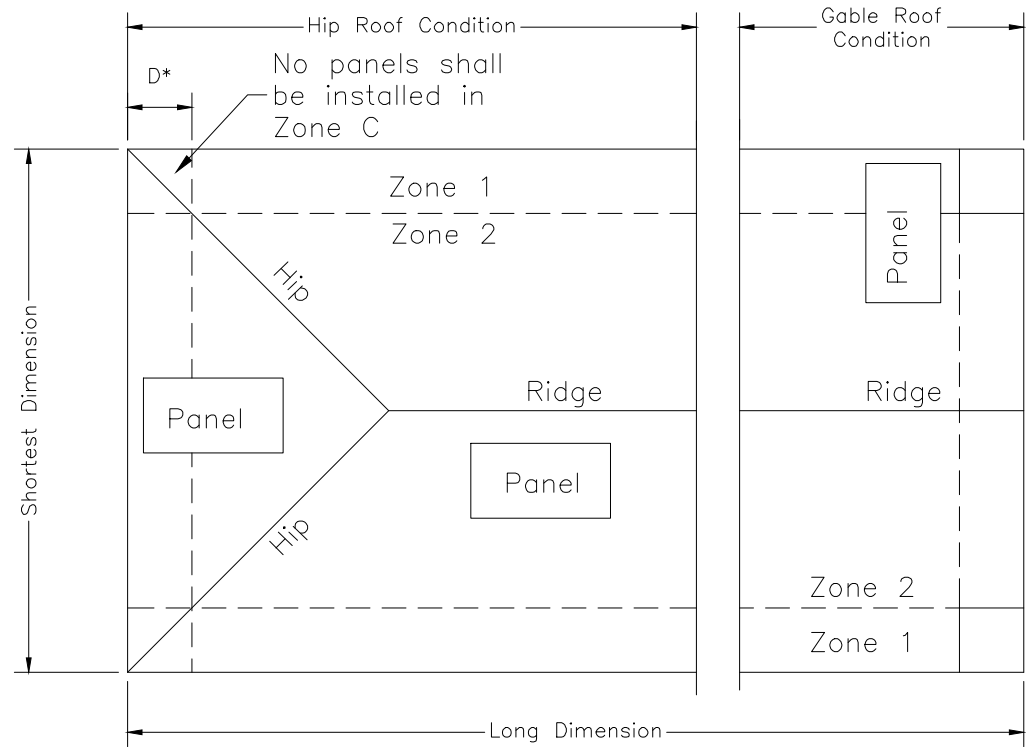
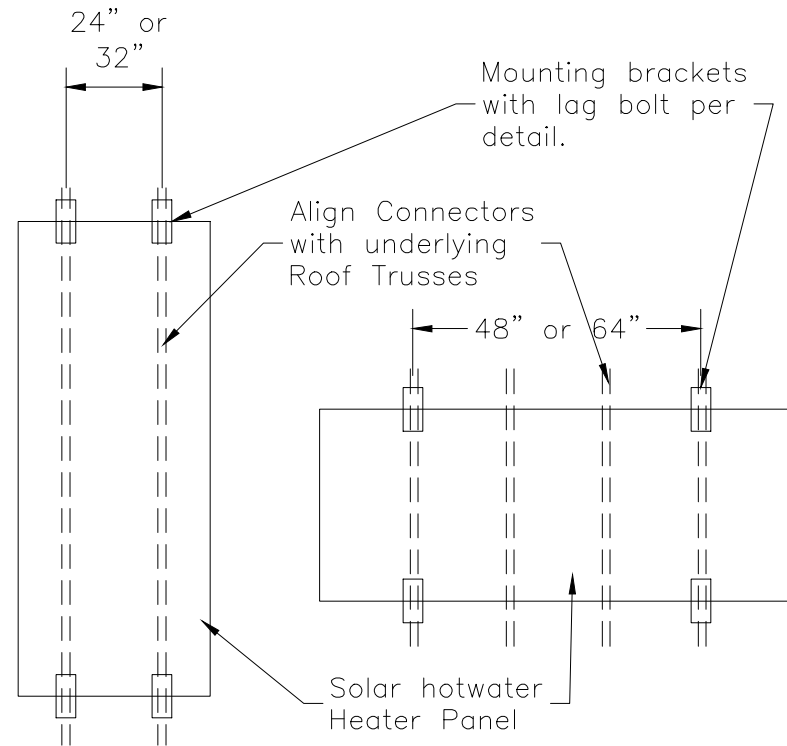


* Zone 3 width shall be the smallest of either 10% of short dimension of building or 40% of mean roof height, or 7 feet.



