

STATE OF CONNECTICUT CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051 Phone: (860) 827-2935 Fax: (860) 827-2950 E-Mail: siting.council@ct.gov Web Site: portal.ct.gov/csc

VIA ELECTRONIC MAIL

August 1, 2023

Bradley Parsons
Director of Design and Permitting
Verogy
124 LaSalle Road, 2nd Floor
West Hartford, CT 06107
bparsons@verogy.com

RE:

PETITION NO. 1550 – VCP FX Middletown, LLC d/b/a Verogy declaratory ruling, pursuant to Connecticut General Statutes §4-176 and §16-50k, for the proposed construction, maintenance and operation of a 1.5-megawatt AC roof-mounted solar photovoltaic electric generating facility located at the Fed Ex Distribution Center, 49 FedEx Drive, Middletown, Connecticut, and associated electrical interconnection.

Dear Bradley Parsons:

The Connecticut Siting Council (Council) is in receipt of your correspondence dated July 27, 2023, regarding compliance with Condition No. 2 of the Council's Declaratory Ruling issued on March 3, 2023 for the above-referenced facility. The correspondence includes the final structural design for the racking system stamped by a Professional Engineer duly licensed in the State of Connecticut, in accordance with Condition No. 2.

Therefore, the Council acknowledges that Condition No. 2 has been satisfied. This acknowledgment applies only to the condition satisfied by the July 27, 2023 correspondence.

Please be advised that deviations from the standards established by the Council in the Declaratory Ruling are enforceable under the provisions of Connecticut General Statutes §16-50u.

Thank you for your attention and cooperation.

Sincerely,

Melanie A. Bachman Executive Director

Walink Meel

MB/IN/laf



Bradley Parsons
development@verogy.com
(860) 288-7215 x715

124 LaSalle Road, 2nd Floor
West Hartford, CT 06107
Verogy.com

July 27, 2023

Via Electronic Filing

Melanie Bachman, Executive Director/Staff Attorney Connecticut Siting Council 10 Franklin Square New Britain, CT 06051

Re: Petition No. 1550 - VCP FX CT, LLC Petition for Declaratory Ruling pursuant to Connecticut General Statutes §4-176 and §16-50k, for the Construction, Operation, and Maintenance of a 1.5 MW AC Roof-Mounted Solar Photovoltaic Electric Generating Facility at FedEx Distribution Center, 49 FedEx Drive, Middletown, Connecticut – PE Stamped & Signed Structural Design

Dear Ms. Bachman:

Pursuant to Condition No. 2 in the Connecticut Siting Counsel's ("CSC") Findings of Fact, Opinion, and Decision and Order ("Declaratory Ruling") (Petition No. 1550), we are hereby providing, via email, the final structural design for the racking system stamped by a Professional Engineer duly licensed in the State of Connecticut prior to commencement of construction.

If you have any questions concerning this notification, please contact me at your convenience.

Sincerely,

Bradley J. Parsons

Director of Design and Permitting



VSE Project Number: U4867.0016.231

April 12, 2023

Verogy 150 Trumbull Street Hartford, CT 6103

REFERENCE: Fedex Middletown Building: 49 Fedex Drive, Middletown, CT 06457 Solar Array Installation

To Whom It May Concern:

Per your request, we have reviewed the rails and connections the existing structures at the above referenced site. The purpose of our review was to determine the adequacy of the proposed racking and connections to the existing building. Based upon our review, we conclude that the proposed connection method is adequate to support the proposed solar panel installation. Based on the manufacturer specifications, the Ironridge XR100 rail, and accompanying racking is adequate to span 48" between attachment points. The analysis of the existing structure is by others, including the attachment of the metal roof panels to the existing structure.

Design Parameters

Code: Connecticut State Building Code, 2022 Edition (2021 IBC)

Risk Category: II

Design wind speed, Vult: 120 mph (3-sec gust)

Wind exposure category: C Ground snow load, Pg: 30 psf Flat roof snow load, Pf: 30 psf

Existing Roof Structure

Roofing material: metal seam

Roof slope: 1.8°

Connection to Roof

Mounting connection: (1) S-5! E or E Mini Clamp to min. 24 ga steel roofing

Maximum mounting spacing along rails:

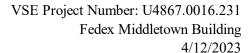
Zone 1' (Beyond 24' from roof edge): 48" o.c.

Zone 1 (Beyond 12' from roof edge to 24' from roof edge): 48" o.c.

Zone 2 (Within 12' of roof edge): 24" o.c.

Zone 3 (Within 12' of roof corner and within 4' of roof edge): 24" o.c.

Install (2) rails per row of panels, evenly spaced; panel length perpendicular to the rails shall not exceed 90 in Rail cantilever shall not exceed the lesser of 50% of the connection spacing or maximum cantilever allowed by manufacturer





Limitations

Installation of the solar panels must be performed in accordance with manufacturer recommendations. All work performed must be in accordance with accepted industry-wide methods and applicable safety standards. The design of the solar panels, the existing structure, and electrical engineering is the responsibility of others.

