTWORK BACK TO FAN, AS CLOSE AS IS PRACTICAL. RETAIN EXHAUST GRILLE AND PREP DUCT FOR REINSTALLATION.
- DISCONNECT FLUE AND COMBUSTION AIR DUCTS FROM DWH-1 AND CAP.

KEYED NOTES:

- PROVIDE NEW DWH-1 ON EXISTING PAD, RECONNECT DOMESTIC COLD WATER INLET AND DOMESTIC HOT WATER OUTLET IN THE SAME CONFIGURATION.
- PROVIDE NEW DWH-2 ON EXISTING PAD, RECONNECT DOMESTIC HOT WATER INLET, DOMESTIC HOT WATER OUTLET, AND NATURAL GAS INLET IN THE SAME CONFIGURATION.
- PROVIDE NEW DWH-3 ON MEZZANINE ABOVE MANURE SEPARATION CONTROL ROOM. PROVIDE SHEET METAL DRAIN/LEAK PAN AND SPOT DETECTOR WITH LOCAL ALARM.
- PROVIDE NEW DUCT ELBOW DOWN THROUGH MEZZANINE TO ROOM BELOW AND REINSTALL EXISTING EXHAUST GRILLE.
- RELOCATE EXISTING THERMOSTAT TO THE SOUTH, AS NEEDED TO INSTALL LADDER UP TO MEZZANINE.
- PROVIDE TEES WITH VALVE AND CAP.
- PROVIDE 2" PRE-ENGINEERED COMPOSITE EQUIPMENT PAD FOR PUMP. PROVIDE RUBBER VIBRATION PADS AND ANCHOR PUMP TO MEZZANINE.
- RE-CONNECT 3" FLUE AND COMBUSTION AIR DUCTS TO NEW DWH.
- PROVIDE 1-1/2" CW CONNECTION, WITH VALVE TO DWH-2. NORMALLY CLOSED.
- PROVIDE 1-1/2" HW CONNECTION FROM DWH-2 TO DWH-1 HW SUPPLY MAIN. CONNECTION TO SERVE AS BACKUP FOR DIGESTER HEAT FIRED DWH-1.

GENERAL NOTES:

- SEE MECHANICAL PIPING SCHEMATIC M-601 FOR PIPING CONTINUATION AND CONNECTIONS.
- ALL ABOVE GROUND, INDOOR AND OUTDOOR DOMESTIC WATER PIPING TO BE INSULATED AND PVC JACKETED WITH HEAT TRACED PER SPECIFICATION 220719.
- COORDINATE ALL SHUTDOWNS WITH OWNER.
- PROVIDE ISOLATION VALVES AT INLET AND OUTLET OF UNIT HEATERS.



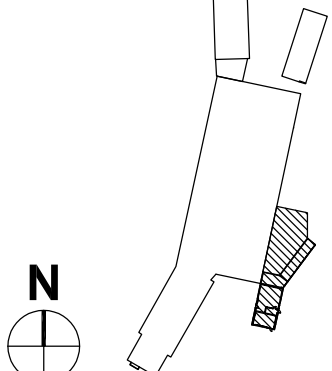
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KEY PLAN



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PROJECT #:	19640.08
DRAWN BY:	CAS
CHECKED BY:	BFW
SCALE:	AS NOTED

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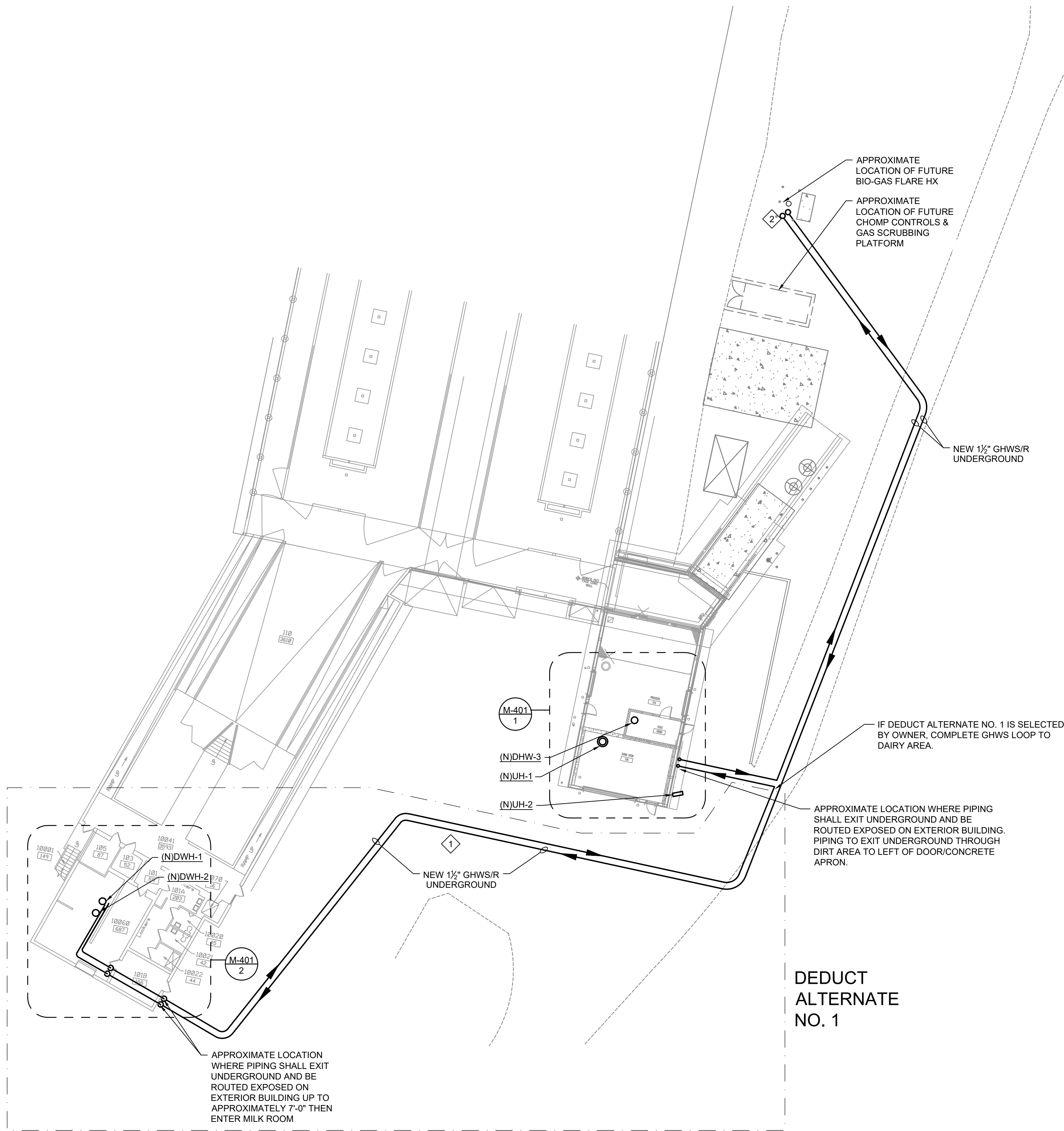
0 1

IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

MECHANICAL  
ENLARGED PLANS



1 MECHANICAL SITE PLAN  
SCALE: 1"=20'-0"



KEYED NOTES:

- NEW 1 1/2" GLYCOL HEATING-HOT-WATER SUPPLY AND RETURN (GHWS/R) PIPING UNDERGROUND AS INDICATED. STUB UP MIN. 12" ABOVE GROUND WITHIN 3' OF FUTURE BIO-GAS FLARE HEAT EXCHANGER LOCATION AND CAP FOR FUTURE USE. PRE-INSULATED BURIED PIPING SHALL BE A DELEGATED DESIGN TO THE MANUFACTURER. MANUFACTURER SHALL SUPPLY ALL THERMAL EXPANSION CALCULATIONS AND REQUIRED ANCHORING.
- 1 1/2" GHWS/R UP. FINAL CONNECTION TO BIOGAS FLARE BY OTHERS.

GENERAL NOTES:

- SEE MECHANICAL PIPING SCHEMATIC M-601 FOR PIPING CONTINUATION AND CONNECTIONS.
- ALL ABOVE GROUND, INDOOR AND OUTDOOR DOMESTIC WATER PIPING TO BE INSULATED AND PVC JACKETED WITH HEAT TRACED PER SPECIFICATION 220719.
- COORDINATE ALL SHUTDOWNS WITH OWNER.
- DEDUCT ALTERNATE NO. 1 INCLUDES ALL PIPING TO DAIRY AREA, DWH-1, DWH-2, AND ALL WORK ASSOCIATED WITH DAIRY SHOWN ON M-401.



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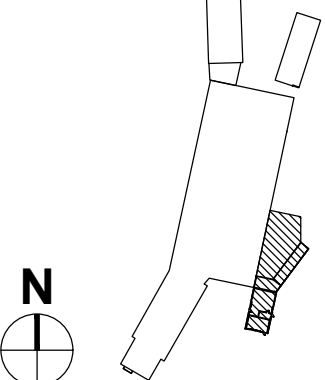
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CONSTRUCTION DOCUMENTS  
TEACHING DAIRY BARN EXPERIMENTAL  
ANAEROBIC DIGESTER ENABLING  
CORNELL UNIVERSITY  
ITHACA, NY 14850

KEY PLAN



DATE:	11/24/2025
PROJECT #:	19640.08
DRAWN BY:	ADK
CHECKED BY:	BFW
SCALE:	AS NOTED

VERIFY SCALE

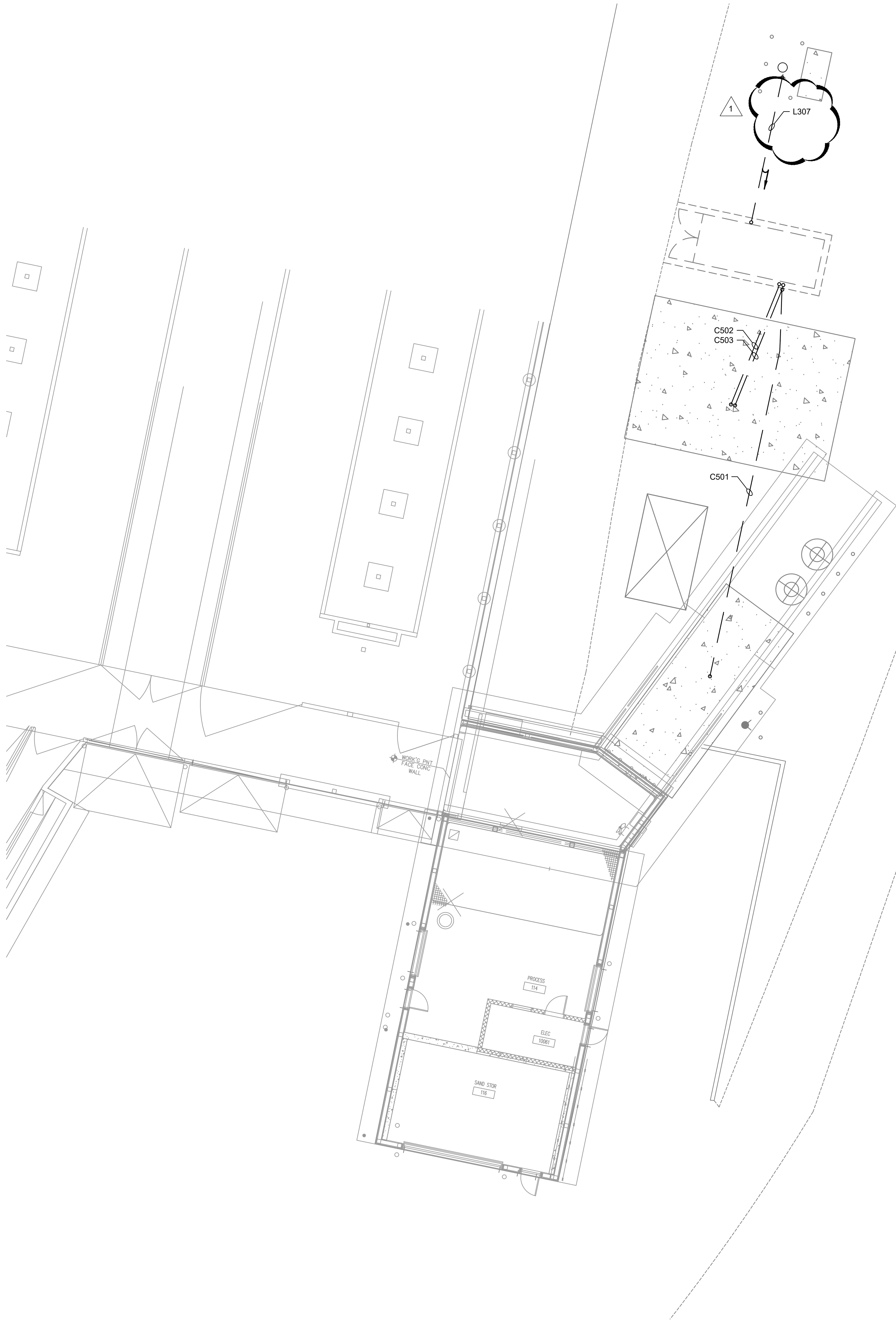
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0 1

IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

MECHANICAL  
SITE PLAN

M-101R



1 MECHANICAL SITE PLAN  
SCALE: 1"=10'-0"

UNDERGROUND MECHANICAL PROCESS PIPING SCHEDULE								
PIPE ID	SCHEDULE & MATERIAL	NOMINAL SIZE	INSULATION	FUTURE CONTENTS	BURIAL DEPTH	STUB-UP HEIGHT	SLOPE	DIRECTION
L307	HDPE FLEX TUBING	1-1/4"	-	BIO-GAS	SEE C-104	24"	2%	TO CONTAINER
C501	SCH. 40 PVC	4"	1"	(4) 1/2" PEX-A; GLYCOL HW	SEE C-104	24"	-	-
C502	SCH. 40 PVC	4"	1"	(4) 1/2" PEX-A; GLYCOL HW	SEE C-104	24"	-	-
C503	SCH. 40 PVC	4"	1"	(4) 1/2" PEX-A; GLYCOL HW	SEE C-104	24"	-	-

GENERAL NOTES:

- G1. PROVIDE UNDERGROUND PIPING PER SCHEDULE ABOVE. STUB UP MIN. 24" ABOVE GROUND AND CAP FOR FUTURE USE.
- G2. SEE STRUCTURAL DRAWING S-101 AND S-102 FOR EXACT STUB UP LOCATIONS/DIMENSIONS IN CONCRETE PADS.
- G3. SEE SUPPLEMENTAL INFORMATION FOR FUTURE CONTAINER DRAWING



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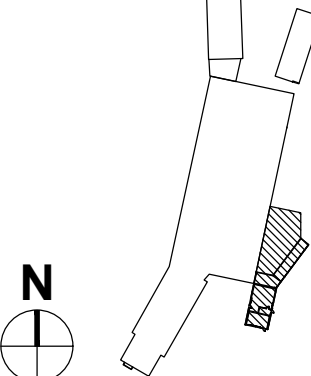
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KEY PLAN



DATE:	11/24/2025
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SCALE:	AS NOTED

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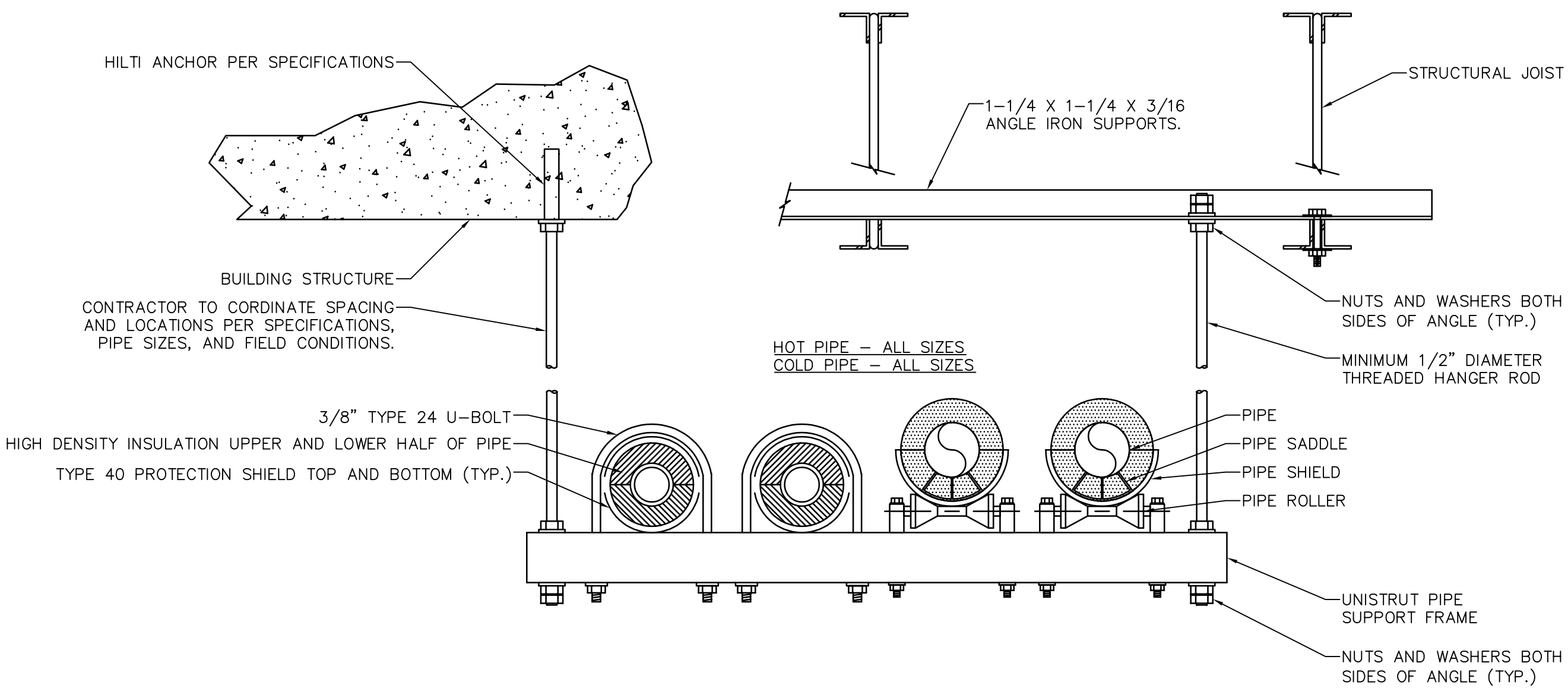
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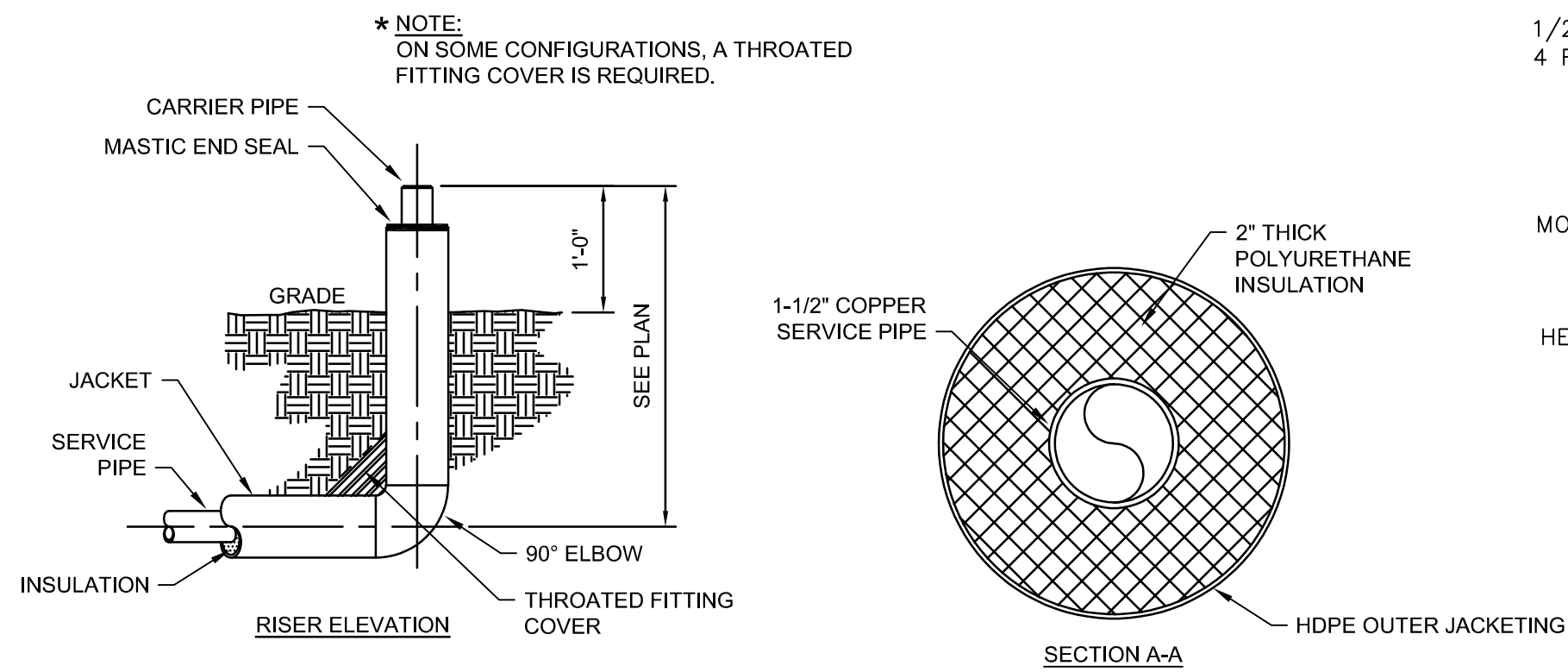
IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

