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# Construction Documents

## HORIZON CENTRAL GAS PIPING AUGMENTATION BETA RESEARCH FACILITY CONSTRUCTION



STATE PROJECT NO.: H27-1966

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TITLE

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PROCESS PIPING

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### A/E PROJECT TEAM

Architectural: WATSON TATE SAVORY LIOLLO ARCHITECTURE

Mechanical/Plumbing: SSOE, INC.

Watson Tate Savory Liollo  
ARCHITECTURE

HORIZON CENTRAL GAS  
PIPING AUGMENTATION  
Beta Research Facility Construction

University of South Carolina  
Work Order No.: CP00326647/FN00378366

Project Number: H27-1966

Date: 26 MARCH 2012

Revisions:

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Cover Sheet  
& Index  
of Drawings

A0.0

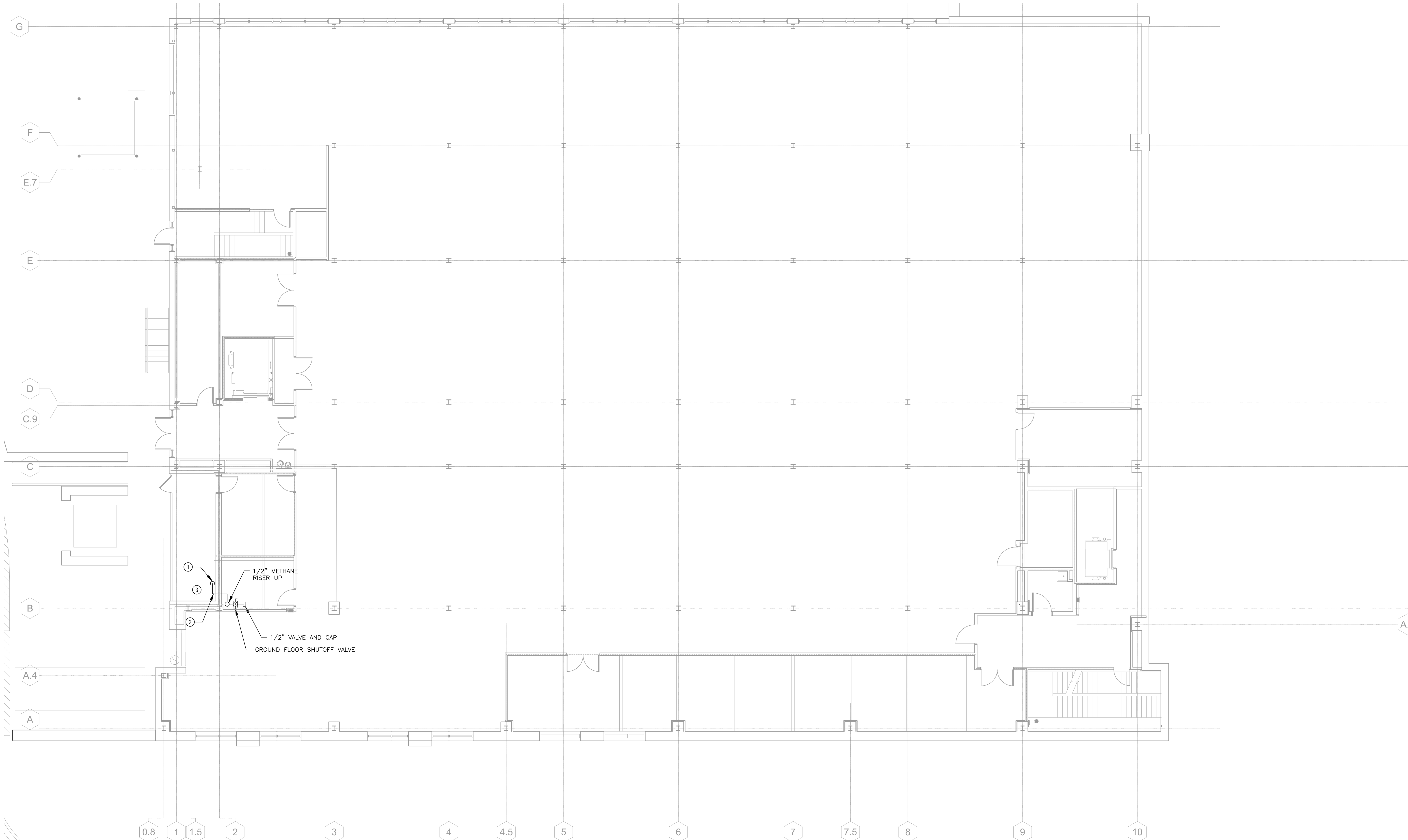
These drawings are the property of Watson Tate Savory Liofillo Architecture and may not be used in whole or in part without written consent of the architects and any infringement is subject to legal action.

