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<td>Third Floor Plan</td>
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<td>PreDesign Interior Renderings</td>
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<td>Grand Lounge</td>
<td>36</td>
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</table>
PHASE SIGN-OFF

JLG 20117 - UND Flight Operations Building and Hangar
Schematic Design Phase Sign-off
July 23, 2021

Attached are the Schematic Design phase documents for your review and approval.

Please provide signature below stating that you have reviewed the Schematic Design documents provided in this submittal, and JLG Architects and consultants can move into the next phase of design. If necessary, please provide any concerns or questions that need to be addressed prior to moving into the Design Development phase of design or as part of the next phase of design.

__________________________  ______________________
PIC Signature             Date

__________________________  ______________________
Owner Signature           Date
PROJECT OVERVIEW

The University of North Dakota Aviation Program, a part of the John D. Odegard School of Aerospace Sciences, is the top collegiate aviation program in the United States. Flight Operations for this premier program currently function out of a compact two-story building which does not meet their needs and does not portray the significance of UND Aviation. As a leader in aviation education, UND is looking to replace the existing old and under-sized Flight Operations Building on its airport campus with a new landmark building that will celebrate UND Aviation history. Along with replacing the Flight Operations Building, UND is also looking to replace an adjacent hangar building to allow it to serve as a multi-purpose space to expand the program’s impact with the greater campus and aviation partner community.

The design of the new modern three-story Flight Operations Building prioritizes efficient workflow, technology, and natural light. While the building will have recognizable spaces such as Dispatch, Records, Instructor Work Areas, and a Flight Store, it will also include additional new spaces such as a Grand Lounge with two-story views to the Bravo Apron, Briefing/Debriefing Huddle Rooms, open soft seating areas throughout, and an executive Board Room to further enhance the education of future aviation professionals. The site design includes the addition of a parking lot and updating to existing parking to the south of the Flight Operations Building. The new parking lot will be located at an existing retention pond and new drainage utility will be required to properly drain the new site layout.

The overall design embodies the aspirational nature of aviation. The building’s architecture gives one the sense of being ‘lifted-up.’ A perforated screen wall on the south exterior not only serves to filter the strong south daylight and control heat-build up at the large window openings, but also gives the representation of being airborne as it thrusts off the building façade. Exterior materials are a composition of strong, durable finishes at the base of the building with warm tone materials above. Interior materials are a composition of wood, along with durable floor and wall materials that contrast, but compliment the warmth of the wood. An abundance of natural light characterizes the quality of the indoor space. The new building will inspire students, engage industry partners, and bring pride to UND Aerospace and it continues to expand its legacy.

OWNER PROJECT GOALS

1. The UND Flight Operations Building will be a landmark that ‘lifts up’ and inspires current and future students, while celebrating the rich history and ongoing legacy as the top collegiate aviation program in the United States.
2. Effective use of technology and modernization of how things operate, truly be on the leading edge of our aviation peers with a priority on safety/technology (data, analytics, metrics)
3. Provide a place for industry partners to set up and promote themselves. The building should also be a great venue to attract the community and inspire the next generation of pilots and aviation experts
4. Improve parking and access to be easy and intuitive
5. videos and improved workflow and collaboration between dispatch, flight instructors, and management. This includes maintaining the physical interior connection between the project and the administration building
6. Future proofing, think beyond when the building opens (infrastructure and flexibility are key) – what has COVID taught us?
7. Dream dispatch process – allow for more public space on the first floor, less space for offices/desks with the help of technology
8. Provide healthy and naturally lit workplace environments, with access to outdoor space
# Project Schedule

## Schematic Design
May 3, 2021 to July 23, 2021

## Design Development
August 9, 2021 to October 8, 2021

## Construction Documents
Pending

## Bidding
Pending

## Construction
Anticipated Summer of 2023

## 2021 Schedule

### May
- **6th** – Owner Kick-Off Meeting
- **19th** – Owner Meeting
- **May 6th** – Owner Kick-Off Meeting
- **PD program & plan review**

### June
- **3rd** – Owner Meeting
  - PD exterior design review, plan review & hangar review
  - **Week of June 7th** – Meeting with City of GF, Initial Code Analysis
- **17th** – Owner Meeting
  - Code update, site review, program confirmation & hangar overview

### July
- **1st** – Owner Meeting
  - Site & plan review & sustainability overview
- **15th** – Owner Meeting
  - Exterior design review & interior finish overview
- **23rd** – SD REVISION
- **29th** – Owner Meeting
  - Review SD set & DD phase meetings summary

### August
- **Week of August 2**
  - Student & Staff Input & Mitigation
  - Preliminary Submittal to FAA
- **12th** – Owner Meeting
  - Overall design review
- **16th** – Security Review Meeting
- **23rd** – Catering Review Meeting
- **26th** – Owner Meeting
  - Finishes review & branding
  - A/V and IT system review

### September
- **3rd** – 50% DD SET
- **Week of September 6th**
  - DD Code Review with City
  - Mach & Elec systems review with Facilities
- **9th** – Owner Meeting
  - Review furniture options
- **23rd** – Owner Meeting
  - DD page turn/review
- **27th** – Door Hardware Review Meeting
- **October 7th** – Owner Meeting
  - Review DD set
- **October 8th** – 100% DD SET
- **21st** – Owner Meeting
  - Review DD estimate
- **October 18th to 23rd** – UND Homecoming
- **29th** – Start CD’s
### BUILDING STATISTICS

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<tr>
<th>Parameter</th>
<th>Value</th>
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<tr>
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<tr>
<td>Height (Max)</td>
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</table>

### ZONING / SITE REQUIREMENTS

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<th>Requirement</th>
<th>Details</th>
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<tbody>
<tr>
<td>Zoning Type</td>
<td>Industrial</td>
</tr>
<tr>
<td>Site Address</td>
<td>123 Main St, Anytown, USA</td>
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<tr>
<td>Lot Size</td>
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### BUILDING CODE ANALYSIS - APPLICABLE GOVERNING CODES

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<th>Code</th>
<th>Section</th>
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<tr>
<td>IGCC</td>
<td>2015 edition</td>
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### BUILDING CODE ANALYSIS - OCCUPANCY CLASSIFICATION AND USE

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<th>Details</th>
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<td>Use</td>
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### CHAPTER 5 TYPES OF CONSTRUCTION

