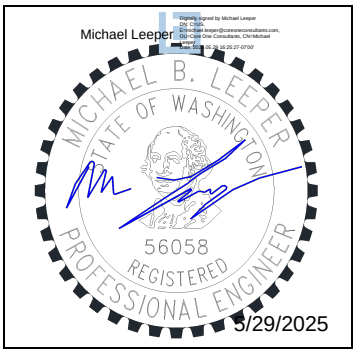
CORE ONE CONSULTING US LTD.
13555 SE 36th St, Suite 100
Bellevue, WA 98006

Structural Analysis Report

Site Name:	Mercer Island
Site Number:	SD05
Project:	LTE 1C RRH Swap
Client:	AT&T
FA #:	10092489
IWM #:	WSWOR0048444
PTN #:	3801A1HCV6
Structure Type:	Rooftop
Structure Description:	Slab
Site Location:	7900 SE 28th Street Mercer Island, WA 98040 King County 47.58564°N, 122.23206°W
Analysis Load Case:	Final Configuration
Analysis Result:	**Adequate @ 64%** See Conclusion & Recommendations for installation requirements.

SEAL



Michael Leeper, PE
Director of Engineering

Rev: 0 May 29, 2025

REVIEWED
By mpaulinio at 7:41 am, Jun 06, 2025

1.0 Introduction

At the request of AT&T , an analysis of the existing structure has been performed. All supporting documents have been obtained from the client and are assumed to be accurate and applicable to this site. The structure was analyzed using Enercalc.

2.0 Analysis Procedure & Design Criteria

The following documents were provided for site Mercer Island :

- Construction Drawings
  Core One Consulting USA, Project # 2501U623, Rev A dated 04/07/2025
- Antenna Loading
  DE130 Scoping Document, dated 01/21/2025
- Previous Structural Analysis
  Trylon, Project #204606, dated 03/16/2022
- RFDS
  AT&T , Site #: MERCER ISLAND

The structures have been analyzed pursuant to the following Design Criteria:

Adopted Codes:	
IBC: 2021	Local Codes: 2021 MICC
TIA: 222-H	AISC: 16TH ED.
ASCE: 7-16	ACI: 318-19
Gravity Design Loading:	
Assumed Minimum Design Roof Loading: D_L: 15 psf; R_{LL}: 20 psf; S_L: 25 psf	
Wind Design Loading:	
Design Wind = 98 mph *[3-sec gust Ultimate]*	
Design Wind W/ ICE = 30 mph *[3-sec gust Ultimate] with 1" ice*	
Exposure Category C Risk Category II	Topographic Category 1 K_{zt}=1.0 Ground Elevation = 93' (NAVD 88)
--	Live Load(s) reduction is confirmed to either not govern or not be applicable to mounts
Seismic Design Loading:	
Site Class D-Default S_s = 1.394g, S_1 = 0.485g, S_{DS} = 1.115g	Importance Factor, I_p = 1.0

3.0 Proposed Appurtenance & Equipment Information

Table 3.1 – Proposed AT&T Final Antenna Configuration[1]

RAD Height (ft)	Qty.	Appurtenance[1,2]	Sector	Coax	Mount type	Carrier
67'-6"	**3**	**AIR6472 B77G B77M**	Alpha/ Beta/ Gamma	**(3) Fiber (6) 6 AWG DC Power**	Pipe Mount	**AT&T**
66'-0"	3	CMA-UBTMLBMLBHH-6516-16-21-21				
	3	NNH4-65B-R6				
	3	**4490 B5/B12A**				
	3	**4494 B14/B29**				
	3	**4890 B25/B66**				
	3	DC9-48-60-24-PC16-EV				

1. Bold items denote appurtenances to be installed
2. Refer to A&E Construction Drawings for additional information regarding final antenna and equipment locations and orientations.

