



March 6, 2019

Attn: Mr. Marshall Green  
Quick Mount PV  
2700 Mitchell Dr.  
Walnut Creek, CA, 94598

RE: Quick Mount PV – QRail Standard  
PV Panel Racking System  
State of West Virginia Certification Letter

SEI Project No.: 17549.04

Dear Mr. Green:

Structural Enginuity Inc. (SEI) has completed its review of the Quick Mount PV – QRail Standard PV Panel Racking System (QMR-RS) for typical installations in the state of West Virginia. The QRail Standard is compliant with the sections of the following design references and codes when installed per the conditions and design criteria delineated herein.

**Design References and Codes:**

- ASCE/7-10 – Minimum Design Loads for Buildings and Other Structures
- 2015 Aluminum Design Manual, by the Aluminum Association
- Materials information and section and details provided by Quick Mount PV as appendages to this letter
- 2015 International Building Code and 2015 International Residential Code
- AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Modules, November 2012 by ICC-ES

**General Mounting System and Analysis Overview:**

The QRail Standard consists of 6005-T5 (acceptable alternative materials include 6005A-T61 and 6061-T6) extruded aluminum per ASTM B221-08. The rails are used in pairs to support photovoltaic solar panels in order to span between points of attachment to the existing roof structure. The following tables and information summarize the structural analysis performed by SEI in order to certify the QRail Standard for the state noted above.

The analysis for certification included the following parameters for each rail system.

QRail Standard:

- Risk Category II
- Roof Slopes up to 45 degrees
- Portrait & Landscape orientation of photovoltaic panels
- Max Module Dimensions = Varies, see tables
- Max Mean Roof Height = Varies, see tables (If roof slope < 10°, use eave height)

1815 W. Diehl Rd, Suite 100, Naperville, IL 60563  
630-219-1997 (P)  
www.structuralenginuityinc.com


- Wind Analysis:
  - o Wind Category: B, C, and D
  - o Roof Zones 1, 2, and 3
  - o Wind Directionality Factor ( $K_d$ ) = 0.85
  - o Topographic Factor ( $K_{zt}$ ) = 1
- Snow Analysis:
  - o Snow Exposure Factor ( $C_e$ ) = 1.0
  - o Thermal Factor ( $C_t$ ) = 1.2
  - o Slope Factor ( $C_s$ ) per ASCE 7-10, Figure 7-2a
  - o Importance Factor ( $I_s$ ) = 1
- Seismic Analysis:
  - o Seismic Design Category E or less ( $S_d$  = 2.0 max)
  - o Importance Factor ( $I_p$ ) = 1
  - o Amplification Factor ( $a_p$ ) = 1.0 per ICC-AC428
  - o Component Response Modification Factor ( $R_p$ ) = 1.5 per ICC-AC 428

Applicable loading combinations consisting of dead, wind, snow, and seismic loads in accordance with the governing code requirements were used to determine allowable rail span lengths, based on bending stress capacity, shear capacity, axial capacity, and an assumption of a single-span condition with an allowable deflection of  $L/60$ . Design wind pressures were determined using Components and Cladding calculations per ASCE 7-10, Chapters 26-30 in conjunction with the loading parameters noted above. Applicable roof snow load shall be based on ground snow load maps, equations, and factors of ASCE 7-10, Chapter 7 and applicable sections of the 2015 International Building Code for the location of the project in combination with the loading parameters noted above.

It should be noted that the analysis was limited to the capacity of the QRail Standard. Attachments of the rail to the roof structure and analysis of the roof structure itself shall be the responsibility of the installer, and should be reviewed and approved by a registered design professional where required by the local authority having jurisdiction.

### **Installation Notes:**

The QRail Standard shall be installed with the following guidelines to be in compliance with attached span tables:

- Tables noted below assume two support rails are being used per each row of photovoltaic modules in a roof solar array.
- Rails shall be continuous and not spliced over a minimum of 2 supports except for span lengths shaded with . In these cases it is acceptable to use a minimum of 1 support per rail section as long as all supports are located at a maximum of 48" on center and the first and last rail sections have a minimum of 2 supports.
- System shall be mounted parallel to roof surface with a 2" to 10" gap between roof surface and bottom of module.
- Installation over roof overhangs or within 10" of any roof edge is not recommended
- Maximum end cantilever of aluminum support rail shall not exceed 1/3 of allowable span in the roof wind pressure zone of the cantilever.
- Tables attached are limited to structural capability of the support rails only; therefore, observe all local jurisdiction requirements regarding roof setback requirements when laying out support rails and solar array.

- Actual span lengths used must be within capacity of roof attachment and structural capacity of roof member supporting solar array.

**Conclusion and Certification Summary:**

Based on the structural analysis performed by SEI in regards to the loading parameters specified above for QRail Standard, the following C1 through C57 QRail Span tables for the Quick Mount PV QRail Standard System were determined. The various span information is controlled by the applicable wind and snow loads to the structure to which the array is being mounted on the roof and based on the roof zone to which the array is installed on the roof. The tables allow for multiple panel sizes and orientations as follows:

Tables 1-6: 15 ft max mean roof height, panels in portrait orientation with a maximum length of 67.5"

Tables 7-12: 15 ft max mean roof height, panels in landscape orientation with a maximum width of 42"

Tables 13-21: 30 ft max mean roof height, panels in portrait orientation with a maximum length of 67.5"

Tables 22-30: 30 ft max mean roof height, panels in landscape orientation with a maximum width of 42"

Tables 31-39: 60 ft max mean roof height, panels in portrait orientation with a maximum length of 67.5"

Tables 40-48: 60 ft max mean roof height, panels in landscape orientation with a maximum width of 42"

Tables 49-57: 60 ft max mean roof height, panels in portrait orientation with a maximum length of 82"

Tables 58-66: 30 ft max mean roof height, panels in portrait orientation with a maximum length of 80"

This letter is to certify that the loading criteria and design basis used for the structural analysis of the QRail Standard PV Panel Racking System for the span tables attached is validated and performed in compliance with the governing building codes for the state of West Virginia.

Please contact our office if you have any further questions relating to this matter.

Sincerely,

Peter Martin  
Engineer III  
[pmartin@structuralenginuityinc.com](mailto:pmartin@structuralenginuityinc.com)



Allan T. Myket, P.E.  
President/Founder  
[amyket@structuralenginuityinc.com](mailto:amyket@structuralenginuityinc.com)



3/7/2019

**Structural Enginuity Inc.**