FSU INSPIRE

CONTRACT DOCUMENTS
50% PROGRESS SET

ADVANCED MANUFACTURING FACILITY

DISCIPLINE NARRATIVES & SUPPORTING EXHIBITS

6 AUGUST 2026

Bay County, Florida
Project Number: TBD

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FSU InSPIRE

Advanced Manufacturing Facility

General Works Package

Discipline Narratives & Supporting Exhibits

Bay County, FL
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Issue and Revision Record

Revision	Originator	Checker Approver	Description	Issued Date
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Bay County, FL
Project Number: TBD

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ARCHITECTURE NARRATIVE

PROJECT INFORMATION

The Florida State University InSPIRE Advanced Manufacturing Facility is envisioned as the first phase of a multi-phase research and innovation campus located within Venture Crossings at St. Joe in Panama City Beach, Florida. The facility is intended to support advanced manufacturing research with future phases accommodating the workforce development, material testing, a wind tunnel, and an event space to support industry collaboration and technology transfer of knowledge. Phase I goals are to provide a flexible environment capable of adapting to evolving manufacturing processes and equipment on day one and in the future.

The architectural design will establish a durable, highly functional industrial research facility that balances operational efficiency with an inviting public presence representative of Florida State University's research mission.

CODES & STANDARDS

The facility shall be designed in accordance with the current Florida Building Code, as adopted by Bay County, Florida, including all applicable referenced codes and standards governing structural design, life safety, accessibility, energy conservation, fire protection, and building systems. The architectural and engineering disciplines will work collaboratively to develop a coordinated, maintainable, and functional facility that supports the operational objectives of the Advanced Manufacturing program.

- 2023 Florida Building Code, Building (8th Edition)
- 2023 Florida Building Code, Accessibility
- 2023 Florida Building Code, Mechanical
- 2023 Florida Building Code, Plumbing
- 2023 Florida Building Code, Fuel Gas
- 2023 Florida Building Code, Energy Conservation
- 2023 Florida Fire Prevention Code
- NFPA Standards as adopted by the Florida Fire Prevention Code
- National Electrical Code (NFPA 70)
- Florida Department of Environmental Protection requirements, as applicable
- Bay County development regulations
- Venture Crossings Design Standards
- Applicable Florida State University design criteria and owner standards

ARCHITECTURAL PLANNING

The architectural design is driven by functionality, operational efficiency, and long-term adaptability. The building organization is based upon the Owner-reviewed Block Plan and Room Data Sheets developed in coordination with the FSU InSPIRE Advanced Manufacturing team. These documents establish the functional relationships between manufacturing, laboratory, administrative, storage, and building support spaces and serve as the foundation for the overall building layout.

The building program has been developed from the Owner's Room Data Sheets together with subsequent planning workshops and design coordination, resulting in the current 50% CD progress floor plan. The facility is organized into four primary functional zones: public, administrative, manufacturing, and building support.

- The public entry serves as the primary arrival sequence and provides direct access to administrative functions and training spaces. Administrative offices are positioned to support both visitor engagement and daily operations while maintaining appropriate separation from manufacturing activities.
- The manufacturing floor is organized to promote an efficient production workflow. This arrangement minimizes material handling conflicts while supporting operational flexibility and future equipment modifications.
- Support spaces including mechanical, electrical, information technology, hazardous material storage, restrooms, and building services are strategically distributed to efficiently serve the operational requirements of the facility.

BUILDING STRUCTURE

The primary building structure consists of a pre-engineered metal building (PEMB) system selected for its economy, speed of construction, flexibility, and ability to accommodate large clear-span manufacturing spaces. This structural approach provides an efficient and economical solution while allowing the facility to adapt to changing operational needs over time.

The exterior enclosure will consist of metal wall panels over rigid insulation finished in a combination of red and grey (R-6.5) with vinyl backed insulation (R-13), a white standing seam metal roof assembly with a minimum thermal performance of R-30, and an aluminum storefront system with insulated Low-E glazing. These assemblies provide a durable, low-maintenance building envelope capable of meeting the thermal performance requirements of the current Florida Building Code while supporting the project's budget objectives. The integrated envelope is intended to provide an energy-efficient, weather-resistant facility with reduced long-term maintenance requirements.

BUILDING SYSTEMS

Building systems and architectural elements will be coordinated with the structural, mechanical, electrical, plumbing, and fire protection disciplines to provide a fully integrated and code-compliant facility. Coordination with the Owner’s equipment will continue throughout the design process as program requirements are further refined by Florida State University.

- This Architectural Design Narrative represents the current schematic design intent and will continue to be refined as programming, equipment coordination, and Owner-directed design decisions progress through subsequent phases of design.

STRUCTURAL NARRATIVE

APPLICABLE CODES & STANDARDS:

- 2023 Florida Building Code
- 2021 International Building Code
- ASCE 7-22
- ACI 318-19
- AISC 15th Edition – Steel Construction Manual
- AISC 360-16, AISI S100-16 (2020) with Supplement 2-20 for cold-formed purlins and girts, and MBMA standards/manuals as applicable.

DESIGN CRITERIA

Building Risk Category: II – Standard
Building Type – Pre-Engineered Metal Building (PEMB)

Dead Load (Advanced Manufacturing Facility):

Standing Seam Roof	3.0 psf
Sub-Purlins	1.0 psf
Insulation	1.0 psf
Framing (purlins)	3.0 psf
Sprinkler	3.0 psf
MEP	5.0 psf

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	Collateral	5.0 psf
	Total	21.0 psf
Live Load:		
	Roof	20 psf
	Light Storage	125 psf
	Stairs	100 psf
	Manufacturing and testing Area	
	Concrete slab	250 psf or Governing Equipment
Snow Load:		
	Ground Snow Load	5 psf
Rain Load:		
	15-Minute Rainfall Intensity	8.67 in/h
	60-Minute Rainfall Intensity	4.6 in/h
Wind Load:		
	Wind Speed	139 mph (Ult)
	Exposure Category	C
	Building Enclosure	Enclosed
Seismic Load:		
	S_s	0.097g
	S_1	0.059 g
	Site Class	E (Assumed)
	Sd_s	0.100 g
	Sd_1	0.086 g
	Importance Factor (Ie)	1.00
	Seismic Design Category	B
	Analysis Procedure	Equivalent Lateral Force
	Seismic Force Resisting System	Steel System Not Detailed for Seismic Resistance R = 3.0, Omega = 3.0, Cd = 3.0

Foundations for the building:

- Depending on the subsurface conditions, groundwater elevation, anticipated settlement, and allow-able bearing capacity, the building can be supported on shallow foundation system consisting of continuous footings and tie beams with a slab on grade.
- The foundation system will be designed to support the reactions from the pre-engineered metal building rigid frames, exterior wall framing, and other building and equipment loads.

Exterior Cladding:

- The exterior wall system is anticipated to consist of cold-formed steel girts supporting metal wall panels.
- The metal wall panels, girts, and their connections will be designed to resist the required positive and negative wind pressures, including the higher pressures occurring within wall edge and corner zones.
- Wall openings, including overhead doors, personnel doors, louvers, and other penetrations, will be framed with supplemental structural steel or cold-formed framing as required.

- The exterior wall panels are considered non-load-bearing cladding.

