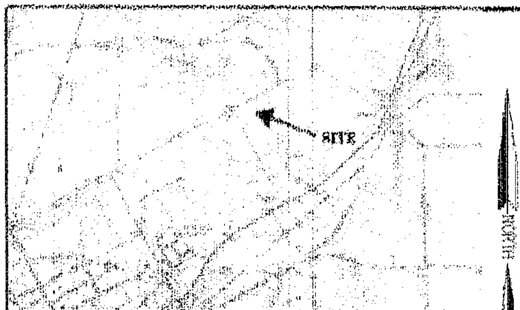
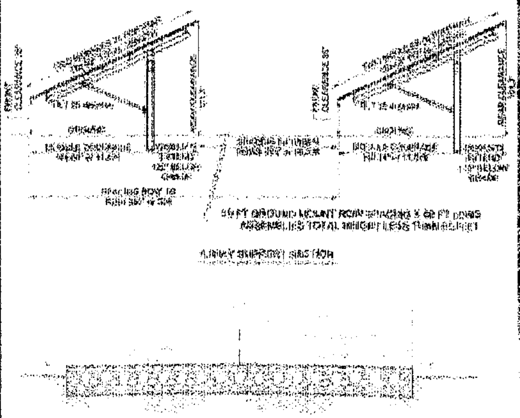


Proposed Community Solar Garden
4575 North Rd,
Canandaigua NY 14424

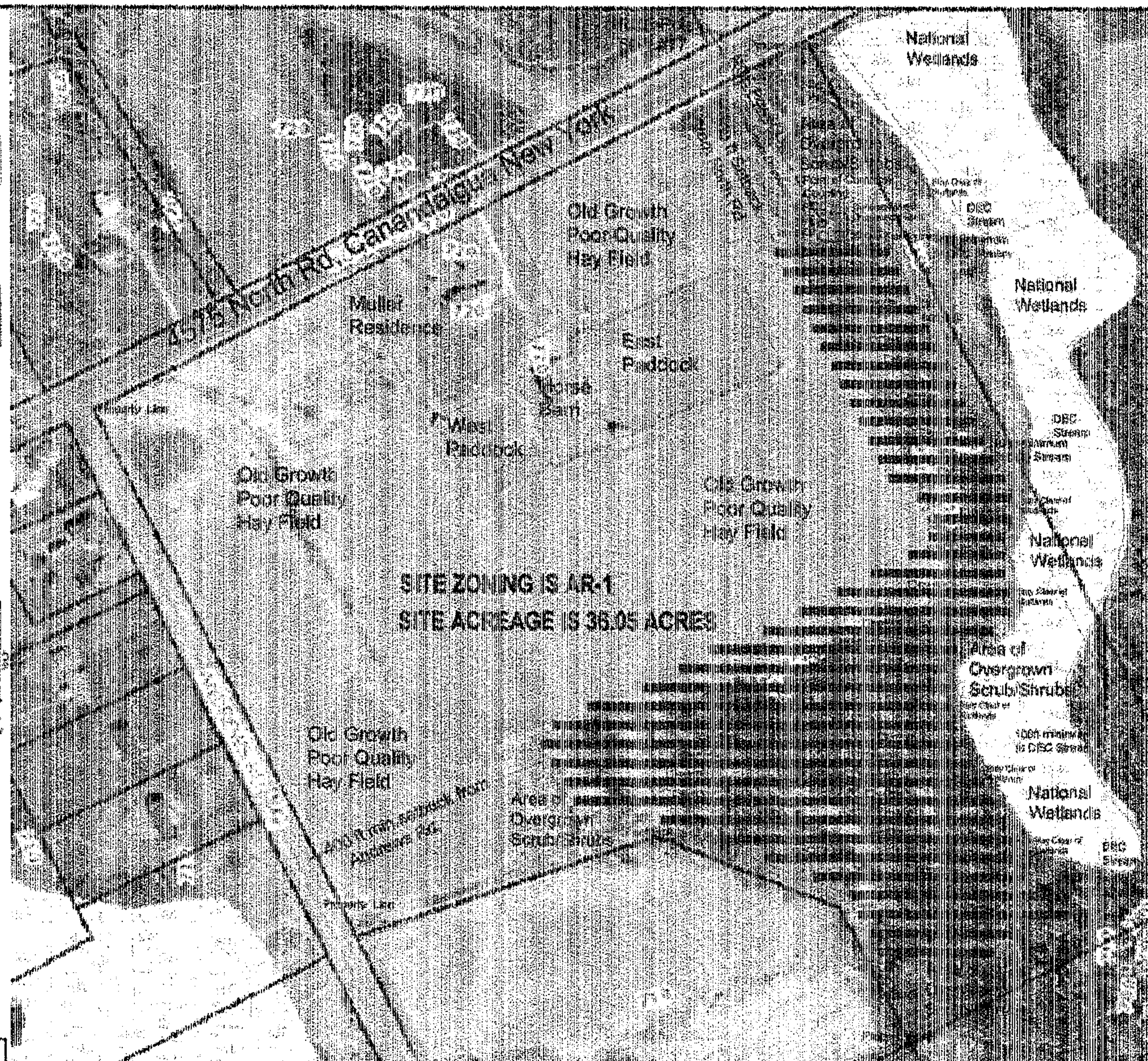
RGE Service #10300226294
RGE DG#7981 1.98MW