4.0 Structural Analysis Results and Conclusion

Upon reviewing the results of this analysis, it is our opinion that the existing structure meets the specified code requirements. The structure is considered acceptable to support the final loading configuration as listed within this report. The controlling structure usages are displayed in the tables below:

Table 4.1 – Rooftop Structure Capacity

Load Case	Governing Assembly Components	Capacity	Results
Worst Case	Slab	64%	Pass

The additional equipment proposed for the referenced project will not increase the design gravity loading by more than 5 percent or the lateral loading by more than 10 percent, therefore the proposed installation is acceptable per the requirements listed in sections 502.4 and 502.5 of the 2021 IEBC. See appendix for details.

Table 4.2 – Structural Component Material Strengths

Structural Component	Nominal Strength/Material[1]
Pipe	F_y = 35 ksi (A53, Gr. B)
Tube	F_y = 46 ksi (A500, Gr. B)
Structural Shapes (L, C, W, etc.), Plate & Bar	F_y = 36 ksi (A36)
Wood	Dimension Lumber: DF-L No. 2 GluLam: DF/DF 24F-V4
Uni-Strut (P1000, etc.)	F_y = 33 ksi (A570, Gr. 33)
Connection Bolts	A325
U-Bolts / Threaded Rod	SAE J429 Grade 2 (Substitution: ASTM A449) F_y = 57 ksi (Yield) & F_u = 74 ksi (Tension)
	SAE J429 Grade 5 (¼" to 1" Nominal ϕ) F_y = 92 ksi (Yield) & F_u = 120 ksi (Tension)
Mechanical Anchors	Concrete: HILTI KWIK Bolt TZ2 Stainless Steel Expansion Anchors (ICC-ES ESR-4266)
	CMU: Threaded Rod / Rebar HILTI HIT-HY 270 Epoxy (ICC-ES-ESR-4143)
Stainless Steel Bolts	18-8 Stainless, Grade 316/304 F_y = 74 ksi (Yield) & F_u = 29 ksi (Tension)
Welds	E70XX Electrodes
Platform Steel Grating	McNichols GW Series – 1-1/2"x1/8" (8.3 psf) (Or Equivalent)
Fiberglass Reinforced Plastic (FRP)	F_u = 33,000 psi E = 2,600,000 psi
Concrete / Reinforcing	f'_c = 3,000 psi / F_y = 60 ksi
Concrete Slab Post-Tensioning	F_y = 270 ksi Ultimate Strength
CMU	f'_m = 1,500 psi

1. Strengths listed were assumed for this analysis and are based upon ASTM, AISC, RCSC, AWS and ACI preferred specification values. Values and materials are consistent with industry standards. Material strengths were taken from original design documents when available.

4.3 Analysis Notes & Assumptions

Core One Consulting USA does not take responsibility for the appurtenances or equipment loading of other carriers, as these fall outside the scope of this analysis. This evaluation focuses solely on the areas and structural members immediately adjacent to the referenced carriers existing and proposed equipment and antenna mount assemblies. Our assessment is based only on the information provided, and we have not independently verified the existing structural conditions. If any of the reported conditions (such as appurtenance loading, member sizes, etc.) are inaccurate, please contact our office immediately to request an amended report, as any discrepancies will render this evaluation inaccurate.
This analysis confirms the adequacy of the primary components of the structure. However, it's important to note that not all connections, welds, bolts, plates, etc., were individually detailed and analyzed. In instances where specific analysis was not conducted, it was assumed that the existing connection plates, welds, bolts, etc., were sufficient to develop the full capacity of the main structural members.
Furthermore, this analysis does not account for unusual or extreme wind events, rime/in-cloud ice loadings, harmonic or nodal vibration, vortex shedding, or similar conditions. Therefore, it is the owner's responsibility to determine the appropriate design wind speed and the amount of ice accumulation beyond code minimum values that should be considered in the analysis.
This report solely evaluates the proposed carrier's structure outline in the appendix. It does not assess the adequacy of other mounts, tower, building or coaxial mounting attachments, which are assumed to be adequate and installed per manufacturer requirements for the purposes of this analysis.

