CITY OF EAST GRAND FORKS
ARENA FEASIBILITY STUDY

APPENDIX

NOVEMBER 2019

[DRAFT]
11/08/19

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Life Connected East Grand Forks, MN

JLG architects

B32° Ice Rink Engineers

ONE

Condition Assessment Report

Building Information					
Building Name	Gross Square Feet	Year Built	Existing Drawings	Renovation Date	Renovation Cost
EGF Civic Center	65,400	1973		2006, 2015	

Rating Legend

5 System condition is in new or near new condition.

4 System is generally suitable for intended use. Minor improvements are needed to improve building performance & longevity.

3 System is suitable, but requires specific upgrades to meet performance and operational objectives.

2 System has serious deficiencies.

1 System is unsuitable for intended use.

Exterior Building Condition

CATEGORY	SYSTEMS	RATINGS: EXCELLENT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	POOR	COMMENTS
Site	Pavement	5	4	3	2	●	- Water moves away from building very well. - Unconventional ADA parking configuration. Some ADA stalls and aisles appear to have more than 2% cross slope. -Parking lot is in poor condition.
	Drainage	5	4	●	2	1	
	Signage	5	●	3	2	1	
	Lighting	5	●	3	2	1	
	Accessibility	5	4	3	●	1	
North	Foundation	5	4	●	2	1	- Wall panel and trim is relatively new, but very beat up near ground (likely due to lawn mowing). - Vents near SE doors similarly damaged.
	Walls	5	●	3	2	1	
	Roof N/A	5	4	3	2	1	
	Windows/Doors	5	4	3	2	1	
	Trim	5	4	●	2	1	
East	Foundation	5	4	●	2	1	- Closure trim at NE concourse door shows corrosion. - Wall panel and trim is relatively new, but very beat up near ground (likely due to lawn mowing).
	Walls	5	●	3	2	1	
	Roof N/A	5	4	3	2	1	
	Windows/Doors	5	4	●	2	1	
	Trim	5	4	3	●	1	
South	Foundation	5	4	●	2	1	- Window sealant is brittle and discolored. - Wall panel and trim is relatively new, but very beat up near ground (likely due to lawn mowing).
	Walls	5	●	3	2	1	
	Roof N/A	5	4	3	2	1	
	Windows/Doors	5	4	●	2	1	
	Trim	5	4	●	2	1	
West	Foundation	5	4	●	2	1	- Sealant needed at pipe penetration north of transformer. - Louver at grade. Patch or relocate to avoid water flow into building. - Wall panel and trim is relatively new, but very beat up near ground (likely due to lawn mowing).
	Walls	5	●	3	2	1	
	Roof N/A	5	4	3	2	1	
	Windows/Doors	5	4	●	2	1	
	Trim	5	4	●	2	1	

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Condition Assessment Report

Interior Building Condition

CATEGORY	SYSTEMS	EXCELLENT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	POOR	COMMENTS
Room Name Mens' Restroom Room # 104	Floors	5	●	3	2	1	- New finishes from most recent renovation. - Isolated scuffs on wall. - Dents in metal door.
	Walls	5	●	3	2	1	
	Ceilings	5	4	●	2	1	
	Fixed Equipment	5	●	3	2	1	
	Window(s) N/A	5	4	3	2	1	
	Door(s)	5	4	3	●	1	
	Accessibility	5	4	●	2	1	
Room Name Womens' Restroom Room # 104	Floors	5	●	3	2	1	- New finishes from most recent renovation. - Isolated scuffs on wall. - Dents in metal door.
	Walls	5	●	3	2	1	
	Ceilings	5	4	●	2	1	
	Fixed Equipment	5	4	3	2	1	
	Window(s) N/A	5	4	3	2	1	
	Door(s)	5	4	3	●	1	
	Accessibility	5	4	●	2	1	
Room Name Coach Room #	Floors	5	●	3	2	1	- New finishes from most recent renovation.
	Walls	5	●	3	2	1	
	Ceilings	5	●	3	2	1	
	Fixed Equipment	5	●	3	2	1	
	Window(s) N/A	5	4	3	2	1	
	Door(s)	5	4	●	2	1	
	Accessibility	5	4	●	2	1	
Room Name Girls' Locker Rm Room #	Floors	5	4	●	2	1	- New finishes from most recent renovation. - Isolated scuffs on wall.
	Walls	5	●	3	2	1	
	Ceilings	5	4	●	2	1	
	Fixed Equipment	5	●	3	2	1	
	Window(s) N/A	5	4	3	2	1	
	Door(s)	5	4	●	2	1	
	Accessibility	5	4	●	2	1	
Room Name Compressor Room #	Floors	5	4	3	●	1	- Ramp down to floor. - Door knob, no lever.
	Walls	5	4	3	●	1	
	Ceilings N/A	5	4	3	2	1	
	Fixed Equipment	5	4	●	2	1	
	Window(s) N/A	5	4	3	2	1	
	Door(s)	5	4	●	2	1	
	Accessibility	5	4	3	2	●	

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Condition Assessment Report

Interior Building Condition

CATEGORY	SYSTEMS	EXCELLENT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	POOR	COMMENTS
Room Name Linen? Room #	Floors	5	4	●	2	1	- Door knob, no lever. - Door scrapes on floor.
	Walls	5	4	●	2	1	
	Ceilings N/A	5	4	3	2	1	
	Fixed Equipment	5	4	3	●	1	
	Window(s) N/A	5	4	3	2	1	
	Door(s)	5	4	3	●	1	
	Accessibility	5	4	3	●	1	
Room Name Zam Office Room #	Floors	5	4	3	●	1	- Door knob, no lever. - Not enough floor area at door.
	Walls	5	●	3	2	1	
	Ceilings	5	●	3	2	1	
	Fixed Equipment	5	4	●	2	1	
	Window(s)	5	4	●	2	1	
	Door(s)	5	4	●	2	1	
	Accessibility	5	4	3	●	1	
Room Name Shop Room #	Floors	5	4	●	2	1	- Curb at door.
	Walls	5	4	●	2	1	
	Ceilings N/A	5	4	3	2	1	
	Fixed Equipment	5	4	●	2	1	
	Window(s) N/A	5	4	3	2	1	
	Door(s)	5	4	3	●	1	
	Accessibility	5	4	3	2	●	
Room Name Zam Room #	Floors	5	4	●	2	1	
	Walls	5	4	●	2	1	
	Ceilings N/A	5	4	3	2	1	
	Fixed Equipment	5	4	●	2	1	
	Window(s) N/A	5	4	3	2	1	
	Door(s)	5	4	●	2	1	
	Accessibility	5	4	3	●	1	
Room Name Boys' HS Locker Room #	Floors	5	4	3	●	1	- Shower curb.
	Walls	5	4	●	2	1	
	Ceilings	5	4	3	2	●	
	Fixed Equipment	5	4	3	●	1	
	Window(s) N/A	5	4	3	2	1	
	Door(s)	5	4	3	●	1	
	Accessibility	5	4	3	●	1	

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Condition Assessment Report

CATEGORY	SYSTEMS	EXCELLENT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	POOR	COMMENTS
Interior Building Condition							
Room Name: Players' Entrance (east addition) Room #:	Floors	5	4	3	2	●	- Major cracking in exterior wall of players' entrance east addition
	Walls	5	4	3	●	1	
	Ceilings N/A	5	4	3	2	1	
	Fixed Equipment	5	4	3	●	1	
	Window(s) N/A	5	4	3	2	1	
	Door(s)	5	4	●	2	1	
	Accessibility	5	4	3	●	1	
Room Name: Lobby/ Restrooms Room #:	Floors	5	4	●	2	1	-Floors in good condition, dirty. -a few ceiling tiles are stained -No accessible route from the exterior of the building for a portion of the ADA parking. Interior of Lobby/Restrooms is accessible.
	Walls	5	●	3	2	1	
	Ceilings	5	4	●	2	1	
	Fixed Equipment	5	●	3	2	1	
	Window(s)	5	4	3	2	1	
	Door(s)	5	●	3	2	1	
	Accessibility	5	4	●	2	1	
Room Name: Lobby/Office/ Concessions Room #:	Floors	5	4	●	2	1	-Floors are in good condition, dirty. -Walls have some marks, overall good condition. - A few stains in ceiling panels. -Display casework has some damage at the base, and is worn. -No accessible route from the exterior of the building. Interior of Lobby/Restrooms is accessible.
	Walls	5	●	3	2	1	
	Ceilings	5	4	●	2	1	
	Fixed Equipment	5	4	3	●	1	
	Window(s)	5	4	3	2	1	
	Door(s)	5	●	3	2	1	
	Accessibility	5	4	●	2	1	
Room Name: Arena Upper Bowl Seating Room #:	Floors	5	4	●	2	1	-Minor cracking in concrete floor, fair condition. -Some paint is bubbling on the interior side of the exterior wall at this level, near/at CMU columns. -Amount of accessible seating appears to be less than minimum code required. -North end of upper bowl seating does not have guardrail at top, safety concern.
	Walls	5	4	●	2	1	
	Ceilings	5	4	●	2	1	
	Fixed Equipment	5	4	●	2	1	
	Window(s)	5	4	3	2	1	
	Door(s)	5	●	3	2	1	
	Accessibility	5	4	3	●	1	
Room Name: Arena Upper Bowl Restrooms Room #:	Floors	5	●	3	2	1	-There are not grab bars for the ADA stall in the Men's or Women's restrooms. The women's restroom also has a column impeding the accessible clearance required in the women's restroom.
	Walls	5	●	3	2	1	
	Ceilings	5	●	3	2	1	
	Fixed Equipment	5	●	3	2	1	
	Window(s)	5	4	3	2	1	
	Door(s)	5	4	3	2	1	
	Accessibility	5	4	3	●	1	

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Condition Assessment Report

CATEGORY	SYSTEMS	EXCELLENT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	POOR	COMMENTS
Interior Building Condition							
Room Name: Concessions Seating Area Room #:	Floors	5	4	●	2	1	-Sticky residue was on the floor in the circulation path. There are some damaged ceiling tiles.
	Walls	5	●	3	2	1	
	Ceilings N/A	5	4	●	2	1	
	Fixed Equipment	5	4	●	2	1	
	Window(s) N/A	5	4	●	2	1	
	Door(s)	5	●	3	2	1	
	Accessibility	5	4	●	2	1	
Room Name: Concessions Main Level Room #:	Floors	5	●	3	2	1	
	Walls	5	●	3	2	1	
	Ceilings	5	●	3	2	1	
	Fixed Equipment	5	●	3	2	1	
	Window(s)	5	●	3	2	1	
	Door(s)	5	●	3	2	1	
	Accessibility	5	4	●	2	1	
Room Name: Room #:	Floors	5	4	3	2	1	
	Walls	5	4	3	2	1	
	Ceilings	5	4	3	2	1	
	Fixed Equipment	5	4	3	2	1	
	Window(s)	5	4	3	2	1	
	Door(s)	5	4	3	2	1	
	Accessibility	5	4	3	2	1	
Room Name: Room #:	Floors	5	4	3	2	1	
	Walls	5	4	3	2	1	
	Ceilings	5	4	3	2	1	
	Fixed Equipment	5	4	3	2	1	
	Window(s)	5	4	3	2	1	
	Door(s)	5	4	3	2	1	
	Accessibility	5	4	3	2	1	
Room Name: Room #:	Floors	5	4	3	2	1	
	Walls	5	4	3	2	1	
	Ceilings	5	4	3	2	1	
	Fixed Equipment	5	4	3	2	1	
	Window(s)	5	4	3	2	1	
	Door(s)	5	4	3	2	1	
	Accessibility	5	4	3	2	1	

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Mechanical Assessment

CATEGORY	SYSTEMS	RATINGS: EXCELLENT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	POOR	COMMENTS
Building Civic Center Name_____	Heating			●			
	Ventilation		●				
	Air Conditioning					●	
	Plumbing			●			
	Fire Protection					●	
	Temperature Controls				●		
	Fire Protection Systems					●	
		5	4	3	2	1	
		5	4	3	2	1	
		5	4	3	2	1	

OVERALL COMMENTS

Heating provided through gas fired furnaces for locker rooms and auxiliary spaces. Furnaces are generally fairly new and in operating condition. Heating for the rink comes from electric coils in the air handling units.
Ventilation for the ice rink provided through multiple dedicated air handling units. Exhaust fans are provided in the space for relief air. Locker rooms provide with exhaust fans or heat recovery ventilators. Spaces with only exhaust fans get ventilation air through transfer from rink space.
Generally, the building is not air conditioned.
One water heater is past its useful life and will need to be replaced. Other water heaters are in good condition. Recent remodeled spaces have new code compliant fixtures. Some old locker room spaces have original fixtures in poor condition and will need code updates.
No fire protection system installed in the building.
Standalone programmable thermostats provided on new furnaces throughout the building. No building automation system present.
Refer to mechanical assessment writeup for detailed information and recommendations.

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Electrical Assessment

CATEGORY	SYSTEMS	RATINGS: EXCELLENT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	POOR	COMMENTS
Building Civic Center Name_____	Power Distribution			●			
	Lighting Fixtures			●			
	Lighting Control				●		
	Technology Infrastructure			●			
	Security Infrastructure					●	
	Access Control					●	
	Technology Integration				●		
		5	4	3	2	1	
		5	4	3	2	1	
		5	4	3	2	1	

OVERALL COMMENTS

Original 1970's 480V Electrical Service and Distribution is ready for upgrade.
Lighting throughout is mostly fluorescent. Many areas are in need of an upgrade. Arena has updated high-bay LED's in great condition.
Very few areas have automatic lighting controls.
Emergency lighting needs to be expanded to properly cover the spaces.
Data infrastructure is adequate but limited.
No card access is installed.
No security cameras are installed.
Fire alarm has been installed in many areas as they've been remodeled. Some areas are missing. The system does not support voice notification which is now required for assembly occupancies in MN.

See Electrical Assessment Narrative for additional information.