Customer:
You Save Green Inc.
Daniel Bennett, GCMS Inc.
315-686-1956

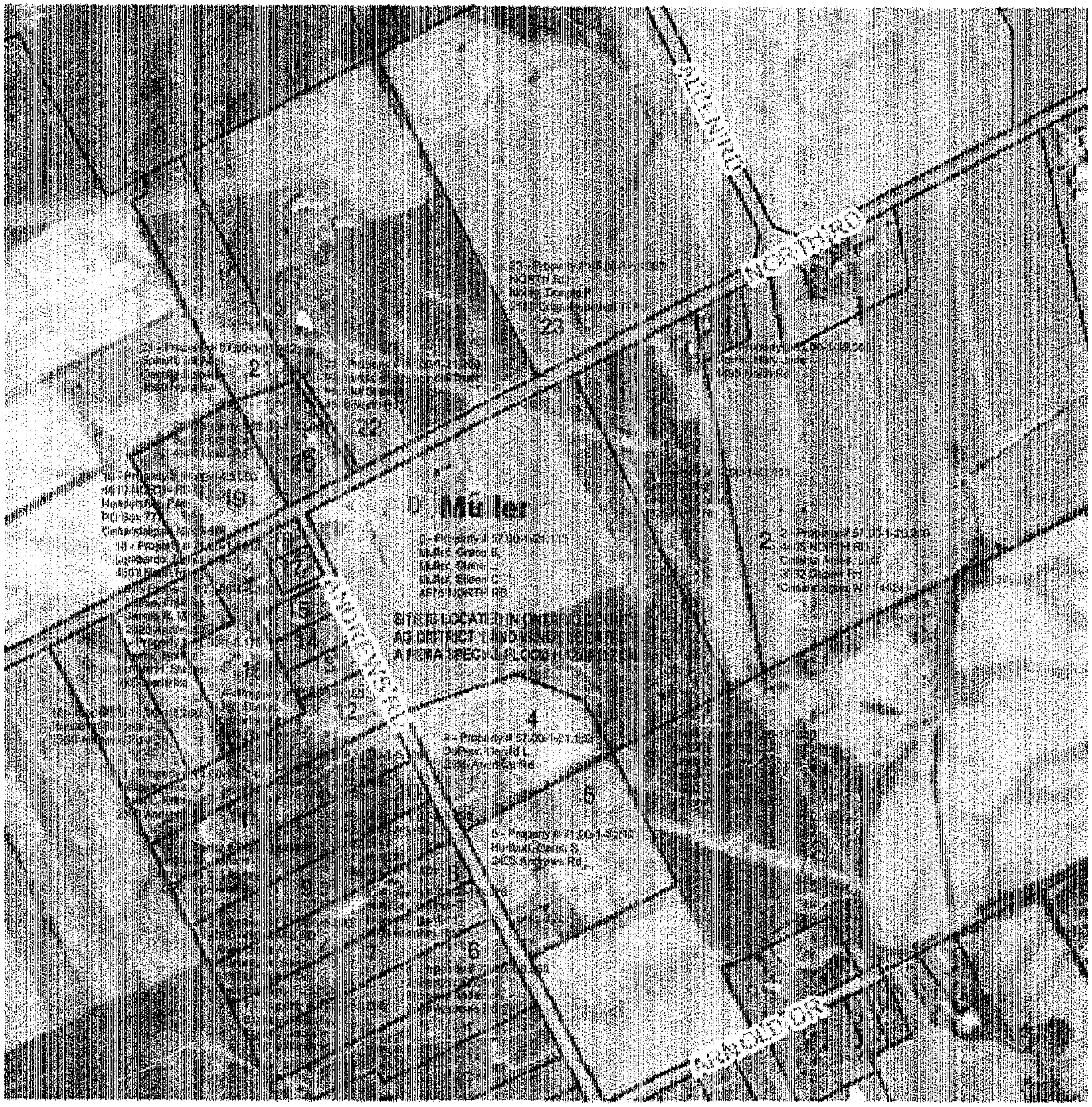


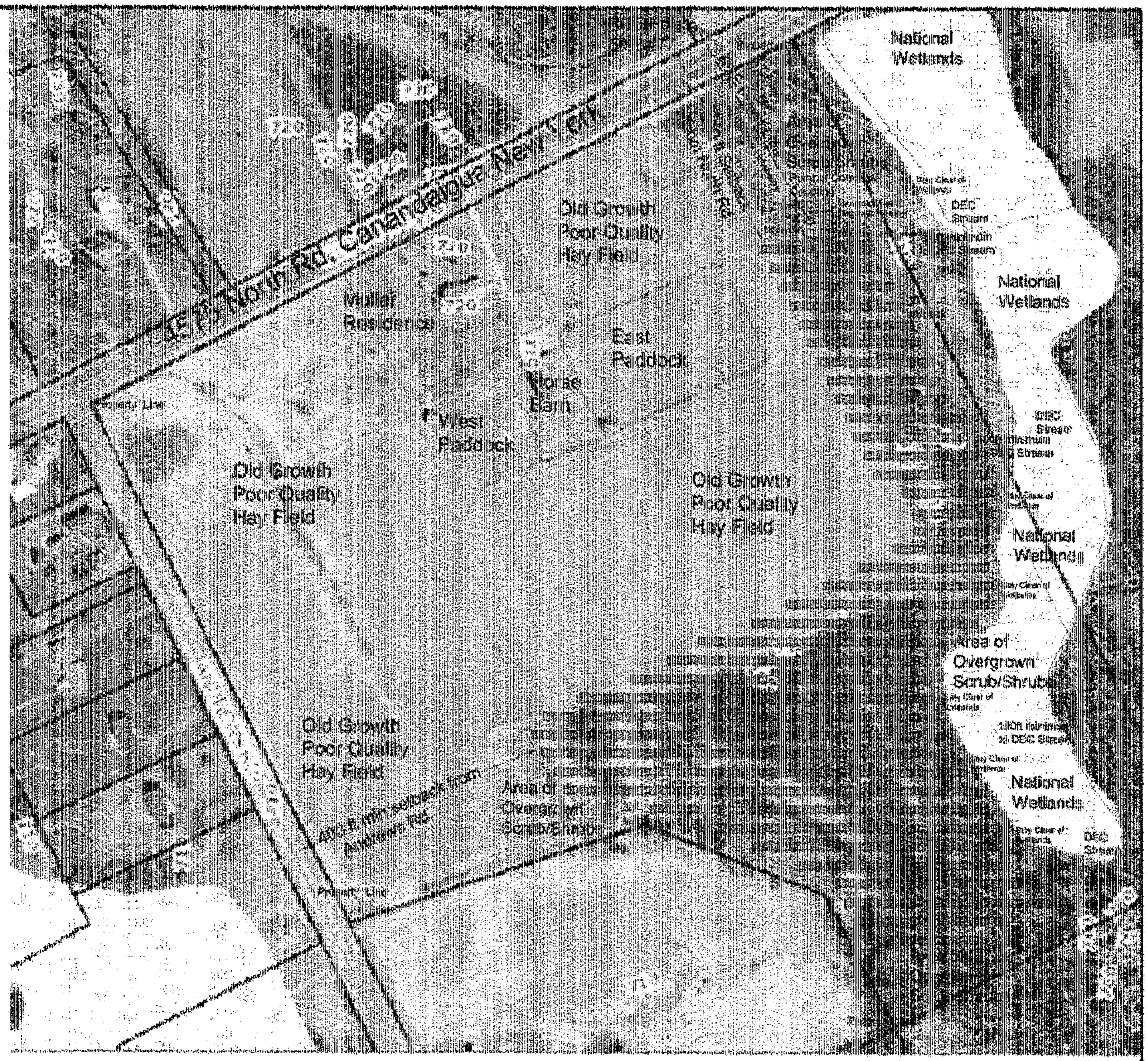
PLANNING BOARD APPROVAL

SIGNED DATE



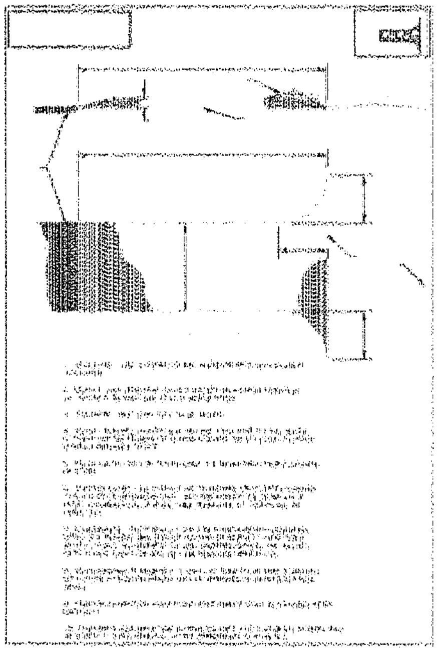
THE PROPERTY OWNERS AND APPLICANT ARE AWARE OF THE TOWN OF CANANDAIGUA'S RIGHT TO FARM LAW

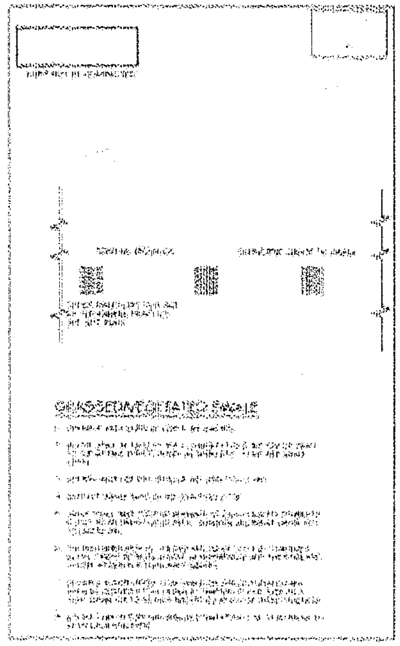

NORTH RD
ANDREWS RD
ARNOLD DR
Müller
23
22
21
20
19
17
13
14
12
6
4
5
2


National Wetlands
Canandaigua New York
Muller Residence
Old Growth Poor Quality Hay Field
East Paddock
Horse Barn
West Paddock
Old Growth Poor Quality Hay Field
Old Growth Poor Quality Hay Field
Old Growth Poor Quality Hay Field
National Wetlands
DEC Stream
National Wetlands
Area of Overgrown Scrub/Shrubs
100ft Setback to DEC Stream
National Wetlands
DEC Stream
Area of Overgrown Scrub/Shrubs
Property Line
Property Line