MECHANICAL  
PROCESS PIPING  
PLAN

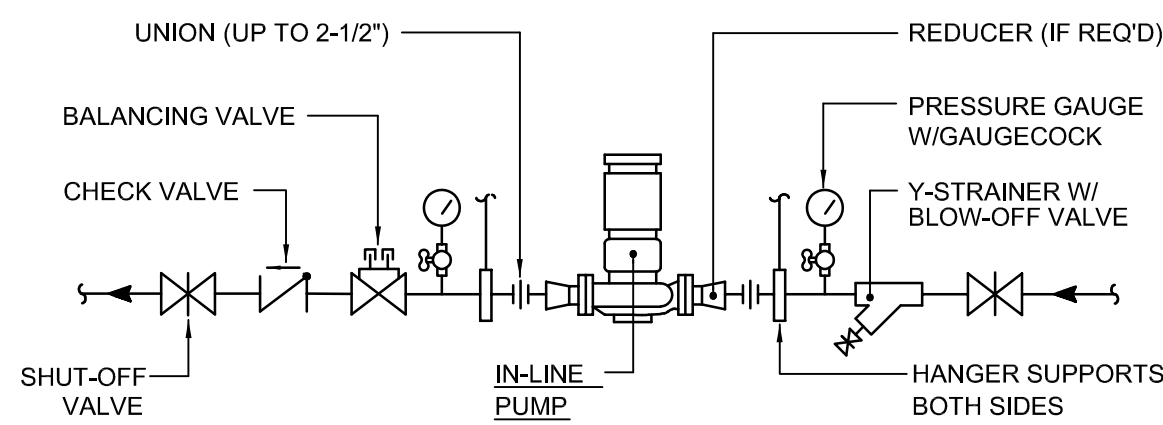
M-102R



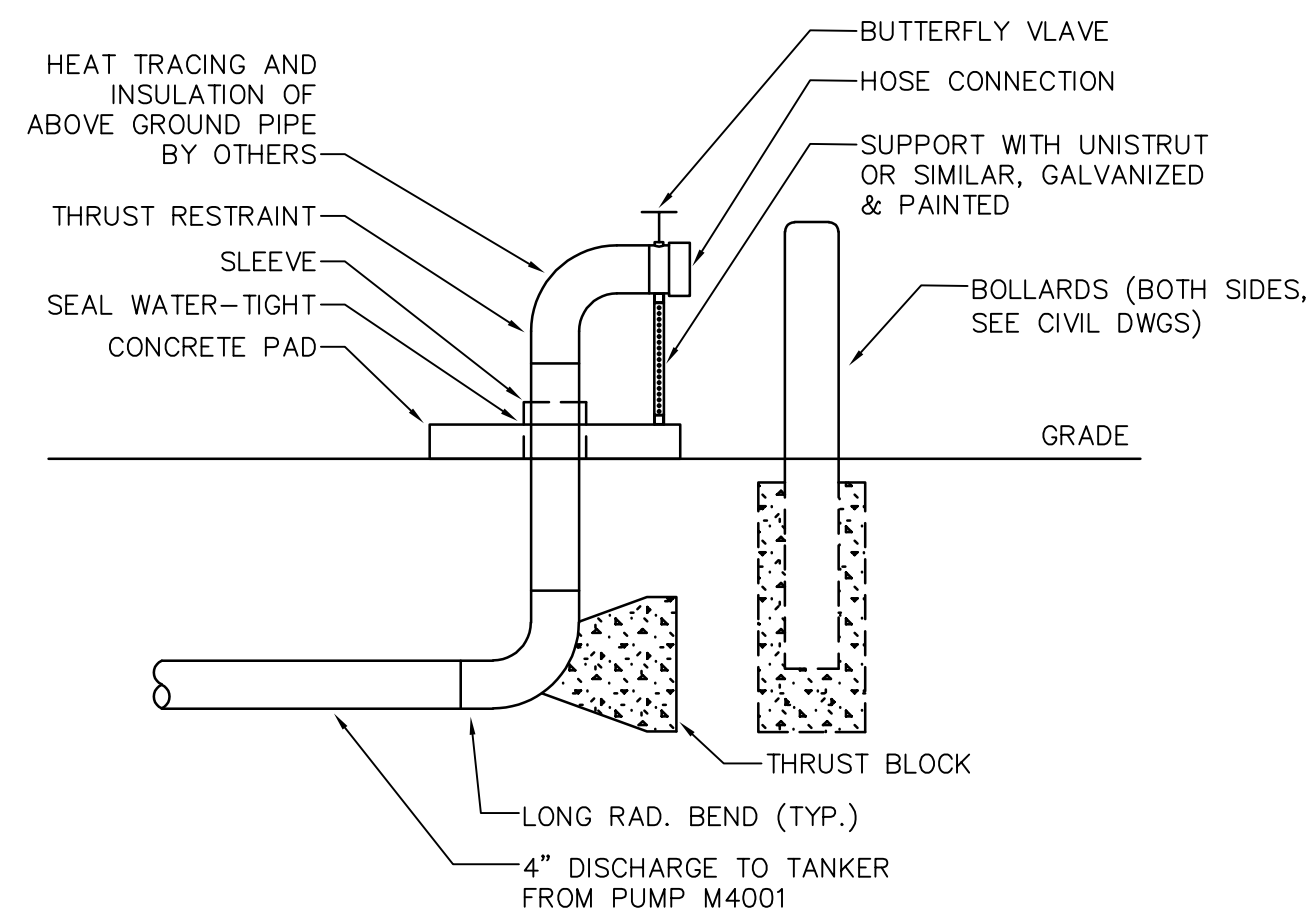
1 TRAPEZE PIPE SUPPORT DETAIL FOR MULTIPLE PIPING SYSTEMS  
SCALE: NONE



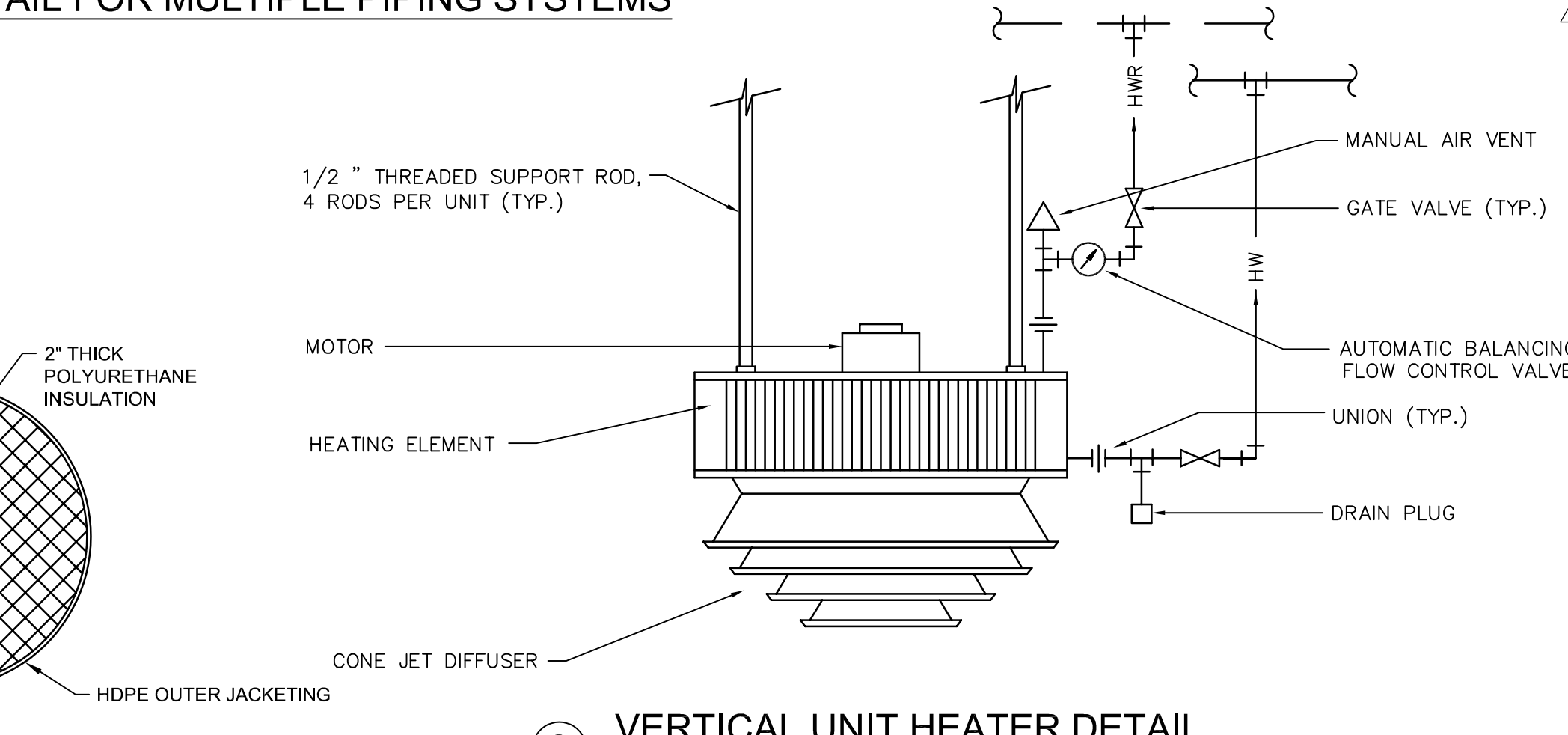
2 UNDERGROUND PRE-INSULATED PIPE DETAIL  
SCALE: NONE



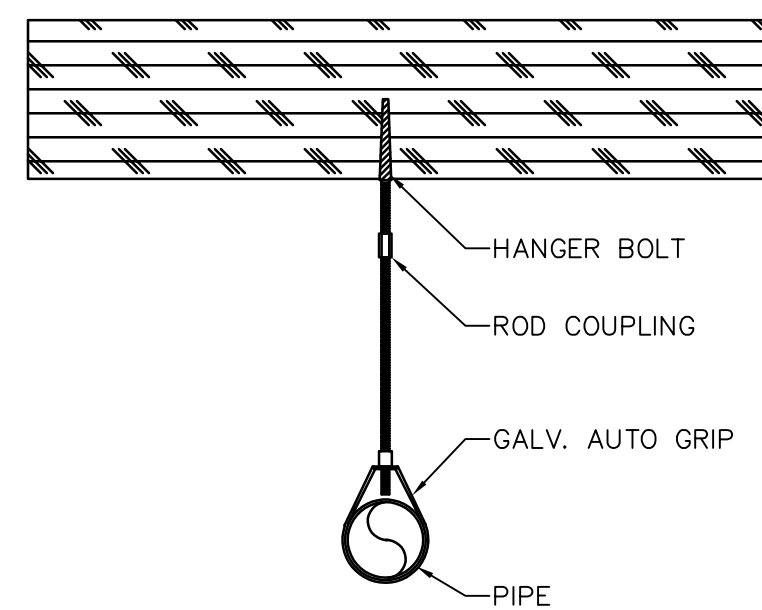
4 UNDERGROUND PRE-INSULATED PIPE DETAIL  
SCALE: NONE



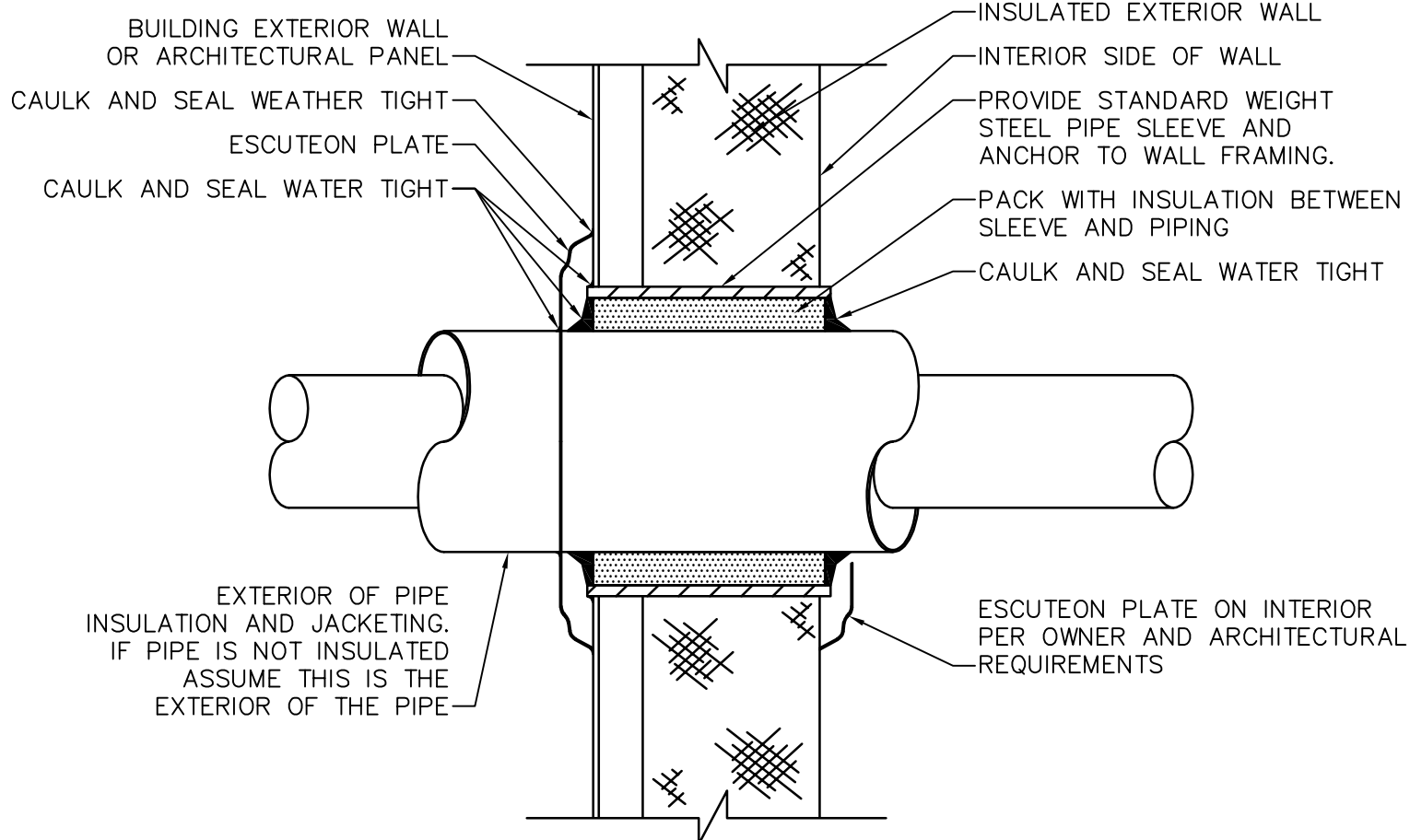
7 TANKER CONNECTION DETAIL  
SCALE: NONE