Roof Layout Plan

Scale: NTS



Typical Solar Panel Layout

Scale: 1/4"=1'

Engineering Notes			
Basic Wind Speed	- 170 MPH		
Wind Importance Factor	- 1		
Wind Exposure	- C		
Design Wind Pressure			
Roof Angle	Zone 1	Zone 2	Zone 3
0° - 7°	71.2 PSF	109.5 PSF	N/A
7° - 45°	65.0 PSF	107.0 PSF	N/A

VALID FOR RESIDENTIAL APPLICATIONS UP TO THREE-STORY ONLY. FOR COMMERCIAL APPLICATIONS, CONTRACTOR SHALL SUBMIT SIGNED AND SEALED INSTALLATION DRAWINGS FOR EACH INDIVIDUAL PROJECT.

BASIS OF CALCULATION:

- 1) Assume 50% of panel is in Zone 1 & 50% in Zone 2
- 2) Uplift Pressure: $71.2 \times 0.5 + 109.5 \times 0.5 = 90.3$ PSF Max
- 3) Panel Area (A): $4' \times 8' = 32$ sf
- 4) Fastener: 0.242" dia wood screws (#14)
- 5) Withdrawal Capacity: 287.33 lb/in thread length
- 6) Number of Fasteners (N): 4 each panel

TYPICAL CALCULATION:

Applied Force

$$F = P \times A = (90.3 \text{ psf}) \times (32 \text{ sf}) = 2,891 \text{ lb} = \text{total uplift per panel}$$

Resisting Capacity

$$S = W \times L \times N = (287.33 \text{ lb/in}) \times (3.0 \text{ in}) \times 4 = 3,448 \text{ lb} = \text{Resisting Capacity}$$

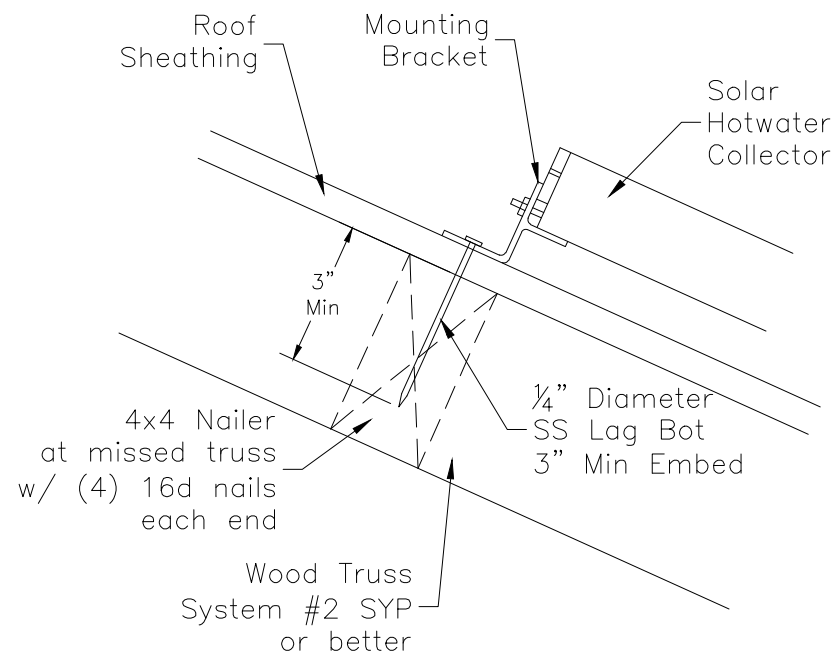
$$F = 2,891 \text{ lb} < S = 3,448 \text{ lb} \{OK\}$$

LEGEND:

- 1) P - Uplift pressure (psf)
- 2) A - Maximum Collector's Area (sf)
- 3) N - Minimum Number of connectors per panel
- 4) F - Total Uplift Force per Panel (lb)
- 5) S - Total Fastener Force (lb)
- 6) L - Fastener Length (in)

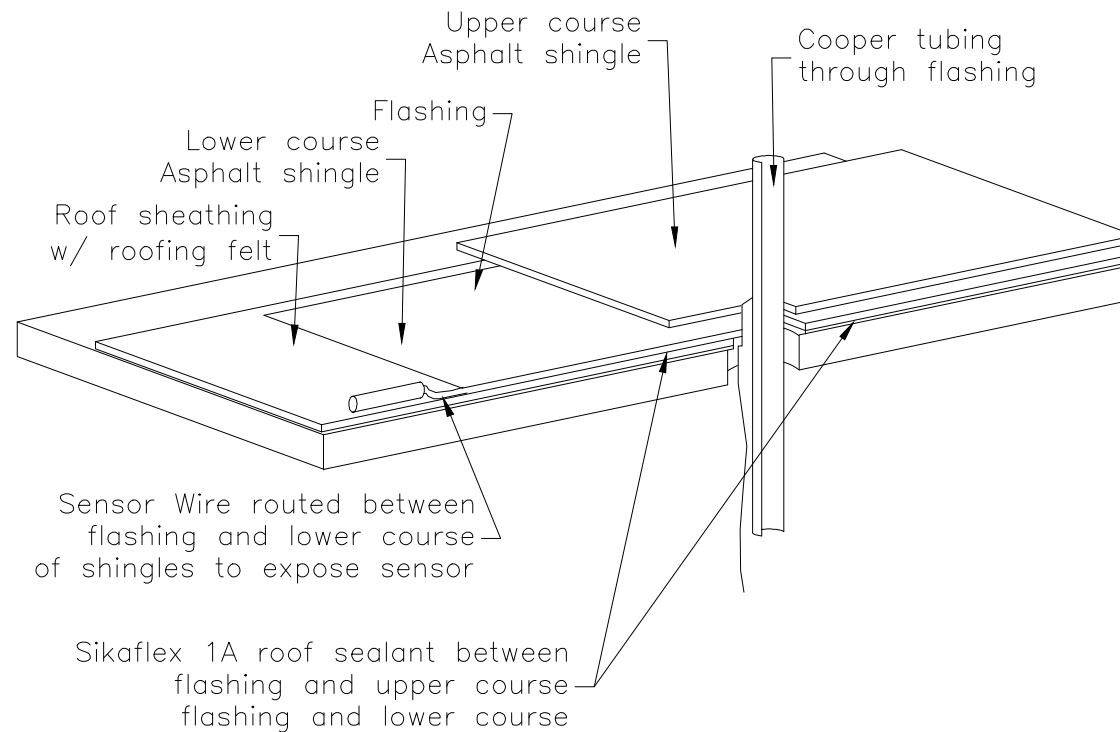
NOTES:

1. These drawings provide the structural requirement for the installation of Solar Hotwater Collectors on low rise residential building with a mean roof height of 30 feet, located in Open Terrain with Scattered Obstructions (Exposure C).
2. The design meets the minimum requirements of the Florida Building Code 2010 and ASCE 7.
3. The installation shall be in accordance with these drawings and utilize hardware (strap, clamps and screw) provide by the manufacturer and detailed in these drawings and plumbed in accordance with the manufacturers installation manual.
4. Each solar collectors shall be secured with a (4) Stainless Steel Brackets connected directly into existing roof trusses
5. All hardware (hose clamps, screws etc.) to be ANSI 304 stainless steel.
6. Lag bolt capacities and embedment are based on USDA General Technical Report FPL-GTR-190 "Wood Handbook - Wood as an Engineering Material"
- 7.



