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Bloomington Building Expansion

Project Description

Verizon Wireless

10801 Bush Lake Road,
Bloomington, MN.

August 25, 2020

Private & Confidential

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MORRISON HERSHFIELD
MISSION CRITICAL

VERIZON WIRELESS PROJECT DESCRIPTION
BUILDING EXPANSION
25 August 2020

I. EXECUTIVE SUMMARY

Morrison Hershfield (MH) was retained by Verizon Wireless (VzW) to provide design services for an expansion to the MSC at the Bloomington mobile switching center (MSC) located at 10801 Bush Lake Road, Bloomington, MN. Additional consultants include Sunde Engineering for survey and civil design, ESI for acoustic analysis and design and Damon Farber for Landscape Architecture.

The Bloomington MSC Expansion project is a Multi-Access Edge Computing (MEC) MSC Expansion which includes the addition of a new AC UPS power, space and cooling to support the MEC equipment space. The expansion is designed to accommodate the new Verizon high density concept which includes a new +/- 7000SF Network Equipment Room, electrical distribution rooms, UPS /battery rooms, and associated cooling systems.

A. The existing 53,134 sf MSC will be expanded by approximately 16,722 sf under this project to a total size of 69,856 sf. The building will be expanded at the north side and northwest corner. New spaces will include:

- Approximately 6773 sf of HD Network Equipment Room
- Two new AC Electrical Rooms designed at N+N
- Two new UPS/Battery Rooms designed at N+N

C. A minimum 8' high concrete masonry unit (CMU) security screen wall will be provided around the new equipment yard. The north screenwall, parallel to Old Shakopee Road, will be approximately 14' high to screen the new AHUs. The new screen wall will match and continue the existing screen wall.

D. Concrete pads will be provided for 2 new exterior generators near the northeast corner of the MSC.

E. There is no roof top equipment installed on this project.

F. The mechanical design utilizes exterior Air Handling Units for the mechanical system serving the HD Network Room. These units are placed along the long north side of the HD Network Room to discharge air into the supply plenum providing even air distribution throughout the space. The AC Power Rooms and UPS Rooms are cooled using DX CRAC Units with exterior condensers. Ventilation provided by dedicated outside air DX AHU.

G. FM-200 systems will be provided in all Network Equipment Spaces, AC Electric Rooms and UPS/Battery Rooms rooms per current NSTD386, Fire Protection Systems in Switching Center Design. All other areas will be provided with a preaction sprinkler system.

H. The existing fire alarm system will be modified and extended into the new construction.

I. Two additional 480V, 4000A, AC Service entrance and distribution system will be provided. See electrical section for details.

J. One additional exterior diesel generator will be provided for standby power to one distribution system, day one. A second generator is included as an alt alternate, but will be installed day one. See electrical section for detail.

K. The existing grounding system will be modified to comply with current VZW Standards.

L. The existing security system will be modified and extended into the new construction per current NSTD397, Security Systems in Switching Center Design and other current standards.

M. The AC power systems will be fully tested prior to cutover to live service in accordance with current NSTD 169, Power System Test Requirements

II. ARCHITECTURAL

A. GENERAL SITE DESCRIPTION

1. Under the Bloomington MSC Building Expansion Project the existing 52,134 sf, one story MSC will be expanded by 16,722 sf to provide a new high density Network Equipment Room, two new AC Power Rooms and two new UPS/Battery Rooms.

2. The existing site is zoned IP, Industrial Park and is bordered by industrial properties (IP and I-1) to the east, west and south. The existing site is bordered by R-1, single family residential to the north.

3. The site is accessed from a 30' wide curb cut and driveway off Bush Lake Road and a service entrance from a 25' wide curb cut and driveway off Louisiana Avenue. The existing parking is located along the east side of the property and limited parking within the secure equipment yard. The building is entirely encircled by asphalt paving. There are currently 106 approved parking stalls on site, including 99 stalls in the main parking area and 7 stalls within the secure equipment yard. The proposed addition will displace approximately 14 of the current parking stalls. These stalls will be relocated on the site.

4. The existing secure Equipment Yard is enclosed by a 8' high CMU wall The existing wall will be extended to fully enclose the new equipment area. Any mature trees removed for construction of the new addition will be replaced. Additional landscaping will be provided along the north

side of the building, which will serve a screen for the new addition. Existing sidewalks will require widening to a minimum width of 8'-0".

5. The building expansion will be to the north, into what is currently asphalt pavement and grass areas. A new generator with integral fuel tank is proposed on the northeast side of the building.

6. Underground site utilities will need to be located and protected during construction. New underground site work items are described in the electrical scope. The asphalt paved areas and any disturbed landscaping will be restored to match existing conditions.

