Exhibit CS-BW-57

Docket 8302
Exhibit CS-ECOS-9
Structural Design

Selman & Associates
Engineers · Consultants · Designers
708-267-7535 www.SelmanAndAssociates.net

90 MPH Wind, Seismic and Snow Load Calculations for Cablofil FAS rack system supporting Trina 305W panels at Chelsea Solar Project in Bennington, VT 05201

August 29, 2014

Panel Manufacturer:	Trina
Panel Model:	305W
Project Location:	Bennington VT
Seismic Design Category (SDC)	B
Governing Codes:	IBC2009/ASCE7-05
Ground Snow Load:	50 PSF
Design Wind Speed:	90 MPH

A Cablofil FAS rack system will meet the 90 MPH design wind speed, snow load and seismic design requirements of IBC2009/ASCE7-05 when supporting Trina 305W panels installed at Chelsea Solar Project.

The panels are to be installed at an incline angle of 30 degrees from the horizontal, supported by Cablofil W6x8.5 steel I-beams. I-beams are to have a maximum installed height of 59 inches above ground, providing a 24 inch height from ground to southern edge of panel. Pier approximate on-center spacing will be a maximum of 90 inches.

The W6x8.5 steel I-beams have a minimum embedment depth of 11.5 feet below ground, in 8 inch diameter, concrete filled, drilled shafts.

General	Location	Chelsea Solar Project
	Applicable Building Code	IBC2009/ASCE7-05
	Seismic Design Category (SDC)	B
Panel Data	Panel Manufacturer	Trina
	Panel Model / Incline Angle	305W / 30 degrees
	Panel Height (in)	77.01
	Panel Depth (in)	1.57
	Panel Width (in)	39.06
	Support Spacing (in)	90.00
	Panels per support	3.23
	Weight of Panels and tables per support (D, lb)	196.13
	Total Design Load (D+.75(Fw+S), lb)	1,586
Snow	Design Snow Load (S, lb) =	1,013
	Snow Importance, I	0.8
	Ground Snow Load (p_g, lb/ft^2)	50.00
	Exposure Factor (C_e)	1.00
	Thermal Factor (C_t)	1.00
	Minimum Flat Snow Load (p_f)	28
Wind	90mph Wind Load (Fw, lb) =	840
	Exposure Category =	C
	Maximum Panel center installed height (ft) =	4.92
	Panel Depth =	1.57
	Panel Width =	39.06
	Panels projected front area Af =	20.89
	Panels projected top area At =	36.18
	Velocity Pressure coefficient Kz =	0.85
	Topography factor Kzt =	1.00
	Directionality factor Kd =	0.9
	Wind Speed V =	90
	Importance factor Iw =	0.87
	qz =	13.80
	Gust Effect factor G =	0.85
	Force coeff Cf =	1.71
Seismic	F_E =	11
	$F_{E\ Max}$ =	61
	$F_{E\ Min}$ =	11
	S_{DS} =	0.195
	S_{D1} =	0.115
	a_p =	1.00
	I_P =	1.00
	R_P =	6.00
	z / h =	1.0
	S_S (% of g) =	18.50
	S_1 (% of g) =	7.20
	Site Coefficient F_a =	1.58
	Site Coefficient F_v =	2.40
	Site Soil Classification =	D
	Seismic Upward Force (lb), F up =	7.67

Horizontal Beam Bending Analysis

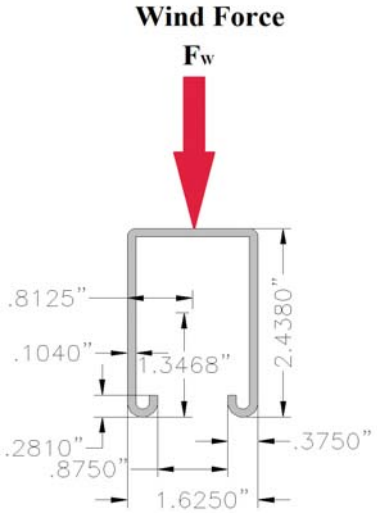
Material description		Nominal Dimensions		C1 (in)	C2 (in)
12ga G90 Galvanized ASTM A653		2.44	High, in	1.347	1.091
		1.63	Wide, in		
Yield Stress, min.	F_y	50,000	(psi)		
Young Modulus of Elasticity	E	30,000,000	(psi)		

Horizontal Beam Data

Total Design Load (Lbs)	Beams Sharing Design Load	Design Load per beam (Lbs)	I_x (in^4)	S (in^3)	Centroid Location (in)
1,586	4	397	0.5148	0.38	1.35

Design Wind Load Uniformly Distributed on horizontal beams.