VECTOR STRUCTURAL ENGINEERING, LLC

CT Firm License: PEC 0001229



Jacob Proctor, P.E.

CT License: PEN.0034373 - Expires: 01/31/2024

Project Engineer

Enclosures

JSP/wic



JOB NO.: U4867.0016.231 SUBJECT: WIND PRESSURE

PROJECT: Fedex Middletown Building

Components and Cladding Wind Calculations

Label: Solar Panel Array Note: Calculations per ASCE 7-16

SITE-SPECIFIC WIND PARAMETERS:

Basic Wind Speed [mph]: 120 Notes:

Exposure Category: C
Risk Category: II

ADDITIONAL INPUT & CALCULATIONS:

Height of Roof, h [ft]: 20 (Approximate)

Comp/Cladding Location: Gable Roofs θ ≤ 7°

Enclosure Classification: Enclosed Buildings

Zone 1' GCp: 0.90 Figure 30.3-2A Zone 1' γ_a : 0.73 Fig. Zone 1 GCp: 1.63 (negative coeff.) Zone 1 γ_a : 0.73 29.4-8

Zone 2 GCp: 2.30 Zone 2 γ_a : 0.80

Zone 3 GCp: 3.20 Zone 3 γ_a : 0.80

 α : 9.5 Table 26.11-1 z_g [ft]: 900 Table 26.11-1 K_h : 0.90 Table 26.10-1 K_e : 1.00 Table 26.9-1

K_{zt}: 1 Equation 26.8-1

K_d: 0.85 Table 26.6-1

Velocity Pressure, q_h [psf]: 28.1 Equation 26.10-1

 γ_{E} : 1.50 Section 29.4.4

WIND PRESSURES: Equation 29.4-7 $p = q_h(GC_p)(\gamma_E)(\gamma_a)$

Zone 1', p [psf]: 27.7 psf (1.0 W)

Zone 1, p [psf]: 50.1 psf (1.0 W) Zone 2, p [psf]: 77.6 psf (1.0 W)

Zone 3, p [psf]: 108.0 psf (1.0 W)

(0.2h = 4 ft)

(0.6h = 12 ft)

(1.2h = 24 ft)



JOB NO.: U4867.0016.231 SUBJECT: CONNECTION

PROJECT: Fedex Middletown Building

Calculate Uplift Forces on Connection

	Pressure (0.6 Dead -0.6 Wind) (psf)	Max Trib. Width ¹ (ft)	Max Trib. Area ² (ft ²)	Max Uplift Force (lbs)
Zone 1'	14.8	4.0	15.0	222
Zone 1	28.2	4.0	15.0	423
Zone 2	44.8	2.0	7.5	336
Zone 3	63.0	2.0	7.5	473

Calculate Connection Capacity

Roof Connector:	S-5! E or E Mini Clamp											
Additional Connection Info:	to min. 24 ga steel roofing											
Ultimate Capacity ³ [lbs/in]:	1550											
Factor of Safety:	3											
Qty. of Connectors:	1											
Prying Coefficient:	1											
Total Capacity [lbs]:	517											

Determine Result

Maximum Demand:	473
Connection Capacity:	517

Result: Capacity > Demand, Connection is adequate.

Notes

- 1. 'Max Trib. Width' is the width along the rails tributary to the connection.
- 2. 'Max Trib Area' is the product of the 'Max. Trib Width' and 1/2 the panel width/height perpendicular to the rails. (2) rails per row of panels. Length of panels perpendicular to the rails shall not exceed 90".
- 3. Ultimate capacity values are from manufacturer testing. Metal gauge is unknown. A conservative thickness has been used. Metal gauge shall be verified in field prior to installation of solar panels. Roof deck model is unknown or has not been tested for this connector. The capacity used is based on conservative values from testing of the connector on similar roof deck model.
- 4. Install metal roof connector per manufacturer's written instructions with recommended fasteners when indicated.

