



***MIKE MANSFIELD  
ADVANCED TECHNOLOGY CENTER  
MSE FACILITY***



***Prepared by  
MSE Technology Applications, Inc.  
P.O. Box 4078  
200 Technology Way  
Butte, Montana 59702  
406-494-7100***

# Table of Contents

<b>Facility Information .....</b>	<b>1</b>
<b>Introduction.....</b>	<b>1</b>
Analytical Laboratory (#1).....	3
Resource Recovery Facility (#2) .....	3
Warehouse (#3) .....	3
Building 50 (#4) .....	3
Building 60 (#5) .....	4
Weld/Fabrication Shop (#6) .....	5
Machine Shop (#7) .....	5
Office Buildings (#8) .....	5
Liquid Nitrogen Storage, Vaporization, and Delivery System (#9).....	5
Building 20 .....	5
Intermediate-Scale Test Cell .....	6
Verification Test Cell .....	6
Settling and Evaporation Ponds.....	6
MSE Geoprobe Services .....	7
<b>Building 60 Description .....</b>	<b>7</b>
<b>Building 50 Description .....</b>	<b>9</b>
<b>Building 20 Description .....</b>	<b>12</b>
Material Processing System .....	12
Building 20 Utilities .....	13
<b>MSE Laboratory Building Description.....</b>	<b>15</b>
<b>Warehouse Building Description .....</b>	<b>16</b>
<b>Machine Shop Description.....</b>	<b>17</b>
<b>Fabrication Shop Description.....</b>	<b>19</b>
<b>Administration Office Building Description .....</b>	<b>21</b>
<b>Operations Office Building Description .....</b>	<b>23</b>
<b>Additional Photos .....</b>	<b>25</b>

## List of Figures

The Mansfield Center Is Secure, Adaptable, and Diverse.....	2
Building 60.....	7
Interior View of Testing Area.....	8
Building 50.....	9
Electrical Panels.....	10
Control Room on Second Floor .....	10
Tetragenics Circuit Board Assembly Shop .....	11
Building 20 – Dry Materials Handling.....	13
Railroad Spur which Services Site Adjacent to Building 20.....	14
MSE Laboratory .....	15
Warehouse Building .....	17
Machine Shop Interior.....	18
Fabrication Shop .....	19
Fabrication Shop Interior.....	20
Front of Administration Office Building.....	22
Interior View of Administration Office Building.....	22
Reception Area of Operations Office Building .....	23
Interior View of Operations Office Building .....	24
Large Conference Room of Operations Office Building.....	24
Secondary Cooling Tower Used with Testing.....	25
Access Road to Mansfield Center.....	25
Neighborhood View Looking South.....	26
Neighborhood View Looking North .....	26

---

# Facility Information

---

## Introduction

---

The MSE Technology Application's, Inc. (MSE) primary base of operations is located at the Mike Mansfield Advanced Technology Center (Mansfield Center), a large engineering, testing, and evaluation facility located on a 53-acre industrial site in Butte, Montana. The Mansfield Center has the necessary infrastructure to design, fabricate, develop, test and/or operate, any components, subsystems, or technologies.

The site is located near the intersection of I-15 and I-90, in close proximity to the municipal airport and a major railroad intersection connecting north-south Union Pacific and east-west Burlington Northern Santa Fe Corporation rail lines. The site has its own railroad spur that allows large-scale equipment and supplies to be delivered and transferred to clients.

All necessary local, state, and federal regulatory and environmental permits are in place to support the development of components, technologies, and processes. The Mansfield Center is in compliance with air, water, and waste disposal requirements.

The entire facility is fenced, with controlled access provided by a programmable gate to provide entry on any schedule.

The heart of the Mansfield Center is a high test bay structure (Building 60) with a floor area of 9000 square feet (90 feet by 100 feet). The entire area is served by a 10-ton overhead bridge crane. The test bay has a full-length service pit (25 feet deep) to accommodate tall equipment and process configurations. The test bay is also equipped with power distribution and service from on-site air, nitrogen, and plant cooling water systems. Services from these process systems are easily modified and provide excellent flexibility in servicing a variety of projects. Additionally, off-gas cleaning and wastewater handling equipment is installed to provide full, in-out service for projects in the test bay.