Super Structure:

- The approximately 50,000-square-foot advanced manufacturing facility will utilize a pre-engineered metal building structural system.
- The building footprint is anticipated to be approximately 335'-0" long by 150'-0" wide.
- The primary structural framing will consist of PEMB rigid frames spanning approximately 150'-0" across the building width.
- The rigid frames are anticipated to be spaced at approximately 30'-0" on center along the building length. Final frame spacing will be coordinated with the PEMB manufacturer, architectural layout, overhead doors, mechanical systems, and equipment clearances.
- The primary rigid frames will consist of tapered built-up steel columns and rafters. Secondary framing will consist of cold-formed roof purlins and wall girts supporting the metal roof and wall panel systems.
- The structure shall be designed for the high wind forces applicable to the Bay County, Florida area, including lateral wind pressures, roof uplift, component-and-cladding pressures, and net uplift reactions at the foundations.
- Supplemental structural framing will be provided as required around large overhead doors, loading areas, mechanical openings, equipment penetrations, and other discontinuities in the PEMB framing.

Lateral Load Resisting System:

- The primary lateral-force-resisting system in the transverse direction will consist of the PEMB rigid frames spanning approximately 150'-0".
- The longitudinal lateral-force-resisting system will consist of PEMB roof and wall bracing, including rod bracing, cable bracing, portal frames, or other PEMB manufacturer-designed bracing systems.
- The roof purlins, wall girts, eave struts, and associated bracing components will transfer wind forces to the primary rigid frames, braced bays, and foundations.
- Braced-bay locations will be coordinated with architectural openings, overhead doors, loading areas, manufacturing operations, and future equipment requirements.
- Where conventional diagonal bracing conflicts with required openings or facility operations, portal frames or other rigid-frame solutions may be used, subject to coordination with the PEMB manufacturer.

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INTERIOR DESIGN NARRATIVE

PROJECT INFORMATION

The interior design will emphasize flexibility and adaptability, with a clear focus on supporting future growth. Public-facing areas will feature a bold, modern aesthetic that reflects a high level of design, while administrative, manufacturing, testing and evaluation spaces will prioritize durability and functionality. This balance ensures the building serves as both a striking showpiece and a practical environment that supports the organization's goals.

Public Entrance Lobby

The Public Entrance Lobby will serve as the Welcome Center, featuring upholstered lounge chairs and small sofas.

Administrative Offices

The Administrative Offices will include a combination of open and enclosed workspaces, featuring 18 shared workstations, four private offices, and two training rooms that can be turned into one large training room.

A small break room will serve the dedicated staff, equipped with built-in millwork and standard appliances.

Interior finishes will include concrete floors throughout and polycarbonate partitions to promote transparency and natural light. Ceilings will feature a combination of acoustical ceiling tile and gypsum board to balance functionality with a refined aesthetic.

Advanced Manufacturing

The Advanced Manufacturing Floor will be organized into a series of open work bays, each dedicated to a specific process zone: AM-Wire, Heat Treatment, Coatings, Machining, Joining, Finishing, Assembly, Metallography, Tool Room, Composites, and Metrology/QA/Inspection. Each zone will feature specialized equipment, along with industrial-style work tables or benches and stools to support hands-on operations.

Environmental controls will include zoned HVAC with humidity control to maintain air quality and protect equipment and materials.

Adjacent to the manufacturing floor, the Feedstock & Storage Room will provide secure storage for aluminum. This room will feature security cameras, elevated locking systems, and 1-hour fire-rated construction. It will be equipped with humidity and oxygen sensors, Class D fire extinguishers, and stations for personal protective equipment (PPE). Temperature control will be critical to maintaining material integrity.

Interior finishes for all Advanced Manufacturing spaces will include static-dissipative epoxy flooring and chemical/wear resistant epoxy flooring, high-performance wall coatings, and exposed ceilings with a minimum clear height of 30 feet to support equipment clearance and ventilation.

Lighting will be tailored to meet the specific functional needs of each space, providing appropriate illumination levels to support all manufacturing activities with clarity and precision. All exterior glazing will be fitted with blackout shades to allow full control of natural light intrusion.

Shipping & Receiving | Storage

The Shipping & Receiving area will be strategically located with direct access to the Advanced Manufacturing space to support efficient delivery and handling of critical components. The area will include two loading docks: one elevated dock with a hydraulic dock leveler and one at-grade dock equipped with a loading dock lift. Each dock will feature a 18-foot wide by 16-foot high roll-up door for building access.

A dedicated zone within Shipping & Receiving will serve the Advanced Manufacturing operations, featuring a personnel workstation, steel work tables, industrial shelving, pallet racks, and a designated charging station for an electric forklift.

The Storage space will accommodate hazardous materials, raw materials, and special waste. Each of these specialty storage zones will be equipped with spill containment measures and lockable enclosures to ensure safe and secure handling.

Interior finishes in this area will include slip-resistant sealed concrete flooring, high-performance wall paint, and exposed structural ceilings for durability and ease of maintenance.

Restrooms

Interior finishes will consist of polished concrete flooring and wall tile for durability and visual interest, and painted gypsum board ceilings for a clean, finished appearance.

FIRE PROTECTION NARRATIVE

CODES AND STANDARDS

Florida Building Code, 8th 2023 Edition

Florida Fire Prevention Code, 8th 2023 Edition

Adopted State and Local Codes

NFPA 13, 2019 Edition - Standard for Installation of Sprinkler Systems

NFPA 70, 2020 Edition – National Electrical Code (NEC)

NFPA 72, 2019 Edition - National Fire Alarm and Signaling Code

The following analysis is based on a review of applicable sections of the Florida Building and Fire Prevention Codes, as well as multiple NFPA Standards. The basis of this narrative includes limited equipment information received from FSU and is designed with the worst-case hazard in mind. The building will be a shell building with FSU providing future modifications to both fire alarm and fire suppression systems when adding equipment/ processes within the building.

FIRE SUPPRESSION SYSTEM

The facility will be equipped throughout with an automatic fire suppression system. The design and installation of these systems shall be in accordance with the Florida Building/Fire Prevention Codes (FBC/FFPC) and NFPA 13, Standard for the Installation of Sprinkler Systems. In general, the public/common areas of the facility will be considered Light Hazard, the shipping and receiving area will be considered OH2 assuming no Class I – IV commodities over 12ft or Class A plastics over 5ft, with the back of house advanced manufacturing floor being Extra Hazard 2. All added equipment was defined by FSU to have manufacturers provided protection systems. Additional systems will be added, if necessary, by FSU in the future. A double check valve backflow preventer will be provided at the water entry of the facility to prevent cross contamination of the public water supply. A fire department connection and means to perform the required forward-flow test on the backflow preventer will be provided. All fire suppression system control valves will be electronically monitored with tamper switches connected to the building fire alarm system.

FIRE ALARM SYSTEM

An intelligent addressable fire alarm system will be provided throughout the facility in accordance with the requirements of the Florida Building/Fire Prevention Codes (FBC/FFPC) and the NFPA 72, National Fire Alarm and Signaling Code. The fire alarm system will monitor the facility's suppression system flow switches, valve supervisory switches, smoke / heat detectors, and automatically notify the remote receiving station of alarm, supervisory, and trouble events. Audible and visible occupant notification will be provided throughout the facility to alert occupants in the event of a fire. Manual pull stations and automatic smoke detection will be provided where required by the applicable codes stated above. Duct smoke detectors will be provided as required by the International Mechanical Code. The fire alarm system will communicate with the remote monitoring station via IP/Cellular DACT and cellular transceiver.

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WATER SUPPLY

The water supply tested is fed from two water storage tanks and a pump house that serves the adjacent airport property as well as the Venture Crossings Addition. An initial flow test was conducted on 6/26/2026 that provided results that did not meet the initial demand of the building. The results of this test produced 57psi static with 25psi residual at 919gpm. Bay County provided an assessment and reported the initial flow test was not performed long enough to activate the fire pumps. Additionally, the fire pump house was being serviced for damage during the initial flow test. A new fire hydrant flow test will be required to identify the available water supply flow and pressures. The flow test will be utilized to perform hydraulic calculations to determine if a fire pump or water storage tank is required for the facility.