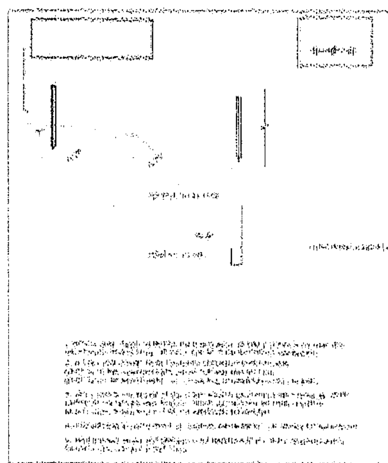
KEY

GENERAL NOTES





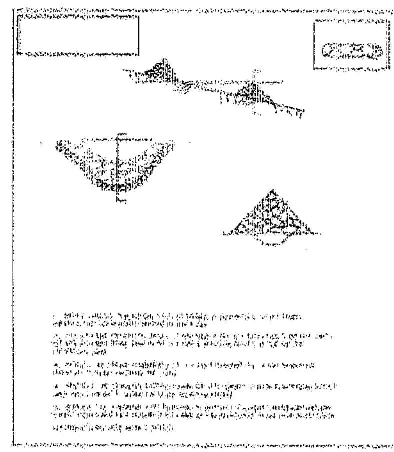
TOP SOILING SPECIFICATIONS



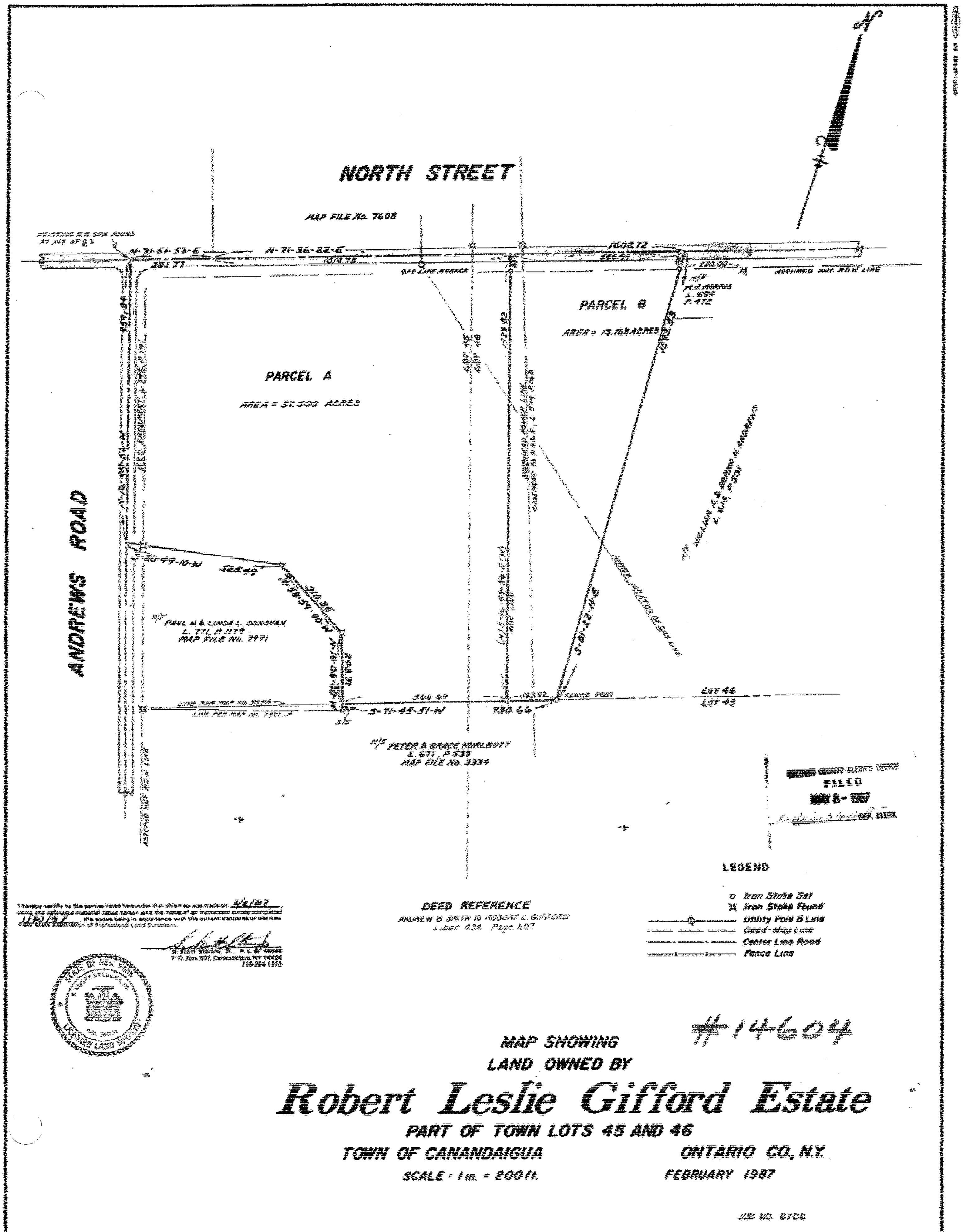
LAND GRADING SPECIFICATIONS

SEDIMENT & EROSION CONTROL MEASURES

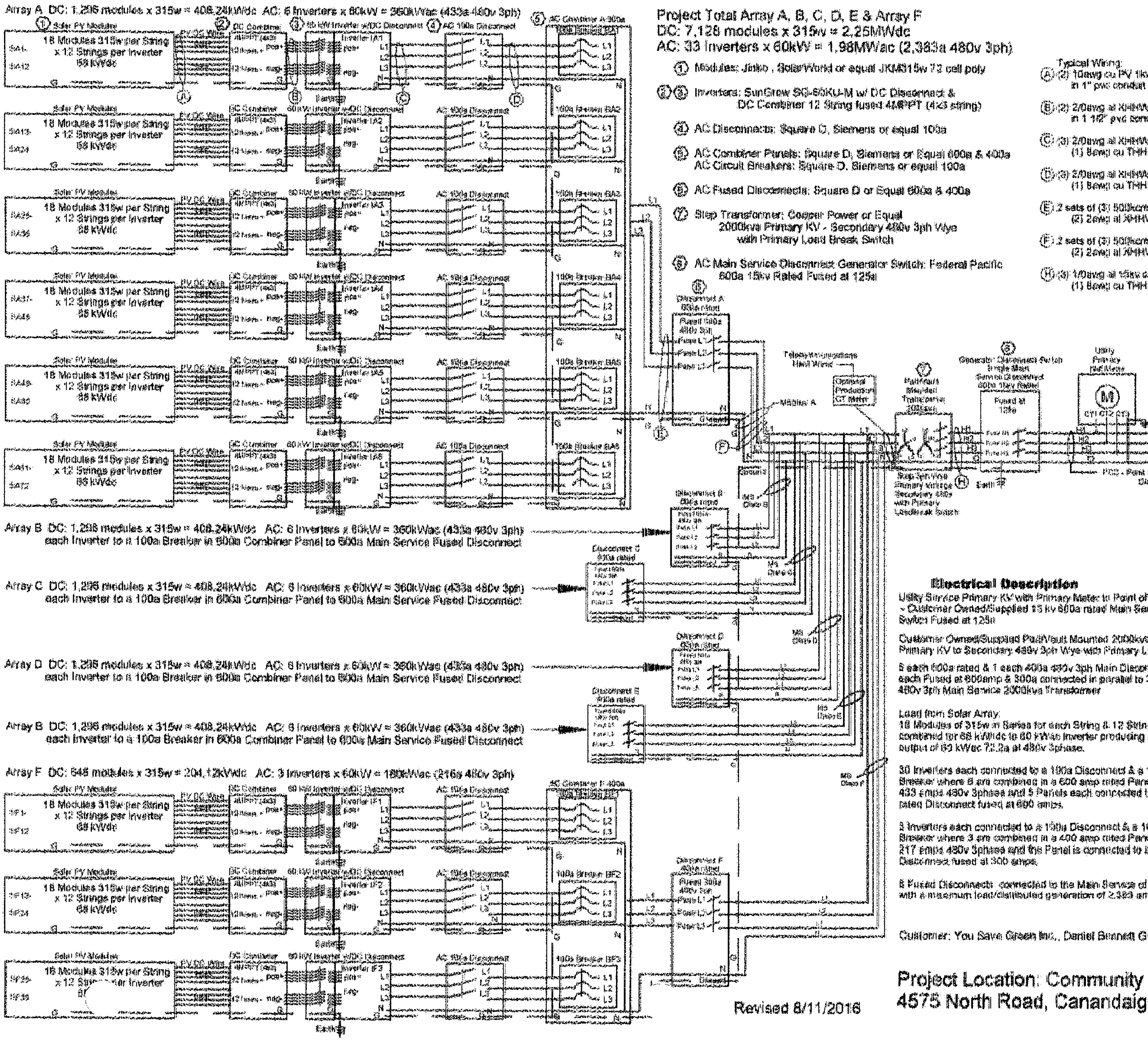
MATERIAL STOCKPILING



EXCERPTS FROM NYS STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL
AUGUST 2005



NORTH STREET
MAP FILE No. 7608
N-71-36-22-E
1608.72
PARCEL A
AREA = 37.300 ACRES
PARCEL B
ANDREWS ROAD
S-80-49-10-W
S-71-45-51-W
730.44
FENCE POST
LOT 46
LOT 45
N/F PAUL M & LINDA L. DONOVAN
MAP FILE No. 7771
N/F PETER & GRACE HURLBUTT
MAP FILE No. 3334
FILED
LEGEND
Iron Stake Set
Iron Stake Found
Utility Pole & Line
Deed-Map Line
Center Line Road
Fence Line
DEED REFERENCE
#14604
MAP SHOWING
LAND OWNED BY
Robert Leslie Gifford Estate
PART OF TOWN LOTS 45 AND 46
TOWN OF CANANDAIGUA
ONTARIO CO., N.Y.
SCALE: 1 in. = 200 ft.
FEBRUARY 1987



Project Total Array A, B, C, D, E & Array F
DC: 7,128 modules x 315w = 2.25MWdc
AC: 33 Inverters x 60kW = 1.98MWac (2,383a 480v 3ph)

(1) Modules: Jinko, SolarWorld or equal JKM315w 72 cell poly

(2)(3) Inverters: SunGrow SG-60KU-M w/ DC Disconnect & DC Combiner 12 String fused 4MPPT (4x3 string)

(4) AC Disconnects: Square D, Siemens or equal 100a

(5) AC Combiner Panels: Square D, Siemens or Equal 600a & 400a
AC Circuit Breakers: Square D, Siemens or equal 100a

(6) AC Fused Disconnects: Square D or Equal 600a & 400a

(7) Step Transformer: Cooper Power or Equal
2000kva Primary KV - Secondary 480v 3ph Wye
with Primary Load Break Switch

(8) AC Main Service Disconnect Generator Switch: Federal Pacific
600a 15kv Rated Fused at 125a

Typical Wiring:
(A) (2) 10awg cu PV 1kv, (1) 8awg bare cu G
in 1" pvc conduit min. (multiple pairs in larger conduit)

(B) (2) 2/0awg al XHHW 1kv, (1) 6awg cu THHN G
in 1 1/2" pvc conduit

(C) (3) 2/0awg al XHHW, (1) 8awg cu THHN N,
(1) 8awg cu THHN G in 2" pvc conduit

(D) (3) 2/0awg al XHHW, (1) 8awg cu THHN N,
(1) 8awg cu THHN G in 2" pvc conduit

(E) 2 sets of (3) 500kcmil al XHHW, (2) 2awg al XHHW N,
(2) 2awg al XHHW G in (2) 4" pvc conduits

(F) 2 sets of (3) 500kcmil al XHHW, (2) 2awg al XHHW N,
(2) 2awg al XHHW G in (2) 4" pvc conduits

(H) (3) 1/0awg al 15kv cable, (1) 8awg cu THHN N,
(1) 8awg cu THHN G in 2" pvc conduit

Electrical Description

Utility Service Primary KV with Primary Meter to Point of Common Coupling - Customer Owned/Supplied 15 kv 600a rated Main Service Disconnect Switch Fused at 125a

Customer Owned/Supplied Pad/Vault Mounted 2000kva Step Transformer Primary KV to Secondary 480v 3ph Wye with Primary Load Break Switch

5 each 600a rated & 1 each 400a 480v 3ph Main Disconnects each Fused at 600amp & 300a connected in parallel to 3000a 480v 3ph Main Service 2000kva Transformer

Load from Solar Array:
18 Modules of 315w in Series for each String & 12 Strings in Parallel combined for 68 kWdc to 60 kWac Inverter producing a maximum output of 60 kWac 72.2a at 480v 3phase.

30 Inverters each connected to a 100a Disconnect & a 100a Circuit Breaker where 6 are combined in a 600 amp rated Panel for a max. 433 amps 480v 3phase and 5 Panels each connected to a 600 amp rated Disconnect fused at 600 amps.

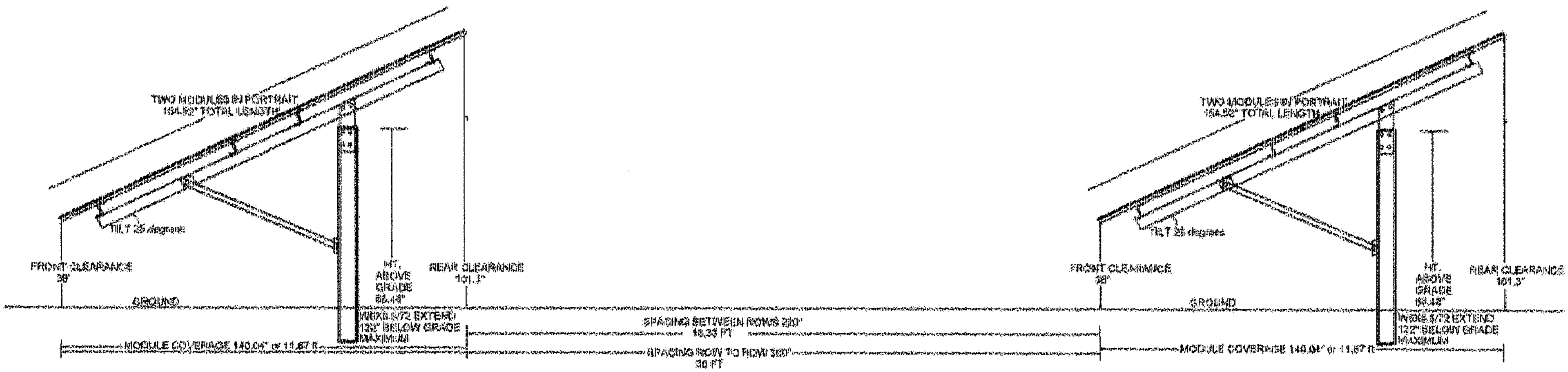
3 Inverters each connected to a 100a Disconnect & a 100a Circuit Breaker where 3 are combined in a 400 amp rated Panel for a maximum 217 amps 480v 3phase and the Panel is connected to a 400 amp rated Disconnect fused at 300 amps.

