The Dow Chemical Company
633 Washington Avenue
1803 Building
Midland, MI 48674

April 7, 2022

Ms. Gail Dieter

New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau E, Section B
625 Broadway, 12th Floor
Albany, NY 12233-7017

Subject: Waterloo Building 4 Vapor Intrusion Mitigation Pilot Test – Modifications to Existing Subslab Depressurization System, 30 Percent Basis of Design - Former Hampshire Chemical Corp. Facility, Waterloo, New York- Site No. 850001A

Dear Ms. Dieter:

Hampshire Chemical Corp. (HCC) is pleased to submit one hard copy and one electronic copy of Waterloo Building 4 Vapor Intrusion Mitigation Pilot Test – Modifications to Existing Subslab Depressurization System, 30 Percent Basis of Design for the Former Hampshire Chemical Corp. Facility, Waterloo, New York for Site No. 850001A.

This mitigation alternative is being conducted pursuant to the Remedial Design Work Plan submitted to NYSDEC and New York State Department of Health (NYSDOH) that discussed the pilot test design and SSDS implementation, operation and maintenance (O&M), and safety. NYSDEC and NYSDOH provided approval of the Remedial Design Work Plan on August 16, 2019.

If you have any questions about this Basis of Design Report, please contact me at 519-939-7595, or Brian Carling at 610-384-0747.

Sincerely,

Robert Stuetzle
Senior Remediation Specialist

Copy To: Ms. Gail Dieter, NYSDEC Central Office (Disc and Hard Copy)
Mr. Mark Sergott, NYDOH (Disc)
Mr. Matthew Gillette, NYSDEC Region 8 (Disc)
Mr. David Pratt, NYSDEC Region 8 (Disc)
Mr. David Breyette, Evans Chemetics LP (Disc)
Jacobs Project File

# Waterloo Building 4 Vapor Intrusion Mitigation Pilot Test - Modifications to Existing Subslab Depressurization System

**30 percent Basis of Design**

FINAL

April 2022

Former Hampshire Chemical Corp.

# Waterloo Building 4 Vapor Intrusion Mitigation Pilot Test – Modifications to Existing Subslab Depressurization System

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|---|---|
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| Author: | Beth Weinhouse |
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Jacobs

1999 Bryan Street, Suite 1200
Dallas, Texas 75201
United States
T +1.214.638.0145
F +1.214.638.0447
www.jacobs.com

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### Document History and Status

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# Contents



## Appendixes

# Acronyms and Abbreviations

| | |
|---|---|
| $\mu g/m^3$ | microgram(s) per cubic meter |
| CH2M | CH2M HILL Engineers, Inc. |
| HCC | Hampshire Chemical Corp. |
| Jacobs | Jacobs Engineering Group Inc. |
| LEL | lower explosive limit |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| O&M | operations and maintenance |
| Pa | Pascal |
| PFE | pressure field extension |
| PHA | process hazard analysis |
| RTDs | Resistance Temperature Detectors |
| scfm | standard cubic feet per minute |
| site | Former Hampshire Chemical Corp., Waterloo, New York facility |
| SSDS | subslab depressurization system |

# 1. Introduction

This document summarizes the preliminary (30 percent) Basis of Design for modifications to the existing subslab depressurization system (SSDS) located within Building 4 at the former Hampshire Chemical Corp. (HCC), Waterloo, New York facility (site). The modifications will allow for the safe remote operation, monitoring, and continuous datalogging during implementation of the next phase of the pilot test (Phase 3). Phases 1 and 2 of the pilot tests, conducted in late 2019 and early 2020, respectively, operated for short periods of time and data collection was completed manually. To better evaluate the effectiveness of the existing SSDS, Phase 3 of the pilot test requires continuous long-term operation (more than 30 days of continuous run time). The system modifications described in this basis of design will allow long-term operation of the SSDS and automated data collection.

## 1.1 Background

The site is located at 228 East Main Street in the village of Waterloo, Seneca County, New York. It is bordered to the north by East Main Street, to the east by Gorham Street, to the west by East Water Street, and to the south by the Cayuga Seneca Canal. Evans Chemetics operates a specialty sulfur compound manufacturing facility at the site. The site contains several interconnected buildings that house chemical manufacturing facilities, offices, a quality control laboratory, maintenance, and shipping/receiving operations, as well as an industrial wastewater treatment plant. The site also includes outside drum storage areas and several tank farms.

The site is regulated under the Resource Conservation and Recovery Act with the New York State Department of Environmental Conservation (NYSDEC) as the lead agency regarding responses to environmental releases. Resource Conservation and Recovery Act facility investigation efforts have been conducted at the site since 1993 to evaluate the nature and extent of releases. The ongoing manufacturing operations by Evans Chemetics at the site are regulated by Occupational Safety and Health Administration and delegated state agencies. Emissions points are governed by an air permit from NYSDEC.

In 2016, CH2M HILL Engineers, Inc. (CH2M, now a subsidiary of Jacobs) completed a historical data review and field infrastructure assessment (building survey) for Buildings 3 and 4 in support of a subslab vapor investigation. The vapor investigations revealed that methane and hydrogen sulfide are being generated in the subsurface environment. Additional investigations were conducted to refine the conceptual site model. Based on data collected, it was concluded that a strongly anaerobic zone is present under Building 4 and that this anaerobic environment is the source of the hydrogen sulfide and methane. CH2M recommended that a feasibility study be completed to evaluate alternatives that could mitigate the risks posed by hydrogen sulfide and methane beneath Building 4.

On March 1, 2018, NYSDEC's approval of the *Evaluation of Subslab Hydrogen Sulfide and Methane Concentrations Technical Memorandum* (CH2M 2017) included a request to conduct a feasibility study for long-term mitigation alternatives for hydrogen sulfide and methane. The selected proposed long-term mitigation alternative is the use of an SSDS and treatment of vapor from under the Building 4 slab. Jacobs designed a pilot test that would demonstrate the efficacy of a SSDS to capture and treat the hydrogen sulfide and methane vapors in the site's subslab environment.

On July 17, 2019, HCC submitted a Remedial Design Work Plan to NYSDEC and New York State Department of Health (NYSDOH) that discussed the pilot test design and SSDS implementation, operation and maintenance (O&M), and safety. NYSDEC and NYSDOH provided approval of the Remedial Design Work Plan on August 16, 2019.

The existing SSDS was constructed in October 2019, and Phase 1 of the pilot test was conducted in December 2019. Phase 2 of the pilot test was conducted in February and March 2020. A more detailed summary of the pilot test activities and results are presented in the *Remedial Action Progress Report* (Jacobs 2021a).

Phases 1 and 2 of the pilot test showed that SSDS is effective as a mitigation remedy; however, a longer duration pilot test phase was recommended to evaluate the negative pressure differential across the slab under variable subslab soil saturation and groundwater levels.

# 2. Pilot Test Objective

The overall objective of the pilot test remains the same as previous phases, which is to test and measure the effectiveness of the SSDS at reducing hydrogen sulfide and methane concentrations beneath the Building 4 slab to (1) prevent potential entry of these constituents into the structure and (2) reduce the risk of these constituents migrating through the environment. This program is following an adaptive mitigation approach with the intent to scale up the SSDS system for long-term mitigation. The pilot test was originally designed to demonstrate that a sustained negative pressure differential of at least 1 pascal when measured under cold weather conditions, or 2.5 pascals when measured under warm weather conditions (American National Standards Institute/American Association of Radon Scientists and Technologists 2017) can be maintained across the unsaturated footprint of Building 4 where elevated methane and hydrogen sulfide concentrations are present. The negative pressure differential created and maintained by the SSDS will result in capturing potentially hazardous subslab vapors for subsequent treatment in Evans' existing scrubber system before discharge to the atmosphere. Reversing the pressure differential across the slab and capturing the subslab vapors will reduce the concentration of the constituents in the subsurface and the likelihood of the subslab vapor migrating into and impacting indoor air at Building 4.

The following performance goals were developed for Phase 3 based on observations made and data collected during Phase 1 and 2 of the pilot test:

1) Decide whether the pressure field extension (PFE) can reach any unsaturated areas along the northern wall of Building 4 area with the some of the highest concentrations using the two existing extraction points.
2) Identify if the areas outside the PFE that are generally saturated and, therefore, unable to contribute significant vapor flux into the building OR if unsaturated, have concentrations below 4 percent methane and 46,400 $\mu g/m^3$ hydrogen sulfide.
3) Evaluate the degree and rate of water level fluctuations and if these fluctuations are associated with local meteorological conditions, canal level changes, or facility operations.

To satisfy the Phase 3 pilot test objectives, additional data will be collected over a longer test period (a minimum of 30 days). Modifications to the SSDS are necessary to support testing and data collection over this longer period. The system modifications described in this basis of design will allow for safe remote operation, monitoring, and continuous automated datalogging during implementation of the Phase 3 pilot test. Section 3 provides a description of the modifications.

# 3. Design Components

This section presents a summary of the existing SSDS and modifications that will be made to satisfy Phase 3 pilot test objectives. The Phase 3 pilot test objective will be met with the following overall system modifications:

1) Subslab pressure will be monitored utilizing micromanometers during the pilot test. The micromanometers will be located throughout the building with a focus along the building/plume edges using select existing and new vapor sampling/radius of influence monitoring locations (Figures 1 and 2). The subslab pressure measurements will identify whether the PFE can reach the northern wall of Building 4 using the two existing extraction points.
2) New piezometers will be installed in Building 4 (PZ-09, PZ-10, PZ-12, and PZ-13) and Building 11/11A (PZ-08 and PZ-11) (Figure 2), with continuously recording groundwater level measurements downloaded to a system dashboard. The groundwater monitoring will be used to identify whether changes in saturation immediately under the slab in Building 4 are predictable and support a subslab vadose zone from which vapors can be recovered. Areas of saturation that are unable to contribute significant vapor flux into the building even if outside the PFE don't require mitigation.
3) In addition to continuously recording groundwater levels in the new piezometers directly under Building 4, shallow groundwater levels will be monitored directly adjacent, both north and south, of Building 4, and meteorological data will be continuously monitored, downloading to a system dashboard to support evaluating the degree and rate of water level fluctuations and if these fluctuations are associated with meteorological conditions or facility operations. An understanding of the rate and predictability of the water level variation will enable Jacobs to assess whether the SSDS can be practically adjusted to handle these variations during future full-scale operation. Areas of high groundwater or saturation are unable to contribute significant vapor flux into the building and don't require mitigation.