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<tr>
<td>Structural</td>
<td>Steel frame</td>
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<tr>
<td>Insulation</td>
<td>R-15 rated panels</td>
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<tr>
<td>Finishing</td>
<td>Painted steel</td>
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### CHAPTER 6 SPECIAL CONSIDERATIONS

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<th>Consideration</th>
<th>Details</th>
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<tbody>
<tr>
<td>Fire Protection</td>
<td>Automatic sprinkler system</td>
</tr>
<tr>
<td>Accessibility</td>
<td>ADA compliant ramps</td>
</tr>
<tr>
<td>Energy Efficiency</td>
<td>LED lighting</td>
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</tbody>
</table>

### CHAPTER 7 GENERAL BUILDING HEIGHTS AND AREAS

<table>
<thead>
<tr>
<th>Height</th>
<th>Area</th>
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<tbody>
<tr>
<td>Max.</td>
<td>100 ft</td>
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<tr>
<td>Min.</td>
<td>50 ft</td>
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</tbody>
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### CHAPTER 8 BUILDING ENTRANCES AND EXITS

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<tr>
<th>Exit Type</th>
<th>Details</th>
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<tbody>
<tr>
<td>Main Entrance</td>
<td>Aluminum glass doors</td>
</tr>
<tr>
<td>Service Entrance</td>
<td>Sliding steel doors</td>
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</table>

### CHAPTER 9 BUILDING LIFE SAFETY

<table>
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<th>Requirement</th>
<th>Details</th>
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<tbody>
<tr>
<td>Exit Width</td>
<td>36&quot; minimum</td>
</tr>
<tr>
<td>Exit Egress</td>
<td>45 minutes</td>
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</table>

### CHAPTER 10 BUILDING ELEVATORS AND STAIRWAYS

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>Elevators</td>
<td>3 passenger</td>
</tr>
<tr>
<td>Stairways</td>
<td>100 linear ft</td>
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### CHAPTER 11 BUILDING MECHANICAL SYSTEMS

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<thead>
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<th>System</th>
<th>Details</th>
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<tbody>
<tr>
<td>HVAC</td>
<td>Ductless mini-split</td>
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<tr>
<td>Plumbing</td>
<td>3&quot; drain lines</td>
</tr>
<tr>
<td>Electrical</td>
<td>3-phase 208V power</td>
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### CHAPTER 12 BUILDING UTILITIES

<table>
<thead>
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<th>Utility</th>
<th>Capacity</th>
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<tbody>
<tr>
<td>Water</td>
<td>250 GPM</td>
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<tr>
<td>Sewer</td>
<td>50 GPM</td>
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<tr>
<td>Electricity</td>
<td>1000 kW</td>
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### CHAPTER 13 BUILDING SERVICES

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<thead>
<tr>
<th>Service</th>
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<tbody>
<tr>
<td>Wi-Fi</td>
<td>100 Mbps</td>
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<tr>
<td>Phone</td>
<td>VOIP system</td>
</tr>
<tr>
<td>Security</td>
<td>Access control</td>
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</tbody>
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### CHAPTER 14 BUILDING SECURITY

<table>
<thead>
<tr>
<th>Security Feature</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>Cameras</td>
<td>360° panoramic</td>
</tr>
<tr>
<td>Alarm System</td>
<td>Intrusion detection</td>
</tr>
<tr>
<td>Surveillance</td>
<td>Fingerprint scanning</td>
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</table>

### CHAPTER 15 BUILDING MAINTENANCE

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<thead>
<tr>
<th>Maintenance Plan</th>
<th>Details</th>
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<tbody>
<tr>
<td>Schedule</td>
<td>Quarterly inspections</td>
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<tr>
<td>Resources</td>
<td>Full-time maintenance staff</td>
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</table>

### CHAPTER 16 BUILDING MANAGEMENT

<table>
<thead>
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<th>Management Strategy</th>
<th>Details</th>
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<tbody>
<tr>
<td>Sustainability</td>
<td>LEED Gold certification</td>
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<tr>
<td>Energy Conservation</td>
<td>Smart thermostats</td>
</tr>
<tr>
<td>Operational Efficiency</td>
<td>Automated systems</td>
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</tbody>
</table>

---

Preliminary Code Review

JLG 20117 | © 2021 JLG Architects
PRELIMINARY CODE REVIEW

CHAPTER 7 GENERAL BUILDING HEIGHTS AND AREAS

FLIGHT OPERATIONS BUILDING AND HANGAR

UND FLIGHT OPERATIONS BUILDING AND HANGAR
# PRELIMINARY CODE REVIEW

## 9.0 Fire Protection and Life Safety Systems

### 9.1 Fire Alarm and Detection Systems

<table>
<thead>
<tr>
<th>Item</th>
<th>Requirement</th>
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</thead>
<tbody>
<tr>
<td>9.1.1</td>
<td>Fire alarm systems shall be designed and installed in accordance with the latest edition of NFPA 72, The National Fire Alarm and Signaling Code.</td>
</tr>
<tr>
<td>9.1.2</td>
<td>Smoke detectors and heat detectors shall be provided in all areas of the building where there is a risk of fire.</td>
</tr>
</tbody>
</table>

### 9.2 Sprinkler Systems

<table>
<thead>
<tr>
<th>Item</th>
<th>Requirement</th>
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</thead>
<tbody>
<tr>
<td>9.2.1</td>
<td>Sprinkler systems shall be designed and installed in accordance with the latest edition of UL 1771, Standard for the Installation of Sprinkler Systems.</td>
</tr>
<tr>
<td>9.2.2</td>
<td>Sprinkler systems shall be provided in areas where there is a risk of fire.</td>
</tr>
</tbody>
</table>

### 9.3 Fire Extinguishers

<table>
<thead>
<tr>
<th>Item</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.3.1</td>
<td>Fire extinguishers shall be provided in accordance with NFPA 10, Standard for Portable Fire Extinguishers.</td>
</tr>
<tr>
<td>9.3.2</td>
<td>Fire extinguishers shall be located in areas where there is a risk of fire.</td>
</tr>
</tbody>
</table>

### 9.4 Emergency Lighting

<table>
<thead>
<tr>
<th>Item</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.4.1</td>
<td>Emergency lighting systems shall be designed and installed in accordance with NFPA 101, Life Safety Code.</td>
</tr>
<tr>
<td>9.4.2</td>
<td>Emergency lighting systems shall be provided in areas where there is a risk of fire.</td>
</tr>
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</table>