Typical Mounting Bracket Installation

Scale: 1/4"=1'



Roof Penetration Detail

Scale: NTS

Business Authorization Number - EB 00006579

Unroe Engineering, Inc.
Engineering/Planning/Scientific Evaluations
PO Box 690942, Orlando, FL 32869 ◀ PH 407-299-0560 ◀ FX 407-429-7639

Date: 05/16/12

Scale: -----

File: SOLARIS

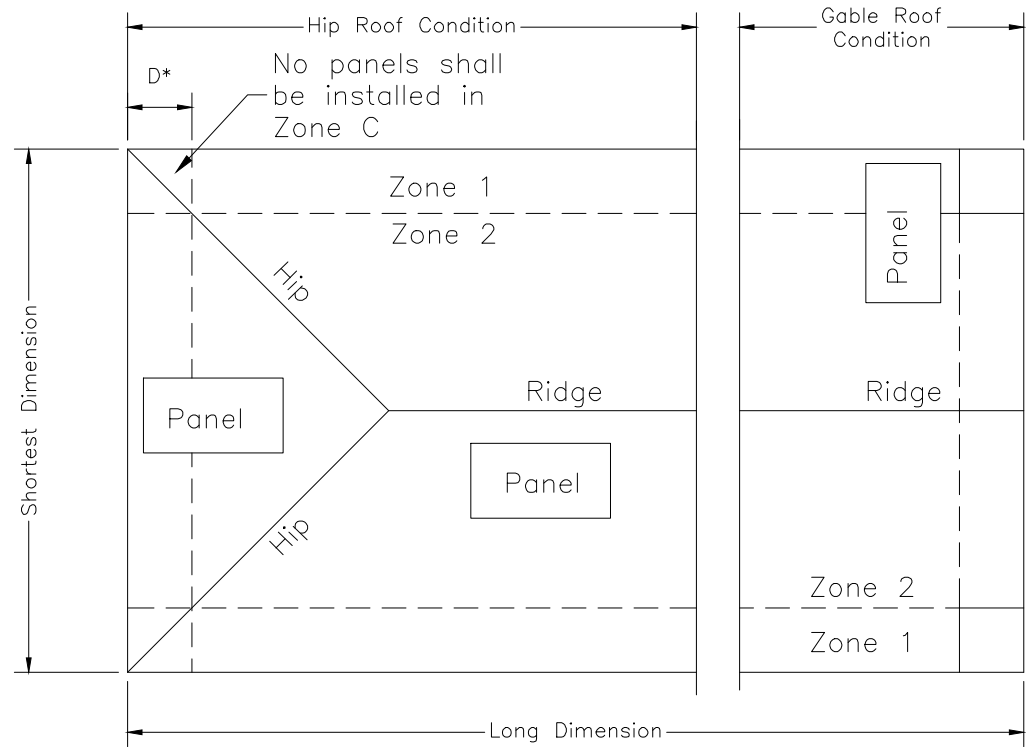
Drawing No.

HW1

Darcy Unroe PE 60929

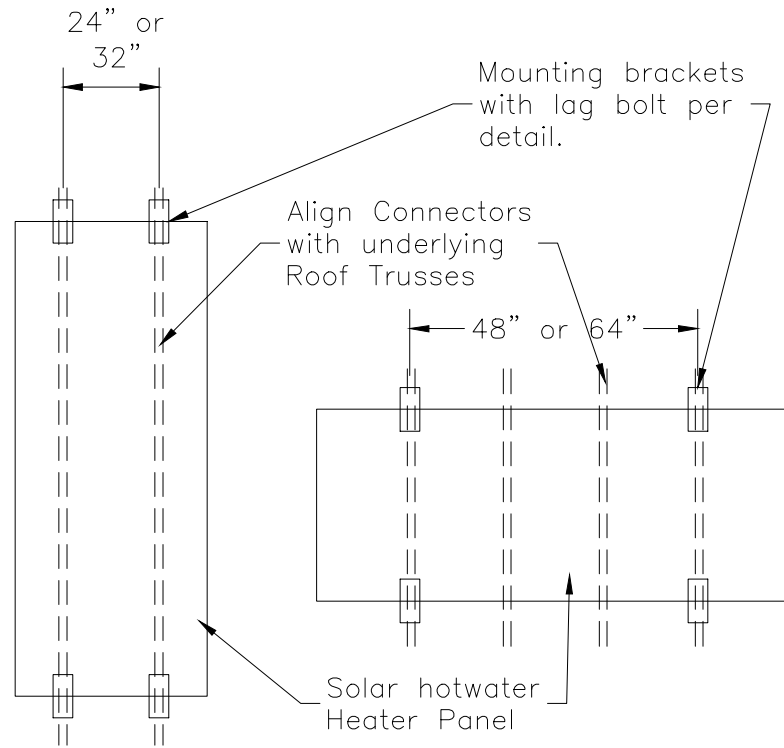
Solar Hotwater Panel Installation Details
Typical Asphaltic Shingle Installation
SOLARIS Energy - (772) 419-0047