**GENERAL NOTES:**

1. ENTIRE METHANE PIPING SYSTEM SHALL BE INSTALLED IN COMPLIANCE WITH 2008 INTERNATIONAL FUEL GAS CODE.
2. EXCEPT FOR THROUGH PENETRATIONS, METHANE PIPING LOCATED INSIDE THE BUILDING SHALL BE INSTALLED IN EXPOSED LOCATIONS AND PROVIDED WITH READY ACCESS FOR VISUAL INSPECTION.
3. LAB GAS TUBING: THE LAB GAS PIPING SHALL BE FULLY ANNEALED, HIGH QUALITY SEAMLESS, DRAWN TYPE 316 AUSTENITIC STAINLESS STEEL HYDRAULIC TUBING COMPLYING WITH ASTM A269. 1/4" SHALL BE 0.035" WALL THICKNESS AND 1/2" SHALL BE 0.049" WALL THICKNESS. TUBING HARDNESS SHALL BE 90 HRB OR LESS.
  - 3.1. DURING WELDING, THE TUBING SYSTEM SHALL BE CONTINUOUSLY PURGED WITH UHP ARGON. CLEAN AND PURGE AT COMMISSIONING.
  - 3.2. SYSTEMS SHALL BE PRESSURE TESTED AT 300 PSIG (UHP HELIUM) FOR 24 HOURS. MAXIMUM PRESSURE DROP FOR THE 24 HOUR TEST (TEMPERATURE CORRECTED) SHALL BE 0 PSIG. THE TEST METHODS AND DEVICES USED SHALL BE APPROVED 5 DAYS PRIOR TO THE TEST. THE TEST DEVICES SHALL BE CALIBRATED AND TRACEABLE.
  - 3.3. THE MINIMUM SUPPORT SPACING SHALL BE 4 FT FOR 1/4" TUBING AND 5 FT FOR 1/2" TUBING.
  - 3.4. THE MANDREL BEND TUBING RADIUS SHALL BE A MINIMUM OF 3 TIMES THE TUBING OUTSIDE DIAMETER.
  - 3.5. TUBING SHALL BE SWAGELOK 316L-14 AND TB OR EQUAL.
  - 3.6. JOINING METHODS SHALL BE ORBITAL WELD FOR ALL JOINTS.
4. ALL NEW LAB GAS TUBING, COMPONENTS AND ASSOCIATED EQUIPMENT AND SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS. THE LAB GAS SYSTEM, COMPONENTS AND EQUIPMENT SHALL BE GUARANTEED FOR A PERIOD OF 1 YEAR AFTER ACCEPTANCE BY THE OWNER INCLUDING LABOR AND MATERIALS.
5. REQUIRED CONTROL WIRING, PNEUMATIC CONTROL TUBING, SAFETY INTERLOCKS, ETC. SHALL BE COORDINATED WITH THE BUILDING CONTROLS CONTRACTOR.
6. DROPS SHALL TERMINATE WITH 1/4 TURN BALL VALVE (SIMILAR TO SWAGELOK SS436 WITH COMPRESSION FITTING AND SC11 CLEANLINESS LEVEL).
7. SHUTOFF VALVES SHALL BE 1/4 TURN BALL VALVE (SIMILAR TO SWAGELOK SS436 WITH SC11 CLEANLINESS LEVEL.)
8. EXISTING GAS DETECTION SYSTEM SHALL BE UTILIZED FOR DETECTION OF METHANE.
9. CONTRACTOR SHALL HAVE SOUTH CAROLINA PROCESS PIPING CONTRACTOR LICENSE AND MINIMUM 5 YEARS EXPERIENCE WITH ORBITALLY WELDED 316 STAINLESS STEEL PIPING SYSTEMS.
10. PROVIDE SHOP DRAWING SUBMITTALS FOR ALL MATERIALS TO BE PROVIDED.