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September 30th, 2019

JLG Architects
Attn: Michael McLean
124 N 3rd Street
Grand Forks, ND 58203

Re: Civic Center Condition Assessment Report
East Grand Forks, MN
HE – 039.0156

Mr. McLean:

Upon your request, Heyer Engineering (Heyer) made a site visit to the above referenced site on the afternoon of Tuesday, August 20th, 2019. The purpose of the site visit was to perform a structural observation of portions of the building to determine the nature and severity of bowing and cracking observed in its exterior basement walls. Heyer's observation was limited to a visual observation only. No destructive or invasive means of testing or observation was to be performed.

Existing Structure and Observations

The subject structure, originally constructed in the mid 1970's, is primarily an ice rink facility with stadium riser seating. The primary roof structure consists of large main trusses supported by steel columns. Secondary structural roof elements consists of steel bar joists and steel roof deck. Concourse is primarily poured concrete over metal deck. Exterior and foundation walls are Concrete Masonry Units (CMU). The CMU walls are pinned by the concourse slab structure approximately 12' above the lower level. Scans of the existing building drawings were provided to Heyer by JLG, however drawings were is rough condition and some items on the drawings were not legible.

While observing the exterior of the building, the soil is currently soil banked up against the exterior walls at various heights. In general, the soil is at its highest (approximately at concourse elevation) at egress doors and dips to lower elevations between doors. Exact soil elevations were not determined in our visual observation.

To our understanding, the existing CMU walls below exterior grade are exhibiting cracking and inward movement. Upon walking and observing the lower level, Heyer did observe a number of areas along the exterior walls where inward movement of the CMU block has occurred. Steel column braces had been previously installed in select locations to brace the wall from further inward movement. The braces appeared to be structurally working as intended in their area of influence.

Conclusions and Interpretations

The structural issues observed, bowing walls and crack pattern exhibited, are not unusual for CMU walls retaining soil. It is Heyer's opinion that the inward bowing is being caused by the lateral pressure of the embanked soil against the lower level CMU walls. Heyer assumes that native clayey soils were used in the backfill of the wall. Clayey soils tend to absorb moisture more that granular fills and as such swell under wet

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September 30th, 2019
JLG Architects
RE: EGF Civic Center Condition Assessment
East Grand Forks, MN

conditions causing lateral pressure on retaining walls. However, some small amount of lateral deflection of the CMU wall should be expected considering the consistent soil load against the wall.

Because of the condition of the scanned drawings provided to Heyer, the actual amount of design reinforcement used in the walls in not able to be determined. The information is either on a drawing not provided or is not legible on the provided drawings. In review of what can be found on the existing drawings, it would appear that the designers would have most likely thought that soil was banked roughly up 9' of the total 12' height of the 12 " CMU wall. While observing the exterior of the building, the current soil elevation on average appears to be roughly consistent with the 9' elevation shown in the drawings. Using the assumed height of soil, and by making some normal assumptions for backfill (clay) properties, Heyer estimates that wall should be reinforced with (1) #5 @ 8" oc or (1) #6 @ 16" oc.. Because the wall is still largely intact, Heyer is of the opinion that that some reinforcing must be within the wall, however we cannot confirm its structural adequacy. The only way to determine the actual amount of reinforcing utilized in the wall is to perform more testing. Based on previous experience, typical historical design criteria for CMU, and the amount of movements observed, it is Heyer's opinion that the wall is possibly under-reinforced by today's standards. Because of the large number of assumptions that were needed to be made an estimate analysis, Heyer would recommend further testing be performed.

Heyer also recommend monitoring of all lower level walls for continued movement. In areas, where excessive bowing in of the CMU walls are observed (~1" or more), Heyer recommends installing column braces, similar to what has been previously installed in other areas. Design of the type and number of column braces is beyond the scope of this report, but Heyer would be happy to assist in the preparation of that design. Another supplemental remediation measure that could also be utilized would be to excavate the backfilled soils adjacent to the structure and install a free draining granular material. If the current soils are clay, the replacement free draining granular material would not hold as much moisture and more rapidly move ground water to the buildings sump system. Reducing the moisture in the soil would lessen the lateral pressure against the walls.

On a related matter, Heyer is of the understanding that a second ice sheet addition to the building is being contemplated. A building addition directly adjacent to the existing building would also remove the backfill pressure against the walls. The addition would therefore likely eliminate the need to brace the existing walls or perform soils corrections in those areas.

Again, it is to be noted that Heyer's opinions are based on the limited visual nature of Heyer's observations. Most of the structural component of the building not able to be directly observed. Heyer did not perform any destructive or other invasive means of testing. If during the renovation process additional damage is found, reassessment and modification the opinions and recommendations stated above can be made.

If you have any questions or comments, please do contact us.

Sincerely,
HEYER ENGINEERING, INC

Eric A. Greiff, PE
Principal

OBERMILLER NELSON ENGINEERING

MECHANICAL SYSTEM ASSESSMENT – M01

Date	8/7/19
Project #	2019237
Project Name	EGF Civic Center Arena Assessment
Project Location	East Grand Forks, MN
Description	Mechanical System Assessment and Recommendations

PART 1. MECHANICAL GENERAL INFORMATION

1.1 OVERVIEW

A. The existing facility currently houses an ice rink and auxiliary spaces including locker rooms, concessions, kitchen, offices, mechanical and electrical rooms. The original building was constructed in 1973 with partial remodels done in 2006 and 2015. The total area of the building is roughly 84,000 square feet.

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 (Division 23) and Temperature Controls (Division 25)

B. Fire Protection Systems (Division 21) included in this document:

1. Existing Fire Protection System
2. Recommendation for the Fire Protection System

C. Plumbing systems (Division 22) included in this document:

1. Existing Plumbing System
2. Recommendation for the Plumbing System

D. HVAC (Division 23) included in this document:

1. Existing Dehumidification System
2. Existing Heating Plant
3. Existing Ventilation and Air Conditioning System
4. Recommendation for the Dehumidification, Heating, Ventilation, & Air Conditioning Systems

E. Temperature Controls (Division 25) included in this document:

1. Existing Temperature Control Systems
2. Recommendation for the Temperature Control Systems

1.3 TECHNICAL CRITERIA

A. Codes: The following is a partial list of applicable codes governing the systems described herein:

1. 2015 Minnesota Mechanical Fuel & Gas Code
2. 2015 Minnesota Plumbing Code
3. 2015 Minnesota Energy Code
4. International Fire Code (IFC) (edition and amendments currently adopted by the state of Minnesota and city of East Grand Forks).
5. NFPA 101 Life Safety Code.
6. NFPA 13 Installation of Fire Protection Systems
7. Americans with Disabilities Act (ADA).
8. ASHRAE 90.1

PART 2. **SPRINKLER SYSTEMS (DIVISION 21)**

2.1 EXISTING FIRE PROTECTION SYSTEM:

A. The building is currently not sprinkled.

B. Recommendations:

1. Requirement for fire protection system is dependent on architectural code analysis. A new 6" water line would be brought into the building to provide a fire protection service with a wet sprinkler system installed throughout. Galvanized piping would be utilized in ice rink space.
   a. Cost: $5/square foot (does not include water service, typically $10,000 to 20,000 depending on civil)

PART 3. **PLUMBING SYSTEMS (DIVISION 22)**

3.1 EXISTING PLUMBING SYSTEM:

A. The two main water heaters are natural gas fired units and are located in the lower level Storage 148 area. One water heater was manufactured in 1997, is now 22 years old and is past its useful life. The other water heater was installed in 2011 and is still in good condition. A recirculating pump system is installed for these water heaters and serves a portion of the building. Additional electric hot water heaters installed in 2015 at concessions areas at either end of the building. These water heaters are in good condition.

B. Plumbing fixtures overall appear to be in working order and in good condition. Some recent remodel areas have had plumbing fixtures replaced within the last few years. Newer fixtures are generally sensor operation type and wall hung water closets. Wraps provided under newer sinks to meet ADA requirements.

C. Some plumbing fixtures in the older locker rooms do not meet current standards as stated in the Minnesota Plumbing Code and therefore should not be reinstalled during any remodel work. Public use lavatory faucets are not provided with ASSE 1070 rated thermostatic mixing valves to protect against scalding. Showers have a shared central floor drain where water would pass under other bathers.

D. Recommendations:

1. The 1997 water heater should be replaced with new. The rest of the existing water heaters are in good condition and should remain.
   a. Cost: $20,000
2. During remodel, any old plumbing fixture should be replaced with new as well as ASSE 1070 rated thermostatic mixing valves being provided to protect against scalding. The architect will need to determine the requirements to meet current ADA standards for the toilet room layout.
   a. Cost: $5,000 per plumbing fixture

PART 4. **HVAC (DIVISION 23)**

4.1 EXISTING DEHUMIDIFCATION SYSTEM:

A. The building is not currently equipped with a dehumidification system. If year-round ice operation is desired this is a greater concern since excess humidification can degrade ice quality, create fog in the air, and can condense and damage finish surfaces.

4.2 EXISTING HEATING PLANT:

A. The ice arena bowl is heated using electric heating coils in the arena air handling units. The electric source is less desirable due to higher operating costs and maintenance compared to a hot water system. Gas furnaces were provided in area recently remodeled locker room and concession spaces. Electric cove heaters and unit heaters provide supplemental heat in entryways and restrooms.

4.3 EXISTING VENTILATION & AIR CONDITIONING SYSTEMS:

A. The ice rink has multiple dedicated air handling units around the perimeter of the space to provide ventilation to the rink. Power roof mounted relief fans and roof hoods are located on one end of the rink to relieve air. The units are equipment with waste heat coils from the ice refrigeration system as well as electric heating coils. These units do not have air conditioning and are original to the ice arena. Two of the units are currently not operational and the rest of the units are past their useful life.

B. An air handling unit with a cooling coil is located in the space but no refrigerant lines or condensing unit are installed.

C. Concessions areas are provided with gas fired furnaces. These units do not have air conditioning installed. Exhaust is being provided from each of the concessions areas. These furnaces are new and in good operating shape.

D. Lower level locker rooms were provided with new furnaces, exhaust fans, and heat recovery ventilators during remodels in 2006 and 2015. These units are in operating condition and provide the code required ventilation to the spaces. These units are not equipped with air conditioning.

Units installed in 2006 are approaching the end of there useful life (15 years) and can be replaced as they fail.

E. Some lower level exhaust fans are original to the building are reaching the end of their useful life.

F. Air conditioning is not installed in the building with the exception of a weight room on the east side of the building. The furnace and condensing unit for this space is still operating but is approaching the end of its useful life.

G. Recommendations:

1. Provide hot water heating plant with high efficiency boilers. Hot water heat will be the most efficient and cost effective long term option for heating the building. All new equipment would be hot water heat and existing electric heating elements would be replaced with hot water. As gas fired furnaces fail, they could be replaced with hot water equipment. Boiler plant would be sized to handle the entire load of the building including equipment converted to hot water at a later date.
   a. Cost: $400,000
2. Replace air handling units in ice arena with new units. Existing units are beyond useful life and starting to fail. Basis for new units would be hot water heat with DX cooling to condition the space. Units would be sized to handle the ventilation required in the hockey rink.
   a. Cost: $650,000
3. A dedicated dehumidification unit should be provided for the ice rink if year-round operation is desired. This will allow for the code required ventilation airflow rate to be provided without the humidity in the space going beyond acceptable limits. The unit would be sized to account for the additional air required when operating a Zamboni. Unit would have a hot water heating coil and DX cooling coil to control discharge air temperature.
   a. Cost: $450,000
4. Lower level exhaust fans are at the ends of their useful life. New exhaust fans should be provided to replace existing original exhaust fans as they fail.
   a. Cost: $8,000 per fan
5. Furnaces installed in the 2006 remodel are in good working condition but are approaching the end of there expected life. These should be planned to be replaced in the coming years as they fail.
   a. Cost: $20,000
6. Areas equipped with gas fired furnaces could be converted to hot water if a boiler plant is added to the building. This would give the equipment better temperature control and is more efficient with lower operating costs. These renovations could be done as equipment fails or all at once.
   a. Cost: $30/square foot of area changed

PART 5. **AUTOMATIC TEMPERATURE CONTROLS (DIVISON 25)**

5.1 EXISTING AUTOMATIC TEMPERATURE CONTROL SYSTEMS:

A. The existing building has very limited controls, with all equipment being stand alone. Line voltage programmable thermostat provided on furnaces for locker rooms and concessions. These thermostats would meet the code requirements but give limited information to the owner.

B. Recommendations:

1. A new digital controls (DDC) system with central monitoring capabilities should be installed in the building. This will allow set back and energy conservation strategies to be setup when new equipment is installed. Additionally, new controls will help the building meet current code requirements and provide increased indoor air quality. The system shall also alarm all equipment so maintenance personnel can maintain and troubleshoot all equipment remotely with limited staff.
   a. Cost: $420,000

Respectfully,
Obermiller Nelson Engineering, Inc.

Ross Young

Attachment(s): None
Cc: file

OBERMILLER NELSON
ENGINEERING

ELECTRICAL SYSTEM ASSESSMENT – E02

Date	8/7/19
Project #	2019237
Project Name	East Grand Forks Ice Arena Assessments
Project Location	East Grand Forks, MN
Description	EGF Civic Center Arena: Existing Electrical System Assessment and Recommendations

PART 1. **ELECTRICAL GENERAL INFORMATION**

1.1 OVERVIEW

A. The existing facility in East Grand Forks, MN currently contains a large assembly space with an ice arena as well as a large amount of ancillary spaces for mechanical/electrical, offices, locker rooms, restrooms, and kitchen/concessions.

1.2 SCOPE

A. This narrative document summarizes the schematic design for the major electrical systems (Division 26), electronic communications systems (Division 27), and electronic safety and security systems (Division 28) to be included in the project.

B. 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).

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

1. Structured cabling for voice / data communication systems.
2. Sound systems.

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

1. Fire alarm system.
2. Security Camera System.
3. Electronic Access Control and Door Monitoring System.

PART 2. **DESCRIPTION OF ELECTRICAL SYTEMS**

2.1 LOW VOLTAGE ELECTRICAL POWER DISTRIBUTION

A. The existing electrical services consist of (1) 3000A, 480V, 3-phase service in the lower level of the west side of the building. Electrical distribution also consists of step-down transformers to feed 208V distribution equipment. Main service and distribution equipment are original to the 1975 era building and are past their expected life.