Other significant buildings and features located at the Mansfield Center include:

- 25,000 square foot (ft<sup>2</sup>) operations and service building (Building 50) attached to the test bay.
- 27,000 ft<sup>2</sup> dry materials handling and transport facility (Building 20).
- 12,000 ft<sup>2</sup> fabrication area (Fabrication Shop).
- 5,000 ft<sup>2</sup> analytical laboratory (MSE Laboratory) with additional area for treatability studies.
- 5,000 ft<sup>2</sup> machine shop that could be tailored to other uses, if necessary.
- 4,000 ft<sup>2</sup> secure warehouse to ensure accurate shipping and receiving of materials and products.
- 1-acre concrete storage pad.
- Wastewater storage and evaporation ponds.

- 400,000 gallon, full bladder, covered liquid storage tank.
- 20,000 ft<sup>2</sup> Operations Office building.
- 9,000 ft<sup>2</sup> Administration Office building.

Electrical service to the site is provided directly from a major transmission line, and the site has its own 20 MVA transformation and distribution system. Public water is supplied via a 12-inch water main, with a loop distribution at the site.

MSE's offices are equipped with IBM-compatible desktop computers integrated into a local area network. Color and black and white printers, plotters, and scanners are located throughout the office buildings and the facility. A Silicon Graphics Workstation equipped with 180MHz, RS 10000, 64-bit processor and Sun Ultra 60 Workstation and a Beowulf class computer are available for advanced numerical simulation and modeling.

An aerial photograph of the Mansfield Center is shown below with the major facilities or structures labeled. Capability descriptions of these facilities or structures are listed following the figure.



*The Mansfield Center Is Secure, Adaptable, and Diverse*

## ***Analytical Laboratory (#1)***

The MSE Laboratory is a commercial analytical laboratory equipped to perform inorganic analyses, bacterial analyses, and physical testing parameters on sample types including water, wastewater, soils, coal, tailings, ores, hazardous wastes, and airborne pollutants. The laboratory is certified by the Montana Department of Environmental Quality to analyze drinking water samples. All analyses follow stringent internal and external quality control measures. The laboratory is regularly audited by the State of Montana, U.S. Environmental Protection Agency's (EPA) Office of Research and Development, and private customers.



## ***Resource Recovery Facility (#2)***

This facility is adjacent to the Analytical Laboratory and was designed to accommodate laboratory-, bench-, intermediate-, and some full-scale treatability studies. Almost any kind of equipment can be brought into the Resource Recovery Facility (RRF), and processes can be tested for performance in a manner that will produce accurate and defensible data.

The RRF is equipped with two standard laboratory hood systems for ventilation. In addition, the facility has a large hood measuring 10 feet (ft) high by 14 ft wide by 7 ft deep that is designed in accordance with the National Fire Protection Association. The large laboratory hood provides 125-feet per minute of face velocity across the front opening of the hood, resulting in a volumetric air exchange of 17,500 cubic feet per minute (cfm), which provides 18 air exchanges in the hood per minute. The building also has compressed air; plant water; a 20-horsepower drum mixer; an electric lift; a flammables refrigerator; a centrifuge; two shaker tables; a heated shaker table; two drying ovens; water baths; liquid release test apparatus; several scales (from small-scale to drum-scale); a viscometer; conductivity, pH, and oxidation-reduction potential meters; temperature probes; data loggers; glassware; and other miscellaneous laboratory test equipment.



## ***Warehouse (#3)***

MSE maintains a critical stores and consumables warehouse to provide support for all projects based at the facility and to support materials shipping and receiving. The facility can receive deliveries by truck or rail to accommodate large shipments or bulk materials.

## ***Building 50 (#4)***

Building 50 has a Special Purpose Industrial Factory Group F-1 moderate hazard structure occupancy classification per the International Building Code (IBC). This allows the use of the building for assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair, or processing operations that are not classified as a Group H hazardous occupancy. Manufacturing and testing activities are allowed in this structure.

The ground floor of Building 50 is used for pilot- to intermediate-scale projects are conducted in this area that includes compressed air; plant water; a heating, ventilating, and air-conditioning system; and a small deionized water system. The space is equipped with refrigerators, a drying oven, a fiberglass flow tank used for flux measurements, and a band saw used to cut grout samples when necessary.



The ground floor of Building 50 also contains an Underwriters Laboratories (UL) Listed Panel Shop that manufactures custom control panels used in a variety of applications. MSE is certified with UL508A in the United States and Canadian Underwriters Laboratory (CUL) for industrial control panels. MSE's Industrial Control Panel Shop provides design, fabrication, wiring, and installation services. Panel applications include SCADA, pump/motor/process control, and security/remote monitoring.