### 9.5 Fire Stopping Systems

<table>
<thead>
<tr>
<th>Item</th>
<th>Requirement</th>
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</thead>
<tbody>
<tr>
<td>9.5.1</td>
<td>Fire stopping systems shall be designed and installed in accordance with NFPA 251, Standard for the Evaluation of Firestop Systems.</td>
</tr>
<tr>
<td>9.5.2</td>
<td>Fire stopping systems shall be provided in areas where there is a risk of fire.</td>
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</table>

### 9.6 Emergency Egress Systems

<table>
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<tr>
<th>Item</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.6.2</td>
<td>Emergency egress systems shall be provided in all areas of the building.</td>
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### 9.7 Means of Egress

<table>
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<tr>
<th>Item</th>
<th>Requirement</th>
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</thead>
<tbody>
<tr>
<td>9.7.1</td>
<td>Means of egress shall be designed and installed in accordance with NFPA 1, Standard for the Safety of People in Buildings.</td>
</tr>
<tr>
<td>9.7.2</td>
<td>Means of egress shall be provided in all areas of the building.</td>
</tr>
</tbody>
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---

## 10.0 Means of Egress

<table>
<thead>
<tr>
<th>Item</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.1</td>
<td>Means of egress shall be designed and installed in accordance with NFPA 1, Standard for the Safety of People in Buildings.</td>
</tr>
<tr>
<td>10.2</td>
<td>Means of egress shall be provided in all areas of the building.</td>
</tr>
</tbody>
</table>

---

**Notes:**
- All systems shall be designed and installed in accordance with the latest edition of applicable NFPA standards. 
- Systems shall be tested and maintained in accordance with NFPA guidelines. 
- All systems shall be clearly marked and easily accessible in case of emergencies. 
- Fire protection and life safety systems shall be reviewed and approved by the appropriate authority having jurisdiction.
**PRELIMINARY CODE REVIEW**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
<th>Access Load</th>
<th>Water Fixtures</th>
<th>Lavatories</th>
<th>Bed/Meal Rooms</th>
<th>Building Entries</th>
<th>Other</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
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<td></td>
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<tr>
<td>Efficient Wash</td>
<td></td>
<td>Efficient Wash</td>
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<tr>
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<td>Sanitary</td>
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<tr>
<td>Fire Hydrant</td>
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<td>Fire Hydrant</td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>Crane Hook</td>
<td></td>
<td>Crane Hook</td>
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<td></td>
</tr>
<tr>
<td>Fire Protection</td>
<td></td>
<td>Fire Protection</td>
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</table>

**MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
<th>Access Load</th>
<th>Water Fixtures</th>
<th>Lavatories</th>
<th>Bed/Meal Rooms</th>
<th>Building Entries</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>Male</td>
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<td>Male</td>
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<tr>
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<td>Efficient Wash</td>
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<tr>
<td>Sanitary</td>
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<td>Sanitary</td>
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<tr>
<td>Fire Hydrant</td>
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<td>Fire Hydrant</td>
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</tr>
<tr>
<td>Crane Hook</td>
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</tbody>
</table>

**UNION FLIGHT OPERATIONS BUILDING AND HANGAR**
SITE PLAN DIAGRAM

- FLIGHT OPERATIONS BUILDING
- BRAVO APRON
- BRICK APARTMENT
- ADJACENT HANGAR FACADE IMPROVEMENT
- PHASE I - EXPANDED PARKING 122 STALLS
- PHASE II PARKING RECONFIGURED PARKING LOT 34 STALLS
- BUS TURN AROUND LANDSCAPE/ART INSTALLATION
- FUTURE STUDENT PLAZA (POST TOWER RELOCATION)
- NEW PARKING ACCESS OFF AIRPORT DRIVE
- AIRPORT DRIVE
- FUTURE DETENTION POND
- FUTURE TOWER LOCATION - TBD
- CHARLIE APRON
- PHASE II PARKING RECONFIGURED PARKING LOT 34 STALLS
- BUS TURN AROUND LANDSCAPE/ART INSTALLATION
- FUTURE STUDENT PLAZA (POST TOWER RELOCATION)
- NEW PARKING ACCESS OFF AIRPORT DRIVE
- AIRPORT DRIVE
- FUTURE DETENTION POND
- FUTURE TOWER LOCATION - TBD
- CHARLIE APRON
## SPACE PROGRAM

### Proposed Flight Operations Building

<table>
<thead>
<tr>
<th>Number</th>
<th>Space Type</th>
<th>Capacity</th>
<th>ASF/Occ.</th>
<th>ASF</th>
<th>Qty</th>
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<tr>
<td></td>
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### Public Spaces

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### Instructor/Student Interaction Spaces

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### Total

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THIRD FLOOR PLAN
SOUTH ELEVATION

- Skylights
- Perforated metal panel screen system
- Metal cladding
- Precast concrete
- Existing skyway
WEST ELEVATIONS
NORTH ELEVATION
EAST ELEVATION
EXTERIOR CONCEPT | BOARDS

1. Perforated metal panel screen system
2. Metal cladding
3. Concrete or masonry base
4. Perforated metal panels

UND FLIGHT OPERATIONS BUILDING AND HANGAR
INTERIOR CONCEPT | BOARDS
INTERIOR CONCEPT | BOARDS
INTERIOR CONCEPT | BOARDS
PRELIMINARY INTERIOR FINISHES | FIRST FLOOR

- Tile
- Sealed Concrete
- Walk Off Carpet
- Rubber Flooring
- Loft
- Carpet Tile
- Epoxy Flooring
- Large Format Tile or Terrazzo
PRELIMINARY INTERIOR FINISHES | SECOND FLOOR

- TILE
- SEALED CONCRETE
- BACK OFF CARPET
- RUBBER FLOORING
- LVT
- CARPET TILE
- EPOXY FLOORING
- LARGE FORMAT TILE OR TERRAZZO
PRELIMINARY INTERIOR FINISHES | THIRD FLOOR

- TILE
- SEALED CONCRETE
- WALK OFF CARPET
- RUBBER FLOORING
- LVT
- CARPET TILE
- EPOXY FLOORING
- LARGE FORMAT TILE OR TERRAZZO
1.1 STRUCTURAL

The flight operations facility is a multi-story structure with a 1-story low roof attachment that will be sited on the current site of the existing flight operations building.

The adjacent hangar 256 will either be renovated or replaced with a new hangar.