12ga G90 Galvanized ASTM A653 horizontal beams are uniformly loaded by panels along beam length.



Description	Variable	Value	Units	Derivation / Conclusion
Total Unsupported Length	L_t	90.00	(in)	Optimized design to keep $f_{b,L}/F_b$ <1.0
Design Load per beam	P	397	(lb)	from Wind, Snow & dead load combinations
Linear load	w	4.41	(lb per in)	= Design Load / Unsupported Length
		53	(lb per ft)	
Section Modulus	S	0.38	(in^3)	= I_y / c, from mfr data
Allowable Bending Stress	F_b	20,000	(psi)	Fy * 0.4, SF=2.5

Bending Stress

Max Moment	M_L	4,461	(in-lb)	$=w * L^2 / 8$
Actual Bending Stress	$f_{b,L}$	11,671	(psi)	= M_L / S
Actual / Allowable	$f_{b,L} / F_b$	0.58	**<1, Acceptable Stress**	

Conclusion:

12ga G90 Galvanized ASTM A653 horizontal beams will not exceed allowable bending stress.

10.5" High Pier Cap Bending Analysis

Material description	Nominal Dimensions	C1 (in)	C2 (in)
10ga G90 Galvanized ASTM A653	10.50 High, in	5.250	5.250
	2.00 Wide, in		
Yield Stress, min. F_y	50,000 (psi)		
Young Modulus of Elasticity E	30,000,000 (psi)		

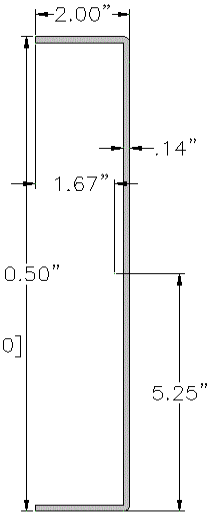
Horizontal Beam Data

Total Design Load (Lbs)	Beams Transfering Design Load	Design Load per beam loading location (Lbs)	I_x (in^4)	S (in^3)	Centroid Location (in)
1,586	2	793	26.3431	5.02	5.25

Design Wind Load Uniformly Distributed on horizontal beams.

10ga G90 Galvanized ASTM A653 pier caps are point loaded by horizontal beams along cap length.

```
------------    10.5" Pier Cap    -------------
Area:                  1.9135
Perimeter:             28.6163
Bounding box:     X: -1.6692  --  0.3308
                  Y: -5.2503  --  5.2497
Centroid:         X: 0.0000       Y: 0.0000
Moments of inertia:  X: 26.3431   Y: 0.5190
Product of inertia:  XY: 0.0002
Radii of gyration:   X: 3.7104    Y: 0.5208
Principal moments and X-Y directions about centroid:
     I: 0.5190 along [0.0000 1.0000]
     J: 26.3431 along [-1.0000 0.0000]
```



Description	Variable	Value	Units	Derivation / Conclusion
Pier Cap Length	L_t	120.00	(in)	From Engineering Data Sheet 07/11/2014
Design Load per beam contact	P	793	(lb)	from Wind, Snow & dead load combinations
Design Load per beam contact	P_{Net}	1,586.17	(lb)	=2 * P
Equivalent beam location	X_{Comb}	39	(in)	From CI0218 drawing 10/15/2012
Section Modulus	S	5.02	(in^3)	= I_y / c, from mfr data
Allowable Bending Stress	F_b	20,000	(psi)	= Fy * 0.5, SF=2

Bending Stress

Max Moment	M_L	61,861	(in-lb)	$=P_{Net} * X_{Comb}$
Actual Bending Stress	$f_{b,L}$	12,328	(psi)	= M_L / S
Actual / Allowable	$f_{b,L} / F_b$	0.62	**<1, Acceptable Stress**	

Conclusion:

10ga G90 Galvanized ASTM A653 pier caps will not exceed allowable bending stress.