The upper floor of Building 50 contains the Instrumentation and Control (I&C) shop and the MSE Tetragenics SCADA shop that develops systems for electric power generation stations, transmission lines, industrial building security systems, substations, and fresh water and wastewater management systems. SCADA systems are customized for specific applications and include operator requested features.

## ***Building 60 (#5)***

Building 60 has a High-Hazard Group H-1 structure occupancy classification per the IBC. This allows the storage and use of materials in the building that pose a detonation hazard such as explosives, oxidizers, and reactive materials. Manufacturing and testing activities are allowed in this structure.

The ground floor of Building 60 is a truss height high bay insulated steel building (including a pit area with ground level and intermediate depth level grating and a concrete bottom floor) with a reinforced concrete floor, overhead lighting, and heating and ventilation systems. Building 60 is set up for testing with a wet pipe fire suppression system and has walls that have integral blowout panels. Building 60 also has four axial fan power roof ventilators for exhaust ventilation of the building. Each power roof ventilator exhausts 23,000 cfm for a total exhaust rate of



92,000 cfm. The building has an overhead crane with trolley and hoist rated for maximum load of 10 tons, capable of coverage of entire Building 60. Large-scale projects are routinely conducted in Building 60.



The upper floor of Building 60 contains a state-of-the-art Control Room for remote monitoring and control of the projects conducted on the ground floor of the building. The control room uses fiber-optic switches to communicate with facility and test equipment. Multiple human-machine interface (HMI) stations can

be used for both control and monitoring of projects throughout the test areas. Additionally, camera and microphones are placed throughout Building 60. These images are displayed and recorded in the Control Room on both HMI personal computers as well as a large video wall display. The Control Room can be segregated for multiple projects or used for large-scale testing.

### ***Weld/Fabrication Shop (#6)***

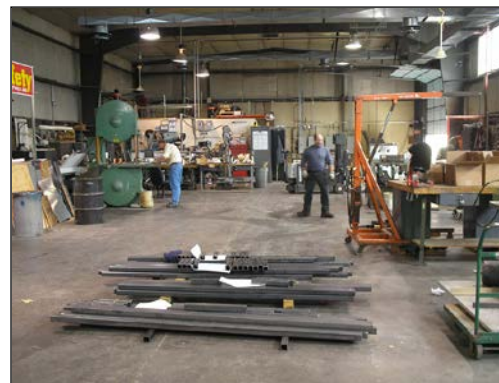


The Weld/Fabrication shop provides shield metal arc welding, gas tungsten arc welding, gas metal arc welding, and flux core arc welding. MSE has also welded a variety of plastic materials including acrylic, PVC, HDPE, LLDPE, polycarbonate, and polypropylene.

The welding bay can easily handle piping up through 8 ft in diameter and has procedures qualified for carbon steel, stainless steel, and exotic alloys. MSE can service any foreseeable equipment requirements, including specific tool development, repair, or modification.

### ***Machine Shop (#7)***

The Machine Shop is primarily used to develop original components, tools, and jigs or repair parts and equipment. The shop includes presses, a large radial drill, four knee milling machines, three lathes, metal punches, bench grinders, automated plasma cutting equipment, and vertical and horizontal band saws.



### ***Office Buildings (#8)***

The Mansfield Center includes two office building, which are connected by a breezeway.

### ***Liquid Nitrogen Storage, Vaporization, and Delivery System (#9)***

Liquid nitrogen is stored cryogenically at the facility and then vaporized and distributed to experiments and components as necessary. Liquid nitrogen storage capacity is up to 21,000 gallons and can be vaporized at 20,000 standard cubic feet per hour and delivered at pressures up to approximately 225 pounds per square inch.

### ***Building 20***

Building 20 is unique because it was designed for the specific purpose of pulverizing, drying, storing, and transporting coal for use in conducting magnetohydrodynamics (MHD) testing and development. Since then, the building has been used to produce Zeolite drilling mud material. Since the MPS has been used to process coal for the MHD program and Zeolite drilling mud, new coal processing and drilling mud business should be pursued by MSE. The focus should be maintaining and developing similar public/private sector business opportunities. The plan is to lease Building 20 and the MPS to firms for testing and development of new or experimental coal and other material processing systems and equipment. This would include bench scale and pilot plant scale processing systems. The potential process activities include:



- Rough crushing.
- Grinding.
- Pulverizing and drying.
- Screening/sizing of material.
- Packaging.

Potential product markets include:

- Coal.
- Drilling mud.
- Talc.
- Lime.
- Desiccant.
- Grain/livestock feed.
- Rough crushing gravel.