* Zone 3 width shall be the smallest of either 10% of short dimension of building or 40% of mean roof height, or 7 feet.



Roof Layout Plan

Scale: NTS



Typical Solar Panel Layout

Scale: 1/4"=1'

Engineering Notes			
Basic Wind Speed	- 170 MPH		
Wind Importance Factor	- 1		
Wind Exposure	- C		
Design Wind Pressure	Zone 1	Zone 2	Zone 3
Roof Angle			
0° - 7°	71.2 PSF	109.5 PSF	N/A
7° - 45°	65.0 PSF	107.0 PSF	N/A

VALID FOR RESIDENTIAL APPLICATIONS UP TO THREE-STORY ONLY. FOR COMMERCIAL APPLICATIONS, CONTRACTOR SHALL SUBMIT SIGNED AND SEALED INSTALLATION DRAWINGS FOR EACH INDIVIDUAL PROJECT.

BASIS OF CALCULATION:

- 1) Assume 50% of panel is in Zone 1 & 50% in Zone 2
- 2) Uplift Pressure: $71.2 \times 0.5 + 109.5 \times 0.5 = 90.3$ PSF Max
- 3) Panel Area (A): $4' \times 8' = 32$ sf
- 4) Fastener: 0.242" dia wood screws (#14)
- 5) Withdrawal Capacity: 287.33 lb/in thread length
- 6) Number of Fasteners (N): 4 each panel

TYPICAL CALCULATION:

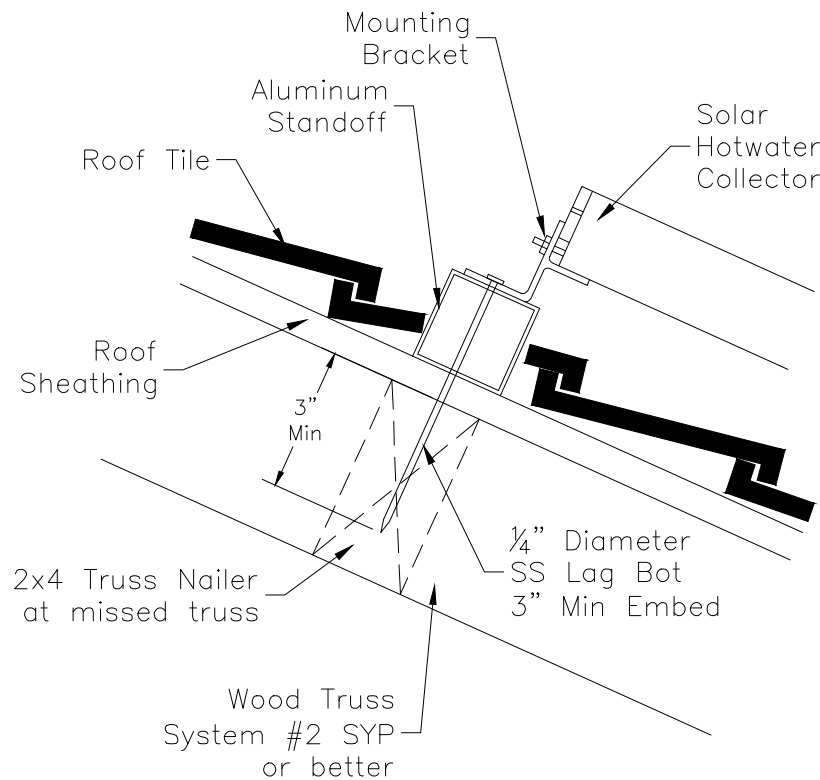
Applied Force
 $F = P \times A = (90.3 \text{ psf}) \times (32 \text{ sf}) = 2,891 \text{ lb} = \text{total uplift per panel}$