Hangar 256 will have an elevated interior walk way to connect to the 2nd floor of the flight operations building.

1.1.1 Roof Design Loads

- Minimum Roof Live Load including all equipment enclosures = 20 PSF

1.1.1.1 Snow Load

Snow load for the facility is based on ASCE 7-16, which is incorporated by reference in the IBC.

Primary Structure, not including canopies and overhangs:
- Flat Roof Snow Load, pf = 42 psf
  - Occupancy Category II
  - Ground Snow Load, pg = 60 psf
  - Snow Importance Factor, Is = 1.0
  - Thermal Factor, Ct = 1.0 for heated, enclosed structures
  - Exposure Factor, Ce = 1.0
- Rain-on-snow Surchage (Slope < ½ inch/foot) =5 psf
- Snow Drifts at low-high roof transitions per ASCE 7-16, Chapter 7

For canopies and overhangs:
- Flat Roof Snow Load, pf = 50 psf
  - Occupancy Category II
  - Ground Snow Load, pg = 60 psf
  - Snow Importance Factor, Is = 1.0
  - Thermal Factor, Ct = 1.2 for unheated and open-air structures
  - Exposure Factor, Ce = 1.0
- Rain-on-snow Surchage (Slope < ½ inch/foot) =6 psf
- Snow Drifts at low-high roof transitions per ASCE 7-16, Chapter 7

1.1.2 Wind Load

Wind load for the facility is based on ASCE 7-16, which is incorporated by reference in the IBC.

- Ultimate Design Wind Speed (3 second gust), V = 110 MPH
- Occupancy Category II
- Wind Exposure C
- Internal Pressure Coefficient = +/- 0.18 MWFRS
- Main Wind Force Resisting System (MWFRS) wind load design pressures will be calculated for simple shear diaphragm provisions of ASCE 7-16 Chapters 26 and Chapter 27
- Shear wall MWFRS

1.1.3 Seismic Load

Seismic load for the structure is based on ASCE 7-16, which is incorporated by reference in the IBC.

Seismic response parameters were determined using:
- Occupancy Category II
- Site Soil Class D
- Seismic Importance factor Is = 1.0
- SDS = 0.048 g
  - S5 = 0.045 g
- SD1 = 0.027 g
  - S1 = 0.017 g
- Seismic Design Category A
- Basic Seismic Force Resisting System – Shear walls

1.1.4 Design Stresses

- Concrete minimum compressive strength (28 days)-all footing concrete – f'c = 3,500 psi
- Slabs on grade and slabs on metal deck – f'c=4,000 psi
- Reinforcing Bars (ASTM A615, Grade 60) – Fy = 60,000 psi
- Welded Wire Fabric (ASTM A185) – Fy = 60,000 psi
- Structural Wide Flange Shapes – Fy = 50,000 psi A992
- HSS Rectangular shapes – ASTM 500 Grade B, fy=46,000 psi
- HSS Round Pipe shapes- ASTM A500 Grade B, fy=42,000 psi
- Cold-formed structural steel studs - Fy =33 ksi (minimum), G60 galvanized coating for interior placement, G90 for exterior placement

1.1.5 Foundation Systems

Until a geotechnical report is completed, the most likely option is to use steel piles advanced to end bearing at interior columns.

Steel piles options include:
- Driven steel HP12x53
  - $55-$60/ft
  - Loud, disruptive with potentially harmful soil vibrations
  - Inexpensive, and very readily available from local markets
  - Very common
  - Have decent flexural capacity if needed
  - Welded section joints less likely to have fit-up issues at splices
  - Mobilization probably cost $20,000, and is less than other options due to local availability of very good installers
  - If we need piles, I will try to get these to work since they are the least cost option available
  - Load verifications are easy to do with a dynamic test, costs about $8,000
- Hydraulically advanced high capacity drilled piles, 7" OD x 0.408" wall thickness 65T-70T capacity
  - $110-$120/ft
  - Low disturbance with little to no induced soil vibrations
  - Bolted section splices, can be prone to fit up
  - No flexural capacity
  - Very little if any uplift/tenesile capacity
  - Mobilization likely more, about $30,000
  - If we need piles, I would use them judiciously to manage costs
  - If load verifications are needed, we need a static load test that costs about $40,000

- Driven steel pipe piles
  - Have the same general pro and cons as driven steel HP12x53
  - Have the same general pro and cons as driven steel HP12x53, except they will cost more.

If conventional shallow foundations are possible, we assume the allowable bearing capacity will not exceed of 1,200 psf. Final confirmation will be made by a completed geotechnical report.

Shallow footings and foundation walls will be reinforced cast in place structural concrete. Minimum footing thickness will be 12" and minimum width will be 20". Minimum wall thickness will be 8".

It is likely that shallow foundations will be acceptable at lightly loaded non-bearing wall or walls that support only wall finishes, and that piles will be used at interior columns.

1.1.6 Equipment Foundations

Heavily loaded equipment pads or other specialty foundations are not anticipated.

1.1.7 Structural Framing

1.1.7.1 Gravity Loads

Floor live loads on the 2nd and 3rd floors are typical of this type of occupancy and program:
- 100 PSF exit path loads
- 50 PSF office loads
- 80 PSF corridor loads.

Live loads at storage areas are treated as an area with the same live load as a corridor.

Areas of 50 PSF office load consist of moveable partition walls, making use of the 20 PSF partition wall dead load a reasonable requirement. The sum of the 50 PSF live + 20 PSF partition dead is nearly equal to the effects of the 80 PSF live load. Therefore, the entire floor plate will be designed with an 80 PSF live load.

Live load reduction will be used.

1.1.7.2 Gravity Framing System

Primary gravity framing system for the 2nd and 3rd floor levels will be non-composite hot-rolled steel beams supporting a composite slab on metal deck.

A bay study to compare composite beams to non-composite beams was completed. Criteria of the study

Wide flange steel columns will be used for the columns. Columns on the exterior walls will be loaded with transverse wind loads.

The cantilevered floors and roof that extend from Grid B south to Grid A are proposed to be supported with heavy wide flange columns (W18x65 or similar) on Grid B that supports stub cantilever steel girder beams (W21x62 or similar) extending from Grid B to Grid A. The roof beam will be a continuous beam.

Maximum beam framing depth for all areas north of Grid B is 16" with 4" slab and metal deck thickness for a maximum framing depth of 20".