3 VERTICAL UNIT HEATER DETAIL  
SCALE: NONE



5 HANGER BOLT ANCHOR DETAIL  
SCALE: NONE



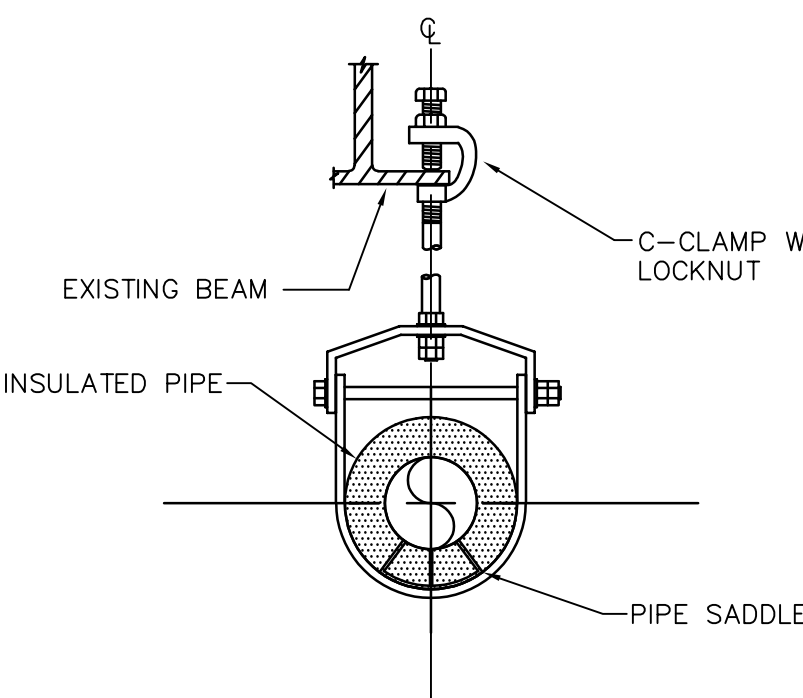
8 EXTERIOR WALL SLEEVE DETAIL  
SCALE: NONE

WATER HEATER SCHEDULE																
EQUIPMENT TAG	BASIS OF DESIGN			LOCATION	SERVICE	WORKING FLUID	FLOW (GPM)	WPD (FT)	STORAGE (GAL)	DOMESTIC WATER		RECOVERY (GPH)	GAS INPUT MAX (MBH)	ELECTRICAL	NOTES	
	MANUFACTURER	MODEL	TYPE							EWT (°F)	LWT (°F)			V/PH/Hz		
DWH-1	LOCHINVAR	SQUIRE SIT065	INDIRECT	SEE PLAN	DOMESTIC HOT WATER PRE-HEAT	40% GLYCOL	14	5.7	67	50	140	-	-	-	1	
DWH-2	AO SMITH	BTH 150 100	GAS-FIRED	MILKING PARLOR MECHANICAL ROOM	DOMESTIC HOT WATER POST-HEAT	-	-	-	100	140	180	170.9	150	120/1/60	1, 2	
DWH-3	LOCHINVAR	SQUIRE SIT030	INDIRECT	SEE PLAN	DOMESTIC HOT WATER PRE-HEAT	40% GLYCOL	14	3.9	27	50	140	-	-	-	1	
NOTES:																
1. PROVIDE T&P RELIEF VALVE PIPED TO SAFE POINT OF DISCHARGE																
2. PROVIDE HEAT TRAPS ON WATER CONNECTIONS																

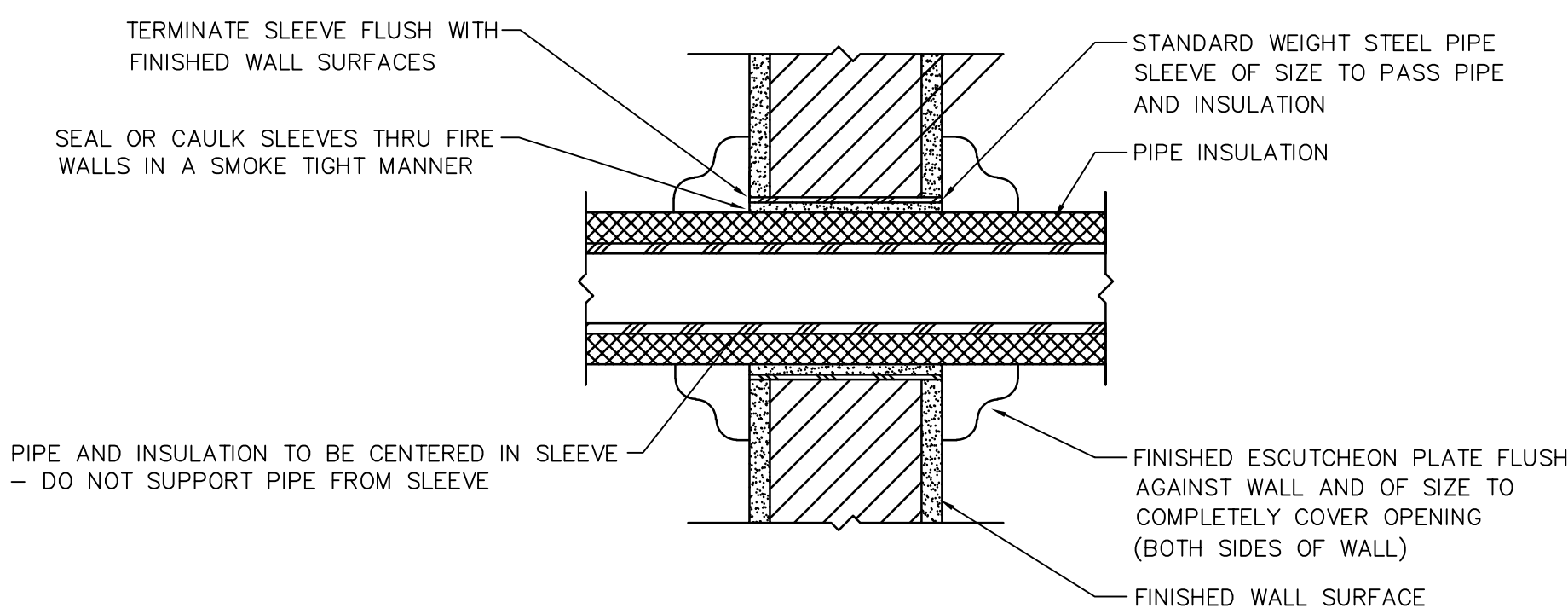
FIXTURE TAG	FIXTURE	PLUMBING CONNECTION SIZES (IN.)				MOUNTING HEIGHT (IN.)	DESCRIPTION
		WASTE	VENT	COLD WATER	HOT WATER		
HB-1	HOSE BIB	-	-	-	1/2	18	1. NIBCO T-585-70-HC, TWO-PIECE BRONZE BALL VALVE - THREADED AND HOSE CONNECTIONS 2. ASSE 1015 DOUBLE CHECK BACKFLOW PREVENTER
EW-1	EYEWASH	1-1/4	-	1/2	1/2	36	1. GUARDIAN G1750BC EYE/FACE WASH, WALL MOUNTED, STAINLESS STEEL BOWL AND COVER 2. WATTS E5150 EXPOSED SUPPLY FIXTURE - HYDROGUARD XP SERIES FOR EYE/FACE WASH. ASSE 1071 COMPLIANT 3. 1-1/4 WASTE OUTLET TO BE INDIRECT DRAINED TOWARDS GRATED PIT 4. UNIT SHOULD BE INSTALLED SO THAT WATER FLOW PATTERN IS POSITIONED BETWEEN 33° AND 53° ABOVE FLOOR.

EQUIPMENT TAG	BASIS OF DESIGN		TYPE PUMP	SERVICE	FLUID TEMP (°F)	FLUID FLOW (GPM)	TOTAL HEAD (FT)	MOTOR				NOTES
	MANUFACTURER	MODEL						ENCLOSURE	HP	RPM	V/PH/Hz	
P-1	XYLEM	3SV5GC4F60 1-22SV	VERT MULTISTAGE	GLYCOL HW LOOP	170	17	85	TEPE	1	3500	460/3/60	
<b>NOTES:</b> 1. PUMP SHALL BE ENABLED TO RUN WHENEVER DIGESTER FLARE IS ACTIVE. COORDINATE CONTROL SIGNAL CONNECTION TO BMS WITH OTHER DIGESTIVE SUPPLIER.												

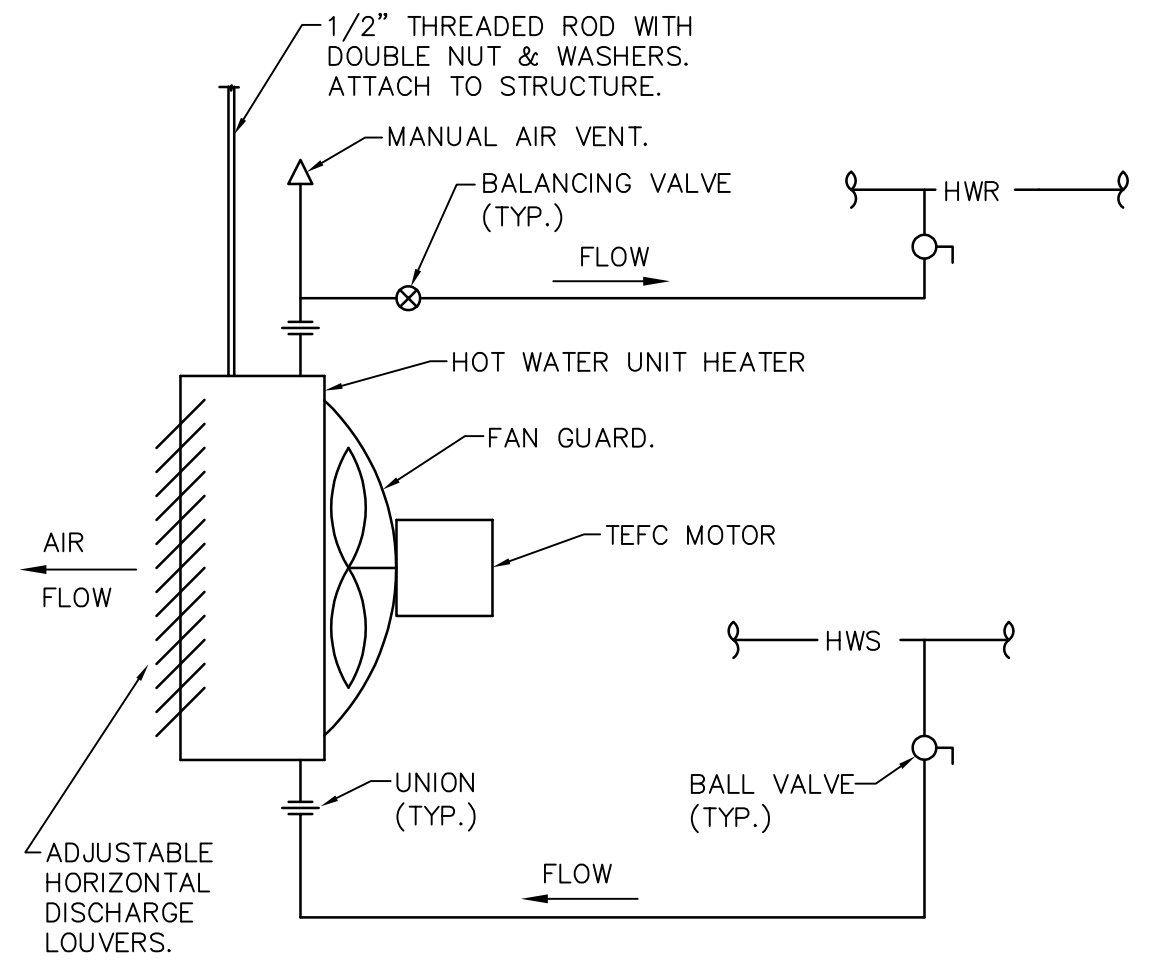
EQUIPMENT TAG	BASIS OF DESIGN		SERVICE	TYPE	CFM	HOT WATER COIL					ELECTRICAL		NOTES
	MANUFACTURER	MODEL				MBH	GPM	WPD	EWT (°F)	LWT (°F)	HP	V/PH/Hz	
UH-1	MODINE	V/VN 212	SAND DRYING	VERTICAL HW	3,610	161.7	16.8	1.5	180	160	1/3	115/1/60	1
UH-2	MODINE	HSB 258	EMERGENCY HEAT REJECTION	HORIZONTAL HW	4,560	201.9	21	5.7	180	160	1/2	115/1/60	1
<b>NOTES:</b> 1. CONTROLLED VIA BMS SIGNAL TO MOTOR STARTER													



6 CLEVIS HANGER WITH INS. SADDLE DETAIL  
SCALE: NONE



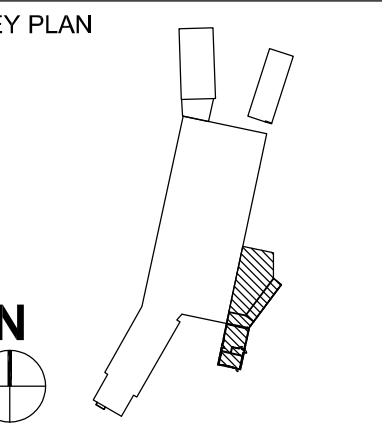
9 PIPE SLEEVE THRU INTERIOR WALL  
SCALE: NONE



10 HORIZONTAL HOT WATER UNIT HEATER PIPING  
SCALE: NONE



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1	ADDENDUM NO. 1	11/24/25



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PROJECT #:	19640.08
DRAWN BY:	ADK
CHECKED BY:	BFW
SCALE:	NONE

#### VERIFY SCALE

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IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

MECHANICAL DETAILS AND SCHEDULES

M-500R



SEQUENCE OF OPERATION:

WHEN A RUN SIGNAL IS RECEIVED FROM THE FLARE CONTROL SYSTEM THE SYSTEM SHALL RUN CONTINUOUSLY. THE SYSTEM PUMP SHALL RUN UNTIL RUN SIGNAL IS NO LONGER PRESENT.

