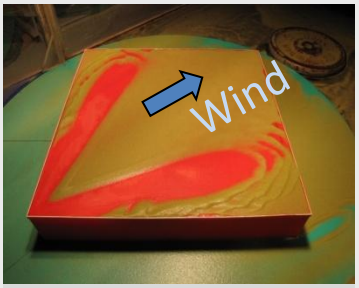
RWDI
CONSULTING ENGINEERS
& SCIENTISTS

# WIND FORCES ON SOLAR SYSTEMS

**RWDI works with racking manufacturers and energy services teams to determine code compatible, customized wind load coefficients for specific racking geometries of roof and ground mounted solar systems.**

Wind loads on arrays mounted on roofs are dominated by turbulence generated due to the aerodynamics of the roof corners and edges of the building itself.



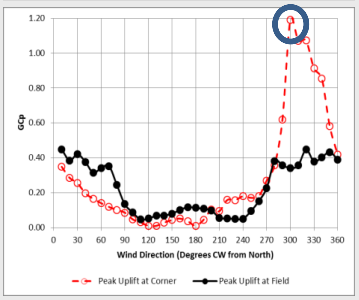

Scouring Test Indicating Extent of Corner Vortices Produced by Building Envelope

**Did you know?**

**There can be a factor of 5 or more reduction in uplift based entirely on the configuration of racking**

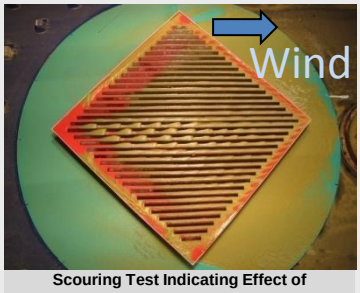
**Significant unpopulated areas in an array can create new wind-exposed edge and corner zones**

Wind loads on roof mounted arrays generally don't reach their highest values under winds perpendicular to building edges; they typically peak for winds approaching the building edges at angles of approximately 45 degrees.

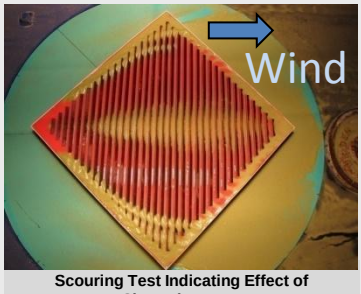



**Wind loads on modules mounted on roofs are not greater closer to the roof edge, but are greater on modules positioned on the periphery of a continuous array; no matter where situated on a simple flat roof, or on the ground**

The array can affect the aerodynamics of the flat roof causing higher wind loads on arrays mounted at a skew to the building walls

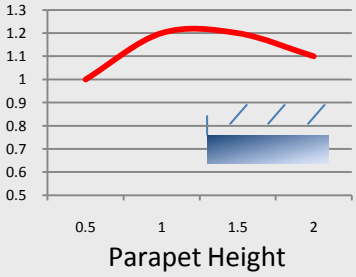



Scouring Test Indicating Effect of Skewed Array – Wind Parallel to Rows




Scouring Test Indicating Effect of Skewed Array – Wind Perpendicular to Rows

Building parapets do not necessarily provide shelter; they can actually increase wind loads on much of the array




**For ballasted systems the structural stiffness of the racking itself is a key factor in determining the ability to share wind loads over larger areas, reducing the correlated peak forces**

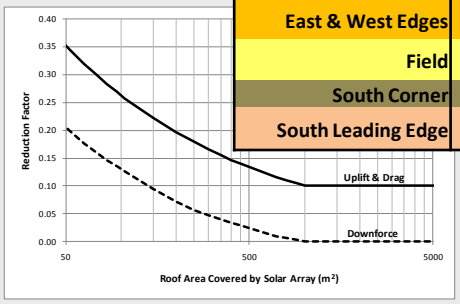
RWDI
CONSULTING ENGINEERS
& SCIENTISTS

# WIND FORCES ON SOLAR SYSTEMS

## Our design recommendations provide savings over building code interpretation… Generic or site-specific, they appeal to Professional Engineers who are used to codes

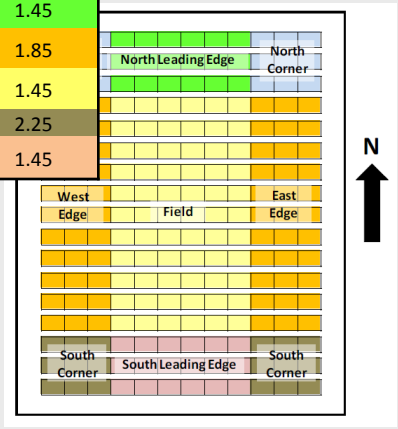
Design Table

| | Uplift (Example Only) | | Downforce (Example Only) | |
|---|---|---|---|---|
| | GCp (ASCE 7-05) | CpCg (NBCC 2005) | GCp (ASCE 7-05) | CpCg (NBCC 2005) |
| North Corner | 1.05 | 2.25 | 0.85 | 1.85 |
| North Leading Edge | 0.65 | 1.45 | 0.65 | 1.45 |
| East & West Edges | 0.85 | 1.85 | 0.85 | 1.85 |
| Field | 0.65 | 1.45 | 0.65 | 1.45 |
| South Corner | 0.85 | 1.85 | 1.05 | 2.25 |
| South Leading Edge | 0.65 | 1.45 | 0.65 | 1.45 |



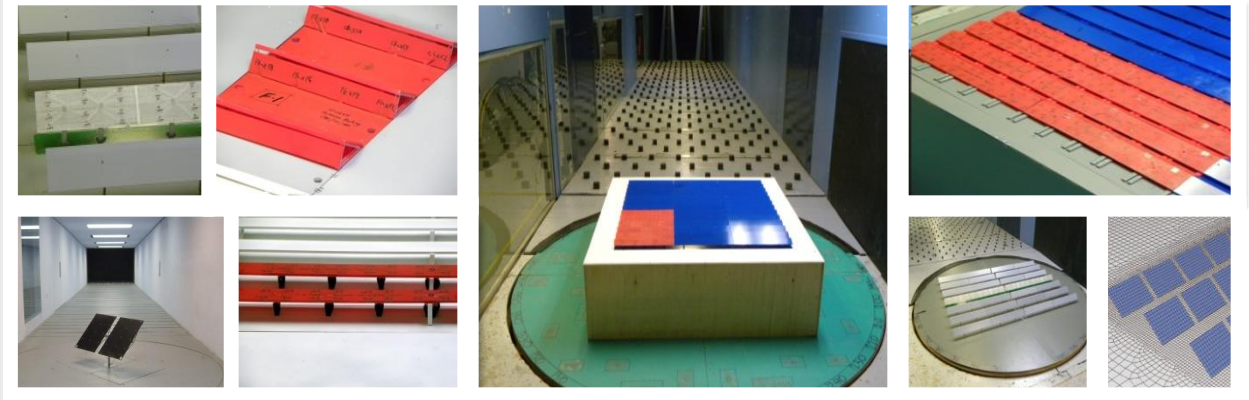

Area Reduction for Sliding Resistance

Zones of array




## Industrial research tools used by RWDI

- 4 boundary layer wind tunnels for scale model testing
- Water flume wind and snow simulator
- In-house model shops, rapid prototyping and 3D printers
- Multi-component force and pressure scanning instrumentation
- Computational Fluid Dynamics (CFD) and in-house HPC Computing Cluster




**For Additional Information Contact Scott Gamble**
**+ 519-823-1311 x2256 / scott.gamble@rwdi.com**