PROJECT DATA	
Project Number:	SD05
Carrier:	AT&T Mobility
Carrier Site ID:	10092489
Carrier Site Name:	Mercer Island
Date:	4/25/2025

CODES AND STANDARDS	
Building Code:	2021 IBC
Local Code:	2021 MICC
Analysis Code:	TIA-222-H
Design Criteria	LRFD

STRUCTURE DETAILS		
Structure Type:	Building	
Structure Height:	62.8	ft
Mount Status:	Existing	
Mount Type:	Pipe	
Mount Elevation:	66.0	ft
Number of Sectors:	3	

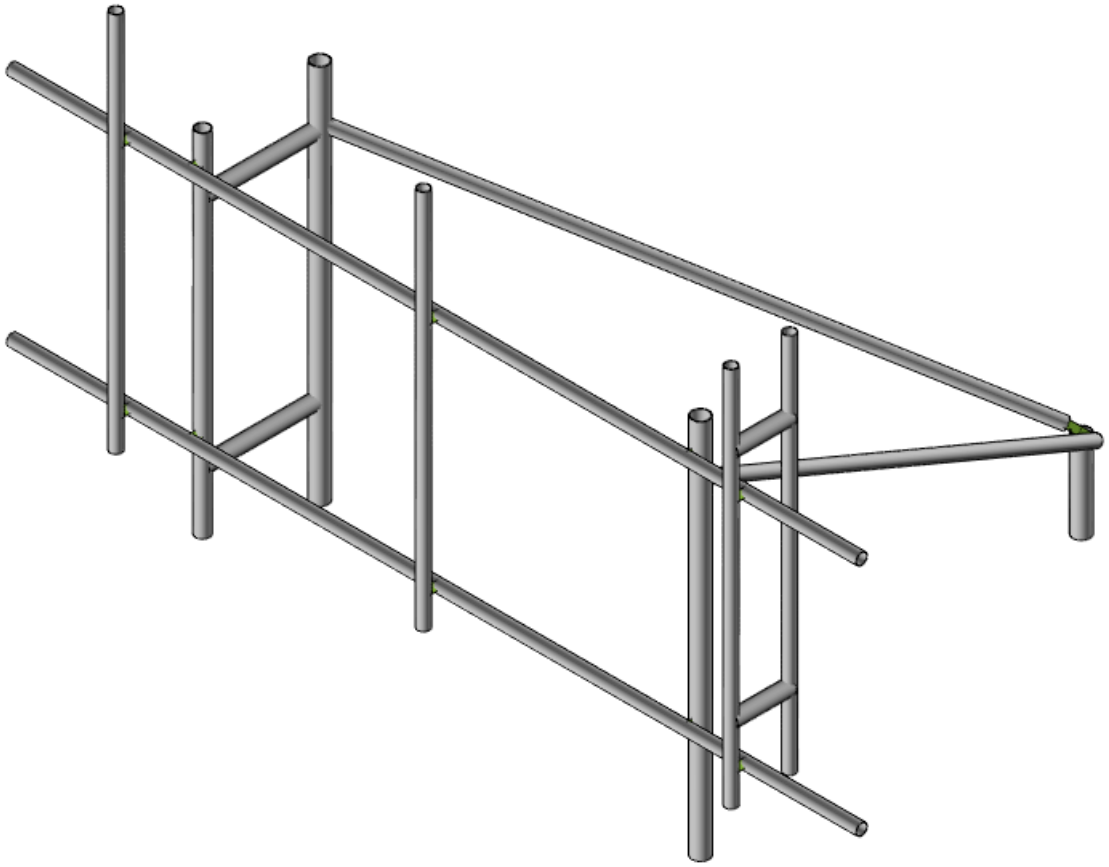
SITE PARAMETERS				
Classification			**Topography**	
Risk Category:	II		Category:	1
Exposure Category:	C		Feature:	0
Site Class:	D - Default		Calculated Factor:	1.000
Wind and Ice Parameters			**Seismic Parameters**	
Design Wind Speed:	98	mph	Short Period Accel.:	1.394
Ice Wind Speed:	30	mph	1-Second Accel.:	0.485
Design Ice Thickness:	1.00	in		