THE SYSTEM BYPASS VALVES SHALL MODULATE TO MAINTAIN A 20 DEG. F TEMPERATURE DIFFERENCE BETWEEN THE HEATING HOT WATER SUPPLY AND RETURN WITH THE FOLLOWING PRIORITY;

1. MILKING PARLOR DOMESTIC HOT WATER PRODUCTION (DWH-1)
2. MANURE SEPARATION SHED DOMESTIC HOT WATER PRODUCTION (DWH-3)
3. SAND SHED SAND DRYING UNIT HEATER (UH-1)
4. HEAT REJECTION UNIT HEATER (UH-2)

THE MILKING PARLOR DOMESTIC HOT WATER HEATER (DWH-1) BYPASS VALVE SHALL MODULATE TO MAINTAIN A TANK TEMPERATURE SET-POINT OF 140 DEG. F (ADJ.).

THE MANURE SEPARATION SHED DOMESTIC HOT WATER HEATER (DWH-3) BYPASS VALVE SHALL MODULATE TO MAINTAIN THE MANURE SEPARATION SHED DOMESTIC HOT WATER TANK TEMPERATURE SET-POINT OF 140 DEG. F (ADJ.). THE BYPASS VALVE SHALL MODULATE OPEN ONLY WHEN THE DWH-1 BYPASS VALVE IS FULLY OPEN AND THE 20 DEG. F. DIFFERENCE BETWEEN SUPPLY AND RETURN TEMPERATURE IS NOT SATISFIED, OR WHEN THE DWH-1 BYPASS VALVE IS CLOSED BECAUSE THE TANK TEMPERATURE SET-POINT IS SATISFIED.

THE SAND SHED SAND DRYING UNIT HEATER (UH-1) BYPASS VALVE SHALL MODULATE OPEN ONLY WHEN THE DWH-3 BYPASS VALVE IS FULLY OPEN AND THE 20 DEG. F. DIFFERENCE BETWEEN SUPPLY AND RETURN TEMPERATURE IS NOT SATISFIED, OR WHEN BOTH THE DWH-1 AND DWH-3 BYPASS VALVES ARE CLOSED BECAUSE THE TANK TEMPERATURE SET-POINTS ARE SATISFIED

AS THE HEATING HOT WATER RETURN TEMPERATURE BEGINS TO FALL BELOW THE 20 DEG. F DIFFERENCE, THE BYPASS VALVES SHALL START MODULATING CLOSED IN REVERSE PRIORITY.

IF THE SAND SHED SPACE TEMPERATURE EXCEEDS 100 DEG. F (ADJ.), THE INDOOR UNIT HEATER SHALL BE LOCKED OUT AND THE OUTDOOR HEAT REJECTION UNIT HEATER SHALL BE ENABLED.

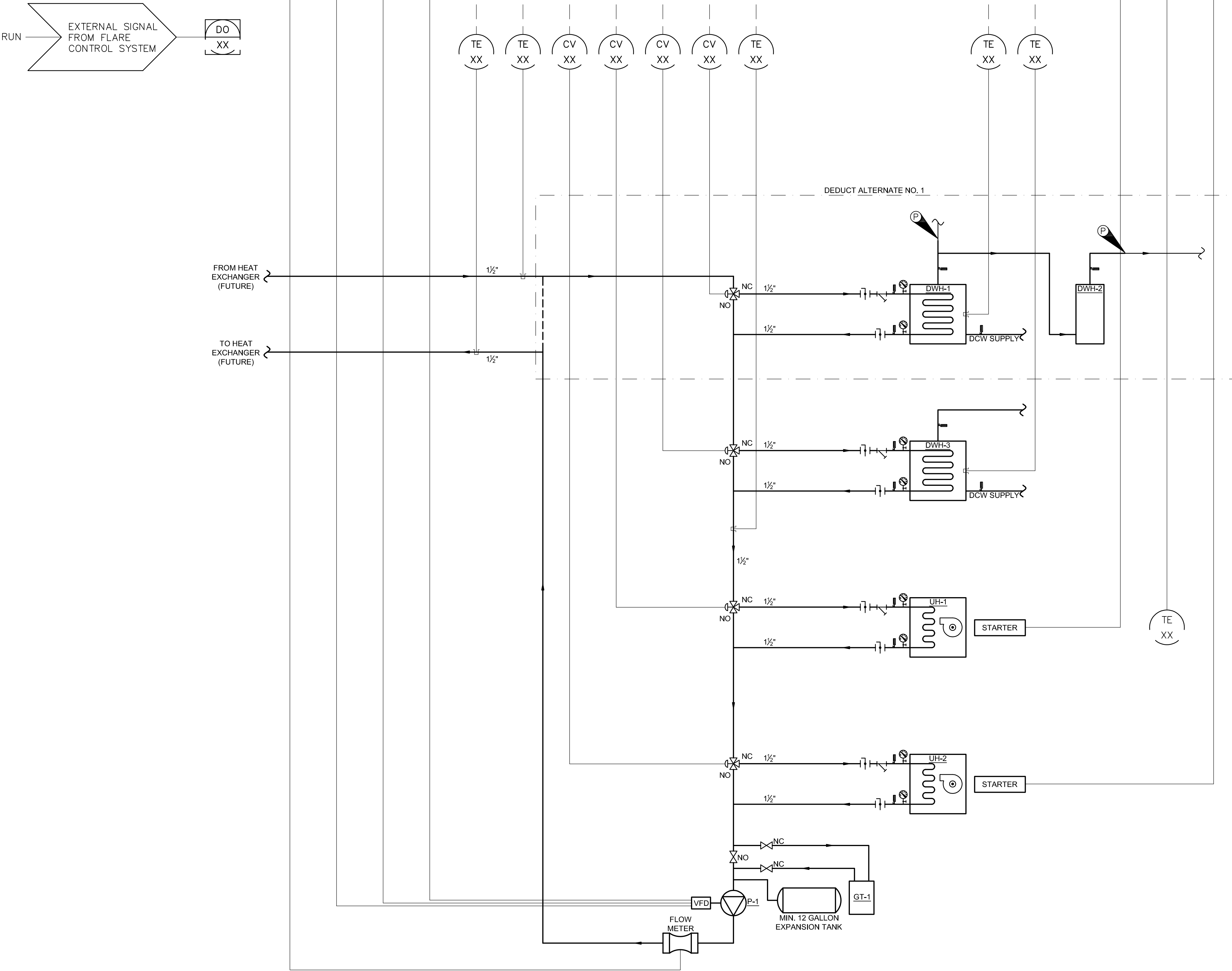
IF THE HEATING HOT WATER SUPPLY TEMPERATURE EXCEEDS 185 DEG. F (ADJ.) ALL BYPASS VALVES SHALL MODULATE OPEN AND ALARM SHALL BE GENERATED.

TRENDING:

THE BMS SHALL MONITOR AND TREND THE SUPPLY AND RETURN GLYCOL WATER TEMPERATURES TO AND FROM THE FLARE AND ALSO TREND THE FLOW SIMULTANEOUSLY. THE BMS SHALL CALCULATE ENERGY SAVED BASED ON THE FLOW AND TEMPERATURE DIFFERENTIAL. ASSUMING 40% PROPYLENE GLYCOL FLUID.

GENERAL CONTROLS NOTES:

1. PROVIDE A NEW BUILDING MANAGEMENT SYSTEM TO CONTROL, MONITOR, ALARM AND TREND THE NEW MECHANICAL SYSTEMS.
2. PROVIDE A NEW CONTROL PANEL IN THE MANURE SEPARATION SHED, SEE M-101 FOR EXACT LOCATION. SEE E-101 FOR POWER AND DATA CONNECTIONS.
3. PROVIDE A NEW CONTROL PANEL IN THE MILKING PARLOR MECHANICAL ROOM, SEE M-101 FOR EXACT LOCATION. SEE E-101 FOR POWER AND DATA CONNECTIONS.
4. PROVIDE FULL SIZE, 3-WAY, FULLY MODULATING, 24V POWERED CLOSED, BYPASS VALVES.
5. VFD IS UTILIZED TO BALANCE SYSTEM FLOW DURING STARTUP AND TAB. PUMP TO BE BALANCE TO PROVIDE DESIGN GPM. IF DEDUCT ALTERNATE NO. 1 IS SELECTED, THE VFD SPEED SHALL BE ADJUSTED LOWER TO PROVIDE DESIGN FLOW.



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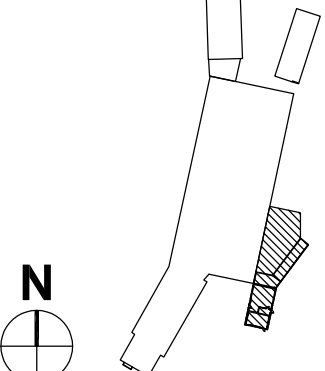
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CONSTRUCTION DOCUMENTS  
**TEACHING DAIRY BARN EXPERIMENTAL ANAEROBIC DIGESTER ENABLING**  
CORNELL UNIVERSITY  
ITHACA, NY 14850

KEY PLAN



DATE:	11/24/2025
PROJECT #:	19640.08
DRAWN BY:	ADK
CHECKED BY:	BFW
SCALE:	NONE

VERIFY SCALE

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MECHANICAL PIPING AND CONTROLS SCHEMATIC



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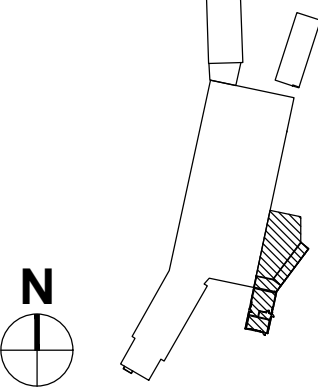
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ITHACA, NY 14850

KEY PLAN



DATE:	11/24/2025
PROJECT #:	19640.08
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CHECKED BY:	BRW
SCALE:	AS NOTED

**VERIFY SCALE**

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IF BAR IS NOT ONE (1) INCH LONG,  
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ELECTRICAL  
SITE PLAN

