
ICON
ARCHITECTURAL GROUP

**FACILITY ASSESSMENT FOR**

# NORTH DAKOTA YOUTH CORRECTIONAL CENTER PHYSICAL PLANT

Mandan, ND | July 2024

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ICON ARCHITECTURAL GROUP

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Prairie Engineering, P.C.
Professional Consulting Engineers

# INTRODUCTION TO THE PROJECT

This document represents a review of the existing Physical Plant on the campus of the current North Dakota Youth Corrections Center in Mandan, ND. ICON Architectural Group (ICON) has teamed up with Prairie Engineering and Kraus-Anderson to prepare the information contained within this report. The facility assessment was commissioned to assist the Department of Corrections in addressing an aging structure and plan for a more efficient facility to accommodate the needs of the campus. This assessment includes input from design professionals, engineers, construction managers and Physical Plant staff. The evaluation of the facility was done by observation of the existing conditions. There was no destructive testing done.

The scope of this report is to identify deficiencies within the current facility – code compliance, Americans with Disabilities Act (ADA) compliance, security and operational adequacy. This will assist the Construction Manager in applying costs associated with the demolition and construction of a Physical Plant facility. There was no destructive testing performed during this assessment. All noted concerns and deficiencies were observed by the design team.

The current location of the North Dakota Youth Correctional Center on the west side of the city of Mandan was approved by the North Dakota Legislature in 1901 and with the facility first opening to students on May 13, 1903. This has served as the State's center of juvenile justice administration under several different names. In 1995, it became the North Dakota Youth Correctional Center (YCC).

Early in its history, the campus of YCC served as an orphanage for children of incarcerated adults, accidents, or abandonment. As part of these children being cared for, education and counseling played a role and continues to be an important component in the residents' day-to-day lives. In 1938, the school was the only youth correctional center in the nation to offer high school classes and only one of four in the US to house both boys and girls. Although many ages of children were part of the history of YCC, in 2005 an age requirement was enacted to replace the 1935 ruling. The current facility has the ability to house residents from ages 12 to 20.

At one time, YCC had approximately 300 residents, faculty, and staff. Currently, it houses approximately 35 residents, faculty, and staff. The campus includes resident housing (cottages), a chapel, cafeteria, administration, school programs and gymnasium. In order for all these facilities to operate each day, there is a series of tunnels connecting these structures to the main Physical Plant on the southwest corner of the campus. The Physical Plant is the main hub of the campus supplying heating to the other buildings on campus, and emergency power to a few buildings. It also houses the woodworking and plumbing shops required to maintain the other structures on campus. Because there are no existing drawings of the Physical Plant building, the exact age of the structure is not known. It is estimated that the existing building dates to the 1910's.

In 2018, ICON Architectural Group was hired to perform a structural assessment and evaluation of the building. The full assessment can be found in Appendix A at the back of this report. At that time, structural engineer Michael Jochim made a site visit, and it was apparent that the building structure has exceeded its useful life expectancy.

The findings at that time were obvious signs of building movement and areas of structural distress and damage. Recommendations for structural repairs and additional monitoring were provided along with associated costs. Mr. Jochim outlined each space within the facility noting various observed items from hairline cracking in slabs to walls being out of plumb. There were a couple of areas of major concern noted and it was recommended they be addressed immediately.

Since that initial site visit, a couple of the items of structural deficiencies have been addressed and corrected. The wall opening between the boiler area and the Storage Room has been shored up with a new steel beam assembly, steel column, and FRP reinforcement on the concrete wall. ICON helped facilitate this repair with construction drawings in 2021. The existing roof joists of the Storage Room have had joist hangers installed on the ends of them to help support the roof structure. However, some are still damaged and were not fully repaired through "sistering" as was originally recommended.

Several initial deficiencies noted do not appear to have been addressed. None of the cracks that were noted to be monitored are being monitored. The ceiling in the plumbing storage area that has water damage has not been removed, so the condition of the roof framing is unknown. The plumbness of the walls of the boiler area has also not been verified since the initial site visit.

In 2020, The Moss Group, Inc. and CGL released the North Dakota Department of Corrections and Rehabilitation Master Plan 2021 – 2030. This plan focused on *"identifying cost-effective approaches to invest in capital planning while also aligning operational practices necessary to fulfill the department's vision and mission".* As part of the master planning process, there was a visual survey done to determine for each building the general condition and suitability for future use. The evaluation included a field survey of the building envelope and interviews with building management and maintenance personnel. Each building's condition was graded per a Facility Condition Index (FCI) scoring matrix ranging from Good (showing normal wear requiring routine maintenance) to Replace (needs replacing immediately for safety, security and/or serviceability) as described within the report. In this study the Physical Plant overall condition was deemed Poor. Per the FCI scoring, this indicates infrastructure, and systems are mostly below standard with some elements reaching the end of useful life and requiring replacement. The sustainability of this building was also deemed poor, and that remodel would be costly as all ADA issues would need to be addressed and code violations be resolved. Additional comments from the team were: "Funds should not be invested in this building. Structural changes over the

years have caused wall cracks that make the building unsafe in its present condition. Cost to renovate would far exceed the cost to replace the present structure."

In August 2022, BWBR conducted a correctional facility study for the North Dakota Department of Corrections and Rehabilitation. In this study, a concept for the new women's facility was to re-use existing buildings and infrastructure on the campus of YCC instead of building a new facility. The study identified several buildings worthy of saving based on their age, condition and programmatic use. The Physical Plant was not one of these buildings. It was recommended that the Physical Plant along with several other buildings be demolished based on age and condition.

## SITE CONTEXT

The North Dakota Youth Correctional Center campus is located on the west side of Mandan south of the I-94 business loop and west of the Heart River. It is a 40-acre property located at 701 16th Ave SW along HWY 1806. The campus is accessed on the north side by 16th Ave. SW off of the I-94 business loop and from the east side by the USDA Northern Great Plains Research entrance off HWY 1806. The access to the Physical Plant is best from the east side.

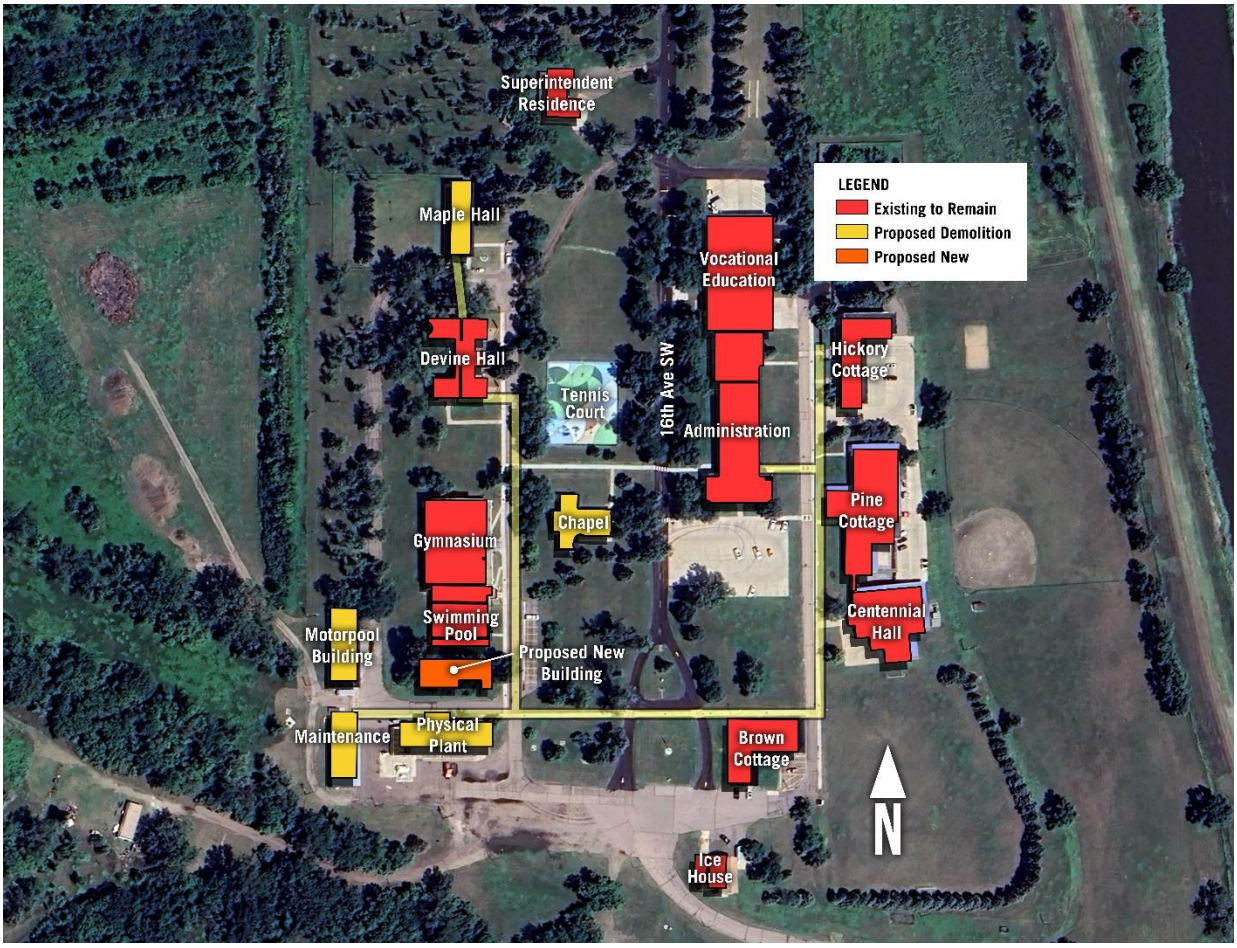
The campus is made up of 13 buildings, including resident cottages, administration, gymnasium, pool, chapel and food service. The sand volleyball court, baseball and soccer fields are outside the


**NORTH DAKOTA YOUTH CORRECTIONAL CENTER**
**MANDAN, NORTH DAKOTA**

campus, yet accessible to residents. There are several parking areas throughout campus for staff and visitors to utilize.

The buildings are connected by a tunnel system which houses several service lines such as the main steam lines, condensate return lines and tanks, communication lines, electrical lines for street lights and some domestic water lines. The existing conditions of the tunnel system were beyond the scope of this assessment.

The existing Physical Plant facility sits in the southwest corner of the campus. With the reduced resident population at YCC, there are several buildings slated for demolition in the long-range plan. They include Maple Cottage, Motorpool Building, Maintenance Shop, Physical Plant and the Chapel. With the potential of 5 structures coming off-line at the campus, including the Physical Plant, this allows YCC to review the needs of the campus, and provide a Physical Plant with appropriately sized equipment to handle the remaining buildings and move the location closer to them. This would eliminate some of the tunnel system and subsequent pipelines that are currently being used.




**NORTH DAKOTA YOUTH CORRECTIONAL CENTER**
**CAMPUS MAP**

# EXISTING BUILDING INVENTORY

**ARCHITECTURAL**

The interior is divided into tool shop, storage, boiler room, open office/break space, plumbing shop and plumbing storage. There is one 3/4 restroom and one 1/4 restroom to serve the entire building and there is tunnel access in the northeast corner of the addition. The second story is not used to full capacity due to restricted access. There is a stair on the east side that is only accessible from the exterior on the north. This is not an efficient or effective use of storage for the internal functions of the building.


**NORTH DAKOTA YOUTH CORRECTIONAL CENTER**
**PHYSICAL PLANT | EXISTING PLAN**

**STRUCTURAL**

The existing building is a concrete and wood framed structure approximately 140'x 40' with a small 40' x 12' addition on the north side. Although there were no existing drawings to determine the exact age of the Physical Plant, it is estimated that the original building dates to the 1910s. At some point during the history of the building the original wood framed high roof was removed and replaced with 16" deep precast concrete double tees with a ballasted roof.

The existing wall construction is 14" thick, consisting of 6" of concrete, a 2" air gap, and another 6" of concrete. The addition on the north side is concrete masonry walls with a wood framed roof structure.