6 Fused Disconnects connected to the Main Service of 3000a 480v 3ph with a maximum load/distributed generation of 2,383 amps 1,980kWac

Customer: You Save Green Inc., Daniel Bennett GCMS Inc, 315-686-1956

Revised 8/11/2016

Project Location: Community Solar Garden
4575 North Road, Canandaigua NY 14424

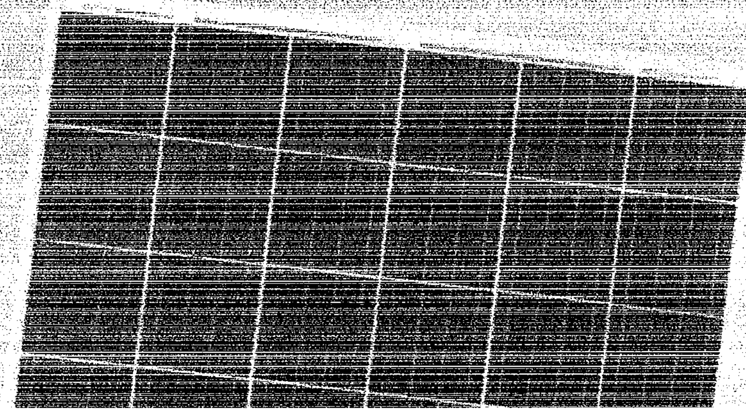


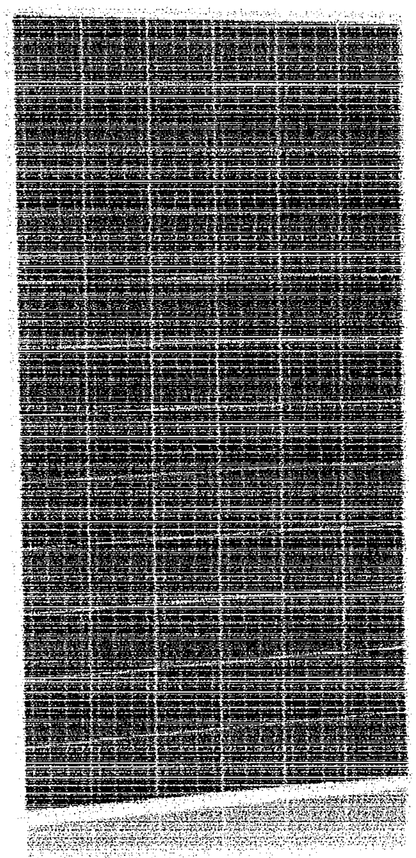
30 FT GROUND MOUNT ROW SPACING X 60 FT LONG ASSEMBLIES
TOTAL HEIGHT 8 FT

www.jinkosolar.com

JKM315P-72
295-315 Watt

POLY CRYSTALLINE MODULE





c UL us LISTED

KEY FEATURES

Innovative solar cells
Four bus-bar cell technology provides a more robust and powerful module ideal for utility scale applications

Higher module efficiency
Polycrystalline 72-cell module with power output available to 315W (16.23% conversion efficiency)

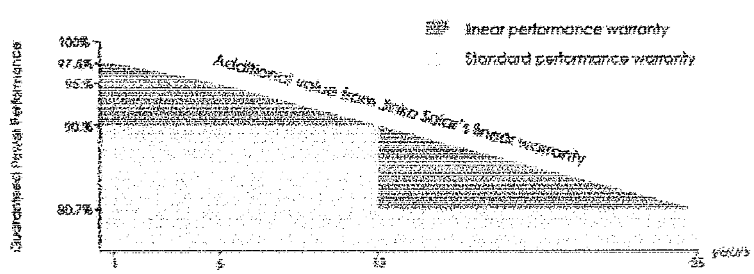
Low-light performance
Improved low light performance through advancements in glass technology and surface texturing

Strong and durable
Tested and fixed to endure up to 5400Pa positive and 2400Pa negative loads

Weather resistance
Certified by TUV for high salt mist and ammonia resistance

LINEAR PERFORMANCE WARRANTY

10 Year Product Warranty • 25 Year Linear Power Warranty



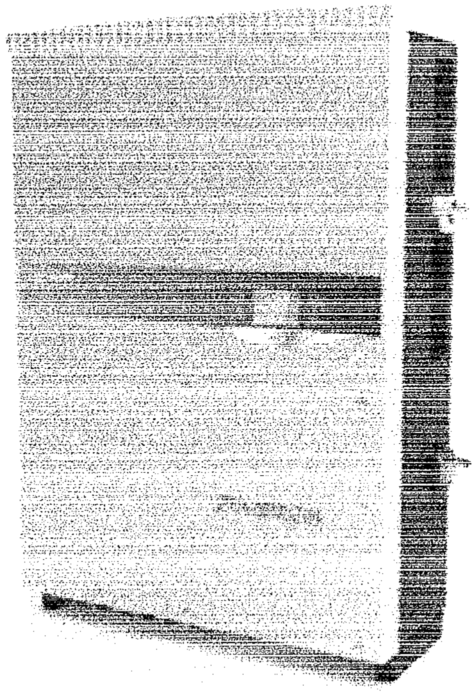
North Rd Solar - Canandaigua

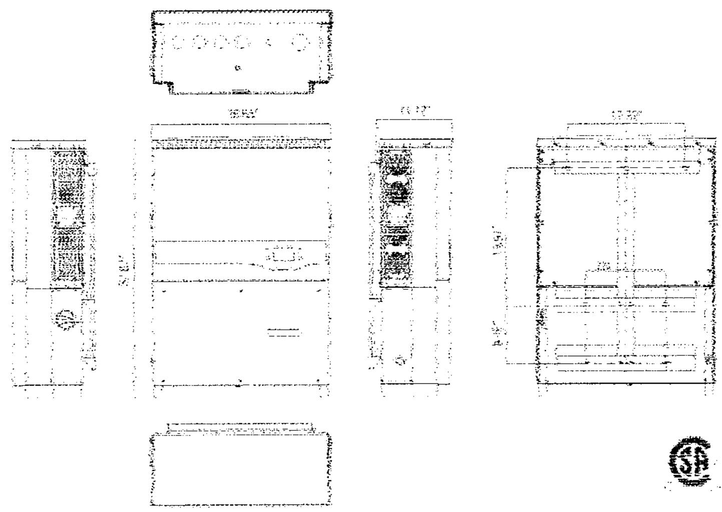
SUNGROW

PV INVERTERS SINCE 1997

www.sungrow.ca

SG60KU-M





Designed for 20+ years of operating life
NEMA4X Electronics Cabinet

98.90% Peak Efficiency, 98.5% CEC Efficiency
Adaptive Edge Quad MPPT® for Fast Tracking

High Power Density, Small Equipment Footprint
DC/AC Disconnect
480/277Vac, Perfect for Commercial Applications

Continuous Active Power Control
Advanced Grid Support Functionality

KEY HIGHLIGHTS:

- With over 12GW deployed in more than 50 countries since 1997, we've learned some things about how to build great products. By working with our partners and listening to our customers, we've engineered and manufactured our inverters to be robust, reliable, providing maximum uptime.
- The SG60KU-M transformerless inverter features best-in-class peak efficiency of 98.90%. Employing a patented thermal management system, the inverter is able to operate from -13°F to 140°F (-25°C to 60°C), and up to 13,000' (4,000 m).
- The SG60KU-M is 1,000Vdc, includes 4 MPPT's, is extremely light weight, and can be mounted vertically as well as horizontally, giving maximum design flexibility and lowering installation costs.
- Built for the grid, Sungrow inverters meet grid requirements around the world. Full remote and local power curtailment, PF, HVRT, LVRT, FRT controls via ModBus & Ethernet.

SUNGROW

PV INVERTERS SINCE 1997

www.sungrow.ca

SPECIFICATIONS

CERTIFICATIONS

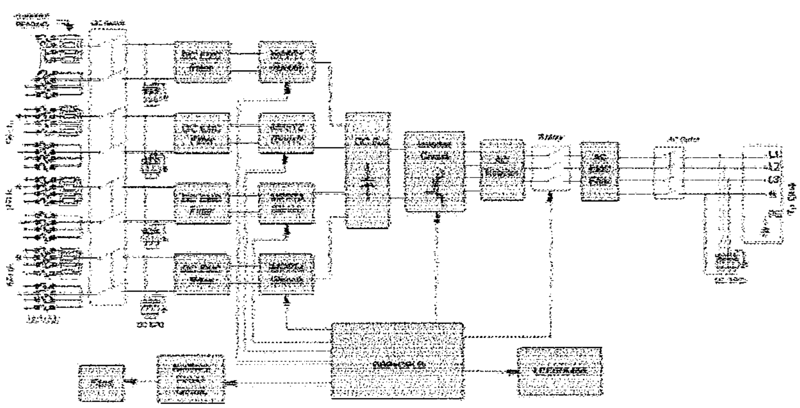
- UL1741, UL1699B, UL1998, IEEE1547, CSA C22.2 #107.1-01, FCC Class A

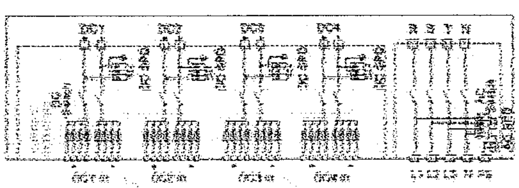
WARRANTY AND SERVICES

- 10 Year Standard Warranty
- Extended Warranty: 15, 20 years
- Preventive Maintenance Plan
- 99% Up Time Guarantee
- Commissioning Services
- Systems Design Services
- Sungrow Certified Training Program

MONITORING OPTIONS

- Data Acquisition: SolarInfo Logger®
- Web Based Monitoring: SolarInfo Banks® website
- SolarInfo Design® software
- Smart Phone apps available
- Open Communication Protocol: ModBus
- Ethernet