PLUMBING NARRATIVE

GENERAL SCOPE

Plumbing systems will include domestic cold water, domestic hot water, domestic hot water return, tepid water for emergency fixtures, treated water for labs, sanitary waste and vent, lab waste and vent, primary and secondary storm water and natural gas.

A reduced pressure zone assembly backflow preventer and water meter will be provided for the domestic water service. A pressure regulator will be provided in the event of elevated supply pressure. The quality of the domestic water service will be investigated to determine whether water softening and or filtration is required.

Domestic hot water is anticipated to be supplied by a natural gas fired tank-type water heater. However, the feasibility of heat pump water heaters with storage tanks will also be investigated during the design phase.

A domestic hot water recirculation pump will circulate hot water through a thermostatic mixing valve to supply 125 degree Fahrenheit water to the recirculation system serving fixtures that require domestic hot water while maintaining the water temperature at the water heaters at 140 degrees Fahrenheit.

Wall mounted toilets will be low consumption type. Toilets will have hard-wired sensor activated flush valves. Lavatory faucets will be hard-wired sensor activated and protected with point of use ASSE 1070 compliant mixing valves. Emergency eyewashes and combination eyewash/showers will be provided per ANSI/ISEA Z358.1 requirements and located based on input from the facility's safety officer. Tepid water will be supplied to emergency fixtures via an emergency thermostatic mixing valve. A bi-level, on wall, hands free electric water cooler with filter and bottle filler will provide drinking water. Freeze proof backflow protected wall hydrants will be placed on exterior perimeter walls in locations required.

Floor drains throughout the facility that are anticipated to receive only occasional flow and would therefore be at risk of drying out will be provided with barrier type trap guards. Floor drains will be provided in the fire protection room and at emergency showers.

Storm drainage will be accomplished with the use of gutters and downspouts. Downspouts will discharge onto grade..

MECHANICAL SYSTEMS NARRATIVE

DESIGN GOALS

1. Economical initial construction cost.
2. Flexibility to allow for expansion of HVAC systems in the future.
3. Economical annual utility cost and consumption.
4. Provide systems with a high level of durability and longevity.
5. Provide good accessibility for maintenance access.
6. Provide systems with a favorable life cycle cost value.
7. Design for hurricane and flood resilience of all outdoor systems.
8. Acoustic isolation for all sensitive spaces.
9. Interior finishes for select mechanical systems commensurate with high design architectural spaces.
10. Rooftop equipment will be avoided wherever possible.

CODES & STANDARDS

- 2023 Florida Building Code
- National Fire Protection Association (NFPA) Codes.
- American National Standards Institute (ANSI).
- ASTM International – American Society of Testing and Materials (ASTM).
- Underwriters Laboratories, Inc. (UL).
- American Society of Mechanical Engineers (ASME).
- International Association of Plumbing and Mechanical Officials (IAPMO).
- All local public agencies having jurisdiction.

Heating, Ventilation and Air Conditioning (HVAC) Systems:

- Cooling systems – Ground-mounted DX air handling units (AHU) will provide the facility with all required cooling and heating for occupant comfort. The only process load will be a cooling loop for a

vacuum oven. This cooling system will be owner furnished, contactor installed (OFCI). All other cooling will be designed and CFCI.

- Heating systems – Heating will be accomplished through the indirect gas burners associated with each AHU. The admin area will be served by VAV boxes with electric reheat.
- Outdoor air – The Advanced Manufacturing facilities will receive code required outside airflow. It will either be through local AHU's with outdoor air connections or through a central dedicated outdoor air (DOAS) unit. The public space and admin area will also receive outside air from either a local AHU or DOAS unit. Energy recovery will be investigated to pre-treat incoming outside air if a DOAS unit is used.

Administrative Areas:

- Bathrooms, Janitor's closets, and Breakrooms will be provided with exhaust fans for odor and air quality control.

Public Spaces:

- Air terminal selection will be coordinated with interior finish requirements for high design spaces.

Administration Mechanical room:

- Mechanical rooms will be provided and HVAC for those rooms will be evaluated as design progresses.

Advanced Manufacturing Floor Overview:

- The Advanced Manufacturing Floor will contain a multitude of independent manufacturing zones all served by a central chilled water plant. Individual utilities will be provided as each zone requires. Zone level air handling units will be investigated and possibly supplemented with terminal equipment as needed. O_2 sensors will be provided in enclosed spaces where inert gases are used or stored.

Feedstock & Storage:

- Feedstock & Storage will be provided with complete HVAC systems. Precise temperature and humidity control will be provided.
- Compressed air will be provided. The compressed air plant is being designed by owner and installed at a later date.
- O_2 sensors will be provided in enclosed spaces where inert gases are used or stored.
- Airflow will reduce contamination and exposure and shall adhere with ISO/ASTM 52931-23.
- Mechanical equipment will be dust ignition proof.

Advanced Manufacturing-Wire:

- Compressed air will be provided.
- O_2 sensors will be provided in enclosed spaces where inert gases are used or stored.

- Welding exhaust hoods or air scrubbers will be provided where required. Portable fume extraction units may also be utilized which allow operators to roll the movable Fume extraction unit to welding tables as needed.

Advanced Manufacturing-Powder:

- An additive manufacturing powder room will be added at a later date by the owner.
- O_2 sensors will be provided in enclosed spaces where inert gases are used or stored.
- Mechanical equipment will be dust ignition proof.

Heat Treatment:

- Compressed air, Nitrogen, and Argon will be provided at a later date by the owner.
- The main cooling system for the vacuum oven will be provided by the oven manufacturer.
- A local AHU will serve to cool excess waste heat to the area.

Coatings:

- Compressed air, Nitrogen, and Argon will be provided at a later date by the owner.
- Mechanical equipment will be dust ignition proof.

Machining:

- Compressed air, Nitrogen, and Argon will be provided at a later date by the owner.

Joining:

- Compressed air, Nitrogen, and Argon will be provided at a later date by the owner.
- Welding exhaust hoods or air scrubbers will be provided where required. Portable fume extraction units may also be utilized which allow operators to roll the movable fume extraction unit to welding tables as needed.

Finishing:

- Compressed air will be provided at a later date by the owner.

Assembly:

- Assembly will be provided with complete HVAC systems.

Metallography:

- Metallography will be provided at a later date by the owner.

Tool room:

- Compressed air will be provided at a later date by the owner.

Composites:

- Cooling water will be provided.

Metrology-QA-Inspection:

- A Metrology lab will be provided at a later date by the owner.

IT room:

- IT room will be fully conditioned with an independent cooling system.

Shipping & Receiving:

- Shipping & Receiving will be provided with complete HVAC systems.

Testing:

- Testing will be provided with complete HVAC systems.

Heating, Ventilation and Air Conditioning (HVAC) Design Considerations:

The HVAC systems serving the project facility shall be designed to meet the design conditions listed below:

Outside Design Conditions		
	Summer	Winter
Design Temperature:	92.8°F DB / 76.8°F WB (@0.4%)	21.7°F DB (@n=10)
ASHRAE Climate Zone:	2A	

Noise Criteria Design:

- The table below lists the proposed maximum noise criteria for each space within the project facility. Listed values shall serve as a guideline for the design, sizing, and selection of all equipment and systems within the listed space types.

Space	Noise Criteria
Offices	NC 30
Conference Rooms	NC 25
Waiting Areas	NC 35
Corridors	NC 35
Storage/Restrooms	NC 40
Mechanical & Electrical Rooms	NC 40
IT Rooms	NC 40
Advanced Manufacturing	NC 50

Ventilation Requirements:

- The more stringent of local Codes or ASHRAE Standard 62.1 requirements shall be used to determine minimum ventilation rates for the project.