### ***Intermediate-Scale Test Cell***



This facility, originally constructed for the investigation of biologically enhanced barriers, is capable of testing a wide range of biogeochemical treatments at a scale that mimics actual field conditions. The test cell measures 180 ft by 130 ft and has a 20-ft maximum depth. Fully lined, the test cell also has a fluids management system and an array of wells that allows experiments over a range of saturations and groundwater velocities. This test cell is ideal for evaluating biogeochemical stabilization, sequestration, mobilization, and barrier technologies.

### ***Verification Test Cell***

MSE has an underground verification test cell to test and evaluate new geophysical techniques and equipment. The MSE verification test site resembles a small concrete basement that is backfilled with native soils from the site. While constructing the test cell, a number of flaws (holes in the "floor" and "walls") were created so that verification technology developers could determine the accuracy of the given technologies. Boreholes and instrumentation were installed in and around the cell to facilitate the development of nonintrusive verification technologies, including geophysical and soil gas sampling.

### ***Settling and Evaporation Ponds***

The Mansfield Center is plumbed with a system of drains, pipelines, and ponds to treat wastewater effluent (containing suspended solids) via settling only; process effluents containing dissolved contaminants are pretreated prior to discharge to the Butte-Silver Bow Wastewater Treatment Plant (POTW). The hypalon-lined, directly connected east and west evaporation ponds are situated along the north side of the Mansfield Center and west of the substation; water from the east pond can be discharged to the POTW. The holding capacity of each of these ponds is approximately 1.8 M gallons. Effluents from the major buildings (e.g., Buildings 50 and 60) are directed to the 0.4-M gallon capacity settling ponds located to the south of the Weld/Fabrication Shop. Decant from the "south" pond was sent via force main north to the west evaporation pond. All four of these ponds have a combined surface area of 1.2 acres and would require various degrees of repair before being placed back in service.

## ***MSE Geoprobe Services***

MSE maintains and operates one Geoprobe direct push rig. The Geoprobe rig is powerful and compact, and can perform in places that standard drilling equipment cannot. This unit is also more versatile than other geoprobe units and can perform a wide variety of tasks. Because the weight of the unit is evenly distributed over both tracks, the Model 66DT can easily maneuver through shallow water, soft sands, or muddy fields.



## **Building 60 Description**

Building 60 has the following architectural and utilities features:

- Building 60 has a High-Hazard Group H-1 structure occupancy classification per the IBC. This allows the storage and use of materials in the building that pose a detonation hazard such as explosives, oxidizers, and reactive materials. Manufacturing and testing activities are allowed in this structure.
- There is a railroad spur close to the building and a paved access to the Building 60 overhead door with an outdoor staging and equipment storage/lay-down area.
- Building 60 is a 90 ft length x 100 ft width x 30 ft truss height high bay insulated steel building (including a 25 ft length x 90 ft width x 25 ft depth pit area with ground level and intermediate depth level grating and a concrete bottom floor) with a reinforced concrete floor, overhead lighting, heating and ventilation systems. For the concrete floor, the ultimate compressive strength is 3,000 pounds per square inch (psi).



***Building 60***



*Interior View of Testing Area*

- Building 60 is set up for testing with a standard coverage wet pipe fire suppression system and walls that have integral blow-out panels.
- Building 60 has 4 axial fan power roof ventilators installed in the roof for exhaust ventilation of the building. Each power roof ventilator exhausts 23,000 cfm for a total exhaust rate of 92,000 cfm.
- Overhead crane with trolley and hook hoist rated for maximum load of 10 tons, capable of coverage of the entire building.
- Nitrogen gas piping system capable of 125 SCFM flow rate with a line pressure range of 120–250 psig.
- Natural gas piping system capable of nominal 2,000 CFH flow rate with a nominal line pressure of 0.25 psig.
- Plant Service water piping system with utility station drops located throughout Building 60, capable of delivering water at a nominal temperature of 60 °F and line pressure range of 60–70 psig.
- Plant Service/Instrument compressed air piping system with utility station drops located throughout Building 60, capable of delivering 190 SCFM flow rate with a line pressure range of 115-120 psig. Compressed air is oil-free and dried to a minimum dew point of -44°F.
- The MSE site electrical power is provided by a 20 MVA Substation. The Building 60 facility electrical infrastructure is capable of supporting a wide variety of manufacturing, fabrication, and testing processes. The utilization voltages available are:

- 3-phase, 3W, 4160 V.
- 3-phase, 4W, 480Y/277V.
- 3-phase, 4W, 208Y/120V.