## 3.1 Existing SSDS Pilot System Process Summary

This subsection provides a summary of the existing SSDS operated during Phase 1 and 2 of the pilot test. Additional details are presented in the Construction Completion Report (Jacobs 2021b).

Subslab vapors are extracted under vacuum from vapor extraction (EX) wells (EX-02 and EX-03) installed through the concrete floor of Building 4 (**Figure 1**). The EX wells are constructed of 3-inch-diameter Schedule 80 polyvinyl chloride materials. The process vapors are conveyed through individual well legs constructed of 3-inch-diameter Type 316 stainless steel pipe. The well legs are each equipped with instruments, sample ports, and valves for process monitoring and control. The well legs combine into a common 3-inch-diameter stainless steel header pipe. The header pipe is equipped with sample ports, an automated block valve (XV-101) with a pneumatic (spring-return) actuator, and manual valves for process control purposes. The system was designed to operate at a maximum of 150 standard cubic feet per minute (scfm) from one or both extraction wells.

The 3-inch-diameter header pipe ties into a 10-inch-diameter Type 316 stainless steel dilution air pipe. The section of 10-inch metal pipe downstream of this tie point (hereafter referred to as the mixing plenum) is designed to adjust the vacuum applied to the EX wells and reduce methane concentration to less than the lower explosive limit of the methane and reduce the concentration of hydrogen sulfide in the process vapor stream. Ambient air is introduced into the plenum under vacuum upstream of the tie point through an inlet duct. The duct is equipped with back draft and manual balancing dampers. The system was designed to operate at a maximum of 1,000 scfm of flow. The downstream mixing plenum is equipped with instruments. The mixing plenum ties into an existing Evans process line that conveys process vapor to Evan's scrubber. Both the mixing plenum and the Evans process line are equipped with manual isolation valves. The process vapors are conveyed through the SSDS piping and scrubber under an induced vacuum using an explosion-proof blower installed on the roof of Building 4A.

### 3.1.1 Codes, Standards, and Regulations

The SSDS pilot test original design and all system modifications will employ the following building codes, where applicable:

- 2016 New York State Uniform Building Code and Supplement
- 2015 International Building Code
- 2015 International Mechanical Code
- 2017 National Electrical Code
- Occupational Safety and Health Administration Standards for General Industry

The SSDS pilot test design also will be guided by:

- New York State Department of Health Final: Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006; especially Section 4 for soil vapor intrusion mitigation
- NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation
- ASTM International E2121
- U.S. Environmental Protection Agency 2015 Vapor Intrusion Guide, sections 8.2.2, 8.3 and 8.4
- American National Standards Institute AARST RMS-LB 2018, Sections 9 and 11
- U.S. Environmental Protection Agency 2008 VI Mitigation engineering issue. Sections 3.1; 5.5 and 5.6

## 3.2 System Component Design Modifications

The design modifications are generally associated with automating the SSDS to allow for remote system operation and monitoring and continuous datalogging. Modifications are based on the following assumptions:

- Phase 3 of the pilot test will be approximately 30 days in duration.
- The SSDS vapor emissions will be treated and discharged through the existing Evans S-6 scrubber. Evans will not discharge their process vapor to the scrubber during the 30-day pilot test period.
- Jacob’s personnel will be onsite for approximately 3 to 5 days during system startup and will perform operation inspections at a minimum 2-week frequency.
- The SSDS will be remotely monitored by Jacobs. Any emergency alarms will be communicated to Evans and Jacobs.

### 3.2.1 Site Conditions

This section provides a summary of the existing site conditions within Building 4. Modifications to the existing SSDS will be completed based on the current site use and electrical area classifications.

#### 3.2.1.1 Outdoor Design Conditions

The system is not designed to maintain specific temperatures; however, in considering overall system performance, the following outdoor design conditions will be applied.

| Extreme Annual Daily Temperature | |
|---|---|
| **Maximum Dry Bulb** | **Minimum Dry Bulb** |
| 101.8 degrees Fahrenheit | -12.0 degrees Fahrenheit |

#### 3.2.1.2 Building Use

An active chemical production unit is located within Building 4. Evans personnel are actively operating and maintaining units full-time (i.e., workers are in facility at all hours). Forklift traffic is common throughout Building 4. Building 4 has upcoming infrastructure changes planned by Evans that may affect the pilot test.

#### 3.2.1.3 Electrical Area Classification

Due to the nature of the chemical manufacturing processes in Building 4, the building interior is designated as electrical Class 1, Division 2. The unsaturated soils beneath the Building 4 concrete floor contain concentrations of hydrogen sulfide and methane above their respective upper explosive limit; therefore, the subslab vapor space has been designated as Class 1, Division 1 by the facility. Down well instruments also require the Class 1, Division 1 rating.

Permanent electronic instrumentation installed as part of the SSDS modifications and electrical installation methods are required to be rated for Class 1, Division 2 spaces per Article 500 of the National Electrical Code, which includes intrinsically safe elements incorporating explosion-proof and spark-resistant components and installation methods.

The adjacent Buildings 3, 11 and 11A are unclassified. The new control panel will be located within Building 11 or 11A allowing for the use of unclassified equipment.

### 3.2.2 Control System

**Proposed Design Modification:** Installation of control panel at a location approved by Evans, currently proposed as Building 11. All new instruments, control panel and programmable logic controller (PLC) which are called out in Piping and Instrumentation Diagram, Appendix A, will be specified to meet the application design requirement.

**Basis for Design Modification:** The SSDS will be modified to include a control panel with a PLC to monitor and control the equipment and a human-machine interface to display system operation data and alarms. A local operator will be able to acknowledge alarms and, upon reconciling the alarm condition, reset the system. The SSDS PLC will be remotely accessible via a web-based remote operator interface that will display operating status and alarms remotely via personal computer access to the web.

Signals will be transmitted from existing and new instruments to the PLC, as shown in the process and instrumentation diagrams presented in Appendix B. The signals will be converted into a data format that will be logged for performance monitoring purposes. The data will be remotely downloaded from the datalogger to generate an operational dashboard.

Select alarms will be transmitted from the PLC to Jacobs and Evans. It is anticipated the alarms will be transmitted to Evans' control room located in Building 3. The types of alarms transmitted and response from Evans and Jacobs will be addressed during the 60 percent design.

**Assumptions:**

- The control panel will be located in an electrically unclassified area (likely Building 11 or 11A, see Figure 2).
  - All existing and new instruments will be hard-wired to the control panel.
  - The PLC will be programmed to automatically respond to alarm conditions (e.g., flammable conditions measured in process vapor piping, high dilution air flow through the scrubber, etc.).

### 3.2.3 Resistance Temperature Detectors

**Proposed Design Modification:** Datalog subslab soil temperature using either existing instruments to locally monitor these conditions or new instruments. The use of existing versus new instruments will be evaluated during the 60 percent design. The instruments will be wired to the new control panel.

**Basis for Design Modification:** Remote monitoring and datalogging of subslab temperature is necessary for Phase 3. The 10 existing Resistance Temperature Detectors (RTDs) used during Phase 1 and 2 of the pilot test were hard-wired to a multi-channel portable datalogger (Fluke 2638A Hydra Series III). The datalogger is located in Building 3. High temperature alarms are currently transmitted to select Jacobs and Evans staff through an autodialer located in Building 3. The proposed design modification will allow this data to be viewed remotely.

### 3.2.4 Onsite Weather System

**Proposed Design Modification:** Weather conditions will be recorded using either existing equipment to locally monitor these conditions or new instruments. The use of existing versus new instruments will be evaluated during the 60 percent design. The instruments will be wired to the new control panel.

**Basis for Design Modification:** An onsite weather system was installed outside Building 4, on the north bank of the canal, to collect local weather data. The system includes a Davis Vantage Pro integrated sensor suite mounted on a 2-meter pole. Data from the integrated sensor suite is transmitted by radio link to a Davis Vantage Pro 2 weather station console and datalogger located inside Building 3. The proposed design modification will allow this data to be viewed remotely.

### 3.2.5 Flow Measurement at Extraction Points

**Proposed Design Modification:** Reconfigure existing flow instruments or purchase new instruments to measure flow rates ranging from the low flow observed during Phase 1 and 2 of the pilot test (less than 3 scfm) to somewhat higher flow rates, more typical of SSD systems (up to 50 scfm). The instruments will be wired to the new control panel.

**Basis for Design Modification:** The flow rates of vapor extracted from the subsurface during the Phase 1 and 2 pilot tests were too low to be measured using the existing flow instruments (FIT-2-1 and FIT-3-1) located on the two SSDS piping legs connected to EX-02 and EX-03. The measurement range of the current flow meters is 3 to 266 scfm; however, actual flows at the extraction wells did not exceed the lower range of the flow indicators of 3 scfm while operating at a vacuum of up to -12 inches water column.

### 3.2.6 Subslab Differential Pressure Monitoring

**Proposed Design Modification:** Install micromanometers at approximately 10 existing PFE monitoring locations to be selected during later design (Figure 1). Additionally, install micromanometers at new PFE monitoring locations within Building 3 (SV-27 and other locations to be finalized during 60 percent design) and at locations where differential pressure between indoor and exterior air can be monitored. If appropriately classified and applicable sensativity micromanometers are available, he micromanometers will be powered and wired to the new control panel. Based on the proximity of PFE monitoring locations to active walkways and driveways within Building 4, the micromanometer will be installed in a manner that does not create an unsafe walking condition or restrict access to manufacturing operations. The subsurface completion options for the micromanometers are shown on Figure 3 and include (1) saw cutting the floor and sinking the tubing into a shallow channel or (2) using a ramp to protect the tubing.