	SG60KU-M
Maximum PV Input Voltage	1000V
Start-Up Voltage	300V
Stop Voltage	280V
MPPT Voltage Range Voltage Range	300 - 950V
MPPT Voltage Range for Nominal Power	550 - 850V
String Fuses	Positive and Negative
Number of MPPTs	4
Maximum Number of DC Inputs	16
Maximum DC short circuit current	200A
Maximum PV input current	112A (28A/28A/28A/28A)
Maximum Current for Input Connector	12A
Maximum Cable Size	10AWG, Cu or Al
AFCI	Yes
DC Switch	Yes
Insulation Detection	Yes
DC Surge Arrester	Type II DIN Rail Surge Arrester (4Pole)
Nominal AC Output Power	60000W
Maximum AC Output Apparent Power	66000VA
Maximum AC Output Current	[illegible]
Nominal AC Voltage	[illegible], 480/277Vac
AC Voltage Range	422 - 528Vac
Nominal Grid Frequency	60Hz
Grid Frequency Range	57-63Hz
THD	<3% (Nominal Power)
DC Current Injection	<0.5% In
Power Factor	>0.99 @ Default Value at Nominal Power (Adj. 0.8 Leading - 0.8 Lagging)
Maximum Cable Size	1/0AWG, Cu or Al
AC Surge Arrester	Type II DIN Rail Surge Arrester
Anti-Islanding Protection	Yes
Low Voltage Ride Through	Yes
DC Reverse Connection Protection	Yes
AC Short Circuit Protection	Yes
Leakage Current Protection	Yes
AC Switch	Yes
Maximum Efficiency	98.90%
CEC Efficiency	98.50%
Isolation Method	Transformerless
Ingress Protection Rating	NEMA 4X
Night Losses	<1W
Operating Ambient Temperature Range	-25°C to 60°C (>50°C derating) -13°F to 140°F (>122°F derating)
Allowable Relative Humidity Range	0 - 100%
Cooling Method	Smart Forced Air Cooling
Max. Operating Altitude	13123ft (4000m), Derated > 9843ft (3000m)
Display	Graphic LCD
Communication	RS485 / Ethernet
DC Connection Type	Screw Terminals
AC Connection Type	Spring Clamp Terminals
Certification	cCSAus
Safety and EMC Standard	UL1741, UL1699B, IEEE 1547, IEEE1547.1, CSA C22.2 107.1-01-2001, FCC Part 15 Sub-part B Class B Limits
Dimensions (WxHxD)	985mm X 660mm X 270mm (38.8" x 26.0" x 10.6")
Mounting Method	Wall-bracket
Weight	70kg (154lbs)
RS485	Standard
Ethernet	Standard
NO Dry Contact	Standard
Protocol	Modbus

Sungrow USA Corporation
47751 Fremont Blvd.
Fremont, CA 94538
tel: 1.510.656.1259
email: sales@sungrow.us
web: www.sungrow.us

Sungrow Canada Inc.
695 Edgeley Blvd. | Vaughan, ON L4K 4V8
tel: 1.888.780.8618 | fax: 1.905.760.1158
email for sales: info@sungrow.ca
email for post-sales: service@sungrow.ca
web: www.sungrow.ca

North Road Ground Mount Solar - Canandaigua NY

FS System – Summary

Part List

Description	Value	Units
124303-06200	S 1.5 Rail 6200	1280
140003-008	Standard FS Ram Post 25 degrees	1120
129303-000	S 1.5 Splice Kit	1280
131001-040	Rapid2+ End Clamp	320
135002-003	Grounding Rapid2+ Mid Clamp Assembly	7040

Calculation

Description	Value	Units
Design Type	72	
Type of Rack	Rammed	
Module Width	992	mm
Size of Rack	2V x 45	
Tilt	25	degrees
Code Version	ASCE7-10	
Wind	110	mph
Ground Snow	40	psf
System Length	1801	inches
Rack Quantity	40	

Rails Location and Cuts

Location	Rails Row	Cut	Rail Length	Total (mm)
Center	1	@	5870	5870
Intermediate	6	@	5870	35220
End	2	@	2330	4660

Cut (4) 5867.4mm rail(s) from (4) 6200mm stock rails.Cut (24) 5867.4mm rail(s) from (24) 6200mm stock rails.Cut (8) 2331mm rail(s) from (4) 6200mm stock rails.

Installation Details

Max Span	Tension	Lateral	Shaft Depth
5.5 ft	2.7 kips	1.67 kips	5.5 ft

Client and Project Information

Client Name (Company)	Dan Bennett
Project Name	2MW
Project Street Address:	North Rd
Project City:	Canandaigua
Project State:	NY
Project Zip Code:	14424
Sales Associate:	New Customer
Client Email:	graystonecms@aol.com

Design Criteria: ASCE7-10
Maximum Wind Speed: 110 MPH
Maximum Ground Snow Load: 40

Seismic Criteria : Seismic category: E

Sds	2.00	Sd1	1.40
Ss	3.00	S1	1.40

Package Includes:

1. State specific Stamped Letter of Blessing
2. Representative Design Calculations
3. Structural Drawings

System Type: FS System ,**System Size:** 2V x 45,**System Location:** Edge Zone

Solar Mounting Systems
SCHLETTER Inc.

Letter of Acceptance

From: Wolfgang Fritz, Vice President of Engineering; Schletter, Inc.

Date: 10/13/2015

Re: Engineering Review for the Schletter Inc. Standardized Racking Systems – State of New York

---

To whom it may concern,

We have thoroughly reviewed the design calculations for the standardized racking solutions. The structures are designed to withstand effects of wind, snow, and earthquake loads. Applicable loads are provided on the attached structural drawings and calculations.

These predesigned structures are compliant with the following codes.

1. 2003 International Building Code, By International Code Council, Inc., 2003.
2. 2006 International Building Code, By International Code Council, Inc., 2006.
3. 2009 International Building Code, By International Code Council, Inc., 2009.
4. 2012 International Building Code, By International Code Council, Inc., 2012.
5. 2015 International Building Code, By International Code Council, Inc., 2014.
6. 2012 North Carolina State Building Code, By International Code Council, Inc., 2011.
7. 2013 California Building Code, by the State of California Building Standards Commission, 2013.
8. 2014 Florida State Building Code, by the State of Florida Building Commission, 2014.
9. [illegible]
10. 2015 Minnesota State Building Code, by International Code Council, Inc., 2015.
11. 2015 New Jersey Building Code, by the International Code Council, Inc., 2015.
12. 2010 New York State Building Code, by the New York State Department of State, 2010.
13. 2011 Ohio Building Code, by the State of Ohio Board of Building Standards, 2011.
14. 2012 Vermont Fire & Building Safety Code, by the State of Vermont Department of Public Safety, 2012.
15. 2011 Wisconsin Commercial Building Code, by the State of Wisconsin Department of Safety and Professional Services, 2011.
16. ASCE 7-05, by the American Society of Civil Engineers, 2006.
17. ASCE 7-10, by the American Society of Civil Engineers, 2010.
18. Aluminum Design Manual: Specifications and Guidelines for Aluminum Structures, by the Aluminum Association, Washington, D.C., 2005

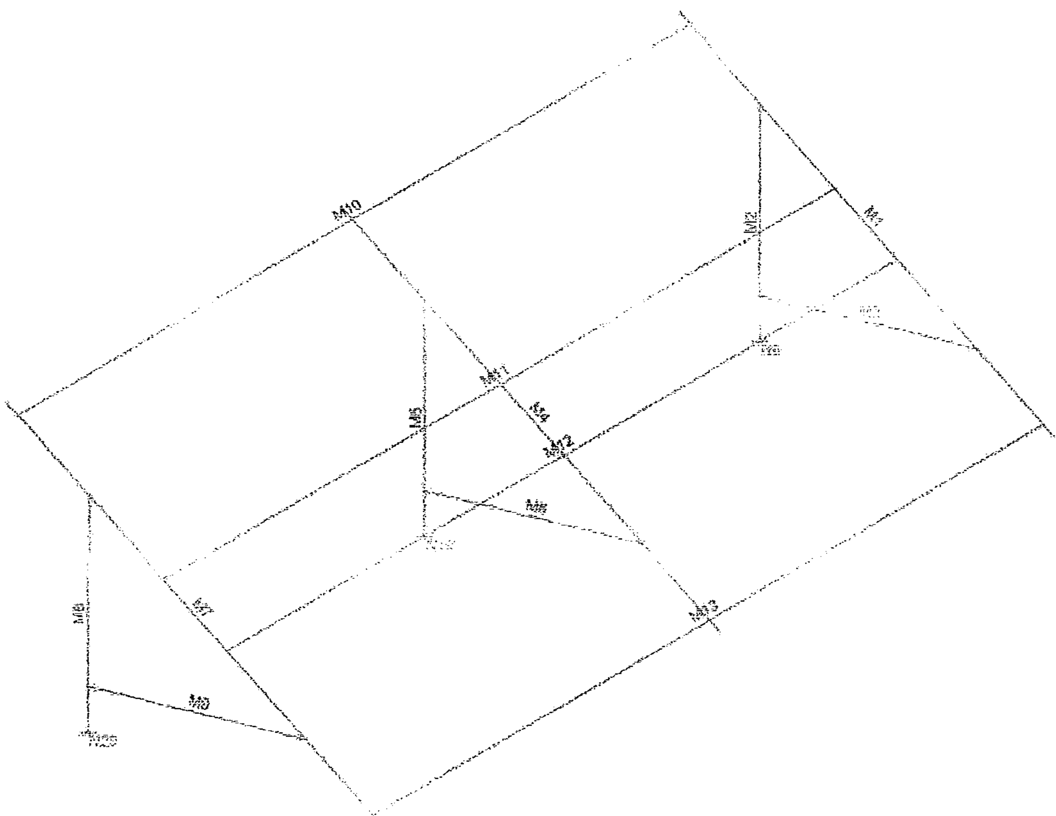
The review is valid for the State of New York and is valid for one year from the date of this letter.

STATE OF NEW YORK
WOLFGANG U. FRITZ
080275
LICENSED PROFESSIONAL ENGINEER

IT IS IN VIOLATION OF LAW FOR ANY PERSON TO ALTER ANY DOCUMENT THAT BEARS THE SEAL OF A PROFESSIONAL ENGINEER, UNLESS THE PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER

10-13-15

Wolfgang Fritz, Ph.D., P.E.
Vice President of Engineering
Schletter Inc.



Schletter, Inc.