**E-101R**

**GENERAL NOTES:**

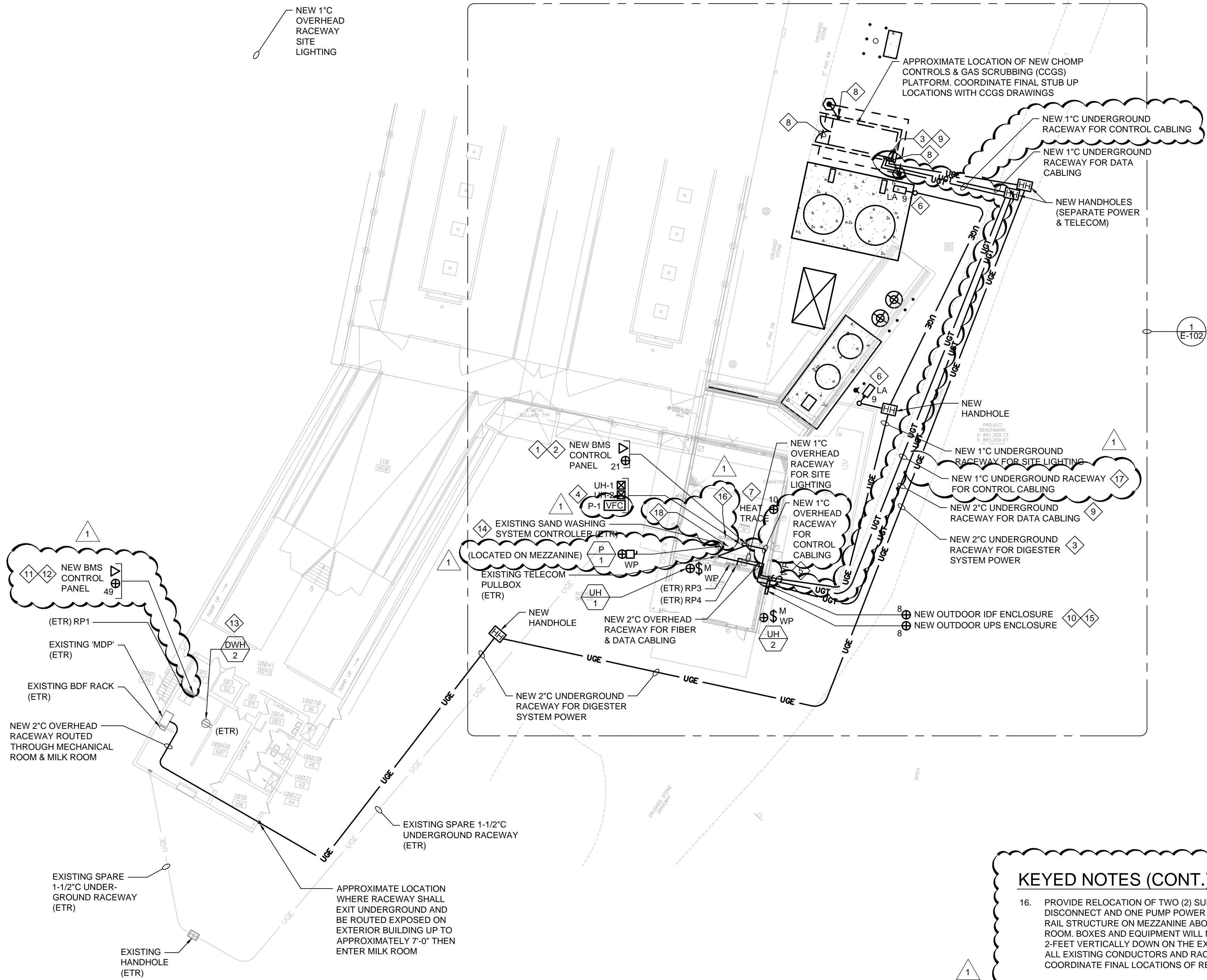
- UTILIZE EMT RACEWAY WHEN ROUTING WITHIN THE CONDITIONED MANURE SEPARATION SHED MECHANICAL ROOM AND SCH. 40 PVC RACEWAY WHEN ROUTING OUTSIDE OF THE MECHANICAL ROOM WITHIN THE SHED.
- REFER TO DRAWING E-102 FOR ADDITIONAL UNDERGROUND CONDUIT THAT SHALL BE FURNISHED AND INSTALLED BY THIS CONTRACTOR FOR THE FUTURE CHOMP CONTROLS & GAS SCRUBBING (CCGS) SYSTEM.
- UTILIZE 2#12, 1#12 GND IN 1" FOR SITE LIGHTING BRANCH CIRCUITING.
- REFER TO "ELECTRIC EQUIPMENT AND CONTROL SCHEDULE" ON DRAWING E-500 FOR MECHANICAL EQUIPMENT POWER AND CONTROL REQUIREMENTS.
- REFER TO DETAIL 5/E-500 FOR ELECTRICAL UNDERGROUND DUCTBANK REQUIREMENTS.
- PROVIDE HANDHOLES WHERE SHOWN. ALL HANDHOLES SHALL BE TRAFFIC RATED (H-20).
- ALL EXTERIOR RACEWAYS ENTERING A BUILDING ABOVE GRADE SHALL TRANSITION FROM PVC TO RGS CONDUIT BEFORE EXITING GROUND. REFER TO DETAIL 3/E-500 FOR ADDITIONAL REQUIREMENTS.

**KEYED NOTES:**

- PROVIDE 120V BRANCH CIRCUIT, FED FROM SPARE 20A-1P CIRCUIT BREAKER (CKT. 21) IN PANELBOARD 'RP4', TO A NEW BMS CONTROL PANEL IN THE MANURE SEPARATION SHED MECHANICAL ROOM.
- PROVIDE CAT 6A DATA OUTLET CONSISTING OF ONE (1) DATA JACK AND ONE (1) CAT 6A OSP CABLE, ROUTED IN 1" C, BACK TO PATCH PANEL IN NEW OUTDOOR IDF ENCLOSURE FOR NEW BMS CONTROL PANEL.
- PROVIDE 480/277V, 3-PHASE, FEEDER TO LOCATION OF FUTURE CCGS PLATFORM. RACEWAY SHALL BE STUBBED UP 24" ABOVE GRADE AT THE LOCATION SHOWN AND THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 30-FEET OF COILED CONDUCTORS TO ALLOW FOR FINAL TERMINATIONS TO THE CCGS PLATFORM BY A FUTURE CONTRACTOR. REFER TO PARTIAL ONE-LINE DIAGRAM (1/E-500) FOR 3-PHASE FEEDER REQUIREMENTS.
- LOCATE UNIT HEATER MANUAL MOTOR CONTROLLERS WITH RELAYS AND PUMP VARIABLE FREQUENCY MOTOR CONTROLLER WITHIN MANURE SEPARATION SHED MECHANICAL ROOM. COORDINATE EXACT LOCATIONS WITH EXISTING EQUIPMENT WITHIN MECHANICAL ROOM.
- PROVIDE NEMA 3R TOGGLE SWITCH ON EXTERIOR OF BUILDING TO ALLOW FOR MANUAL CONTROL OF NEW POLE MOUNTED LUMINAIRES. LUMINAIRES WILL BE PROVIDED WITH INTEGRAL PHOTOCELLS TO KEEP LUMINAIRES OFF IF ENOUGH SUNLIGHT IS PRESENT.
- PROVIDE NEW SITE LIGHTING LUMINAIRES AND ASSOCIATED POLES & POLE BASES. LUMINAIRES SHALL BE FED FROM A NEW 20A-1P CIRCUIT BREAKER (CKT. 9) IN PANELBOARD 'RP4'. PROVIDE CIRCUIT BREAKER TO MATCH EXISTING PANELBOARD CONSTRUCTION (GE A-SERIES II) AND KAIC RATING. REFER TO DETAIL 2/E-500 FOR POLE BASE REQUIREMENTS.
- PROVIDE 120V BRANCH CIRCUIT FOR NEW WATER PIPING HEAT TRACE. HEAT TRACE SHALL BE FED FROM A NEW 20A-1P, 30 mA trip, GROUND FAULT EQUIPMENT PROTECTION (GFPE) TYPE BREAKER (CKT. 10) IN PANELBOARD 'RP4'. PROVIDE CIRCUIT BREAKER TO MATCH EXISTING PANELBOARD CONSTRUCTION (GE A-SERIES II) AND KAIC RATING.
- PROVIDE GROUND GRID AROUND FUTURE CCGS PLATFORM CONSISTING OF TWO (2) 5/8" DIA X 8'-0" GROUND RODS AND BARE #4/0 GROUND WIRE. PROVIDE STUBBED-UP RACEWAYS AT THE LOCATIONS SHOWN (24" ABOVE GRADE) WITH A MINIMUM OF 30-FEET OF COILED WIRE TO ALLOW FOR FINAL TERMINATIONS TO THE CCGS PLATFORM BY A FUTURE CONTRACTOR. THE GROUND WIRE STUB-UP ADJACENT TO THE CCGS 3-PHASE FEEDER SHALL BE USED TO GROUND THE CCGS PANELBOARD, WHILE THE GROUND STUB-UP ON THE OPPOSITE SIDE OF THE PLATFORM SHALL BE USED TO BOND THE PLATFORM ITSELF TO GROUND.
- PROVIDE A SINGLE CAT 6A OUTSIDE PLANT (OSP) DATA CABLE, ROUTED IN A 2" C RACEWAY, FROM PATCH PANEL IN NEW OUTDOOR IDF ENCLOSURE TO LOCATION OF FUTURE CCGS PLATFORM. RACEWAY SHALL BE STUBBED UP 24" ABOVE GRADE AT THE LOCATION SHOWN AND THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 30-FEET OF COILED DATA CABLE TO ALLOW FOR FINAL TERMINATIONS TO THE CCGS PLATFORM BY A FUTURE CONTRACTOR.
- INSTALL NEW OUTDOOR IDF ENCLOSURE AND ASSOCIATED UPS ENCLOSURE (BOTH FURNISHED BY CORNELL CIT) ON EXTERIOR OF MANURE SEPARATION SHED. PROVIDE COMMON 120V BRANCH CIRCUIT TO FEED BOTH THE IDF ENCLOSURE AND UPS ENCLOSURE. CIRCUIT SHALL BE FED FROM A NEW 20A-1P CIRCUIT BREAKER (CKT. 8) IN PANELBOARD 'RP4'. PROVIDE CIRCUIT BREAKER TO MATCH EXISTING PANELBOARD CONSTRUCTION (GE A-SERIES II) AND KAIC RATING. CORNELL CIT WILL FURNISH AND INSTALL ALL REQUIRED FIBER OPTIC CABLES FROM THE EXISTING BDF IN THE MILKING PARLOR MECHANICAL ROOM TO THE NEW OUTDOOR IDF.
- DEDUCT ALTERNATE NO. 1: PROVIDE CAT 6A DATA OUTLET CONSISTING OF ONE (1) DATA JACK AND ONE (1) CAT 6A CABLE, ROUTED IN 1" C, BACK TO PATCH PANEL IN EXISTING BDF RACK IN MILKING PARLOR MECHANICAL ROOM FOR NEW BMS CONTROL PANEL.
- DEDUCT ALTERNATE NO. 1: PROVIDE 120V BRANCH CIRCUIT, FED FROM NEW 20A-1P CIRCUIT BREAKER (CKT. 49) IN PANELBOARD 'RP1', TO A NEW BMS CONTROL PANEL IN THE MILKING PARLOR. PROVIDE U.L. LISTED CIRCUIT BREAKER TO MATCH EXISTING PANELBOARD CONSTRUCTION (GE A-SERIES II) AND KAIC RATING.
- DEDUCT ALTERNATE NO. 1: NEW 120V GAS-FIRED WATER HEATER 'DWH-2' SHALL PLUG INTO EXISTING DUPLEX RECEPTACLE LEFT AFTER REMOVAL OF PREVIOUS PLUG-IN GAS-FIRED DOMESTIC WATER HEATERS IN MILKING PARLOR MECHANICAL ROOM. CONTRACTOR SHALL PROVIDE 12/3 SJO CORD WITH NEMA 5-15 PLUG AND WIRE TO NEW WATER HEATER.
- PROVIDE NEW CAT 6A OSP CABLE FROM EXISTING SAND WASHING CONTROLLER TO PATCH PANEL IN NEW OUTDOOR IDF ENCLOSURE. CORNELL CIT SHALL REMOVE EXISTING DATA CABLE CONNECTED TO CONTROLLER AND ASSIST IN CONNECTION OF NEW CABLE.
- PROVIDE 2#12, 1#12 GND IN 3/4" (RGS) FROM UPS IN UPS ENCLOSURE TO PRE-INSTALLED RECEPTACLE IN IDF ENCLOSURE.