**MECHANICAL**

The existing building has an existing Rainbow Gas service. The meter is located centrally on the south wall of the building, with the gas line into the building being in the main boiler room. The size of the service is likely 3 or 4 inch and is noted on a gas utility drawing received from the Owner to be M.P., which is assumed to be utility medium pressure.

**Plumbing Systems:**

The building is piped with domestic cold and hot water. An electric hot water heater is located in the main boiler room along the east wall. No recirculated system was noted during the walkthrough.

There were only a few plumbing fixtures within the building: a few service sinks and a bathroom.

The condition of the piping, equipment, and fixtures was typical with respect to the age of the building.

**HVAC – Serving the Physical Plant**

The heating for the power house is provided through the use of steam unit heaters in each occupied room. The heating devices appeared to be original to the construction of the building and should be considered for replacement.

Cooling was only provided in the central office area with a through-wall air conditioning unit. The unit appeared to be 20+ years old and should be considered for replacement.

The building did not appear to have any dedicated means of ventilation for occupants, which is not surprising considering the age of the building and lack of mechanical renovations. The windows appeared to have been replaced within the last 20 years and were likely operable originally to provide ventilation.

The restroom on the main level had an exhaust fan operated with the lights which vented to the outdoors.

**Main Campus Boiler System**

The main mechanical system in the building is the steam boiler plant that provides heat for several buildings on the campus. This system is comprised of 3 steam boilers, a forced air make up system, and a fuel oil pump system.

There is one (1) 150 boiler horsepower boiler and two (2) 125 boiler horsepower boilers. Each is Scotch Marine style firetube boiler manufactured by Burnham. The boilers are dual fuel, meaning they are capable of using natural gas or fuel oil. The boilers themselves appeared to be in fair to good condition, with ages varying from 27-31 years old. Each boiler has been re-tubed in the last 5 years, which is a normal practice that extends the life of boilers.

The boilers were originally designed to serve more of the campus than they do currently, with some buildings being demolished or use of them discontinued permanently. It was beyond the scope of this project to do a full load analysis, but it is logical to conclude that at least the smaller boilers may be downsized if replaced with new to provide better overall system turndown.

The boilers are served fuel oil by a duplex fuel pump system and above ground tank. The pumps, components, piping and controls appeared to be 20+ years old. The above ground fuel oil tank appeared to have been replaced in the last 20 years and appeared to be in good condition.

**ELECTRICAL**

Electrically this building is served from an overhead transformer bank just to the south of the parking lot, which is south of the plant building. This provides a 120/240-Volt, 3-phase, delta service configuration. The transformer bank also serves the existing maintenance and wood shop buildings to the west of the plant. This building also provides power to the streetlighting for the south main entry road. There is a stand-by generator at the Physical Plant building that provides back-up power for the plant. This generator was also sized to serve emergency power to the gymnasium building, however that has not been completed to date. The existing Physical Plant also has network services provided through the campus fiber network.

Electrical equipment and services within this building mainly only serve this building, with the exceptions noted above. Replacement of this building would entail new electrical services only for the new building. The new building electrical service would be changed to a 120/208-Volt, 3-phase service to eliminate the delta configuration. The existing generator would be reused to provide back-up power to the new facility. The existing maintenance and wood shop buildings west of the existing Physical Plant building would then be re-served from the new plant facility to allow for the removal of the existing overhead transformer bank. The existing south entry road streetlighting would also be served from the new facility.

The existing campus network would be extended to the new Physical Plant facility via fiber, similar to the existing building. Fiber would be routed through existing tunnel systems, and possibly through conduit infrastructure depending on infrastructure to the new plant.

# APPLICABLE CODES AND STANDARDS USED FOR ASSESSMENT

Below is a list of applicable codes and standards that were used for this assessment. Specific codes have been referenced throughout the document in parentheses following the relevant items.

- North Dakota State Building Code
- 2021 International Building Code (IBC)
- 2021 International Energy Conservation Code (IECC)
- 2023 National Fire Protection Association (NFPA) 70 – National Electrical Code
- 2022 National Fire Protection Association (NFPA) 72 – National Fire Alarm and Signal Code
- 2021 IFC and National Fire Protection Association (NFPA) 101 – Life Safety Code
- 2020 Laws, Rules and Wiring Standards – North Dakota State Electrical Board
- City of Mandan
- 2018 North Dakota Plumbing Code
- 2021 International Mechanical Code (IMC)
- 2021 International Fuel Gas Code (IFC)
- National Fire Protection Association (NFPA)

# CODE ITEMS

The analysis of the existing Physical Plant includes code compliance per the standards listed in the previous section. The facility has been assessed for deficiencies as defined below:

**International Building Code/Americans with Disabilities Act (ADA) Compliance.**

This includes evaluation of the existing Physical Plant regarding the current building codes required by the City of Mandan and the State of North Dakota. Non-compliant items within have been identified and are listed below.

- The building is not sprinklered.
- Group H occupancies shall be equipped throughout with an automatic sprinkler system.

- Emergency alarms for detection and notification of an emergency condition in Group H occupancies shall be provided.
- An approved manual emergency alarm system shall be provided in buildings, rooms or areas used for storage of hazardous materials.
- Emergency alarm-initiating devices shall be installed outside of each interior exit or exit access door of storage buildings, rooms or areas.
- Activation of an emergency alarm-initiating device shall sound a local alarm to alert occupants of an emergency situation involving hazardous materials.
- Doors, frames and hardware are not fire rated as required if the building is not sprinklered.
- Area separation from Group H occupancies and storage is not being maintained.
- Ductwork and electrical conduit pass through walls that are to be rated, allowing smoke and fire to pass into the adjacent spaces.
- Stair handrails do not meet height requirements.
- The handrails do not meet code specified profile and dimensions. Must be of 1-1/2" diameter.
- The floor transition between the exterior overhead door and man door do not meet ramp requirements and is not ADA compliant.
- Uneven floor surfaces and elevations throughout the boiler room are considered tripping hazards.
- Exposed wood framing and decking does not meet the required rated construction type.
- Evidence of Lead paint – See Appendix B
- Restroom does not meet ADA requirements.
- Number of restrooms does not meet IBC requirements.

# OVERVIEW OF EXISTING CONDITIONS

## Finishes

### EIFS

The exterior insulation finish systems (EIFS) at the Physical Plant are showing extensive signs of cracking, patching and additional cracking throughout the years. There is evidence of water infiltration within the system, causing severe degradation of the finishing material. There is no evidence of jointing installed per installation recommendations which is a contributing factor to the extensive amount of movement and cracks appearing. Overall, the exterior finish is in poor condition.

**Masonry**

The concrete masonry units (CMU) used as part of the exterior wall system are showing evidence of water infiltration and movement. Cracking along masonry jointing throughout the interior of the facility is concerning due to the exterior walls supporting of the roof structure.

**Roof**

The roof structure is showing signs of further degradation throughout due to moisture infiltration. There were items identified in prior facility assessments that have not been addressed such as damaged joist hangers. Metal fascia on the main portion of the building appears to be in good condition.

**Openings**

For energy efficiency, general maintenance of the doors and windows is required. This includes replacement of weather stripping, painting, caulking and general repairs where daylight is evident. There are some areas of noticeable interior water damage from window opening failure that should be addressed. Throughout the interior of the facility, doors, frames and hardware replacement is required due to age, code compliance, security or a combination of these.

**Ceilings**

There are multiple ceiling types within the facility including metal and gypsum. There is also a nontraditional ceiling within the east addition that appears to be acoustical tile and rigid foam nailed directly to the roof structure which needs to be completely replaced. There is evidence of water damage and staining throughout the facility that is concerning.

**Floors**

The majority of the floors within the Physical Plant are concrete slab on grade with an epoxy applied finish. There are multiple trench drains and floor slab penetrations. Although these are covered with metal plates or grates, there are many that are bent and project above the floor plane causing tripping hazards throughout the workspaces. The floor slabs also have multiple cracks of various sizes throughout the facility which is evidence of movement and potential slab failure.

**Conveying Equipment**

None present within the facility, which is non-compliant with ADA.

**Environmental Conditions**

In May of 2024, Badlands Environmental Consultants, Inc. was contacted by NDYCC Director of Physical Plant Services, Mr. Michael Kuntz, to test the existing facility for evidence of lead-based paint. Upon testing, twenty-two (22) of the one hundred and ten (110) sample locations contain lead. The lead-based paint containing surfaces were observed in good (intact) to poor (deteriorated) condition. See Appendix B for full report.

When lead-based paint deteriorates or is disturbed during renovation or demolition projects, it can release lead dust or chips that can be ingested or inhaled. This can lead to serious health concerns and should be addressed immediately.

# PHOTOS OF EXISTING CONDITIONS

Photos shown are examples of but not limited to the deficiencies and material conditions observed at the existing Physical Plant facility.

Exterior EIFS in poor condition.
Extensive cracking and evidence of water infiltration causing material failure.
(Photo: 20240216_143818)

Exterior EIFS in poor condition.
Extensive cracking and evidence of water infiltration causing material failure.
(Photo: 20240216_143856)

Exterior drainage along wall and foundation in poor condition.
Evidence of water infiltration.
(Photo: 20240216_1440009)

Exterior electrical.
(Photo: 20240411_150252)

Exterior drainage along the wall and foundation in poor condition.
Evidence of water sitting along the foundation wall.
(Photo:  20240411_145949)

Exposed wood framing, including structural beams, are showing signs of decay and rotting. Structural failure has not occurred but is impending with the visibly poor condition of the wood beams.
(Photo: 20240411_150158)


Uneven floor conditions not meeting ADA requirements.
Poor condition of interior CMU walls.
Daylight evident at doors.
(Photo: 20240216_140711)


Restroom access does not meet ADA requirements.
Wall does not extend to bottom of roof structure above.
Extensive floor slab cracking
(Photo: 20240216_142755)

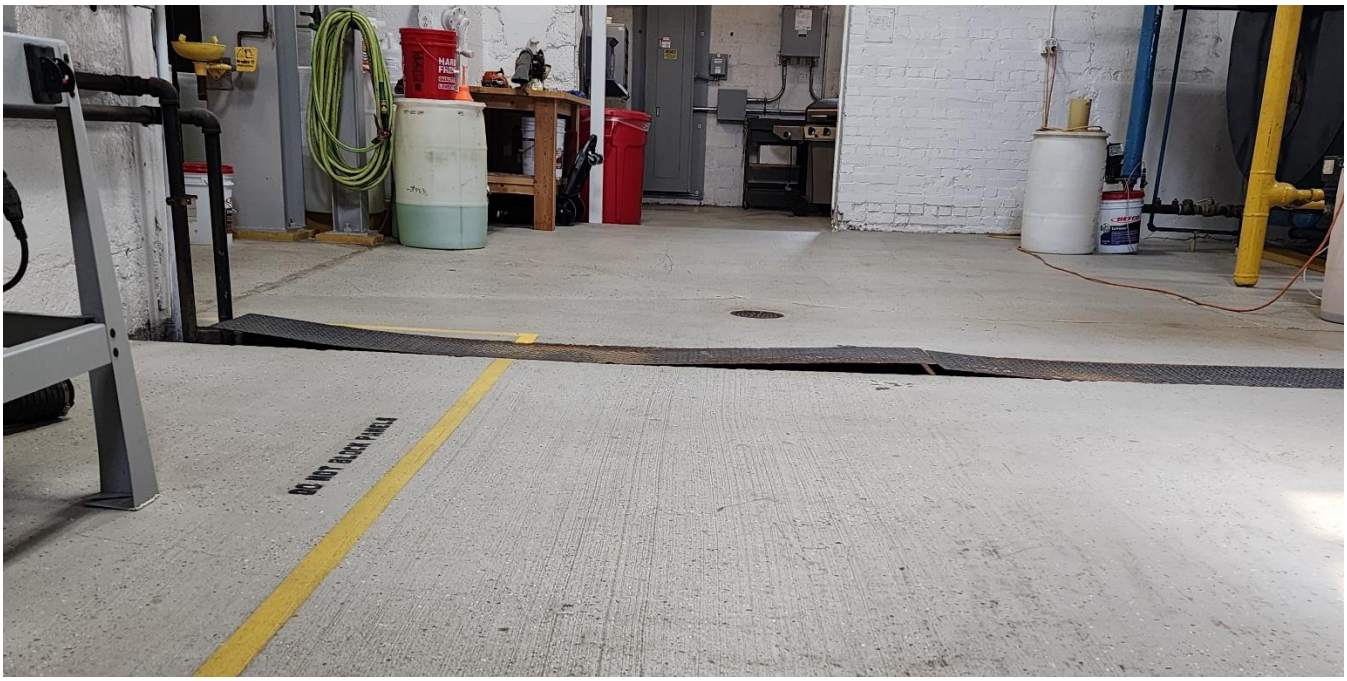
Restroom fixtures do not meet ADA requirements.
No grab bars as required by ADA.
Door hardware does not meet ADA requirements.
(Photo: 20240411_142814)

