NEXIUS

Accelerating Network and Business Transformation

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 08/16/17

MARCH 2, 2017

Verizon Wireless
400 Friberg Parkway
Westborough, MA 01581

RE: PORTLAND 8 ME
44 Bedford Street, Portland ME 04101

To whom it may concern:

Nexius, Inc. has performed the structural analysis for new elevated structural steel platform supporting the proposed Verizon Wireless (VZW) equipment. VZW equipment includes radio cabinets, battery, generator and other appurtenances and their attachments that will support the Verizon Wireless proposed equipment. The analysis was conducted using Maine Uniform Building and Energy Code Amendments to the International Building Code 2009.

The proposed Verizon Wireless equipment will consist of one (1) MTU 20KW natural gas generator; one (1) Charles universal broadband enclosure CUBE-PM63912XXX; one (1) Battery cabinet and related cables and hardware.

Base on the structural analysis performed for the aforementioned site (see attached document), it is our opinion that the existing roof structure can safely support the proposed cabinets and generator and all related hardware. It is assumed that the existing structure has been well maintained and is in good condition. In addition, it is assumed that all proposed equipment will be installed in accordance with manufacturers' specifications.

If you have any questions or need further assistance, please contact this office.

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Sincerely Yours,

STATE OF MAINE
RONALD
J.
JACKSON
3773
REGISTERED
PROFESSIONAL ENGINEER

Ronald J, Jackson, P.E.
National Director of A&E Services
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SUBJECT : STRUCTURAL ANALYSIS
SITE NAME: PORTLAND 8 ME
NEXIUS PROJECT NO. VZ11509

ORIGINATOR : JC
CHECKER : RJJ
DATE : 3/2/2017

The purpose of this calculation is to design new steel platform on the top of the roof located in 44 Bedford street, Portland ME 04101.

Preliminary assumptions used in the analysis

The roof structure is a good and structurally sound condition. The concrete compressive strength is assumed to be 3000 psi (@ 28 days). The VZW equipment is rated for the applicable wind load and secured properly to the steel platform.

Applicable Codes:

- 2009 INTERNATIONAL BUILDING CODE
- ASCE 7-05 Minimum Design Loads for Buildings and Other Structures
- AISC Steel Construction Manual (13th Ed.)
- ACI 318 American Concrete Institute

Scope of Calculation: VZW equipment installed including:

1. Installing new Charles universal broadband enclosure CUBE-PM63912XXX nad CUBE-PM63915XXX
2. Installing new Charles top hat cable management kit 97-002228-A and 97-002230-A
3. Installing new generator MTU 20KW Natural gas.
4. Installing new battery cabinet

Design Criteria:

Dead load	Dl = 25 psf
Live load	Ll = 60 psf
Ground Snow,	Pg = 50 psf
Exposure category	B
Occupancy Category	II
Importance Factor	I = 1.0

Rooftop Equipment Specification:

- Charles Universal broadband enclosure with top hat cable	Net weight = 1000 lbs
- Battery cabinet	Net weight = 2500 lbs
- MTU 20KW Natural gas	Net weight = 2200 lbs

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Snow load at top of enclosure and roof

- Ground snow load — Pg = 50 psf (Ref. ASCE 7-05 Fig. 7-1)
- Exposure Factor — Ce = 1.0 (Ref. ASCE 7-05 Table 7-2)
- Thermal Factor — Ct = 1.2 (Ref. ASCE 7-05 Table 7-3)
- Importance factor — I = 1.0

