



CONSTRUCTION PERMIT APPLICATION

*6/10/16
Higgins*

Applicant Completes: Sections I, II, III (optional), IV, VI, and VII

I. IDENTIFICATION

1. Proposed Work Site at: 629 Higgins Ave

2. Name of Owner in Fee: Joseph Hannapide

Tel. () e-mail

Address 08930

3. Ownership in Fee: Public Private X Municipally ZIP code

4. Principal Contractor: Four Point Tel. (732) 599-6704

Address 3146 RT 68 e-mail

PT Pleasant NJ 08942

License No. OR, if new home, Builder Reg. No. 13VH00870300 Exp. Date 12/31/10

Home Improvement Contractor Registration No. or Exemption Reason (if applicable):

Federal Emp. ID No. 221925256 FAX: (732) 599-8349

5. Architect or Engineer _____ Contact _____

Address _____ e-mail _____

Tel. () FAX: ()

6. Responsible Person in Charge once Work has Begun _____

Tel. () FAX: ()

V. FEE SUMMARY (for office use only)			Update	Update
1. Building	\$ <u>765</u>			
2. Electrical	<u>75</u>			
3. Plumbing				
4. Fire Protection				
5. Elevator Devices				
6. Subtotal				
7. Less 20% for State Plan Review	\$			
8. Subtotal	\$			
9. State Permit Surcharge Fee	\$ <u>119</u>			
10. Subtotal	\$			
11. Cert. of Occupancy				
12. Other				
13. TOTAL	\$ <u>(954)</u>			

VI. BUILDING/SITE CHARACTERISTICS (office use only)

1. Number of Stories _____ ft.

2. Height of Structure _____ ft.

3. Area — Largest Floor _____ sq. ft.

4. New Building Area _____ sq. ft.

5. Volume of New Structure _____ cu. ft.

6. Max. Live Load _____

7. Max. Occupancy Load _____

8. If Industrialized Building: State Approved _____ HUD _____

9. Total Land Area Disturbed _____ sq. ft.

10. Flood Hazard Zone _____

11. Base Flood Elevation _____ ft.

12. Wetlands yes _____ no _____

IIa. PROPOSED WORK

☐ Minor Work ☐ New Building ☐ Addition ☐ Demolition

☐ Repair ☐ Alteration ☐ Renovation ☐ Reconstruction

☐ Asbestos Abat. -Subch. 8 ☐ Lead Hazard Abatement ☐ Radon Remediation ☐ Annual Permit

IIb. SUBCODES (Check all that apply)

	Est. Cost	Plans Rec'd by	Date Rec'd	Rejection Date	Approval Date	Re-viewer	Approval	Rejection	Re-viewer
☒ Building	<u>45,000</u>								
☒ Electrical	<u>100,000</u>								
☐ Plumbing									
☐ Fire Protection									
☐ Elevator									
TOTAL COST									

III. PLAN REVIEW (optional)

IV. DOES OR WILL YOUR BUILDING CONTAIN ANY OF THE FOLLOWING?

1. ☐ DO YOU WANT: Partial Releases	1. ☐ Elevators/Escalators/Lifts/Dumbwaiters/Moving Walks	4. ☐ Refrigeration Systems	8. ☐ Smoke Control Systems in Open Wells
2. ☐ Prototype Processing	2. ☐ High Pressure Boilers	5. ☐ Cross-Connections/Backflow Preventers	9. ☐ Underground Storage Tanks
	3. ☐ Pressure Vessels	6. ☐ Hazardous Uses/Places of Assembly	10. ☐ Swimming Pools, Spas and Hot Tubs
		7. ☐ Sprinklers	11. ☐ LP Gas Tanks

OFFICE DATE RECEIVED: _____

VIII. PRIOR APPROVALS CHECKLIST (office use only)	LOCAL APPROVAL		COUNTY APPROVAL		REGIONAL APPROVAL		STATE APPROVAL		COMMENTS
	Prelimin. Initial	Final Date	Prelimin. Initial	Final Date	Prelimin. Initial	Final Date	Prelimin. Initial	Final Date	
☐ Zoning Officer									
☐ Planning Board									
☐ Zoning Board									
☐ Sewer Authority									
☐ Water Authority									
☐ Police Department									
☐ Health Department									
☐ Soil Conservation									
☐ N.J. Department of Community Affairs									
☐ N.J. Department of Transportation									
☐ N.J. Department of Environmental Protection									
☐ Utility Dig No.									
☐									
☐									

IX. SUBCODES AND SPECIAL REGULATIONS APPLICABLE (office use only—optional)	
Name of Code & Edition	Name of Code & Edition
Building _____	Energy _____
Electrical _____	Barrier Free _____
Plumbing _____	Flood Hazard _____
Fire Protection _____	As Built Elevation Cert. _____
Mechanical _____	Other _____

X. CERTIFICATES ISSUED (office use only)	DATE ISSUED	DATE EXPIRED	DATE REISSUED	DATE EXPIRED
☐ Temporary Certificate of Occupancy	No. _____	_____	_____	_____
☐ Temporary Certificate of Compliance	No. _____	_____	_____	_____
☐ Continued Certificate of Occupancy	No. _____	_____	_____	_____
☐ Certificate of Compliance	No. _____	_____	_____	_____
☐ Certificate of Occupancy	No. _____	_____	_____	_____
☐ Certificate of Approval	No. _____	_____	_____	_____
☐ Lead Abatement Clearance Certificate	No. _____	_____	_____	_____

CERTIFICATION IN LIEU OF OATH

I. OWNER SECTION (to be completed if the applicant is the owner in fee)

I hereby certify that I am the owner in fee of the property listed on Page 1.

Mark the following applicable boxes:

A. () I further certify that a new home (private residence) will be constructed on this property for my own use and occupancy. This dwelling is to be occupied by myself and is not to be used for any purpose other than single family residential use. I attest that all construction, plumbing, or electrical work will be done, in whole or in part, by me or by subcontractors under my supervision, in accordance with all applicable laws; and, I further acknowledge that said new home is not covered under the New Home Warranty and Builders Registration Act (N.J.S.A. 46:3B-1 et seq.) and that such fact shall be disclosed to any person purchasing this property within ten years of the date of issuance of a certificate of occupancy.

I UNDERSTAND THAT IN MARKING BOX A, I ACKNOWLEDGE THAT I AM ASSUMING RESPONSIBILITY FOR THE WORK DONE ON SAID PROPERTY, THE CONDITION OF THE PROPERTY PRIOR TO, DURING, AND AFTER ANY WORK PERFORMED, AND FOR THE PERFORMANCE OF THE SUBCONTRACTORS I HIRE, EMPLOY, OR OTHERWISE CONTRACT OR WITH WHOM I MAKE AGREEMENTS TO PERFORM WORK. I AM VOLUNTARILY AND KNOWINGLY ASSUMING THIS RESPONSIBILITY.

B. () I further certify the following as required by the New Jersey Uniform Construction Code, N.J.A.C. 5:23-2.15(f)1.ix:

I personally prepared the plans submitted for: 1) the new home referred to in A.; or, 2) an addition, alteration, renovation, or repair to an existing single family residence owned and occupied by myself and located on the property listed on Page 1; or, 3) a new structure that will be physically separate from, but that will be deemed part of, an existing single family residence that is owned and occupied by myself and located on the property listed on Page 1.

C. () I further certify that I will perform or supervise the following work:

C.1. () Building C.2. () Fire Protection

I further certify that I will perform the following work:

C.3. () Electrical C.4. () Plumbing

D. () I agree to advise all contractors on this project that they are required to be registered with the New Jersey Division of Taxation and to comply with all New Jersey tax laws.

I further certify the following as required by the Uniform Construction Code, N.J.A.C. 5:23-2.15(a)5: All required State, county, and local prior approvals have been given, including such certification as the construction official may require.

I understand that if any of the above statements are willfully false, I am subject to punishment.

Signature _____ Date _____

II. AGENT SECTION (to be completed if the applicant is not the owner in fee)

I hereby certify the following as required by the Uniform Construction Code, N.J.A.C. 5:23-2.15(d): the proposed work is authorized by the owner in fee; and I have been authorized by the owner in fee to make this application as his agent.

I further certify the following as required by the Uniform Construction Code, N.J.A.C. 5:23-2.15(a)5: All required State, county, and local prior approvals have been given, including such certification as the construction official may require.

I agree to advise all contractors on this project that they are required to be registered with the New Jersey Division of Taxation and to comply with all New Jersey tax laws.

I understand that if any of the above statements are willfully false, I am subject to punishment.

(X) Check if contractor.

Agent Name Louis Iannicello

Address 3140 RT 88 PT PLEASANT NJ 08742

Telephone (732) 522-4284

Signature [Signature]

III. () LEAD HAZARD ABATEMENT: Include Homeowner or Building Owner Affidavit as per N.J.A.C. 5:17.

Spring Lake Regional Const Dept
423 Warren Ave
Spring Lake NJ 07762
(732)449-3252



CERTIFICATE

1308 - BRIELLE BORO

Date Issued: 01/19/2011
Permit # 10-00166
Certificate: 1000166.1

IDENTIFICATION

Block 65.01 Lot 8 Qualifier
Work Site Location 629 HIGGINS AVENUE
Brielle, NJ 08730
Owner in Fee M HOLTZMAN REALTY, LLC
Address 44 FARMERSVILLE ROAD
CALIFON, NJ 07830
Telephone FOUR POINT REFRIGERATION
Contractor 3140 ROUTE 88
Address POINT PLEASANT, NJ 08742
Telephone (732) 899-6704 FAX
Lic No/Bldrs Reg No. Fed. Emp. No.
Home Imprv. Reg No. / Exempt
Reason -

☐ CERTIFICATE OF OCCUPANCY

This serves notice that said building or structure has been constructed in accordance with the New Jersey Uniform Construction Code and is approved for occupancy.

☒ CERTIFICATE OF APPROVAL

This serves notice that the work completed has been constructed or installed in accordance with the New Jersey Uniform Construction Code and is approved. If the permit was issued for minor work, this certificate was based upon what was visible at the time of the inspection.

☐ TEMPORARY CERTIFICATE OF OCCUPANCY/COMPLIANCE

If this is a temporary Certificate of Occupancy or Compliance, the following conditions must be met no later than _____ or will be Reason for TCO: _____

☐ CERTIFICATE OF CLEARANCE - LEAD ABATEMENT 5:1

This serves notice that based on written certification, lead abatement was performed as per NJAC 5:17, to the following extent:

- [] Total removal of lead-based paint hazards in scope of work
[] Partial or limited time period (_____ years); see file

☐ CERTIFICATE OF CONTINUED OCCUPANCY

This serves notice that based on a general inspection of the visible parts of the building there are no imminent hazards and the building is approved for continued occupancy.