25° Tilt w/ Seismic Design

HCV

Standard FS Racking System

Representative Calculations - ASCE 7-10

1. INTRODUCTION

1.1 Project Description

The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. FS ground mount system.

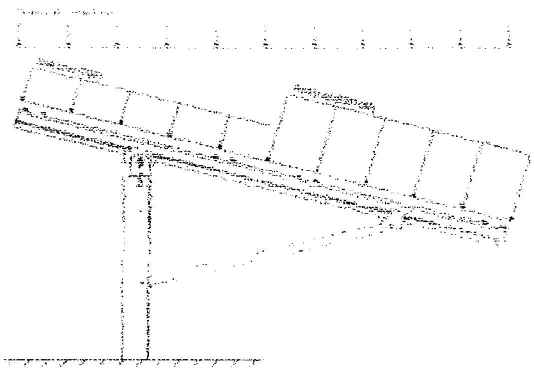
1.2 Construction

Photovoltaic modules are attached to aluminum purlins using clamp fasteners. Purlins are clamped to inclined aluminum girders, which are then connected to galvanized steel posts. Each support structure is equally spaced.

PV modules are required to meet the following specifications:

	Maximum		Minimum
Height =	2000 mm	Height =	1900 mm
Width =	1050 mm	Width =	970 mm
Dead Load =	3.00 psf	Dead Load =	1.75 psf

Modules Per Row = 2
Module Tilt = 25°
Maximum Height Above Grade = 3 ft



Typical loading conditions of the module dead loads, snow loads, and wind loads are shown on the left.

1.3 Technical Codes

- ASCE 7-10 - Chapter 26-31, Wind Loads
- ASCE 7-10 - Chapter 7, Snow Loads
- ASCE 7-10 - Chapter 2, Combination of Loads
- International Building Code, IBC, 2012, 2015
- Aluminum Design Manual, Eighth Edition, 2005

2. LOAD ACTIONS

2.1 Permanent Loads

g_{MAX} = 3.00 psf
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads

Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 18.59 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.82
C_e = 0.90
C_t = 1.20

2.3 Wind Loads

Design Wind Speed, V = 110 mph — Exposure Category = C
Height < 15 ft — Importance Category = II

Peak Velocity Pressure, q_z = 19.00 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

Cf_{TOP} = 1.1 *(Pressure)*
Cf_{BOTTOM} = 1.7
Cf_{TOP} = -2.2 *(Suction)*
Cf_{BOTTOM} = -1

Provided pressure coefficients are the result of wind tunnel testing done by Ruscheweyh Consult. Coefficients are located in test report # [illegible]. Negative forces are applied away from the surface.

2.4 Seismic Loads

S_S =	2.50	R =	1.25
S_{DS} =	1.67	C_S =	0.8
S_1 =	1.00	ρ =	1.3
S_{D1} =	1.00	Ω =	1.25
T_a =	0.05	C_d =	1.25

ASCE 7, Section 12.8.1.3: A maximum S_s of 1.5 may be used to calculate the base shear, C_s, of structures under five stories and with a period, T, of 0.5 or less. Therefore, a S_{DS} of 1.0 was used to calculate C_s.

2.5 Combination of Loads

ASCE 7 requires that all structures be checked by specified combinations of loads. Applicable load combinations are provided below.

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W [M]
1.54D + 1.3E + 0.2S [R]
0.56D + 1.3E [R]
1.54D + 1.25E + 0.2S [O]
0.56D + 1.25E [O]

(ASCE 7, Eq 2.3.2-1 through 2.3.2-7) & (ASCE 7, Section 12.4.3.2)

Allowable Stress Design, ASD

Member deflection checks and foundation designs are done according to the following ASD load combinations:

1.0D + 1.0S
1.0D + 0.6W
1.0D + 0.75L + 0.45W + 0.75S
0.6D + 0.6W [M]
1.238D + 0.875E [O]
1.1785D + 0.65625E + 0.75S [O]
0.362D + 0.875E [O]

(ASCE 7, Eq 2.4.1-1 through 2.4.1-8) & (ASCE 7, Section 12.4.3.2)

[M] *Uses the minimum allowable module dead load.*
[R] *Include redundancy factor of 1.3*
[O] *Includes overstrength factor of 1.25. Used to check seismic drift.*

3. STRUCTURAL ANALYSIS

3.1 RISA Results

Appendix B.1 contains outputs from the structural analysis software package, RISA. These outputs are used to accurately determine resultant member and reaction forces from the loads seen throughout Section 2.

3.2 RISA Components

A member and node list has been provided below to correlate the RISA components with the design calculations in Section 4. Items of significance have been listed.

Purlins	Location
M10	Top
M11	Mid-Top
M12	Mid-Bottom
M13	Bottom

Posts	Location
M2	Outer
M5	Inner
M8	Outer

Girders	Location
M1	Outer
M4	Inner
M7	Outer

Reactions	Location
N8	Outer
N19	Inner
N29	Outer

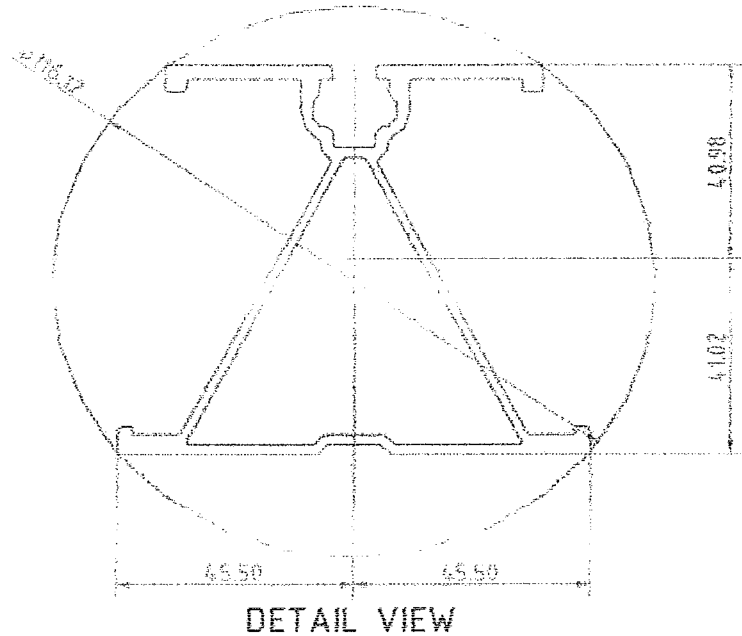
Struts	Location
M3	Outer
M6	Inner
M9	Outer

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

Aluminum purlins are used to transfer loads to the support structure. Purlins are designed as continous beams with cantilevers. These are considered beams with internal hinges that can be joined with splices at 25% of the support respective span. See Appendix A.1 for detailed member calculations. Section units are in (mm).

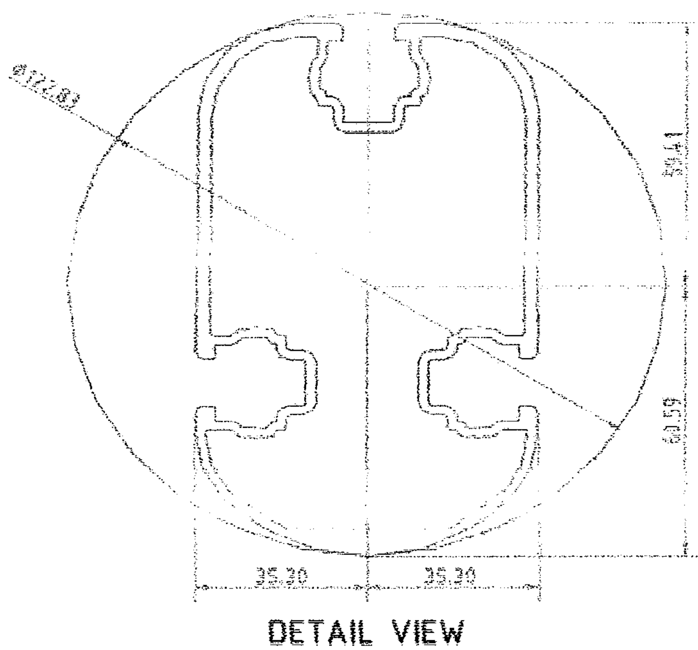
Purlin Type =	[illegible]
Aluminum Type =	6105-T5
F_{ty} =	35 ksi
L_b =	114 in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07 ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08 ksi
S_y =	1.33 in^3
S_x =	0.6 in^3
E =	[illegible]
I_y =	2.18 in^4
I_x =	1.07 in^4
A =	1.25 in^2
g =	1.50 lbs/ft
M_y =	1.421 k-ft
M_z =	0.172 k-ft
$M_{y\ allowable}$ =	[illegible]
$M_{z\ allowable}$ =	1.154 k-ft
Utilization =	[illegible]



4.2 Girder Design

Loads from purlins are transferred to the posts using an inclined girder, which is connected to the steel post. Loads on the girder result from the support reactions of the purlins. See Appendix A.2 for detailed member calculations. Section units are in (mm).

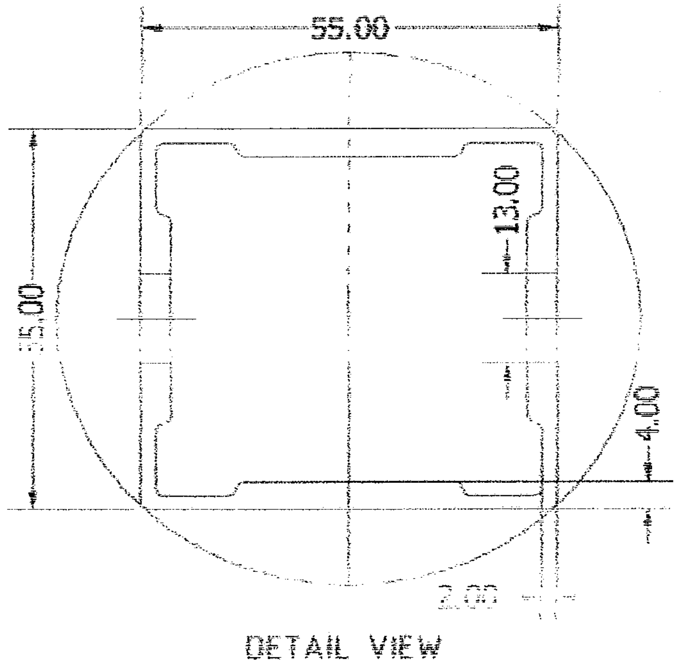
Girder Type =	T5
Aluminum Type	[illegible]
F_{ty} =	35 ksi
L_b =	81.77 in
$\Phi F_{ty\ AXIAL}$ =	30.80 ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	30.06 ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	31.56 ksi
S_y =	1.98 in^3
S_x =	1.02 in^3
E =	10100 ksi
I_y =	4.74 in^4
I_x =	1.83 in^4
A =	1.93 in^2
g =	2.32 lbs/ft
M_y =	3.186 k-ft
M_z =	[illegible]
P_z =	4.614 k
$M_{y\ allowable}$ =	4.960 k-ft
$M_{z\ allowable}$ =	3.472 k-ft
$P_{z\ allowable}$ =	59.439 k
Utilization =	72%



4.3 Strut Design

The aluminum strut connects a portion of the girder to the galvanized steel post. Girder forces are then transferred down through the strut into the post. The strut is attached with single M10 bolts at each end. See Appendix A.3 for detailed member calculations. Section units are in (mm).