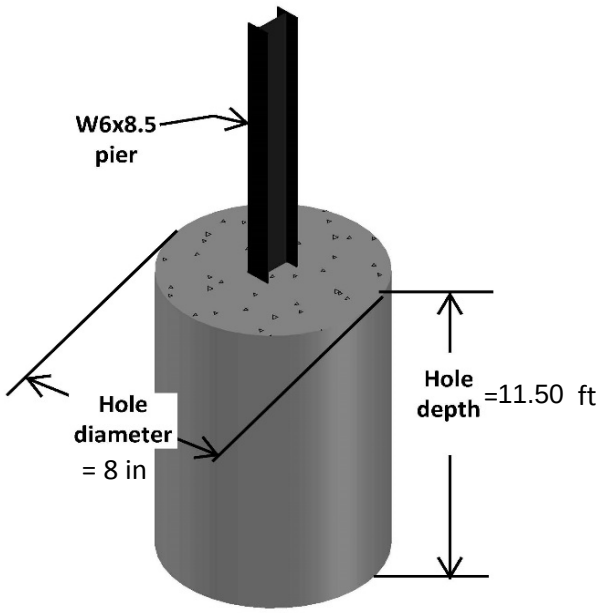
A) Lateral Embedment Analysis per IBC2009 1807.3.2.2

F_w (lb)	h_{max} (in)	Diam. (b, in)	Diam (b, ft)
840	59.00	8	0.67

S_1 (psf)	A	h (ft)	Embed. Depth (d)	Added Depth (ft)[Note 1.]	Round up to nearest half foot, say:
717.73849	4.1094883	4.92	7.18 ft	4.00	11.50 ft
			86 in		

B) Vertical Embedment Analysis per IBC2009 1807.3.2.3

Hole Diameter (in)	Hole Depth (in)	Hole Surface Area (in^2)	Hole Surface Area (ft^2)	Vertical Pressure (lb/ft^2)	Vertical Resistance (lb)
8	86	2164.765	15.03	1,500	22,550



Notes:

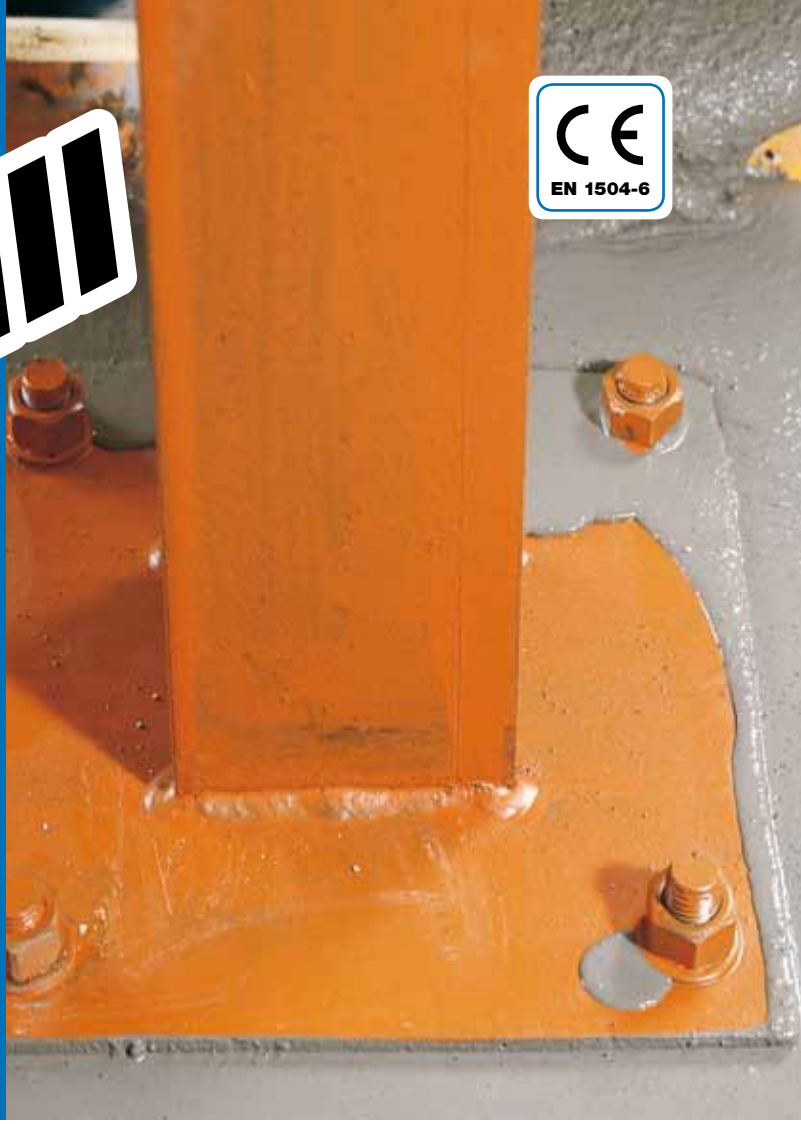
1) Per geotechnical report dated 08/06/14 Section 4.3.1.1 Note 2.