HVAC Direct Digital Controls:

- All HVAC systems will be provided with Direct Digital Controls, and all HVAC equipment will be tied into the Building Management System (BMS), to allow the facilities managers to program setpoints, schedules of operations, and alarms.
- HVAC equipment that is controlled locally will also be connected to the BMS for equipment status, on/off functions, and alarm setpoints.
- An automatic digital BMS will be provided. The BMS will monitor and control all the HVAC equipment located within the facility.
- The BMS will have all monitoring and alarm points available at central monitoring station read-writeable across encrypted internet access applet from off-site.

DESIGN ASSUMPTIONS

- Dust collection will not be required.
- Critical spaces will maintain temperature within ±1°F (±2°F is acceptable), with relative humidity maintained within ±5% RH. Temperature control is more critical than humidity control
- Nitrogen and argon will not be stored in bulk or generated on-site.
- Acids and bases will be stored and handled in quantities not exceeding 2 liters.
- No specific sound pressure or noise-level criteria are required.
- The compressed-air system will provide ISO 8573-1 Class 3.3.3 air quality at 200 psi and 450 scfm by the owner at a later date.
- The vacuum oven will be present on day one of operations and will reject 40 kW of to air.
- All waste heat kW figures given to FSB from FSU are accurate and to be designed with.

ELECTRICAL NARRATIVE

CODES & STANARDS

2020 NATIONAL ELECTRICAL CODE (N.E.C.)
2023 FLORIDA BUILDING CODE

MAIN POWER DISTRIBUTIONS

For this narrative, it is assumed the local utility can provide 480V service to the site. The preliminary electrical load for the new FSU InSPIRE facility is estimated to be between 2.5 and 3.0 megawatts (MW), which corresponds to approximately 3,600 amps (A) at 480V. To serve this load while providing capacity for future expansion, a 5,000A, 480/277V main switchboard will be installed in the building's main electrical room.

From the main switchboard, power will be distributed throughout the advanced manufacturing space via direct conduit connections to the switchboard. Several 480/277V and 208/120V panelboards will be strategically located throughout the manufacturing areas to provide convenient overhead power distribution. The 480/277V panelboards and 208/120V panelboards will then supply power to manufacturing equipment, HVAC systems, lighting, plumbing equipment, and other building electrical loads. Panelboards will be installed at floor level, while transformers will be mounted overhead near structural columns. All equipment locations and power requirements are preliminary. All equipment locations and power requirements, including power intake, breaker requirements, wire size, voltage, frequency conversions, and disconnecting means will need to be coordinated once equipment design is finalized. FSB has been directed to provide standard voltages (480/277V 3PH & 208/120V 3PH) and a standard frequency (60HZ).

The remaining major spaces enclosed by walls will be served by dedicated 480V and 208/120V panelboards. These panelboards will either be located in the main electrical room, where the served space is in close proximity, or within the individual spaces themselves when the distance from the main electrical room makes local distribution more practical. Refer to EP601 for one-line diagram.

HAZARDOUS AREAS

Hazardous location, as determined by NFPA 70, will be applicable to specific rooms containing hazardous gases, dust, or fibers. All electrical devices, conduits, lighting devices, light fixtures, and electrical equipment within these spaces will be rated for the classification. Further identification of the hazardous rating for these spaces will be coordinated with the owner.

LIGHTING SYSTEMS

Light levels and power densities will comply with the IESNA requirements, ASHRAE 90.1, and LEED requirements. LED type light fixtures will be utilized throughout the facility. Overall, light fixture design intent for general lighting will be 2'x2' recessed troffers, 6" downlights, 4' strip lights, and highbay LEDs.

Lighting systems will consist of high-efficiency LED luminaires selected to meet the illumination, code, and operational requirements of each area. Fixture types will be selected based on the intended function and environmental conditions, including general, task, and accent lighting where required. Fixtures installed in areas with specialized environmental conditions will have the appropriate enclosure rating and construction to withstand the operating environment and comply with applicable safety requirements.

Lighting controls will include switching and occupancy/vacancy sensing as required by the applicable energy code. Lighting controls throughout the facility will be designed to support functional flexibility, energy efficiency, and user comfort. Zones will be provided in spaces such as conference rooms and collaboration zones to accommodate varying operational needs, including A/V integration and multipurpose configurations. Electrical and mechanical rooms will be equipped with manual controls. The overall system will include local control stations, with provisions for scene selection, dimming, and potential integration with building automation systems, while ensuring compliance with current energy codes and standards.

EMERGENCY SYSTEMS

Emergency lighting will be provided throughout the building to ensure safe egress and code compliance in the event of a power outage. Battery backup will be provided to serve the emergency lighting system. These batteries will be designed to supply a minimum of 90 minutes of emergency power, in accordance with NFPA 101 Life Safety Code and NEC (NFPA 70) requirements. Fixtures connected to the system will be strategically located in all required egress paths, exit stairways, and critical areas to maintain occupant safety during loss of normal power.

This design does not include provisions for an electric fire pump. In the scenario where the flow test indicates that an electric fire pump is required, additional coordination will be needed with the local utility to determine reliability as defined in NFPA 20. If determined unreliable, a generator will be required to be provided.

TELECOMMUNICATIONS

The telecommunications infrastructure shall consist of pathways, telecom racks, and telecom room buildout in accordance with Florida State University (FSU) ITS standards, applicable codes, and industry standards. FSB will coordinate with FSU ITS throughout project design for compliance with FSU standards and preferred location and quantities of telecommunication infrastructure and equipment. Outside plant pathways to the facility will consist of manholes and conduit ductbank per FSU standards. FSB will coordinate with FSU regarding demarcation of the outside plant. The telecommunication service entrance will consist of a minimum of (4) 4" conduits stubbed up in the Main Telecommunications Room (MTR).

Telecommunications pathways will consist of cable tray where practical, with conduit systems serving work area outlets, wireless access points, and other telecommunications devices. Pathway routing will be coordinated to maintain accessibility and comply with FSU conduit length and pull box requirements.

Telecommunication rooms will be dedicated to communications equipment and designed in accordance with FSU standards for size, environmental conditions, power, grounding, and physical security.

The telecommunication grounding system will be connected to the building electrical grounding system as required by ANSI/TIA-607 and FSU standards.

LIGHTNING PROTECTION

The lightning protection system will comply with NFPA 780 and will be designed to protect the facility from lightning strikes and associated electrical surges. It will include a counterpoise loop installed around the building perimeter, providing a low-impedance path to ground. All major electrical and mechanical equipment will be bonded to this loop to ensure equipotential grounding and reduce the risk of arcing or damage from voltage differentials. The system will be combined with surge protection at key service and distribution points to safeguard sensitive systems.

TAB 2
APPENDIX A

- Exterior Rendering
- Mechanical - Vacuum Oven Division of Responsibilities

FSB
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VACUUM OVEN DIVISION OF RESPONSIBILITIES

EXECUTIVE NARRATIVE

Due do the speed of the project, FSU has directed FSB to make assumptions about the divisions of responsibility (DOR) for the design and installation of the vacuum oven. FSU understands that this approach opens them up to possible operational issues and future problems. They accept these associated risks.

Below is an outline of the assumed system and installation requirements that the project will be designed around. Solar Atmosphere (SA) is the current basis of design for the vacuum oven.