☐ CERTIFICATE OF COMPLIANCE

This serves notice that said potentially hazardous equipment has been installed and/or maintained in accordance with the New Jersey Uniform Construction Code and is approved for use until _____.

CONSTRUCTION OFFICIAL

PermitsNJ

Fee \$0.00

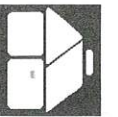
Paid [\$0.00]

Check No.

Collected by:



BUILDING SUBCODE TECHNICAL SECTION



A. IDENTIFICATION—APPLICANT: COMPLETE ALL APPLICABLE INFORMATION, WHEN CHANGING CONTRACTORS, NOTIFY THIS OFFICE. CALL UTILITY DIG NO: 1-800-272-1000.

Block 65.01 Lot 8 Qualification Code _____

Work Site Location 629 Higgins Ave.

Owner in Fee: Joseph Pennipede

Tel. () _____ e-mail _____

Address Four Point 08730

Contractor: PT Pleasant 08742 Tel. (932) 899-0704

Address PT Pleasant 08742 e-mail _____

Contractor License No. or Builder Registration No. 13VH00878300 Exp. Date 12/31/10

Home Improvement Contractor Registration No. or Exemption Reason (if applicable): _____

Federal Emp. ID No. 221925256 FAX: (932) 899-8399

JOB SUMMARY (Office Use Only)

PLAN REVIEW	Date	Initial	INSPECTIONS	Type:	Failure	Dates (Month/Day)	Initial
						Failure	Approval
☒ All	<u>9/11/10</u>	<u>S</u>	Footings				
☐ Footings/Foundations			Footings Bonding				
☐ Structural/Framework			Foundation				
☐ Exterior			Slab				
☐ Interior			Frame				
			Truss Sys./Bracing				
Joint Plan Review Required:			Barrier-Free				
☐ Elec. ☐ Plumb. ☐ Fire ☐ Elevator			Insulation				
SUBCODE APPROVAL for PERMIT			Finishes -Base Layer				
Date: <u>9/11/10</u>			Finishes -Final				
Approved by: <u>S</u>			Energy				
SUBCODE APPROVAL for CERTIFICATE			Mechanical				
☐ CO ☐ CCO ☐ CA			TCO				
Date: <u>9/11/10</u>			Other				
Approved by: <u>S</u>			Final				
			Barrier-Free				

B. BUILDING CHARACTERISTICS

Use Group Present A-3 Proposed A-3

No. of Stories _____ Constr. Class Present _____ Proposed IF

Height of Structure _____ ft. If Industrialized Building: _____

Area — Largest Floor _____ sq. ft. State Approved _____ HUD _____

New Bldg. Area/All Floors _____ sq. ft. _____

Volume of New Structure _____ cu. ft. _____

Max. Live Load _____

Max. Occupancy Load _____

Est. Cost of Bldg. Work:

1. New Bldg. \$ 45,000.-
2. Rehabilitation \$ 20,000.-
3. Total (1 + 2) \$ 65,000.-

U.C.C. F-110
(rev. 12/07)

C. CERTIFICATION IN LIEU OF OATH

I hereby certify that I am the (agent of) owner of record and am authorized to make this application.

Signature _____

D. TECHNICAL SITE DATA

DESCRIPTION OF WORK

50KW solar system mounted on roof.

TYPE OF WORK:

- ☐ New Building
- ☐ Addition
- ☐ Rehabilitation
- ☐ Roofing
- ☐ Siding
- ☐ Fence _____ Height (exceeds 6') _____ Sq. Ft.
- ☐ Sign _____ Sq. Ft.
- ☐ Pool
- ☐ Retaining Wall _____ Sq. Ft.
- ☐ Asbestos Abatement Subchapter 8
- ☐ Lead Haz. Abatement NJAC 5:17
- ☐ Radon Remediation
- ☒ Other 50KW solar Elec.
- ☐ Demolition

FEE (Office Use Only)

Administrative Surcharge \$ _____
Minimum Fee \$ _____
State Permit Surcharge Fee \$ _____
TOTAL FEE \$ 765

Date Received
Control #

9/3/10

Date Issued
Permit # 10-00166

1 White = Inspector Copy
3 Pink = Office Copy

2 Canary = Office Copy
4 Gold = Applicant Copy



ELECTRICAL SUBCODE TECHNICAL SECTION



A. IDENTIFICATION—APPLICANT: COMPLETE ALL APPLICABLE INFORMATION. WHEN CHANGING CONTRACTORS, NOTIFY THIS OFFICE. CALL UTILITY DIG NO. 1-800-272-1000.

Block 65.01 Lot 8 Qualification Code _____

Work Site Location 629 Higgins Ave

Owner in Fee: Joseph Randojele

Tel. () _____ e-mail _____

Address _____ 06730

Contractor: THOMAS ELECTRICAL CONTRACTORS, INC. (732) 223-0747

Address 2220 LANDMARK PL. STE 4 e-mail _____

MANASQUAN NJ 08736

Contractor License No. 955A Exp. Date 3/31/12

Home Improvement Contractor Registration No. or Exemption Reason (if applicable): _____

Federal Emp. ID No. 22-324-8393 FAX: () _____

B. ELECTRICAL CHARACTERISTICS

Use Group _____ Present _____ Proposed _____

☐ Pole/Pad # _____ ☐ Temporary ☐ Other _____

Building Occupied as _____ Utility Co. _____

Est. Cost of Elec. Work \$ 25,000 -

JOB SUMMARY (Office Use Only)

PLAN REVIEW

☐ No Plans Required

☐ Partial -Underslab Utilities Approved

Date: _____ Approved by: _____

☒ Electric Plans Approved

Date: 9/1/10 Approved by: MS

Joint Plan Review Required:

☐ Bldg. ☐ Plumb. ☐ Fire. ☐ Elev.

SUBCODE APPROVAL for PERMIT

Date: _____

Approved by: _____

SUBCODE APPROVAL for CERTIFICATE

☐ CO ☐ CCO CA

Date: 1-19-10

Approved by: _____

C. CERTIFICATION IN LIEU OF OATH

I hereby certify that I am the (agent of) owner of (agent of) owner of record and am authorized to make this application and perform the work listed on this application.

Applicant's Signature/Contractor's Seal and Signature

☐ Licensed Elec. Contractor ☐ Certified Landscape Irrigation Contr ☐ Exempt Applicant

D. TECHNICAL SITE DATA

DESCRIPTION OF WORK

Interior Connect solar system
To Grid.

QTY. SIZE

ITEMS

FEE (Office Use Only)

- Lighting Fixtures
- Receptacles
- Switches
- Detectors
- Light Poles
- Motors—Fract. HP
- Emergency & Exit Lights
- Communications Points
- Alarm Devices/F.A.C. Panel

TOTAL NUMBERS

- Pool Permit/with UW Lights
- Storable Pool/Spa/Hot Tub
- KW Elec. Range/Receptacle
- KW Oven/Surface Unit
- KW Elec. Water Heater
- KW Elec. Dryer/Receptacle
- KW Dishwasher
- HP Garbage Disposal
- KW Central A/C Unit
- HP/KW Space Heater/Air Handler
- KW Baseboard Heat
- HP Motors 1/+ HP
- KW Transformer/Generator
- AMP Service
- AMP Subpanels
- AMP Motor Control Center
- KW Elec. Sign/Outline Light
- 1 50kw solar elec sys.

Administrative Surcharge \$ _____

Minimum Fee \$ _____

State Permit Surcharge Fee \$ _____

TOTAL FEE \$ 75

Date Received 9/3/10
Control # _____
Date Issued 10-00166
Permit # _____



CONSTRUCTION PERMIT

Date Issued: 9/3/10
Permit # 10-00166

IDENTIFICATION Block 65.01 Lot 8 Qualifier _____

Work Site 629 HIGGINS AVENUE Contractor FOUR POINT REFRIGERATIO
Brielle, NJ 08730 Address 3140 ROUTE 88
Owner in Fee M HOLTZMAN REALTY, LLC POINT PLEASANT, NJ 08742
Address 44 FARMERSVILLE ROAD Telephone (732) 899-6704
CALIFON, NJ 07830 Lic. No. or
Telephone _____ Bldrs. Reg. No.
Home Reg. No.
or Exemption _____

**Is hereby granted permission to
perform the following work:**

[X] BUILDING [] PLUMBING
[X] ELECTRICAL [] FIRE PROTECTION [] LEAD HAZARD ABATEMENT
[] ELEVATOR DEVICES [] ASBESTOS ABATEMENT [] DEMOLITION

DESCRIPTION OF WORK:

INSTALL SOLAR ELECTRIC PANELS ON ROOF

NOTE: If construction does not commence within one (1) year of date of issuance, or if construction ceases for a period of six (6) months, this permit is void.

Estimated Cost of Work for Selected Subcode(s) \$70,000.00

Construction Official _____

Date 9/1/10 # 9279

V. FEE SUMMARY (Office Only)	
1. Building	\$765.00
2. Electrical	\$75.00
3. Plumbing	\$0.00
4. Fire Protection	\$0.00
5. Elevator	\$0.00
6. Plan Review	\$0.00
7. Subtotal	\$840.00
8. DCA State Fee	\$119.00
9. Subtotal	\$959.00
10. Certificate	\$0.00
11. Subtotal	\$959.00
12. Exemption	\$0.00
TOTAL	\$959.00

REQUIRED INSPECTIONS

Construction work must be inspected in accordance with the State Uniform Construction Code Regulation N.J.A.C. 5:23-2.18. This agency will carry out such periodic inspections during the progress of work as are necessary to insure that work installed conforms to the requirements of the Uniform Construction Code.

The owner or other responsible person in charge of work must notify this agency when work is ready for any required inspections specified below. Requests for inspections must be made at least 24 hours prior to the time the inspection is desired. Inspections will be performed within three business days of the time for which they are requested. The work must not proceed in a manner which will preclude the inspection until it has been made and approval given.

☐ Required inspections for all subcodes for one and two family dwellings are the following:

1. The bottom of footing trenches before placement of footings, except that in the case of pile foundations, inspections shall be made in accordance with the requirements of the building subcode.
2. Foundations and all walls up to grade level prior to back filling.
3. Utility services, including septic.
4. All structural framing, connections, wall and roof sheathing and insulation; electrical rough wiring, panel and service installation; rough plumbing. The framing inspection shall take place after the rough electrical and plumbing inspections and after the installation of the heating, ventilation and/or air conditioning duct system. The insulation inspection shall be performed after all other subcode rough inspections and prior to the installation of any interior finish material.

☐ Additional required inspections for all subcodes of construction, for other than one- and two-family dwellings, are fire suppression systems, heat producing devices and Barrier Free subcode accessibility, if applicable.