B. GENERAL BUILDING DESCRIPTION

1. The existing structure was constructed as a type II-B non-rated building, consisting of 8 inch CMU with face brick veneer, metal deck roof supported by an unprotected steel joist and column system.

2. The structural aspects of the proposed addition are covered in the Structural Basis of Design. The exterior wall construction is 8" CMU with 2" rigid insulation and a face brick veneer. The exterior wall is furred with metal studs with 1 layer GWB, insulated with R-13 fiberglass batt insulation. The interior wall construction is constructed entirely of non-combustible 2-hour fire rated construction consisting of two 5/8" layers gypsum wallboard (GWB) each side over metal stud construction.

    a. Type II-B for Business occupancy has a maximum allowable building area of 23,000 sf. With the following modifications allowed:
        i. This area can be tripled if the facility is fire sprinklered throughout, an allowable increase of 69,000 sf.
        ii. The area can be increased due to frontage adjoining or having access to a public way by a factor of .7 for this site, an allowable increase of 16,100 sf.

3. The new addition will be constructed of similar masonry construction to match the existing but with the exterior wall insulation increased to R-13. The building exterior will be designed to match the existing construction and colors as closely as possible. The interior of the building, including the underside of the exposed roof deck and structural framing will be painted to match existing.

4. The new floor system will be reinforced concrete slab on grade. Additional structural aspects of the floor and foundation system are discussed in the structural Basis of Design. The HD Network Room will have a 3'-0" high raised access floor. New floor finishes will conform to current NSTD388 and NSTD388.

SPACE ALLOCATION BY ROOM:			
HD Network Room	6,773 sf	Total	6,773 sf
Plenum	665 sf	Total	665 sf
AC Power Room 1	1,166 sf	Total	1,166 sf
AC Power Room 2	1,166 sf	Total	1,166 sf
AC UPS Room 1	1,813 sf	Total	1,813 sf
AC UPS Room 2	1,813 sf	Total	1,813 sf
Circulation	1,672 sf	Total	1,672 sf
TOTAL			15,068 sf

III. STRUCTURAL

A. GENERAL

Structural design and installation of the building expansion will comply with current NSTD 398, Structural Systems in Switching Center Design and NSTD119, Network Installation Standard. Required governing code will be the 2020 Minnesota State Building Code based on the 2018 International Building Code.

B. VERTICAL LOAD CARRYING SYSTEM

New Building Expansion:

Where new expansion meets the existing building, only roof deck is tied to the existing structure sharing lateral loads and existing structure will be checked for structural integrity. Structural framing system for vertical loads will be supported on new foundations independent of the existing building. Any non-structural connections to the existing building will be provided in such a manner that their impact to the existing building will be minimized to the greatest extent possible.

The new expansion will utilize roof metal deck without concrete fill supported by a combination of open web steel joists and joist girders, as well as steel wide-flange beams. These roof framing elements will be supported by the exterior bearing concrete masonry unit (CMU) walls and steel HSS columns that will be supported by continuous footings or spread footings.

New Auxiliary Framing System:

The Auxiliary Framing system will be hung from the new roof framing elements as noted above in a grid pattern. This grid will be constructed and seismically braced consistent with the requirements of the most recent edition of NSTD 119.

C. LATERAL LOAD CARRYING SYSTEM

The basic lateral force resisting system for the new building expansion will be composed of flexible roof diaphragm and exterior reinforced CMU shear walls.

D. FOUNDATION SYSTEM

Foundations will consist of continuous and spread footing founded on approved bearing material. The allowable bearing pressure and final foundation system selection will be as determined by the project geotechnical engineers.

E. DESIGN CRITERIA

Codes: 2020 Minnesota State Building Code and 2018 edition of the International Building Code.

LOADS

Live Loads - Roof

Uniform Snow Load	42	psf

Dead Loads – Floor

Batteries	600	psf
Equipment	400	psf

Dead Loads – Roof

Framing, Ceiling, Mech'l	5.0	psf
Roofing	7.0	psf
Auxiliary Framing	5.0	psf
Miscellaneous	3.0	psf
Total DL =	**20.0**	**psf**

Dead Loads – Roof

Cable System	40	psf

Lateral Loads

Basic Wind Speed	122	MPH
Exposure Category	B	
Risk Category	IV	

Seismic Data (Ordinary Reinforced Masonry Shear Walls)

Site Class	D – Default
Risk Category	IV
Importance Factor	= 1.50
Short Period Acceleration S_S	= 0.048g
One Second Period Acceleration S_1	= 0.030g
Maximum Considered Earthquake, S_{MS}	= 0.077g