**KEY NOTES:**

1. PROVIDE COMBINATION AUTO/CHANGEOVER/BANK SELECTOR PRESSURE REGULATOR (SIMILAR TO SWAGELOK KMCI08C41240010), 316 SS BODY, DUAL STAGE HIGH ACCURACY GAS DELIVERY SYSTEM. UNIT SHALL AUTOMATICALLY SWITCH GAS FLOW FROM A DEPLETED CYLINDERS IN MANIFOLD TO SECONDARY MANIFOLD (1 MANIFOLD PER SIDE WITH 2 CYLINDERS PER MANIFOLD). UNIT SHALL BE BRACKET MOUNTED WITH 1/4" PORTS AND INCLUDE INLET AND SUPPLY PRESSURE GAUGES. MANIFOLD SHALL CONSIST OF MANUAL SHUTOFF VALVE, FLEXIBLE STAINLESS STEEL HOSE, CHECK VALVE (SIMILAR TO SWAGELOK 6U-CW48W4), AND CYLINDER GAS CONNECTION.
2. PROVIDE AIR TO OPEN SHUTOFF VALVE (SIMILAR TO SWAGELOK 6UW-0P) AND EXCESS FLOW CONTROL VALVE (SIMILAR TO SWAGELOK SS-YS54) BETWEEN SWITCHING PANEL AND METHANE PIPE ENTRANCE TO BUILDING.
3. PROVIDE VENTED RUPTURE DISC (SET @ 100 PSIG) ON BUILDING SERVICE SIDE OF CHANGEOVER PRESSURE REGULATOR, LOCATED IN CYLINDER BAY.