Micromanometers will be tolerant of subsurface soil and groundwater conditions. The connection point between the micromanometers and PFE monitoring locations will be designed such that the micromanometers can be disconnected to facilitate the manual collection of subslab soil gas samples or verification of the presence of water with a syringe, as periodically required. If appropriately classified and applicable sensativity micromanometers are not available, alternative methods for subslab differential pressure monitoring will be selected later in the design.

Pressure Field Extension Monitoring Needs:

- At distant monitoring points: sensitivity to 1 pascal (Basis: E2121 states: "The depressurization goal is to maintain 0.025 to 0.035 inches water column (6 to 9 Pa) everywhere under the slab" but more recent guidance allows lower values.
- Range: 8 inches water column (1,992 Pa) to -15 inches water column (-3,736 Pa) (basis Phase 1 and 2 data).
- Measurement frequency/logging: visible at 1-minute intervals during pilot testing for ease of adjustment with long-term logging at 15-minute intervals.

**Basis for Design Modification:** During the Phase 1 and 2 pilot tests, multiple micromanometers were attached to PFE monitoring locations in Building 4 to measure differential pressure between the subslab atmosphere and ambient air. These micromanometers were battery-powered rental units that required manual download of data and two battery changeouts per day. Furthermore, the limited battery life often resulted in data loss during the early morning hours. Differential pressure data was downloaded from the internal micromanometer memory to a laptop computer one to three times per week during pilot testing. Downloads were performed over a Universal Serial Bus connection using the software (LogDat2) provided by the instrument manufacturer. The proposed design modification will allow these data to be viewed remotely.

### 3.2.7 Subslab Water Level Monitoring

**Proposed Design Modification:** Six new 2-inch-diameter polyvinyl chloride piezometers will be installed to approximately 8 feet below ground surface. The wells will be installed with a 1-foot-long screen (0.001 slot size). Instruments will be installed in the wells to continuously monitor water levels in the new wells (Endress+Huaser DeltaPilot FMB53). The instruments will be powered and wired to the new control panel. Based on the proximity of piezometers to active walkways and driveways within Building 4, the wiring will be installed in a manner that does not create an unsafe walking condition or restrict access to manufacturing operations.

An evaluation of various technologies for down well water level measurement and collection was completed by Evans and Jacobs, including wave-guided radar and pressure transducers. Instrument selection of the Endress+Hauser DeltaPilot FMB53 (Appendix C), using pressure transducer technology, was selected based on cost, ease of function, electrical area classification and durability.

The wells and water level sensors will be installed in spring 2022, prior to the other system modifications, to capture baseline seasonal and longer-term groundwater data prior to initiating Phase 3 of the pilot test. The pre-pilot test data may not be automatically downloaded or immediately accessible until the other system modifications have been completed.

The design assumptions are as follows:

1) Cable passthroughs will be sealed to prevent the escape of hydrogen sulfide.
2) Any wellhead pressure generated by groundwater off-gassing needs to be monitored using a separate sensor for water level compensation.
3) Wells with transducers need to be constructed with aboveground manifolds for instrument connections and to avoid flooding.
4) A manual water level access port needs to be incorporated to confirm and calibrate automated measurements.
5) Material selection needs to be compatible with the water and subsurface atmosphere.

**Basis for Design Modification:** Subslab soil saturation and groundwater levels vary beneath the site and may affect the PFE induced by an EX well. Continuous subslab water level monitoring is required to understand the relationship between changes in the PFE and subslab water levels across Building 4 area. Once the system is wired to the panel, the proposed design modification will allow this data to be viewed remotely.

# 4. Rough-Order-of-Magnitude Cost Development

Development of a rough-order-of-magnitude cost estimate inclusive of modifications to the existing system and long-term O&M (assume full-time operation) will be completed at 60 percent design.

# 5. Project Delivery and Completion Strategy

## 5.1 Design Approach

This 30 percent design provides a summary of the proposed modifications to the existing SSDS and basis for the modifications. The 60 percent and 90 percent designs will provide further details on proposed instruments, system datalogging, and control system design and functionality.

## 5.2 Division of Responsibilities

This section presents a summary of the division of responsibilities between HCC, Evans, and Jacobs to modify the SSDS. The detailed (90 percent) design will provide technical scopes of work to support completion of the tasks described as follows.

### 5.2.1 Hampshire Chemical Corp.

HCC will complete the following tasks in support of the SSDS modifications:

- Purchase instrumentation and materials.
- Provide Evans with copies of equipment and instrument installation and operational manuals.
- Subcontract equipment for purchase.

### 5.2.2 Evans Chemetics

Evans Chemetics will complete the following tasks in support of the SSDS modifications:

- Provide technical support, review, and approval of system modifications.
- Submit the operational flexibility air permitting to allow treating the subslab vapor in S-6 scrubber, if needed.
- Provide daily safe work permitting and coordinate HCC contractor activities with site operations.
- Receive and store equipment and materials purchased by Jacobs or HCC.
- Provide office space for Jacobs' onsite construction supervisor.
- Manage O&M of the blower and S-6 scrubber.
- Provide local support with SSDS operations for simple, short-term tasks.

### 5.2.3 Jacobs

Jacobs will complete the following tasks in support of the SSDS modifications:

- Prepare design of SSDS system modifications.
- Prepare scopes of work for construction activities.
- Procure subcontractors.
- Provide construction management of the Phase 3 system modifications.
- Prepare sampling and analysis plan and operating procedures for Phase 3 of the pilot test.
- Prepare the operational flexibility air permitting notification to allow treating the subslab vapor in S-6 scrubber, as needed.

- Provide staff to implement the Phase 3 pilot test fieldwork.
- Subcontract instrumentation and mechanical contractors.
- Complete the installation and fabrication of the system modification design.

## 5.3 Process Hazard Analysis Overview

In early 2019, HCC, Evans Chemetics, and Jacobs conducted a process hazard analysis (PHA) to evaluate and mitigate the potential hazards associated with the SSDS operations). In July 2019, a final PHA was completed to review the final pilot test design prior to construction and pilot testing. Previous PHAs were completed in support of installing subslab extraction points, sampling probes, and sampling subslab vapors and water (Appendix D).

During the Phase 3 60 percent design, a PHA will be conducted to review the proposed system modifications. Layers of protection identified during Phase 1 and 2 of the pilot test will be revisited as part of the PHA to confirm they remain protective of personnel and property.

# 6. Pilot Test Operations and Monitoring

Phase 3 of the pilot test will be continuously operated for 30 days. System operations will be remotely monitored by Jacobs, and Jacobs will coordinate local support with Evans, as needed. The following guidance documents will be developed as part of the pilot test design and operations:

- Remedial Design Work plan updated for Phase 3 of the pilot test.
- Sampling and analysis plan that outlines detailed objectives for the SSDS pilot test, including data collection, sample analysis, project action limits, quality assurance, health and safety actions, and a detailed field schedule.
- A comprehensive field manual, which includes the following:
  - Commissioning information that includes step-by-step instructions on operating the SSDS pilot test system on clean air to confirm proper functionality of the valves and instruments. The scrubber will first be operated on clean air at the anticipated SSDS pilot test flow rates.
  - Step-by-step instructions on how to safely introduce subslab gases into the SSDS pilot test system, including stop criteria.
  - Performance monitoring worksheets and flow charts to support clear and concise data collection for the required monitoring.
  - System shutdown information that includes step-by-step instructions on how to stop the pilot system operations, safely remove subslab gases from parts throughout the SSDS pilot test system, and safely complete short-term decommissioning of the system.

# 7. Permitting

Vapor emission calculations will be prepared in support of air permitting for the Phase 3 pilot test during the 60 percent design. If the potential-to-emit vapor emissions are below Evans Chemetics' existing air permit limits, which is expected, only a notification letter is required for the Phase 3 pilot test and will be submitted by Evans as part of the 60 percent design.

The Phase 1 and 2 potential-to-emit vapor emissions were below Evans Chemetics' existing air permit limits; thus, a notification letter was required for the Phase 1 and 2 pilot tests. On January 3, 2019, a preliminary pilot test notification letter was submitted to NYSDEC per Air Permit 8-4538-00003/00099 requirements (Evans). An updated pilot test notification letter, which incorporated emissions calculations that included data collected in March 2019, was submitted to NYSDEC per Air Permit 8-4538-00003/00099 requirements on June 7, 2019. NYSDEC acknowledged and authorized the changes described in Evans Chemetics' June 7 letter in a notification received on June 27, 2019.

# 8. Schedule

The following summarizes the proposed pilot test design schedule.

| Task | Schedule |
|---|---|
| 30 percent Design Review | March 2022 |
| PHA Review | April 2022 |
| Installation of Groundwater Monitoring Levels | May to June 2022 |
| 60 percent Design | February to May 2022 |
| 90 percent Design | May to June 2022 |
| Fabrication and Installation of System Modifications | July to August 2022 |
| Phase 3 Pilot Test Operation | August to September 2022 |

# 9. References

American National Standards Institute/American Association of Radon Scientists and Technologists. 2017, revised. *Soil Gas Control Systems in New Construction*.

CH2M HILL Engineers, Inc. (CH2M). 2016. *Evaluation of Vapor Concentrations in AOC B (Building 4) and AOC D (Building 3) at the Former Hampshire Corp. Facility, Waterloo, New York.*

CH2M HILL Engineers, Inc. (CH2M). 2017. *Evaluation of Subslab Hydrogen Sulfide and Methane Concentrations Technical Memorandum*.

Evans Chemetics. 2019. Pilot Test Notification Letter. Submitted to New York State Department of Environmental Conservation. January 3.

Evans Chemetics. 2019. *Pilot Study Notification for State Facility Air Permit #8-4538-00003/00099*. Submitted to New York State Department of Environmental Conservation. June 7.