All equipment is installed by the contractor. Equipment provided by SA is owner furnished, contractor installed (OFCI). Equipment design by FSB is contractor furnished, contactor installed (CFCI)

OFCI Equipment list - High Confidence:

It is currently assumed with high confidence that SA WILL design and provide the following systems:

1. Vacuum furnace and all directly associated equipment and controls
2. Vacuum pumps serving the oven
3. Outdoor dry cooler
4. Pumps and VFD's to support cooling water system (Installed on a skid)
5. Controls for pumps, VFD's, and dry cooler
6. Required hydronic tanks

OFCI Equipment list - Low Confidence:

It is currently assumed with low confidence that SA WILL design and provide the following:

1. Temperature and pressure sensors for pump and dry cooler control
2. Temperature and pressure test ports
3. Motorized control valves for pumps, dry cooler, and oven
4. Expansion tanks
5. Buffer tanks (if necessary)
6. Air water separators

7. Glycol feed stations (if heat tracing the outside pipe is not chosen)
8. Heat tracing of dry cooler and exterior piping (if adding glycol to the system is not chosen)
9. Chemical feed stations for water quality management
10. Water test stations (if necessary)
11. Flow meters
12. Air vents
13. Water softeners (if necessary)
14. Nitrogen tanks, piping, and valves (if necessary)

CFCI Equipment list:

It is assumed that FSB will be required to design the below-listed systems. It is currently assumed that SA will NOT be providing the following:

1. Hydronic piping for cooling water (connecting dry cooler, pumps, and oven)
2. Piping insulation
3. Piping supports
4. Manual hydronic valves (beyond any pre-packaged valves on the pump, oven, or dry cooler skids)
5. Exterior concrete pad for dry cooler
6. Interior located space for SA supplied pumps
7. HVAC system to condition the room the vacuum oven is in
8. Electrical panel and wiring for oven, pumps, VFD's, and dry cooler

Other design assumptions:

1. The heat rejection from the oven to the surrounding space is 40 kW.
2. The range for the outside surface temperature of the oven during operation is 90°F to 200°F.
3. The system pressure ranges from 30 psi - 60 psi.
4. The max flow through the system is 516 gpm. Piping will be designed around this flow.
5. The max cooling supply temperature allowable for cooling the oven is 110°F.
6. The pumps provided by SA will be located indoors.

7. The system is allowed to have glycol in it. Glycol will be provided in the system to protect against freezing. The system does not need to be 100% water.
8. Solar Atmosphere will handle all the water treatment requirements. This includes controlling the:
    a. Allowable total hardness
    b. Total dissolved solids
    c. Oxygen content
    d. PH value
    e. Clorine level
    f. And all other chemicals in the water (SO_4, $HC0_3$, PO_4, NH_3, Fe, Mn, CO_2, H_2S, etc.)
9. SA will not provide a responsibility matrix.
10. SA will not provide a typical layout or flow diagram for reference.
11. SA will likely not provide everything this document states they are to provide. FSU accepts the risk and associated cost to modify the system and construction as needed once SA's full responsibilities are documented after FSB completes its design of the building.
12. FSB is not liable for change orders or redesign efforts due to incorrect assumptions as outlined in this document.