Roof will be standard 1.5B20 roof deck supported by open-web steel joists. Hot rolled beams will be used at any heavy roof top units to avoid the use of special joists.

1.1.7.2 Lateral Loads

Wind shear will govern over seismic shear.

Shear walls will be used as the main wind force resisting system (MWRFS) throughout the structure.

1.1.8 Required Special Inspections

This project is subject to IBC 2016 special inspections balanced against local practice that delegates much responsibility of defining the required inspections to the structural engineer of record. In general, local municipal inspections will not require as much special inspection as Chapter 17 of the IBC.

Typical quality control testing consisting of pre-construction soil classification approval submittals and field compaction testing, pre-construction concrete mix design submittals and field testing, and pre-construction structural steel material and fabrication submittals are anticipated.

Masonry will be designed to avoid most or all field inspection requirements by using the lower allowable stresses associated with assumptions of no special inspections.
Structural steel moment connections will use field-installed bolts to avoid the inspection requirements of field-welded moment connections.

The backfill of the excavations left after demolition of the existing flight operations building must have continual observation and field testing.
PART 1. MECHANICAL GENERAL INFORMATION

1.1 OVERVIEW
A. This narrative document summarized the design concepts for the major fire protection (Division 21), plumbing (Division 22), and HVAC & Controls (Division 23). It is also intended to serve as a basis to support discussion, further design, and aid in preliminary cost estimating, as it is not exhaustive of all components required to be provided with the systems.

B. The following narrative outlines the fire protection, plumbing and mechanical infrastructure being proposed for this building as part of this project.

1.2 SCOPE
A. This narrative document summarizes the design concepts for the major mechanical systems including Fire Protection (Division 21), Plumbing (Division 22), HVAC & Controls (Division 23)

1.3 TECHNICAL CRITERIA
A. Codes: The following is a partial list of applicable codes governing the systems described herein:
5. Uniform Plumbing Code
6. NFPA 13 Installation of Fire Protection Systems
7. ASHRAE 90.1
8. UND Design Guidelines

PART 2. SPRINKLER SYSTEMS (DIVISION 21)

2.1 SPRINKLER SERVICE
A. A new 6" water line will be brought into the building to provide a fire protection service.

B. The building sprinkler riser will be situated in the water service room on the west side of the building. The riser will have 2 sprinkler zones, with one serving the hanger and the other serving the main building. The service will have a double check valve to protect the potable water supply from the domestic water main.

C. A fire department connection will be located along the south side of the building, in a location coordinated with the local fire department.

2.2 SPRINKLER PIPING:
A. Fire sprinkler system piping shall be a minimum wall thickness of Schedule 40 for pipe up to 8 inches in diameter. Where approved by NFPA, State Fire Marshall, and local authorities, Schedule 10 pipe may be used for main piping only.

2.3 SPRINKLER HEADS
A. Sprinkler heads shall be upright in exposed spaces. The heads in ceiling spaces will be of the concealed type.

2.4 FOAM FIRE SUPPRESSION SYSTEM
A. Full architectural code analysis required to determine needs based on NFPA. At this time, it is assumed that the facility will meet the requirements of NFPA 409 to be Group III and will be protected with a wet sprinkler system. No foam fire suppression system planned for the hanger at this time.

2.5 PRE-ACTION OR CLEAN AGENT SYSTEMS
A. There will not be any pre-action or clean agent suppression systems for any of the server or data rooms within the facility.

PART 3. PLUMBING SYSTEMS (DIVISION 22)

3.1 PLUMBING PIPING
A. The water service piping from 5' outside the building to the final plumbing fixture is by this contractor. A new 6" water line will be brought into the building to provide a fire protection service. A 2" water line will be brought into the building for the domestic water service. Both lines will be brought into the water entrance/sprinkler room located on the west side of the building.

B. Above ground piping - Tubing 1-1/2" size and smaller shall be Type L hard drawn copper. Tubing 2" size and larger shall be Type M hard drawn copper. Soft drawn copper tubing in small sizes may be used adjacent to fixtures and equipment.

C. All water piping will be insulated with a minimum of 1/2" fiberglass insulation.

3.2 SANITARY AND STORM PIPING
A. All sanitary and storm piping from a point 5' outside the building to the final plumbing fixture is by this contractor. A 4" sanitary service is anticipated to be required.

B. The roof drainage and overflow drainage will be handled by roof drains spread throughout the building roof. The primary and overflow drainage will then drain through the building. The primary drainage will be connected to an underground storm water connection. The storm piping from the street to the building will be by the civil contractor. All overflow roof drains will day lighted 18" above grade at areas around
the building. At this point it is anticipated that a 10° storm service will be required to the building.

C. All underground piping will be schedule 40 PVC or no hub cast. All above grade piping will be no hub cast iron pipe. All above grade piping will be allowed to be schedule 40 PVC if the runs are not longer than 35° or in return air plenum spaces.

3.3 DOMESTIC WATER HEATER
A. The single domestic water heater will be installed in the main mechanical room. It will be sealed combustion, gas fired water heater similar to AO Smith BTX, 80 MBH input rating based on preliminary calculations. A recirculation pipe system and pump will be installed to keep the water hot to all fixtures throughout the building.

3.4 SUMP PUMPS
A. The elevator pit will have a dedicated sump pit with duplex sump pumps discharging into the storm sewer service. Drain tile for the elevator pits will be provided by the general contractor.

3.5 NATURAL GAS PIPING
A. Natural gas piping will be provided to serve the gas fired boilers, water heaters, and fireplaces. A gas service will be installed on the south side of the building by the main mechanical room. The service will be 2 PSI pressure and anticipated building load will be 3500 CFH.
B. All gas piping will be schedule 40 steel.