Damped Short Period Acceleration, S_{DS}	= 0.051g
Maximum Considered Earthquake, S_{M1}	= 0.072g
Damped One Second Period Acceleration, S_{D1}	= 0.048g
Site Coefficient, F_A	= 1.6
Site Coefficient, F_V	= 2.4
Site Design Category	A
Response Modification Factor, R	= 2.0
Seismic Response Coefficient, C_S	= 0.038

F. MATERIALS

Concrete:

Footings, grade beams	4,000 psi	Normal Wt
Slab on Grade	4,000 psi	Normal Wt
Mech'l curbs and pads	4,000 psi	Normal Wt
Misc. Arch'l Conc.	3,000 psi	Normal Wt

Concrete Reinforcing Steel:

ASTM A-615 Gr 60	fy = 60 ksi (Shop Bend)
ASTM A-706 Gr 60	fy = 60 ksi (Shop Bend)
ASTM A-185	Welded Wire Fabric

Steel:

Structural Bolts	ASTM F3125 Gr. A325/A490	
Anchor Rods	ASTM A307	
Wide Flange Shapes	ASTM A572/A992	50 KSI
Plates, Shapes, Angles and Rods	ASTM A36	36 KSI
Structural Pipe	ASTM A53 – Grade B	35 KSI
Structural Tubing (Square or Rectangular)	ASTM A500 – Grade B	46 KSI

IV. MECHANICAL

A. GENERAL MECHANICAL PROJECT DESCRIPTION

The Mechanical scope of proposed project will provide new HVAC systems in the building with N+1 capacity. These goals will require careful design and planning to avoid any impacts on the existing switching equipment areas as a result of construction and deliver a cost and schedule effective project. This project will require extensive O&Ms for onsite staff to properly support new HVAC systems and equipment.

B. ANTICIPATED NEW BUILDING LOADS AND PROPOSED NEW BUILDING HVAC SYSTEMS –

1. Future Loads – The goal of this project is to provide all HD Network Room equipment areas with the capability to accommodate 200

Watts/SF of internal equipment load. The HD Network Room of approximately 6,773 SF will be provided with underfloor air distribution to accommodate the new load.

Building Areas and Expected Future Equipment Cooling Capacity Required (does not include skin, lights and people loads):

Area Description	Approximate Planned Areas (SF)	Estimated Watts/SF	Approximate Tons
New HD Network Room	6,773	200	568
New AC/Power Room	1,166	16	5
New AC/Power Room	1,166	16	5
New AC/UPS Room	1,813	31	16
New AC/UPS Room	1,813	31	16
New Corridors	1,672	13	6
New Building Sub Totals	**15,068 SF**		**640 Tons**

2. The design will provide all critical HVAC systems with N+1 capacity per NSTD385. The Mechanical design for the new HD Network Room will be served by five 400kW AHUs (three Day-1 with one redundant).
3. CRAC units in a N+1 configuration for the AC/UPS Rooms under normal operation. The AC/Power Rooms shall be conditioned with one CRAC in an N configuration (no redundancy).
4. A dedicated outside air DX AHU shall be provided for ventilation and make-up air in accordance with ASHRAE 62.1. Exhaust systems will be provided for ventilation and for battery hydrogen gas per NSTD385 and local AHJ requirements in the electrical rooms. One wall-mounted, DX split system shall be provided in addiction to the dedicated outside air unit to meeting cooling loads in the corridors.
5. Two new, 2-ton, DX Split FCUs shall be provided for cooling in the Secure Corridors to supplement the dedicated outside air unit.
6. Provide all modifications to the existing Building Automation System (BAS) associated with any HVAC system additions as a result of the Building Expansion. All alarms associated with all new building systems per NSTD398 will be included in the design.
7. Design will include temperature sensors rack mounted at a minimum of every 3rd rack along each aisle. Temperature sensors shall be mounted at 1/3 and 2/3 above the finished floor.
8. New Main and Distribution Ductwork – As part of the new cooling and ventilation systems installation new main and distribution ductwork will be installed.
9. Building Exhaust – New exhaust systems will be installed as part of this project for each of the new AC/Power and AC/UPS Rooms. Battery hydrogen gas exhaust will be installed per current NSTD32, NSTD385 and local jurisdiction requirements.
10. New Electric Wall Heaters will be provided for heating of the corridors.
11. New DX Split systems will be installed in the discharge air plenum for the HD Network Room to provide dehumidification when needed.

C. FIRE PROTECTION SYSTEMS

1. Fire protection upgrades and modifications – Fire protection work will be performed as part of this addition, particularly in the new construction areas. This work will include EWFDS and VEWFDS in the new building expansion areas, as well as extension of the pre-action sprinkler system and addition of FM200 suppression systems for the critical spaces in the expansion area. All new Fire Protection upgrades will be installed per NSTD386, Fire Protection Systems in Switching Center Design.