TAB 3
APPENDIX B

- Equipment List - Owner Provided

Proposed AM Facility Details

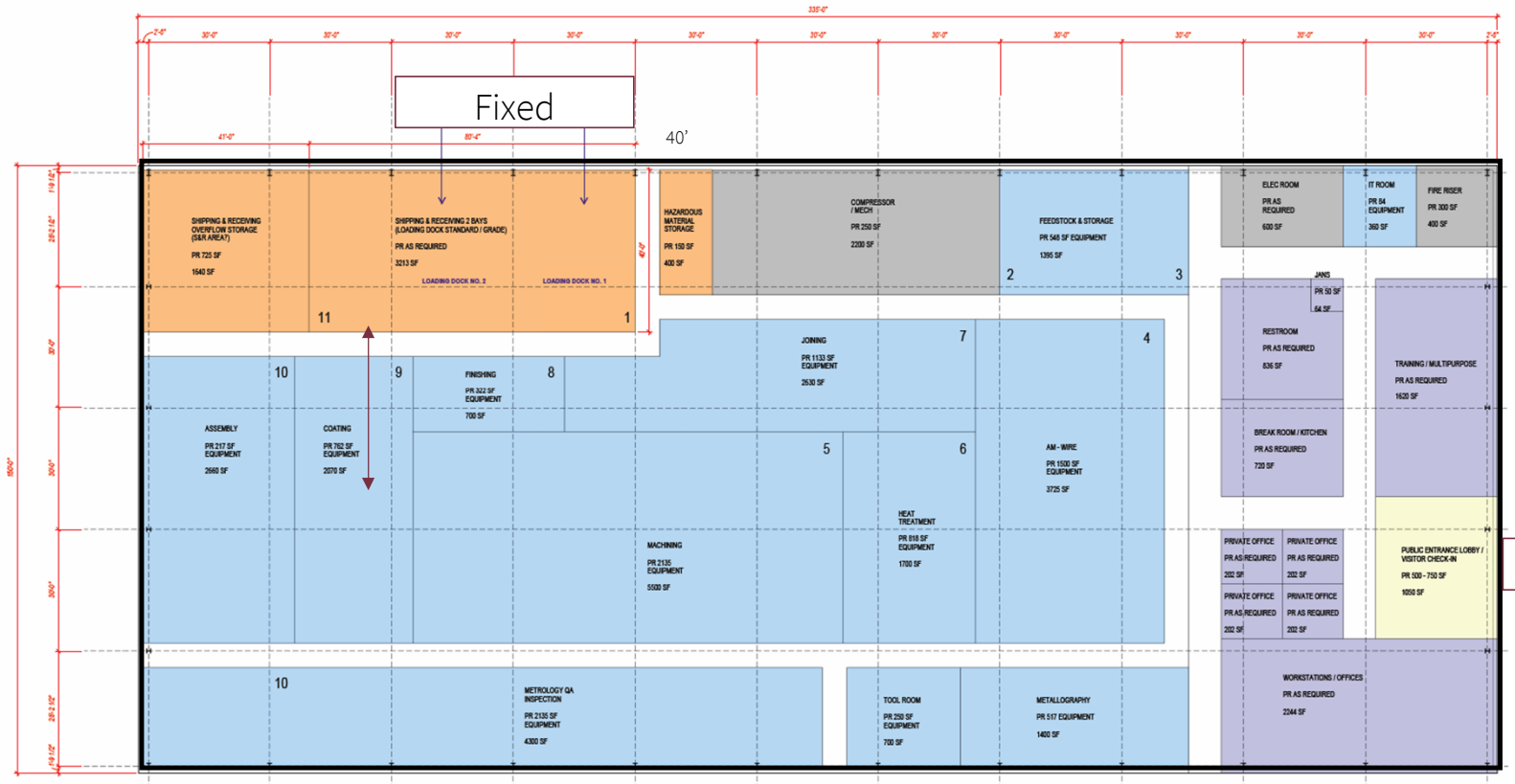
Abdalla Nassar

Chris Apple

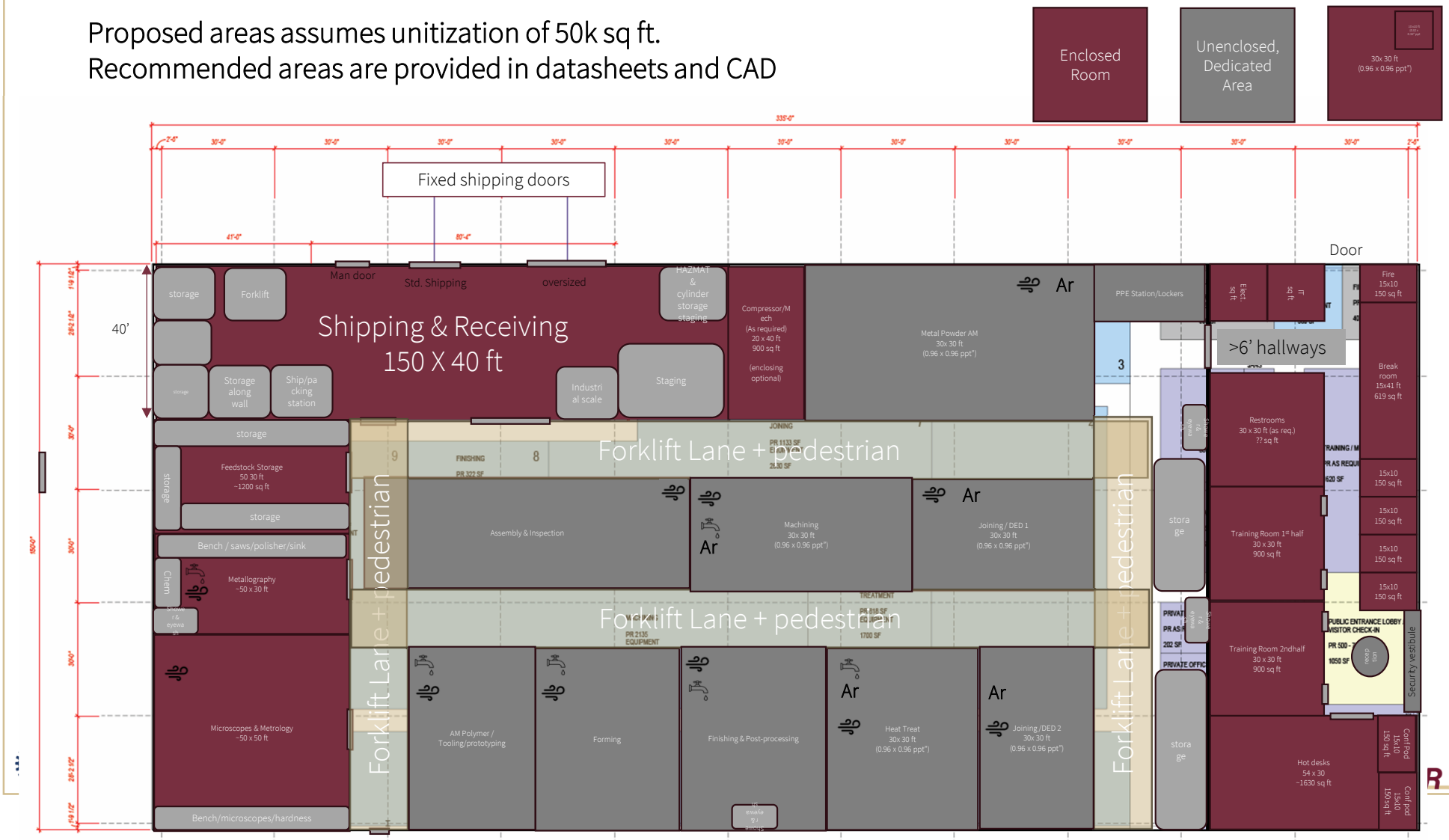
ASTRO America

abdalla@astroa.org

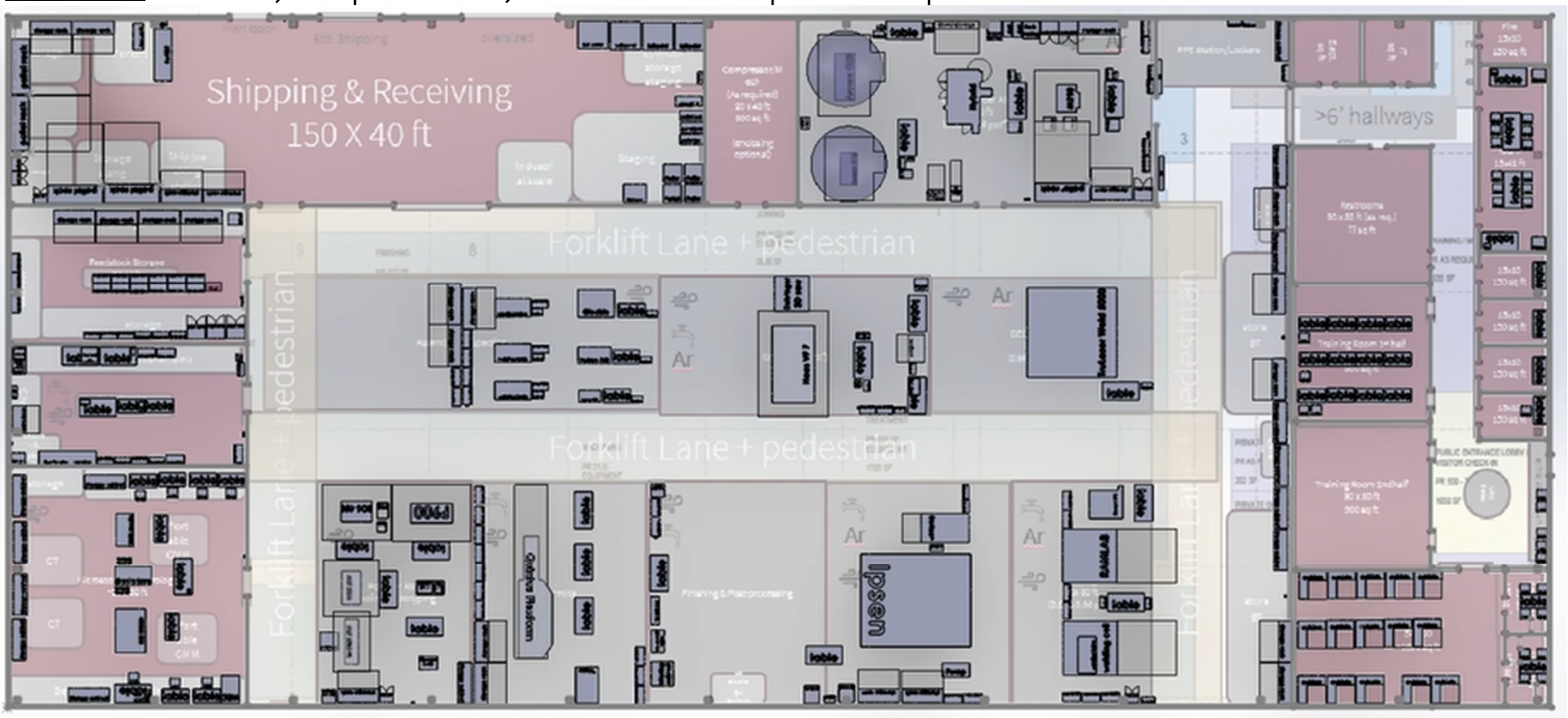
The initial layout has been modified. Shipping door locations, entry way locations, and relative size of office and manufacturing areas have been preserved.



Proposed areas assumes unitization of 50k sq ft.
Recommended areas are provided in datasheets and CAD



Proposed areas assumes unitization of 50k sq ft.
Recommended areas are provided in datasheets and CAD
Minimum electrical, compressed Air, and additional requirements provided in data sheets.