**1**  
P1.0 **GROUND FLOOR METHANE PROCESS PIPING**  
SCALE: 1/8" = 1'-0"

Project Number: H27-1966

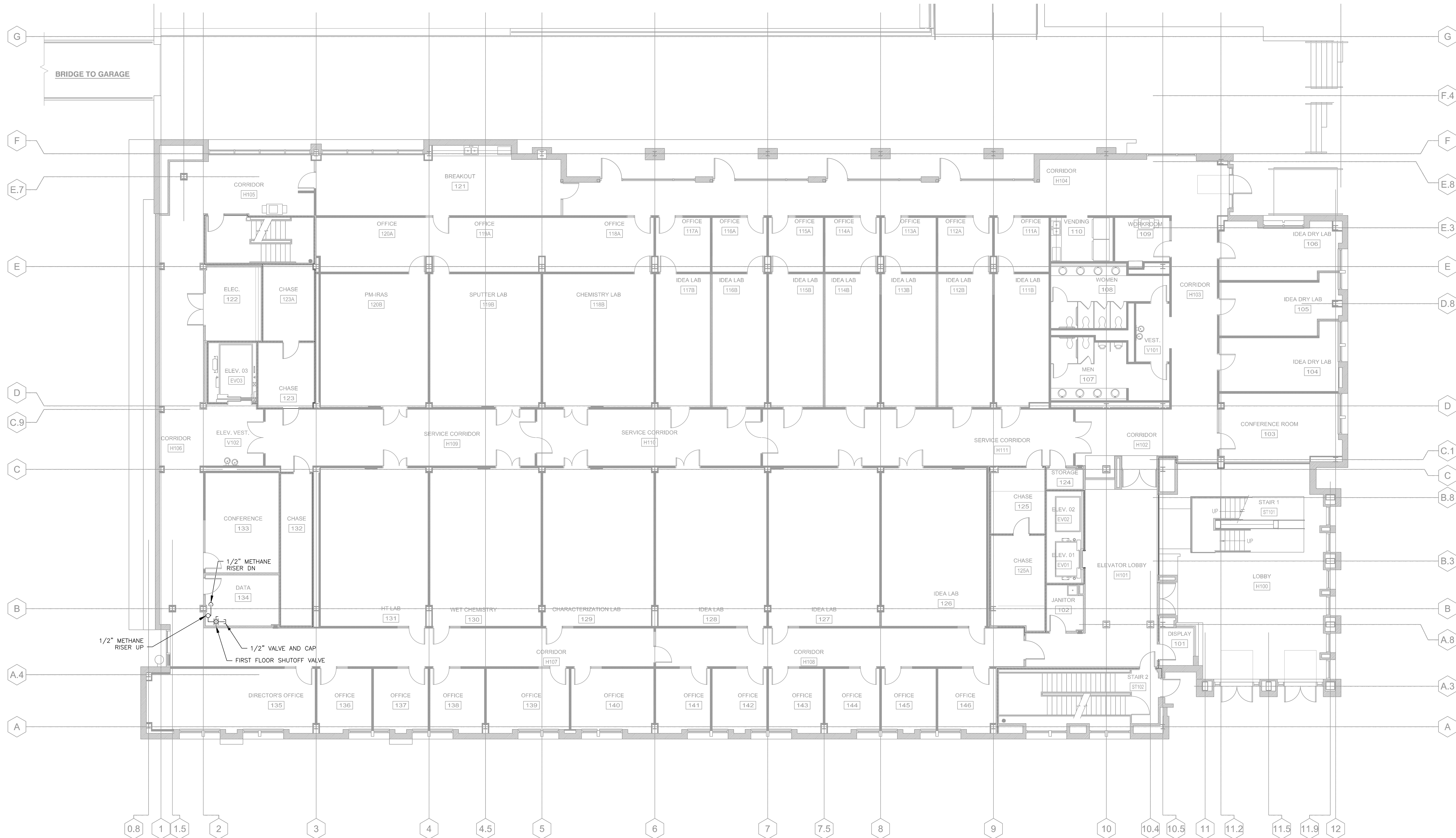
Date: 26 MARCH 2012

Revisions:


Ground Floor  
Methane  
Process Piping

**P1.0**

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- 3.1. DURING WELDING, THE TUBING SYSTEM SHALL BE CONTINUOUSLY PURGED WITH UHP ARGON. CLEAN AND PURGE AT COMMISSIONING.
- 3.2. SYSTEMS SHALL BE PRESSURE TESTED AT 300 PSIG (UHP HELIUM) FOR 24 HOURS. MAXIMUM PRESSURE DROP FOR THE 24 HOUR TEST (TEMPERATURE CORRECTED) SHALL BE 0 PSIG. THE TEST METHODS AND DEVICES USED SHALL BE APPROVED 5 DAYS PRIOR TO THE TEST. THE TEST DEVICES SHALL BE CALIBRATED AND TRACEABLE.
- 3.3. THE MINIMUM SUPPORT SPACING SHALL BE 4 FT FOR 1/4" TUBING AND 5 FT FOR 1/2" TUBING.