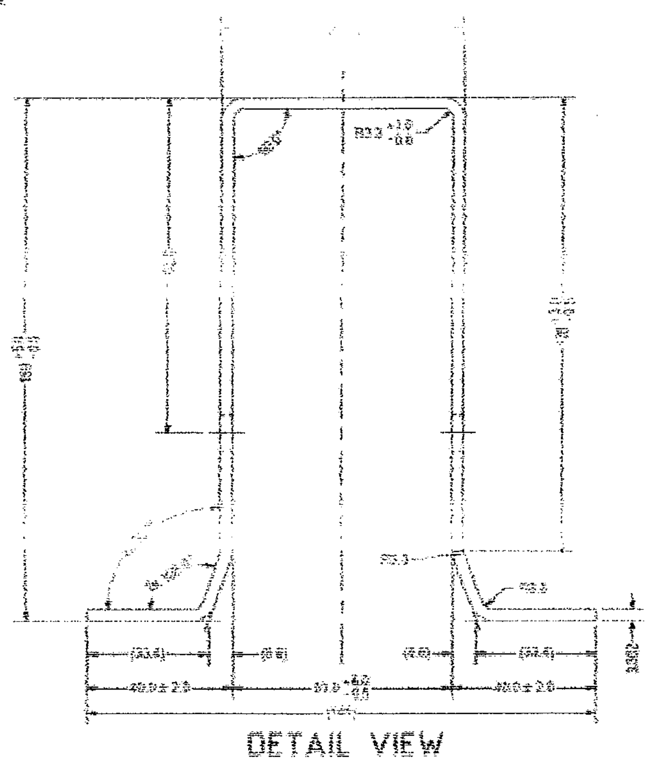
Strut Type =	55x55
Aluminum Type =	6105-T5
F_{ty} =	[illegible] ksi
L_b =	74.80 in
$\Phi F_{ty\ AXIAL}$ =	9.61 ksi
$\Phi F_{ty\ BENDING}$ =	28.22 ksi
S_y =	0.60 in^3
S_x =	0.60 in^3
E =	10100 ksi
I_y =	0.67 in^4
I_x =	[illegible]
A =	0.98 in^2
g =	1.18 lbs/ft
M_y =	0.007 k-ft
M_z =	0.000 k-ft
P_n =	4.756 k
$M_{y\ allowable}$ =	1.408 k-ft
$M_{z\ allowable}$ =	1.408 k-ft
$P_{n\ allowable}$ =	9.441 k
Utilization =	51%



4.4 Post Design

Galvanized steel posts are a roll formed steel section, that are either ram driven into the ground or placed in a concrete foundation at a defined depth. Embedment depths will be provided on the structural drawings or through a geotechnical testing report. See Appendix A.4 for detailed member calculations. Section units are in (mm).

Post Type =	PSB
Steel Type =	JZ340
F_{ty} =	50 ksi
L_b =	81.31 in
Φ =	0.90
ΦF_{ty} =	54.00 ksi
S_y =	3.46 in^3
S_x =	1.55 in^3
E =	29000 ksi
I_y =	10.94 in^4
I_x =	4.31 in^4
A =	2.23 in^2
g =	7.59 lbs/ft
M_y =	14.924 k-ft
M_z =	0.000 k-ft
P_i =	6.212 k
$M_{y\ allowable}$ =	19.207 k-ft
$M_{z\ allowable}$ =	14.389 k-ft
P_c =	30.879 k
Utilization =	99%



5. FOUNDATION DESIGN CALCULATIONS

5.1 Rammed Post Foundations

The following LRFD loads include a safety factor of 1.3, and are to be used in conjunction with a Schletter, Inc. Geotechnical Investigation Report. The forces below should fall within the guidelines provided in the Geotechnical Investigation Report. If a Geotechnical Investigation Report is not present, please proceed to Section 5.2 for a concrete footing design.

Maximum Tensile Load =	[illegible] k
Maximum Lateral Load =	2.65 k

5.2 Design of Drilled Shaft Foundations

The galvanized steel post is to be embedded into a cylindrical drilled shaft foundation. For the purpose of design, the post is considered to be fixed to the ground. The applicable lateral force, uplift, and compression resistance checks are seen below.

5.3 Lateral Force Resistance

The equivalent lateral force is applied at the top of the post to determine the required embedment depth. A lateral soil bearing capacity for clay is assumed. Footing is unrestrained at ground level. (IBC Eq. 18-1)

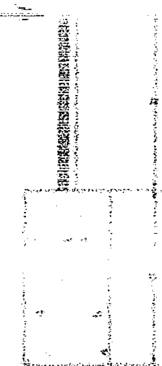
Lateral Force @ Top of Pole, P =	1.44 k
Height of Pole Above Grade, H =	5.78 ft
Diameter of Pole Footing, B =	2.00 ft
Lateral Soil Bearing Capacity, S =	0.10 ksf/ft
Isolated Pole Factor, F =	2
First Trial Depth, D =	3.25 ft

$$S_3 = Min\,(D, 12')$$

$$S_1 = Min\left(\frac{D}{3}, 12'\right)$$

$$A = 2.34\, P/_{S_1 B}$$

$$D = \left\{0.5A\left(1 + \sqrt{1 + \left(\frac{4.36H}{A}\right)}\right)\right\}$$



Lateral Bearing @ Bottom =	S_3
Lateral Bearing @ D/3 =	S_1
Required Depth =	D

	Non-Constrained
Lateral Force @ Top of Pole, P =	1.44 k
Height of Pole Above Grade, H =	5.78 ft
Diameter of Pole Footing, B =	2.00 ft
Lateral Soil Bearing Capacity, S =	0.20 ksf/ft

1st Trial @ D_1	3.25 ft
Lateral Soil Bearing @ D/3, S_1 =	0.22 ksf
Lateral Soil Bearing @ D, S_3 =	0.65 ksf
Constant $2.34P/(S_1B)$, A =	7.75
Required Footing Depth, D =	11.86 ft
2nd Trial @ D_2 =	7.56 ft
Lateral Soil Bearing @ D/3, S_1 =	0.50 ksf
Lateral Soil Bearing @ D, S_3	1.51 ksf
Constant $2.34P/(S_1B)$, A =	3.33
Required Footing Depth, D =	6.54 ft
3rd Trial @ D_3 =	7.05 ft
Lateral Soil Bearing @ D/3, S_1 =	0.47 ksf
Lateral Soil Bearing @ D, S_3 =	1.41 ksf
Constant $2.34P/(S_1B)$, A =	3.57
Required Footing Depth, D	6.95 ft

4th Trial @ D_4	6.95 ft
Lateral Soil Bearing @ D/3, S_1 =	0.46 ksf
Lateral Soil Bearing @ D, S_3 =	1.39 ksf
Constant $2.34P/(S_1B)$, A =	3.62
Required Footing Depth, D =	6.92 ft
5th Trial @ D_5 =	6.94 ft
Lateral Soil Bearing @ D/3, S_1 =	0.46 ksf
Lateral Soil Bearing @ D, S_3	1.39 ksf
Constant $2.34P/(S_1B)$, A =	3.63
Required Footing Depth, D =	7.00 ft

A 2ft diameter x 7ft deep footing unrestrained at ground level is required for the racking structure.

5.4 Uplifting Force Resistance

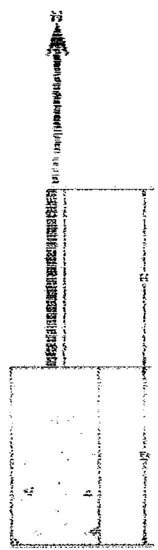
Uplifting forces of the racking system are checked against the uplift resistance of the soil. Clay soils are assumed.

Weight of Concrete, g_{conc} = 145 pcf
Uplifting Force, N = 2.22 k
Footing Diameter, B = 2.00 ft
Factor of Safety = 2.50
Cohesion = [illegible] psf
γ_s = 120.43 pcf
α = 0.45

Required Concrete Weight, g = 1.42 k
Required Concrete Volume, V = 9.77 ft^3
Required Footing Depth, D = 3.25 ft

Iteration	z	dz	Qs	Side
1	0.2	0.2	118.10	4.77
2	0.4	0.2	118.10	4.66
3	0.6	0.2	118.10	4.56
4	0.8	0.2	118.10	[illegible]
5	1	0.2	118.10	4.35
6	1.2	0.2	118.10	4.25
7	1.4	0.2	118.10	4.15
8	1.6	0.2	118.10	4.04
9	1.8	0.2	118.10	3.94
10	2	0.2	118.10	3.83
11	2.2	0.2	118.10	3.73
12	2.4	0.2	118.10	3.63
13	2.6	0.2	118.10	3.52
14	2.8	0.2	118.10	3.42
15	3	0.2	118.10	3.32
16	3.2	0.2	118.10	3.21
17	3.4	0.2	118.10	3.11
18	0	0.0	0.00	3.11
19	0	0.0	0.00	3.11
20	0	0.0	0.00	3.11
21	0	0.0	0.00	3.11
22	0	0.0	0.00	3.11
23	0	0.0	0.00	3.11
24	0	0.0	0.00	3.11
25	0	0.0	0.00	3.11
26	0	0.0	0.00	3.11
27	0	0.0	0.00	3.11
28	0	0.0	0.00	3.11
29	0	0.0	0.00	3.11
30	0	0.0	0.00	3.11
31	0	0.0	0.00	3.11
32	0	0.0	0.00	3.11
33	0	0.0	0.00	3.11
34	0	0.0	0.00	3.11
Max.	3.4	Sum	0.00	

A 2ft diameter x 3.25ft deep footing unrestrained at ground level is required for the racking structure.