3.6 PLUMBING FIXTURES:
A. All fixtures will be piped to allow for individual and room isolation valves for servicing.
B. Plumbing fixtures will be similar to the following
1. Lavatory’s – under counter vitreous china with battery operated motion sensors
2. Urinals – wall hung china with battery operated flush valves
3. Water Closets – wall hung china with battery operated flush valves
4. Water coolers – dual height water cooler with a touch free water bottle filler
5. Sinks – stainless steel of various sizes with goose neck spouts and blade handles
6. Wall hydrants – wall hydrants will be located at various locations around the perimeter of the building to allow for hose connections every 100-150 feet. Hydrants similar to Woodford 867.
7. Hose Bibbs – all mechanical rooms will have hot and cold water hose bibs for maintenance
8. Mop basins – 2x2 fiberglass basin with wall mounted mop sink faucets

PART 4. HVAC (DIVISION 23)

4.1 HEATING AND CHILLED WATER PIPING
A. All piping for the hot water heating system shall be black mild steel pipe, ASA Schedule 40 thickness. Fittings shall be banded black cast iron 125-pound fittings. Grooved piping will be allowed.
B. All hot and chilled water piping may be Type L hard drawn copper tubing at Contractor’s option. Fittings for copper tubing shall be cast bronze or wrought copper solder fittings. All connections shall be made using 95-5 solder. Press fit fittings will be allowed.
C. The piping will be run in several reverse return loops in the building to allow for partial isolation of the system to keep the rest of the building operational during maintenance of specific equipment or spaces.
D. The entire hot water piping system will have 35% ethylene glycol installed in it for freeze protection.
E. The entire chilled water piping system will have 35% ethylene glycol installed in it for freeze protection.
F. The entire geothermal water piping system will have 25% propylene glycol installed in it for freeze protection.

4.2 PERIMETER SUPPLEMENTAL HEATING EQUIPMENT
A. In exterior offices, huddle rooms, and public spaces with glazing, hot water finned tube radiation will be installed on exterior walls. Where glazing goes down to the floor, pedestal mount fixtures will be used.
B. In stairwells and vestibules, hot water cabinet unit heaters will be installed.
C. In mechanical rooms, hot water unit heaters will be installed.

4.3 GEOThermal WELLFIELD
A. As a sustainability option, geothermal heating and cooling is being explored. As part of this option, a geothermal wellfield would be installed north of the building underneath the apron. The geothermal wellfield header would be installed on the north wall of the mechanical room.
B. A water-to-water heat pump would be required to convert the geothermal water to heating and cooling water. Redundant circulating pumps would be provided for each of the geothermal, heating, and cooling water loops. Expansion tanks and hydronic specialties would be provided for each loop.
C. This option would eliminate the boiler plant and DX cooling (Air Cooled Condensing Units) noted later in this narrative. The heating water piping system and supplemental heating equipment would remain but would be sized for the lower heating water temperatures associated with the geothermal system. The air side system would remain the same.

4.4 WATER TO WATER HEAT PUMP
A. Under the geothermal system option, a water-to-water heat pump will be utilized to generate heating and chilled water from the geothermal wellfield water loop. Heat pump would be similar to Aermec NXP1660, generating 130 tons of cooling and 1300 MBH heating.
B. Water to water heat pump will be located in the main mechanical room. Redundant circulating pumps would be provided for the geothermal, heating, and cooling water loops. The pumps will be base mounted.
4.5 BOILER PLANT
A. With the standard HVAC system option, the heating for the building shall be done with high efficiency hot water boilers similar to Aero Benchmark. The boiler plant will have two (2) 1,500,000 BTU boilers, depending on final heating load calculations and redundancy requirements.
B. The boiler plant will be located in the main mechanical room.
C. Redundant, variable primary flow heating pumps will be provided for the boiler plant and heating loop in the building. The pumps will be base mounted.

4.6 AIR HANDLING UNITS
A. Air handling units will be indoor units, similar to Daikin vision series model CAH. They will consist of at least the following- direct drive exhaust fans with VFDs, economizer section, MERV 8 and MERV 13 filter sections, DX-cooling coil, hot water heating coil, and direct drive supply fans with VFDs.
B. All units will be Variable Air Volume (VAV) style to maximize efficiency.
C. All air handling units will have the outside air intake and relief air exhaust sized for 100% economizer.
D. The building will be served as follows:
   1. Main Building – 1 VAV unit, 35,000 CFM
   2. Hanger – 1 single zone unit, 10,000 CFM

4.7 ENERGY RECOVERY AIR HANDLING UNITS
A. Energy recovery air handling unit will be provided to exhaust air from restroom groups and pre-treat the outside air for the building and the hanger air handling units. Energy recovery unit will be indoor unit similar to Oxygen8 consisting of at least the following- direct drive exhaust fan with ECM, MERV 8 filters, fixed enthalpy recovery core, direct drive supply fan with ECM.
B. The building will be served as follows:
   1. Main Building – 1 unit, 3,000 CFM
   2. Hanger – 1 unit, 3,000 CFM

4.8 AIR COOLED CONDENSING UNITS
A. Cooling for the building will be generated from roof mounted air-cooled condensing units and paired with direct expansion (DX) cooling coils mounted in air handling units. The condensing units will be sized to match the associated air handling unit load. Condensing units will have scroll type compressors with the ability to offload to reduce cooling capacity and match building load.

4.9 POWER VENTILATORS
A. It is assumed that no cooking activities will be conducted in hanger area serving kitchen and that it will be for catering/serving only. No kitchen hood/grease exhaust/make-up air system is planned for the building.
B. General and bathroom exhaust will be handled through the energy recovery air handling units for the building.

4.10 ELECTRICAL AND SERVER ROOM COOLING
A. Electrical and server rooms that will require cooling year-round will have mini-splits to provide cooling. The evaporator coils will be installed over the doors into the rooms, and the condensers will be located on the mechanical room roof.

4.11 VARIABLE AIR VOLUME (VAV) BOXES
A. VAV boxes will be provided with hot water heating coils in the ductwork to provide separate zoning and space controls for offices and huddle. Zoning will be verified during design. Multiple offices/huddle rooms will be grouped and served by a single VAV boxes if they have similar cooling requirements.

4.12 DUCTWORK & DISTRIBUTION
A. Ductwork and fittings shall be constructed and supported in accordance with SMACNA HVAC Duct Construction Standards – Metal and Flexible, 1995 Edition with 1997 Addendum except as modified herein.
B. Ductwork and fittings shall be fabricated from G60 galvanized steel sheets complying with ASTM A527.
C. All supply ductwork in spaces with ceilings will be insulated with 2” fiberglass insulation.
D. All ductwork shall be built to 4” pressure class prior to VAV boxes, and 2” pressure class in all other instances.

4.13 TESTING AND BALANCING
A. All water and air systems will be tested by a 3rd part Testing And Balancing (TAB) agency. The TAB contractor will be either NEBB or AABC certified for balancing commercial HVAC and Plumbing systems.