Row Labels	Max of Phase	Max of Voltage	Max of frequency (Hz)	Sum of Current (A)	Sum of Chilled Water Heat total (kW)	Sum of Waste Heat HVAC total (kW)	Sum of Average Power consumption(kW or kVA)	Sum of Max Power Total (kW)	Max of Compressed air pressure (bar)	Sum of Air total (L/min)	Tap Water	Drain	Min Dimensions	Max Dimensions
Assembly & Inspection	**3.00**	**480.00**	**60.00**	**250.50**	**18.00**	**62.90**	**187.12**	**194.13**	**7.00**	**1740.00**	FALSE	FALSE	53' x 29'	74' x 29'
Instron MPX (750 Joules)	3.00	240.00	60.00	15.00	0.00	0.40	1.00	6.24		0.00				
MSC Inventory Machine	1.00	120.00	60.00	3.00	0.00	0.00	0.10	1.87		0.00				
Snap-on - 73" Triple-Bank 15-drawer classic series drawer section					0.00	0.00	0.00	0.00		0.00				
Stronghands tools - Buildpro Max tables, 8' x 4'					0.00	0.00	0.00	0.00		0.00				
Instron Tensile 6800	3.00	240.00	60.00	17.50	0.00	2.50	7.27	7.27		0.00				
Uline - H-1871					0.00	0.00		0.00		0.00				
Uline - H-3915					0.00	0.00		0.00		0.00				
Gleeble 3500	3.00	480.00	60.00	215.00	18.00	60.00	178.75	178.75	7.00	1740.00				
Feedstock Storage	**1.00**	**230.00**	**60.00**	**14.30**	**0.00**	**0.00**	**2.00**	**11.05**		**0.00**	FALSE	FALSE	30' x 42' min	30' x 50' max
3M- Versaflo TR-600					0.00	0.00	0.00	0.00		0.00				
Amerex - MODEL C571					0.00	0.00	0.00	0.00		0.00				
Linde Gas - ADDvance powder cabinet	1.00	120.00	60.00	2.00	0.00	0.00	0.00	1.25		0.00				
Ruwac - Powerhouse Ex: 24 Gallon, 150 CFM-500 CFM	1.00	230.00	60.00	12.30	0.00	0.00	2.00	9.80		0.00				
Uline - H-1871					0.00	0.00		0.00		0.00				
Uline - H-3915					0.00	0.00		0.00		0.00				
Uline H-15645S-Y					0.00	0.00		0.00		0.00				
Finishing	**3.00**	**230.00**	**60.00**	**12.13**	**0.00**	**35.30**	**3.14**	**4.83**	**7.00**	**1005.00**	TRUE	TRUE	6' x 48' min	23' x 48' max
Normfinish AM DI 14	1.00	230.00	50.00	2.13	0.00	0.30	0.85	0.85	7.00	1000.00				
Snap-on - 73" Triple-Bank 15-drawer classic series drawer section					0.00	0.00		0.00		0.00				
Monsoon MDD-Mini	3.00	230.00	60.00	10.00	0.00	35.00	2.29	3.98	7.00	5.00				
Uline - H-1871					0.00	0.00		0.00		0.00				
Forming	**3.00**	**480.00**	**60.00**	**105.50**	**10.00**	**14.00**	**38.01**	**80.41**	**7.00**	**250.00**	FALSE	FALSE	33' x 48 min	37' x 48' max
Quintius Flexform press	3.00	480.00	60.00	90.00	10.00	7.00	20.00	74.82	7.00	250.00				
Uline - H-1871					0.00	0.00		0.00		0.00				
Uline - H-3915					0.00	0.00		0.00		0.00				
Hurrichill AP36BC-2T blast chiller	1.00	208.00	60.00	15.50	0.00	7.00	18.01	5.58		0.00				
Heat Treat	**3.00**	**480.00**	**60.00**	**949.30**	**403.00**	**212.00**	**703.00**	**732.21**	**7.00**	**70.00**	TRUE	TRUE	39' x 48' min	45' x 48' max
Oberon HR-PB-KIT-L					0.00	0.00		0.00		0.00				
Snap-on - 73" Triple-Bank 15-drawer classic series drawer section					0.00	0.00		0.00		0.00				
IPSEN - H6672. smaller model - H5448. May replace with inert atmosphere furnace	3.00	440.00	60.00	823.00	400.00	200.00	598.00	627.21	7.00	50.00				
Deltech DT-SBL-AE-36	3.00	480.00	60.00	108.25	3.00	12.00	90.00	90.00	7.00	20.00				
Nabertherm N 41/H	3.00	480.00	60.00	18.04	0.00	0.00	15.00	15.00		0.00				
Uline - H-1871					0.00	0.00		0.00		0.00				
Uline - H-3915					0.00	0.00		0.00		0.00				
IT		**240.00**	**60.00**	**30.00**	**0.00**	**6.00**	**20.00**	**7.20**		**0.00**	FALSE	FALSE		
42U Rack		240.00	60.00	30.00	0.00	6.00	20.00	7.20		0.00				
Joining-DED 1	**3.00**	**400.00**	**50.00**	**80.00**	**5.00**	**4.50**	**15.00**	**55.43**	**7.00**	**100.00**	FALSE	FALSE	30' x 29' min	47' x 29' max
TruLaser Cell 5030 (9229 x 6145 x 2200) (6kW) w/ welding cutting and cladding options	3.00	400.00	50.00	80.00	5.00	4.50	15.00	55.43	7.00	100.00				
Joining-DED 2	**3.00**	**480.00**	**60.00**	**170.00**	**10.00**	**31.44**	**89.93**	**131.64**	**6.00**	**530.00**	FALSE	FALSE	20' x 48' min	30' x 48'max
Miller - Multimatic 220 AC/DC Multiprocess Welder - 907757 with weld enclsoure	1.00	230.00	60.00	30.00	0.00	4.14	6.90	23.90		0.00				
MSC Inventory Machine					0.00	0.00	0.10	0.00		0.00				
RAMLAB Panasonic TL-1800	3.00	480.00	60.00	50.00	10.00	10.00	30.00	41.57	6.00	530.00				
Snap-on - 73" Triple-Bank 15-drawer classic series drawer section					0.00	0.00	0.00	0.00		0.00				
Stronghands tools - Buildpro Max tables, 8' x 4'					0.00	0.00	0.00	0.00		0.00				
Uline- H-5179BLU					0.00	0.00	0.00	0.00		0.00				
RAMLAB Controller	3.00	440.00	60.00	55.00		14.00	41.92	41.92						
Fronius TPS 400i CMT attached to co-bot (Fronius Cobot Cell CWC-S w/ TPS 400i)	3.00	400.00	50.00	35.00	0.00	3.30	11.02	24.25	0.00	0.00				
Uline - H-1871					0.00	0.00		0.00		0.00				
Machining	**3.00**	**400.00**	**60.00**	**132.00**	**0.00**	**17.50**	**49.79**	**58.84**	**6.90**	**114.00**	TRUE	TRUE	37' x 30' min	58' x 30' max
MSC Inventory Machine					0.00	0.00	0.10	0.00	0.00	0.00				
Snap-on - 73" Triple-Bank 15-drawer classic series drawer section					0.00	0.00	0.00			0.00				
Haas VF-7/50	3.00	220.00	60.00	70.00	0.00	9.00	26.67	26.67	6.90	114.00				
Behringer 3D Saw LPS-T 3D/ Klaeger	3.00	400.00	50.00	26.00	0.00	5.00	13.00	18.01		0.00				
Tensile Mill CNC Mini	3.00	230.00	60.00	15.00	0.00	1.20	3.44	5.98	0.00	0.00				
TensileTurn CNC Industrial Upgrade Model	3.00	230.00	60.00	20.00	0.00	1.60	4.58	7.97	0.00	0.00				