CALCULATIONS				
Wind and Ice			**Seismic**	
Velocity Pressure:	26.99	psf	Short Period Design:	1.11520
Ice Velocity Pressure:	2.34	psf	1-Second Design:	0.38800
Ice Thickness:	1.0718	in	Short Period Coef.:	1.20000
			1-Second Coef.:	1.20000

EQUIPMENT SUMMARY					
Equipment Model	**EPA_N**	**EPA_T**	**WIND F_N**	**WIND F_T**	**SEISMIC E_h**
--	FT^2	FT^2	LBS	LBS	LBS
ERICSSON AIR 6472 B77G/B77M*	4.9	1.7	120.6	40.3	51.5
CELLMAX TECHNOLOGIES CMA-UBTMLBMLBHH/6516/16/21/21	15.1	5.1	366.2	123.6	66.9
COMMSCOPE NNH4-65B-R6*	6.9	2.4	168.4	58.3	64.6
ERICSSON RADIO 4490 B5/B12	2.0	0.9	48.1	22.1	45.5
ERICSSON RADIO 4494 B14/B29	2.4	0.9	58.5	23.0	38.4
ERICSSON RADIO 4890 B25/B66	2.0	0.9	48.1	22.4	45.5
RAYCAP DC9-48-60-24-PC16-EV	2.0	1.0	49.3	24.4	23.4

***Antenna CaAa values are provided per Manufacturer CFD data, and implemented from all wind directions with Ka = 1.0.All other Manufacturers have not generated CFD data and therefore not implemented in this analysis.**

EQUIPMENT SUMMARY											
Equipment Model	CFD Antenna Increments										
--	**0**	**10**	**20**	**30**	**40**	**45**	**50**	**60**	**70**	**80**	**90**
ERICSSON AIR 6472 B77G/B77M	4.9	4.8	4.4	3.9	3.3	3.1	2.9	2.4	1.9	1.6	1.7
COMMSCOPE NNH4-65B-R6	6.9	8.5	9.0	8.5	7.8	7.4	6.9	5.2	4.3	3.1	2.4



CORE ONE CONSULTING USA	Core One Consulting USA	Mercer Island	SK-1
	MZ		Apr 25, 2025 at 11:41 AM
	SD05		SD05_loaded.r3d

Concrete Beam

Project File: SD05.ec6

DESCRIPTION: Slab at Mount Location

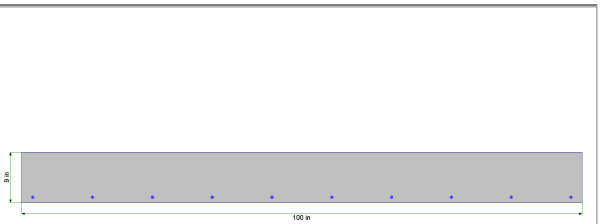
CODE REFERENCES

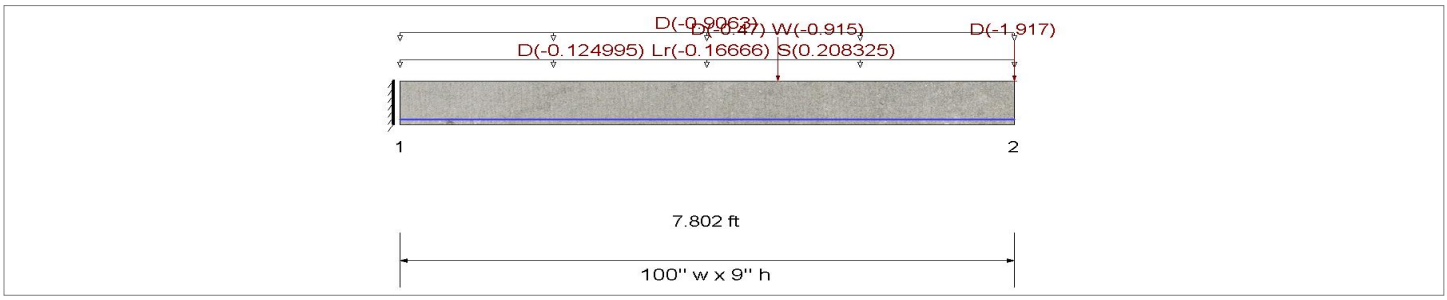
Calculations per ACI 318-19, IBC 2021, ASCE 7-16
Load Combination Set : ASCE 7-16