MAPEI

IN COMPLIANCE WITH EUROPEAN STANDARD
EN 1504-6
MAPEI
ANCHORING MORTAR

Mapefill

CE
EN 1504-6



High-flow non-shrink cementitious anchoring grout

WHERE TO USE
For precision anchoring of machinery and metallic structures.

Some application examples
- Anchoring machine tools by casting below the machine base.
- Anchorage structural steel work.
- Filling rigid joints between elements in concrete and precast concrete structures.
- Installations below wall level, etc.

TECHNICAL CHARACTERISTICS
Mapefill is a pre-blended powdered grout composed of high strength cement, graded aggregates and special admixtures with an expansive agent formulated by the MAPEI research laboratories.

Mapefill when mixed with water is transformed into a fluid grout without segregation that is able to fill intricate spaces.

Mapefill, due to its expansive agent, is characterized by a total absence of shrinkage in its plastic phase (ASTM norm 827) and its hardened phase (UNI norm 8147) and develops very high early flexural and compressive strength.

Mapefill also has the following qualities:
- excellent impermeability to water;
- excellent adhesion to iron and concrete;
- excellent resistance to dynamic/mechanical stress;
- modulus of elasticity and thermal expansion coefficient similar to those of high quality concrete;
- **Mapefill** does not contain metal aggregates or aluminium dust.

Mapefill meets all the main requirements for EN 1504-9 ("*Products and systems for the protection and repair of concrete structures; definitions, requirements, quality control and conformity assessment. General principles for the use of products and systems*") and the minimum requirements for EN 1504-6 ("*Anchoring steel reinforcement*").

RECOMMENDATIONS
- Do not use **Mapefill** for structural repair by pouring in forms (use **Mapegrout Hi-Flow**).
- Do not use **Mapefill** for vertical applications by spray or trowel (use **Mapegrout Thixotropic**).
- Do not add cement or admixtures to **Mapefill**.
- Do not add water when the mix has started to set.
- Do not use **Mapefill** if the bag is damaged or has already been opened.
- Do not apply **Mapefill** at temperatures below +5°C.

APPLICATION PROCEDURE
Preparing the substrate
- Remove all deteriorated concrete down to sound substrate.

Mapefill

Repairing rigid joints of a highway bridge with Mapefill

TECHNICAL DATA (typical values)

PRODUCT IDENTITY	
Type:	CC
Consistency:	powder
Colour:	grey
Maximum aggregate size (mm):	2.5
Bulk density (kg/m³):	1,300
Dry solids content (%):	100
Chloride ions content: – minimum requirements ≤ 0.05% - according to EN 1015-17 (%):	≤ 0.05
APPLICATION DATA (at +20°C - 50% R.H.)	
Colour of mix:	grey
Mixing ratio:	100 parts of **Mapefill** with 14-15 parts water (approx. 3.50-3.75 l per 25 kg bag)
Slip value of mortar according to EN 13395-2 (cm):	> 45
Density of mix (kg/m³):	2,250
pH of mix:	> 12.5
Application temperature range:	from +5°C to +35°C
Pot life of mix:	approx. 1 h

FINAL PERFORMANCE (14.5% blending water)

Performance characteristic	Test method	Requirements according to EN 1504-6	Product performance
Compressive strength (MPa):	EN 12190	> 80% of the value declared by the manufacturer	30 (after 1 day) 55 (after 7 days) 70 (after 28 days)
Flexural strength (MPa):	EN 196/1	not required	5 (after 1 day) 8 (after 7 days) 9 (after 28 days)
Modulus of elasticity in compression (GPa):	EN 13412	not required	27 (after 28 days)
Bond strength to concrete (MC 0.40 type substrate - water/cement ratio = 0.40) according to EN 1766 (MPa):	EN 1542	not required	≥ 2 (after 28 days)
Impermeability to water - penetration depth - (mm):	EN 12390/8	not required	< 5
Free expansion in the plastic phase (%):	ASTM 827	not required	≥ 0.3
Drawing resistance of the steel rods - movement under a 75 kN load (mm):	EN 1881	≤ 0.6	< 0.6
Adherence tension of rods anchored with Mapefill (MPa):	RILEM-CEB-FIP RC6-78	not required	> 25
Reaction to fire:	EN 13501-1	Euroclass	A1, $A1_{fl}$

- Scarify the surface and completely eliminate dust, oils, grease, debris and laitance.