**KEYED NOTES (CONT.):**

- PROVIDE RELOCATION OF TWO (2) SURFACE MOUNTED JUNCTION BOXES, ONE (1) DISCONNECT AND ONE PUMP POWER CONNECTION TO ACCOMMODATE NEW GUARD RAIL STRUCTURE ON MEZZANINE ABOVE MANURE SEPARATION SHED MECHANICAL ROOM. BOXES AND EQUIPMENT WILL NEED TO BE RELOCATED APPROXIMATELY 2-FEET VERTICALLY DOWN ON THE EXISTING CMU WALL. EXTEND AND RECONNECT ALL EXISTING CONDUCTORS AND RACEWAY TO RELOCATED BOXES AND EQUIPMENT. COORDINATE FINAL LOCATIONS OF RELOCATED ITEMS WITH GUARD RAIL INSTALLER.
- PROVIDE SINGLE 1" C RACEWAY FROM NEW BMS PANEL IN MANURE SEPARATION SHED MECHANICAL ROOM TO ACCOMMODATE THE ADDITIONAL WOODEN JOISTS. THE CONTRACTOR SHALL PROVIDE A PULLSTRING TO ALLOW FOR INSTALLATION OF CONTROL CABLES BY FUTURE CONTRACTOR.
- PROVIDE RELOCATION OF APPROXIMATELY EIGHT (8) EXISTING RACEWAYS THAT RUN VERTICALLY UP THROUGH THE EXISTING JOIST SPACE IN THE MANURE SEPARATION SHED MECHANICAL ROOM TO ACCOMMODATE THE ADDITIONAL WOODEN JOISTS. AT LEAST ONE (1) JUNCTION BOX MOUNTED ON THE SIDE OF ONE OF THE EXISTING WOODEN JOISTS WILL ALSO NEED TO BE RELOCATED.



**ELECTRICAL SITE PLAN**  
SCALE: 1"=20'-0"





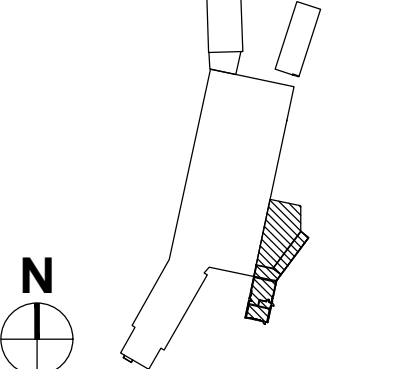
NOTE: UNAUTHORIZED ALTERATION OR ADDITION TO THIS DRAWING IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW ARTICLE 145, SECTION 7209.

REVISIONS		
#	DESCRIPTION	DATE
1	ADDENDUM NO. 1	11/24/25

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KEY PLAN



DATE:	11/24/2025
PROJECT #:	19640.08
DRAWN BY:	DSU
CHECKED BY:	BRW
SCALE:	AS NOTED

VERIFY SCALE

BAR IS ONE (1) INCH LONG ON ORIGINAL DRAWING:



IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

ELECTRICAL  
DETAILS AND  
SCHEDULES

E-500R

ELECTRIC EQUIPMENT AND CONTROL SCHEDULE

GENERAL NOTES:

- ALL DEVICES PROVIDED BY THE ELECTRICAL CONTRACTOR.
- ITEM ID INDICATES EQUIPMENT TAG USED ON FLOOR PLANS.
- PROVIDE OVERLOADS, SIZED AS REQUIRED BY THE DIVISION 21, 22, AND 23 CONTRACTOR.
- REFER TO PLANS FOR CONTROL EQUIPMENT AND DISCONNECT LOCATIONS.
- "NF" INDICATES NON-FUSED.
- WIRE SIZE ARE BASED ON COPPER CONDUCTORS.

EQUIPMENT									POWER SOURCE, PROTECTION & WIRING				CONTROLLERS										DISCONNECT SWITCH				REF. NOTES	ITEM ID
ITEM ID	NAME	DRAWING NUMBER	HP	KW	PHASE	SYSTEM VOLTS	FLA	MCA	PANEL OR CONTROL CENTER WITH CKT. NUMBER	OVER CURRENT PROTECTION	POWER WIRING FROM PANEL TO CONTROL UNIT AND FROM CONTROL UNIT TO EQUIPMENT			MANUAL CONTROLLER WITH RELAY	VARIABLE-FREQUENCY MOTOR CONTROLLER (VFC) WITH BYPASS							CONTROLLER NEMA RATING	SWITCH AMPS	FUSE SIZE	NEMA RATING	FACTORY MOUNTED		
											PHASE/ NEUTRAL	GROUND	CONDUIT															
UH-1	UNIT HEATER - SAND DRYING	E-101	1/3		1	115	7.2		RP4-19	20A-1P	(2)#12	(1)#12	3/4"	X								1	20	NF	3R		2,3	UH-1
UH-2	UNIT HEATER - HEAT REJECTION	E-101	1/2		1	115	9.8		RP4-11	20A-1P	(2)#12	(1)#12	3/4"	X								1	20	NF	3R		1,3	UH-2
DWH-2	GAS-FIRED DOMESTIC WATER-HTR	E-101			1	115	5				REFER TO DRAWING E-101 FOR POWER AND CONTROL REQUIREMENTS.																	DWH-2
P-1	PUMP	E-101	1		3	460	2.1		RP3-20,22,24	20A-3P	(3)#12	(1)#12	3/4"	X								1	20	NF	3R		1,4	P-1

REFERENCE NOTES:

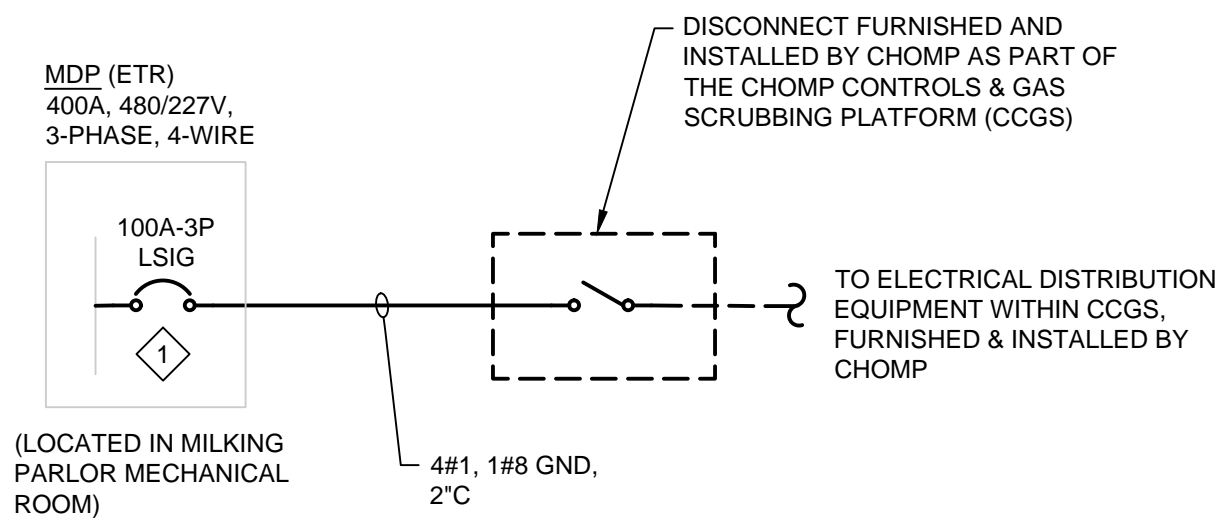
- PROVIDE NEW U.L. LISTED CIRCUIT BREAKER TO MATCH EXISTING PANELBOARD CONSTRUCTION (GE A-SERIES II) AND KAIC RATING.
- UTILIZE SPARE CIRCUIT BREAKER IN PANELBOARD.
- PROVIDE A LOCKABLE, WEATHERPROOF, MOTOR-STARTING SWITCH TO ACT AS THE LOCAL MEANS OF DISCONNECT FOR THE UNIT-A HEAVY DUTY TYPE DISCONNECT SWITCH IS NOT REQUIRED.
- DISCONNECT SWITCH SHALL BE PROVIDED WITH AUXILIARY CONTACTS THAT SHALL BE WIRED BACK TO THE VFC AND ENABLE SHUTDOWN OF THE VFC IN THE EVENT THE DISCONNECT SWITCH IS OPENED; PROVIDE 2#18 IN 3/4" BETWEEN THE DISCONNECT AND CONTROLLER.

LUMINAIRE SCHEDULE

TYPE	DESIGN MAKE	DESCRIPTION	HOUSING	REFLECTOR/LENS	HOUSING/ REFLECTOR FINISH	MOUNTING	LAMP TYPE	COLOR TEMPERATURE	CRI	LUMEN OUTPUT	FIXTURE WATTAGE (WATT)	EFFICIENCY (LUMEN/ WATT)	DIMMING TYPE (DOWN TO %)	VOLTAGE (VOLTS)	NOTES
LA	LEOTEK #ARIETA 13	POLE MOUNTED LED SITE LUMINAIRE WITH TYPE 5 DISTRIBUTION AND INTEGRAL PHOTOCELL. SHALL BE INTERNATIONAL DARK SKY ASSOCIATION LISTED.	DIE-CAST ALUMINUM	ACRYLIC	BLACK	POLE	LED	3000K	>70	9,930	72	138	--	120	1

NOTES:

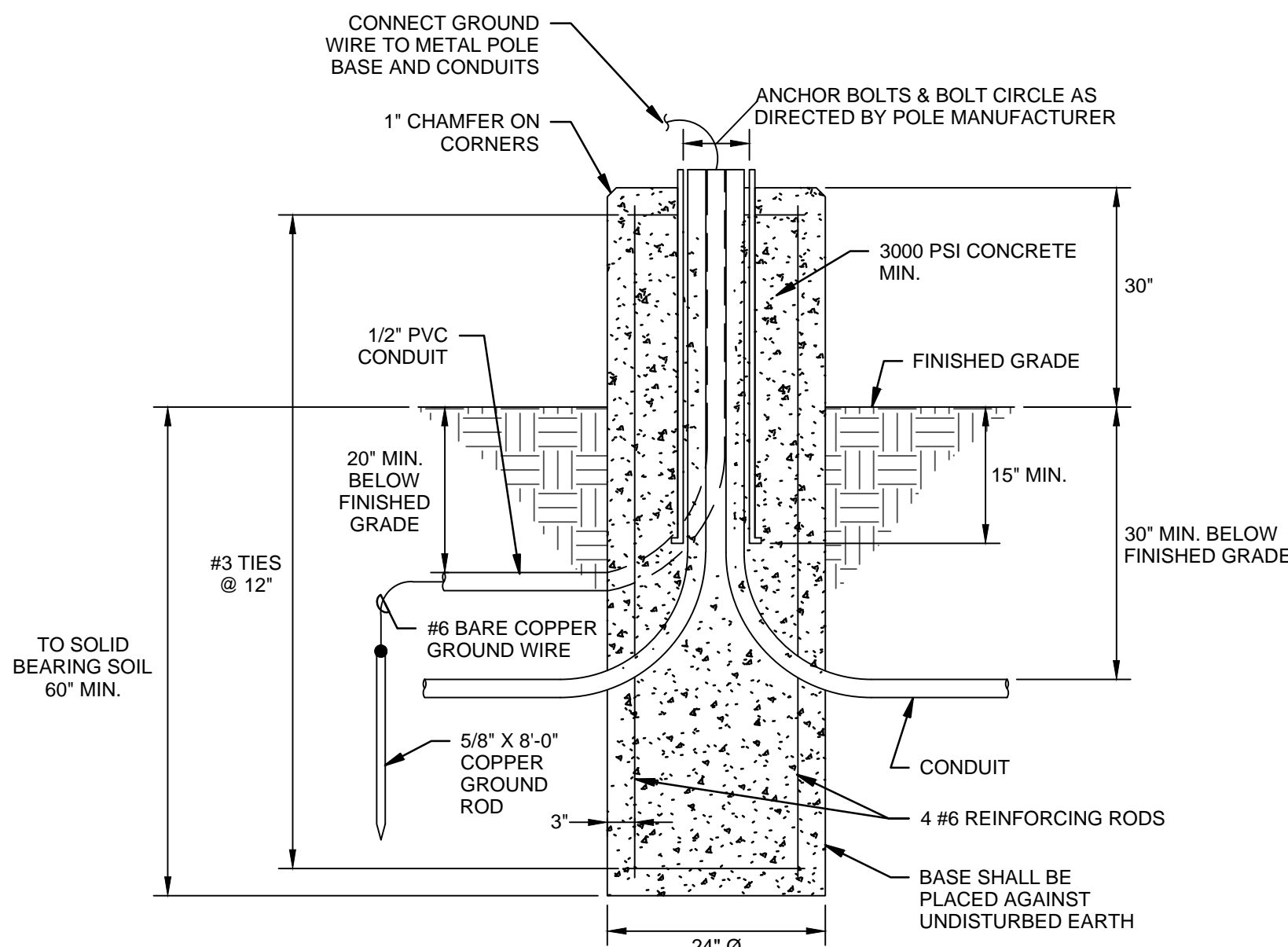
- PROVIDE WITH 16-FOOT SQUARE, ALUMINUM POLE WITH FINISH TO MATCH LUMINAIRE.