General Information

f'c	=	4.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = f'c$^{1/2}$ * 7.50	=	474.342 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		3
			Number of Resisting Legs Per Stirrup	=	2

Seismic Design Category = A





Cross Section & Reinforcing Details

Rectangular Section, Width = 100.0 in, Height = 9.0 in
Span #1 Reinforcing....
10-#5 at 1.0 in from Bottom, from 0.0 to 7.802 ft in this span

Load for Span Number 1

Uniform Load : D = -0.0150, Lr = -0.020, S = 0.0250 ksf, Tributary Width = 8.333 ft, (Design Loads)

Point Load : D = -0.470, W = -0.9150 k @ 4.802 ft, (Mount)
Point Load : D = -1.917 k @ 7.802 ft, (Brick Cladding)
Uniform Load : D = -0.9063 k/ft, Tributary Width = 1.0 ft, (Beam Weight)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.637** : 1	
Section used for this span	**Typical Section**	
Mu : Applied	68.633	k-ft
Mn * Phi : Allowable	107.784	k-ft
Location of maximum on span	0.000	ft
Span # where maximum occurs	Span # 1	

Maximum Deflection

Max Downward Transient Deflection	0.000 in	Ratio =	0	<360.0	Lr Only
Max Upward Transient Deflection	-0.007 in	Ratio =	26624	>=360.0	
Max Downward Total Deflection	0.000 in	Ratio =	0	<180.0	
Max Upward Total Deflection	-0.149 in	Ratio =	1256	>=180.0	Span: 1 : +D+0.750Lr+0.450W

Maximum Forces & Stresses for Load Combinations

Load Combination Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	7.802	68.63	107.78	0.64

Concrete Beam

Project File: SD05.ec6

DESCRIPTION: Slab at Mount Location

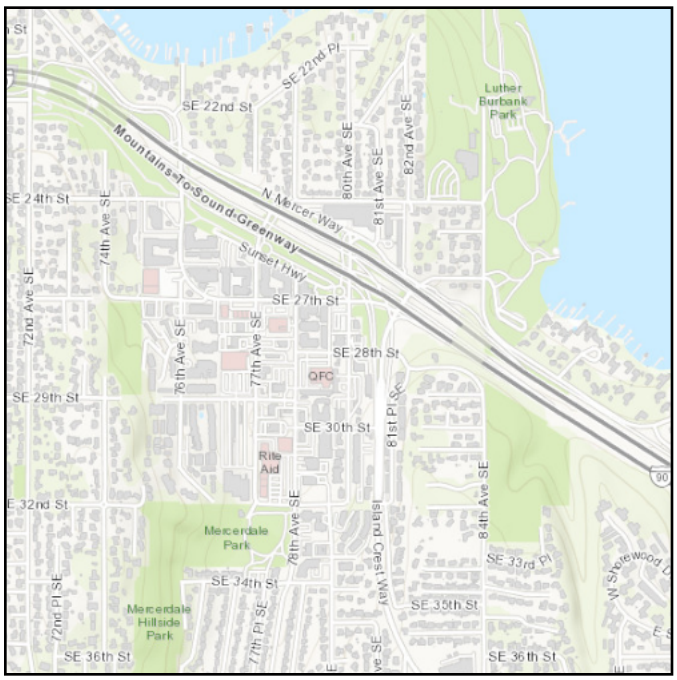
Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
+1.40D					
Span # 1	1	7.802	68.04	107.78	0.63
+1.20D+0.50Lr					
Span # 1	1	7.802	60.86	107.78	0.56
+1.20D+0.50S					
Span # 1	1	7.802	55.15	107.78	0.51
+1.20D+1.60Lr					
Span # 1	1	7.802	66.44	107.78	0.62
+1.20D+1.60Lr+0.50W					
Span # 1	1	7.802	68.63	107.78	0.64
+1.20D+1.60Lr-0.50W					
Span # 1	1	7.802	64.24	107.78	0.60
+1.20D+1.60S					
Span # 1	1	7.802	48.18	107.78	0.45
+1.20D+1.60S+0.50W					
Span # 1	1	7.802	50.37	107.78	0.47
+1.20D+1.60S-0.50W					
Span # 1	1	7.802	45.98	107.78	0.43
+1.20D+0.50Lr+W					
Span # 1	1	7.802	65.25	107.78	0.61
+1.20D+0.50Lr-W					
Span # 1	1	7.802	56.46	107.78	0.52
+1.20D+0.50S+W					
Span # 1	1	7.802	59.54	107.78	0.55
+1.20D+0.50S-W					
Span # 1	1	7.802	50.76	107.78	0.47
+0.90D+W					
Span # 1	1	7.802	48.13	107.78	0.45
+0.90D-W					
Span # 1	1	7.802	39.35	107.78	0.37
+1.20D+0.20S					
Span # 1	1	7.802	57.05	107.78	0.53
+0.90D					
Span # 1	1	7.802	43.74	107.78	0.41