New York State Department of Environmental Conservation (NYSDEC). 2018. Response letter and approval of the *Evaluation of Subslab Hydrogen Sulfide and Methane Concentrations Technical Memorandum*. June 2727.

New York State Department of Environmental Conservation (NYSDEC). 2010. DER-10, *Technical Guidance for Site Investigation and Remediation.* May.

New York State Department of Environmental Conservation (NYSDEC). 2019. *Response to Notification of Change under Operation Flexibility*. March 1.

New York State Department of Health. 2006. *Final: Guidance for Evaluating Soil Vapor Intrusion in the State of New York.* October.

# Figures


LEGEND

- Shallow resistance temperature detector (RTD)
- Deep resistance temperature detector
- Groundwater monitoring well
- Subslab depressurization system (SSDS) extraction well
- Vapor sampling / radius of influence (ROI) monitoring location

0 feet 25

**Figure 1**

**Existing Subslab Depressurization System Extraction and Monitoring Locations**

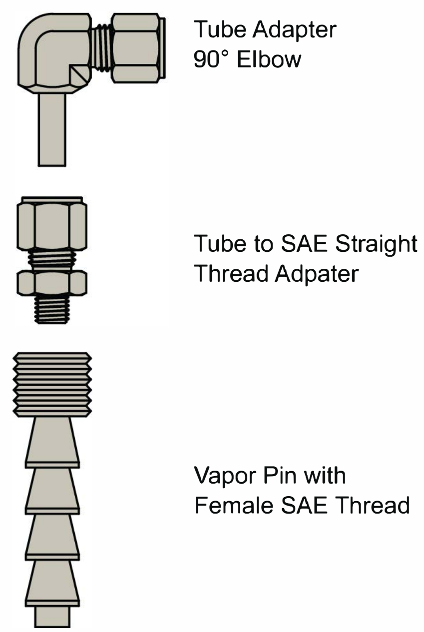
Building 4 Vapor Intrusion Mitigation Pilot Test - Modifications to Existing Subslab Depressurization System

30% Basis of Design

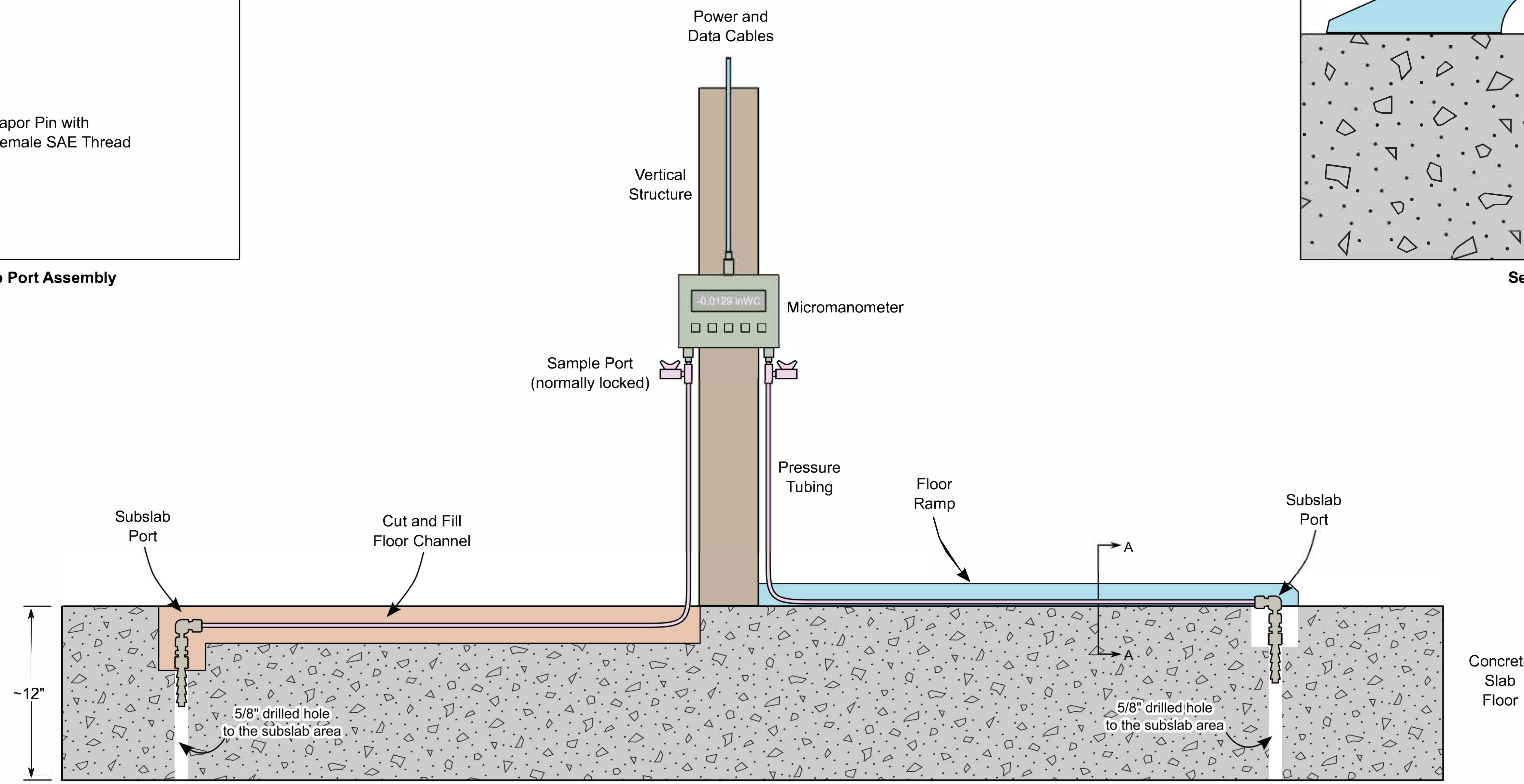
*Former Hampshire Chemical Corp.*

*Waterloo, NY*

Jacobs

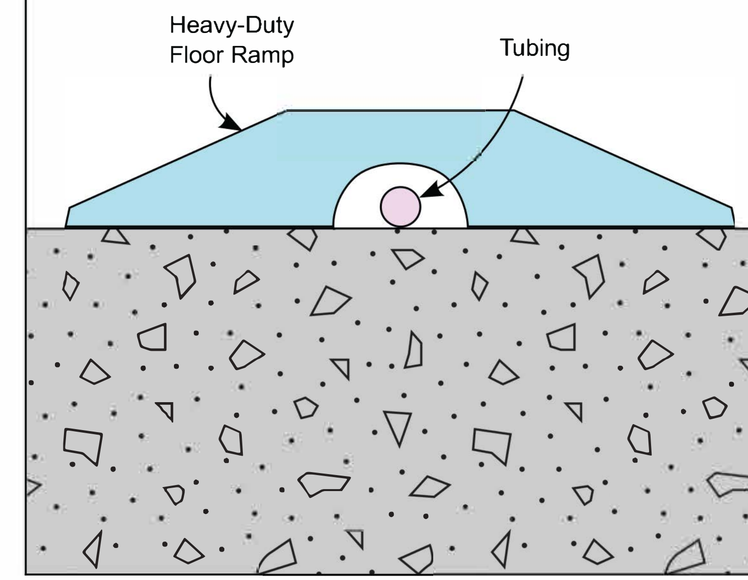



**Possible Subslab Port Assembly**




**Option 1. Probe and tubing installed below grade.**

**Option 2. Probe and tubing installed partially above grade**




**Section A**

**Figure 3**
**Concepts for Pressure Field Extension Monitoring, Subslab Vapor Port Assembly, and Micromanometer Installation**
Building 4 Vapor Intrusion Mitigation Pilot Test - Modifications to the Existing Subslab Depressurization System
30% Basis of Design
*Former Hampshire Chemical Corporation*
*Waterloo, New York*

Notes:
1. Not to scale

Jacobs

# Appendix A
# Design Drawings

# INDEX TO DRAWINGS

| SHEET NO. | DRAWING NO. | TITLE |
|---|---|---|
| GENERAL | | |
| 1 | G-001 | INDEX TO DRAWINGS |
| PROCESS | | |
| 2 | M-001 | PIPING AND INSTRUMENTATION DIAGRAM LEGEND |
| 3 | M-002 | PIPING AND INSTRUMENTATION DIAGRAM |
| 4 | E-101 | FLOOR PLAN - GROUND LEVEL POWER PLAN |

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| 2 | 2/7/2022 | DRAWING MARK-UPS FOR SYSTEM MODIFICATIONS | EBW | JCH |
| 1 | 3/13/20 | CONSTRUCTION REDLINE | JCH | PK |
| 0 | 8/13/19 | ISSUE FOR CONSTRUCTION | EBW | KR |

DSGN J MCMURREN | DR P KARABAN | CHK C JOHNSON | APVD E WEINHOUSE

WATERLOO SSDS PILOT TEST
WATERLOO, NEW YORK
FORMER NEW HAMPSHIRE
CHEMICAL CORPORATION

JACOBS

INDEX TO DRAWINGS

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE JANUARY 2022
PROJ 707538
DWG G-001
SHEET 1 of 4

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# INSTRUMENTATION IDENTIFICATION

## EXAMPLE SYMBOLS

CLARIFYING ABBREVIATIONS
BB
DEVICE ABBREVIATION
FIT
YYYA
ALPHABETICAL SUFFIX
LOOP NUMBER

Copy from SC-OR

FE — FIELD MOUNTED INSTRUMENT

FY I/I — REAR-OF-PANEL MOUNTED INSTRUMENT

FIC — PANEL MOUNTED INSTRUMENT

YL 00 — MOTOR CONTROL CENTER MOUNTED INSTRUMENT

## SPECIAL CASES

HS 00 — ON-OFF HAND SWITCH. MAINTAINED CONTACT SWITCH (CONTROLLED DEVICE WILL RESTART ON A RETURN OF POWER AFTER POWER FAILURE)