B. All electrical distribution equipment is original to the area that it serves. Most panels are beyond expected life and are due for replacement.

C. In the main service room there is a panel that is tapped from the incoming service conductors that originally served as an emergency power panel. This method of providing emergency power is not longer valid and the panel would no longer be considered emergency power (see emergency lighting notes).

D. Several panels are located in locations that are accessible to the public (like corridors and concourses) where they could be susceptible to tampering. Two panelboards are located in the men's bathroom near the south side entrance to the building. These panels should be removed from the restroom and replaced with new panels at a new location to get them out of a public space where there are potentially wet conditions and where they could be subject to tampering.

E. Cover heaters in the existing south upper level bathrooms are showing signs of age and the paint is peeling.

F. Existing devices: There are some existing non-GFCI devices in locker rooms that should be replaced with GFCI type.

G. Recommendations:

1. Aged existing electrical equipment and associated feeders should be placed on a schedule for upgrade.
    a. Cost: $200,000 (these upgrades could be absorbed by other renovation or expansion projects)
2. Replace existing non-GFCI devices in locker rooms that should be replaced with GFCI type.
    a. Cost: $75 per device.

2.2 GENERAL INTERIOR AND EXTERIOR LIGHTING SYSTEMS

A. Most of the general interior lighting in the building is linear fluorescent (T8 lamps) fixtures. There are several recessed prismatic troffers and surface mounted fixtures with either wraparound prismatic lenses or strip lights with bare lamps. The older visitor locker rooms have old jelly-jar type fixtures with screw-in base lamps.

B. Exterior lighting has all been upgraded to LED wall mounted lighting.

C. The arena lighting has been upgraded to modern LED high bay fixtures. The perimeter of the arena concourse has linear direct/indirect fluorescent fixtures.

D. Interior light levels appear to be adequate in most public spaces, but several service areas are lacking light (including all spaces under the bleacher areas.

E. ***Recommendations:***

1. Replace all existing interior lighting (except the arena ice area) with new LED light fixtures for better efficiency (not necessary to meet any codes, just a recommendation for upgrade).
    a. Cost: $5 per square foot (not including the arena floor area).

2.3 LIGHTING CONTROL SYSTEMS

A. Most lighting controls in the building are manual switches only. Occupancy sensors for lighting control have been installed only in some of the updated restrooms.

B. Arena lighting is controlled manually by switches at inconvenient locations (accessible to the public).

C. ***Recommendation:***

1. Provide occupancy sensor controlled lighting throughout the building as required by current energy codes. Low voltage switches and dimmers would be utilized to allow for manual-on, auto-off control of the lighting as is now required by the energy codes. Mechanical and electrical rooms would be left with manual control of the lighting.
    a. Cost: $1.25 per SF for affected areas (not including arena).
2. Provide contactor or relay-based lighting control for the arena lighting and move the centralized control location to a secure location accessible only by staff or those authorized to control it.
    a. Cost: $10,000

2.4 EMERGENCY LIGHTING AND EGRESS SIGNAGE

A. Exit signs are mostly LED type with integral batteries and most appear to be in good condition.

B. Emergency egress lighting is self-contained emergency lighting with integral batteries and adjustable light heads. Most of the fixtures are in acceptable condition. Some of the existing emergency lights are older and should be replaced with new to ensure proper battery life.

C. Coverage appears to be acceptable in some areas except at the perimeter of the arena concourse, seating, arena floor, and some corridors in the lower level. There are emergency fixtures installed, but the coverage will not meet code requirements for occupied spaces. There is also no emergency lighting installed in the weight room and some of the mechanical and electrical service areas.

D. There is no existing exterior emergency lighting.

E. Recommendations:

1. Add additional emergency lighting for proper coverage at the arena concourse, seating areas, floor area, and lower level. Include centralized battery inverter and dedicated emergency fixtures for arena.
    a. Cost: $27,000 (cost will vary depending on the areas involved)
2. Add exterior emergency lighting.
    a. Cost: $9000.

2.5 STRUCTURED CABLING FOR VOICE AND DATA COMMUNICATIONS

A. Communications wiring and wireless access points are currently installed as necessary to meet the facility's needs which are relatively limited. No issues were reported.

B. Communications demark is located in the electrical service room on the west side.

C. ***Recommendations:*** None for the existing facility, however, a building expansion or renovation project should consider the addition of a secured and temperature controlled centralized data closet(s).

2.6 AUDIO SYSTEMS

A. The current arena sound system is aging. Staff reports that there are some areas where audible coverage is not adequate.

B. ***Recommendations:*** Consider the installation of a new sound system for the arena. This is not a code item and the cost can vary greatly depending on the system and coverage desired.

1. A full Audio system review is beyond the scope of this assessment, but consider the scale of cost of upgrade for just the arena to be in the $100 to $200k range for a very good system.

PART 3. ELECTRONIC SAFETY AND SECURITY SYSTEMS

3.1 ELECTRONIC DOOR ACCESS CONTROL

A. The building does not currently have any electronic access control system installed.

B. ***Recommendations:*** Consider the installation of a new electronic access control system to monitor the position of exterior doors and allow more secure and controlled access to the space.

1. Cost: $35,000 (15 doors).

3.2 SECURITY AND SURVEILLANCE CAMERA SYSTEMS

A. There is currently no security or surveillance camera system.

B. ***Recommendations:*** Consider the installation of a surveillance camera system for better security, asset protection, and liability protection.

1. Cost: Cost is greatly dependent on scope but assume a cost of $1200 per camera plus an additional $10,000 for control and recording equipment.

3.3 FIRE ALARM SYSTEM

A. There is an existing Simplex 4006 panel serving the building. The existing system is older technology and supports only hard-wired, non-intelligent systems. The system also supports only horns and strobes, but no voice type notification as is required for assembly occupancies like this in MN.

B. The system covers areas that have been touched by renovation, but there still are remaining areas (mostly in the lower level and in the weight room area) that do not yet have fire alarm notification or detection installed. These spaces include many of the service corridors and rooms as well as the older visitor locker rooms.

C. The newer, remodeled team locker rooms do have proper notification and detection installed.

D. According to the Minnesota amendments to the IBC:

1. A fire alarm system shall be installed in in Group A occupancies having an occupant load of 300 or more. However, a fire alarm system is not required in buildings with an occupant load of less than 1,000 when a sprinkler system is installed throughout the building. Currently there is no sprinkler system installed.
2. Automatic fire detectors (smoke or heat detectors) are required to be installed in laundry rooms, boiler and furnace rooms, mechanical and electrical rooms, shops, kitchens, trash collection rooms, storage rooms, and similar areas.
3. Audible notification shall be voice type.

E. Fire alarm coverage for notification is not adequate for the arena. There is only horn/strobe coverage at the east and west hallways and does not appear to properly cover the entire space.

F. The existing air handlers for the arena do not have duct smoke detectors installed.

G. ***Recommendations:*** Provide an all new addressable fire alarm system with voice notification throughout the building.

1. Cost: $2 per square foot for all new system.

PART 4. TECHNICAL CRITERIA

4.1 CODES AND STANDARDS

A. The following is a partial list of applicable codes governing the systems described herein:

1. International Building Code (IBC) 2015.
2. International Mechanical Code (IMC) 2015.
3. International Fire Code (IFC) 2015.
4. 2015 Minnesota Building Code.
5. 2015 Minnesota Energy Code.
6. NFPA 70 National Electrical Code.
7. NFPA 72 National Fire Alarm and Signaling Code.
8. NFPA 101 Life Safety Code.
9. Americans with Disabilities Act (ADA).

B. The following is a partial list of design and installation standards governing the systems described herein:

1. BICSI Telecommunications Distribution Methods Manual.
2. IES Lighting Handbook, Tenth Edition.

3. International Electrical Testing Association (NETA) Standards.
4. National Electrical Contractors Association (NECA) Standards.

Respectfully,
Obermiller Nelson Engineering, Inc.

Tony Nelson

Attachment(s): none
Cc: ICS, file.

Note: Main Building entrance

01

Note: Designated Accessible Parking at cross-slope

02

Note: Standing water in parking lot after rainfall. Pavement/drainage in poor condition

03

Note: Positive drainage around the building

04

FACILITY ASSESSMENT
JLG 19147 – EGF CIVIC CENTER ARENA
RE: EFG ARENA STUDY
July 19th, 2019

Note: Damaged wall panel and trim along bottom of building

05

Note: Closure trim at NE concourse door shows corrosion from water

06

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Note: Sealant needed around pipe penetration

07

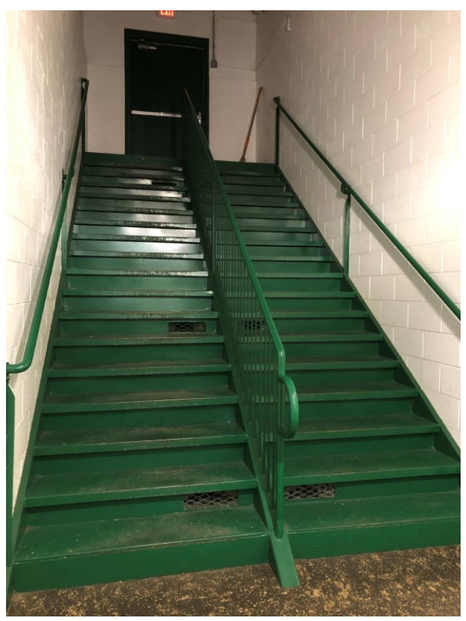
Note: Louver at grade can be a potential for water penetration.

08

FACILITY ASSESSMENT
JLG 19147 – EGF CIVIC CENTER ARENA
RE: EFG ARENA STUDY
July 19th, 2019

Note: High School boys locker room

09



Note: Players entrance at east side of building

10

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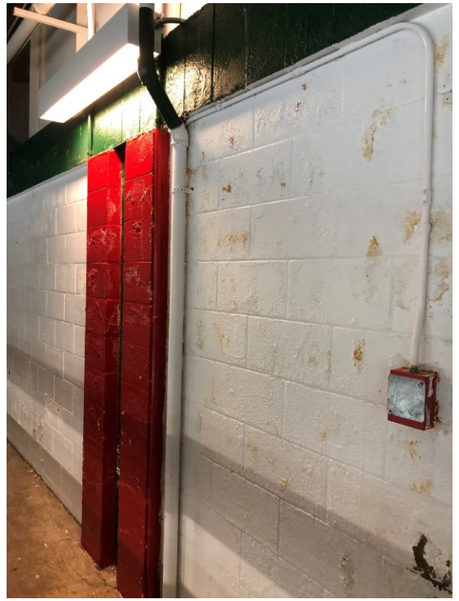

Note: Paint bubbling up at exterior wall/column at main level

11

Note: No railing behind seating area at north main level, safety concern

12

FACILITY ASSESSMENT
JLG 19147 – EGF CIVIC CENTER ARENA
RE: EFG ARENA STUDY
July 19th, 2019

Note: No grab bars at north Women's restroom ADA stall. Width is impeded by column in stall.

13

Note: Damaged tile at main level concession seating

14

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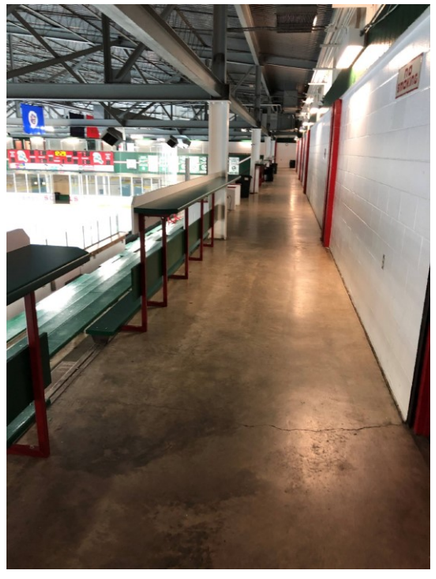
Note: Seating aisle steps have steel tread nosing every other step that makes the riser height vary each step. Can be a potential tripping hazard

15



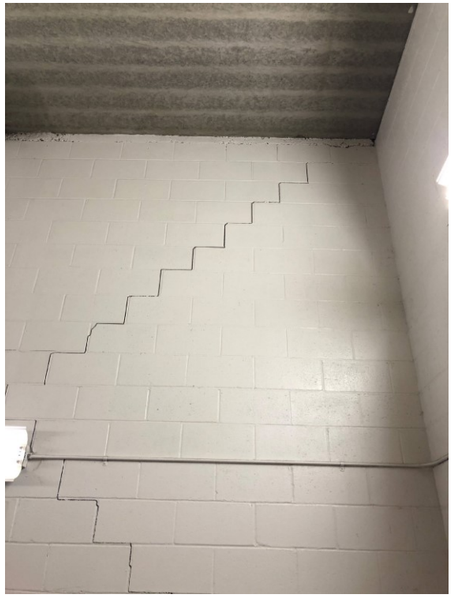
Note: Main level concourse at the east side

16

FACILITY ASSESSMENT
JLG 19147 – EGF CIVIC CENTER ARENA
RE: EFG ARENA STUDY
July 19th, 2019

Note: West exterior wall below seating has bowed in over years, additional structural column and beam to support it. Some water damage is visible.

17



Note: East players' entrance addition has major cracking in the exterior bearing wall.

18

Note: Original Switchgear and Panelboards are past expected life.

19

Note: Arena LED Lighting

20

FACILITY ASSESSMENT
JLG 19147 – EGF CIVIC CENTER ARENA
RE: EFG ARENA STUDY
July 19th, 2019

Note: 1997 Water Heater (Left)

21

Note: Typical natural gas furnace serving auxiliary spaces. Many install in 2006 with no cooling.

Note: Air Conditioning Unit Serving Bowl. Refrigerant coil not connected to any condensing unit.

22

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Note: Typical air handling unit serving bowl original to building. Electric heat with no cooling.

23

Note: Typical exhaust fan. Original to building.