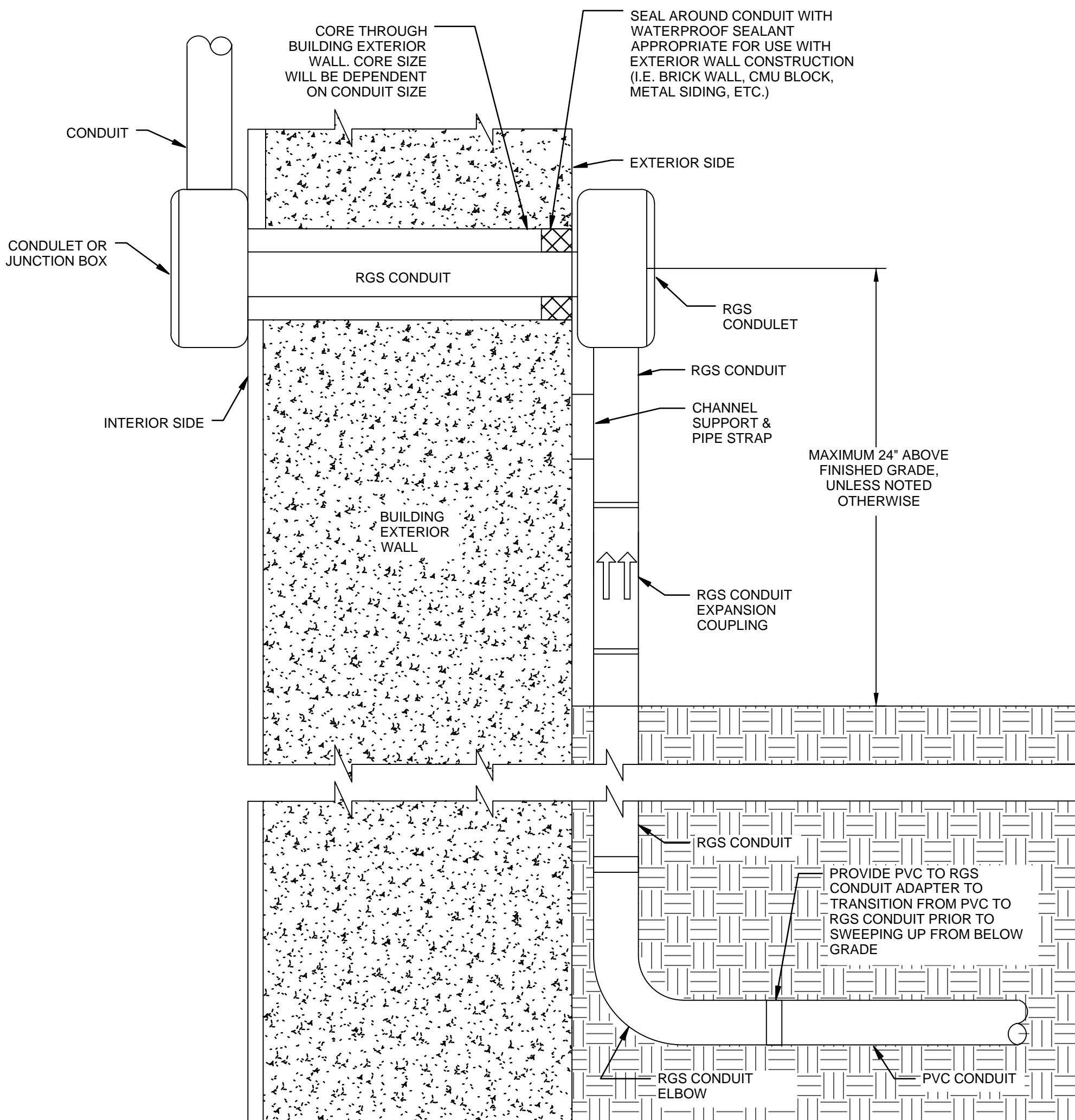
KEYED NOTES:

- PROVIDE CIRCUIT BREAKER TO MATCH EXISTING SWITCHBOARD CONSTRUCTION (GE SPECTRA SERIES) AND KAIC RATING.

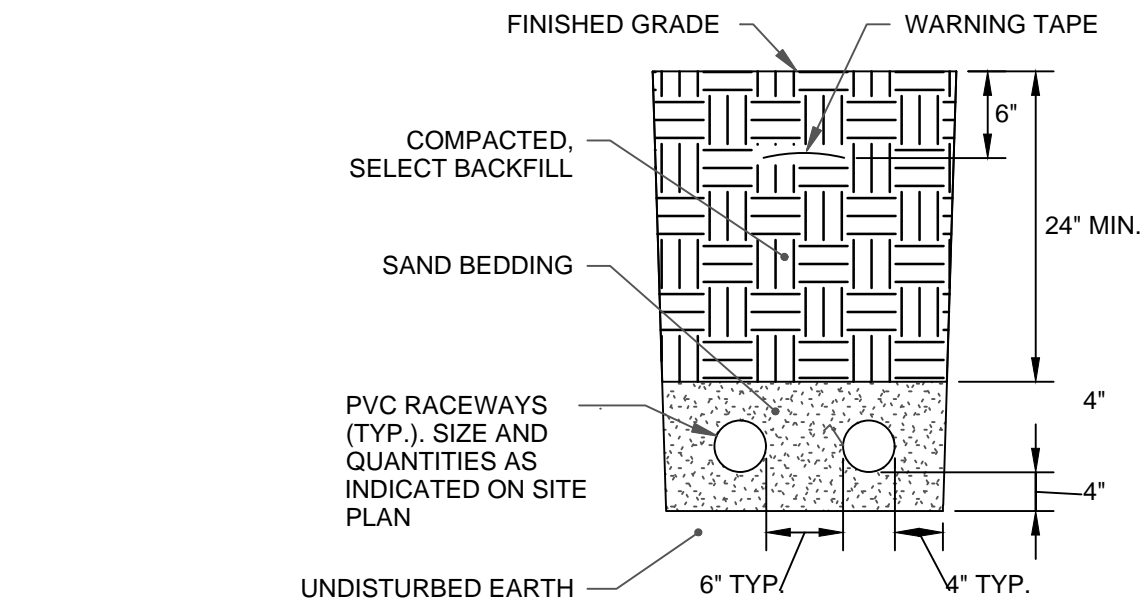
1 PARTIAL ONE-LINE DIAGRAM  
SCALE: N.T.S.



2 TYPICAL SITE LIGHTING POLE BASE DETAIL  
SCALE: N.T.S.



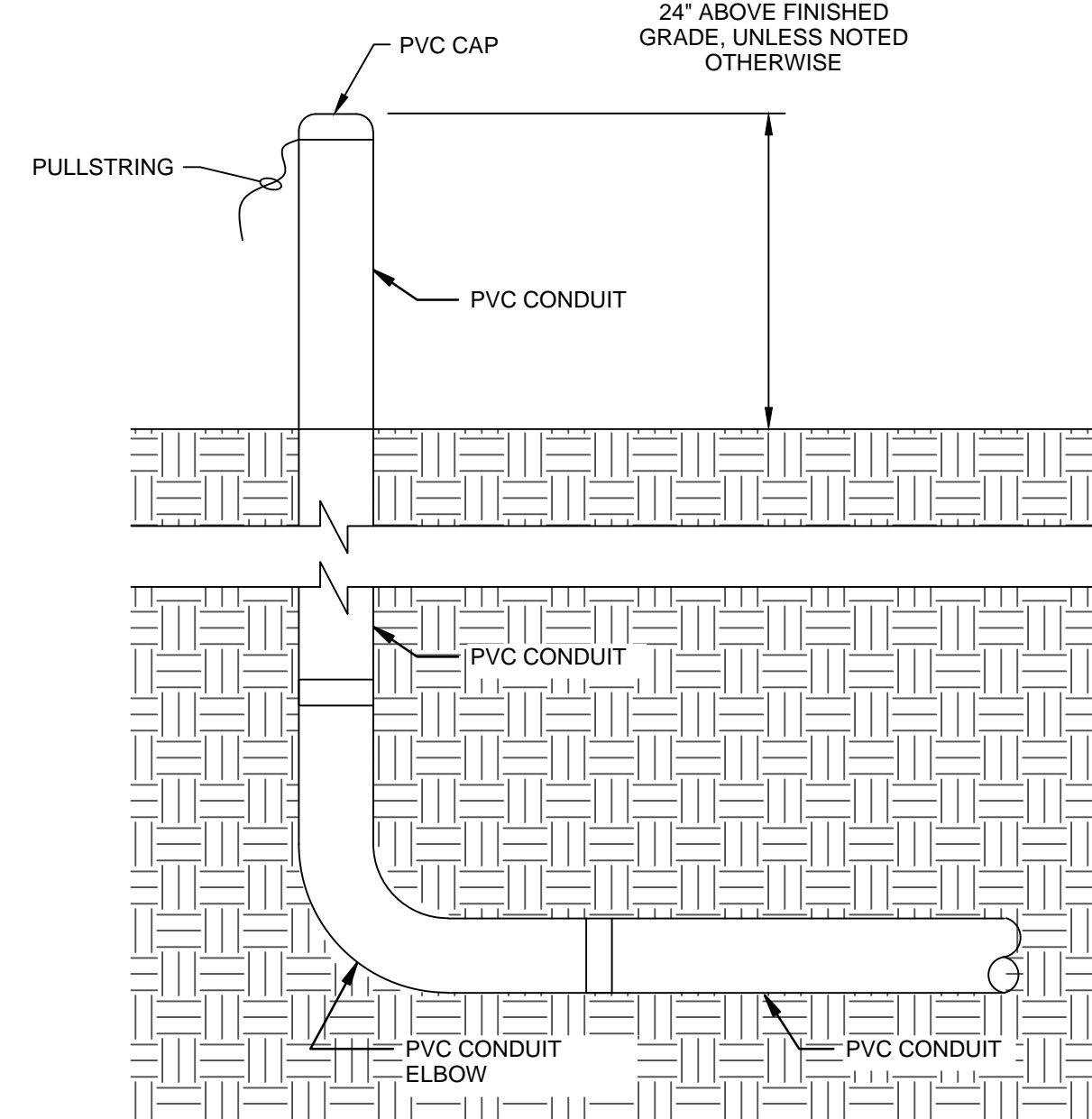
3 TYPICAL ABOVE GRADE EXTERIOR WALL PENETRATION DETAIL  
SCALE: N.T.S.



DIRECT BURIED DUCT BANK NOTES  
AND SPECIFICATIONS:

- MAXIMUM DEPTH TO TOP OF DUCT BANK IS 30". DEVIATION IS ALLOWED IF TOTAL LENGTH OF SECTION GREATER THAN 30" DEEP IS LESS THAN 25% OF DISTANCE BETWEEN MANHOLES. WHERE POSSIBLE, INCREASE DEPTH UNDER ROADWAYS AND PARKING LOTS TO 48" WHERE 25% RULE CAN BE ADHERED TO.
- CONDUIT SPECIFICATION: RIGID NON-METALLIC PVC CONDUIT, DESIGNED RATED FOR USE WITH 90 C RATED CABLE. SCHEDULE 80 PVC. CONDUITS SHALL COMPLY WITH NEMA STANDARD TC-6 & 8, AND ASTM F-512 FOR UTILITY DUCTS. TRANSITION TO ENCASED RIGID GALVANIZED STEEL (RGS) UNDER ROADWAY CROSSINGS AND PAVED AREAS WHERE COVER WILL BE LESS THAN 4 FEET, AND AT BUILDING PENETRATIONS.
- PROVIDE MULE TAPE PULLING STRING IN ALL SPARE CONDUITS.

5 TYPICAL DUCTBANK DETAIL  
SCALE: N.T.S.



4 TYPICAL ABOVE GRADE STUBBED-UP RACEWAY DETAIL  
SCALE: N.T.S.