Improper ceiling material and installation.
Extensive water damage on ceiling.
Evidence of mold – not tested.
No fire suppression.
(Photo: 20240216_142237)


Unprotected ceiling structure.
Interior walls in poor condition.
No fire suppression.
(Photo: 20240216_141519)

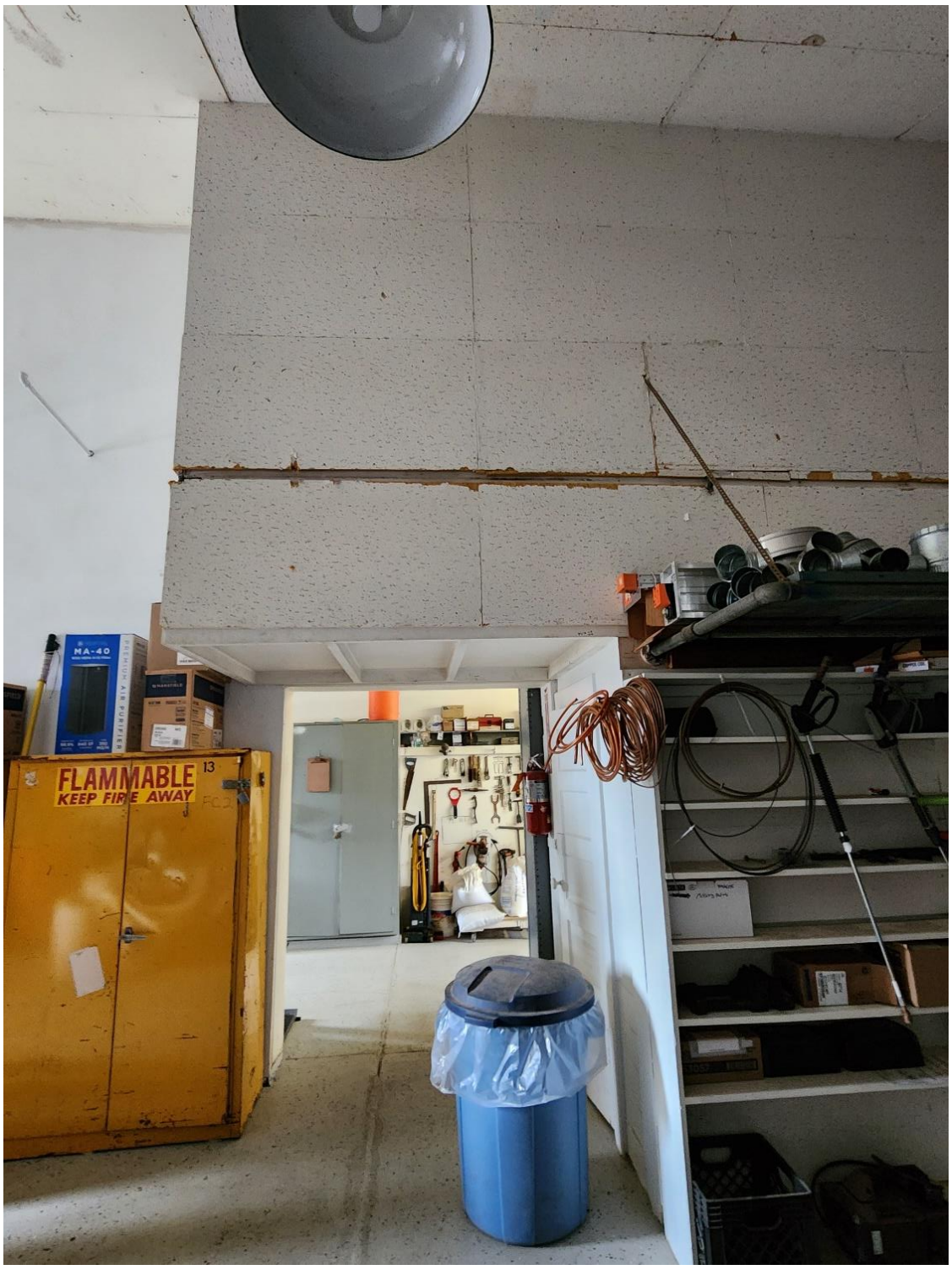
Extensive water damage on ceiling.
Evidence of mold – not tested.
No fire suppression.
(Photo: 20240216_142137)

Extensive water damage on ceiling.
Evidence of mold – not tested.
Electrical conduit showing signs of water damage and rusting.
Lighting has not been updated.
(Photo: 20240216_142139)



Bent trench drain covers within interior floor slab – potential tripping hazards.
(Photo: 20240411_141837)

Nonstandard ceiling material.
Electrical conduit showing signs of water damage and rusting.
Lighting has not been upgraded.
(Photo: 20240216_142219)




Minimum head clearance not met under stair.
(Photo: 20240216_142452)

Window jambs and sills in poor condition and non-standard construction methods.
Location of water and pest infiltration.
(Photo: 20240411_135835)

Wall penetrations infilled with non-standard construction methods.
Non-rated ceiling assembly as required by building code.
Location of water and pest infiltration.
(Photo: 20240411_135834)

Ceiling penetrations not properly capped and protected.
There is visible evidence of concrete spalling and cracking which leads to exposure of concrete reinforcement, and a decrease in strength and load-carrying capacity of the members.
(Photo:  20240411_141552)

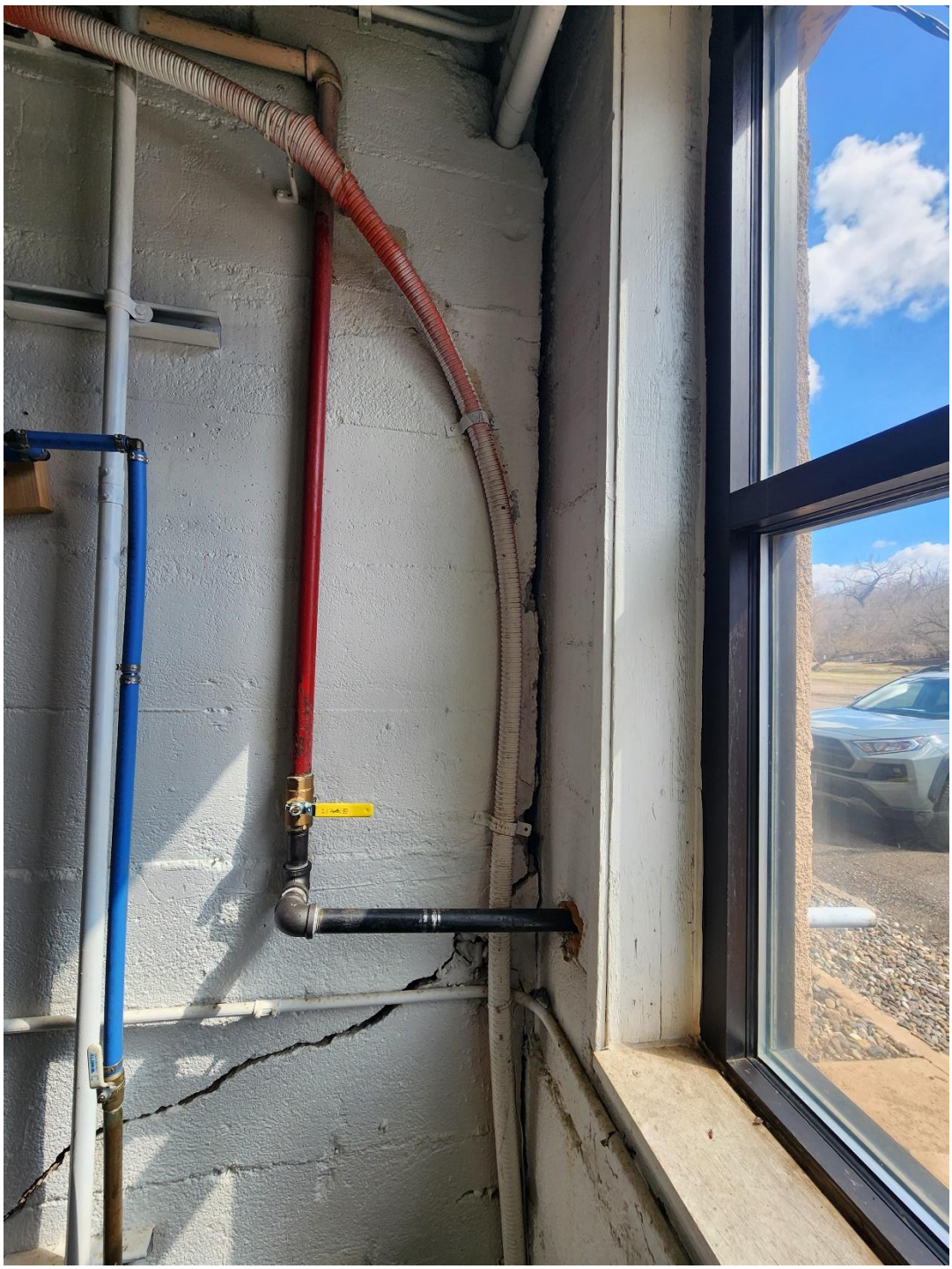
There is visible evidence of concrete spalling and cracking which leads to exposure of concrete reinforcement, and a decrease in strength and load-carrying capacity of the members.
Evidence of water infiltration.
Cracking at ceiling/wall connection.
(Photo:  20240411_141604)

There is visible evidence of concrete spalling and cracking which leads to exposure of concrete reinforcement, and a decrease in strength and load-carrying capacity of the members.
(Photo:  20240411_141708)

Wall penetrations not sealed.
Finish material failure.
(Photo: 20240411_145007)

The ceiling joists of the Storage Room are cracked and failing. Joist hangers have been installed, but the joists themselves are still damaged and should be reinforced. There is the potential for roof failure as snow drifts onto this low roof from the higher Boiler area.
Non-protected ceiling assembly.
(Photo: 20240411_142546)


Floor slab cracking indicates settlement and differential movement between areas of the building. Some areas of the floor slabs are structural slabs over mechanical tunnels, and not slabs on grade. Cracking of these slabs could lead to water infiltration, reinforcement exposure, and failure of the slab. The cracking also creates potential trip hazards in the floor slab. (Photo: 20240411_142636)



Interior wall and exterior wall pulling away from each other, with a 1” wide gap.
Large diagonal crack that extends through the wall, located at the bottom of the north-south interior wall between the Heating Plant Office and Boilers. Both the crack and the gap are indicative of excessive building settlement.
Wall penetrations not properly protected. (Photo: 20240411_145052)