24

Condition Assessment Report

Building Information					
Building Name	Gross Square Feet	Year Built	Existing Drawings	Renovation Date	Renovation Cost
VFW Arena					

Rating Legend

5 System condition is in new or near new condition.
4 System is generally suitable for intended use. Minor improvements are needed to improve building performance & longevity.
3 System is suitable, but requires specific upgrades to meet performance and operational objectives.
2 System has serious deficiencies.
1 System is unsuitable for intended use.

CATEGORY	SYSTEMS	RATINGS: EXCELLENT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	POOR	COMMENTS
Site	Pavement	5	4	3	●	1	- Ground heaving prevents north and east exterior doors from opening in winter time. - Water flows under doors during heavy rain events. - Possible tree debris on SW corner of roof (difficult to see).
	Drainage	5	4	3	2	●	
	Signage	5	4	●	2	1	
	Lighting	5	4	3	●	1	
	Accessibility	5	4	3	●	1	

Exterior Building Condition

North	Foundation	5	4	3	●	1	- No gutter at roof edge; water sheet draining off roof. - Water from roof has eroded 12" of soil from grade, creating a back-slope toward the building. - Water from roof is landing at door/stoop, likely exasperates heaving.
	Walls	5	4	●	2	1	
	Roof N/A	5	4	3	2	1	
	Windows/Doors	5	4	3	●	1	
	Trim	5	4	●	2	1	
East	Foundation	5	4	3	●	1	- Widening gap between OH zam. door and exterior apron. - Stoop/slab has been completely removed at one door. - One door is badly dented.
	Walls	5	4	●	2	1	
	Roof N/A	5	4	3	2	1	
	Windows/Doors	5	4	3	●	1	
	Trim	5	4	●	2	1	
South	Foundation	5	4	3	●	1	- Brick is in generally good condition. - Two large dents in panel trim at front entry soffit. - Up to 2" gap between foundation and concrete flatwork (no stoop?).
	Walls	5	4	●	2	1	
	Roof N/A	5	4	3	2	1	
	Windows/Doors	5	4	●	2	1	
	Trim	5	4	3	●	1	
West	Foundation	5	4	3	●	1	- Water has eroded soil from grade, creating a back-slope toward the building. - Some dents in high panel from inside.
	Walls	5	4	●	2	1	
	Roof N/A	5	4	3	2	1	
	Windows/Doors	5	4	●	2	1	
	Trim	5	4	●	2	1	

Condition Assessment Report

Interior Building Condition

CATEGORY	SYSTEMS	EXCELLENT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	POOR	COMMENTS
Room Name Overlook - 2nd Floor Room #	Floors	5	4	●	2	1	- Area is in an unfinished state following water damage. Unfinished walls, no window trim, wall panels removed for drying. - No elevator access to upper level.
	Walls	5	4	3	2	●	
	Ceilings	5	4	●	2	1	
	Fixed Equipment	5	4	●	2	1	
	Window(s)	5	4	3	2	●	
	Door(s)	5	4	3	●	1	
	Accessibility	5	4	3	2	●	
Room Name Multi-Purpose / Exercise Room #	Floors	●	4	3	2	1	- Partially finished state. New flooring, lights, and paint. No window trim, no air diffusers. - No elevator access.
	Walls	5	●	3	2	1	
	Ceilings	5	●	3	2	1	
	Fixed Equipment	5	4	●	2	1	
	Window(s)	5	4	3	●	1	
	Door(s)	5	4	3	2	●	
	Accessibility	5	4	3	2	●	
Room Name Office - 2nd Floor Room #	Floors	●	4	3	2	1	- All new finishes. - No elevator access.
	Walls	●	4	3	2	1	
	Ceilings	●	4	3	2	1	
	Fixed Equipment	●	4	3	2	1	
	Window(s)	5	●	3	2	1	
	Door(s)	5	●	3	2	1	
	Accessibility	5	4	●	2	1	
Room Name Room #	Floors	●	4	3	2	1	- Less than 18" between wall and door with closer. Consider reversing swing.
	Walls	●	4	3	2	1	
	Ceilings	●	4	3	2	1	
	Fixed Equipment	●	4	3	2	1	
	Window(s) N/A	5	4	3	2	1	
	Door(s)	5	4	●	2	1	
	Accessibility	5	4	3	●	1	
Room Name Conference Rm - 2nd Floor Room #	Floors	●	4	3	2	1	- All new finishes.
	Walls	●	4	3	2	1	
	Ceilings	●	4	3	2	1	
	Fixed Equipment	●	4	3	2	1	
	Window(s) N/A	5	4	3	2	1	
	Door(s)	5	●	3	2	1	
	Accessibility	5	4	●	2	1	

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Condition Assessment Report

Interior Building Condition

CATEGORY	SYSTEMS	EXCELLENT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	POOR	COMMENTS
Room Name Conference Office - 2nd Floor Room #	Floors	●	4	3	2	1	
	Walls	●	4	3	2	1	
	Ceilings	●	4	3	2	1	
	Fixed Equipment	●	4	3	2	1	
	Window(s) N/A	5	4	3	2	1	
	Door(s)	5	4	●	2	1	
	Accessibility	5	4	●	2	1	
Room Name Conference Toilet / Server - 2nd Floor Room #	Floors	5	4	●	2	1	- No grab bars in toilet.
	Walls	5	4	3	●	1	
	Ceilings	5	●	3	2	1	
	Fixed Equipment	5	4	3	●	1	
	Window(s) N/A	5	4	3	2	1	
	Door(s)	5	4	3	●	1	
	Accessibility	5	4	3	2	●	
Room Name Lobby Room #	Floors	5	4	3	●	1	-Some of the rubber flooring is bubbling in areas, and has some wear. - Some marks, but walls are solid CMU and in fair condition. - Door Hardware is not ADA compliant. - Ramp slope exceeds maximum ADA. requirement. No handrail on both sides -Threshold height at the entrance door into building exceeds max. requirement.
	Walls	5	4	●	2	1	
	Ceilings	5	4	●	2	1	
	Fixed Equipment	5	4	3	●	1	
	Window(s)	5	4	●	2	1	
	Door(s)	5	4	3	●	1	
	Accessibility	5	4	3	●	1	
Room Name Lobby RR Room #	Floors	5	4	3	●	1	-Gaps between rubber tiles, place for dirt and moisture. Flooring should be non-porous. -Door opening (no door) into Women's restroom gives direct view of mirror, privacy issue. -No 5' turning radiums at restrooms, no pipe protection below sinks, no ADA stalls.
	Walls	5	4	●	2	1	
	Ceilings	5	4	●	2	1	
	Fixed Equipment	5	4	3	●	1	
	Window(s)	5	4	3	2	●	
	Door(s)	5	4	3	2	●	
	Accessibility	5	4	3	2	●	
Room Name Lobby Concessions Room #	Floors	5	4	3	●	1	- Rubber floor is porous and not an acceptable material for commercial kitchen applications. -Door knobs not ADA compliant. -Door/frame into concessions has some noticeable scratches and dents.
	Walls	5	●	3	2	1	
	Ceilings	5	4	●	2	1	
	Fixed Equipment	5	4	3	●	1	
	Window(s)	5	4	3	2	1	
	Door(s)	5	4	3	●	1	
	Accessibility	5	4	●	2	1	

Condition Assessment Report

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CATEGORY	SYSTEMS	RATINGS: EXCELLENT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	POOR	COMMENTS
Interior Building Condition							
Room Name Lobby Locker Room # Room	Floors	5	4	3	●	1	-Carpet is worn in Locker Room
	Walls	5	4	●	2	1	
	Ceilings	5	4	●	2	1	
	Fixed Equipment	5	4	●	2	1	
	Window(s)	5	4	3	2	1	
	Door(s)	5	4	3	●	1	- Door knob/hardware not ADA compliant.
	Accessibility	5	4	3	●	1	
Room Name Arena Concourse Room # /Seating	Floors	5	4	●	2	1	-Paint peeling in some areas, minor cracks. There are signs of moisture penetration from roof in corners of the arena concourse.
	Walls	5	4	●	2	1	
	Ceilings	5	4	3	2	1	
	Fixed Equipment	5	●	3	2	1	-There is black mold in the SE corner of the building near the floor, it appears that water is penetrating from grade into the slab/wall.
	Window(s)	5	4	●	2	1	
	Door(s)	5	4	3	2	●	-Insulation above the CMU wall has some rips and tears.
	Accessibility	5	4	3	●	1	
Room Name Arena Rink Room # Floor	Floors	5	4	3	●	1	The rink floor appears uneven and has noticeable bumps.
	Walls	5	4	3	2	1	
	Ceilings	5	4	3	2	1	
	Fixed Equipment	5	4	●	2	1	
	Window(s)	5	4	3	2	1	
	Door(s)	5	4	3	2	1	
	Accessibility	5	4	3	●	1	
Room Name Locker Rm Room # 4 Restrooms	Floors	5	4	●	2	1	
	Walls	5	4	●	2	1	- No grab bars, no ADA stalls. - No protected piping under lavatories.
	Ceilings	5	4	●	2	1	- Restroom stall doors exceed force requirements to open for ADA compliance (too heavy).
	Fixed Equipment	5	4	3	●	1	
	Window(s)	5	4	3	2	1	- Drinking fountain in hallway exceeds maximum height for ADA compliance.
	Door(s)	5	4	3	●	1	-No tactile signage.
	Accessibility	5	4	3	2	●	
Room Name Locker Room Room # 4-1	Floors	5	4	3	2	●	- Floor is bubbling and is a trip hazard. Rubber flooring doesn't finish tight to the wall edge in all places, and is a place for accumulation of moisture and dirt.
	Walls	5	4	●	2	1	
	Ceilings	5	4	●	2	1	
	Fixed Equipment	5	●	3	2	1	
	Window(s)	5	4	3	2	1	
	Door(s)	5	4	3	●	1	-Doors are dented, and no ADA knobs.
	Accessibility	5	4	●	2	1	

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Condition Assessment Report

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CATEGORY	SYSTEMS	RATINGS: EXCELLENT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	POOR	COMMENTS
Interior Building Condition							
Room Name Locker Room Room # 4-4	Floors	5	4	3	●	1	-Carpet is worn in Locker Room
	Walls	5	4	●	2	1	
	Ceilings	5	4	●	2	1	
	Fixed Equipment	5	4	●	2	1	
	Window(s)	5	4	3	2	1	
	Door(s)	5	4	3	●	1	- Door knob/hardware not ADA compliant.
	Accessibility	5	4	3	●	1	
Room Name Locker Room # Rooms 1,2,3	Floors	5	4	●	2	1	-Rubber flooring at/near wet areas (showers, toilets).
	Walls	5	4	●	2	1	
	Ceilings	5	4	●	2	1	
	Fixed Equipment	5	4	●	2	1	-No ADA toilet stalls.
	Window(s)	5	4	3	2	1	-Lavatories are not accessible.
	Door(s)	5	4	3	●	1	-Pipe below lavatories are not completely protected.
	Accessibility	5	4	3	●	1	
Room Name__________ Room #_________	Floors	5	4	3	2	1	
	Walls	5	4	3	2	1	
	Ceilings	5	4	3	2	1	
	Fixed Equipment	5	4	3	2	1	
	Window(s)	5	4	3	2	1	
	Door(s)	5	4	3	2	1	
	Accessibility	5	4	3	2	1	
Room Name__________ Room #_________	Floors	5	4	3	2	1	
	Walls	5	4	3	2	1	
	Ceilings	5	4	3	2	1	
	Fixed Equipment	5	4	3	2	1	
	Window(s)	5	4	3	2	1	
	Door(s)	5	4	3	2	1	
	Accessibility	5	4	3	2	1	
Room Name__________ Room #_________	Floors	5	4	3	2	1	
	Walls	5	4	3	2	1	
	Ceilings	5	4	3	2	1	
	Fixed Equipment	5	4	3	2	1	
	Window(s)	5	4	3	2	1	
	Door(s)	5	4	3	2	1	
	Accessibility	5	4	3	2	1	

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Mechanical Assessment

CATEGORY	SYSTEMS	RATINGS: EXCELLENT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	POOR	COMMENTS
Building VFW Arena Name_____	Heating	○	○	○	◉	○	
	Ventilation	○	○	○	◉	○	
	Air Conditioning	○	○	○	○	◉	
	Plumbing	○	○	○	◉	○	
	Fire Protection	○	○	○	○	◉	
	Temperature Controls	○	○	○	○	◉	
	Fire Protection Systems	○	○	○	○	◉	
		5	4	3	2	1	
		5	4	3	2	1	
		5	4	3	2	1	

OVERALL COMMENTS

Heating provided through electric unit heaters for majority of the building. The ice rink space has a dedicated air handling unit with hot water heat but the boilers are not operational. Remodeled exercise area has a gas fired furnace.
Ventilation provided for ice rink through dedicated air handling unit. Restrooms and locker rooms do not have adequate exhaust airflow. Make up air for restrooms comes from ice rink space and no dedicated make up air is provided for locker rooms.
Water heaters are at the end of their useful life. Plumbing fixtures overall are in working order but original to the construction. Anti-scald valves and some piping insulation are missing which would be required per code.
No fire protection system installed in the building.
Some stand alone controls provided for some equipment but are limited and aging. Electric heaters have integral thermostats. Programmable controls not present.
Refer to mechanical assessment writeup for detailed information and recommendations.

Electrical Assessment

CATEGORY	SYSTEMS	RATINGS: EXCELLENT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	POOR	COMMENTS
Building VFW Arena Name_____	Power Distribution	○	◉	○	○	○	
	Lighting Fixtures	○	○	◉	○	○	
	Lighting Control	○	○	○	◉	○	
	Technology Infrastructure	○	○	◉	○	○	
	Security Infrastructure	○	○	○	○	◉	
	Access Control	○	○	○	○	◉	
	Technology Integration	○	○	○	◉	○	
		5	4	3	2	1	
		5	4	3	2	1	
		5	4	3	2	1	

OVERALL COMMENTS

Electrical services and power distribution were replaced/refurbished after the 1997 flood.
Lighting is mostly linear fluorescent fixtures. Good opportunity to upgrade to LED for energy savings.
Lighting controls are primarily manual. Very few automatic lighting controls.
Emergency lighting needs to be expanded to properly cover the spaces.
Data infrastructure is adequate but limited.
No card access is installed.
No security cameras are installed.
The building does not have a fire alarm system. A voice notification system should be installed throughout the building.