Rail:	Gable Roof Flush Mount System Span Table (inches) - Portrait or Landscape Installation																																														
XR100	**Max Module Length: 92.5", Max Module SF: 29.5 SF Exposure C																																														
Wind Roof														80 psf	*	T	90 ps	f*	Т	100 p	sf*	Т	110 p	sf*	120 psf* Exposed Mod.					Mod.	Er	dge Mod.															
Speed Slope (mph) (deg.	Gro	up 1 Grou	p 2 Gro	ıp 3 Gro	up 1 Gi	oup 2 Gr	oup 3	Group 1	Group	2 Group	3 Group	o 1 Gro	oup 2 Gro	up 3	iroup 1	Group 2	Group 3	Group	1 Group	2 Group	3 Grou	p 1 Gr	oup 2 G	iroup 3	Group 1	Group 2			Group 2	Т	3 Group	T		3 Group	T	2 Group		T	Т	3 Group	T	Т	3 Group	1 Group	2 Group 3	Group 1	Group 2 Group 3
90 8-20	0 1	12 112	2 10	01 9	96	96	96	79	79	79	77		77	77	72	72	72	64	64	64	58	3	58	58	54	54	54	51	51	51	48	48	48	48	48	48	44	44	44	42	42	42	112	86	77	80	67 61
mph 21-27	_	10 110		_			93	79	79	79	78			78	72	72	72	64	64	64	_		59	59	55	55	55	52	52	52	49			_			_	44	_	43			_		88	88	73 68
28-45	_	07 10 ¹ 12 10 ¹					92 96	79 79	79 79	79 79	77	_	78 7 77	77	72 72	72 72	72 72	66 64	66	66	6 ²		58 58	64 58	58 54	58 54	58 54	54 51	54 51	54	51 48	51 48	51 48				48	48		45 42			_	98	87 72	86 75	78 72 64 56
21-2	_	10 110					93	79	79	79	78			78	72	72	72	64	64	64	_		59	59	55	55	55	52	52	52	49	49	_	48	48	48	44	44	_	43	43	43	_	87	82	83	69 64
mph 28-45	15 1	07 107	7 10				92	79	79	79	78	+	78	78	72	72	72	66	66	66	64		64	64	58	58	58	54	54	54	51	51	51		_		48	48	_	45	_	_	_		82	82	74 67
100 8-20 21-2	_	12 98 10 106					93	79 79	79 79	79 79	77 78			77 78	72 72	72 72	72 72	64 64	64	64 64	_		58 59	58 59	54 55	54 55	54 55	51 52	51 52	51 52	48							44		42	_			75 82		72 79	60 48 65 61
mph 28-45	5 1	07 10	7 9	7 9			92	79	79	79	78		78	78	72	72	72	66	66	66	_	_	64	64	58	58	58	54	54	54	51		51			_	48	48	_	45	_	_	_	87	78	77	72 64
105 8-20	_	12 92 10 99					82	79	79	79	77	-		77	72	72	72	64 64		64	_		58	58	54	54 55	54	51 52	51	51	48							44		42		_	_	72		66	54 42
mph 21-27	_	10 99 07 103		_			93 92	79 79	79 79	79 79	78 78			78 78	72 72	72 72	72 72	66	64	64 66	_		59 64	59 64	55 58	58	55 58	54	52 54	52 54	49 51		49 51	_			_	44		43 45		_	_	83	72 73	75 73	61 57 67 60
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9.20	_	06 81					72	79	79	72	77		_	72	72	72	72	64	64	64	_		58	58	54	54	54	51	51	51	48						44	44		43	_	_	_	64		59	42 33
115 mph 21-27	_	09 88					83	79	79	79	78	-		78	72	12	72	64	64	64	_	_	59	59	55	55	55	52	52	52	49							44		43		_	_	69		68	54 44
28-45		06 96 08 77					83 69	79 79	79 77	79 69	78	_		78 59	72	72 72	72 69	66 64	66	66	_		64 58	64 58	58 54	58 54	58 54	54 51	54 51	54 51	51 48	51 48	51 48	_	_	_	48	48	_	45 42	_			75 58	66 42	67 55	61 53 38 30
21-27		04 84					78	79 79	79	78	78			78	72	72	72	64	64	64			59	59	55	55	55	52	52	52	49			_	_		44	44	_	43	_		_	65		65	48 39
mph 28-45	5 1	01 89	7				79	79	79	79	78		78 7	78	72	72	72	66	66	66	64		64	64	58	58	58	54	54	54	51	51	51		_		48	48	_	45	_	_		72	64	64	58 48
130 8-20 21-27	_	69 6 76	_	_	36		61 72	79 79	69 76	61 72	77	-		72	72 72	69 72	61 72	64 64	64	61	58	_	58 59	58 59	54 55	54 55	54 55	51 52	51 52	51 52	48	48				_	44	44	_	42	_	_	_	44 58	32 48	48 60	32 26 39 32
mph 28-45	_)2 82					72	79	79	72	78	-		72	72	72	72	66	66	66	64		64	64	58	58	58	54	54	54	51	51	51	_			48	48		45			_	65		58	51 38
140 8-20		64		_			51	76	64	51	76			51	72	64	51	64	64	51			58	51	54	54	51	51	51	51	48		_	_			_	44		42	_		_	33		40	26 22
mph 21-27	_	36 69 34 75		_	_		64 66	79 78	69 75	64	78 77	_		54 56	72 72	69 72	64 66	64 66	64	64 66	59	_	59 64	59 64	55 58	55 58	55 58	52 54	52 54	52 54	49 51	49 51	49 51					44		43 45		_	_	45 59	33 45	54 51	32 26 42 32
150 8-20		8 55	_				39	68	55	39	68			39	68	55	39	64	55	39	_		55	39	54	54	39	51	51	39	48		_	_				44	_	42	_	_		28		35	24 19
21-27		9 64					58	79	64	58	78	_		8	72	64	58	64	64	58	_		59	58	55	55	55	52	52	52	49							44		43	_		_	35		48	28 21
9 20		77 72 64 42		_	_		61 32	76 64	72 42	61 32	75 64	_		51 32	72 64	72 42	61 32	64 64	64 42	61 32	_	_	61 42	61 32	57 54	57 42	57 32	54 51	54 42	54 32	51 48	_		_	_		48	48		45 42	_			52 24	_	41 32	35 27 20 17
21-2		3 58					45	73	58	45	73	_		15	72	58	45	64	58	45	_	_	58	45	55	55	45	52	52	45	49							44		43				29	24	41	24 17
mph 28-45		2 64					57	72	64	57	72			57	67	64	57	64	64	57		_	59	57	56	56	56	54	54	54	51	51	51				48	48	_	45				41	29	35	30 24
170 8-20 21-27		33 38 48	_				27 35	58 68	33 48	27 35	58 68			27 35	58 68	33 48	27 35	58 64	33 48	27 35	_	_	33 48	27 35	54 55	33 48	27 35	51 52	33 48	27 35	48				_		44	33 44		42			_	22	18	27 36	18 15 21 15
mph 28-45		66 60					48	66	60	48	66			18	66	60	48	64	60	48	_	_	58	48	55	55	48	53	53	48	51	51		_		_	_	48		45	_	_	_	33		30	27 20
175 8-20	_	32	_				26	53	32	26	53		_	26	53	32	26	53	32	26	_		32	26	53	32		51	32	26	48							32	_	42		_		20		25	17 14
mph 21-27	_	55 42 54 58					32 42	65 64	42 58	32 42	65 64	_		32 12	65 64	42 58	32 42	64 61	42 58	32 42			42 58	32 42	55 55	42 55	32 42	52 53	42 53	32 42	49 50	42 50	_		_		44	42		43 45				24 32	18	34 28	20 14 25 18
8-20	_	9 29					24	49	29	24	49	_		24	49	29	24	49	29	24			29	24	49	29		49	29	24	48	29				_		29	_	42	_			19		24	16 13
180 21-27		38	2			38	29	64	38	29	64	_		29	64	38	29	64	38	29	_)	38	29	55	38	29	52	38	29	49	38	29		38	29	44	38	29	43	38	29	42	24		32	19 13
28-45	15 6	51 55	3	8 6	51	55	38	61	55	38	61		55	38	61	55	38	60	55	38	57	7	55	38	54	54	38	52	52	38	50	50	38	48	48	38	48	48	38	45	45	38	33	29	22	27	24 17