☐ Required special inspections. The applicant by accepting the permit will be deemed to have consented to these requirements:

☐ A final inspection is required for each applicable subcode area before a final Certificate of Occupancy or Approval may be issued. The final inspections include the installation of all interior and exterior finish materials, sealing of exterior joints, mechanical system and any other required equipment; electrical wiring, devices and fixtures; plumbing pipes, trim and fixtures; tests required by any provisions of the adopted subcodes; Barrier Free accessibility, if applicable; and verification of compliance with NJAC 5.23-3.5, "Posting Structures".

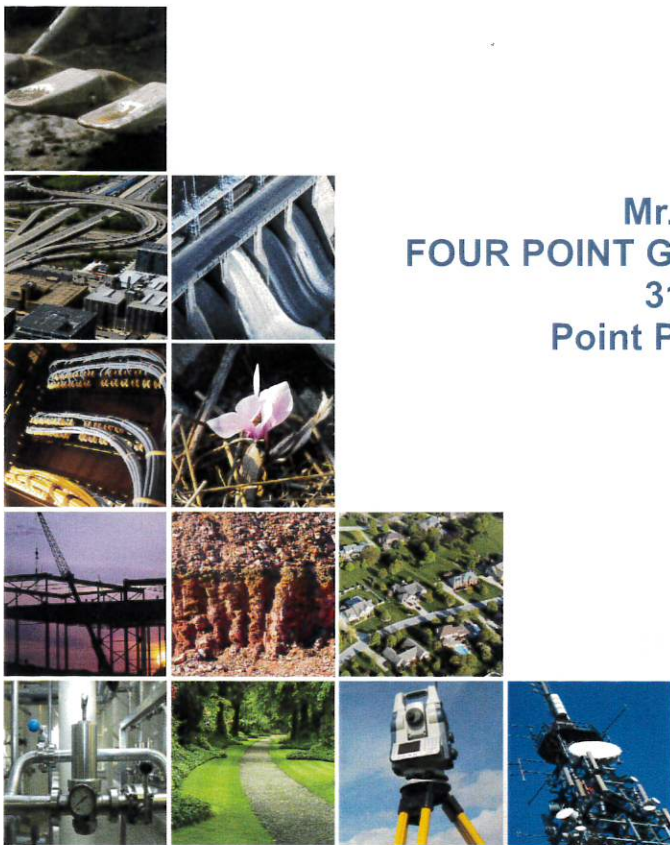
☐ A complete copy of released plans must be kept on the job site.

**Structural Calculations
for
Brielle Sports Club
Rooftop Solar System
Brielle, Monmouth County, New Jersey**

FPA No. 3644.001

Submitted to:

Mr. Lou Ianniello
FOUR POINT GREEN ENERGY SYSTEMS
3140 Route 88
Point Pleasant, NJ 08742



Robin A. Kemper P.E.
Robin A. Kemper, P.E.
N.J.P.E. License No. GE33001

Building Released 8/19/10

August 19, 2010

DESIGN BALLAST FOR SOLAR PANELS

DESIGN BALLAST AS PER "UNIRAC CODE-COMPLIANT
INSTALLATION MANUAL" SHARP 724 WATT $A = \frac{64.6 \times 39.1}{144 \times 1/ft} = 17.54$

DETERMINE WIND LOADS

CONSIDER HIGHT ROOF AS ITS OWN BLDG.

H.T. = 24' ∴ H.T. AT CENTROID = 25' EXP. B

$K_{ZE} = 1.0$ $K_d = .95$ $I = .87$ WIND SPEED = 115 MPH

$C_n U = (-0.9)$ $C_n D = 1.25$

FROM RES. SP2 & SP3

DESIGN PRESSURE UPLIFT = $-12.93 \text{ PSF} = p_U$

DESIGN PRESSURE DOWNWASH = $18.25 \text{ PSF} = p_D$

$WLFU = \text{MODULE AREA} \times p_U = 17.54(-12.93) = -225^{\#}$

$WLF D = \text{MODULE AREA} \times p_D = 17.54(18.25) = 320^{\#}$

$WLFU_z = WLFU \cos 10^\circ = -225(\cos 10^\circ) = -222^{\#}$

$WLFU_y = WLFU \sin 10^\circ = 225(\sin 10^\circ) = -39^{\#}$

$WLF D_z = WLF D \cos 10^\circ = 320(\cos 10^\circ) = 315^{\#}$

$WLF D_y = WLF D \sin 10^\circ = 320(\sin 10^\circ) = 56^{\#}$

FOR MAIN WIND RESISTING ROOF COMPS -

$a = .4h = .4(24) = 9.6'$

6.5.15, Design Wind Load on Others Structures

$$F = q_z G C_f A_f \quad (6-27)$$

$$q_z = .00256 K_z K_{zt} K_d V^2 I \quad (6-15)$$

Ht. z at the centroid of area $A_f = 25$ ft Exp = B

Exposure coefficient $K_z = 0.67$ 6.5.6.6, T-6-3 for MWFR

Topography factor $K_{zt} = 1.00$ 6.5.7.2

Directionality factor $K_d = 0.85$ Table 6-4

Wind Speed $V = 115$ mph

Importance factor $I_w = 0.87$ Table 6-1

$$q_z = 16.77 \text{ psf}$$

Gust Effect factor $G = 0.85$ 6.5.8

Force coeff $C_f = -0.9$ Figure 6-21 through 6-23

Design wind pressure, $F/A_f = -12.83$ psf

5#7. 10. 5130r

6.5.15, Design Wind Load on Others Structures

$$F = q_z G C_f A_f \quad (6-27)$$

$$q_z = .00256 K_z K_{zt} K_d V^2 I \quad (6-15)$$

Ht. z at the centroid of area $A_f = 25$	ft	Exp = B
Exposure coefficient $K_z = 0.67$		6.5.6.6, T-6-3 for MWFR
Topography factor $K_{zt} = 1.00$		6.5.7.2
Directionality factor $K_d = 0.85$		Table 6-4
Wind Speed $V = 115$	mph	
Importance factor $I_w = 0.87$		Table 6-1
$q_z = 16.77$	psf	
Gust Effect factor $G = 0.85$		6.5.8
Force coeff $C_f = 1.28$		Figure 6-21 through 6-23
Design wind pressure, $F/A_f = 18.25$	psf	

SNOW LOADS

$$SL_r = SL_g \times \cos 10^\circ = 20 (\cos 10^\circ) = 19.7 \text{ PSF}$$

$$SLF_r = SL_r \times \text{MODULE AREA} = 19.7 (17.54) = \underline{346}^\#$$

LOAD COMBINATIONS

DLF_1 = WT. OF MODULES & RAILING MATERIALS DIVIDED BY OVERALL ARRAY AREA

$$224 \text{ WATT} = 44.1^\# \quad \text{RRAIL FRAME W/BRACKETS} = 8^\#$$

$$DLF_1 = 52.1^\#$$

$$\text{LOAD COMBINATION 1 } LC_1 = DLF_1 + SLF_r = 52.1 + 346 = \underline{398}^\#$$

$$\text{LOAD COMBINATION 2 } LC_2 = DLF_1 + WLF_{DZ} = 52.1 + 315 = \underline{367}^\#$$

$$\begin{aligned} \text{LOAD COMBINATION 3 } LC_3 &= DLF_1 + (.75 \times SLF_r) + (.75 \times WLF_{DZ}) \\ &= 52.1 + (.75)(346) + (.75)(315) = \underline{540}^\# \end{aligned}$$

$$\begin{aligned} \text{LOAD COMBINATION 4 } LC_4 &= (.6 \times DLF_1) + WLF_{DZ} \\ &= .6(52.1) + (-222) = \underline{-191}^\# \end{aligned}$$

Z DIRECTION LOAD COMBINATIONS, DOWNFORCE

$$DLF_{DZ} = (\text{MAY. LCI, LC1, OR LC3}) = \underline{549\#}$$

$$DLF_{DZ}/4 = 549/4 = \underline{137\#} \text{ FORCE IN EA. RAPIDRAC BRACKET IN Z DIRECTION}$$

$$DLF_{DZ}/4 < 400\# \quad \underline{137\# < 400\# \text{ OK}}$$

$$DLF_{UZ} = \text{UPLIFT DESIGN FORCE IN Z} = \text{LC4} = \underline{191\#}$$

$$DLF_{UZ}/4 = 191/4 = 48\# \text{ FORCE IN EA. RAPIDRAC BRACKET IN Z DIRECTION}$$

$$DLF_{UZ}/4 < 630\# \quad \underline{48\# < 630\# \text{ OK}}$$

Y DIRECTION LOAD COMBINATIONS

$$DLF_{DY} = \text{DOWNWARD DESIGN FORCE IN Y}$$

$$DLF_{UY} = \text{UPLIFT DESIGN FORCE IN Y}$$

$$DLF_{DY}/2 < 1034\# \text{ (2X BOLT SHEAR)}$$

$$DLF_{UY}/2 < 1034\# \text{ (TENSILE FORCE)}$$

X DIRECTION LOAD COMBINATIONS

$$\text{LOAD COMBINATION 5 } LC5 = DLF_2 + (0.7E)$$

FIRST DESIGN BALLAST



FRENCH & PARRELLO

ASSOCIATES, P.A., CONSULTING ENGINEERS

1800 Route 34, Suite 101 • Wall, New Jersey 07719
T 732.312.9800 • F 732.312.9801 • www.fpaengineers.com

JOB BRIEFER SPORTS CLUB 3641-01
SHEET NO. SP6 OF
CALCULATED BY RAK DATE 6-18-10
CHECKED BY DATE
SCALE

DETERMINE BALAST DUE TO UPLIFT WIND

WT. REQUIREMENTS Z-DIR.