See Electrical Assessment Narrative for additional information.

MECHANICAL SYSTEM ASSESSMENT – M01

Date	8/7/19
Project #	2019237
Project Name	EGF Veterans Arena Assessment
Project Location	East Grand Forks, MN
Description	Mechanical System Assessment and Recommendations

PART 1. MECHANICAL GENERAL INFORMATION

1.1 OVERVIEW

A. The existing facility currently houses an ice rink and auxiliary spaces including locker rooms, exercise room, and offices. The original building was constructed in 1981 with additions more recently. The total area of the building is roughly 45,000 square feet.

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 (Division 23) and Temperature Controls (Division 25)

B. Fire Protection Systems (Division 21) included in this document:
   1. Existing Fire Protection System
   2. Recommendation for the Fire Protection System

C. Plumbing systems (Division 22) included in this document:
   1. Existing Plumbing System
   2. Recommendation for the Plumbing System

D. HVAC (Division 23) included in this document:
   1. Existing Dehumidification System
   2. Existing Heating Plant
   3. Existing Ventilation and Air Conditioning System
   4. Recommendation for the Dehumidification, Heating, Ventilation, & Air Conditioning Systems

E. Temperature Controls (Division 25) included in this document:
   1. Existing Temperature Control Systems
   2. Recommendation for the Temperature Control Systems

1.3 TECHNICAL CRITERIA

A. Codes: The following is a partial list of applicable codes governing the systems described herein:
   1. 2015 Minnesota Mechanical Fuel & Gas Code

2. 2015 Minnesota Plumbing Code
3. 2015 Minnesota Energy Code
4. International Fire Code (IFC) (edition and amendments currently adopted by the state of Minnesota and city of East Grand Forks).
5. NFPA 101 Life Safety Code.
6. NFPA 13 Installation of Fire Protection Systems
7. Americans with Disabilities Act (ADA).
8. ASHRAE 90.1

PART 2. **SPRINKLER SYSTEMS (DIVISION 21)**

2.1 EXISTING FIRE PROTECTION SYSTEM:

A. The building is currently not sprinkled.

B. Recommendations:

1. Requirement for fire protection system is dependent on architectural code analysis. A new 6" water line would be brought into the building to provide a fire protection service with a wet sprinkler system installed throughout. Galvanized piping would be utilized in ice rink space.
   a. Cost: $5/square foot (does not include water service, typically $10,000 to 20,000 depending on civil)

PART 3. **PLUMBING SYSTEMS (DIVISION 22)**

3.1 EXISTING PLUMBING SYSTEM:

A. The two main water heaters are natural gas fired units and are located in the main level mechanical room. These water heaters were manufactured in 2000, are now 19 years old and are past the end of their useful life. A recirculating pump system is installed for these water heaters.

B. An electric water heater is installed in the front portion of the building serving the fixtures in that area. The water heater was manufactured in 1997 and is at the end of its useful life. No hot water recirculation system installed for this water heater.

C. Existing domestic water piping is generally not insulated throughout the building.

D. Plumbing fixtures overall appear to be in working order, but most are 30 years old or more. Fixtures are manual operator type with a mix of wall hung flush valve and tank type water closets. Not all of the fixtures meet current standards as stated in the Minnesota Plumbing Code and therefore should not be reinstalled during any remodel work. Public use lavatory faucets are not provided with ASSE 1070 rated thermostatic mixing valves to protect against scalding. Showers have a shared central floor drain where water would pass under other bathers.

E. Recommendations:

1. New water heaters should be provided to replace existing units.
   a. Cost: $20,000 per each natural gas water heater, $12,000 for electric water heater
2. All domestic cold, hot & hot water recirculation piping should be insulated with new fiberglass thermal insulation to prevent the cold water piping from condensation as well as meeting the Minnesota Plumbing Code for hot water piping.
   a. Cost: $65,000 (extents of piping need to be verified)
3. A hot water recirculation piping and pump system should be added to the electric water heater to provide hot water quickly to the plumbing fixtures.
   a. Cost: $15,000
4. During any toilet room remodel, all plumbing fixture should be replaced with new as well as ASSE 1070 rated thermostatic mixing valves being provided to protect against scalding. The architect will need to determine the requirements to meet current ADA standards for the toilet room layout.
   a. Cost: $5,000 per plumbing fixture

PART 4. **HVAC (DIVISION 23)**

4.1 EXISTING DEHUMIDIFCATION SYSTEM:

A. The building is not currently equipped with a dehumidification system. If year-round ice operation is desired this is a greater concern since excess humidification can degrade ice quality, create fog in the air, and can condense and damage finish surfaces.

4.2 EXISTING HEATING PLANT:

A. The majority of the building is heated through electric unit heaters. These units are suspended from ceilings in the spaces they serve. The electric source is less desirable due to higher operating costs compared to a hot water system and higher maintenance.

B. Two natural gas hot water boilers are installed in the mechanical room to heat air for the ice rink area. One of the boilers is being replaced this year with new high efficiency 1000 MBH input boilers.

C. Inline pumps circulate water between the hot water boilers and the ice rink air handling units. These pumps look to be in good condition.

4.3 EXISTING VENTILATION & AIR CONDITIONING SYSTEMS:

A. The ice rink has a dedicated air handling unit to provide ventilation to the rink space. A non-powered relief louver is located on one end of the rink. The unit is equipment with a hot water coil and are waste heat coil from the ice refrigeration system. The unit does not have air conditioning and is original to the ice arena.

B. The building auxiliary spaces are not being provided with ventilation air. Bathrooms at the front of the building do not have exhaust installed. Locker rooms typically have some exhaust at the locker restrooms, but airflow rates would not meet the code requirements for locker rooms and restrooms. No make up air is provided in the auxiliary spaces and would be drawn in through doorways from the rink space. Exhaust fans are sidewall mounted on the exterior and appear to be original to the building.

C. Air conditioning is not installed in the building with the exception of a wall hung split system unit installed in one of the locker rooms. A furnace serving the exercise room and office has a DX cooling coil but no associated condensing unit.

D. Recommendations:

1. The remaining original hot water boiler and their associated components are at the end of their useful life and should be replaced. Any additional new boilers would match the new high efficiency boiler already being installed. All of the piping, pumps, and controls in the boiler room should be replaced. We recommend 50% ethylene glycol be used to re-fill the system for freeze protection. The size of the heating plant should be increased to pick up the additional load for the spaces previously provided with electric heat. Ventilation air for all spaces would be provided with hot water heat to condition the outside air. Hot water heat will be the most efficient and cost effective long term option for heating the building.
   a. Cost: $240,000
2. Replace existing air handling unit serving ice arena in its place, re-using ductwork. Existing unit is beyond its useful life and starting to fail. Basis for new unit would be hot water heat with DX cooling to condition the space. Unit would be sized to handle the ventilation required in the hockey rink.
   a. Cost: $250,000
3. A dedicated dehumidification unit should be provided for the ice rink if year-round operation is desired. This will allow for the code required ventilation airflow rate to be provided without the humidity in the space going beyond acceptable limits. The unit would be sized to account for the additional air required when operating a Zamboni. Unit would have a hot water heating coil and DX cooling coil to control discharge air temperature.
   a. Cost: $400,000
4. New air handling units should be provided for locker rooms and restrooms throughout the building to provide the code required ventilation and exhaust. The units would have energy recovery as required by code. Ductwork would be replaced to be properly sized for the code required airflow. Units would be hot water utilizing the building boiler plant.
   a. Cost: $500,000

PART 5. **AUTOMATIC TEMPERATURE CONTROLS (DIVISON 25)**

5.1 EXISTING AUTOMATIC TEMPERATURE CONTROL SYSTEMS:

A. The existing building has very limited controls on all heating and ventilation devices in the building, with all equipment being stand alone. Electric unit heaters have built in thermostats. Line voltage thermostat provided on furnace serving exercise area. These systems can be ineffective in providing proper space temperature control and energy savings. It is expected that most of these control components do not have reset control strategies associated with them that would be required for the current energy code requirements.

B. Recommendations:

C. A new digital controls (DDC) system with central monitoring capabilities should be installed in the building. This will allow set back and energy conservation strategies to be setup when new equipment is installed. Additionally, new controls will help the building meet current code requirements and provide increased indoor air quality. The DDC system should control all heating and air conditioning equipment to allow for automatic temperature control, seasonal adjustments, and maximize HVAC system efficiencies. The system shall also alarm all equipment so maintenance personnel can maintain and troubleshoot all equipment remotely with limited staff.
   1. Cost: $225,000

Respectfully,
Obermiller Nelson Engineering, Inc.

Ross Young

Attachment(s): None
Cc: file

OBERMILLER NELSON
ENGINEERING

ELECTRICAL SYSTEM ASSESSMENT – E01

Date	8/7/19
Project #	2019237
Project Name	East Grand Forks Ice Arena Assessments
Project Location	East Grand Forks, MN
Description	EGF Veterans Arena: Existing Electrical System Assessment and Recommendations

PART 1. **ELECTRICAL GENERAL INFORMATION**

1.1 OVERVIEW

A. The existing facility in East Grand Forks, MN currently contains a large assembly space with an ice arena as well as some ancillary spaces for mechanical/electrical, offices, locker rooms, restrooms, and concessions.

1.2 SCOPE

A. This narrative document summarizes the schematic design for the major electrical systems (Division 26), electronic communications systems (Division 27), and electronic safety and security systems (Division 28) to be included in the project.

B. 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).

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

1. Structured cabling for voice / data communication systems.
2. Audio systems.

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

1. Fire alarm system.
2. Security Camera System.
3. Electronic Access Control and Door Monitoring System.

PART 2. **DESCRIPTION OF ELECTRICAL SYTEMS**

2.1 LOW VOLTAGE ELECTRICAL POWER DISTRIBUTION

A. The existing electrical services consist of (1) 2000A, 208V, 3-phase service and (1) 800A, 480V, 3-phase service. Both are located on the east side of the building in the compressor room. In addition, there is (1) smaller 400A, 208V electrical service on the west side by the concessions area.

B. The two larger services on the east side were replaced following the 1997 floor and are both in good condition and are within their expected life (expected life is around 30 years). The smaller service on the west side appears to have been refurbished at the same time. The inspector's tag indicates that the interior was replaced in 1997.

C. It appears that most panelboards in the building were replaced or refurbished following the 1997 flood. All appear to be in working order and would be within expected life if replaced/refurbished in 1997. Most branch circuit panels are full with only limited capacity to add circuits.

D. Existing devices: It appears that most electrical devices were replaced in 1997 after the flood and are generally in good condition. GFCI protected receptacles are required in locker rooms and there appear to be several devices that are not GFCI protected right now.

E. Recommendations:

1. Leave the existing service and panels in place. Consider adding panel replacement to future maintenance and upkeep plan sometime within the next 8 to 10 years as the panels reach expected life. Any projects in the area of any existing branch circuit panels should consider replacement of the associated panel with new for additional circuit capacity and equipment update.
    a. Cost: Nothing right now. Cost of panel replacement varies with panel size, but assume $6000 per panel and an additional $5000 per feeder to replace with new.
2. Replace existing receptacles with new GFCI type where required by code.
    a. Cost: $75 per device.

2.2 GENERAL INTERIOR AND EXTERIOR LIGHTING SYSTEMS

A. Most of the general interior lighting in the building is surface mounted fluorescent (T8 lamps) linear fixtures with wraparound prismatic lenses. The remodeled area on the upper level has new LED flat panels installed.

B. Exterior lighting has all been upgraded to LED wall mounted lighting except for existing HID type fixtures on the north and east exposures of the building.

C. The arena lighting is 8-lamp T5 high bay fixtures with wall mounted T8 fluorescent wraparound fixtures at the perimeter.

D. Interior light levels appear to be adequate.

E. ***Recommendations:***

1. Replace all existing interior lighting with new LED light fixtures for better efficiency (not necessary to meet any codes, just a recommendation for upgrade).
    a. Cost: $5 per square foot.
2. Replace remaining exterior HID lighting with LED.

    a. $3000.

2.3 LIGHTING CONTROL SYSTEMS

A. Most lighting controls in the building are manual switches only. Occupancy sensors for lighting control have been installed only in a couple locations.

B. Arena lighting is controlled manually by switching the circuit breakers at the 277V panel that feeds the lighting.

C. ***Recommendation:***

1. Provide occupancy sensor controlled lighting throughout the building as required by current energy codes. Low voltage switches and dimmers would be utilized to allow for manual-on, auto-off control of the lighting as is now required by the energy codes. Mechanical and electrical rooms would be left with manual control of the lighting.
    a. Cost: $1.25 per SF for affected areas (not including arena)
2. Provide contactor or relay-based lighting control for the arena to avoid controlling the lighting at the breakers.
    a. Cost: $10,000

2.4 EMERGENCY LIGHTING AND EGRESS SIGNAGE

A. Exit signs are mostly LED thermoplastic body type with integral batteries.

B. Emergency egress lighting is self-contained emergency lighting with integral batteries and adjustable light heads. Most of the fixtures are in acceptable condition, but coverage is poor for an assembly occupancy. Some of the existing emergency lights are older and should be replaced with new to ensure proper battery life

C. There is no existing exterior emergency lighting.

D. Recommendations:

1. Add additional emergency lighting for proper interior coverage. Include centralized battery inverter and dedicated emergency fixtures for arena.
    a. Cost: $18,000
2. Add exterior emergency lighting.
    a. Cost: $4000

2.5 STRUCTURED CABLING FOR VOICE AND DATA COMMUNICATIONS

A. Communications wiring and wireless access points are currently installed as necessary to meet the facility's needs which are limited. No issues were reported.

B. Communications demarks are located at the west side by concessions and at the east side in the compressor room.

C. ***Recommendations:*** None for the existing facility, however, a building expansion project should consider the addition of a secured and temperature controlled centralized data closet(s).