## Building 50 Description

---

Building 50 has the following architectural and utilities features:

- Building 50 has a Special Purpose Industrial Factory Group F-1 moderate hazard structure occupancy classification per the IBC. This allows the use of the building for assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations that are not classified as a Group H hazardous occupancy. Manufacturing and testing activities are allowed in this structure.
- There is a railroad spur close to the building and a paved access to the Building 50 overhead door with an outdoor staging and equipment storage/lay-down area.
- Building 50 is a two-storied insulated steel building with lighting, and HVAC systems. Individual floors are described as follows:
  - The ground floor (reinforced concrete floor) is 152.5 ft length x 100 ft width x 21 ft height (including an electrical equipment room and laboratory/test area). For the concrete floor, the ultimate compressive strength of the concrete is 3,000 psi.
  - The second floor (solid floor) is 90 ft length x 100 ft width x 17 ft height (includes a 30 ft length x 32 ft width x 10 ft height t-bar suspended ceiling climate controlled control room with lay-in HVAC and lighting systems and vented/HVAC supply tile access flooring).



*Building 50*



*Electrical Panels*



*Control Room on Second Floor*



*Tetragenics Circuit Board Assembly Shop*

- The first and second floors have an HVAC system combined with hot water and electric unit heaters.
- Building 50 has a standard coverage wet pipe fire suppression system and a Halon fire suppression system in the control room.
- Nitrogen gas piping system capable of 125 SCFM flow rate with a line pressure range of 120–250 psig.
- Natural gas piping system capable of nominal 2,000 CFH flow rate with a nominal line pressure of 0.25 psig.
- Plant Service water piping system with utility station drops located throughout Building 50, capable of delivering water at a nominal temperature of 60°F and line pressure range of 60–70 psig.
- Plant Service/Instrument compressed air piping system with utility station drops located throughout Building 50, capable of delivering 190 SCFM flow rate with a line pressure range of 115–120 psig. Compressed air is oil-free and dried to a minimum dew point of -44°F.
- The MSE site electrical power is provided by a 20 MVA Substation. The building electrical infrastructure is capable of supporting a wide variety of manufacturing, fabrication, and testing processes. The electrical services to the Building 50/60 complex include the following:
  - Main switch gear-MSA: 3-phase, 3W, 4160V, 3000 amps.
  - 3-phase, 3W, 4160V motor control centers MCC-MA and MCC-MB.
  - Unit substation GSA: 1000/1333 KVA-AA/FA 3-phase, 4W, 480Y/277V.

- Unit substation WSA: 1000/1333 KVA-AA/FA 3-phase, 4W, 480Y/277V.
- Unit substation TSA: 1000/1333 KVA-AA/FA 3-phase, 4W, 480Y/277V

Other utilization voltages available are:

- 3-phase, 4W, 480Y/277V.
- 3-phase, 3W, 480V.
- 3-phase, 4W, 208Y/120V.

## Building 20 Description

---

### ***Material Processing System***

The Material Processing System (MPS) is located in Building 20 of the MSE Mike Mansfield Advanced Technology Center and was originally used to crush, dry, pulverize, and store coal for the MHD electrical power generation testing program. The system consists of the following subsystems:

- Raw Material System
  - 15,000 pounds capacity raw coal feed hopper on outdoor concrete raw coal storage slab.
  - 35 tons per hour capacity material crusher and vertical bucket elevator (based upon ¾-inch crushed particle size) that loads the crushed raw material storage bin.
  - 80 tons capacity crushed raw material storage bin at 50 lb/cu ft (15 ft diameter x 30 ft height with 60° cone) with screw conveyor on outlet, located inside of building.
  - System includes feeder belt with tramp iron magnet for the material crusher (located on outdoor concrete slab).
- Material Pulverizer/Dryer System
  - 6 tons capacity pulverizer feed surge bin with rotary feeder on outlet.
  - Raymond 66-inch roller mill material pulverizer, 20,700 lb/hr capacity.
  - 5.3 million Btu/hr direct fired (natural gas) roller mill air heater with 1,835 cfm blower.
- Pulverized Product System
  - 53 tons capacity product material storage bin at 35 lb/cu ft (15 ft diameter x 30 ft height with 60° cone) with rotary feeder at outlet.
  - 15,000 SCFM bag house dust collector (2,880 sq ft filter).
  - 11 ft diameter cyclone vacuum product material collector.
  - System includes main fan (250 hp motor).
- Miscellaneous Systems
  - Product fines capture system with bag house, blower, and scrubber.
  - Additional product storage silo (15 ft diameter x 56 ft height with 60° cone).
  - 3 carbon steel product feed transport/injector vessels.