$$Pf = 0.7(Ce)(Ct)(I)(Pg) \quad \text{(ASCE 7-05 Eq. 7-1)}$$

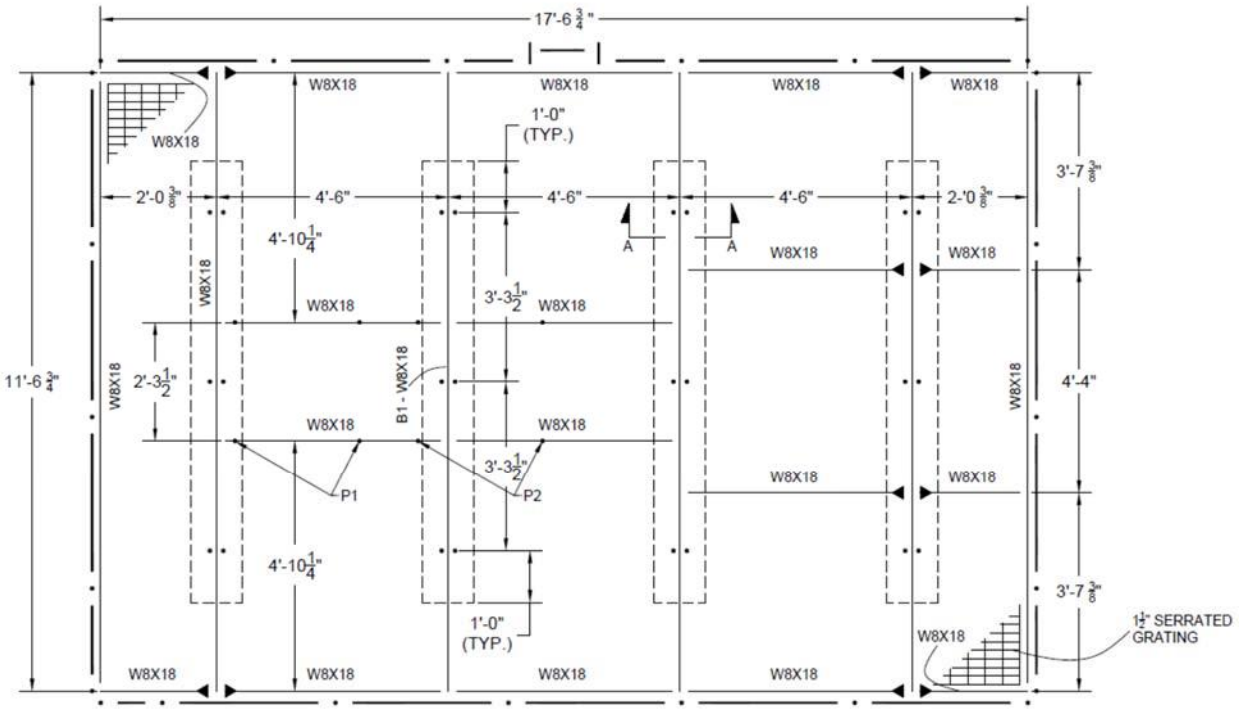
$$Pf = 42\ psf$$

Load Combination

- LC 1 = 1.4 D (Ref. ASCE 7-05 Section 2.4.1)
- LC 2 = 1.2 D + 1.6 LL + 0.5 S (Ref. ASCE 7-05 Section 2.4.1)
- LC 3 = 1.2D + 1.6 S + LL (Ref. ASCE 7-05 Section 2.4.1)

Calculation

B1 is chosen in this calculation since It has the largest tributary area and supporting the battery cabinet. Therefore, it is expected this beam produce the largest moment.



Tributary length of B1 = 4.5'
P1 = 500 lbs
P2 = 625 lbs

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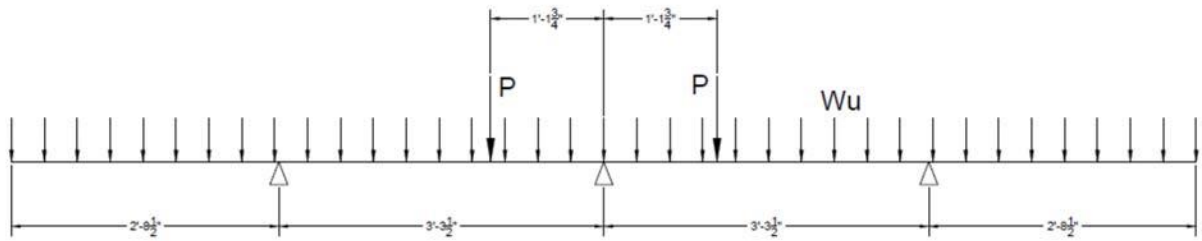

P dl = 1125 lbf (Conservative)
Wu dl = $= (25)4.5 = 112.5\ plf$
Wu ll = $(60)4.5 = 270\ plf$
Wu s = $(42)4.5 = 189\ plf$
a = 1.9167 ft
b = 2.145 ft
L = 3.29167 ft

For conservatism, the both cantilever will be ignored in order to get maximum moment in between the support.

Moment max = $\frac{(P)(a)(b)}{4(l)^2}(l+a) + \frac{(Wu)l^2}{8}$

Mu – DL = 708 lb-ft
MU – LL = 366 lb-ft
MU – S = 256 lb-ft

Moment Max – LC 1 = $1.4\ (708)$
Moment Max – LC 2 = $1.2\ (708) + 1.6(366) + 0.5(256)$
Moment Max – LC 3 = $1.2(708) + 1.6(256)$

LC 1 = 992 lb – ft
LC 2 = 1563 lb-ft
LC 3 = 1260 lb-ft

Based on analysis above, LC 2 governs with max moment = 1563 lb-ft

Section and material properties of W8x18

Fy = 36 ksi
Zx = 17 in^3
Mp = 612 kip-in
Lr = 17.25 ft
Lp = 5.1 ft
Lb = 12 ft
Mr = 383 kip-in
Cb = 1.0

Mn = $Cb\left(Mp - (Mp - Mr)\left[\frac{Lb-Lp}{Lr-Lp}\right]\right)$ Mn = 482 Kip-in

$\emptyset Mn = 434\ kip - in \quad or \quad 36166\ lb - ft$ >>> Moment max (Mu) OK

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Conclusion

The new platform is adequate to support new proposed VZW equipment, live load and snow according to applicable building code.