2.6 AUDIO SYSTEMS

A. The current arena sound system is aging, but still meets the needs of the facility.

B. ***Recommendations:*** None.

PART 3. ELECTRONIC SAFETY AND SECURITY SYSTEMS

3.1 ELECTRONIC DOOR ACCESS CONTROL

A. The building does not currently have any electronic access control system installed.

B. ***Recommendations:*** Consider the installation of a new electronic access control system to monitor the position of exterior doors and allow more secure and controlled access to the space.

   1. Cost: $22,500 (9 doors).

3.2 SECURITY AND SURVEILLANCE CAMERA SYSTEMS

A. There is currently no security or surveillance camera system.

B. ***Recommendations:*** Consider the installation of a surveillance camera system for better security, asset protection, and liability protection.

   1. Cost: Cost is greatly dependent on scope but assume a cost of $1200 per camera plus an additional $10,000 for control and recording equipment.

3.3 FIRE ALARM SYSTEM

A. There is currently not a fire alarm system installed in the building. According to the Minnesota amendments to the IBC:

   1. A fire alarm system shall be installed in in Group A occupancies having an occupant load of 300 or more. However, a fire alarm system is not required in buildings with an occupant load of less than 1,000 when a sprinkler system is installed throughout the building. Currently there is no sprinkler system installed.
   2. Automatic fire detectors (smoke or heat detectors) are required to be installed in laundry rooms, boiler and furnace rooms, mechanical and electrical rooms, shops, kitchens, trash collection rooms, storage rooms, and similar areas.
   3. Audible notification shall be voice type.

B. ***Recommendations:*** Provide an addressable fire alarm system with voice notification throughout the building:

   1. Cost: $2 per square foot.

PART 4. TECHNICAL CRITERIA

4.1 CODES AND STANDARDS

A. The following is a partial list of applicable codes governing the systems described herein:

   1. International Building Code (IBC) 2015.
   2. International Mechanical Code (IMC) 2015.
   3. International Fire Code (IFC) 2015.
   4. 2015 Minnesota Building Code.
   5. 2015 Minnesota Energy Code.
   6. NFPA 70 National Electrical Code.
   7. NFPA 72 National Fire Alarm and Signaling Code.
   8. NFPA 101 Life Safety Code.
   9. Americans with Disabilities Act (ADA).

B. The following is a partial list of design and installation standards governing the systems described herein:

   1. BICSI Telecommunications Distribution Methods Manual.
   2. IES Lighting Handbook, Tenth Edition.
   3. International Electrical Testing Association (NETA) Standards.
   4. National Electrical Contractors Association (NECA) Standards.

Respectfully,
Obermiller Nelson Engineering, Inc.

Tony Nelson

Attachment(s): none
Cc: ICS, file.

FACILITY ASSESSMENT

JLG 19147 – EGF VFW ARENA

RE: EFG ARENA STUDY

July 19th, 2019

Note: Main Building entrance

01

Note: Condition of parking lot paving is below average

02

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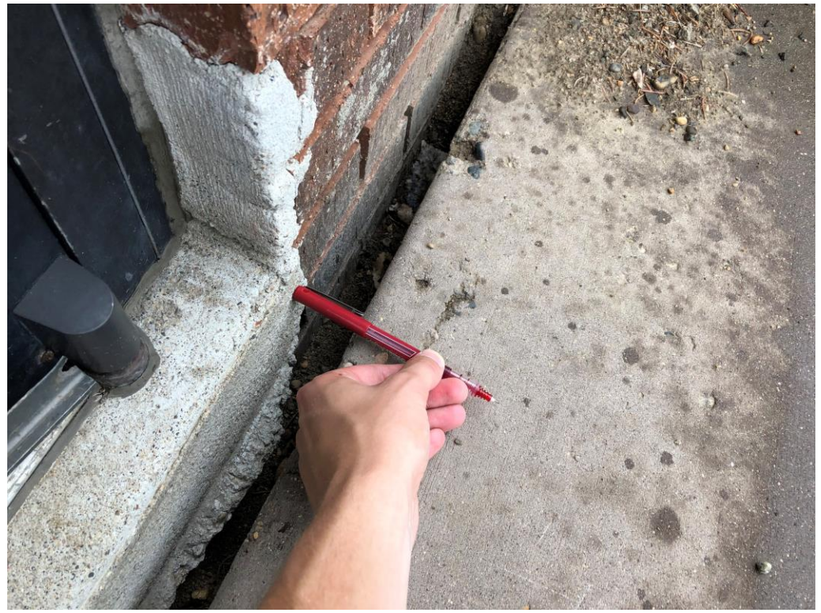


Note: Concrete path has settled away from building entrance doors (no stoops)

03

Note: Missing trim around mechanical louver

04

FACILITY ASSESSMENT
JLG 19147 – EGF VFW ARENA
RE: EFG ARENA STUDY
July 19th, 2019

Note: Sealant needed around wall penetration

05

Note: Uncontrolled water has eroded soil creating backslope toward building, especially at north and west faces.

06

Note: Eroded soil at west building face

07

Note: Failing retaining wall near northwest corner

08

FACILITY ASSESSMENT
JLG 19147 – EGF VFW ARENA
RE: EFG ARENA STUDY
July 19th, 2019

Note: Missing stoop and damaged doors, east face

09

Note: Damaged fence and gate

10

DRAFT 11/08/19

Note: Pooling water at exterior of mechanical and Zamboni rooms

11

Note: Waterlogged concrete heaves in winter and interferes with egress doors.

12

FACILITY ASSESSMENT
JLG 19147 – EGF VFW ARENA
RE: EFG ARENA STUDY
July 19th, 2019

Note: Ramp to game level exceeds allowable slope; no handrails.

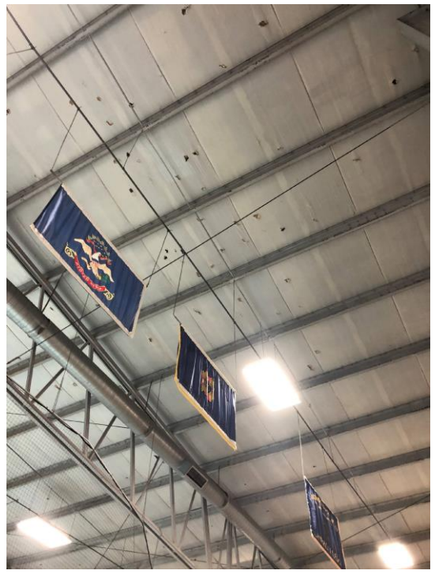
13

Note: Porous flooring in Lobby restrooms.

14

Note: Porous flooring in Lobby Concessions

15



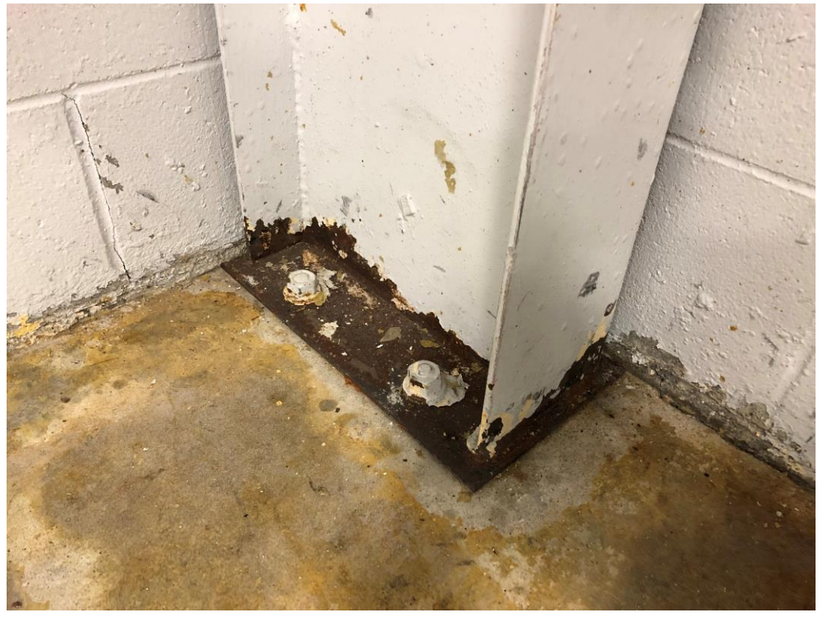
Note: Errant pucks have damaged the roof insulation.

16

FACILITY ASSESSMENT
JLG 19147 – EGF VFW ARENA
RE: EFG ARENA STUDY
July 19th, 2019

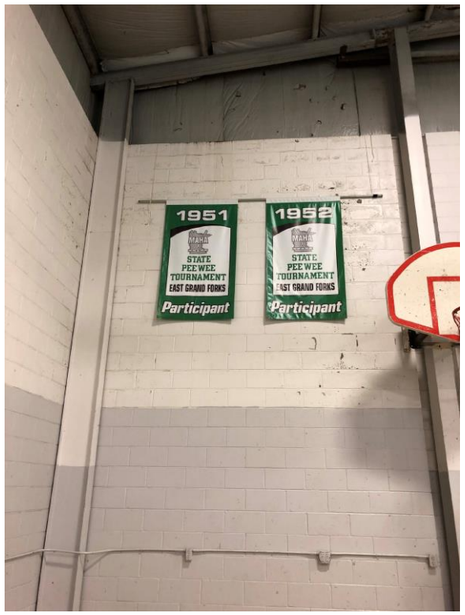
Note: Water is infiltrating the concourse, likely due to soil erosion, and pooling causing mold.

17



Note: Evidence of water infiltration at concourse.

18



Note: Evidence of water leaking from roof, southeast corner. Bubbling paint caused by water vapor driving through the CMU wall.

19

Note: Condition of the rink floor

20

FACILITY ASSESSMENT
JLG 19147 – EGF VFW ARENA
RE: EFG ARENA STUDY
July 19th, 2019

Note: Bubbled flooring in locker rooms is a trip hazard.

21

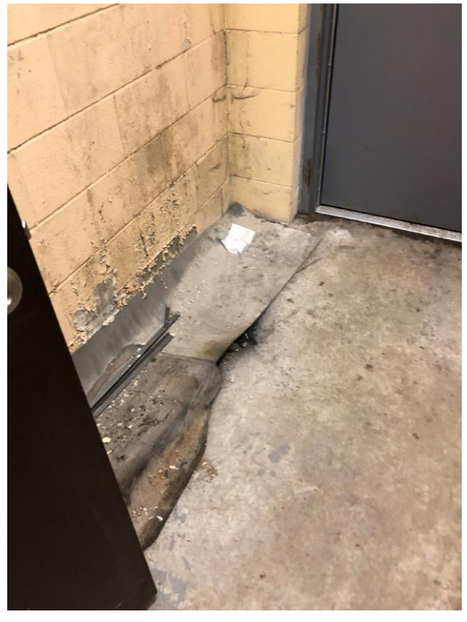
Note: Bubbled flooring in locker rooms is a trip hazard.

22

DRAFT 11/08/19

Note: No ADA stall or grab bars provided in restrooms. Partition doors exceed ADA maximum force requirements.

23



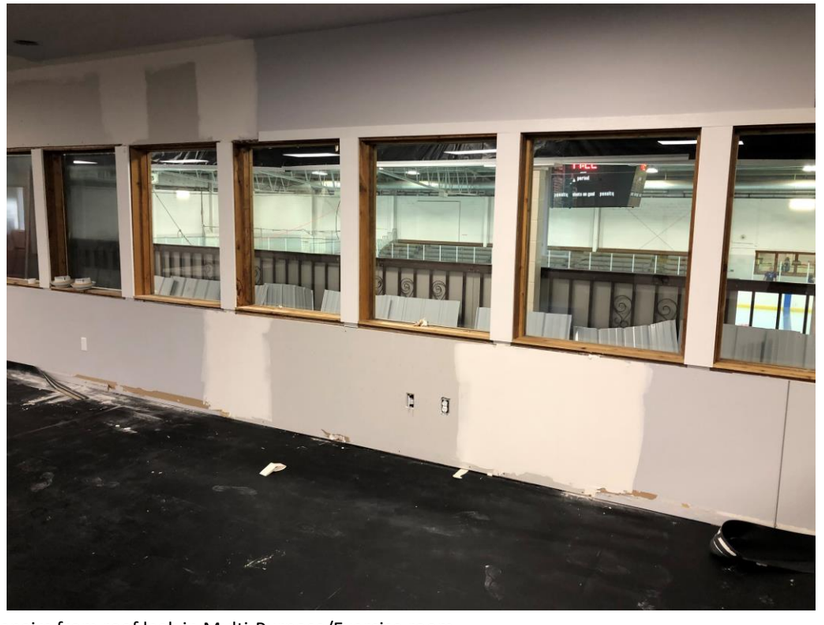
Note: Debris in egress stair.

24

FACILITY ASSESSMENT
JLG 19147 – EGF VFW ARENA
RE: EFG ARENA STUDY
July 19th, 2019

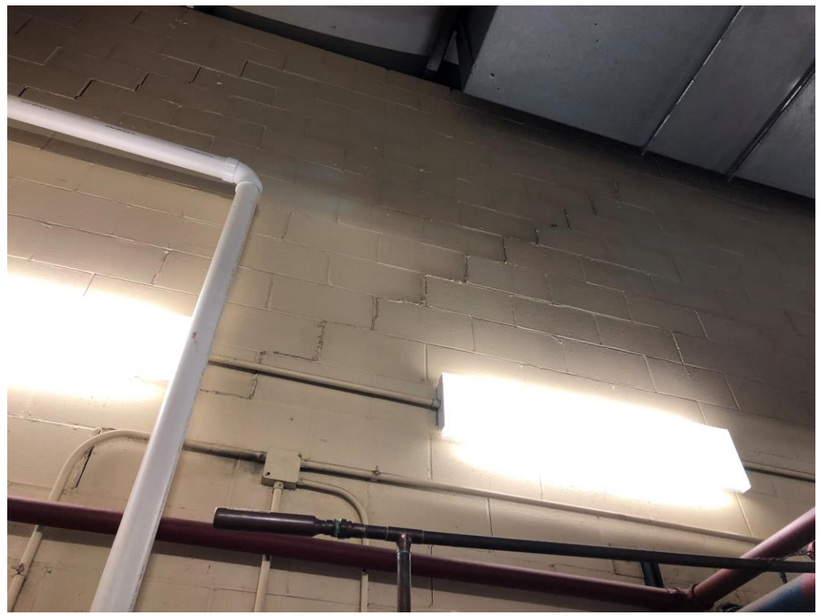
Note: Ongoing repairs from roof leak at Overlook.