Hexagon - Absolute arm -7-axis (8725-7) / Keyance Wide Area CMM (with granite table)	1.00	120.00	60.00	1.00	0.00	0.70	2.00	0.21		0.00				
Metal Powder - AM	**3.00**	**415.00**	**60.00**	**172.30**	**0.00**	**42.90**	**98.94**	**121.77**	**7.00**	**2853.00**	FALSE	FALSE	40' x 76'	40' x 76'
3M- Versaflo TR-600					0.00	0.00	0.00	0.00		0.00				
Amerex - MODEL C571					0.00	0.00	0.00	0.00		0.00				
Linde Gas - ADDvance powder cabinet					0.00	0.00	0.00	0.00		0.00				
MSC Inventory Machine					0.00	0.00	0.10	0.00		0.00				
Ruwac - Powerhouse Ex: 24 Gallon, 150 CFM-500 CFM	1.00	230.00	60.00	12.30	0.00	0.00	3.00	9.80		0.00				
Snap-on - 73" Triple-Bank 15-drawer classic series drawer section					0.00	0.00	0.00	0.00		0.00				
Statictek - TT_FM236720GY					0.00	0.00	0.00	0.00		0.00				
TBD					0.00	1.20	0.50	0.00		0.00				
TBD - UPS					0.00	0.00	0.00	0.00		0.00				
Hybrid manufacturing technologies	3.00	415.00	50.00	64.00	0.00	16.00	46.00	46.00	7.00	283.00				
EOS M290 x 2 400W	3.00	400.00	50.00	32.00	0.00	1.70	5.00	22.17	7.00	20.00				
Arcam Q10 Plus	3.00	400.00	60.00	32.00	0.00	8.00	22.17	14.60	6.00	630.00				
Arcam Q20 Plus	3.00	400.00	60.00	32.00	0.00	16.00	22.17	29.20	6.00	1920.00				
Metallography	**3.00**	**240.00**	**60.00**	**61.30**	**2.24**	**17.70**	**10.56**	**8.18**	**7.00**	**140.00**	TRUE	TRUE	26' x 26'	50' x 26'
3M- Versaflo TR-600					0.00	0.00	0.00	0.00		0.00				
Amerex - MODEL C571					0.00	0.00	0.00	0.00		0.00				
Buehler - AbrasiMet L Pro	3.00	240.00	60.00	26.00	0.00	0.00	4.00	0.00		0.00				
Buehler - EcoMet 30 Twin Semi-automated grinder-polisher	1.00	120.00	60.00	8.80	0.00	0.20	0.50	1.83	4.00	10.00				
Buehler - Simplivac vacuum mounting system					0.00	0.20	0.50	0.00		0.00				
Culligan - QS/QW-48					2.00	16.00	3.00	0.00		0.00				
Hall Flow Meter					0.00	0.00	0.00	0.00		0.00				
Labconco - Protector XL	1.00	115.00	60.00	10.00	0.00	0.40	1.00	1.99	7.00	30.00				
Linde Gas - ADDvance powder cabinet	1.00	120.00	60.00	2.00	0.00	0.00	0.00	1.66		0.00				
Malvern Panalytical - Zetasizer Ultra	1.00	120.00	60.00	4.00	0.00	0.10	0.10	0.83		0.00				
Uline H-1564S-Y					0.00	0.00	0.00	0.00		0.00				
Uline - H-1871					0.00	0.00				0.00				
Uline H-15645S-Y					0.00	0.00				0.00				
Guardian Emergency shower/eyewash station - Plastic H-5101					0.00	0.00				0.00				
Keyence VHX	1.00	120.00	60.00	3.50	0.00	0.10	0.10	0.73		0.00				
Buehler SimpliMet 4000	1.00	120.00	60.00	1.00	0.24	0.20	0.12	0.42		0.00				
NDT-LP1D	1.00	120.00	60.00	6.00	0.00	0.50	1.25	0.72	6.00	100.00				
Metrology	**1.00**	**230.00**	**60.00**	**99.00**	**0.50**	**143.67**	**23.86**	**79.09**		**5.00**	FALSE	FALSE	39' x 52' min	51' x 52' max
Bruker - ContourX-100	1.00	120.00	60.00	4.00	0.00	0.10	0.11	0.83		0.00				
Buehler - Wilson VH3100	1.00	120.00	60.00	4.00	0.00	0.20	0.50	0.83		0.00				
NSI-X5000	1.00	230.00	60.00	60.00	0.00	1.17	13.80	23.90		0.00				
Thermo Fischer Scientific - FEI Quanta 650 FEG SEM	1.00	230.00	60.00	15.00	0.50	1.00	3.00	5.98		5.00				
Waygate - Phasor XS					0.00	0.00	1.00	0.00		0.00				
Zeiss Xradia 515 Versa	1.00	230.00	60.00	15.00	0.00	1.20	3.45	5.98		0.00				
https://cnc-specialty-store.com/measuring-inspection/surface-plates/precision-granite-surface-plate-48-x-96-x-10-grade-a														
https://cnc-specialty-store.com/maintenance-tools/granite-surface-plate-support-stand								0.00						
Hexagon - Absolute arm -7-axis (8725-7) / Keyance Wide Area CMM (with granite table)	1.00	120.00	60.00	1.00	0.00	140.00	2.00	41.57		0.00				
Outside of Facility					**0.00**	**0.00**	**0.00**	**0.00**		**0.00**	TRUE	TRUE		
Microbulk 1000L System					0.00	0.00	0.00	0.00		0.00				
Polymer-AM	**3.00**	**240.00**	**60.00**	**234.00**	**1.00**	**61.00**	**74.30**	**74.30**	**8.00**	**0.12**	TRUE	TRUE	33' x 68'	33' x 68'
EOS INTEGRA P 450	3.00	240.00	60.00	40.00	0.00	5.00	12.50	12.50	6.00	0.00				
MJF 5200	1.00	240.00	60.00	80.00	1.00	8.00	3.46	3.46	0.00	0.00				
MJF 5200 Processing station	1.00	240.00	60.00	14.00	0.00	8.00	22.17	22.17	0.00	0.00				
Chiller - EOS INTEGRA P 450	1.00	230.00	60.00	20.00	0.00	8.00	22.17	22.17	0.00	0.00				
Stratasys Fortus F900	1.00	230.00	60.00	40.00	0.00	8.00	9.20	9.20	8.00	0.12				
Across international AT19-UL vacuum oven	1.00	120.00	60.00	20.00	0.00	8.00	2.40	2.40		0.00				
blue print cabinet - H-8796RT					0.00	8.00	0.00	0.00		0.00				
Oryx sca1200ht	1.00	120.00	60.00	20.00	0.00	8.00	2.40	2.40		0.00				
Shipping & Receiving	**3.00**	**480.00**	**60.00**	**25.00**	**0.00**	**17.00**	**18.88**	**20.78**	**0.00**	**0.00**	FALSE	FALSE	125' x 240' min	150' x 40' max,
Lockout Safety - LS EV COMBO KIT					0.00	0.00	0.00	0.00		0.00				
Uline - H-10515					0.00	0.00	0.00	0.00		0.00				
Uline - H-11386					0.00	0.00	0.00	0.00		0.00				
Toyota - 05-9FBM25T		0.00	0.00	0.00	0.00	14.00	7.00	0.00		0.00				
Toyota - 90605-U0671-71	3.00	480.00	60.00	25.00	0.00	3.00	11.88	20.78	0.00	0.00				
Grand Total	**3.00**	**480.00**	**60.00**	**2335.33**	**449.74**	**665.91**	**1334.54**	**1579.85**	**8.00**	**6807.12**				

Special considerations

- ESD flooring required in AM Powder areas and feedstock storage.
  - AM Powder areas were added per FSU direction.
- Locations for safety showers, primary, and secondary eyewash stations are specified in CAD
- Forklift and pedestrian paths are specified in CAD/Drawings
- Max and Min dimensions provided