- Control Room
  - Located within Building 20 on 1<sup>st</sup> floor.
  - The control room consists of operator stations and system monitoring instruments for the Material Processing System.



*Building 20 – Dry Materials Handling*

### ***Building 20 Utilities***

Building 20 has the following architectural and utilities features:

- **High-Hazard Group H-2:** Building 20 has a High-Hazard Group H-2 structure occupancy classification per the IBC. This allows the manufacturing, processing, generation, or storage and use of materials in the building that pose a deflagration hazard or a hazard from accelerated burning such as flammable or combustible liquids, combustible dusts, flammable gases, oxidizers, and reactive materials. Manufacturing and testing activities are allowed in this structure. Based on recent usage, updates are required to maintain this classification.
- **Railroad Spur/Paved Access Roads:** There is a railroad spur close to the building and a paved access road to Building 20 with paved outdoor staging and equipment storage/lay-down area, and concrete slab area (previously used as a raw coal storage area).
- **Insulated Self-Contained Steel Building:** Building 20 is a 5-storied (plus penthouse story) insulated steel building with lighting, heating, and ventilating systems. The heating and ventilating systems are a combination of forced air handling units, unit heaters, and roof ventilators. Individual floors are described as follows:



- The ground floor (reinforced concrete) is 190 ft length x 50 ft width x 14 ft height (including a compressor room, laboratory area, and control room). For the concrete floor, the ultimate compressive strength of the concrete is 3,000 pounds per square foot (psi).
- The 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> floors (grating floors) are 120 ft length x 50 ft width x 12 ft height.
- The 5<sup>th</sup> floor (grating floor) is 120 ft length x 50 ft width x 14 ft height.
- The penthouse floor (grating floor) is 42 ft length x 50 width x 14 ft height.



*Railroad Spur which Services Site Adjacent to Building 20*

- **Wet Pipe Fire Suppression System:** Building 20 is equipped with a standard coverage wet pipe fire suppression system.
- **Overhead Crane:** In the building is an overhead crane with trolley and hook hoist rated for maximum load of 3 tons, located adjacent to an overhead door on the north side of the building and capable of coverage of a 10 ft x 18 ft x full building height area within Building 20.
- **Nitrogen Gas Piping System:** Low pressure nitrogen gas piping system capable of 380 SCFM flow rate with a line pressure of 175 psig.
- **Natural Gas System:** Natural gas piping system capable of nominal 2,000 CFH flow rate with a nominal line pressure of 0.25 psig.
- **Water System:** Plant Service water piping system with utility station drops located throughout Building 20, capable of delivering water at a nominal temperature of 60°F and line pressure range of 60–70 psig.

- **Compressed Air System:** Plant Service/Instrument compressed air piping system with utility station drops located throughout Building 20, capable of delivering 250 SCFM flow rate with a line pressure of 100 psig. Compressed air is dried to a minimum dew point of -44°F.
- **Electrical Power Substation:** Building 20 houses the 2,000 KVA electrical power unit substation. The Building 20 facility electrical infrastructure has several motor control centers and is capable of supporting a wide variety of manufacturing, fabrication, and testing processes. The utilization voltages available are:
  - 3-phase, 3W, 480 V.
  - 3-phase, 4W, 480Y/277V.
  - 3-phase, 4W, 208Y/120V.

## MSE Laboratory Building Description

The MSE Laboratory Building has the following architectural and utilities features:

- The MSE Laboratory Building has an Industrial Factory Group F-1 moderate hazard structure occupancy classification per the IBC. This allows the use of the building for assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations that are not classified as a Group H hazardous occupancy. Manufacturing and testing activities are allowed in this structure.
- There is a parking lot adjacent to the building and a paved access to the 3 building overhead doors with an outdoor staging and equipment storage/lay-down area.