25



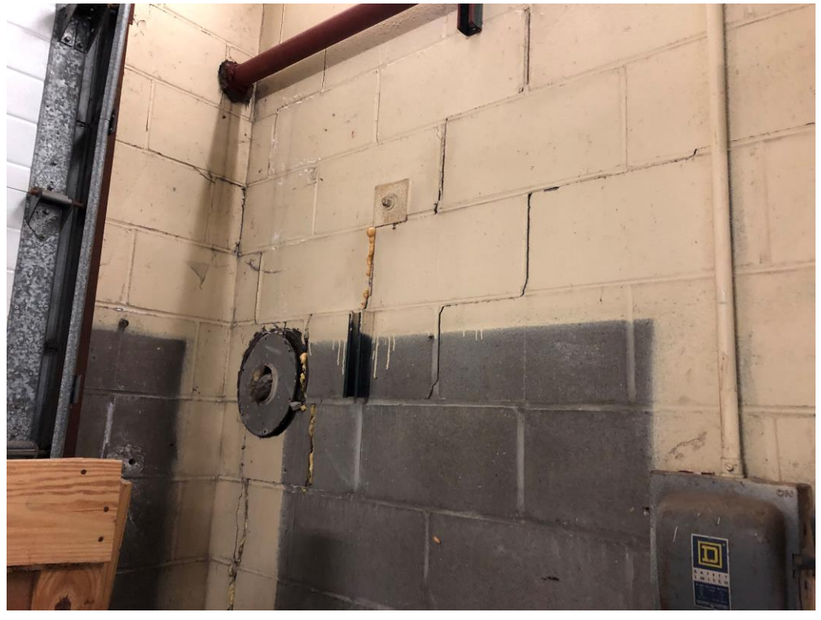
Note: Ongoing repairs from roof leak in Multi-Purpose/Exercise room.

26



Note: Significant cracking in exterior wall of mechanical room, likely settling.

27



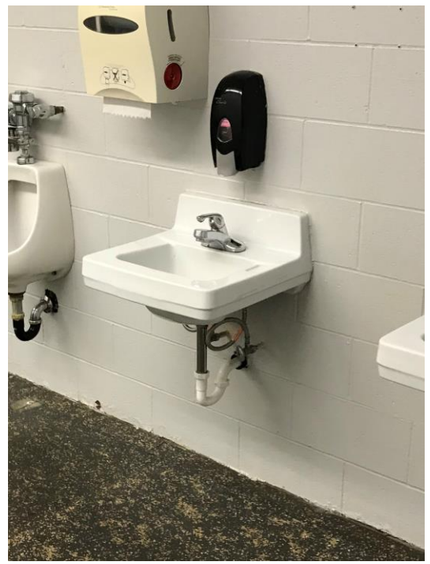
Note: Significant cracking in exterior wall of mechanical room, likely settling.

28

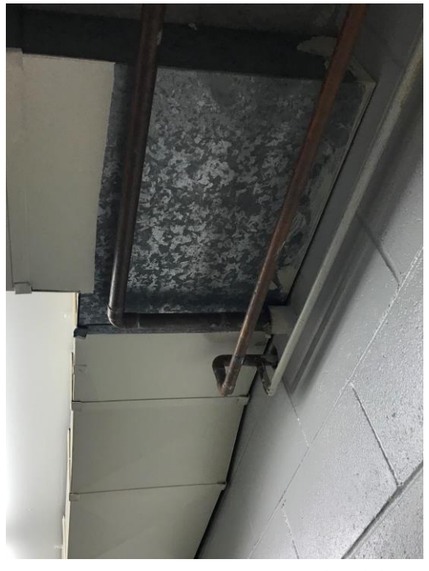
FACILITY ASSESSMENT
JLG 19147 – EGF VFW ARENA
RE: EFG ARENA STUDY
July 19th, 2019

Note: Electric heat used throughout the axillary spaces.

29



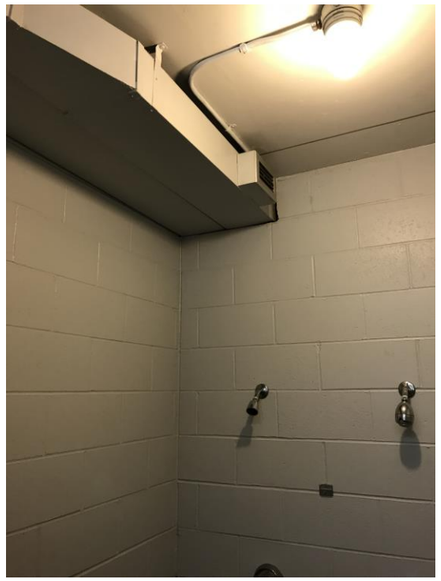
Note: Scald protection not provided on public lavatories.



Note: Domestic water piping uninsulated throughout Locker room spaces.

30

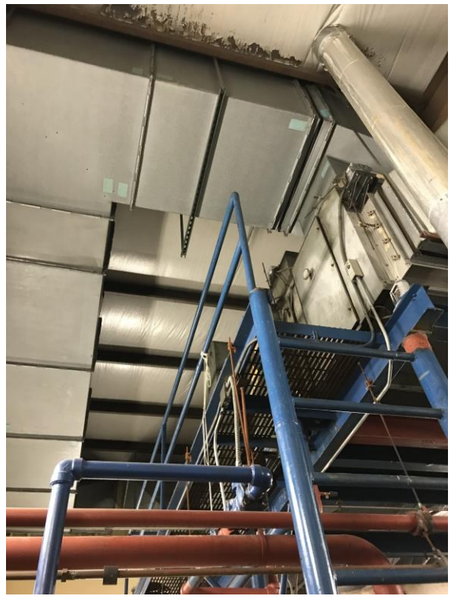
Note: Water Heaters installed in 2000 are at end of useful life.



Note: Exhaust from locker rooms and no make up air provided into spaces.

31

Note: Sidewall exhaust fans original to building.



Note: Air handling unit serving arena. Hot water heat and no cooling.

32

Note:

FACILITY ASSESSMENT
JLG 19147 – EGF VFW ARENA
RE: EFG ARENA STUDY
July 19th, 2019

Note: New Switchgear after the 1997 Flood.

33

Note: Panelboards replaced/refurbished after the 97 flood.

34

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Note: Breakers used for lighting control.

Note:

35

Note:

Note:

36

ICE SYSTEM PRELIMINARY ASSESSMENT

VFW Memorial Arena and Civic Center
East Grand Forks, MN
8.7.9

1.0 Introduction

The following report is a very brief and preliminar asseseemnt of the ice systems and recommended improvements at the VFW Memorial Arena and at the Civic Center. The ice system includes the refrigeration system, ice rink floor, waste heat recovery system and dasher board system.

2.0 VFW Arena

The VFW arena is a smaller ice arena facility with minimal spectator seating. The existing ice system is a direct R-22 refrigeration system manufactured by Holmsten Ice Rinks. The refrigeration system was installed after the flood in 1997 and was a used refrigeration system at the time of installation. The system is over 22 years old and is nearing or has exceeded its 25 year life expectancy. The ice rink floor is original to the facility that was built in 1982. The floor system is over 37 years old and has greatly exceeded its useful life.

If this facility will continue to be used as an ice arena facility, we recommend the following ice system options.

1. Continue to use the existing ice system as-is. This is a direct refrigeration system that circulates R-22 refrigerant throughout the rink floor. The quantity of R-22 in the system is very high and likely around 6,000 pounds. The greatest risk to the system is a leak in the aging piping systems (either the floor or refrigeration system) that releases the entire charge of R-22. This would have an estimated cost of $60,000 to $120,000. The City could purchase spare used parts from similar systems as backup to lessen the possible financial impact and downtime caused by a failure. Parts may include; used compressors, starters, fill and dump solenoid valves, etc. The University of Minnesota Duluth is currently removing a Holmsten Refrigeration System.

   Holmsten Ice Rink's R-22 *direct*-type ice system is one of the most efficient systems designed for ice rink applications. However, because of the following factors, this type of system is no longer a viable type of system to install in today's ice arena facilities:
   a. Safety concerns - Refrigerant is circulated through the ice rink floor systems, potentially exposing spectators to refrigerant if a leak occurs.
   b. Environmental concerns - Requires a large quantity of R-22 refrigerant (6,000 pounds vs. 500 to 1,800 pounds on a modern *indirect* system). R-22 refrigerant has a high ozone depleting potential.
   c. Availability and cost - R-22 is currently on a phase out schedule mandated by the EPA. R-22 refrigerant will no longer be manufactured in the U.S. or imported into the U.S. after 2020.
   d. Cost of replacement - The rink floor, with its ½ inch diameter steel piping, is typically the first part of the system to fail. The supply of the tubing has been limited since 2005 and alternate material is labor intensive to install, making the replacement of a *direct* floor very costly.

2. Replace the entire ice system. The second option would be to replace the entire refrigeration system and ice rink floor system with a new indirect system. The refrigeration options range from a lower cost commercial grade system to a more industrial quality (similar in quality to the existing system), more

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efficient ammonia system. In either case the ice rink floor would require replacement and the refrigeration room may need to be improved. This would provide an opportunity to also increase the size of the existing rink floor from 85'x190' to today's standard size of 85' x 200'.

3.0 Civic Center

The Civic Center is a larger facility with a seating capacity of approximately 3400. The existing ice system is an indirect R-22/glycol refrigeration "stick built" system with an air-cooled condenser. The system was originally installed with the building in 1974 (45 years old). Some of the major equipment has been replaced such as Compressor 1 was replaced in 2008, Compressor 2 was replaced in 2015 and the air-cooled condensers were replaced 2012 or 2015. The electrical motor control center, pumps and other equipment appears to be the original equipment.

The ice rink floor was replaced in 1993 (26 years old) and has reached is expected life. The arena flooded in 1997, however, there are no reported problems with the performance or visible condition of the ice rink floor other than the subfloor heating system does not work. Without the subfloor heating system in good operating condition the length of the ice season should be limited to approximtely 6-7 months to avoid frost build up in the subsoils under the rink floor.

The existing dasher board system was installed somewhere between 2013 and 2015 and are not very accessible. The length of benches in the players boxes are very limited due to existing stairs accessing the locker rooms.

We have outlined the following improvement options with recommendations.

1. Continue to use the system as-is. Most of the major components of the system are fairly new. The City could continue to operate this system for few more years until repairs to the original parts of the system become too time consuming or costly. Keeping in mind that R-22 will no longer be imported into or manufactured in the U.S. after 2020. If the ice system in the VFW is removed or replaced, the existing R-22 refrigerant could be stored and used for the Civic Center facility.
2. Make improvements to the existing system. Replace the remaining original components of the refrigeration system including the motor control center, pumps, heat exchangers etc. Given the age of this system and its use of R-22, this option is not recommended.
3. Replace the R-22 refrigerant with a new blended refrigerant like R-448A. Blended refrigerants are not recommended to be used in flooded type systems and, with the excess supply of R-22 in the marketplace, the refrigerant replacement is unnecessary and would result in a loss of efficiency. The refrigerant replacement can be performed at a later date if desired.
4. Replace the refrigeration system. This option would include replacing the existing refrigeration system, most likely in a new location. The existing equipment room is limited on space and egress. The existing Managers Tool Room is one location that would likely work well for a new refrigeration room and provide options for expanding the refrigeration system to serve a new second sheet. A new industrial grade refrigeration system would cost approximately $650,000 and approximately an additional $175,000 to upsize the major components so the system could serve a second sheet in the future.
5. Replace the ice rink floor. The ice rink floor has exceeded its life expectancy but is not showing signs of failure and has reportedly been working well. The replacement of the rink floor could take a place at a later date.