- 3.4. THE MANDREL BEND TUBING RADIUS SHALL BE A MINIMUM OF 3 TIMES THE TUBING OUTSIDE DIAMETER.
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5. REQUIRED CONTROL WIRING, PNEUMATIC CONTROL TUBING, SAFETY INTERLOCKS, ETC. SHALL BE COORDINATED WITH THE BUILDING CONTROLS CONTRACTOR.
6. DROPS SHALL TERMINATE WITH 1/4 TURN BALL VALVE (SIMILAR TO SWAGELOK SS436 WITH COMPRESSION FITTING AND SC11 CLEANLINESS LEVEL).
7. SHUTOFF VALVES SHALL BE 1/4 TURN BALL VALVE (SIMILAR TO SWAGELOK SS436 WITH SC11 CLEANLINESS LEVEL).
8. EXISTING GAS DETECTION SYSTEM SHALL BE UTILIZED FOR DETECTION OF METHANE.
9. CONTRACTOR SHALL HAVE SOUTH CAROLINA PROCESS PIPING CONTRACTOR LICENSE AND MINIMUM 5 YEARS EXPERIENCE WITH ORBITALLY WELDED 316 STAINLESS STEEL PIPING SYSTEMS.
10. PROVIDE SHOP DRAWING SUBMITTALS FOR ALL MATERIALS TO BE PROVIDED.