HS SS — STOP-START HAND SWITCH MOMENTARY CONTACT SWITCH (CONTROLLED DEVICE WILL NOT RESTART ON RETURN OF POWER AFTER POWER FAILURE)

YL ON PLC-X — OIT DISPLAY/FUNCTION ASSOCIATED WITH PLC INPUT/OUTPUT SIGNAL WIRED TO NOTED PLC PANEL

## INSTRUMENT IDENTIFICATION LETTERS TABLE

| LETTER | FIRST LETTER (S): PROCESS OR INITIATING VARIABLE | FIRST LETTER (S): MODIFIER | SUCCEEDING LETTERS: READOUT OR PASSIVE FUNCTION | SUCCEEDING LETTERS: OUTPUT FUNCTION | SUCCEEDING LETTERS: MODIFIER |
|---|---|---|---|---|---|
| A | ANALYSIS (+) | | ALARM | | |
| B | BURNER FLAME | | USERS CHOICE (+) | USERS CHOICE (+) | USERS CHOICE (+) |
| C | CONDUCTIVITY | | | CONTROL | |
| D | DENSITY (S.G) | DIFFERENTIAL | | | |
| E | VOLTAGE | | PRIMARY ELEMENT | | |
| F | FLOW RATE | RATIO | | | |
| G | GAUGE | | GLASS | GATE | |
| H | HAND (MANUAL) | | | | HIGH |
| I | CURRENT | | INDICATE | | |
| J | POWER | SCAN | | | |
| K | TIME OR SCHEDULE | | | CONTROL STATION | |
| L | LEVEL | | LIGHT (PILOT) | | LOW |
| M | MOTION | | | | MIDDLE |
| N | MOISTURE | | USERS CHOICE (+) | USERS CHOICE (+) | USERS CHOICE (+) |
| O | USERS CHOICE (+) | | ORIFICE | | |
| P | PRESSURE (OR VACUUM) | | POINT (TEST CONNECTION) | | |
| Q | QUANTITY | INTEGRATE | INTEGRATE | | |
| R | | | RECORD OR PRINT | | |
| S | SPEED OR FREQUENCY | SAFETY | | SWITCH | |
| T | TEMPERATURE | | | TRANSMIT | |
| U | MULTIVARIABLE (+) | | MULTIFUNCTION | MULTIFUNCTION (+) | MULTIFUNCTION (+) |
| V | VISCOSITY | | | VALVE OR DAMPER | |
| W | WEIGHT OR FORCE | | WELL | | |
| X | UNCLASSIFIED (+) | | UNCLASSIFIED (+) | UNCLASSIFIED (+) | UNCLASSIFIED (+) |
| Y | EVENT | | | RELAY OR COMPUTE (+) | |
| Z | | | | DRIVE, ACTUATE OR UNCLASSIFIED FINAL CONTROL ELEMENT | |

TABLE BASED ON THE INTERNATIONAL SOCIETY OF AUTOMATION (ISA) STANDARD.

(+) WHEN USED, EXPLANATION IS SHOWN ADJACENT TO INSTRUMENT SYMBOL. SEE ABBREVIATIONS.

## PLC INTERFACES

- ▲ ANALOG INPUT (4-20mA DC)
- ▼ ANALOG OUTPUT (4-20mA DC)
- △ DISCRETE INPUT (24 VDC OR 120VAC)
- ▽ DISCRETE OUTPUT (DRY CONTACT, 120VAC)

## VALVE SYMBOLS

GATE
KNIFE GATE
BUTTERFLY
GLOBE
BALL
PLUG
SEAT PORT ECCENTRIC PLUG
PINCH
NEEDLE
DIAPHRAGM
SWING CHECK
BALL CHECK
SAMPLE
PRESSURE RELIEF
AIR AND/OR VACUUM RELEASE
REGULATED SIDE PRESSURE CONTROL
PRESSURE RELIEF (IN-LINE)
BACKFLOW PREVENTER

## ACTUATOR SYMBOLS

M Z XX — ELECTRIC W/ POSITIONER
XX — PNEUMATIC W/ SOLENOID
H XX — HYDRAULIC
S XX — SOLENOID

NOTE:
ON LOSS OF PRIMARY POWER (PNEUMATIC, ELECTRICAL OR HYDRAULIC)
XX: FO = FAIL OPEN
FC = FAIL CLOSED
FLP = FAIL TO LAST POSITION

## GATE SYMBOLS

SLUICE
SLIDE GATE
SLIDE GATE WITH OPERATOR
FLAP GATE

## PRIMARY ELEMENT SYMBOLS

ORIFICE PLATE
M — ELECTROMAGNETIC FLOWMETER
LS — LEVEL (FLOAT)
THERMAL MASS FLOWMETER
LS — CONDUCTIVE TIP LEVEL SWITCH
SUBMERSIBLE PRESSURE TRANSDUCER
LE — LEVEL (ULTRASONIC)
FI — ROTAMETER

LEL — LOWER EXPLOSIVE LIMIT

## MISCELLANEOUS SYMBOLS

AIR GAP DRAIN
DR
V — VENT TO ATMOSPHERE
DIAPHRAGM SEAL
ANNULAR SEAL
A — AUTOMATIC DRAIN TRAP
R — RELAY
FLEXIBLE CONNECTION
I OR — INTERLOCK, SEE CONTROL DIAGRAMS
CALIBRATION COLUMN
120VAC — 120 VOLT, 60-HZ POWER
480VAC — 480 VOLT, 3-PHASE, 60-HZ POWER
WYE STRAINER
ISR — INTRINSICALLY SAFE RELAY
T — MANUAL DRIP TRAP
FILTER
S — SEAL WATER SET
F — FLUSHING CONNECTION
HOSE ADAPTOR
M — MOTOR
SP — SURGE PROTECTOR
PULSATION DAMPENER
RADIO ANTENNA
ISB — INTRINSICALLY SAFE BARRIER

## FLOW STREAM IDENTIFICATION

- DR — DRAIN
- RS — RAW SEWAGE
- SRS — SCREENED RAW SEWAGE

## ABBREVIATIONS

| | |
|---|---|
| ~~ACK~~ | ~~ACKNOWLEDGE~~ |
| ~~AFD~~ | ~~ADJUSTABLE FREQUENCY DRIVE~~ |
| AUTO | AUTOMATIC |
| ~~ATS~~ | ~~AUTOMATIC TRANSFER SWITCH~~ |
| ~~BTD~~ | ~~BEARING TEMPERATURE DETECTOR~~ |
| ~~$CL_2$~~ | ~~CHLORINE~~ |
| CMD | COMMAND |
| CP | CONTROL PANEL |
| ~~CS~~ | ~~CONSTANT SPEED, CONTROL STATION~~ |
| EMERG | EMERGENCY |
| ~~FWD~~ | ~~FORWARD~~ |
| ~~GCP~~ | ~~GENERATOR CONTROL PANEL~~ |
| ~~GEN~~ | ~~GENERATOR~~ |
| HOA | HAND-OFF-AUTO |
| ~~IPS2~~ | ~~INFLUENT PUMP STATION #2~~ |
| LCP | LOCAL CONTROL PANEL |
| LOR | LOCAL-OFF-REMOTE |
| LOS | LOCKOUT STOP |
| LR | LOCAL-REMOTE |
| ~~MA~~ | ~~MANUAL-AUTO~~ |
| ~~MCC~~ | ~~MOTOR CONTROL CENTER~~ |
| MFR | MANUFACTURER |
| ~~MPD~~ | ~~MOTOR PROTECTION DEVICE~~ |
| ~~MS~~ | ~~MOTOR STARTER~~ |
| ~~MLD~~ | ~~MOTOR LEAKAGE DETECTOR~~ |
| MSC | MANUFACTURER SUPPLIED CABLE |
| ~~MTD~~ | ~~MOTOR TEMPERATURE DETECTOR~~ |
| OC | OPEN-CLOSE (D) |
| OCR | OPEN-CLOSE-REMOTE |
| OCA | OPEN-CLOSE-AUTO |
| OIT | OPERATOR INTERFACE TERMINAL |
| OL | OVERLOAD |
| OO | ON-OFF |
| OOA | ON-OFF-AUTO |
| OOR | ON-OFF-REMOTE |
| OSC | OPEN-STOP-CLOSE |
| ~~PCP~~ | ~~PLANT CONTROL PANEL~~ |
| pH | HYDROGEN ION CONCENTRATION |
| ~~PIPS~~ | ~~PRIMARY INFLUENT PUMP STATION~~ |
| PLC | PROGRAMMABLE LOGIC CONTROLLER |
| POS | POSITION |
| ~~PS~~ | ~~PUMP STATION~~ |
| ~~QTY~~ | ~~QUANTITY~~ |
| ~~REV~~ | ~~REVERSE~~ |
| ~~RIO~~ | ~~REMOTE I/O~~ |
| ~~RSL~~ | ~~RAISE-STOP-LOWER~~ |
| ~~RTU~~ | ~~REMOTE TELEMETRY UNIT~~ |
| ~~RVSS~~ | ~~REDUCED VOLTAGE SOLID STATE~~ |
| ~~SEQ~~ | ~~SEQUENCE~~ |
| SP | SET POINT |
| SPD | SPEED |
| SS | START - STOP |
| TJB | TERMINAL JUNCTION BOX |
| ~~UPS~~ | ~~UNINTERRUPTIBLE POWER SUPPLY~~ |
| ~~UV~~ | ~~ULTRAVIOLET~~ |
| VFD | VARIABLE FREQUENCY DRIVE |

## SELF CONTAINED VALVE & EQUIPMENT TAG NUMBERS

D-W-X-Y

D: ARV = AIR RELEASE VALVE
AS = AIR SEPARATOR
ASV = ANTI-SYPHON VALVE
AVRV = AIR AND VACUUM RELEASE VALVE
BPCV = BACK PRESSURE REGULATING VALVE
E = EDUCTOR
ECU = EVAPORATIVE COOLER UNIT
FAN = FAN, SUPPLY OR EXHAUST
FCV = FLOW CONTROL VALVE
G = GATE
LCV = LEVEL CONTROL VALVE
M = MECHANICAL EQUIPMENT
MXR = MIXER
P = PUMP
PCV = PRESSURE CONTROL VALVE
PVRV = PRESSURE/VACCUM RELIEF VALVE
PSE = RUPTURE DISK
PSV = PRESSURE RELIEF VALVE
SV = SOLENOID VALVE
T = TANK
TCV = TEMPERATURE CONTROL VALVE
W = FACILITY DESIGNATION
X = COMPONENT NUMBER
Y = UNIT NUMBER

## INTERFACE SYMBOLS & LINE LEGEND

S A = PROCESS INTERFACE a D
S A = SIGNAL INTERFACE a D

A,a =INTERFACE LETTER
D =DESTINATION SHEET NO.
S =SOURCE SHEET NO.

