

APPENDIX I – ARCHITECTURAL

I.1 ARCHITECTURAL DESIGN CONSIDERATIONS

The pump station building has been designed aesthetically to resemble pump stations from surrounding communities. The building will be constructed of CMU (concrete masonry units) walls, brick and split-faced CMU veneer, precast concrete roof panels, standing seam metal roofing, glass block for natural lighting, and insulated steel doors for durability. The building design is intended to be simple, secure, durable, easily maintained, as well as aesthetically pleasing.

Building design will be based on the 2015 International Building Code and amendments by the State of North Dakota. The pump station has been classified as a Group U Occupancy, or Utility and Miscellaneous Group, and has been designed using Type 2-B construction. Utility Buildings or group U occupancies are exempt from ADA accessibility requirements.

The total gross area of the proposed Oxbow-Hickson-Bakke pump station is approximately 1,008 square feet with a building height of 22 feet.

Building Design:

1. The exterior building walls shall be constructed of 12" reinforced CMU, 2" rigid board cavity insulation, with a brick and split-faced CMU veneer.
2. Glass block clearstory windows are provided to allow natural daylight into the space.
3. Interior walls are 8" unreinforced CMU extending to the underside of the roof structure.
4. Exterior pedestrian swing doors are heavy duty, commercial grade, insulated steel doors of varying sizes with heavy duty hardware including hinges, locksets, closers, door stops, weather-seals, and thresholds.
5. An electrically operated coiling overhead door will be incorporated to allow tractor-trailer access for servicing wet well equipment.
6. The roof will consist of a one way sloped structure of hollow core precast concrete plank with 4" rigid roof insulation having a minimum R-value of R-30 and standing seam metal roof finish.
7. The interior floors will be concrete with hardened and sealed finish.
8. Interior face of the CMU walls and precast concrete ceiling shall remain unfinished.
9. The wet well will be accessible at multiple locations through flush mounted aluminum floor panels with fall protection and wall mounted ladders.
10. The pump station shall incorporate a 3 ton overhead bridge crane for wet well maintenance and debris removal. The crane will be top running to allow for maximum lift height above the pump station lid. The crane will be supported independently from the building structure using two self-supporting structural steel frames. The columns will be anchored to the concrete pump station lid with post-installed anchors.
11. The building has been designed to comply with the following structural design codes:
 - a. 2015 International Building Code (IBC) with State of North Dakota Amendments
 - b. American Society of Civil Engineers (ASCE) Standard 7-10

- c. 2011 Building Code Requirements and Specification for Masonry Structures
 - d. American Institute of Steel Construction (AISC) 14th Edition
 - e. American Concrete Institute (ACI) 530-11: Building Code Requirements for Masonry Structures.
 - f. Precast Concrete Institute (PCI) MNL-120-04.
12. The building has been designed to withstand the following structural loads:
- a. Live Loads:
 - i. Floor Live Load: By Barr Engineering
 - ii. Roof Live Load: 20 psf
 - b. Dead Loads:
 - i. Precast Roof System: 12 psf (superimposed)
 - ii. Precast Roof Panels 70 psf (max)
 - c. Snow Loads:
 - i. Ground Snow Load, P_g : 50 psf
 - ii. Flat Roof Snow Load, P_f : 42 psf
 - iii. Sloped Roof Snow Load, P_s : 42 psf
 - iv. Importance Factor, I_s : 1.2
 - v. Exposure Factor, C_e : 1.0
 - vi. Thermal Factor, C_t : 1.0
 - vii. Sloped Roof Factor, C_s : 1.0
 - d. Wind Loads:
 - i. Main Wind Force Resisting System
 - 1. Wall Interior Zone 19.8 psf
 - 2. Wall End Zone ($2a = 6.3\text{ft}$) 29.8 psf
 - 3. Roof Interior Zone -9.2 psf
 - 4. Roof End Zone ($2a = 6.3\text{ft}$) -15.5 psf
 - ii. Components and Cladding Wind Pressure
 - 1. Surface 1 ($A_e = 341\text{ sf}$) 16.0/-30.9 psf
 - 2. Surface 2 ($A_e = 341\text{ sf}$) 16.0/-36.7 psf
 - 3. Surface 3 ($A_e = 341\text{ sf}$) 16.0/-36.7 psf
 - 4. Surface 4 ($A_e = 147\text{ sf}$) 25.7/-28.3 psf
 - 5. Surface 5 ($A_e = 147\text{ sf}$) 25.7/-30.8 psf
 - iii. Wind Velocity, V 120 mph
 - iv. Importance Factor, I_w 1.0
 - v. Risk Category IV
 - e. Seismic Loads:
 - i. Analysis Procedure Used Index Force System
 - ii. Seismic Resisting System Ordinary Plain Masonry Shear Walls
 - iii. Importance Factor, I_e 1.5
 - iv. Mapped Spectral Response Acceleration
 - 1. Short Period Response, S_s 5.8g

- 2. 1-Second Period Response, S_1 2.10g
 - v. Seismic Design Category, SDS A
 - vi. Risk Category IV
 - vii. Design Base Shear, V 4.83 kips
 - viii. Seismic Response Coefficient, C_s 0.01