5.5 Compressive Force Resistance

Skin friction of the soil is checked against the compression force from the racking and the weight of the drilled shaft foundation. Skin friction starts at 3ft below grade. Clay soils are again assumed.

Depth Below Grade, D = 7.00 ft
Footing Diameter, B = 2.00 ft
Compressive Force, P = 3.94 k

Footing Area = 3.14 ft^2
Circumference = 6.28 ft
Skin Friction Area = 25.13 ft^2
Concrete Weight = 0.145 kcf

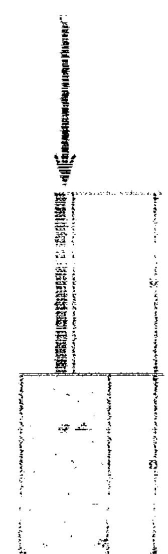
<u>Bearing Pressure</u>
Bearing Area = 3.14 ft^2
Bearing Capacity = 1.5 ksf
Resistance = 4.71 k

<u>Weight of Concrete</u>
Footing Volume = 21.99 ft^3
Weight = [illegible] k

<u>Skin Friction Resistance</u>
Skin Friction = 0.15 ksf
Resistance = 3.77 k

1/3 Increase for Wind = 1.33
Total Resistance = 11.31 k
Applied Force = 7.13 k
Utilization = [illegible]

A 2ft diameter footing passes at a depth of 7ft.

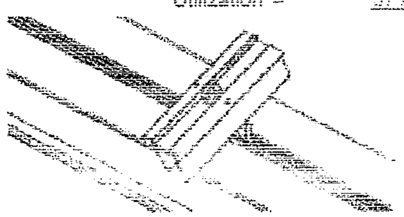


6. DESIGN OF JOINTS AND CONNECTIONS

6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

Modules are secured to the purlins with Schletter, Inc. Rapid2+ mounting clamps. Purlins are secured to the girders with the use of 40mm mounting clamps. The reliability of calculations is uncertain due to limited standards, therefore the strength of the clamp fasteners has been evaluated by load testing.

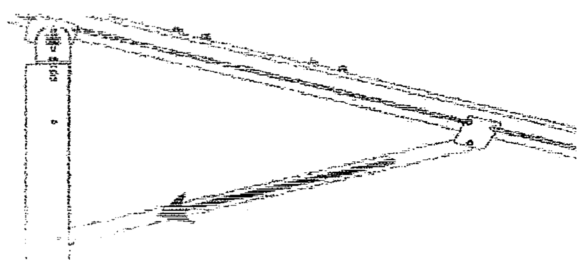
Fastening of Modules to Purlins		Fastening of Purlins to Girders	
Maximum Uplifting Force =	0.455 k	Maximum Uplifting Force =	1.517 k
Allowable Uplift =	1.214 k	Allowable Uplift =	2.180 k
Utilization =	37%	Utilization =	70%



6.2 Strut Connections

The aluminum struts connect the front end of girder to a center section of the steel post. Single M10 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are used.

Maximum Axial Load =	4.756 k	
M10 Bolt Shear Capacity =	8.894 k	*Bolt capacity is accounting for double shear. (ASCE 8-02, Eq. 5.3.4-1)*
Utilization =	[illegible]	

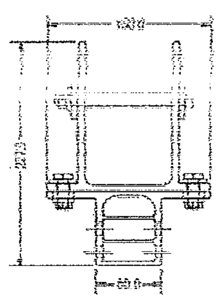


A strut under compression is shown to demonstrate the load transfer from the girder. Single M10 bolts are located at each end of the strut and are subjected to double shear.

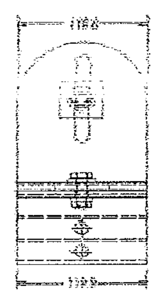
6.3 Girder to Post Connection

In order to connect the girder to the post, custom extruded sections are assembled to create a post head piece. The reliability of calculations is uncertain due to limited standards, therefore the strength of the head piece has been evaluated by load testing.

Maximum Tensile Load =	3.166 k
Allowable Load =	6.649 k
Utilization =	[illegible]



FRONT VIEW



SIDE VIEW

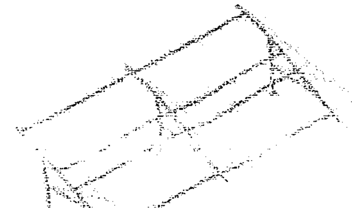
7. SEISMIC DESIGN

7.1 Seismic Drift

The racking structure has been analyzed under seismic loading. The allowable story drift of the structure must fall within the limits provided by (ASCE 7, Table 12.12-1).

Mean Height, h_{sx} =	62.39 in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$
	1.248 in
Max Drift, Δ_{MAX} =	0.889 in
$0.889 \le 1.248$, OK	

The racking structure's reaction to seismic loads is shown to the right. The deflections have been magnified to provide a clear portrayal of potential story drift.



North Road Ground Mount Solar - Canandaigua NY

FS System — Summary

Part List

Description	Value	Units
124303-06200	S 1.5 Rail 6200	1280
140003-008	Standard FS Ram Post 25 degrees	1120
129303-000	S 1.5 Splice Kit	1280
131001-040	Rapid2+ End Clamp	320
135002-003	Grounding Rapid2+ Mid Clamp Assembly	7040

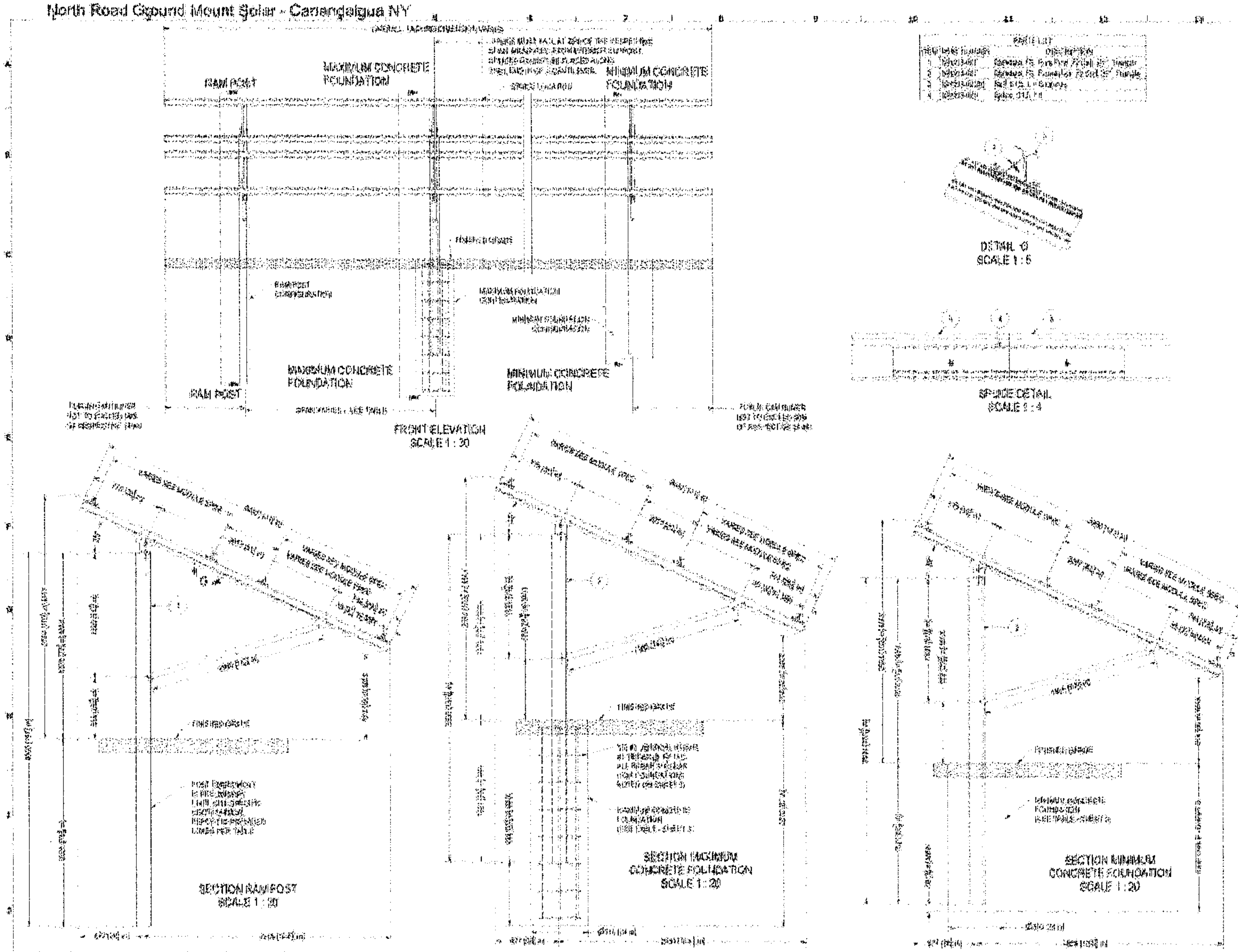
Calculation

Description	Value	Units
Design Type	72	
Type of Rack	Rammed	
Module Width	[illegible]	mm
Size of Rack	2V x 45	
Tilt	25	degrees
Code Version	ASCE7-10	
Wind	110	mph
Ground Snow	40	psf
System Length	1801	inches
Rack Quantity	40	

Rails Location and Cuts

Location	Rails Row	Cut	Rail Length	Total (mm)
Center	1	@	5870	5870
Intermediate	6	@	5870	35220
End	2	@	2330	4660

North Road Ground Mount Solar - Canandaigua NY



Client:
Schletter Inc.
2201 North Forbes Boulevard
Tucson, AZ 85745

SCHLETTER

Standard FS 72 Cell - 25°
Racking Structure
Dimensions and Specifications

Project Site:
Schletter Inc.
1001 Commerce Center Dr
Shelby, NC 28150

Drawing Number:
V.02