N — PROCESS OR SIGNAL LINE CONTINUATION N=1,2,3,ETC — N

- PROCESS LINE
- ANALOG SIGNAL
- DISCRETE SIGNAL
- MOTOR POWER (P)
- ETHERNET (E)
- SERIAL (RS-232) (S)
- DIGITAL COMMUNICATIONS

CONNECTING LINES

INTERFACE TO OR FROM PROCESS EXTERNAL TO PROJECT

## PUMP SYMBOLS

NOTE: XX : AS ADJUSTABLE SPEED
CS-1 CONSTANT SPEED (SINGLE SPEED)
CS-2 CONSTANT SPEED (TWO SPEED)

XX — CENTRIFUGAL PUMP (DRY PIT)
XX — CENTRIFUGAL WET PIT PUMP OR TURBINE PUMP
XX — CHEMICAL FEED PUMP
XX — DIAPHRAGM PUMP
PROGRESSIVE CAVITY PUMP
INLINE BOOSTER PUMP
INJECTOR/ EDUCTOR
XX — SUBMERSIBLE SUMP PUMP
XX — ROTARY SCREW COMPRESSOR
XX — CENTRIFUGAL BLOWER
PERISTALTIC PUMP

Copy from SC-OR

## GENERAL NOTES

1. THIS A STANDARD LEGEND, THEREFORE NOT ALL OF THIS INFORMATION MAY BE USED ON THIS PROJECT.
2. ~~COMPONENTS AND PANELS SHOWN WITH A (◆) ARE SPECIFIED UNDER SECTION PROCESS INSTRUMENTATION AND CONTROL SYSTEM.~~
2. COMPONENTS AND PANELS SHOWN WITH A DOUBLE (✱✱) ARE PART OF A PACKAGE SYSTEM; SEE EQUIPMENT SPECIFICATIONS.

| NO. | DATE | REVISION | BY | APVD |
|---|---|---|---|---|
| 3 | 2/7/2022 | DRAWING MARK-UPS FOR SYSTEM MODIFICATIONS | EBW | JCH |
| 2 | 3/10/20 | AS-BUILT DRAWINGS | EBW | KR |
| 1 | 10/10/19 | ELECTRICAL AND INSTRUMENTATION UPDATES BASED ON DESIGN CHANGES | JCH | JK/RV |
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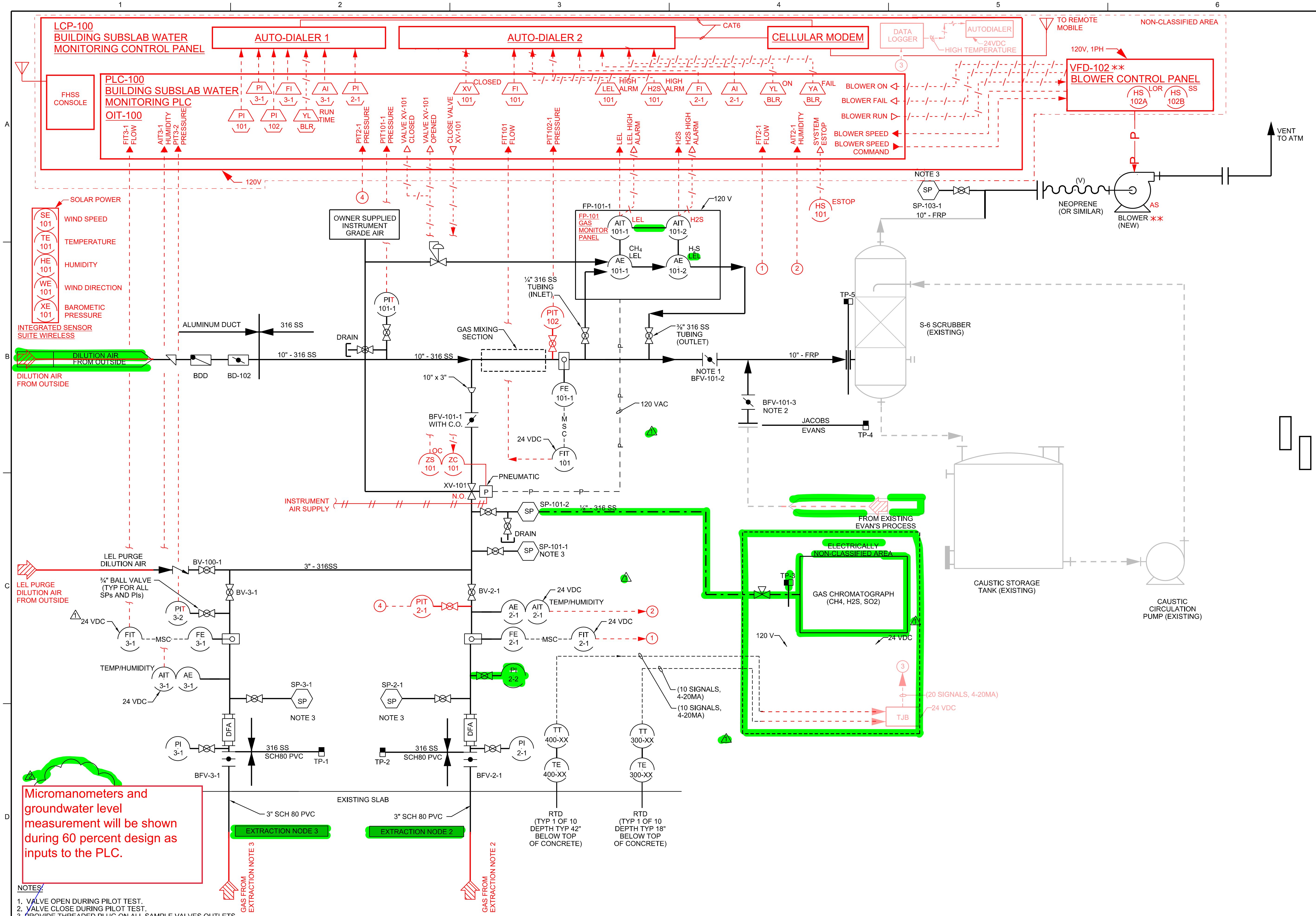
WATERLOO, NEW YORK
FORMER NEW HAMPSHIRE CHEMICAL CORPORATION

PIPING AND INSTRUMENTATION DIAGRAM LEGEND

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

| | |
|---|---|
| DATE | JANUARY 2022 |
| PROJ | 707538 |
| DWG | M-001 |
| SHEET | 2 of 4 |

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PLOT DATE: 2020\03\25 PLOT TIME: 10:42:15 PM

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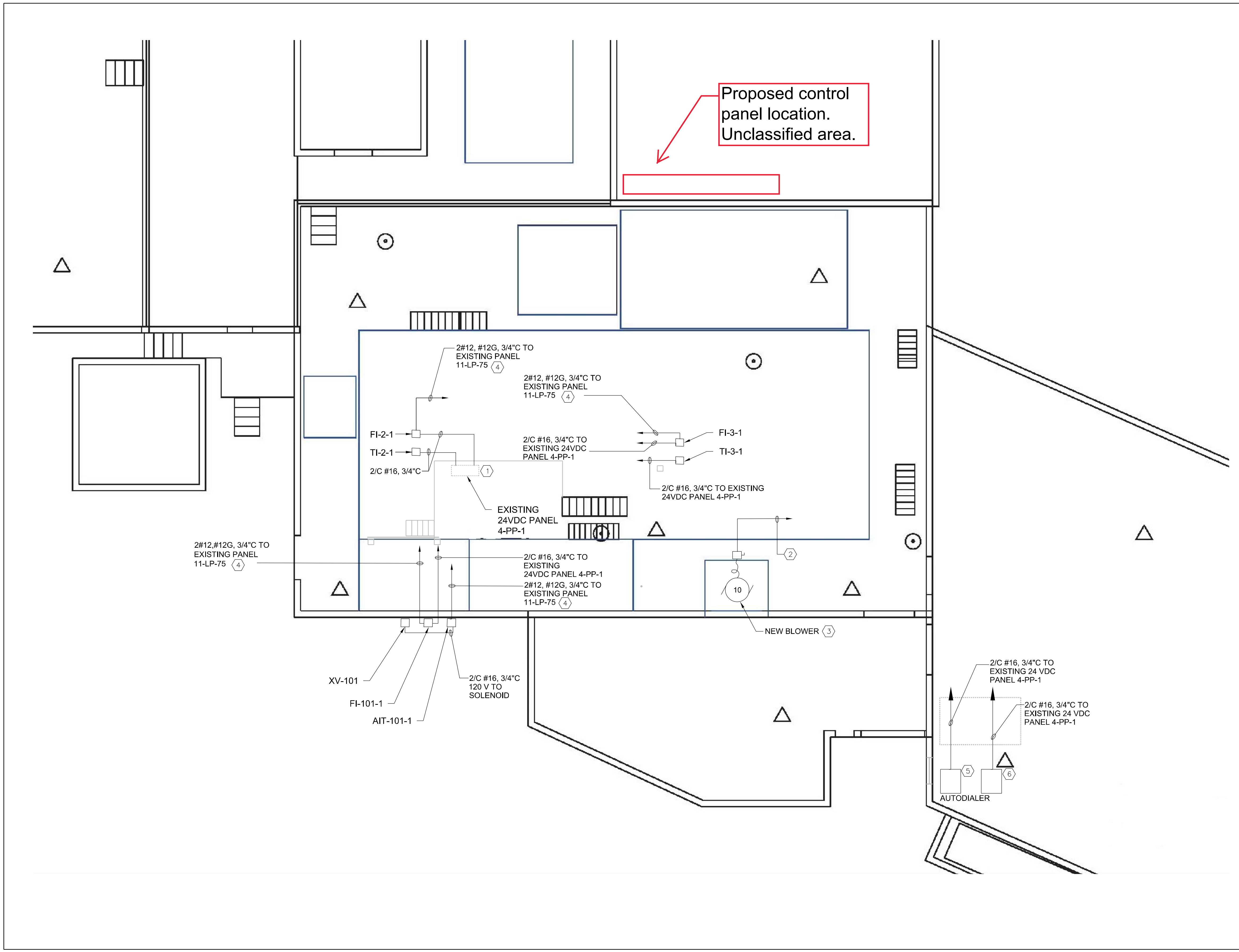