*MSE Laboratory*

- The MSE Laboratory Building is a one-story insulated steel building that is divided into a north side and a south side by a full height wall. The north side houses the laboratory and is 100 ft length x 30 ft width x 15 ft height with a reinforced concrete floor, overhead lighting, and HVAC and unit heater systems. The south side houses the test area and is 75 ft length x 30 ft width x 15 ft height with a reinforced concrete floor, overhead lighting, and unit heaters systems. For both concrete floors, the ultimate compressive strength of the concrete is 3,000 psi. The interior perimeter walls are protected by 7.5 ft height gypsum board.
- The entire building has a standard coverage wet pipe fire suppression system.
- The north side (laboratory) has the following cylinder gases available: nitrogen, argon, helium, and oxygen. The north side also has several free standing fume hoods and sample preparation areas.
- The south side (test area) has a spray booth (14.25 ft width x 7 ft depth x 10 ft height) with filter bank and exhaust fan, and open floor space.
- The entire building has a natural gas piping system capable of nominal 2,000 CFH flow rate with a nominal line pressure of 0.25 psig.
- The entire building has a plant service water piping system with utility station drops located throughout the building, capable of delivering water at a nominal temperature of 60°F and line pressure range of 60–70 psig.
- The entire building has a compressed air piping system with utility station drops located throughout the building, capable of delivering 65 SCFM flow rate with a line pressure range of 100–110 psig. Compressed air is filtered, coalesced, and dried to a minimum dew point of 32°F.
- The MSE Laboratory Building has 480 Volt, 200 Amp electrical service to the building, with a motor control center and several panel boards. The building electrical infrastructure is capable of supporting a wide variety of manufacturing, fabrication, and testing processes. The utilization voltages available are:
  - 3-phase, 3W, 480 V-motor control center.
  - 3-phase, 4W, 480Y/277V-panel EXA.
  - 3-phase, 4W, 240/120V-panel EXB Delta High Leg Phase “B”.
  - 3-phase, 4W, 208Y/120V-panel EXC and EXC-1.
  - 1-phase, 3W, 120/240V-panels EXA-1 and EXA-2.

## Warehouse Building Description

---

The Warehouse Building has the following architectural and utilities features:

- The Warehouse building has a Special Purpose Industrial Factory Group F-1 moderate hazard structure occupancy classification per the IBC. This allows the use of the building for assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations that are not classified as a Group H hazardous occupancy.
- There is a paved access to the Warehouse overhead door with an outdoor staging and equipment storage/lay-down area.

- The Warehouse is a one-story insulated steel building that is divided into a north side and a south side by a full height wall. The north side houses the receiving and storage area and is 80 ft length x 50 ft width x 25 ft height with a reinforced concrete floor, overhead lighting, and gas-fired infra-red heating system. The south side houses the office area and is 35 ft length x 35 ft width x 15 ft height with a reinforced concrete floor, overhead lighting, HVAC and electric unit heaters systems. The concrete floor for the entire building has an ultimate compressive strength of 3,000 psi.
- The Warehouse has photoelectric smoke detectors with alarm system. Update is necessary for proper function.
- The receiving area has an overhead door and indoor storage shelves unit.
- Natural gas piping system capable of nominal 2,000 CFH flow rate with a nominal line pressure of 0.25 psig.
- The Warehouse electrical service consists of 120 VAC receptacles located throughout the building.



*Warehouse Building*

## **Machine Shop Description**

---

The Machine Shop is located on the MSE site and has the following features:

- Building dimensions are 50 ft length x 100 ft width x 20 ft eave height.
- Insulated steel building with reinforced concrete floor, overhead door, overhead interior lighting, with unit heaters and ventilation.
- Standard coverage wet pipe fire suppression system.

- The building 200 amp electrical service includes the following utilization voltages:
  - 3-phase, 4W, 480Y/277V.
  - 3-phase, 3W, 480V.
  - 3-phase, 4W, 240/120V.
  - 1-phase, 3W, 120/240V.

The building has several welding receptacles to support a wide variety of manufacturing and fabrication processes.



*Machine Shop Interior*

- The equipment in the machine shop includes the following:
  - Vertical milling machines:
    - Bridgeport, 9"x 42", with power feed and digital readout (DRO).
    - Bridgeport, 9"x 42", manual feed.
    - Enco, 9"x 42", manual feed.
    - Enco, 10"x 54", with power feed and DRO.
  - Lathes:
    - Jet, 14"x 40", with DRO.
    - Monarch, 16"x 36".
    - LeBond, 13"x 48".
    - Enco, 9"x 20".

Band saws:

- Lincoln, 12"x 16".
- Tannewitz, 20"x 30"
- Jet cutoff saw, 10"x 10".

Other shop equipment:

- Drake 150 ton hydraulic press.
- Ikeda, Radial drill, w/10" column.
- Sand blaster in cabinet.
- (2) Heat treat furnaces, 8"x 10"x 12".
- Parts washer.