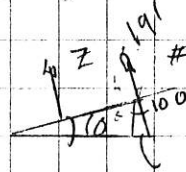
$$BW_{uz} = LC_4 \text{ OR } DLF_{uz} = \underline{\underline{-191\#}}$$

WT. REQUIREMENTS Y-DIR.

$$BW_{uy} = (.6 \times DLF_1 + BW_{uz} + DLF_{az}) \times 0.4$$

$$= (.6 \times 52.1 + (-191) + (-191)) \times 0.4 = \underline{\underline{-140\#}}$$

DETERMINE DLF_{uy} :



$$51W 10^\circ = \frac{y}{191} = 33^\circ$$

$$DLF_{uy} < BW_{uy} \therefore 33^\circ < -140^\circ \therefore BW_{DRAG} = 0$$

$$BW_c = BW_{uz} + BW_{DRAG} = 191 + 0 = \underline{\underline{191\#}}$$

$$.434 BW_c = BW_e = .434(191) = \underline{\underline{83\#}}$$

$$1.5 BW_e = BW_r = 1.5(83) = \underline{\underline{124.5\#}}$$

USE CAP BLOCKS 4"X8"X16" WT=26#/BLOCK

CAN USE REDUCED LOAD BECAUSE UNIRAC
HAS TESTED THE ASSEMBLY IN WIND TUNNELS
& HAS DEVELOPED SPECIFIC DESIGN MODELS

$$124.5/26 = 4.79 \therefore \underline{\underline{USE 5 BALAST BLOCKS/ARRAY}}$$

DETERMINE SUPERIMPOSED LOAD ON ROOF STRUCTURE

LOOK AT ONE PANEL



FRENCH & PARRELLO

ASSOCIATES, P.A., CONSULTING ENGINEERS

1800 Route 34, Suite 101 • Wall, New Jersey 07719
T 732.312.9800 • F 732.312.9801 • www.fpaengineers.com

JOB BRILLE SPORTS CLUB 36TH 001

SHEET NO. SP7

OF

CALCULATED BY LAH

DATE 8-19-10

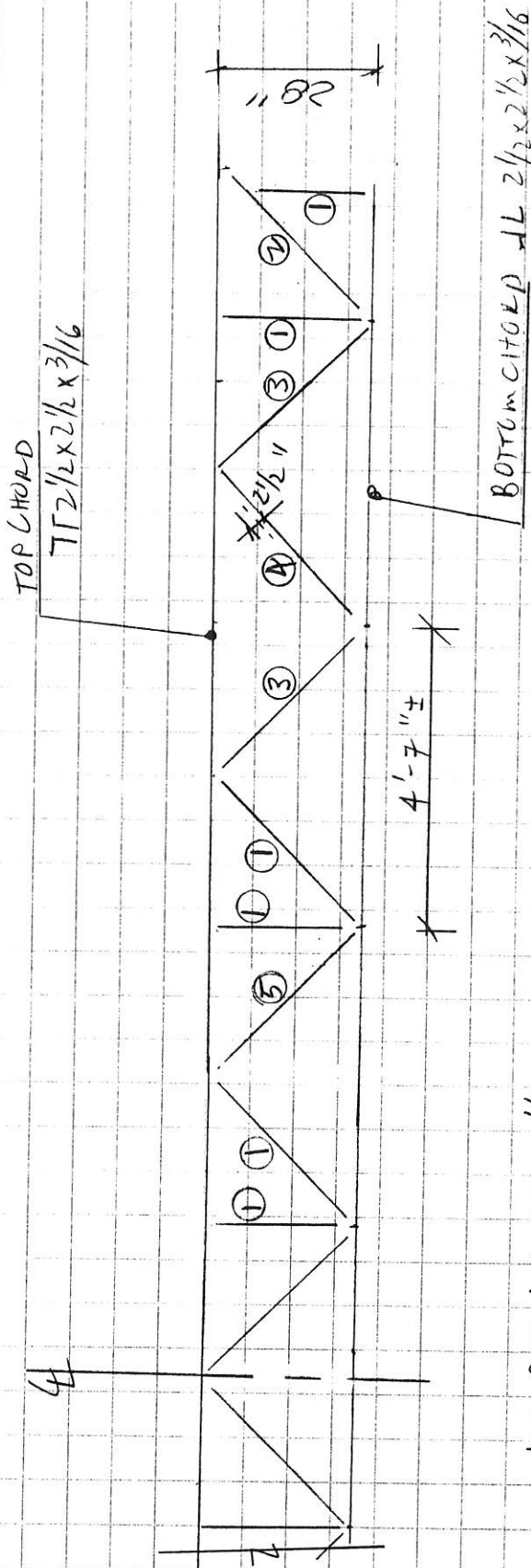
CHECKED BY

DATE

SCALE

$$DL_2 = DCF + BW/A = 52.1 + 26(5) = 192.1 \text{ #} / 17.54 = \underline{\underline{10.4 \text{ PSF}}}$$

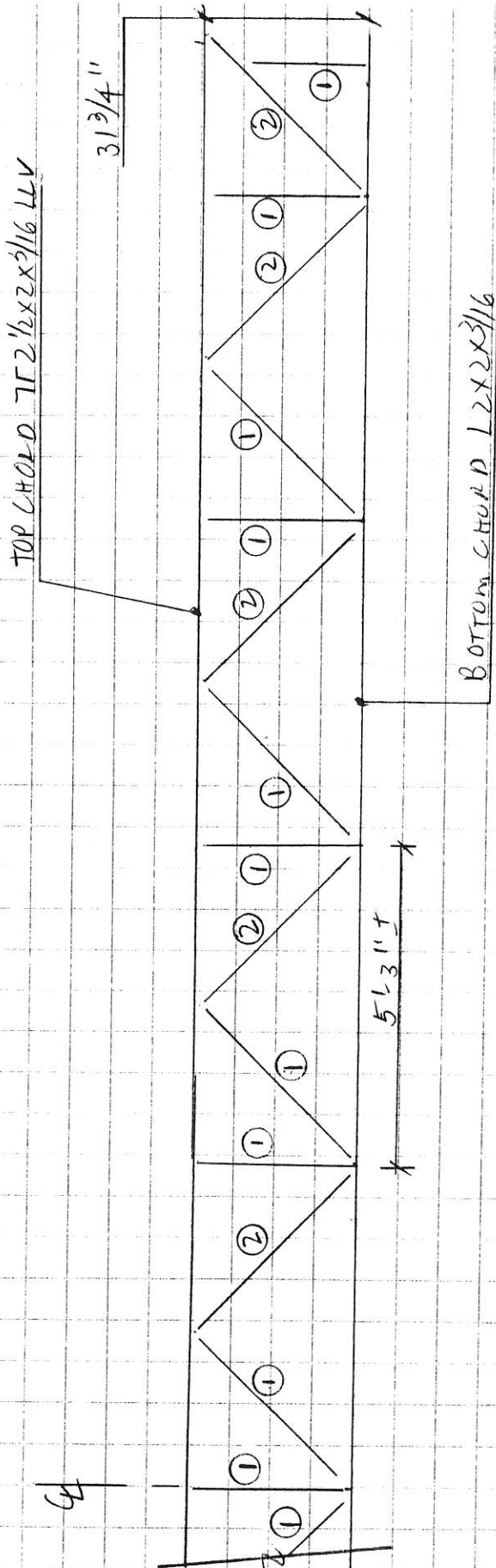
SEISMIC LOADS ARE MINIMAL



MEMBERS: 1- L1 x 1 x 1/8
2- L2 x 1 x 1/8
3- L2 x 2 x 1/8
4- L2 1/2 x 2 x 3/16
5- L1 3/4 x 1 3/4 x 1/8

NOTES:

1. JOIST SEATS 6" ±
2. SPAN 42'-9" ±
3. TAG - TOP OF STEELING. POINT OF ROCKS MD;
J6, J9, ...
4. JOIST SPACING ~ 7'-6"

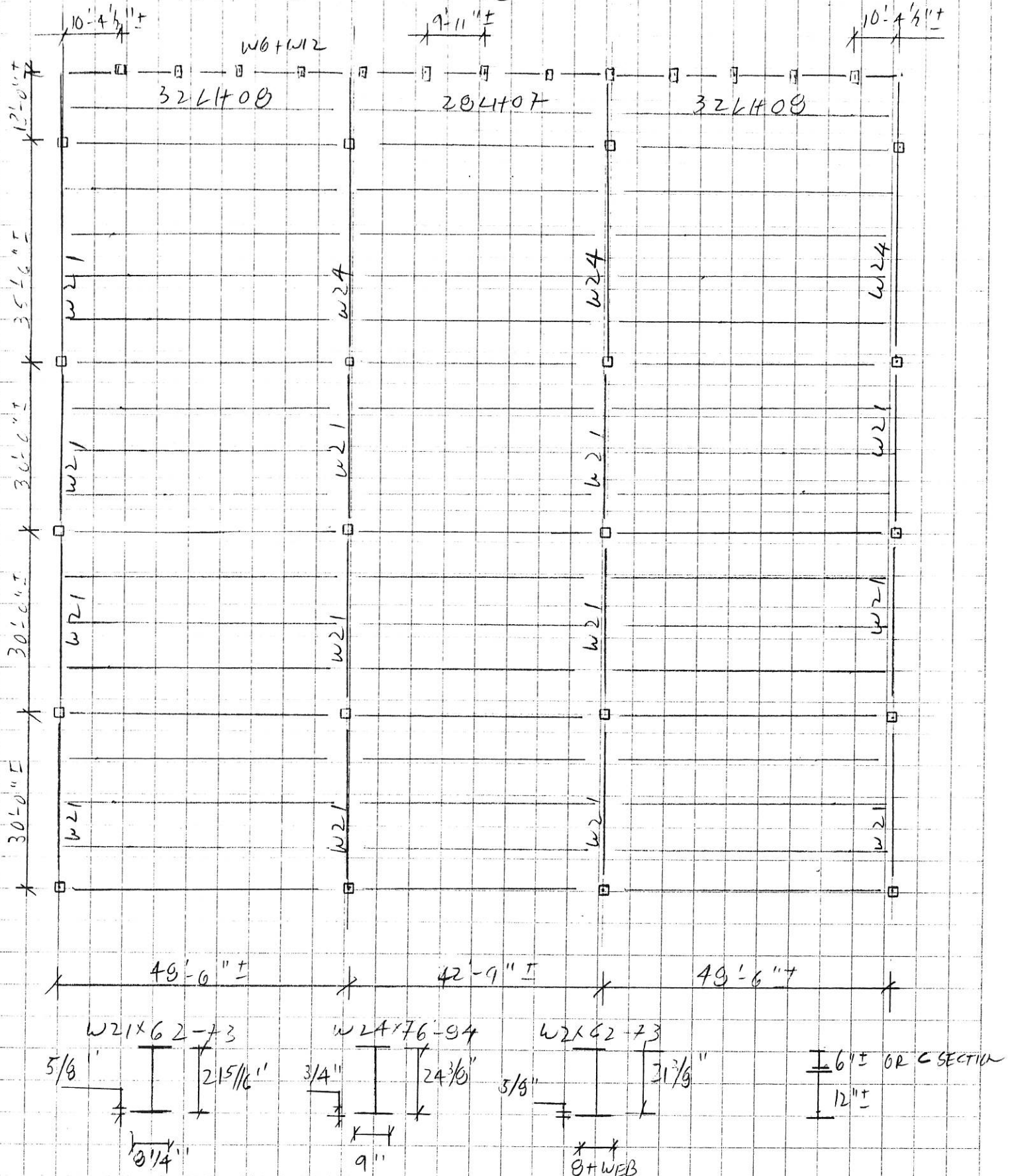


MEMBERS: 1 - L1 X 1 X 1/8
2 - L1 X 1 X 1/8
3 - L2 X 2 X 3/16

NOTES:

1. JOIST SEATS 6"±
2. SPAN 46'-48'-9"±
3. TRK - TODD STEEL INC. POINT OF ROCKS MD;
J6, J9...
4. JOIST SPACING 7'-6"±

JOIST SIZES FROM STI



DETERMINE ALLOW LOADS FOR SOLAR PANELS

DEAD LOAD - ASSUME 20 PSF

SNOW LOAD - GROUND SL = 20 PSF $P_g = I_p = 1.0(20) = 20 \text{ PSF}$
GOVERNS

LIVE LOAD - 20 PSF

TRIB. AREA $A_{T, \text{MIN.}} = 7.1(42.75) = 303.5$

$$R_1 = 1.2 - .001 A_T = 1.2 - .001(303.5) = .9$$

$$R_2 = 1 \quad F = 0$$

$$L_r = L_o R_1 R_2 = 20(.9)(1) = 18 \text{ PSF}$$

DETERMINE SL BUILD-UP AT PARAPET MIN. HT. = 9" MAX. HT. = 28"

$$h_d' = P_g / 2 = 20 / 16.6 = 1.2' \quad \gamma = .13 \text{ pcf} + 14 = .13(20) + 14 = 16.6 \quad 1.2' > 9" \therefore \text{NO SL BUILD-UP AT PARAPET}$$

FROM FIG. 7-9, $L_u = 140'$ $h_d = 3.4(6.75) = 2.6$

$$h_c = 28 / 2.33 - 1.2 = 1.13 \quad h_d \leq h_c \therefore h_d = h_c = 1.13'$$

$$w = 4h_d^2 / h_c = 4(2.6)^2 / 1.13 = 24' \leq 9h_c = 9(1.13) = 9'$$

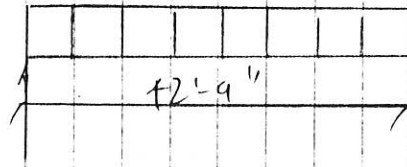
$$p_d = h_d \gamma = 1.13(16.6) = 18.8 \text{ PSF}$$

JOIST SIZES PROVIDED BY STI

20LH07

NO SL BUILD-UP

MAX. SP = $30/4 = 7.5$



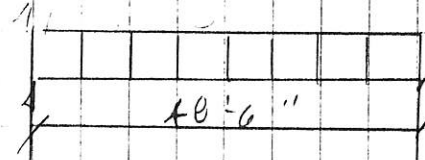
$42' - W_{ALL} = 404 \#/ft$
 $43' - W_{ALL} = 464 \#/ft$
 $W_{LL} = 285 \#/ft$

FOR 43' $W_{TOT} = 464 / 7.5 = 62 \text{ PSF}$

$62 - 20 - \frac{SL}{20} = 22 \text{ PSF ADDIT. CAPACITY}$

32LH09

NO SL BUILD-UP



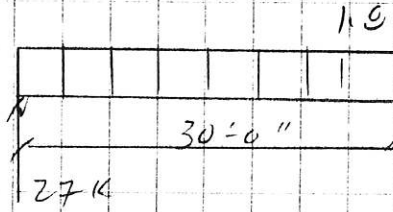
$49' - W_{ALL} = 411 \#/ft$
 $W_{LL} = 255 \#/ft$

FOR 49' $W_{TOT} = 411 / 7.5 = 55 \text{ PSF}$

$55 - 20 - \frac{SL}{20} = 15 \text{ PSF ADDIT. CAPACITY}$

W21

NO SL BUILD-UP



1.9 K/ft
 $W = \frac{(20 + 10) \times 49 + 43}{2} = 1.75 \text{ K/ft SAY } 1.9$

$M = \frac{1.9 (30)^2}{8} = 202.5 \text{ K-FT}$

$W21 \times 62 \quad M_{ALL} = 254 \text{ K-FT} > 202.5 \text{ K-FT}$

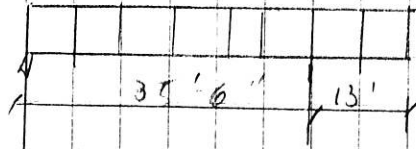
$\frac{254(9)}{(30)^2} = 2.26 \text{ K/ft} / 46 = .05 \times 1000 = 49 \text{ PSF}$

$49 - 20 - 20 = 9 \text{ PSF ADDIT. CAPACITY}$

IF $W21 \times 73 \quad M_{ALL} = 302 \text{ K-FT} \quad \frac{302(9)}{(30)^2} = 2.68 \text{ K/ft} / 46 = 58 \text{ PSF}$
 $58 - 20 - 20 = 18 \text{ PSF ADDIT. CAPACITY}$

W2F

NO SL BUILD-UP



$$m_1 = \frac{w}{8L^2} (L+a)^2 (L-a)^2 = \frac{w}{8(35.5)^2} (48.5)^2 (21.5)^2$$

$$m_2 = \frac{wa^2}{2} = \frac{w(13)^2}{2}$$

$$m_1 = w(110) \quad m_2 = w(84.5)$$

$$W24 \times 76 \quad m = 352 \text{ F}^{-1} \text{ FT} \quad w = 352/110 = 2.99 \text{ F}^{-1} \text{ FT/AG}$$

$$= .06(1000) = 65 \text{ PSF}$$

$$65 - 20 - 10 = 27 \text{ PSF ADDIT. CAPACITY}$$

$$W14 \times 68 \quad m = 306 \text{ F}^{-1} \text{ FT} \quad w = 306/110 = 2.51 \text{ F}^{-1} \text{ FT/AG}$$

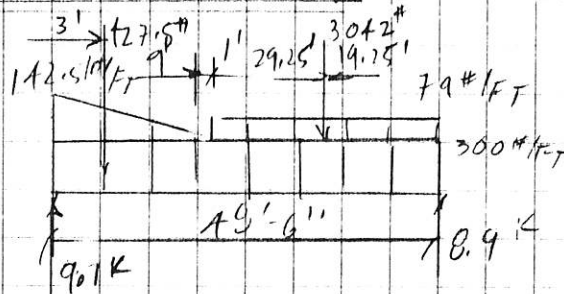
$$= .06(1000) = 56 \text{ PSF}$$

$$56 - 20 - 10 = 19 \text{ PSF ADDIT. CAPACITY}$$

CHECK MEMBERS W/SL & U/L-DUP

32L408

MAX. SP = 7.5'



$$W_1 = (20120)(7.5) = 300 \text{ #/ft}$$

$$W_2 = 19(7.5) = 142.5 \text{ #/ft}$$

$$W_{SP} = (10.5)(7.5) = 79 \text{ #/ft}$$

$$R_1 = 427.5(3) + 3042(29.25) + 142.5(49.5) / 49.5 = 9.0 \text{ k}$$

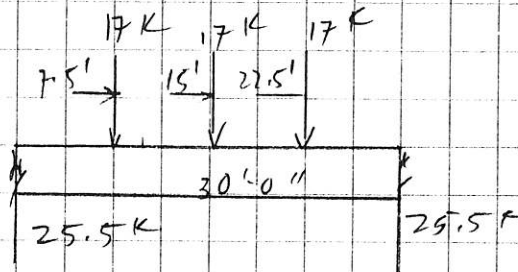
$$R_2 = 427.5(45.5) + 3042(14.75) + 142.5(24.75) / 46.5 = 8.9 \text{ k}$$

$$M_{MAX} = 8.9(23.40) - 379(23.40)^2 / 2 = 104.5 \text{ k-ft}$$

$$W_{EQUIV} = \frac{104.5(8)}{(40.5)^2} = 355 \text{ #/ft} \text{ } 11 \text{ #/ft OK}$$

JOIST IS OK

W21



$$P_1 = 8.9 \text{ k}$$

$$P_2 = (20 + 20 + 10.5)(7.5) \times 42.75 / 2 = 9.1 \text{ k}$$

$$M = 25.5(15) - 17(7.5) = 255 \text{ k-ft}$$

$$\text{IF } W21 \times 62 \text{ } M_{ALLOW} = 254 \text{ k-ft} \approx 255 \text{ k-ft OK}$$



August 19, 2010

Mr. Lou Ianniello
FOUR POINT GREEN ENERGY SYSTEMS
3149 Route 88
Point Pleasant, NJ 08742

Re: **Rooftop Solar Photovoltaic Project for 50 KW DC**
Brielle Sports Club
Structural Letter Summarizing Findings
Brielle, Monmouth County, NJ
FPA Project No. 3644.001C1

Dear Mr. Ianniello:

The proposed solar panels are the 224 Watt panels by Sharp supported by Unirac's RapiRac ballasted system. The installation of the new solar photovoltaic panels is limited to the high roof and the Zone 1 area of the roof. The Zone 1 area is defined as the center section of the roof located 10 feet from the inside face of the parapet or edge of roof. No existing drawings of the building are available.

French and Parrello Associates (FPA) visited the above referenced site on August 13, 2010. The purpose of the visit was to visually observe in discrete locations the condition of the existing roof structure in the high roof area and to determine the roof framing. The opinions stated in this report are based on limited visual observations only. There is no claim, either stated or implied, that all conditions were observed.

Based on the visual observations, the roof structure appeared to be in good condition. There were some soft spots in the roofing and what is believed to be insulation below. No signs of roof leaks were noted at the time of the visit.

Field measurements were taken in order to develop a roof framing plan. Sketches of the roof joists were sent to the Steel Joist Institute (SJI) and they provided the joist sizes to FPA.

Calculations were performed using "Unirac Code-Compliant Installation Manual" to determine the ballast needed for the panel installation. The analysis was based on using cap blocks 4"x8"x16" weighing 26# per block. It was determined that **an average of five (5) cap blocks per solar panel are required** to resist the calculated uplift loads. These blocks are to be installed as per the manufacturer's recommendations. The total superimposed load to the roof structure from the installed panel system is 10.4 psf.



The existing roof structure was analyzed to determine its capacity to support the 10.5 psf load of the solar roof panels. Calculations were performed assuming 20 psf dead load, 20 psf snow load, snow load build-up where applicable, and 10.5 psf solar panel loads.

In summary, based on our analysis the existing roof framing is structurally adequate to support the proposed solar roof panel loads as stipulated above.

It has been a pleasure being of service to you. If you have any questions, please call our office.