**1 FIRST FLOOR METHANE PROCESS PIPING**  
 SCALE: 1/8" = 1'-0"  
 NORTH

Project Number: **H27-1966**

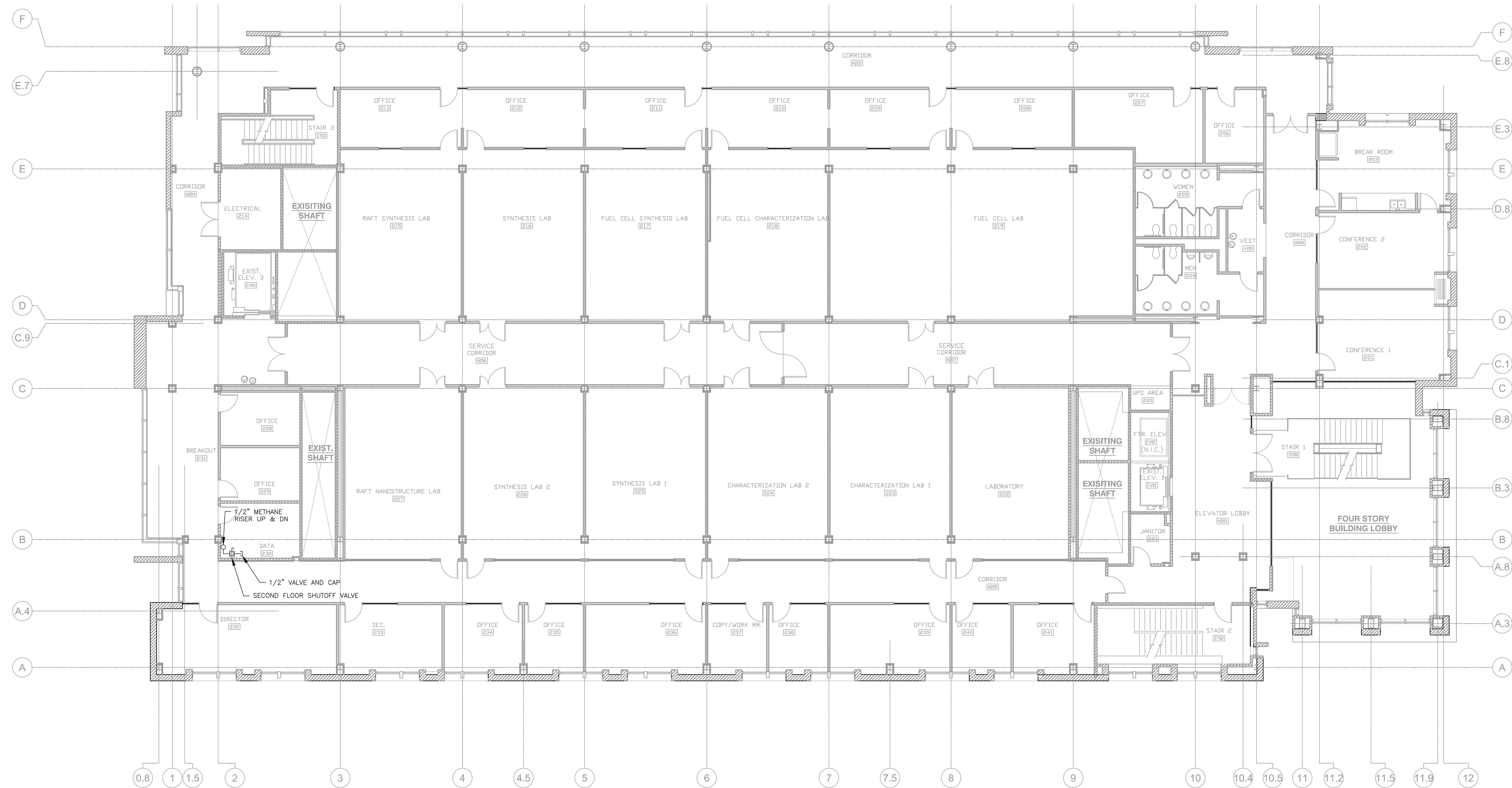
Date: **26 MARCH 2012**

Revisions:


**First Floor Methane Process Piping**

**P1.1**

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- 3.3. THE MINIMUM SUPPORT SPACING SHALL BE 4 FT FOR 1/4" TUBING AND 5 FT FOR 1/2" TUBING.