All of the machinery listed above has all of the tooling required to complete any machining tasks the individual machine is capable of performing.

## **Fabrication Shop Description**

---

The Fabrication Shop is located on the MSE site and has the following features:

- Building dimensions are 100 ft length x 120 ft width x 20 ft eave height with no vertical beams.
- Insulated steel building with reinforced concrete floor, overhead door, overhead interior lighting, interior storage mezzanine (648 square feet), loading dock area with sliding door, with unit heaters and ventilation.



*Fabrication Shop*



*Fabrication Shop Interior*

- Standard coverage wet pipe fire suppression system.
- The building 400 amp electrical service includes the following utilization voltages:
  - 3-phase, 4W, 480Y/277V.
  - 3-phase, 3W, 480V.
  - 3-phase, 4W, 208Y/120V.

The building has several welding receptacles to support a wide variety of manufacturing and fabrication processes.

- The equipment in the fabrication shop includes the following:

Welders:

- Lincoln square wave TIG 355.
- Hobart EXCEL-ARC 6045 CC/CV.
- Lincoln Idealarc TIG 300/300 Variable Voltage AC/DC welding power source.
- Miller millermatic Wire feed.
- Lincoln Idealarc 250 amp AC/DC.
- Miller XMT 300 CC/CV Wire Feed.
- Miller Millermatic 250 amp wire feed.
- Miller Millermatic 350P wire feed.
- Lincoln Idealarc 250 amp AC/DC.
- Oxygen acetylene cutting and welding torches.

Plasma cutter track burner, laser pattern follower, with a 48" x 102" table.

Sand blast cabinet.

Central Machine, 6"x20" Drill/Mill Machine.

MSC Band saw 12"x36".

MSC, 8"x20" Drill/Mill Machine.

Wilton, Cutoff saw 20"x16".

36" finger brake, .062" material max. thickness.

Uni-Hydro, Ironworker hydraulic punch.

Hand and bench grinding equipment.

Numerous fabrication/welding tables.

## **Administration Office Building Description**

---

The Administration Office building has the following architectural and utilities features:

- The Administration Office building has a Business Group B structure occupancy classification per the IBC. This allows the use of the building for office, professional or service-type transactions, including storage of records and accounts.
- There is a parking lot adjacent to the building with a paved access road.
- The building is a one-story office building that is 9000 ft<sup>2</sup> (150 ft length x 60 ft width) x 8 ft height t-bar suspended ceiling with lay-in overhead lighting and HVAC systems.
- The building has a standard coverage wet pipe fire suppression system in the suspended ceiling.
- The offices are a mixture of full ceiling height walls, and some with 6 ft height partition walls.
- There are 2 conference rooms. One conference room is 280 ft<sup>2</sup> (20 ft length x 14 ft width), and the other is 256 sq ft<sup>2</sup> (16 ft length x 16 ft width). There are restrooms in the building.
- The building electrical service consists of 120 VAC receptacles located throughout the building. The building has a computer server room, and connection to the Local Area Network for MSE and to the Internet.





*Front of Administration Office Building*



*Interior View of Administration Office Building*

## Operations Office Building Description

The Operations Office building has the following architectural and utilities features:

- The Operations Office building has a Business Group B structure occupancy classification per the IBC. This allows the use of the building for office, professional or service-type transactions, including storage of records and accounts.
- There is a parking lot adjacent to the building with a paved access road.
- The building is a one-story office building that is 20,000 ft<sup>2</sup> (200 ft length x 100 ft width) x 8.75 ft height t-bar suspended ceiling with lay-in overhead lighting and HVAC systems.
- The building has an extended coverage wet pipe fire suppression system in the suspended ceiling.
- The offices are a mixture of full ceiling height walls, and some with 6 ft height partition walls.
- There is a conference room with dimensions 864 ft<sup>2</sup> (27 ft length x 32 ft width). There is a lunch room with dimensions 920 ft<sup>2</sup> (40 ft length x 23 ft width). There is a reception desk area, a drawing plotter/copier/storage room, and restrooms.
- The building electrical service consists of 120 VAC receptacles located throughout the building. The building has connection to the Local Area Network for MSE and to the Internet.



*Reception Area of Operations Office Building*



*Interior View of Operations Office Building*



*Large Conference Room of Operations Office Building*

## Additional Photos

---



*Secondary Cooling Tower Used with Testing*



*Access Road to Mansfield Center*



*Neighborhood View Looking South*



*Neighborhood View Looking North*