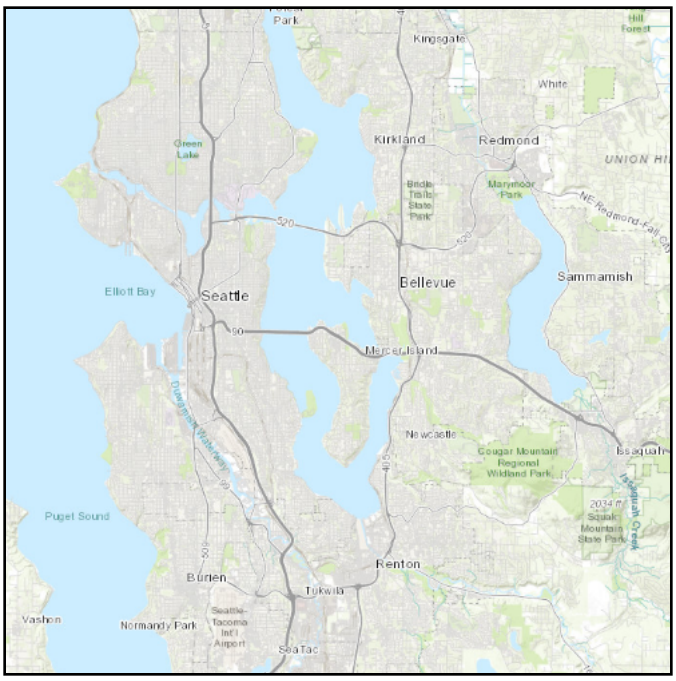
ASCE Hazards Report

Address:
7900 SE 28th St
Mercer Island, Washington
98040

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Default (see Section 11.4.3)

Latitude: 47.585757
Longitude: -122.232083
Elevation: 93.02845448937765 ft (NAVD 88)





Wind

Results:

Wind Speed	98 Vmph
10-year MRI	67 Vmph
25-year MRI	74 Vmph
50-year MRI	78 Vmph
100-year MRI	83 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Mon Apr 07 2025

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

Seismic

Site Soil Class: D - Default (see Section 11.4.3)

Results:

S_S :	1.394	S_{D1} :	N/A
S_1 :	0.485	T_L :	6
F_a :	1.2	PGA :	0.596
F_v :	N/A	PGA_M :	0.715
S_{MS} :	1.672	F_{PGA} :	1.2
S_{M1} :	N/A	I_e :	1
S_{DS} :	1.115	C_v :	1.379

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Mon Apr 07 2025

Date Source: USGS Seismic Design Maps

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	25 F
Gust Speed	30 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Mon Apr 07 2025

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

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