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9. CONTRACTOR SHALL HAVE SOUTH CAROLINA PROCESS PIPING CONTRACTOR LICENSE AND MINIMUM 5 YEARS EXPERIENCE WITH ORBITALLY WELDED 316 STAINLESS STEEL PIPING SYSTEMS.
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**1 SECOND FLOOR METHANE PROCESS PIPING**  
 SCALE: 1/8" = 1'-0" N

Project Number: H27-1966

Date: 26 MARCH 2012

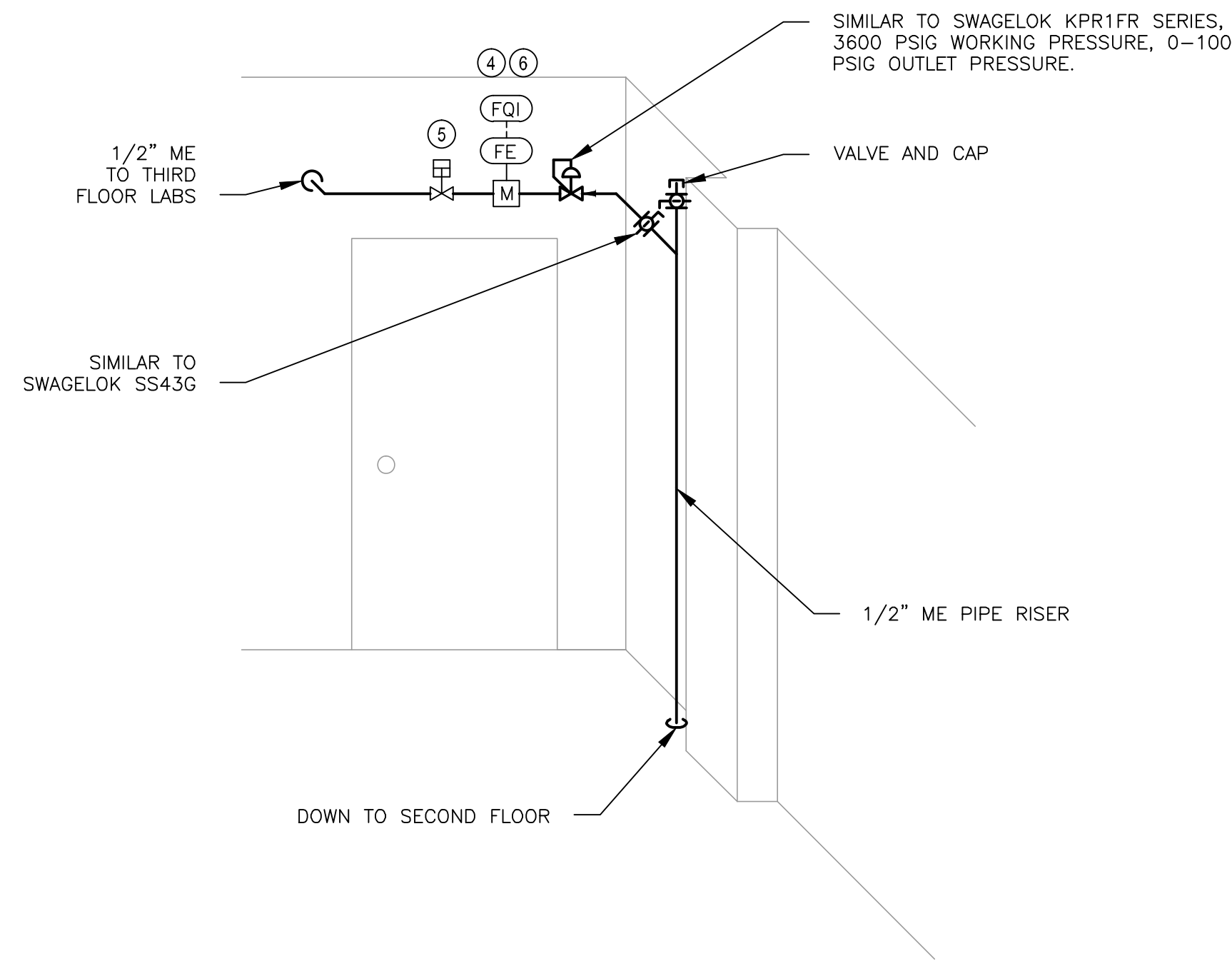
Revisions:


Second Floor  
Methane  
Process Piping

**P1.2**



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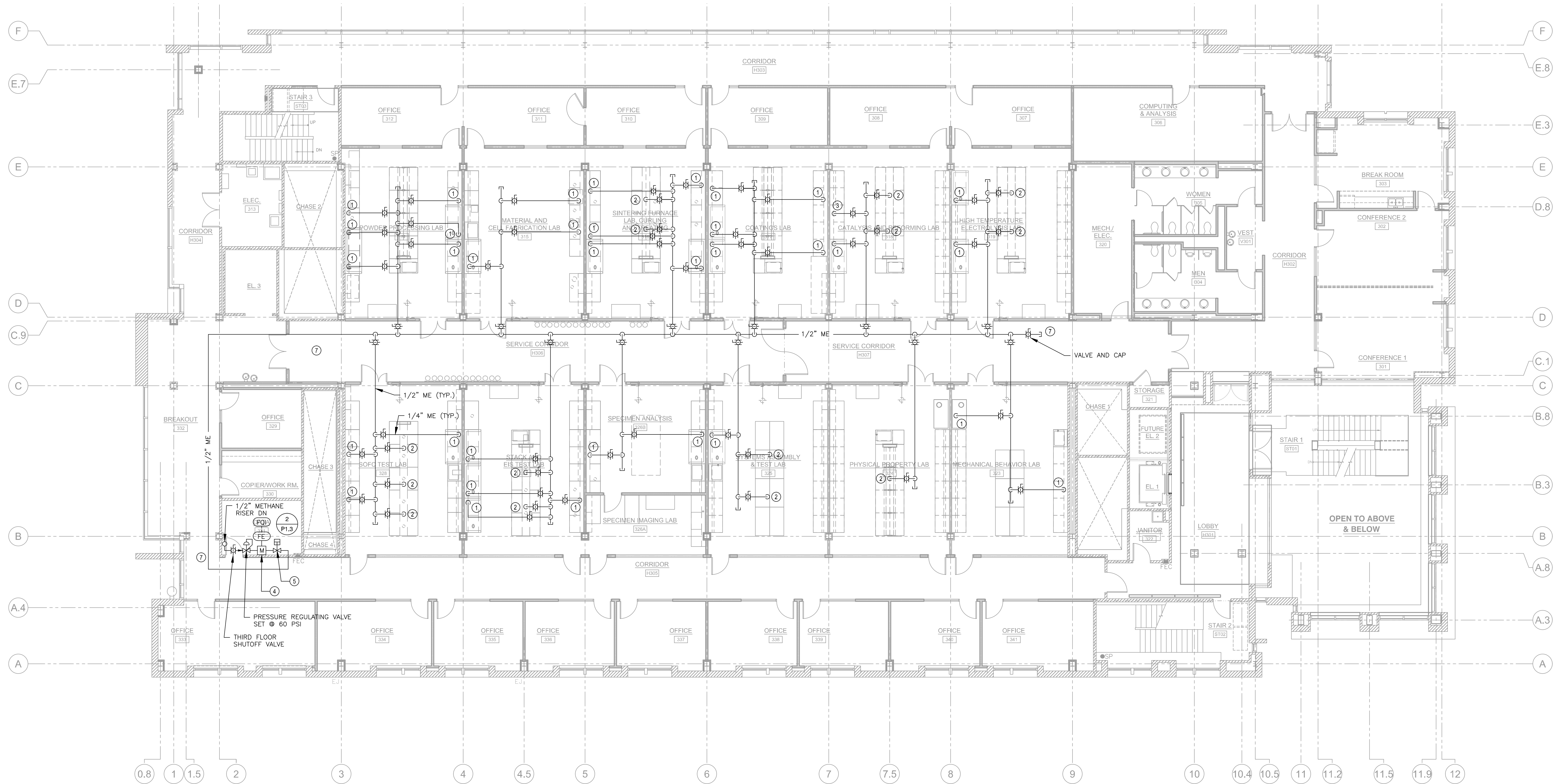
**2 DATA ROOM 331 DETAIL**  
SCALE: NONE

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- DROPS SHALL TERMINATE WITH 1/4 TURN BALL VALVE (SIMILAR TO SWAGelok SS43G WITH COMPRESSION FITTING AND SC11 CLEANLINESS LEVEL).
- SHUTOFF VALVES SHALL BE 1/4 TURN BALL VALVE (SIMILAR TO SWAGelok SS43G WITH SC11 CLEANLINESS LEVEL).
- EXISTING GAS DETECTION SYSTEM SHALL BE UTILIZED FOR DETECTION OF METHANE.
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- TUBING SHALL BE SWAGelok 316L-14 AND TB OR EQUAL.
- JOINING METHODS SHALL BE ORBITAL WELD FOR ALL JOINTS.

**KEY NOTES:**

- METHANE PIPING DROPS TO WALL OUTLET ABOVE BENCH. DROP TO TERMINATE AT SAME HEIGHT AS EXISTING HYDROGEN VALVES.
- METHANE PIPING DROPS TO OVERHEAD OUTLET AT EXISTING SERVICE CARRIER LOCATED AT 8'-0" AFF.
- METHANE PIPING DROPS TO EXISTING OUTLET. DROP TO TERMINATE AT SAME HEIGHT AS EXISTING HYDROGEN VALVES.
- FLOW ELEMENT (FATHOM MASS FLOW METER PN GR1121355 OR EQUAL).
- FLOW CONTROL VALVE (ON-OFF) (SWAGelok 6LV-DP OR EQUAL).
- ROUTE METHANE PIPING ON WALL ADJACENT TO EXISTING HYDROGEN PIPING. COORDINATE ROUTE WITH EXISTING PIPING, DOORS, DUCTWORK, EQUIPMENT, ETC.



**1 THIRD FLOOR METHANE PROCESS PIPING**  
SCALE: 1/8" = 1'-0"