# FLOOR PLAN - GROUND LEVEL - POWER PLAN

1/8"=1'-0"

## GENERAL SHEET NOTES

A. ELECTRICAL INSTALLATIONS INSIDE THE BUILDING SHALL COMPLY WITH CLASS I, DIVISION 2 REQUIREMENTS. AREAS OUTSIDE THE BUILDING ARE GENERAL PURPOSE.

B. ELECTRICAL CONDUIT "HOMERUNS" ARE DIAGRAMMATIC IN NATURE. EXACT CONDUIT ROUTING TO BE COORDINATED IN THE FIELD.

C. REFER TO MECHANICAL DRAWING FOR EXACT LOCATION OF INSTRUMENTS.

## SHEET KEYNOTES

1. TERMINATION POINTS IN EXISTING 24VDC 4-PP-1 PANEL TO BE COORDINATED IN FIELD.

2. BLOWER TO BE CONTROLLED FROM A NEW VFD TO BE INSTALLED IN EXISTING VFD PANEL LOCATED IN BUILDING 11 (LOCATION TO BE DETERMINED IN FIELD). VFD TO BE FURNISHED BY JACOBS (EQUAL TO YASKAWA CIMR-VU-4A-0023-FAA, WITH LCD INTERFACE MODEL JVOP-108) AND INSTALLED BY OWNER. VFD REMOTE LCD INTERFACE TO BE MOUNTED ON THE DOOR OF THE EXISTING VFD PANEL BY OWNER. FEEDER FROM VFD TO BLOWER WILL CONSIST OF 3/C #10 W/ 3-1/C #14G VFD CABLE IN 1" CONDUIT, TO BE FURNISHED BY JACOBS AND INSTALLED BY OWNER. INPUT POWER TO VFD AND CONTROL WIRING TO BE PROVIDED BY OWNER.

3. NEW BLOWER (MOUNTED ON ROOF) AND DISCONNECT SWITCH TO BE FURNISHED BY JACOBS AND INSTALLED BY OWNER.

4. 120VAC TO BE PROVIDED FROM EXISTING PANEL 11-LP-75 VIA EXISTING FIELD JUNCTION BOX "BLDG 4 FJB" (LOCATION TO BE DETERMINED IN FIELD). TERMINATION POINTS INSIDE BLDG 4 FJB TO BE COORDINATED IN FIELD. PROVIDE OVERCURRENT PROTECTION FOR EACH INSTRUMENT PER MANUFACTURERS RECOMMENDATIONS NOT TO EXCEED 20A).

5. PROVIDE 120V OUTLET AS NEEDED TO CONNECT DATALOGGER. OUTLET TO BE FED FROM EXISTING PANEL 11-LP-75 AND SHALL BE SUITABLE FOR THE ELECTRICAL AREA CLASSIFICATION.

6. PROVIDE A JUNCTION BOX OF APPROPRIATE SIZE WITH TERMINALS TO PROVIDE 24VDC LOOP POWER TO RTD'S 400-XX AND 300-XX SERIES (20 RTD'S IN TOTAL). REFER TO P&ID IN DRAWING M-001.

1

## LEGEND

INSTRUMENT LOCATION

HEAVY DUTY DISCONNECT SWITCH, 30A, 600V, 3-POLE, NON-FUSIBLE, NEMA 3R

MOTOR

CONDUIT HOMERUN CONDUCTOR, CONDUIT SIZE AND DESTINATION AS SHOWN

2/C#16,3/4"C

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JACOBS

ELECTRICAL
FLOOR PLAN - GROUND LEVEL
POWER PLAN

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

| | |
|---|---|
| DATE | FEBRUARY 2022 |
| PROJ | 707538 |
| DWG | E-101 |
| SHEET | 4 of 4 |

# Appendix B
# Photo Log

Building 11A looking southeast. Proposed PZ-08 (at gas meter) area

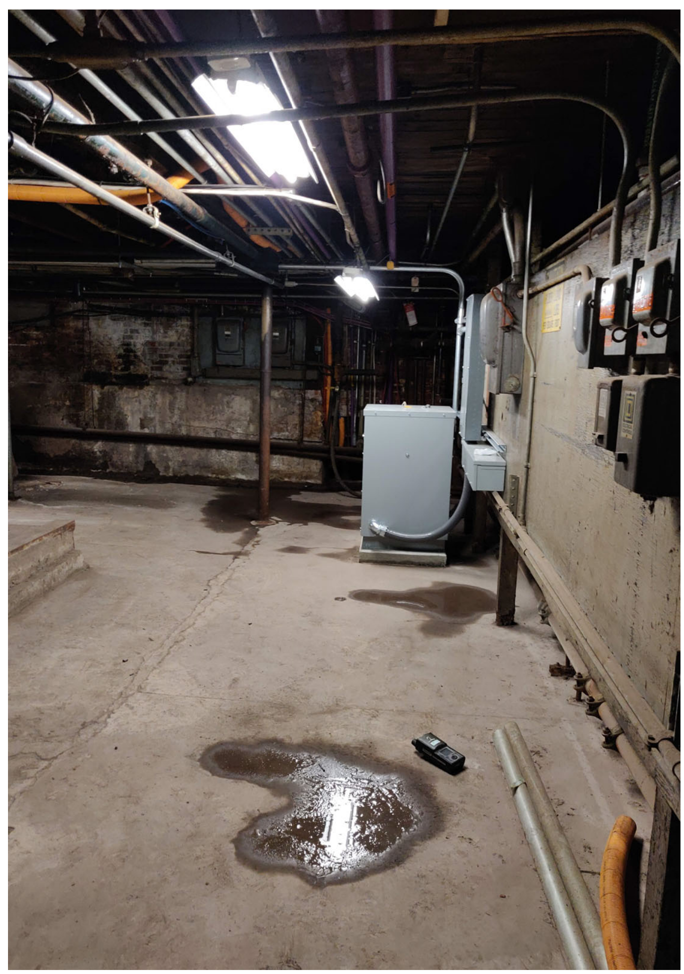
Building 11A looking south

Building 11A looking northeast

Building 11 looking southeast. Proposed PZ-11 Area.