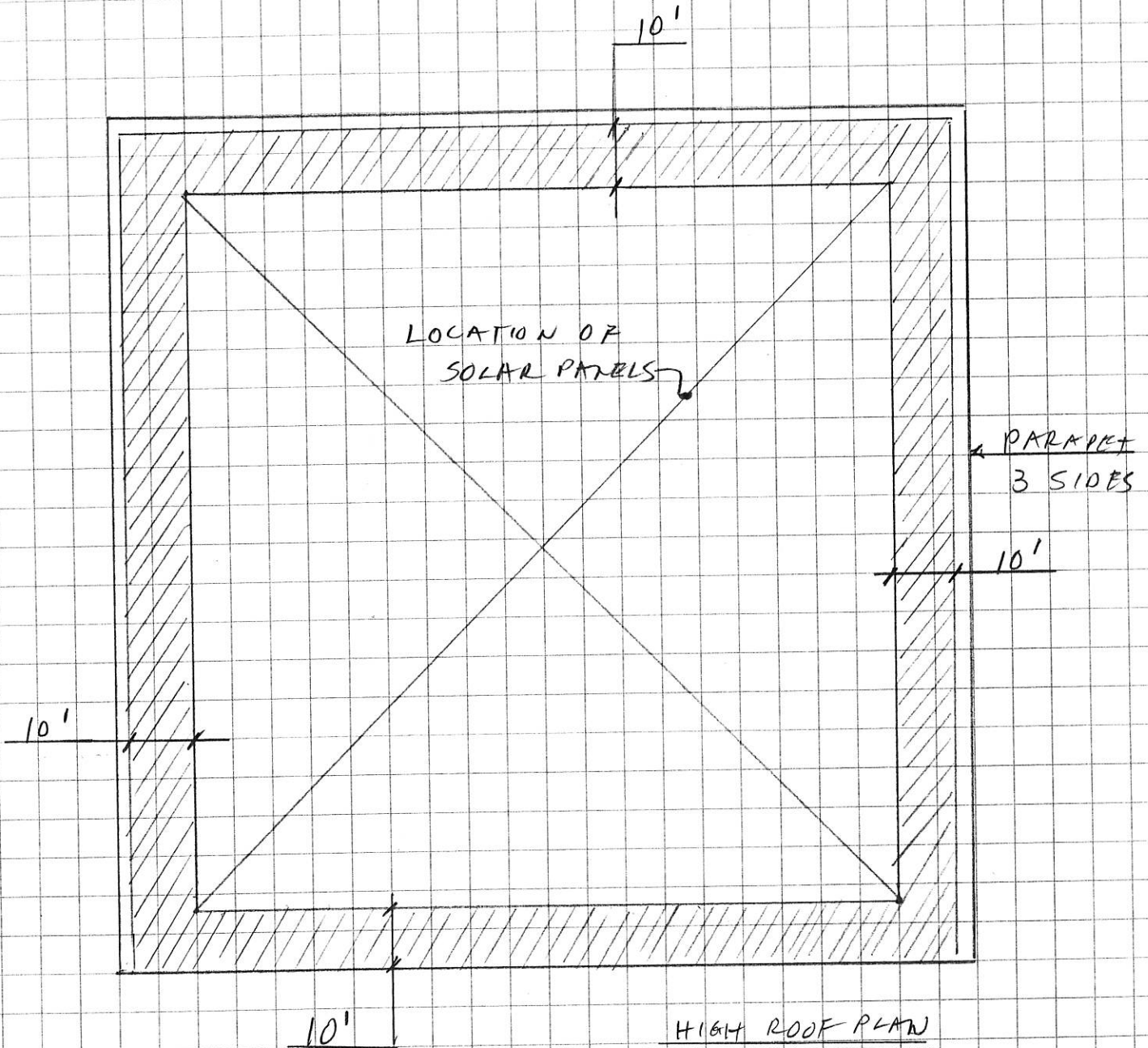
Very truly yours,

FRENCH & PARRELLO ASSOCIATES, P.A.

Robin A. Kemper, P.E., LEED® AP – Associate
Structural Engineering Assistant Manager
N.J. Professional Engineer License No. 33001

Attachment

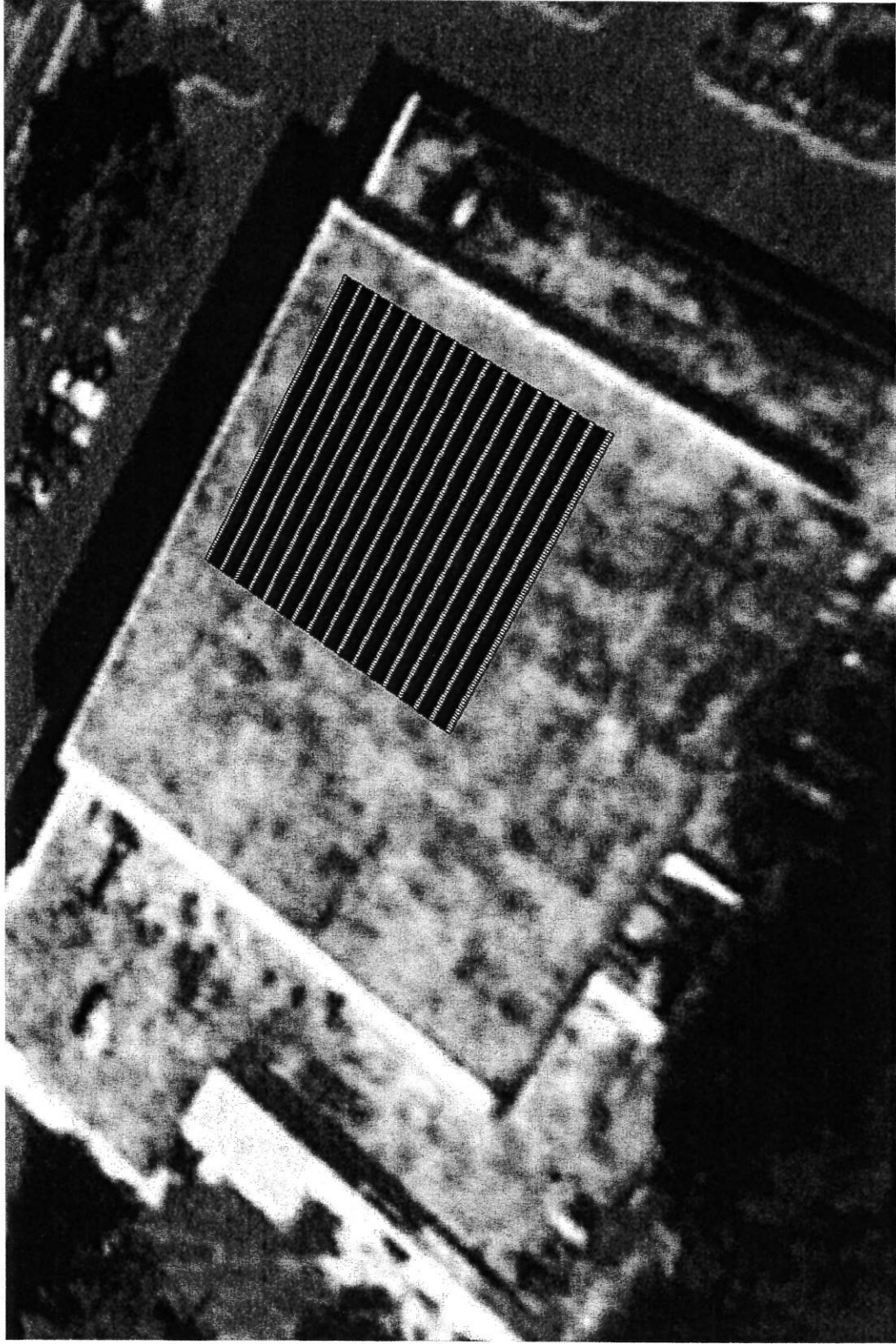
HIGH RISE AVENUE



USE AN AVERAGE OF 5 CAP BLOCKS
PER SOLAR PANEL - CAP BLOCK = 4"X9"X16" WT. = 26#
INSTALL BLOCKS AS PER MANUFACTURER'S
RECOMMENDATIONS

FOUR POINT SOLAR

Brielle Sports Club – 50kW Photovoltaic Roof Layout





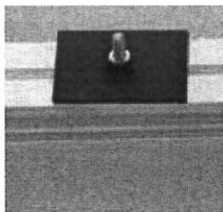
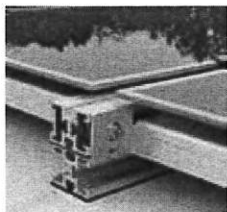
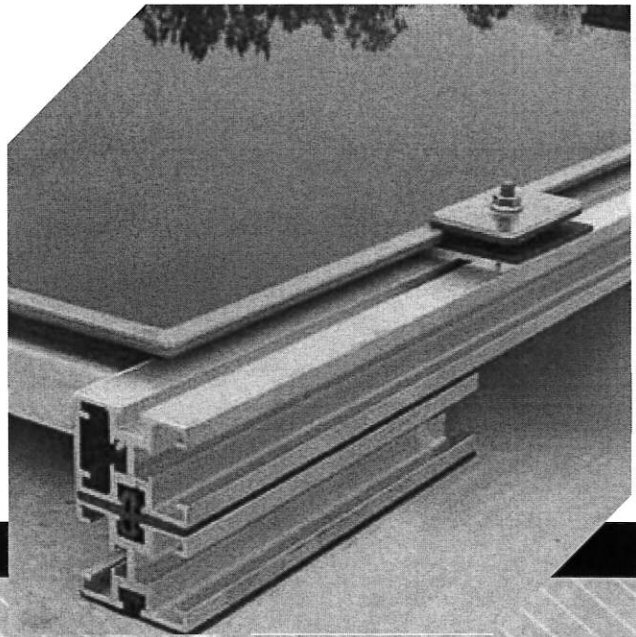
DPW | SOLAR



PREFORMED LINE PRODUCTS

POWER-FAB™

Quality Hardware for the PV Industry



POWER GRID™

Non-penetrating Flat Roof Mounting System
for Maximum Module Density



COMMUNICATIONS



ENERGY

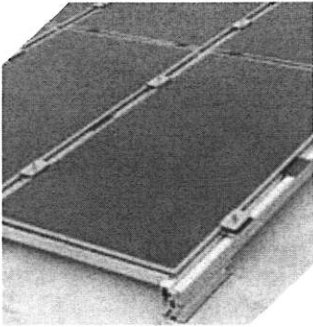


SPECIAL INDUSTRIES



SOLAR

The POWER GRID™ PV Solar Mounting System



Key Benefits

- Increased module density
- Fast installation times
- Roof layout design flexibility
- Full scale wind tunnel qualification
- Reduced overall installation costs

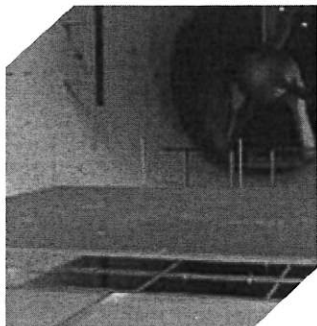
The high density Power Grid top-clamping module system is designed to install fast and provide a secure mounting structure for frameless thin film or framed crystalline modules. Qualified test results from a full scale wind tunnel facility support designs that require less ballast weight and no roof penetrations for most site applications.