# PROPOSED FACILITY

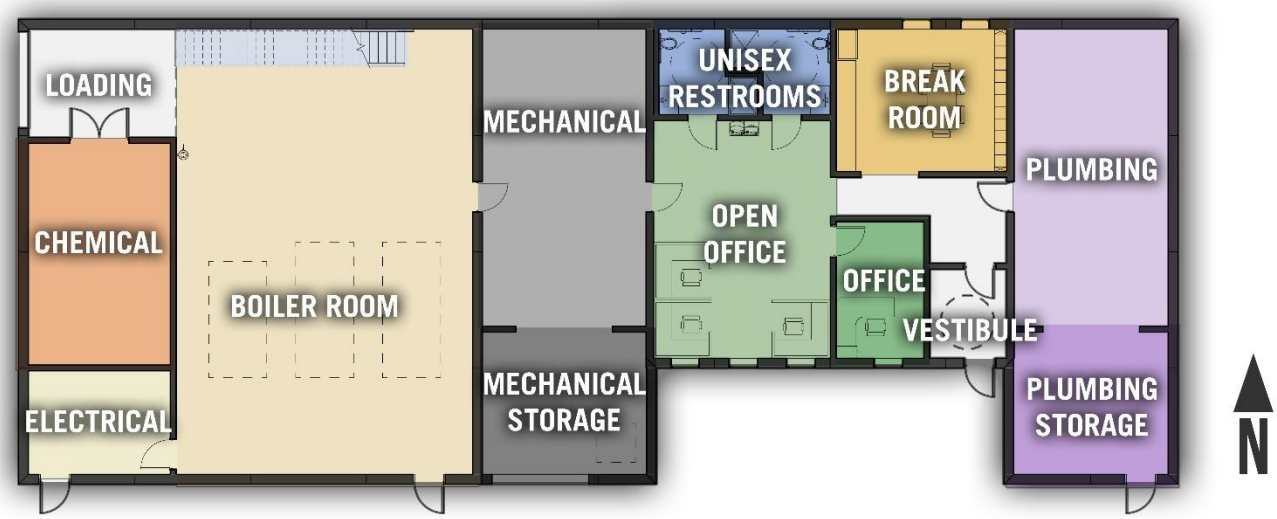
**CIVIL**

The proposed Physical Plant facility would be located directly south of the swimming pool across the street from the existing building to be torn down. This existing lot is currently open with only a few trees to be cleared. This would allow the new facility to be built while keeping the existing facility on-line during construction. The main entrance would face south to the service road and to be protected from the north winds. Staff could utilize the parking to the east to keep the south service road accessible to deliveries and through traffic. The location of the east wall of the new Physical Plant would align with the Swimming Pool directly north to allow for additional room for expansion in the future on the west, if ever needed.


**NORTH DAKOTA YOUTH CORRECTIONAL CENTER**
**PARTIAL CAMPUS MAP | PROPOSED PHYSICAL PLANT SITE**

**ARCHITECTURAL**

The proposed new facility would contain many of the same functions only with a more efficient flow within the building. The interior schematic layout allows for 2 workshop spaces and storage for each. The office space is an open plan to accommodate cubicles along with an enclosed space for administrative staff. There are 2 unisex restrooms each with a shower provided for staff working with chemicals throughout the workday. These are easily accessible from both the office space and the workshops. A small breakroom doubles as use for locker storage for employees. The boiler room and associated spaces are located on the south and west sides for easy access to the existing service tunnel system and proximity to the existing generator. The 2-story vertical space required by the boilers allow for a mechanical storage mezzanine on the west side. The overall size of the proposed Physical Plant is 6,032SF including the storage Mezzanine with the capability to add on if ever needed in the future.




**NORTH DAKOTA YOUTH CORRECTIONAL CENTER**
**PHYSICAL PLANT | PROPOSED SCHEMATIC PLAN**

**STRUCTURAL**

The proposed new facility would be constructed of precast concrete walls for fire rating, durability and efficient material production. The roof would be open web steel joists and steel deck with tapered insulation & EPDM mechanically fastened roof. Floor would be 4" concrete slab on grade. The storage mezzanine would be constructed of a concrete slab on steel deck,

supported on steel beams. Beams would bear on the precast concrete walls and interior CMU bearing walls. Foundations for the building are expected to be cast-in-place concrete walls down 5' for frost protection, with continuous concrete strip footings. Tunnels would be constructed of cast-in-place concrete walls and slabs as required to connect the new building to the existing underground tunnel system.

**MECHANICAL**

Due to the age and condition of the boilers and other support equipment required for the steam system, as well as scheduling complications of construction of a new plant while the existing remains in operation, it would be our recommendation to provide all new boilers and equipment for the new plant facility. This would mean new: boilers (150 hp, 125 hp, and 75 hp), piping/valves/trim etc. as required, fan force make up air, controls, water softening systems, deaerator skid with pumps, gas piping and meter, fuel oil pump and pipe system, and return steam condensate pumps and piping as required. The only recommended items to be reused are the above ground fuel tanks, as they appeared to be in good condition and would be relatively easy to relocate while keeping with the project construction schedule.

The building would be provided a code compliant HVAC system that would consist of steam unit heaters, controls, and a packaged rooftop unit with gas heat for occupied office/work areas outside the boiler room.

**Plumbing**

The building would be provided new plumbing systems and fixtures as required by the design. This would include a 50-gallon gas fired water heater with recirc system, toilets/sinks and other fixtures as required by the design, and meters and piping as required.

**ELECTRICAL**

The new building electrical service would be changed to a 120/208-Volt, 3-phase service to eliminate the delta configuration. The existing generator could be reused to provide back-up power to the new facility, however facility staff raised concerns about the operation of the existing unit, so an alternate cost should be included to provide a new generator system. The existing maintenance and wood shop buildings west of the existing plant building would then be re-served from the new plant facility to allow for the removal of the existing overhead transformer bank. The existing south entry road streetlighting would also be served from the new facility.

The new Physical Plant building would need to be provided with new LED lighting throughout, automatic and manual lighting controls to meet current Energy Code requirements, and emergency lighting fed from the generator system. Exterior LED lighting would be provided around the new facility that would be photocell controlled.

General power receptacles would be provided throughout the facility. Electrical connections would also be provided to all new mechanical equipment. As mentioned previously, the new building would include a 120/208-Volt, 3-phase service, so step-down transformers would not be required.

The existing campus network would be extended to the new plant facility via fiber, similar to the existing building. Fiber would be routed through existing tunnel systems, and possibly through conduit infrastructure depending on infrastructure to the new plant building. Data jacks would be provided where required in the new facility and extended to a data rack in the new building. The campus network would be extended to the rack via the campus fiber network.

A new fire alarm system would be provided that would be networked into the campus fire alarm systems that were installed in 2023/2024. The network connection would be via fiber back to the existing fire alarm network.

# PROPOSED COSTS

**NDYCC Mandan Heating Plant**
**Executive Cost Summary**
**22-Jul-24**

KRAUS-ANDERSON®

| | Preliminary Estimate<br><br>22-Jul-24 |
|---|---|
| **Construction Year** | **Year** |
| **Square Footage - Total** | **6,032** |
| New Building with Mezzanine | 6,032 |
| **Sitework** | **$277,560** |
| **New Construction** | **$5,103,509** |
| General Construction* | $2,779,395 |
| Mechanical | $2,000,866 |
| Electrical | $323,248 |
| **Structure Demolition** | **$156,700** |
| **Construction Contingency** | **Included** |
| **Sub-Total Construction Costs** | **$5,537,769** |
| **Inflation/Escalation Factor** | **$282,753** |
| **Sub-Total Construction Costs** | **$5,820,522** |
| **Misc. Asbestos Abatement Allowance** | **$50,000** |
| **Architect/Engineer** | **$378,334** |
| **Furnishings, Equipment (FF&E)** | **$25,000** |
| **Technology** | **$0** |
| **Financial/Legal** | **$0** |
| **Project/Design Contingency** | **$282,753** |
| **Total Project Costs** | **$6,556,609** |

* Includes additional tunnel work to connect to existing tunnels

# APPENDIX A

2018 Structural Evaluation – ICON Architectural Group

2020 North Dakota Department of Corrections and Rehabilitation Master Plan 2021-2030 – The Moss Group, Inc. and CGL

2022 North Dakota Department of Corrections and Rehabilitation Correctional Facilities Study – BWBR

August 3, 2018

Mr. Chris Jangula
Director of Physical Plant Services
North Dakota Youth Correctional Center
701 16th Ave SW
Mandan, ND 58554

**RE: ND YCC Heating Plant Structural Evaluation**
**ICON Project No. 18-056**

Mr. Jangula;

ICON Architectural Group has put together a structural assessment and evaluation for the Heating Plant Building at the North Dakota Youth Correctional Center in Mandan. Based on the observations made during my site visit on June 20, it is visibly apparent that the building structure has exceeded its useful life expectancy. There are obvious signs of building movement and areas of structural distress and damage. We highly recommend these areas of structural deficiencies be corrected in the immediate future. The areas of building movement and cracking require further observation and monitoring.

Recommendations for structural repairs and additional monitoring are provided. The estimated cost to design and construct the proposed repairs is $23,500. This includes $8,500 for the wood joist repair in the Tools area and $15,000 for the wall repair between the Boilers and Tools areas. The estimated cost to survey and document the wall movement is $5,000. Each additional wall movement survey update would cost around $1,000. See the Appendix at the end of this report for site photos of the specific areas of structural concern that are described in the following sections.

**OBSERVATIONS & EVALUATION**

Though the exact age of the heating plant building is currently unknown, as no drawings of the original existing facility can be found, it is estimated that the original building dates to the 1910's. The footprint of the building is approximately 120'x40', with a small 40'x12' addition on the north side.

The existing building is a concrete and wood framed structure. At some point in the history of the building, the original wood framed high roof was removed and replaced with 16" deep precast concrete double tees and a ballasted roof. The existing wall construction is 14" thick, consisting of 6" of concrete, a 2" air gap, and another 6" of concrete. It is unknown if the concrete is reinforced at all. The small addition is constructed of concrete masonry walls.

The overall Heating Plant Building is divided into Plumbing Storage, Plumbing Shop, Heating Plant Office, Boilers, Storage and Tools.

**Plumbing Storage**

The plumbing storage area is the single-story area on the east end of the building.

- The existing roof framing was not visible in the main plumbing storage area due to the finished ceiling. The ceiling showed visible signs of water damage, including sagging and discoloration. It is unknown what condition the framing is in, but it is most likely water damaged with possible mold and fungi growth.
- The current shingles are in bad condition with visible de-laminating, curling, and peeling. There is also moss build-up on the shingles, indicating excess moisture build-up.
- The roof framing was visible in the stairway to the upper floor above the plumbing shop, at the peak of the plumbing shop roof. The visible framing was 2x6 wood joist framing at 16" o.c. and appeared to be in good structural condition where visible.
- The existing window openings have all been infilled with steel studs and boarded up. There are signs of previous water leakage at the windows, including scale build-up on the concrete walls and water damaged 2x wood framing around the openings.
- There is diagonal cracking in the concrete walls stemming from the corners of the openings, but nothing extremely wide that would indicate excessive building movement or structural distress. These cracks are typical at re-entrant corners in concrete construction.
- There is a long vertical / diagonal crack in the interior concrete wall between the plumbing storage and plumbing shop. The crack isn't very wide but could be an indication of building settlement occurring along the south side of the building.

**Plumbing Shop & Heating Plant Office**

The plumbing shop & heating plant office is the two-story area in the center of the building.

- The existing roof framing of this area consists of the previously described precast concrete double tees. There is a wood post and beam system in place at the roof, but it doesn't currently provide structural support. It is most likely left over from the previous roof system and abandoned in place.
- The existing floor framing consists of a concrete waffle slab system, with two beam and column lines below. The floor structure was not visible from below and the specific type of beams and columns supporting the floor slab were not discernible due to existing finishes.
- Cracking in the interior concrete wall separating this area from the Plumbing Storage, as well as the wall at the Boilers, was visible. Both cracks seem to indicate building movement and settlement along the south exterior wall.
- No other visible signs of structural distress or building movement were found in the structure for this area.

**Storage**

The storage area is the single-story area on the west end of the building.