V. ELECTRICAL

A ELECTRICAL SERVICE:

1. Existing: The existing main electrical system for the Bloomington MSC consists of one 2500kVA 12kV-480/277V utility transformer, one 4000 amp main service entrance and two 2500amp main distribution switchboard. Both distribution systems consist of main tie main configuration. The existing service serves the exiting MSC and does not have enough capacity for the HD equipment upgrade.

2. Proposed New: The new electrical upgrade design shall incorporate two (2) new additional 4000amp utility services at 480V with two 2500kVA pad mounted transformers in addition to the two existing services. The service will provide 2N electrical distribution and alternate feeds to all critical equipment in new equipment area. There will be two new electrical rooms which will be constructed to support two (2) new 4,000A ATS, (2) ATS-GEN, and (2) distribution gear. One per each side.

B GENERATORS:

1. Existing: The Vista MSC is provided with two (2) 1500kW generators.

2. Proposed New: Additional one (1) new exterior 3000KW diesel generator with 65 dB sound enclosure and 12,000 gallon base tank will be added to support the HD power. A second 3000KW generator is provided as an Add Alt, but is intended to be installed day one. Day one generator will provide N back up power for HD power only. With the Add Alt generator installed the HD equipment will have N+N power back up.

C UPS SYSTEM:

1. The UPS systems shall be N+N, located in independent rooms. Each N system will have Three (3) 600KW/600kVA single modules system with

static bypass and three breaker maintenance cabinet. The A UPS system shall be fed from the one new electrical system while the B UPS system will be fed from other electrical system. Static and Maintenance Bypasses will be cross fed to the opposite services. Day one two UPS will be installed and will have provision for third UPS in the future for each system. Each UPS will feed two 300KVA PDU.

2. Maximum UPS load will be 1440kW which is 80% of N capacity.

3. Each UPS plant will support two 300kVA PDUs located in the HD room. Each PDU will feed two RPPs with 600A distribution boards.

D LIGHTNING AND SURGE PROTECTION

1. A lightning protection assessment will be performed for the site in accordance with NFPA 780 guidelines and current NSTD42. This assessment will provide the design review team with the information required to determine whether the installation cost of a LPS for this site is warranted. If the decision is made to install a LPS, a new system will be performance specified for installation by a UL Certified LPS Contractor.

2. A Transient Voltage Surge Suppressor (TVSS) surge protector will be provided at the main service entrance circuit breaker and each standby power switchboard. TVSS devices will also be provided per NADV1173 and OTHR9925.

E GROUNDING:

1. The existing building's grounding system will be modified to comply with current VZW NSTD 33, 34, 36, 40 and 41 grounding standards. A new 60" main ground bar will be provided in the new AC Power Room to provide a central point grounding location for the AC power, DC power and network equipment. A new Lead 5 collection bar will also be installed and interconnected to the new MGB.

2. A soil resistivity test and ground resistance test will be performed at the site to determine the effectiveness of the existing ground ring and to determine the type of ground electrode system that will be used for the remodel and electrical room addition areas. Depending on the results of the testing, the existing ground ring will be extended around the new areas in compliance with latest NSTD40.

3. New Floor Ground Bars (FGBs) will be installed inside the facility and interconnected to the new MGB with 750MCM horizontal equalizers. These FGBs will provide the ground point for new integrated equipment and cable trays to be installed under this project.

4. A detailed grounding survey will be performed during the initial design of this project. Required modifications to the existing system will include reconnection of existing floor groundbars.

F LIGHTING

1. New lighting will be provided in the MSC areas to be remodeled and new expansion areas.
2. AC Lighting: All interior luminaires will be 277V fluorescent with LED lamps and electronic ballasts.
   a. Equipment Areas: LED luminaires for general area lighting at 20 fc may be low, increase to 40 fc.
   b. Corridors: LED
   c. Battery Room: LED

3. Exterior lighting is standard metal halide with a self-contained photocell. Egress and security lighting will be wall-mounted and pole-mounted where required.

4. Lighting levels will be provided per NADV1423.

G SECURITY SYSTEM

1. A building security system assessment will be performed with VZW Operations and the security vendor that services the site to document work required for the remodel. The security system will be expanded into the new building spaces. The design team will work with the facility security vendor to assure that all new areas, as well as existing areas that are modified, are integrated into the overall building security system. Exterior cameras will be relocated and/or added to provide proper coverage of the building. Security system assessments and upgrades will be designed to comply with current VZW Standards NSTD 397 and NSTD 304.

2. The existing MSC card access security control system and CCTV system will be modified to incorporate the interior space modifications and new exterior generator. Door alarm contacts will be provided for all exterior doors and interior doors with access control per VZW requirements.

3. Additional cameras will be provided to monitor the new exterior generator, mechanical equipment, corridor, new receiving room and site.