- Soak the sides of the cavity to be filled with water. Before pouring, wait for the excess water to evaporate. To facilitate the elimination of unabsorbed water, use compressed air or a sponge if necessary.

Preparing the grout
Pour into a concrete mixer 3.50-3.75 litres of water. Start concrete mixer and slowly add **Mapefill** continuously.
Mix for 1-2 minutes, remove from the sides of the concrete mixer any powder that is not well blended; remix for another 2-3 minutes until a fluid homogeneous paste is obtained.
According to the quantities to be prepared, a grout mixer or a mechanical mixer can be used paying careful attention to avoid the formation of air bubbles.
Mixing by hand is not recommended.

Application
Pour **Mapefill** from one side only in a continual flow encouraging the discharge of air bubbles into the appropriate area which should not be less than twice the diameter of the bar to be anchored.
The use of **Mapefill** for connecting precast concrete elements and the filling of rigid joints is recommended for thicknesses up to 60 mm.
It is not necessary to vibrate the grout mechanically; to facilitate the filling of spaces that are particularly difficult, use a wood list or an iron rod.

Addition of fine gravel
For filling cavities that have dimensions greater than those indicated, add **Gravel 6-10** not exceeding 30% by weight of **Mapefill**.
Because certain characteristics may vary, such as workability and strength, it is advisable to carry out preliminary tests at the work site or to consult our Technical Services Department.

INSTRUCTIONS TO BE OBSERVED BEFORE AND AFTER APPLICATION
- At temperatures around +20°C, no particular precautions are required.

- In hot weather it is advisable not to expose the material to sun and to use cold water in preparing the mix.

- In low temperatures it is advisable to use water that is at +20°C.

- After casting, **Mapefill** must be properly cured; the surface of grout exposed to the air must be protected from rapid water evaporation that can cause the formation of surface cracks due to plastic shrinkage especially in hot and/or windy weather.

- Spray water on surface exposed to air the first 24 hours of curing or apply an anti-evaporant.

Cleaning
Fresh grout can be removed from tools with water. After curing, cleaning becomes very difficult and can only be done mechanically.

CONSUMPTION
1.95 kg/dm^3 of cavity to be filled.

PACKAGING
25 kg bags.

STORAGE
Mapefill may be stored for up to 12 months in its original packaging.
The product complies with the conditions of Annex XVII to Regulation (EC) N° 1907/2006 (REACH), item 47.
The product is available in special 25 kg vacuum-packed polyethylene bags which may be stored outside for the entire construction phase of the site. Rain has no effect on its characteristics.

SAFETY INSTRUCTIONS FOR PREPARATION AND APPLICATION
Mapefill contains cement that when in contact with sweat or other body fluids causes irritant alkaline reaction and allergic reactions to those predisposed. It can cause damage to eyes. In case of contact with eyes or skin wash immediately with plenty of water and seek medical attention. It is recommended to use protective gloves and goggles and to take the usual precautions for handling chemical products.
For further and complete information about the safe use of our product please refer to the latest version of our Material Safety Data Sheet.

PRODUCT FOR PROFESSIONAL USE.

WARNING
Although the technical details and recommendations contained in this product data sheet correspond to the best of our knowledge and experience, all the above information must, in every case, be taken as merely indicative and subject to confirmation after long-term practical application; for this reason, anyone who intends to use the product must ensure beforehand that it is suitable for the envisaged application. In every case, the user alone is fully responsible for any consequences deriving from the use of the product.

Please refer to the current version of the Technical Data Sheet, available from our website www.mapei.com

All relevant references for the product are available upon request and from www.mapei.com

Anchoring of structural steel work with Mapefill

Flow test recording to UNI 13395-2

Determination of restained expansion according to UNI 8147

Mapefill

305-5-2014 (GB)

MAPEI®

BUILDING THE FUTURE