- The existing roof framing of the storage area is a cast in place concrete structure that once supported a large fuel tank above. The roof structure consists of 3 east-west spanning concrete beams with a concrete slab spanning north-south between the beams and the exterior walls.
- The slab is in relatively good shape, with some visible hairline cracking on the underside of the slab. This cracking is most likely due to temperature and shrinkage contraction, which is relatively common.
- There are also visible hairline cracks in the concrete beams. The hairline cracks include flexural cracks on the bottom of the beams in the center of the beam span. These small cracks are not a major concern since the roof no longer supports the weight of the previously installed fuel tank.
- The concrete beams are supported on cast in place concrete piers. The center pier on the east side has a section on the face of the pier that has cracked. This crack appears to be caused from some type of anchors having been previously installed in the face of the pier, causing the face of the pier to begin to break out. This cracked section does not appear to go very deep into the pier and should not impact the overall structural capacity of the pier.

**Tools**

The tools area is the single-story addition on the north side of the building.

- The existing roof framing consists of 2x6 wood joist framing at 16" o.c. There are a few joists that have failed and split on the south end. This is most likely due to the original roof not being designed for the snow drift that forms at the roof step from the higher Boiler area down to the Tool area.
- There are vertical cracks that start at the upper corners of the window openings in the north wall. These cracks have most likely occurred due to the absence of control joints in the masonry wall, and are not of major structural concern.
- The opening between the Tools area and the Boilers area is showing signs of distress. See the notes regarding this opening under the Boiler area.

**Boilers**

The boilers area is the large, open, two-story high area in the center of the building.

- Most of the visible signs of structural distress and building movement that were observed during the site visit appear in the Boilers area. These signs included severe wall cracking, damaged concrete and concrete masonry, and out of plumb walls.
- The existing roof framing consists of the previously described precast concrete double tees. There are several areas where large mechanical ducts have been installed up through the precast tees, but no signs of structural issues with the tees.

- There is a large vertical crack extending from the corner of a wall opening between Boilers and Tools. This cracking is a sign of structural distress and failure over the opening and needs to be addressed. The wall at the west end of the opening is also damaged, including cracked, broken and missing concrete. There is no visible header over the existing opening. It appears that the wall is spanning and acting as a header. There is also questionable construction on the east end of the header where the wall is constructed of brick as part of some type of previous wall infill, rather than the typical concrete wall construction.
- Both the north and south exterior walls appear to be out of plumb. The actual plumbness of the walls was not able to be determined due to the limited measuring equipment that was available during the site visit. The only determination that was made was that the distance between the walls at the roof was 3" less than the distance between the walls at the floor. This indicates that either one or both walls is out of plumb. This out of plumbness is a serious structural concern and requires further measurement and analysis, especially when considering the weight of the roof construction that it is supporting.
- There is a large diagonal crack located at the bottom of the north-south interior wall between the Heating Plant Office and Boilers. The crack is quite deep and extends through the wall. There is also a large gap of around 1" wide between the interior wall and the south exterior wall. Both the crack and the gap are indicative of excessive building settlement. This settlement occurs right at an existing sump area where a large underground pipe exists, along the south wall where other signs of building settlement have been noted in other areas of the building.
- The overhead door opening in the south wall is constructed in concrete masonry infill that was part of a previous larger opening in the existing concrete wall. There is a steel header on each face of the wall that is through-bolted to the concrete wall above the infilled opening. There are a few visible cracks in the concrete, but the concrete masonry infill looks fine. There are no structural concerns with this opening or the cracks around it. The cracks are most likely due to shrinkage and differential movement of the surrounding concrete wall, rather than structural distress or building settlement.
- There are a variety of other smaller cracks that emanate from various window and door openings, mostly from the corners. Most of these cracks are likely due to contraction and expansion of the concrete walls, as there are no control joints in the wall construction. Some cracking could be due to minor differential settlement of areas of the walls but overall are not of major structural concern.

## RECOMMENDATIONS

The recommendations included are items of structural concern that should be addressed immediately. These items are critical to the safety of the structure and need to be corrected if the building is to remain in service, regardless of the long-term plans of the existing building.

### Plumbing Storage

- The existing ceiling needs to be removed to field verify the structural condition of the existing roof framing that could be damaged due to water infiltration.

- The large vertical / diagonal crack in the interior concrete wall between the plumbing storage and plumbing shop should be monitored for continued movement. Highly accurate crack monitoring instruments can be installed, but even simple methods to monitor for crack movement could be implemented for the time being. Suggestions for crude and simple crack monitoring include:
    - Parallel movement can be monitored by marking across the crack with a marker and tracking if the sides of the mark stay aligned.
    - Widening of the crack can be monitored by painting the crack and then monitoring for visible signs of the crack opening by noting unpainted areas becoming visible.
    - If crack movement is discernible after a short length of time, such as a few weeks, more accurate methods of monitoring should be utilized.

**Plumbing Shop & Heating Plant Office**

- No major structural items of concern were found in this area.
- Monitor the cracks in interior walls as previously described. Cracks in interior walls occur on the south end of the interior walls between:
    - Plumbing Shop and Plumbing Storage
    - Heating Plant Office and Boilers

**Storage**

- Monitor the crack in the center concrete pier on the east side of the Storage area. Crack monitoring to be performed as previously described.

**Tools**

- The damaged 2x6 roof joists need to be repaired. This should be done by installing a new full length 2x6 member on each side of the existing damaged member. The three plies should all then be glued and screwed together. Proper bearing must be provided at each end of the new joists.
- The vertical cracks at the window openings should be monitored as described previously.
- The opening between Tools and Boilers should be repaired as described under Boilers.

**Boilers**

- The existing wall opening between the boiler area and the tool area needs to be repaired. A new steel lintel beam should be installed over the existing opening. This would require temporary shoring of the existing wall above, removal of a section of wall above the existing opening, installation of the new steel lintel beam, and reconstruction of the wall above the opening. In addition, the damaged and cracked wall at each end of the opening need to be rebuilt out of concrete masonry and then reinforced and fully grouted to support the new steel lintel beam.
- The plumbness of the north and south walls needs to be further investigated and measured. In addition, the bearing condition of the precast double tees should also be verified to determine if the tees are

bearing on the full width of the 14" thick exterior wall or if they are only bearing on the interior 6" concrete face. The plumbness measurements and bearing information should then be used to perform a more detailed analysis on the existing concrete walls to determine if they are structurally able to support the roof in the existing out-of-plumb conditions.

- The large diagonal crack in the wall between the Heating Plant Office and Boilers should be monitored as previously described.

**CONCLUSION**

Given the estimated age of the building structure, the visible state of the existing structure is not uncommon. With the repeated temperature changes, freeze-thaw cycles, and additional environmental factors such as ground water fluctuations, much of the cracking observed can be attributed to long-term differential movement, building settlement, and expansion and contraction of brittle materials such as concrete and concrete masonry. However, some of the specific cracks as described in the recommendation section should be observed and monitored for any changes. Any continued movement or opening of the crack would have to be addressed, most likely by using industry standard foundation stabilization techniques, such as helical piers.

There are also a couple of areas of major concern structurally, as cracking in these areas indicates structural distress, deficiencies and even failure. The cracking observed in the interior walls, even the out-of-plumbness of the tall exterior walls in the Boilers area, could be attributed to building settlement along the south exterior wall. These areas should be addressed immediately as described in the recommendations section, regardless as to the long-term plans of the current structure. Specific repairs for these items is beyond the scope of this evaluation report. Should you decide to move forward with our recommendations, we are more than willing to assist in any way possible to facilitate the correction of these structural concerns.

Thank you for the opportunity to work with you on this project. If you have any questions regarding anything contained in this report, please do not hesitate to contact us.

Sincerely,

Michael Jochim, PE
Structural Engineer

ICON Architectural Group

**APPENDIX 1 –PHOTOS**

Site photos are included to more accurately depict the areas of structural concern mentioned in the report. As with the report, each area of the existing Heating Plant building will be noted separately.

**Plumbing Storage**

Water damage to ceiling. Ceiling to be removed to verify structural condition of roof framing.

Visible crack in interior wall to be monitored.

**Plumbing Shop & Heating Plant Office**

Crack in interior concrete wall between Heating Plant Office and Boilers to be monitored.

**Storage**

Visible crack in concrete pier below concrete roof beam to be monitored. Note the indentations of previously installed anchors in the crack line.

**Tools**

Failed and cracked 2x6 roof joists that need to be repaired and / or replaced.

Vertical crack in wall at window corner, most likely due to a lack of control joints in the CMU wall.

Cracked and damaged bearing at opening in wall between Tools and Boilers to be repaired – see the Boilers section for additional information.

**Boilers**

Large vertical crack in wall at corner of existing wall opening between Boilers and Tools. Opening to be repaired by installing new steel beam lintel.

Cracked and broken concrete at bearing of existing wall opening between Boilers and Tools to be rebuilt and repaired – wall section view.

Cracked and broken concrete at bearing of existing wall opening between Boilers and Tools to be rebuilt and repaired – wall elevation view.

**Boilers (continued)**

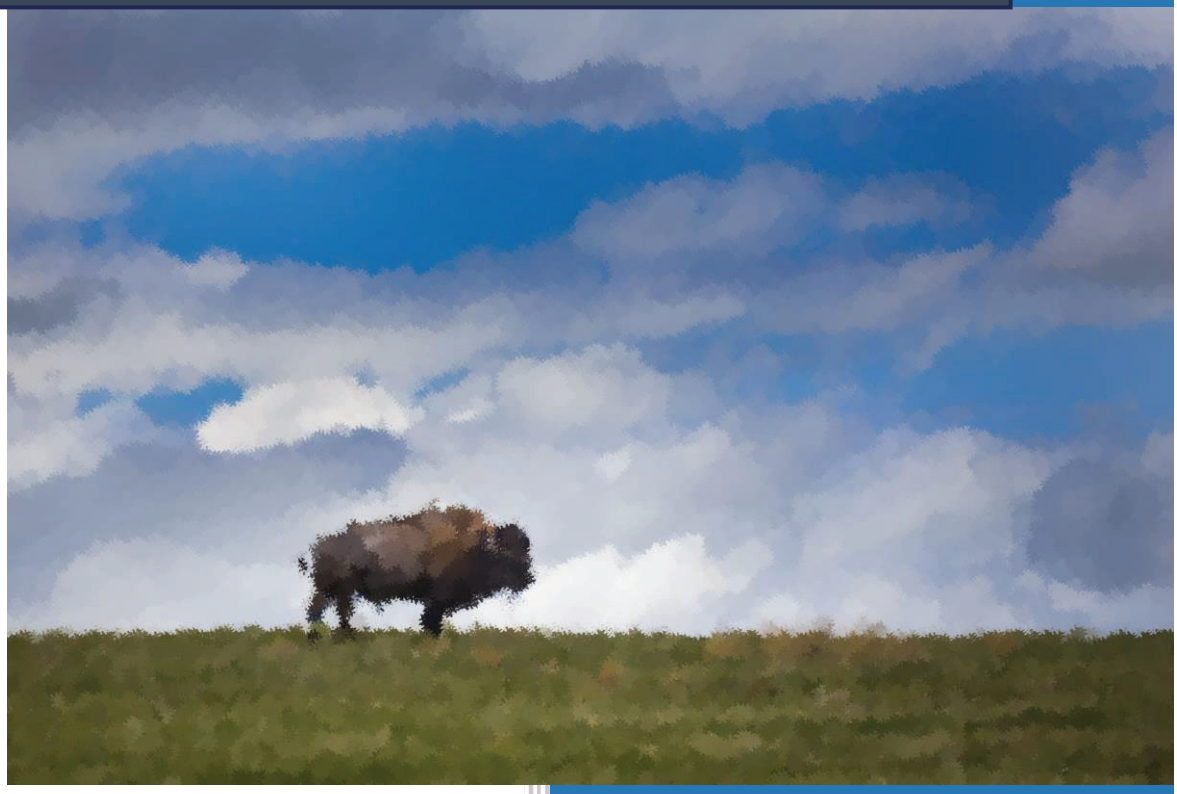
Typical wall cracking around window and door openings.

Gap between interior concrete wall and south exterior wall to be monitored.

Diagonal crack in interior concrete wall that needs to be monitored.