= Shaded cells indicate conditions in which UFO Mid Clamp connection capacity is exceeded. See Note 9 on page 2 for details.

Group

1

2e

2r

= min 64" span

8° - 27°

Group

2

2n

2r

3e

Roof

Slope

Group

ASCE

7-16

Roof

Zones

Group

2e

Grouping of ASCE 7-16 Roof Zones (Gable)

Group

3

28° - 45°

Group

2n

3r

<i>p</i>	(3e)	<u> </u>	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	₽	(3e)	
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<i>p</i>	<u>.</u>	<u> </u>		<u> </u>	 39	ELEVATION

Figure 2: ASCE Roof Zone Locations for Gable Roofs

1. Sarah E. Stenabaugh 2015 Design Wind Loads for Solar Modules Mounted Parallel to the Roof of a Low-rise Building, University of Western Ontario, Ph.D Program Dissertation.

Group

3

3e

Notation (Per ASCE 7-16)

* = Note: additional installation requirement for CAMO module clamp. See Note 10 on Page 3 for details.

a = 10% of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9 m). If an overhang exists, the edge distance shall be measured from the outside edge of the overhang. The horizontal dimensions used to compute the edge distance shall not include any overhang distances.

B = Horizontal dimension of building measured normal to wind direction, in ft (m).

 $\mathbf{h} = \text{Mean roof height, in ft (m)}.$

 θ = Angle of plane of roof from horizontal, in degrees.

^{**}Wind pressure loads used to generate the span tables for modules with maximum lengths of 86" and 92.5" are based on the wind tunnel study "Design Wind Loads for Solar Modules Mounted Parallel to the Roof of a Low-rise Building"1, referenced in ASCE 7-16 Section 29.4.4.



JOB NO.: U4867.0016.231 SUBJECT: SOLAR LAYOUT

PROJECT: Fedex Middletown Building