A unique modular rail concept provides the flexibility to design and install the grid mounting structure around roof obstructions and avoid shaded areas.

The Power Grid system utilizes high strength rails with integrated wiring channels and pre-installed EPDM material to protect the roof surface. Bolt-on spacer bars provide precise rail alignment and eliminate any field cutting or measuring. A one-piece module clamp with positive stop and gasket securely mounts and protects thin film modules from damage. High strength stainless steel clamps secure framed modules. Pre-assembled mounting rails and fewer hardware components greatly reduce on site assembly thus saving both valuable time and costs on every roof installation.



Faster Installation Time – Reduced Labor Costs

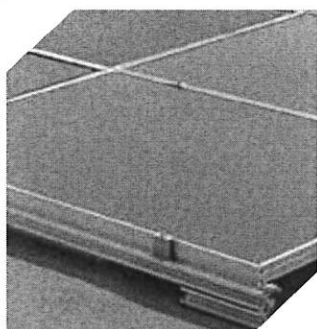


Full Scale Wind Tunnel Tested and Qualified

High Strength – Long Lasting Design

System Owners and Specification Engineers demand a reliable mounting system designed to withstand environmental conditions for the life of the PV module.

- Full scale wind tunnel qualified
- Corrosion resistant aluminum components
- EPDM protection for roof surfaces
- Stainless steel fasteners
- Unimpeded water drainage
- Grid-work of interconnected high strength rails



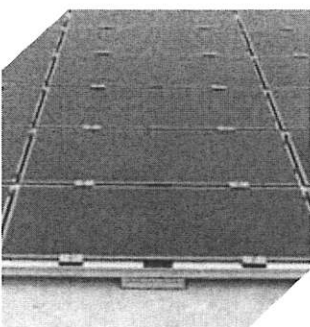
Clamps for framed or unframed modules

Flexibility

Engineers and Architects require a mounting system that offers flexibility in design and application while exceeding building code requirements.

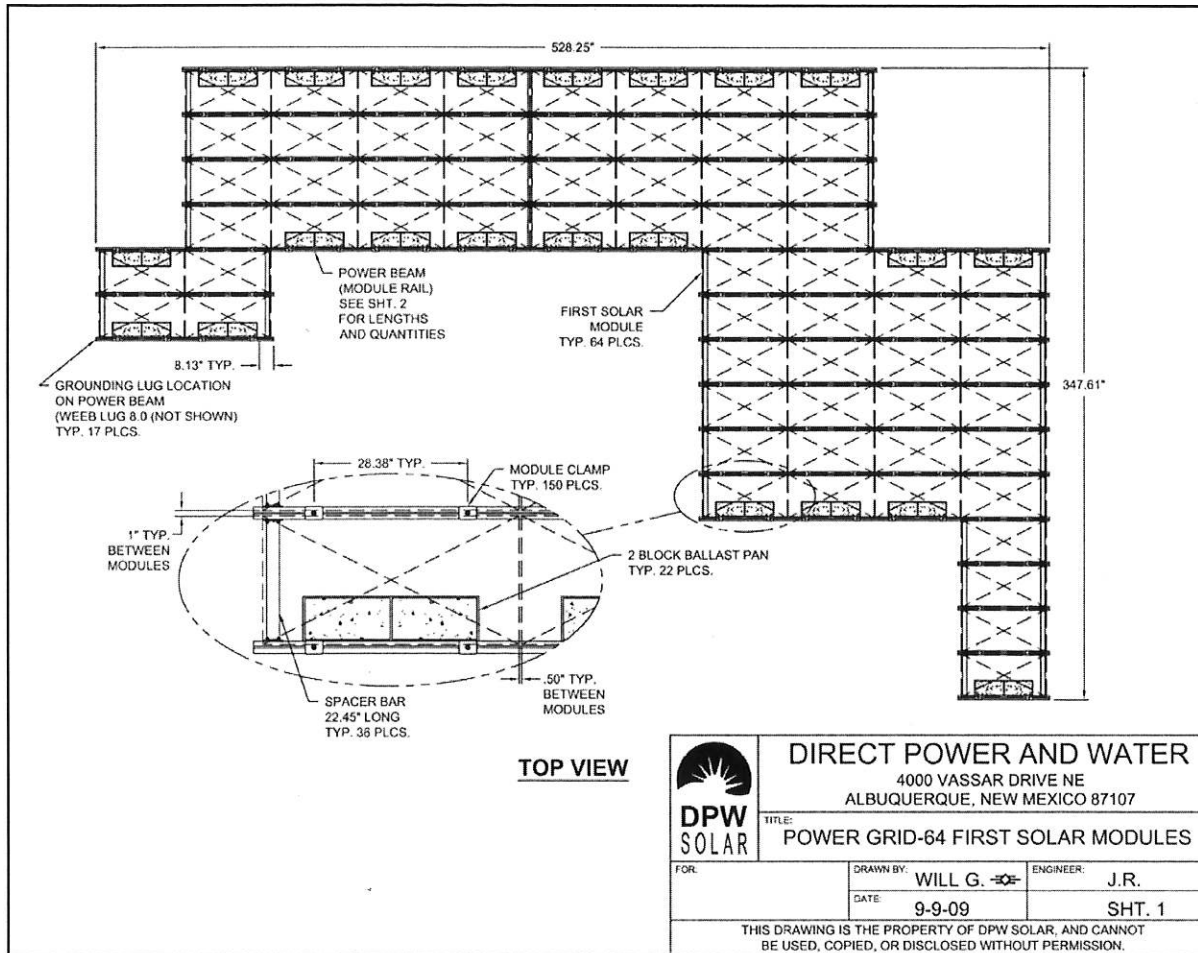
- UL listed materials
- Configurable around roof obstacles
- Compatible with framed or unframed modules
- Integrated grounding system option
- Optional ballast pans for higher speed wind zones
- Penetration options for seismic regions or reducing ballast loads
- Adjustable mounting feet for loading over structural members

Patent Pending



Our engineering staff is available to assist with your next project. Please provide module type, design wind speed, exposure category and building roof layout and height information.

Sample Roof Layout



The POWER GRID™ System is adaptable to any roof layout.



4000-B Vassar Drive NE
 Albuquerque, New Mexico 87107
 USA

Telephone: 800.260.3792
 Fax: 505.889.3548
 Web Site: www.DPWSolar.com
 E-mail: info@power-fab.com

© 2009 Preformed Line Products
 Printed in U.S.A.
 SL-SS-1066
 10.09.2M

Unparalleled Performance

With their advanced system intelligence, next-generation Edge™ MPPT technology, and industrial-grade engineering, PowerGate Plus inverters maximize system uptime and power production, even in cloudy conditions.

Power Efficiency

Power Level	Input Voltage ¹	Efficiency ²
10%	5 kW	90.5%
20%	10 kW	95.0%
30%	15 kW	95.9%
50%	25 kW	96.3%
75%	37.5 kW	96.4%
100%	50 kW	96.0%

¹ 305V minimum ² 480V model

Edge MPPT

Provides rapid and accurate control that boosts PV plant kilowatt yield

Provides a wide range of operation across all photovoltaic cell technologies

Printed Circuit Board Durability

Wide thermal operating range: -40° C (-40° F) to 85° C (185° F)

Conformal coated to withstand extreme humidity and air-pollution levels

Proven Reliability

Rugged and reliable, PowerGate Plus PV inverters are engineered from the ground up to meet the demands of large-scale installations.

Low Maintenance

Modular components make service efficient

Dual cooling fans

Safety

Seismic Zone 4 compliant

Built-in DC and AC disconnect switches

Integrated DC two-pole disconnect switch isolates the inverter (with the exception of the GFDI circuit) from the photovoltaic power system to allow inspection and maintenance

Built-in isolation transformer

Protective cover over exposed power connections



PowerGate Plus 50 kW Specifications

UL/CSA

Input Parameters

Maximum Array Input Voltage	600V DC (UL)	•
Input Voltage Range (MPPT; Full Power)	305–600V DC	•
Maximum Input Current	172A DC	•

Output Parameters

Output Voltage Range (L-L)	183–229V AC	208V AC	•
	211–264V AC	240V AC	•
	422–528V AC	480V AC	•
Nominal Output Voltage	208V AC		•
	240V AC		•
	480V AC		•
Output Frequency Range	59.5–60.5 Hz		•
AC Voltage Range Set Points	-12%/+10%		•
Nominal Output Frequency	60 Hz		•
Number of Phases	3		•
Maximum Output Current per Phase	139A	208V AC	•
	121A	240V AC	•
	60A	480V AC	•
Maximum Overcurrent Protection per Phase	167A	208V AC	•
	145A	240V AC	•
	72A	480V AC	•
CEC-Weighted Efficiency	95.5%		•
Maximum Continuous Output Power	50 kW (50 kVA)		•
Tare Losses	-75.48 W	208V AC	•
	-93.97 W	240V AC	•
	-76.48 W	480V AC	•
Power Factor at Full Load	>0.99		•
Harmonic Distortion	<3% THD		•

Temperature

Operating Ambient Temperature Range (Full Power)	-20° C to +50° C	•
Storage Temperature Range	-30° C to +70° C	•

• Standard • Optional



Output Options

PowerGate Plus 50 kW

UL/CSA	208V AC Output
	240V AC Output
	480V AC Output

Streamlined Design

With all components encased in a single, space-saving enclosure, PowerGate Plus PV inverters are easy to install, operate, and maintain.

Single Cabinet with Small Footprint

No clearance required for sides and back

Convenient access to all components

Large in-floor cable glands make access to DC and AC cables easy

Rugged Construction

Engineered for outdoor environments

Output Transformer

Provides galvanic isolation

Matches the output voltage of the PV inverter to the grid

PowerGate Plus 50 kW Specifications

		UL/CSA
Cooling	Forced Air	•
Noise		
Noise Level	<65 dB(A)	•
Combiner		
Number of Inputs and Fuse Rating	4 (80A DC) (Opt.)	•
	5 (63A DC) (Opt.)	•
Inverter Cabinet		
Enclosure Rating (Outdoor) (IEC Grade)	NEMA 3R	•
Enclosure Finish (14-Gauge, Powder-Coated Steel)	RAL-7032	•
Base and Door Finish (16-Gauge, Powder-Coated Steel)	RAL-7032	•
Cabinet Dimensions (Height x Width x Depth)		74" x 45" x 26.875"
Cabinet Weight		1,732 lbs.
Transformer		
Integrated Internal Transformer		•
Low Voltage Tap Line ¹	20%	•
Testing and Certification		
UL1741, CSA 107.1-01, IEEE 1547, IEEE C62.41.2		•
Zone 4 Seismic Rating		•
Warranty		
Five Years		•
Extended Warranty (10, 15, or 20 years) (Optional)		•
Extended Service Agreement (Optional)		•
Intelligent Monitoring		
Satcon PV View® Plus (Optional)		•
Satcon PV Zone (Optional)		•
Third-Party Compatibility		•

- Standard
- Optional

¹ The 20% boost tap on the isolation transformer increases the AC voltage output range for applications where the solar array DC operating voltage is at or near the lower end of the DC input range. This boost allows for continued inverter operation at lower DC voltage input levels.