***North Dakota Department of Corrections and Rehabilitation***

# Master Plan 2021-2030



Provided by: The Moss Group, Inc.

and CGL

2020

# North Dakota Youth Correctional Center

## Heating Plant - Condition Snapshot

### Security System

| | |
|---|---|
| Exterior Doors |   |
| Interior Doors |   |
| Locks & Door Hardware |   |
| CCTV System | Not Observed |
| Fire Protection | Not Observed |

### M/E/P Systems

| | |
|---|---|
| Electrical |   |
| HVAC |   |
| Plumbing |   |

### Structural Systems

| | |
|---|---|
| Building Envelope |   |
| Windows |   |
| Roof | Not Observed |
| Interior Ceiling | Not Observed |

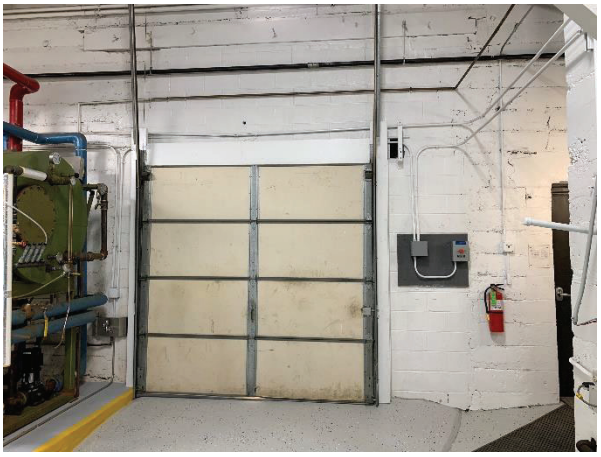
# Central Plant

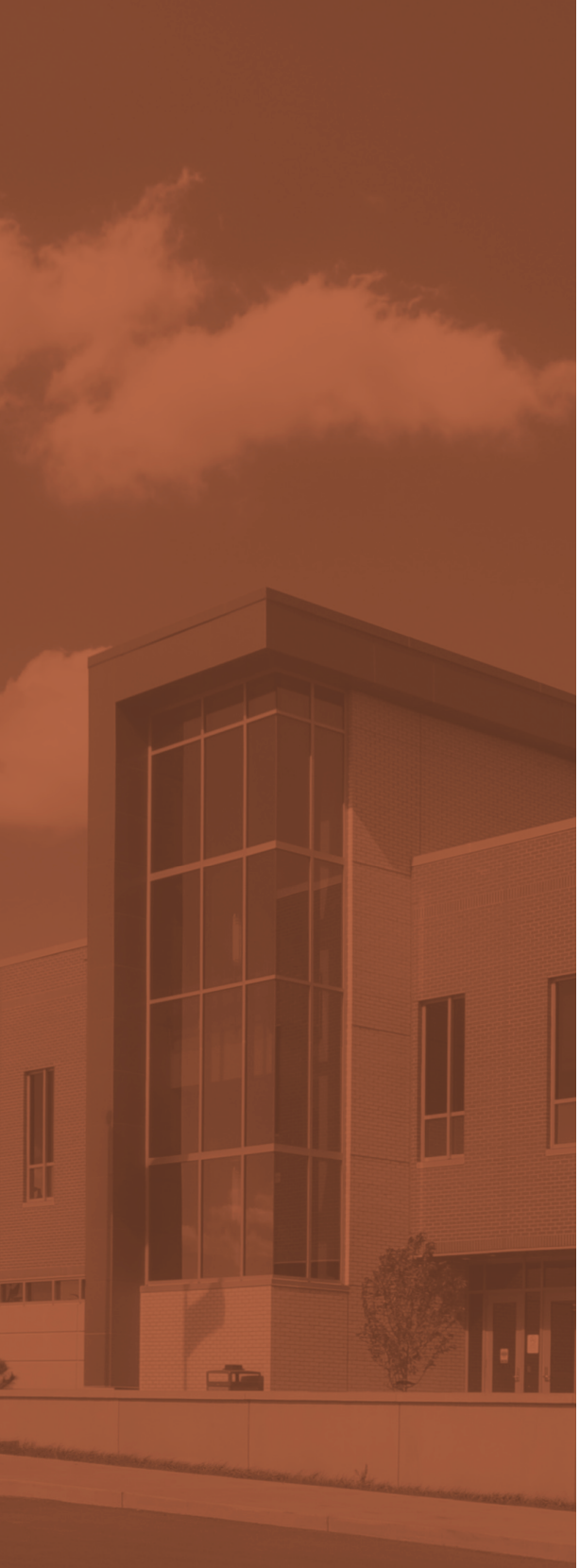
| | | | | |
|---|---|---|---|---|
| **Location** | 701 16th Avenue Mandan ND. 58554 | | | |
| **Description of Use** | The building is currently being used for storage. and Swimming Pool | | | |
| **Year Constructed** | 1921 | | **Owned/Leased:** | Owned |
| **Building Size** | **BGSF:** 7930 | | **# Floors:** | 1 |
| **Overall Facility Condition** | **0.10 - 0.12 Poor** | **Infrastructure & systems are mostly below standard with some elements reaching the end of useful life and requiring replacement** | | |
| **Site** | ***Total Parking Spaces/ADA:*** | Gravel Parking area / no know or observed ADA issues | | |
| | ***Parking Lot:*** | Crush and run - Fair Condition - May have been asphalt at one point in time. | | |
| | ***Access/ADA Issues/Signage:*** | YES - ADA issues exist through the Site | | |
| | ***Expansion Capability:*** | With recent expansion, there is little room to continue expansion. | | |
| **Building Exterior** | ***Exterior Wall:*** | Concrete block and cast concrete | | |
| | ***Roof:*** | Roof was not observed. | | |
| | ***Wind Speed Rating:*** | N/A | | |
| | ***Historic Significance:*** | None Noted | | |
| **Building Interior** | ***Structure:*** | Concrete block and cast concrete | | |
| | ***Access/ADA Issues*** | YES - ADA issues exist through the facility | | |
| | ***Finishes:*** | Interior finishes were in fair condition. | | |
| | ***Layout:*** | Building is housing central plant equipment such as boilers. | | |
| | ***Renovation Suitability:*** | Fair. Numerous code violations and ADA issues would need to be resolved. | | |
| **Technical Systems** | ***Plumbing:*** | Poor - Plumbing systems are mostly below standard with some elements reaching the end of useful life and requiring replacement. | | |
| | ***Mechanical (HVAC):*** | Poor - Mechanical/HVAC systems are mostly below standard with some elements reaching the end of useful life and requiring replacement. | | |
| | ***Electrical:*** | Fair - Electrical systems show some signs that require attention with a few elements needing immediate repair. | | |
| | ***Lighting/Branch Wiring:*** | Fair - Lighting/Branch Wiring show some signs that require attention with a few elements needing immediate repair. | | |
| | ***Fire Protection:*** | No Fire System Present | | |
| | ***Telecomm/Comp. Network:*** | No Telecom/Comp. Network Present | | |
| | ***Vertical Transportation:*** | No Vertical Lift Equipment Present | | |
| **Sustainability** | Poor - Remodel would be costly as all ADA issues would need to be addressed and code violations resolved. | | | |
| **Comments** | This building is nearly 100 years old. Some systems have been upgraded or replaced with some systems nearing the end of their useful life. Funds should not be invested in this building. Structural changes over the years have caused wall cracks that make the building unsafe in its present condition. Cost to renovate would far exceed the cost to replace the present structure. | | | |
| **Recommend** | Plumbing is aging and should be considered for replacement. Underground piping should be replaced based on age and drainage issues. Code violations present. Safety issues exist. HVAC equipment is aging and some units were missing altogether. Comprehensive preventative maintenance is need to extend the life of the asset. | | | |

| | Facility System | | Deferred Maintenance Value |
|---|---|---|---|
| 1 | Locking Hardware | $ | *11,799.84* |
| 2 | Doors | $ | *28,484.56* |
| 3 | CCTV Repairs & Expansion | $ | - |
| 4 | Fencing | $ | - |
| 5 | Fire Protection, Life Safety, Repairs | $ | - |
| 6 | Electrical Repairs & Upgrades | $ | *17,128.80* |
| 7 | Lighting Retrofit/ Renovations | $ | *19,698.12* |
| 8 | HVAC Replacement/Repair | $ | *47,738.60* |
| 9 | Plumbing Fixtures & Repairs | $ | *28,135.64* |
| 10 | Cast Iron Pipe Repair/Replacement | $ | *32,576.44* |
| 11 | Structural Systems | $ | *89,482.12* |
| 12 | Exterior Window Repairs\Replacement | $ | *16,034.46* |
| 13 | Roof Repairs | $ | - |
| 14 | Laundry | $ | - |
| | **Deferred Maintenance** | **$** | **291,078.58** |
| | Current Replacement Value | $ | 2,379,000.00 |
| | **Facility Condition Index** | | **0.122** |

## Heating Plant - Site Pictures







North Dakota Department of
Corrections and Rehabilitation

# CORRECTIONAL FACILITIES STUDY

BWBR Project Number | 3.2021238.00

BWBR

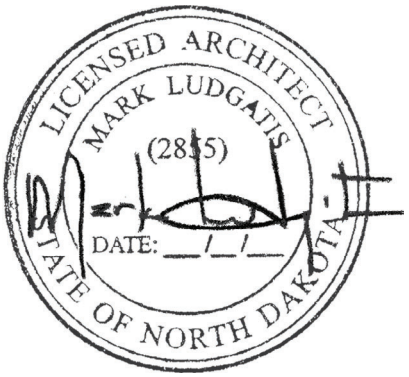
**August 9, 2022**

# CERTIFICATION
## *SIGNATURES*

*I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly registered **Architect** under the laws of the state of North Dakota*

MARK S. LUDGATIS

***Date:*** *08/09/2022* ***Registration Number:*** *2855*



# CONCEPT
## *FOR WOMEN'S FACILITY AT EXISTING HRCC/YCC CAMPUS*

**Women's Reuse Facility Overview:**
In this concept, the focus is on re-use of existing buildings and infrastructure on the HRCC/ YCC Campus, rather than building an entirely new facility. The intent is to conserve existing facility assets, resources, and systems where possible, and provide a concept that is comparable to a new facility in terms of durability, lifespan, and system capacities. This concept involves a phased construction project for demolition of some existing buildings, remodeling and additions to existing buildings, and new buildings to be constructed as needed to meet the overall goals for programmatic functions and placement of facilities in a campus configuration.

The scale of the existing campus and the size of the buildings are more conducive to re-use for the Women's facility which is programmed at a capacity of 260. It should be noted that there is a desire for the Women's facility to be in one connected building, however that cannot be the case when looking at re-use of the existing campus. The concept attempts to connect as many of the buildings together as possible, but there will still be a lot of resident movement outside to access programs and services.

The youth who are currently co-located on the campus will need to be relocated, which also makes this option more complicated for phasing and construction.

**Existing Buildings to Remain**
For existing buildings that will be remodeled for re-use, the intent is to bring them up to modern day standards for code, accessibility, and energy compliance. They should last another 50 years - just as a new facility would. The buildings that the project team considered worthy of saving based of their age, condition, and current programmatic use are:

- Pine Cottage
- Centennial Hall
- School / Administration Building
- Vocational / Trades Building
- Gymnasium /Pool Building

It is the recommendation of the team based on age and condition that the remainder of the buildings on the campus should be demolished to make room for new buildings and additions to meet the programmatic needs of the Women's Facility.

## EXISTING SITE PLAN

BUILDINGS TO REMAIN

BUILDINGS TO BE DEMOLISHED

### PINE COTTAGE

Pine Cottage was originally constructed in 1963. The building had fire damage in 1981 and was later remodeled in 1983. In 2001 an addition was built.

The building area and general structure is suited for use as Women's Orientation housing, however the existing building (which currently houses youth) has only 25 single occupancy rooms, and the Women's program calls for 40 beds. More discussion is needed on whether 25 beds is sufficient or if additional beds will be added.

The building is in good condition overall but requires all new exterior windows, exterior EIFS and roof repairs, as well as extensive remodeling of the interior.