4.14 COMMISSIONING
A. Per the requirements of the International Energy Conservation Code, section C408, new buildings are required to undergo commissioning for mechanical, electrical, and power systems. Prior to the final inspections, a commissioning firm shall provide evidence of system commissioning and completion in accordance with the provisions of section C408 of the IECC.

4.15 AUTOMATIC TEMPERATURE CONTROLS
A. A direct digital control (ODC) system will be installed on all HVAC equipment throughout the building. The system will be tied into the University of North Dakota campus system.
B. The DDC system will control all heating and air conditioning equipment to allow for automatic temperature control, seasonal adjustments, and maximize HVAC system efficiencies. In addition to controlling HVAC equipment, monitoring of critical air and water temperatures and system operations (fan/pump status), the system shall also alarm all equipment so maintenance personnel can maintain and troubleshoot all equipment.
C. Equipment to be controlled and monitored includes:
1. Air Handling Units
2. Variable Air Volume (VAV) Boxes
3. All Pumps
4. Boiler Plant
5. Air Cooled Condensing Units
6. Water to Water Heat Pump
7. Supplemental Perimeter Heating Equipment
8. HVAC Hot Water, Chilled Water, Geothermal Water Temperatures
9. Domestic Hot Water Temperatures
10. Sump Pumps
11. All thermostats and humidity sensors
12. All VFD for pumps and fans.

Respectfully,
Obernel Engineering

Ross Young, PE
Mechanical Engineer

Attachment(s): None
Cc: Obernel, Fike, JLG
ELECTRICAL NARRATIVE

DESIGN NARRATIVE – E01

Date: July 21, 2021
Project #: 2020298
Project Name: UND Flight Operations Building & Hanger
Project Location: Grand Forks, ND
Description: Electrical Schematic Design Narrative

PART 1. ELECTRICAL GENERAL INFORMATION

1.1 OVERVIEW

A. This narrative document summarized the design concepts for the major electrical systems (Division 26), electronic communications systems (Division 27), and electronic safety and security (Division 28). It is also intended to serve as a basis to support discussion, further design, and aid in preliminary cost estimating, as it does not list every piece of electrical or utilization equipment required to be provided with power.

B. The following narrative outlines the electrical infrastructure being proposed for this building as part of this project.

1.2 SCOPE

A. Electrical systems (Division 26) included in this document:

1. Low voltage power distribution system.
2. Interior and exterior lighting systems.
3. Lighting control systems.
4. Emergency interior and exterior lighting systems and egress signage (exit signs).

B. Electronic communications systems (Division 27) included in this document:

1. Structured cabling for voice / data communication systems.
2. Intercom Systems

C. Electronic safety and security systems (Division 28) included in this document:

1. Fire alarm system.
2. Rough-Ins for Owner-provided Electronic Access Control and Door Monitoring System.
3. Rough-Ins and structured cabling for Owner-provided Security Camera System.

PART 2. DESCRIPTION OF ELECTRICAL SYSTEMS

2.1 LOW VOLTAGE ELECTRICAL POWER DISTRIBUTION

A. Electrical service will consist of electrical meter and service entrance distribution panel located in a first floor electrical space. Panelboard will have a main circuit breaker and be rated suitable for use as service equipment. Anticipated capacity: 800-amps, 208/120 volts, 3-phase, 4-wire.

B. Hand dryers shall be installed within bathrooms.

C. Power for bottle fillers shall be provided at water fountains.

D. Power shall be supplied to all owner-provided equipment, as required.

E. Receptacles will be located around the perimeter walls at regular intervals for convenience.

F. Offices shall have receptacles located at each wall.

G. Exterior receptacles will be provided, per Code.

H. Power will be provided to fire pump, as required by NEC.

I. Power will be provided to all equipment within serving kitchen, as required.

J. Power will be provided for all equipment required for assembly area.

K. Panelboards

1. Distribution panelboards will be circuit breaker type with copper or aluminum bus and lugs, 100% neutral bus, and ground bus.
2. Branch Circuit Panelboards will have bolt-on type branch circuit breakers, 20 ampere minimum, copper or aluminum bus, 100% neutral bus, and hinged cover construction.

L. Raceways

1. All wiring will be in metal conduit except for under floor raceway which will be Schedule 40 PVC. Metal conduit will generally be electrical metallic tubing (EMT) except where exposed to damage where it will be full-weight rigid galvanized steel conduit.
2. Flexible metal conduit will be used at equipment connection where required by the application.

M. Wire and Cable

1. Aluminum wire will be used for feeder circuits 100-amps and larger.
2. All feeder and branch circuit wiring for power, lighting, and control will be copper, 98% conductivity, stranded in sizes #8 AWG and larger, with 600 volt THW or THHN-THHN thermoplastic insulation. The exception on insulation will be on VFD motor circuits where 1000 volt high-dielectric XHHW thermoset insulation will be used. Metal Clad (MC) will be allowed for individual branch circuits where hidden in walls and above ceilings. Home runs are to be in conduit.
3. Minimum wire size will be #12 AWG except #14 AWG for control circuits.
4. Feeders will be designed to limit voltage drop to 2% as noted in ASHRAE 90.1.
5. Voltage drop will be designed to not exceed 3% on branch circuits, 5% overall.

N. Grounding systems shall be provided with 5 ohms maximum.

1. All bonding and grounding wires will be copper. Terminations will be bronze.
2. Grounding electrodes will be 10"-O", 3/4" copper clad steel.

O. Wiring Devices

1. Duplex receptacles will be 125 volt grounding types with stainless steel cover plates.
2. GFCI type receptacle will be provided where required by Code.
3. Tamper resistant devices will be provided where required by Code.
P. The Division 25 Contractor will provide VFDs for pumps, and other HVAC equipment motors that require VFDs. Generally, across the line enclosed motor controllers will be provided for motors smaller than 3 HP by the Division 26 contractor. Fire alarm shut downs will be wired directly into the VFDs.

2.2 PHOTOVOLTAIC ARRAY
A. Photovoltaic, solar, or other means of sustainable power shall be discussed more in depth in the design development portion of the project.

2.3 EMERGENCY POWER SYSTEM
A. As of now, an emergency power system is not planned for this facility.

2.4 LIGHTNING PROTECTION
A. A Lightning Protection System will not be provided at this facility.

2.5 GENERAL INTERIOR AND EXTERIOR LIGHTING SYSTEMS
A. Interior and Exterior Lighting systems will be designed in accordance with the recommendations of the Illuminating Engineering Society (IES) and the requirements of the MN Energy Code.
1. IES and design team direction will be followed in regards to light level recommendations where appropriate. This is not a code requirement but a design guideline.
2. NFPA 101 and IBC requirements for emergency lighting levels will be followed.
3. The lighting power density requirements listed in the IIEC for interior and exterior lighting will be followed.