END

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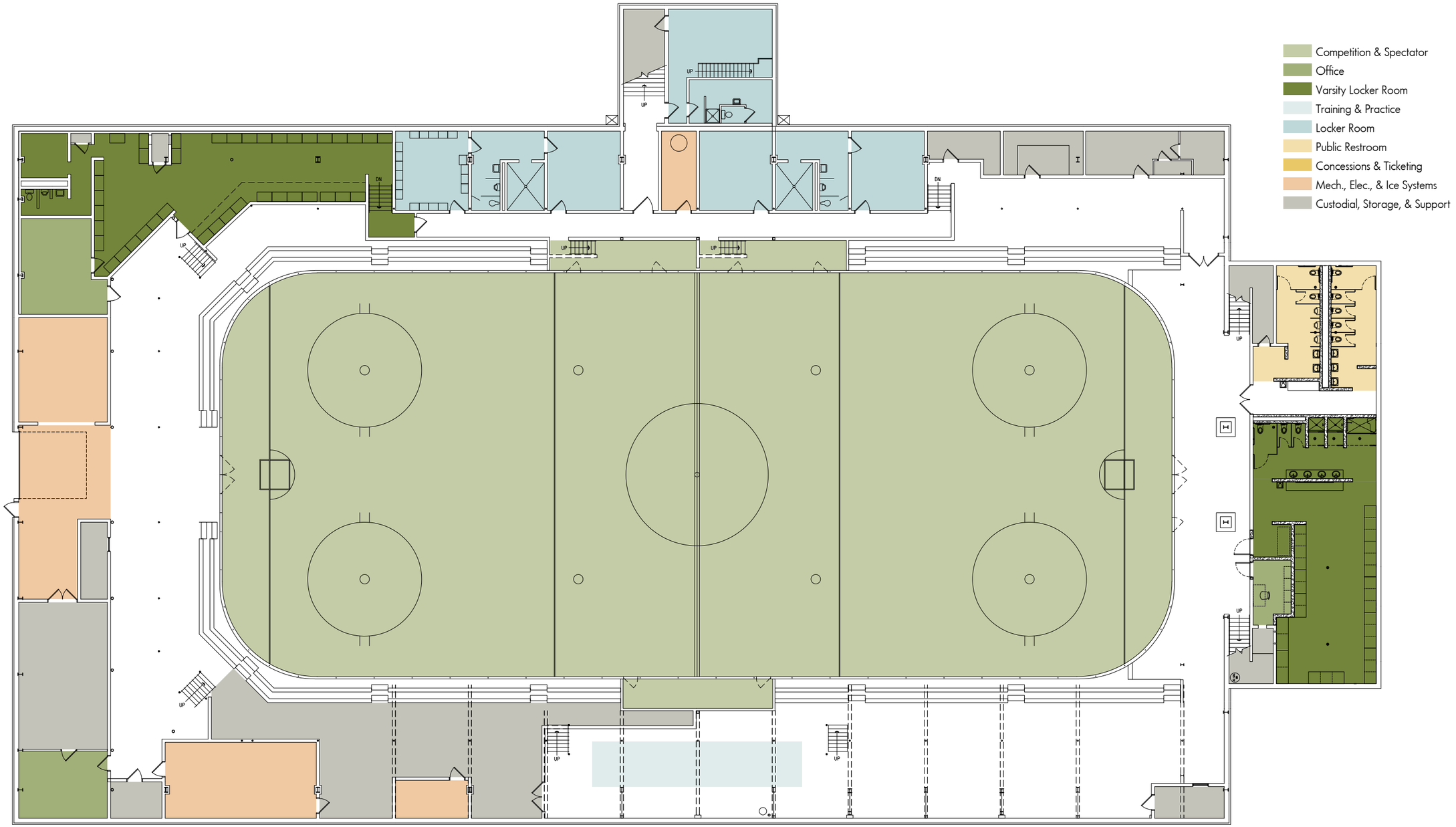

CIVIC CENTER ARENA

LOWER LEVEL FLOOR PLAN

0 10'-8" 21'-4" 42'-8"

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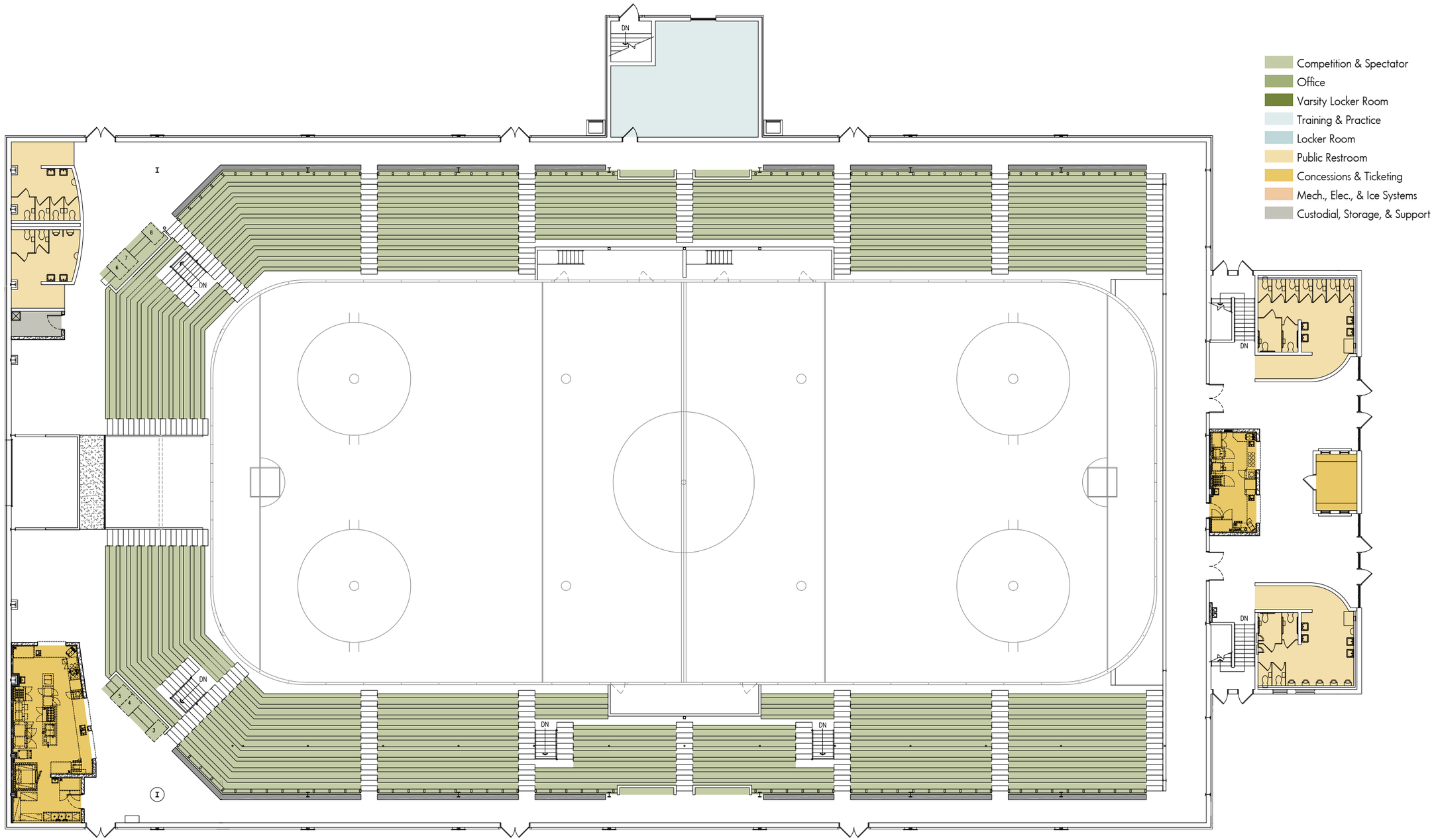

CIVIC CENTER ARENA

FIRST FLOOR PLAN

0 10'-8" 21'-4" 42'-8"

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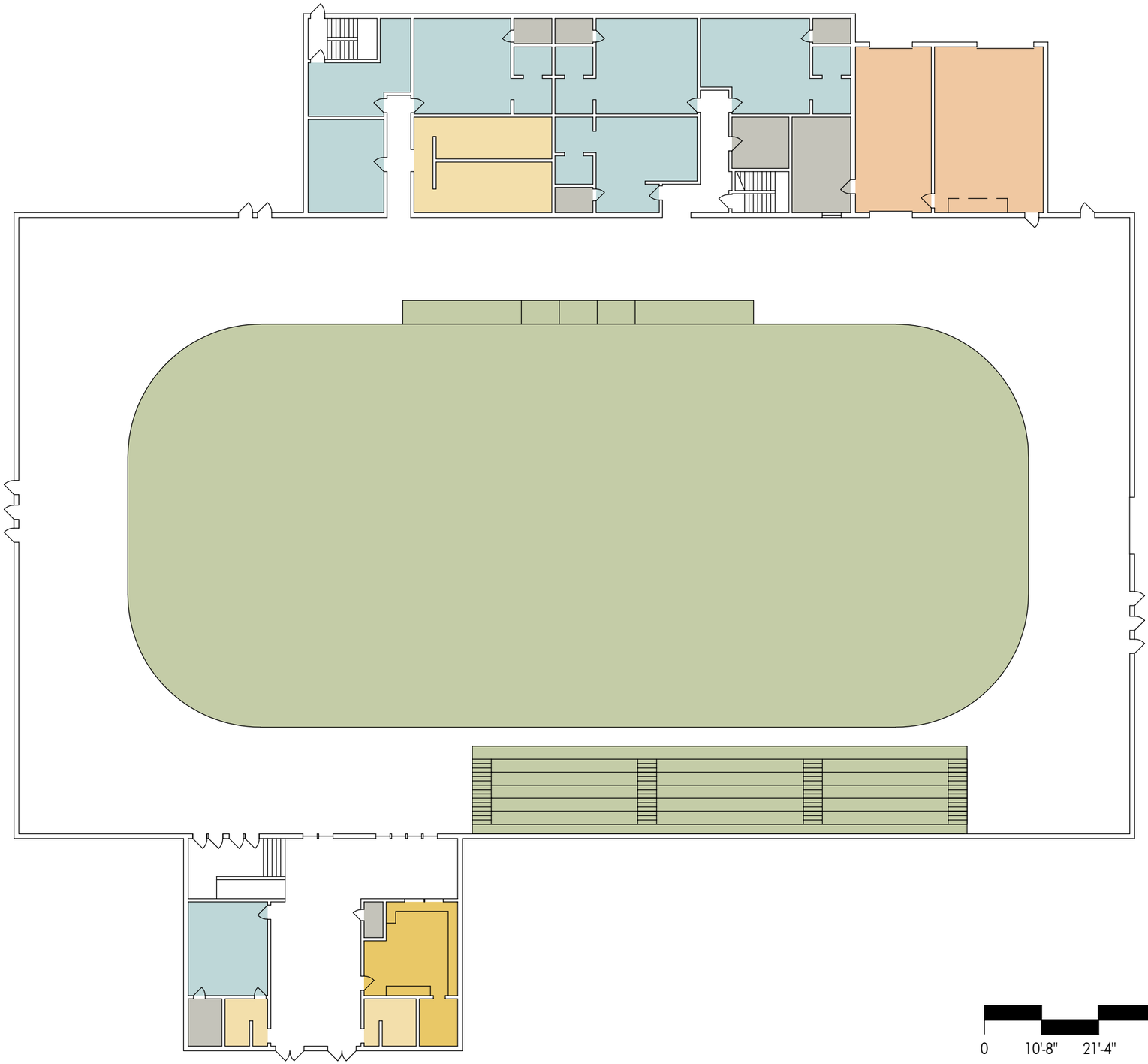
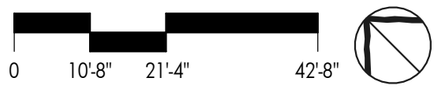


VFW ARENA

FIRST FLOOR PLAN



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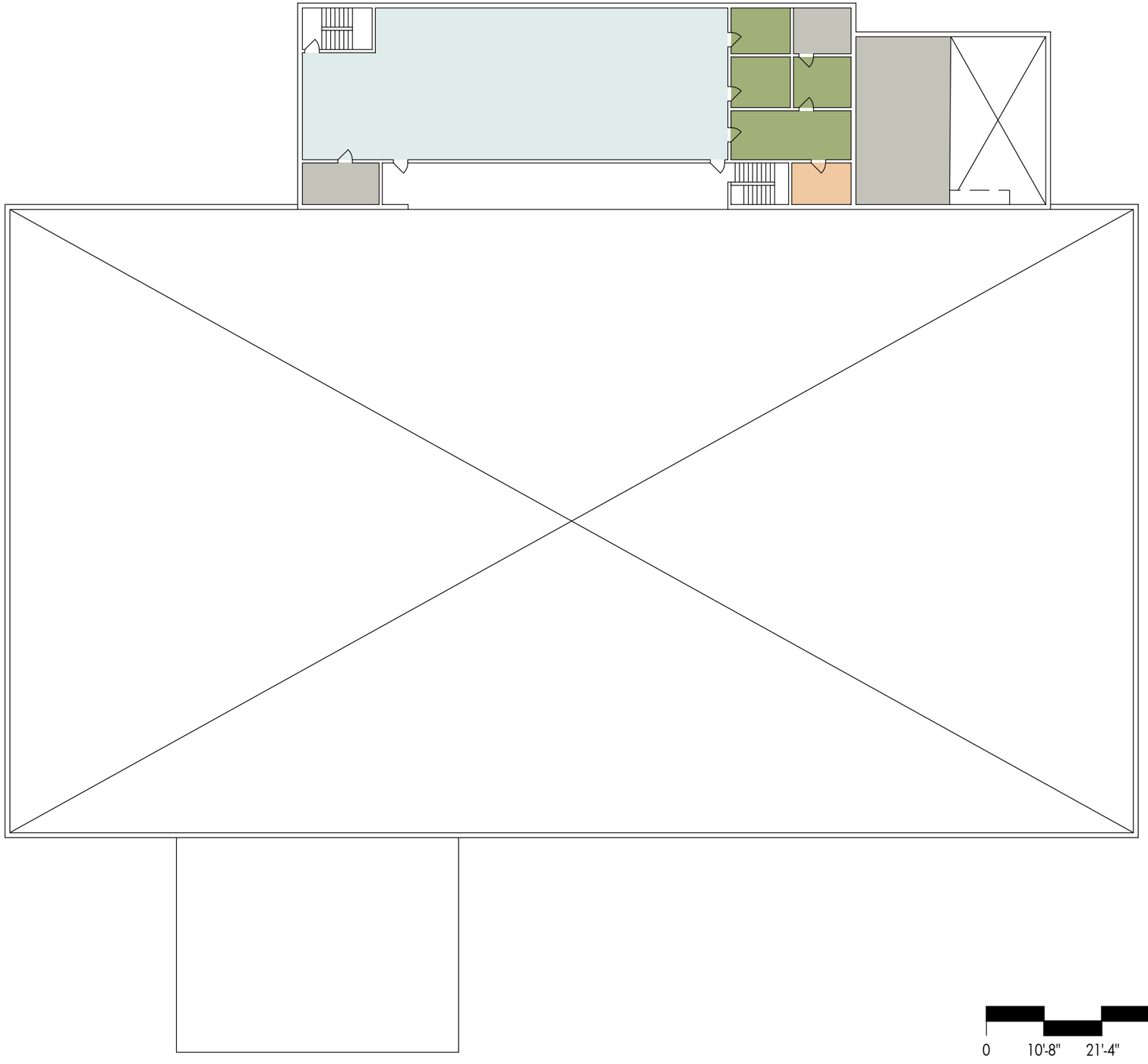
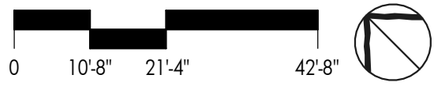


VFW ARENA

SECOND FLOOR PLAN



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