### CENTENNIAL HALL

Centennial Hall was originally constructed in 1988. This building currently serves as the campus kitchen and dining hall and will remain as such for the Women's facility.

The building is in good overall condition and requires only minor interior remodeling and exterior repairs, however it does need all new mechanical, plumbing and electrical systems.

### SCHOOL/ADMINISTRATION

The School/Administration building was originally constructed in 1960. It currently has administrative offices as well as educational classrooms. The concept is to move administrative offices into their own building addition and utilize the existing building for only education and support functions.

This building will require a significant amount of remodeling to bring it to current code, accessibility, and energy requirements. The building requires asbestos and hazardous materials abatement, all new exterior windows, and all new mechanical, plumbing, and electrical systems. The building exterior needs minor repairs to the brick and EPDM roofing. As part of the extensive interior remodeling needed, a small addition is being proposed for an elevator to allow accessible access to the second level.

### VOCATIONAL/TRADES

The Vocational/Trades building was originally constructed in 1981. This building is being proposed to remain as the Vocational / Trades building, therefore requiring very little interior renovation.

The remodeling scope for this building includes all new exterior windows, a new EPDM roof, as well as minor repairs to the exterior brick.

### GYMNASIUM/POOL

The existing Gymnasium was originally constructed in 1925. An addition with an indoor pool with locker rooms was constructed in 1975. The building was later remodeled in 1999.

Remodeling of the Gymnasium/Pool building will include program spaces for recreation and resident programs. The building requires replacement of all exterior windows, a new EPDM roof, minor exterior brick repairs, as well as interior renovation.

Please refer to the appendix for more detailed information about the building systems and repairs necessary for all the existing buildings mentioned above.

### CAMPUS POWER PLANT

The current campus power plant is original to the facility. Although there have been upgrades over the life of the building to the equipment within, the facility is not capable of sustaining the proposed new campus plans. Based on this, a new power plant is proposed to be constructed to serve new and existing buildings to remain.

The new central plant would provide heating and cooling needs as well as emergency and standby power to campus buildings. It may also serve main electrical power to buildings depending on the distance from the plant.

# APPENDIX B

Badlands Environmental report.

**Badlands Environmental Consultants, Inc.**

**James D. McGurren**
President/CEO

May 3, 2024

Mr. Michael Kuntz
North Dakota Youth Correctional Center
701 16th Avenue SW
Mandan, ND 58554

RE: P24-0036 Lead-Based Paint Inspection Report
ND Youth Correctional Center
Heat Plant
701 16th Avenue SW
Mandan, ND 58554

Dear Mr. Kuntz,

Attached are the results of the lead-based paint (LBP) inspection performed by Badlands Environmental Consultants, Inc. (BEC) representatives on May 2, 2024. BEC's scope of work for this project included analyzing painted surfaces within the Heat Plant located within the North Dakota Youth Correctional Center (NDYCC) in Mandan, ND (Site) as part of a future demolition project. BEC representatives and NDDEQ Certified Lead Risk Assessors, Kayla DeHaven and Nick Jangula, performed the LBP inspection.

The specific scope of work for this inspection included the following:

- Analysis of painted surfaces from interior surfaces within the Site, prior to the renovation project, for lead content utilizing the SCIAPS X-550 XRF;
- Provide written documentation on results.

**SAMPLING PROCEDURE**

Suspect and painted surfaces are identified by the building component they cover, the color of the outermost paint, and the type of substrate. The concentration of lead on the painted surfaces is measured in milligrams per square centimeter (mg/cm2), which is the weight of lead over the total depth of paint on a 1cm x 1cm area of surface. The XRF is a state-of-the-art X-Ray Fluorescence spectrum analyzing system for the quantitative measurement of lead in paint on any surface. The XRF utilizes a non-destructive testing technique.

The Sci-Aps HH XRF uses an X-ray tube that generates photons that are directed towards the sample, which is then excited and generates a characteristic photon. These characteristic photons are captured and counted by the detector creating a spectrum. Full spectrum analysis produces defensible data, accurate readings independent of the substrate. The detection range is 0.1-100.0 mg/cm2 with an accuracy of +- 0.1 mg/cm2 (+/-10%) on surface lead and +/-0.1 (+/-30%) on deeply buried lead. Full K and L spectra are displayed on demand and always downloaded to determine if the lead is on the painted surface.

Due to the advanced detection mode, no inconclusive readings are generated. The reading is either positive or negative, eliminating the need for the collection of destructive paint chips. Calibration of the instrument is automatic each time the instrument is turned on and is done several times per day to guaranty quality control. All positive results are printed in bold type on the XRF Table.

## SAMPLE DESCRIPTIONS & RESULTS

Lead-based paint is defined as paint that contains greater than 1.0 mg/cm$^2$ lead or found to contain greater than five-tenths of one percent by dry weight of lead material (0.05% Pb). Twenty-two (22) of the one hundred and ten (110) sample locations contain lead, excluding calibration standards.

- Gray paint – Concrete wall – Office (Samples 37 & 39).
- Gray paint – Wood window frame – Office (Sample 43).
- Gray paint – Wood support – Plumbing Shop (Sample 59).
- White paint - Wood support – Plumbing Shop (Sample 60).
- Gray paint – Wood Door & Jamb – Plumbing Shop (Samples 61 & 62).
- White paint – Concrete wall – Plumbing Shop (Sample 64).
- Yellow paint – Metal Cabinet – Plumbing Storage (Sample 73).
- White paint – Wood window casing – Gaket Room (Sample 80).
- White paint – Plaster walls – Gasket Room (Samples 81 & 85).
- White paint – Wood window Frame – Gasket Room (Sample 83).
- White paint – Wood door jamb – Gasket Room (Sample 86).
- White paint – Plaster walls – Storage (Samples 87 & 88).
- White paint – Wood door trim – Storage (Sample 90).
- White paint – Wood window – Storage (Sample 91).
- Gray paint - Wood shelf – Storage (Sample 92).
- Glaze – Porcelain Sink – Storage (Sample 96).
- Brown paint – Soffit – Exterior (Sample 102).
- Yellow paint – Metal pipe – Exterior (Sample 106).

No other building components were determined to contain lead-based paint during our inspection of the Site.

Please refer to the attached table, which provides the paint color, sample locations, and results.

**RECOMMENDATIONS**

The lead-based paint containing surfaces were observed in good (intact) to poor (deteriorated) condition at the time of this assessment.

The NDDEQ suggests that a Toxicity Characteristic Leaching Procedure (TCLP) analysis for lead be collected prior to the materials being removed. The TCLP sample determines if the materials can be disposed of as general waste or as lead-containing waste. If these materials are not tested utilizing a TCLP analysis, then all materials have to be treated as lead-containing waste. BEC suggests to collect this sample near the start date of the demolition project.

If you have any questions regarding this report, or need further assistance, please give us a call at (701) 223-7335.

Sincerely,

BADLANDS ENVIRONMENTAL CONSULTANTS, INC.

James D. McGurren
President/CEO

# LEAD-BASED PAINT INSPECTION TABLE

| Reading | Floor | Side | Room | Structure | Substrate | Feature | Condition | Color | Results | PbC | PbL | Site |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | | **CAL** | | | | | | **Red** | **Positive** | **1.04** | **1** | P24-0170 |
| 2 | | Lead Paint Standard | | | | | | White | Negative | 0 | 1 | NDYCC |
| **3** | | **Lead Paint Standard** | | | | | | **Yellow** | **Positive** | **3.31** | **1.13** | Heat Plant |
| 4 | Main | A | HVAC Shop | Wall | Concrete | | Good | White | Negative | 0.001 | 1 | Mandan, ND 58554 |
| 5 | Main | A | HVAC Shop | Wall | Wood | Board | Good | Blue | Negative | -0.001 | 1 | |
| 6 | Main | B | HVAC Shop | Door | Wood | Frame | Good | Gray | Negative | 0 | 1 | |
| 7 | Main | B | HVAC Shop | Door | Wood | Door | Good | Gray | Negative | 0.016 | 1.2 | |
| 8 | Main | C | HVAC Shop | Wall | Wood | Board | Good | White | Negative | 0 | 1 | |
| 9 | Main | C | HVAC Shop | Wall | Concrete | | Good | White | Negative | 0.001 | 1 | |
| 10 | Main | | HVAC Shop | Floor | Concrete | | Good | Gray | Negative | 0.163 | 7.74 | |
| 11 | Main | A | Boiler | Wall | Brick | | Good | White | Negative | 0.002 | 1 | |
| 12 | Main | B | Boiler | Wall | Concrete | | Good | White | Negative | 0.002 | 1 | |
| 13 | Main | B | Boiler | Door | Metal | Door | Good | Gray | Negative | 0.001 | 1 | |
| 14 | Main | C | Boiler | Window | wood | Sill | Good | White | Negative | 0.044 | 2.43 | |
| 15 | Main | C | Boiler | Window | Metal | Sash | Good | Green | Negative | 0 | 1 | |
| 16 | Main | | Boiler | Boiler | Metal | Tank | Good | Blue | Negative | -0.002 | 1 | |
| 17 | Main | | Boiler | Boiler | Metal | Tank | Good | Gray | Negative | 0.001 | 1 | |
| 18 | Main | D | Boiler | Wall | Wood | Panel | Good | Gray | Negative | 0.153 | 6.99 | |
| 19 | Main | | Boiler | Boiler | Metal | Tank | Good | Black | Negative | -0.002 | 1 | |
| 20 | Main | A | Boiler | Door | Metal | Door | Good | Brown | Negative | 0.013 | 1.2 | |
| 21 | Main | A | Boiler | Stair | Metal | Rail | Good | Yellow | Negative | 0.001 | 1 | |
| 22 | Main | | Boiler | Floor | Wood | | Good | Gray | Negative | 0.001 | 1 | |
| 23 | Main | | Boiler | Structure | Metal | Beam | Good | Gray | Negative | 0.048 | 1 | |
| 24 | Main | | Boiler | Structure | Metal | Support | Good | Gray | Negative | 0.096 | 1 | |
| 25 | Main | A | Filter Storage | Wall | Concrete | | Good | White | Negative | 0 | 1 | |
| 26 | Main | A | Filter Storage | Window | Wood | Frame | Poor | White | Negative | 0.646 | 1.64 | |
| 27 | Main | A | Filter Storage | Cabinet | Metal | Door | Good | Gray | Negative | 0.002 | 1 | |
| 28 | Main | A | Filter Storage | Cabinet | Metal | Door | Good | White | Negative | 0.038 | 1.16 | |
| 29 | Main | A | Filter Storage | Counter | Wood | Top | Good | Tan | Negative | 0 | 1 | |
| 30 | Main | A | Filter Storage | Door | Wood | Stop | Good | Brown | Negative | 0.002 | 1 | |
| 31 | Main | B | Filter Storage | Wall | Block | | Good | White | Negative | 0 | 1 | |
| 32 | Main | C | Filter Storage | Wall | Stucco | | Good | White | Negative | 0.001 | 1 | |
| 33 | Main | C | Filter Storage | Door | Wood | Cassing | Good | Gray | Negative | 0 | 1 | |
| 34 | Main | C | Filter Storage | Door | Metal | Door | Good | Gray | Negative | 0.019 | 1.03 | |
| 35 | Main | | Filter Storage | Ceiling | Wood | | Good | White | Negative | 0 | 1 | |
| 36 | Main | | Filter Storage | Ceiling | Wood | Joist | Good | White | Negative | 0.001 | 1 | |
| **37** | **Main** | **A** | **Office** | **Wall** | **Concrete** | | **Good** | **Gray** | **Positive** | **1.89** | **7.82** | |
| 38 | Main | B | Office | Wall | Concrete | | Good | White | Negative | 0.463 | 6.16 | |
| **39** | **Main** | **B** | **Office** | **Wall** | **Concrete** | | **Good** | **Gray** | **Positive** | **2.39** | **4.32** | |
| 40 | Main | C | Office | Wall | Sheetrock | | Good | White | Negative | 0 | 1 | |
| 41 | Main | C | Office | Base | Concrete | Board | Good | Gray | Negative | 0 | 1 | |
| 42 | Main | C | Office | Cabinet | Wood | Door | Good | Gray | Negative | 0.149 | 5.82 | |