Note: Specifications are subject to change.



(800) 967-6917
www.dcpower-systems.com

sales@satcon.com

Satcon Corporate
27 Drydock Avenue
Boston, MA 02210
P 617.897.2400

Satcon West
2925 Bayview Drive
Fremont, CA 94538
P 510.226.3800

Satcon Canada
835 Harrington Court
Burlington, ON L7N 3P3
Canada
P 905.639.4692

Satcon Spain
Príncipe de Vergara 93-1º
28006 Madrid, Spain
P 34 917610275

Satcon International SRO
Classic 7 Business Park
Jankovcova 1037/49, Praha 7
Czech Republic

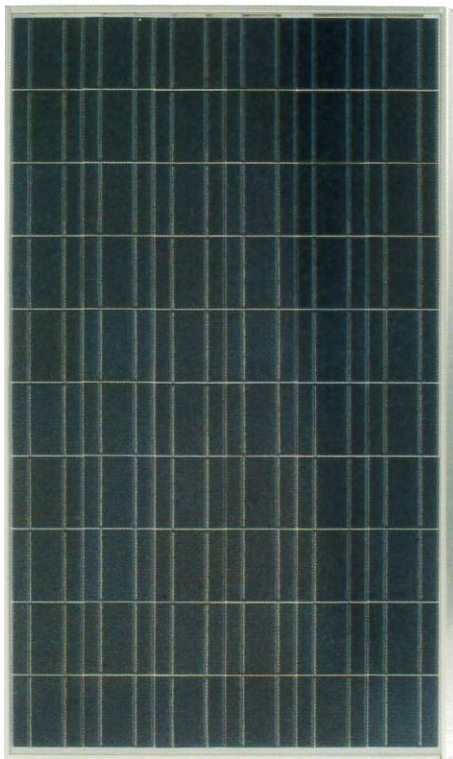
SHARP®

solar electricity

224 WATT

MULTI-PURPOSE MODULE

NEC 2008 Compliant



ND-224UC1

MULTI-PURPOSE 224 WATT
MODULE FROM THE WORLD'S
TRUSTED SOURCE FOR SOLAR.

Using breakthrough technology, made possible by nearly 50 years of proprietary research and development, Sharp's ND-224UC1 solar module incorporates an advanced surface texturing process to increase light absorption and improve efficiency. Common applications include commercial and residential grid-tied roof systems as well as ground mounted arrays. Designed to withstand rigorous operating conditions, this module offers high power output per square foot of solar array.

Business leaders install this module in large commercial applications, demonstrating financial astuteness and environmental stewardship.

ENGINEERING EXCELLENCE

High module efficiency for an outstanding balance of size and weight to power and performance.

DURABLE

Tempered glass, EVA lamination and weatherproof backskin provide long-life and enhanced cell performance.

RELIABLE

25-year limited warranty on power output.

HIGH PERFORMANCE

This module uses an advanced surface texturing process to increase light absorption and improve efficiency.



Sharp multi-purpose modules offer industry-leading performance for a variety of applications.

Improved Frame Technology

SHARP: THE NAME TO TRUST

When you choose Sharp, you get more than well-engineered products. You also get Sharp's proven reliability, outstanding customer service and the assurance of our 25-year limited warranty on power output. A global leader in solar electricity, Sharp powers more homes and businesses than any other solar manufacturer worldwide.

BECOME POWERFUL

224 WATT

ND-224UC1

NEC 2008 Compliant

Module output cables now 12 AWG with locking connectors

ELECTRICAL CHARACTERISTICS

Maximum Power (Pmax)*	224 W
Tolerance of Pmax	+10%/-5%
Type of Cell	Polycrystalline silicon
Cell Configuration	60 in series
Open Circuit Voltage (Voc)	36.6 V
Maximum Power Voltage (Vpm)	29.3 V
Short Circuit Current (Isc)	8.33 A
Maximum Power Current (Ipm)	7.66 A
Module Efficiency (%)	13.74%
Maximum System (DC) Voltage	600 V
Series Fuse Rating	15 A
NOCT	47.5°C
Temperature Coefficient (Pmax)	-0.485%/°C
Temperature Coefficient (Voc)	-0.36%/°C
Temperature Coefficient (Isc)	0.053%/°C

*Measured at (STC) Standard Test Conditions: 25°C, 1 kW/m² insolation, AM 1.5

MECHANICAL CHARACTERISTICS

Dimensions (A x B x C below)	39.1" x 64.6" x 1.8"/994 x 1640 x 46 mm
Cable Length (l)	43.3"/1100 mm
Output Interconnect Cable**	12 AWG with MC4 Locking Connector
Weight	44.1 lbs / 20.0 kg
Max Load	50 psf (2400 Pascals)

**A safety lock clip (Multi Contact part number PV-SSH4) may be required in readily accessible locations per NEC 2008 690.33 (C)

QUALIFICATIONS

UL Listed	UL 1703
Fire Rating	Class C

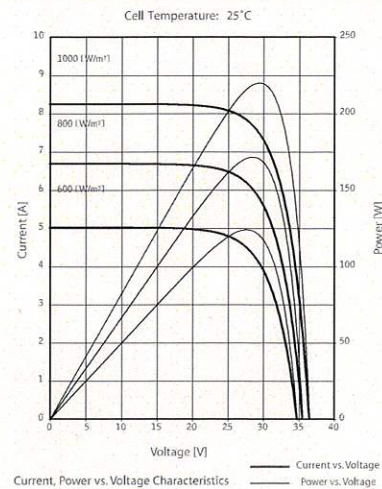


WARRANTY

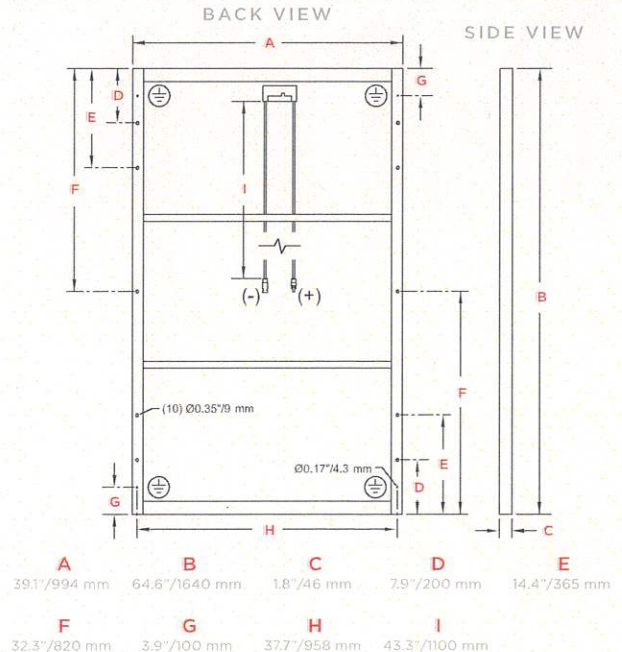
25-year limited warranty on power output
Contact Sharp for complete warranty information

Design and specifications are subject to change without notice.
Sharp is a registered trademark of Sharp Corporation. All other trademarks are property of their respective owners. Contact Sharp to obtain the latest product manuals before using any Sharp device. Cover photo: Solar installation by Pacific Power Management, Auburn CA.

IV CURVES



DIMENSIONS

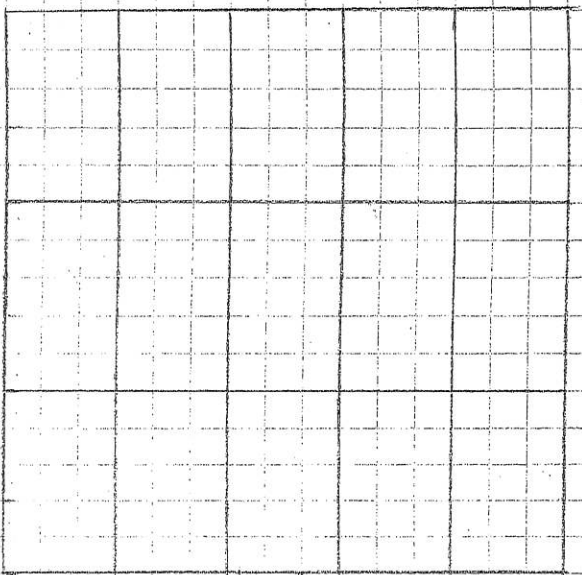


Contact Sharp for tolerance specifications

SHARP®

SHARP ELECTRONICS CORPORATION
5901 Bolsa Avenue, Huntington Beach, CA 92647
1-800-SOLAR-06 • Email: sharpsolar@sharpusa.com
www.sharpusa.com/solar

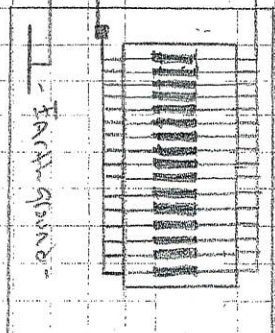
Solar Array Mounted to Roof



IMP	1.6
VMP	24.28
VOC	36.6
ISC	8.5

Panel voltage specs

241 watt solar panels
Model # Sharp SD4-10SD24V1F



Blue box Disconnecting
Combiner Box
16 pole 180 amp rating
13 strings of 14 modules
Fuses @ 80 amps each string

Solar Array mounted on Roof

223 modules total

49,952 Kw Solar Array

Grid type PV system

#2 THWN
Each ground
from Racking

1 1/4" conduit
#4 THWN

located outside
Near Electrical meter
SQUARED
AC/DC Disconnect
4036RB 200 AMP
3 pole Disconnect

#2 THWN

5' Electrical trough

2nd Voltage Disconnect



#2 THWN

Earth Ground

Sat can 50 Kw

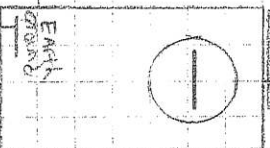
IMP = 1216amps
VMP = 409.92 volts
VOC = 510.4 volts
ISC = 137.8 amps
TOTAL wattage 49,952 watts
Each ground DC AC

Line side tap
For Solar Interconnection
Existing Electrical
Service



#2 THWN

Line side tap
Kupl tap



Existing Electrical
Panel

Brilliant Sports Club
600 Higgins Ave.
Brilliant, NJ 08730

-To Utility

Electric
Mike M