B. Light sources for interior lighting are to be LED throughout.

C. Anticipated lighting design.
1. Building mounted LED security lights will be provided.
2. Exterior lights will be controlled dusk to dawn and dusk to pre-set off via one central photosensor, contactors and time clock with manual override.
3. Bathrooms will utilize recessed LED can lighting.
4. Decorative architectural lighting in the Grand Lounge and Lobby areas.
5. Recessed 2x4 troffers in office and huddle spaces.
6. Recessed 2x2 troffers throughout corridors with suspended ceilings.
7. 4’ LED strip lighting in back of house spaces, such as janitor and storage.
8. Suspended linear fixtures with supplemented can lighting in board and conference room areas.
9. LED accent lighting within Flight Store.
10. Wall-mount LED lighting with automatic dim in stairwells.

D. The following is a preliminary list of preliminary illumination levels:

<table>
<thead>
<tr>
<th>SPACE</th>
<th>HORIZONTAL LEVEL</th>
<th>VERTICAL LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assembly Area</td>
<td>Variable 7.5 FC to 40 FC</td>
<td>Variable 2 FC to 40 FC</td>
</tr>
<tr>
<td>Presentation Area 100 FC</td>
<td>Presentation Area 50 FC</td>
<td></td>
</tr>
</tbody>
</table>

2.6 LIGHTING CONTROL SYSTEMS
A. Lighting control shall be provided via Lutron Vive system as is UND standard.
B. Lighting control requirements listed in the Energy Code will be followed including automatic lighting shut-off, lighting reduction controls, and daylight control zones.
1. In rooms with daylight zones, automatic photosensor control will used to control lighting in daylight zones secondary to other lighting in the room.
   a. Daylights zones extend 15’ into a space or to the first ceiling height partition, whichever is closer to the window, and extends 2’ beyond the window in each direction (right and left).
2. In rooms without occupancy sensors, multiple switches will be provided to allow the lighting load to be reduced by a minimum of 50%.
3. Exterior lighting will be controlled via photosensor and timeclock system.
C. Individual rooms will be provided with stand-alone occupancy sensors. Generally, all rooms with occupancy sensors will include dimmer switches which allow the user to manually dim the lights up and down. Back of house areas that will not require dimming operation will contain on/off toggle switches.
1. Offices.
2. Storage rooms.
3. Restrooms and locker rooms (no manual override).
5. All other spaces, as coordinated with Owner.
D. Mechanical rooms and electrical rooms will be controlled via manual switching only.

2.7 EMERGENCY LIGHTING AND EGRESS SIGNAGE
A. LED type exit signs will be provided to mark paths of egress.
B. General use lighting fixtures connected to the emergency power inverts will be used to provide emergency lighting at the building’s interior and exterior.
C. A minimal number of emergency lights will be wired for 24/7 operation.

PART 3. DESCRIPTION OF COMMUNICATION SYSTEMS

3.1 STRUCTURED CABELING FOR VOICE AND DATA COMMUNICATIONS

A. New telecom service entrance shall be coordinate with service provider and Owner.
B. Horizontal cabling to all data drops will be Category 6 cabling equal to Berk-Tek Leviton CX6200 series.
   1. A cable support system will be provided above accessible ceilings for horizontal cabling.
   2. Cable tray will be used where horizontal cables are concentrated, such as corridors.
   3. As horizontal cables branch out, non-continuous cable supports will be utilized.
   4. Horizontal cabling will be run parallel or perpendicular to building lines.
   5. Horizontal cabling shall be plenum rated.
C. Category 6A horizontal cabling will be provided as required for LAN wireless access points.
D. Voice / Data outlets
   1. Each large freestanding copier will be provided with two horizontal cables.
   2. Single cable will be provided at front of room for front of classroom technology.
   3. Offices will be provided with two data outlets at desk location.
   4. Various other areas will be provided data outlets, as coordinated throughout duration of design.
E. All new horizontal cabling and telecommunication services shall be brought from new telecom racks. Service to new racks shall be provided via switch at service entrance location. All telecommunications equipment, outside of cabling and terminations, will be provided by Owner.
F. AV cabling, rough-ins, telecom cabling, etc. will be supplied as required for assembly area equipment.
G. Ladder racking will be provided in new space for telecom equipment.
H. Racks and ladder racks will be grounded.

PART 4. ELECTRONIC SAFETY AND SECURITY SYSTEMS

4.1 FIRE ALARM SYSTEMS

A. A voice-capable fire alarm system shall be installed with a main fire alarm control panel at a back of house location, and annunciator panel near front entrance, as coordinated with fire marshal.
B. The system will meet the requirements of NFPA 72 and ADA.
C. Addressable automatic detectors will be provided in mechanical and electrical rooms, storage rooms, janitor rooms, and similar areas, as required by Code.
D. Addressable smoke detectors will be provided in supply and return air ductwork of air handling units rated 2,000 cfm or greater and within 5’ of any and all fire-smoke dampers.
E. Addressable relays will be used for control of fire-smoke dampers and air handling equipment.
F. Addressable relays will be used for supervision of fire sprinkler valves and switches.
G. Notification appliances with a general evacuation signal will be located throughout the buildings.

4.2 ELECTRONIC DOOR ACCESS CONTROL AND VIDEO SURVEILLANCE

A. Access control, security, and video surveillance systems will be contracted directly with an owner selected vendor. Exact rough-in and coordination requirements to be determined via UND standards.
B. At a minimum, a complete empty raceway system will be provided for the security systems. This will include recessed backboxes and vertical conduits stubbed up into accessible ceiling spaces. Category 6 cabling will be provided to security camera locations.

PART 5. TECHNICAL CRITERIA

5.1 CODES AND STANDARDS

A. The following is a partial list of applicable codes governing the systems described herein:
   8. Americans with Disabilities Act (ADA).
B. The following is a partial list of design and installation standards governing the systems described herein:

Respectfully,
Obernel Engineering

Travor Fredrickson, PE
Electrical Senior Engineer

Attachment(s): None
Cc: Obernel File, JLG
APPENDIX