| Reading | Floor | Side | Room | Structure | Substrate | Feature | Condition | Color | Results | PbC | PbL | Site |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **43** | **Main** | **C** | **Office** | **Window** | **Wood** | **Frame** | **Good** | **Gray** | **Positive** | **2.61** | **5.21** | P24-0170 |
| 44 | Main | | Office | Floor | Wood | Cover | Good | Gray | Negative | 0.206 | 3.67 | NDYCC |
| 45 | Main | | Office | Floor | Wood | Platform | Good | Gray | Negative | -0.001 | 1 | Heat Plant |
| 46 | Main | | Office | Ceiling | Metal | Tile | Good | White | Negative | 0.301 | 5.77 | Mandan, ND 58554 |
| 47 | Main | B | Bathroom | Wall | Sheetrock | | Good | White | Negative | 0 | 1 | |
| 48 | Main | C | Bathroom | Sink | Porcelain | Top | Good | White | Negative | 0.001 | 1 | |
| 49 | Main | C | Bathroom | Toiler | Porcelain | Top | Good | White | Negative | 0.003 | 1 | |
| 50 | Main | D | Bathroom | Locker | Metal | Door | Good | Tan | Negative | -0.001 | 1 | |
| 51 | Main | C | Bathroom | Shelf | Wood | Shelf | Good | White | Negative | 0 | 1 | |
| 52 | Main | A | Plumbing Shop | Wall | Concrete | | Good | White | Negative | 0.633 | 4.95 | |
| 53 | Main | D | Plumbing Shop | Wall | Concrete | | Good | White | Negative | 0.226 | 2.07 | |
| 54 | Main | B | Plumbing Shop | Wall | Concrete | | Good | White | Negative | 0.125 | 2.66 | |
| 55 | Main | C | Plumbing Shop | Window | Wood | Sill | Good | Gray | Negative | 0.044 | 3.92 | |
| 56 | Main | C | Plumbing Shop | Window | Wood | Frame | Good | Gray | Negative | 0.563 | 2.7 | |
| 57 | Main | D | Plumbing Shop | Shelf | Wood | Shelf | Good | Gray | Negative | 0.001 | 1 | |
| 58 | Main | A | Plumbing Shop | Window | Wood | Frame | Good | Gray | Negative | 0.804 | 2.4 | |
| **59** | **Main** | | **Plumbing Shop** | **Support** | **wood** | **Support** | **Good** | **Gray** | **Positive** | **1.32** | **3.13** | |
| **60** | **Main** | | **Plumbing Shop** | **Support** | **wood** | **Support** | **Good** | **White** | **Positive** | **1.62** | **2.62** | |
| **61** | **Main** | **D** | **Plumbing Shop** | **Door** | **wood** | **Door** | **Good** | **Gray** | **Positive** | **1.11** | **4.38** | |
| **62** | **Main** | **D** | **Plumbing Shop** | **Door** | **wood** | **Jamb** | **Good** | **Gray** | **Positive** | **1.02** | **4.03** | |
| 63 | Main | D | Plumbing Shop | Toiler | Porcelain | Tank | Good | White | Negative | 0.005 | 1.1 | |
| **64** | **Main** | **D** | **Plumbing Shop** | **Wall** | **Concrete** | | **Good** | **White** | **Positive** | **1.12** | **4.81** | |
| 65 | Main | | Plumbing Shop | Ceiling | Metal | Tile | Good | White | Negative | 0.078 | 2.02 | |
| 66 | Main | A | Plumbing Storage | Door | wood | Door | Good | White | Negative | 0.652 | 3.62 | |
| 67 | Main | A | Plumbing Storage | Wall | Fiber | Tile | Good | White | Negative | 0.001 | 1 | |
| 68 | Main | B | Plumbing Storage | Wall | wood | Door | Good | White | Negative | 0 | 1 | |
| 69 | Main | B | Plumbing Storage | Wall | Concrete | | Good | White | Negative | 0.166 | 6.75 | |
| 70 | Main | C | Plumbing Storage | Window | wood | Sill | Good | White | Negative | 0 | 1 | |
| 71 | Main | C | Plumbing Storage | Door | Metal | Door | Good | Black | Negative | -0.001 | 1 | |
| 72 | Main | D | Plumbing Storage | Door | wood | Frame | Good | White | Negative | 0 | 1 | |
| **73** | **Main** | **D** | **Plumbing Storage** | **Cabinet** | **Metal** | **Side** | **Good** | **Yellow** | **Positive** | **1.63** | **1.02** | |
| 74 | Main | | Plumbing Storage | Ceiling | wood | Soffit | Good | White | Negative | 0.001 | 1 | |
| 75 | Main | | Plumbing Storage | Floor | wood | Door | Good | Gray | Negative | 0 | 1 | |
| 76 | Upstairs | | Stairwell | Stair | wood | Step | Good | Gray | Negative | 0.001 | 1 | |
| 77 | Upstairs | | Stairwell | Stair | wood | Riser | Good | Gray | Negative | 0 | 1 | |
| 78 | Upstairs | D | Stairwell | Wall | Concrete | | Good | White | Negative | 0.001 | 1 | |
| 79 | Upstairs | | Stairwell | Stair | wood | Landing | Good | Gray | Negative | 0.001 | 1 | |
| **80** | **Upstairs** | **A** | **Gasket Room** | **Window** | **wood** | **Cassing** | **Poor** | **White** | **Positive** | **1.99** | **8.33** | |
| **81** | **Upstairs** | **A** | **Gasket Room** | **Wall** | **Plaster** | | **Poor** | **White** | **Positive** | **4.55** | **3.29** | |
| 82 | Upstairs | A | Gasket Room | Shelf | wood | Back | Poor | Gray | Negative | 0.134 | 3.48 | |
| **83** | **Upstairs** | **B** | **Gasket Room** | **Window** | **wood** | **Frame** | **Poor** | **White** | **Positive** | **2.83** | **3.06** | |
| 84 | Upstairs | B | Gasket Room | Window | wood | Sash | Poor | White | Negative | 0.144 | 3.64 | |

| Reading | Floor | Side | Room | Structure | Substrate | Feature | Condition | Color | Results | PbC | PbL | Site |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **85** | **Upstairs** | **C** | **Gasket Room** | **Wall** | **Plaster** | | **Poor** | **White** | **Positive** | **6.23** | **2.62** | P24-0170 |
| **86** | **Upstairs** | **C** | **Gasket Room** | **Door** | **wood** | **Jamb** | **Poor** | **White** | **Positive** | **3.59** | **4.67** | NDYCC |
| **87** | **Upstairs** | **B** | **Storage** | **Wall** | **Plaster** | | **Poor** | **White** | **Positive** | **1.17** | **2.4** | Heat Plant |
| **88** | **Upstairs** | **B** | **Storage** | **Wall** | **Plaster** | **Brick** | **Poor** | **White** | **Positive** | **2.92** | **3.5** | Mandan, ND 58554 |
| 89 | Upstairs | B | Storage | Window | wood | Trim | Poor | White | Negative | 0.909 | 13.5 | |
| **90** | **Upstairs** | **B** | **Storage** | **Door** | **wood** | **trim** | **Poor** | **White** | **Positive** | **5.46** | **4.53** | |
| **91** | **Upstairs** | **B** | **Storage** | **Window** | **wood** | **Frame** | **Poor** | **White** | **Positive** | **2.79** | **1.74** | |
| **92** | **Upstairs** | | **Storage** | **Shelf** | **wood** | **Support** | **Poor** | **Gray** | **Positive** | **1.48** | **1.15** | |
| 93 | Upstairs | D | Storage | Door | wood | Door | Poor | White | Negative | 0.156 | 3.52 | |
| 94 | Upstairs | D | Storage | Door | wood | Stop | Poor | White | Negative | 0.458 | 6.7 | |
| 95 | Upstairs | D | Storage | Shelf | wood | Front | Poor | Red | Negative | 0.026 | 1 | |
| **96** | **Upstairs** | | **Storage** | **Sink** | **Porcelain** | | **Good** | **White** | **Positive** | **3.36** | **1.53** | |
| 97 | Upstairs | | Storage | Floor | Concrete | | Poor | Gray | Negative | 0.012 | 1.04 | |
| 98 | Upstairs | | Storage | Tank | Metal | Tank | Poor | Black | Negative | 0.62 | 1 | |
| 99 | Exterior | A | Exterior | Siding | Stucco | | Good | Tan | Negative | 0.003 | 1.37 | |
| 100 | Exterior | A | Exterior | Window | Concrete | Sill | Good | Brown | Negative | 0.006 | 1.03 | |
| 101 | Exterior | A | Exterior | Window | wood | Cover | Good | Brown | Negative | 0.001 | 1 | |
| **102** | **Exterior** | **B** | **Exterior** | **Soffit** | **wood** | | **Good** | **Brown** | **Positive** | **1.65** | **3.4** | |
| 103 | Exterior | B | Exterior | Sign | Metal | | Good | Blue | Negative | 0 | 1 | |
| 104 | Exterior | B | Exterior | Siding | Stucco | | Good | Tan | Negative | 0 | 1 | |
| 105 | Exterior | C | Exterior | Siding | Stucco | | Good | Tan | Negative | 0.001 | 1 | |
| **106** | **Exterior** | **C** | **Exterior** | **Pipe** | **Metal** | | **Good** | **Yellow** | **Positive** | **3.26** | **2.5** | |
| 107 | Exterior | C | Exterior | Floor | Concrete | Splashpad | Good | Tan | Negative | 0.001 | 1 | |
| 108 | Exterior | C | Exterior | Window | Concrete | Sill | Good | Brown | Negative | 0.002 | 1 | |
| 109 | Exterior | C | Exterior | Door | wood | Frame | Good | Brown | Negative | 0 | 1 | |
| 110 | Exterior | C | Exterior | Barrier | Concrete | Tube | Good | Yellow | Negative | -0.001 | 1 | |
| 111 | Exterior | D | Exterior | Siding | Metal | | Good | Brown | Negative | -0.001 | 1 | |
| 112 | Exterior | D | Exterior | Siding | wood | Hatch | Good | Brown | Negative | 0 | 1 | |
| 113 | Exterior | D | Exterior | Siding | Concrete | | Good | Tan | Negative | 0.001 | 1 | |
| 114 | Lead Paint Standard | | | | | | | Gold | Negative | 0.648 | 1 | |
| **115** | **Lead Paint Standard** | | | | | | | **Orange** | **Positive** | **1.5** | **1.04** | |

# CERTIFICATIONS

# North Dakota Department of Environmental Quality Certificate

of

## Lead-Based Paint Abatement

No. 18

This is to certify that James Drayton McGurren has met the requirements of Chapter 33.1-15-24 of the North Dakota Air Pollution Control Rules for certification in the following lead-based paint abatement discipline(s):

- Supervisor
- Worker
- Inspector
- X Risk Assessor
- Project Designer

Exp: 9/20/2025

LBP Control Program

# North Dakota Department of Environmental Quality Certificate

of

## Lead-Based Paint Abatement

No. 312

This is to certify that Kayla A. DeHaven has met the requirements of Chapter 33.1-15-24 of the North Dakota Air Pollution Control Rules for certification in the following lead-based paint abatement discipline(s):

- Supervisor
- Worker
- Inspector
- x Risk Assessor — Exp: 9/18/2026
- Project Designer

LBP Control Program

# North Dakota Department of Environmental Quality Certificate

of

## Lead-Based Paint Abatement

No. 415

This is to certify that Nick Jangula has met the requirements of Chapter 33.1-15-24 of the North Dakota Air Pollution Control Rules for certification in the following lead-based paint abatement discipline(s):

- Supervisor
- Worker
- Inspector
- x Risk Assessor — Exp: 9/24/2024
- Project Designer

LBP Control Program

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