Building 11 looking southwest

Building 11 looking west

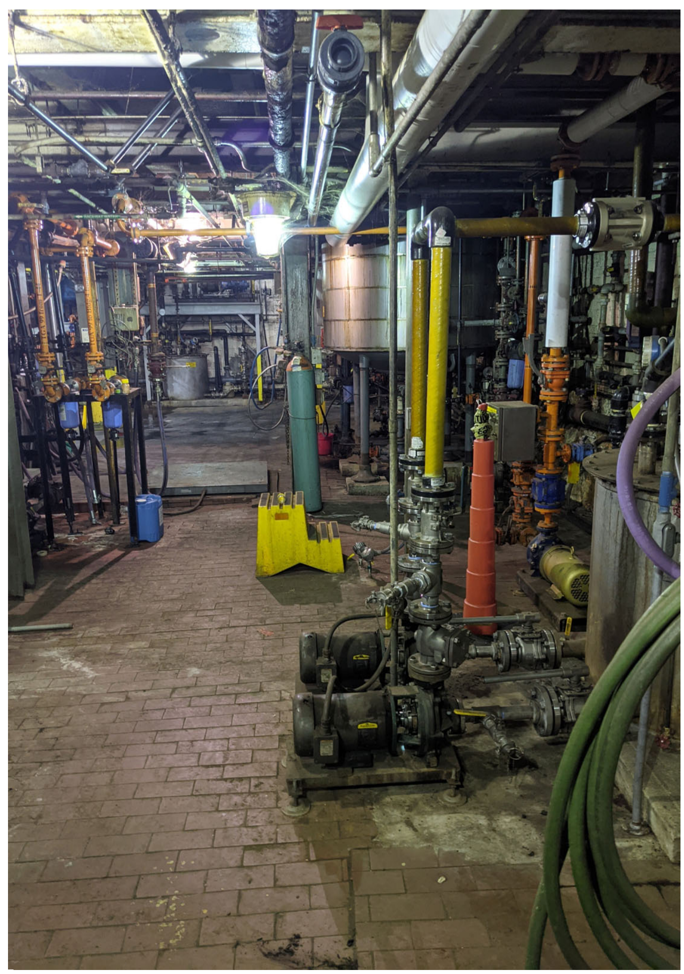


Building 11 looking east

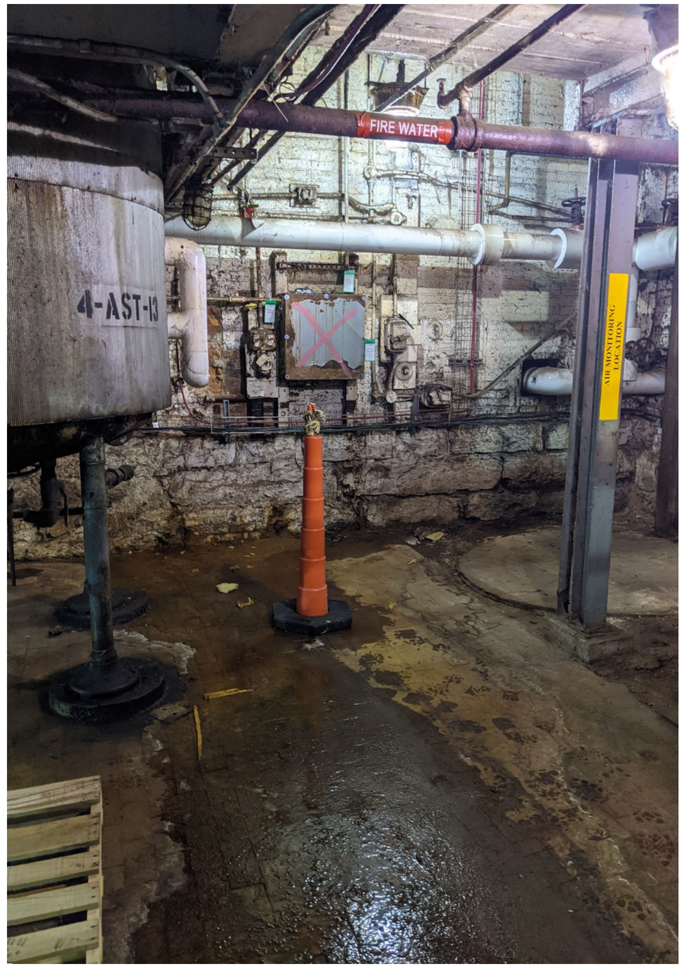

PZ-10 area looking northeast


PZ-10 (at cone) looking northeast


PZ-10 looking northwest


PZ-10 looking west


PZ-13 (at cone) looking southwest




PZ-13 looking north


PZ-13 looking northwest


PZ-09 area looking southeast

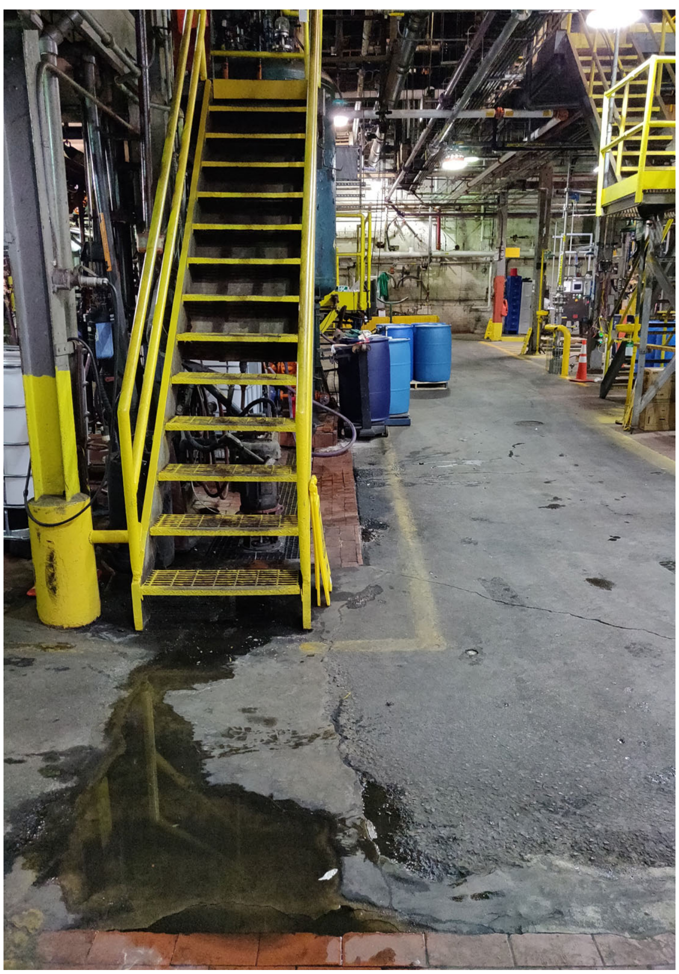

PZ-09 (at cone) looking east

PZ-09 looking northwest


PZ-09 looking nothwest


PZ-12 (at cone) looking northeast


PZ-12 looking east


SV-18 area looking east towards PZ-12


PZ-12 looking west

# Appendix C
# DeltaPilot Specification Sheet

# Hydrostatic Level measurement Deltapilot FMB53

## Pressure sensor with Contite measuring cell for hydrostatic level measurement


More information and current pricing:
www.us.endress.com/FMB53

**Benefits:**

- Hermetically sealed Contite measuring cell with condensate-resistance, high reference accuracy: ±0.2%, optionally ±0.1% and minimum temperature effects
- Modular concept for easy replacement of display or electronics
- Seamless and independent system integration (HART/PA/FF)
- Easy and safe menu-guided operation: On-site via display module, via 4 to 20mA with HART, via PROFIBUS PA, via FOUNDATION Fieldbus
- International usage thanks to a wide range of approvals

### Specs at a glance

- **Accuracy** Standard 0.2% Optional 0.1%
- **Process temperature** PE cable: -10°C...70°C / 14°F...158°F FEP cable: -10°C...80°C / 14°F...176°F
- **Pressure measuring range** 100mbar...10bar (1.5psi...150psi)
- **Process pressure absolute / max. overpressure limit** 40 bar (600 psi)
- **Main wetted parts** Alloy C 316L Cable (PE/FEP) optional coating AuPt optional coating AuRh

**Field of application:** The Deltapilot FMB53 is a cable version with mounting clamp. This device with the Contite measuring cell is typically used in the environmental industries. It is made for level measurement in liquid and paste-like media in open or closed containers and unaffected by possible foam formation. For use in SIL2 safety systems.

## Features and specifications

## Continuous / Liquids

**Measuring principle**

Hydrostatic

**Characteristic / Application**

Pressure transmitter for hydrostatic level measurement with flush mounted metallic Contite measuring cell:
Hermetically sealed, condensate-resistant and climatic-proofed
Cable version with suspension clamp

**Specialities**

Modularity to differential pressure and process pressure devices (replacable display, universal electronics)
diagnostic functions
Hermetically sealed Contite measuring cell (condensate-resistant and climatic-proofed)

**Supply / Communication**

4...20mA HART:
10,5...45V DC
Ex ia: 10,5...30V DC
PROFIBUS PA /
FOUNDATION Fieldbus:
9...32V DC (Non Ex)

**Accuracy**

Standard 0.2%
Optional 0.1%

**Long term stability**

0.05 % of URL/year

**Ambient temperature**

-40°C...85°C
(-40°F...185°F)

**Process temperature**

PE cable: -10°C...70°C / 14°F...158°F
FEP cable: -10°C...80°C / 14°F...176°F

## Continuous / Liquids

**Process pressure absolute / max. overpressure limit**
40 bar (600 psi)

**Pressure measuring range**
100mbar...10bar
(1.5psi...150psi)

**Main wetted parts**
Alloy C
316L
Cable (PE/FEP)
optional coating AuPt
optional coating AuRh

**Process connection**
Mounting clamp

**Max. measurement distance**
100 m (328 ft) H2O

**Communication**
4...20 mA HART
PROFIBUS PA
FOUNDATION Fieldbus

**Certificates / Approvals**
ATEX, FM, CSA, CSA C/US, IEC Ex, INMETRO, NEPSI

**Safety approvals**
SIL

**Design approvals**
EN10204-3.1
NACE MR0175

**Marine approval**
GL/ ABS/ LR/ BV/ DNV

## Continuous / Liquids

**Drinking water approvals**

KTW/ NSF/ ACS

**Options**

Initial device settings
Overvoltage protection

**Application limits**

If pressurized, usage of two pressure transmitters to measure the differential pressure (electronic dP)
Observe ratio head pressure : hydrostatic pressure

## Pressure

**Measuring principle**

Hydrostatic pressure

**Characteristic**

Pressure transmitter for hydrostatic level measurement with flush mounted metallic Contite measuring cell:
Hermetically sealed, condensate-resistant, climatic-proofed and with lowest temperature influences
Cable version with suspension clamp

**Supply voltage**

4...20 mA HART
10,5...45 VDC (Non Ex):
Ex ia: 10,5...30 VDC
PROFIBUS PA:
9...32 VDC (Non Ex)
FOUNDATION Fieldbus:
9...32 VDC (Non Ex)

**Reference Accuracy**

Standard 0.2%
Optional 0.1%

**Long term stability**

0.05 % of URL/year

## Pressure

**Process temperature**
PE cable: -10°C...70°C / 14°F...158°F
FEP cable: -10°C...80°C / 14°F...176°F

**Ambient temperature**
-40°C...85°C
(-40°F...185°F)

**Measuring cell**
100 mbar...10 bar
(1.5 psi...150 psi)

**Smallest calibratable span**
10 mbar (1.45 psi)

**Vacuum resistance**
0 mbar abs.

**Max. Turn down**
100:1

**Max. overpressure limit**
40 bar (600 psi)

**Process connection**
Mounting clamp

**Material process membrane**
316L, AlloyC,
Gold-Rhodium
PE, FEP

**Material gasket**
Viton, EPDM, Kalrez, none

**Fill fluid**
Inert oil,
Synthetic oil

## Pressure

**Material housing**
316L, Die-cast aluminum

**Communication**
4...20 mA HART
PROFIBUS PA
FOUNDATION Fieldbus

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**Safety approvals**
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**Design approvals**
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NACE MR0175

**Marine approvals**
GL/ ABS/ LR/ BV/ DNV

**Drinking water approvals**
KTW/ NSF/ ACS

**Specialities**
Modularity to differential pressure and process pressure devices
(replacable display, universal electronics)
Diagnostic functions

More information **www.us.endress.com/FMB53**

Endress+Hauser USA
United States
addresses.endress.com
info.us.sc@endress.com

Endress+Hauser