Resisting Capacity
 $S = W \times L \times N = (287.33 \text{ lb/in}) \times (3.0 \text{ in}) \times 4 = 3,448 \text{ lb} = \text{Resisting Capacity}$

$F = 2,891 \text{ lb} < S = 3,448 \text{ lb} \text{ (OK)}$

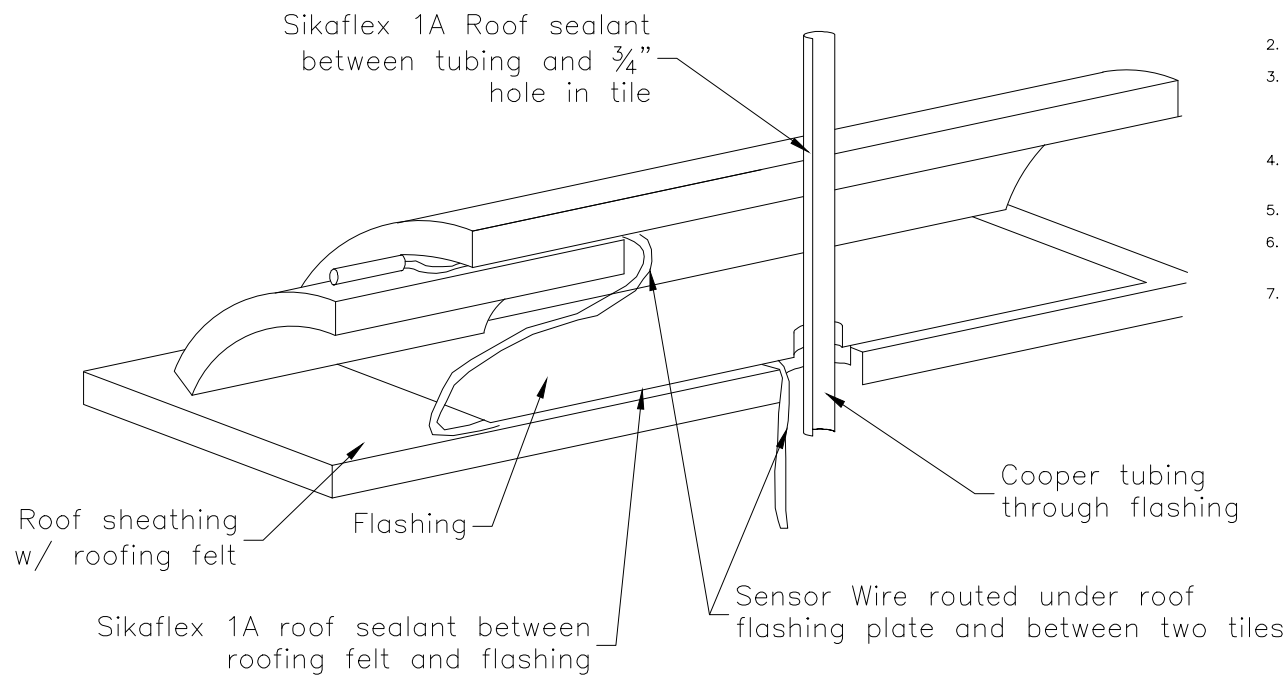
LEGEND:

- 1) P - Uplift pressure (psf)
- 2) A - Maximum Collector's Area (sf)
- 3) N - Minimum Number of connectors per panel
- 4) F - Total Uplift Force per Panel (lb)
- 5) S - Total Fastener Force (lb)
- 6) L - Fastener Length (in)



Typical Mounting Bracket Installation

Scale: 1/4"=1'



Roof Penetration Detail

Scale: NTS

NOTES:

1. These drawings provide the structural requirement for the installation of Solar Hotwater Collectors on low rise residential building with a mean roof height of 30 feet, located in Open Terrain with Scattered Obstructions (Exposure C).
2. The design meets the minimum requirements of the Florida Building Code 2010 and ASCE 7.
3. The installation shall be in accordance with these drawings and utilize hardware (strap, clamps and screw) provide by the manufacturer and detailed in these drawings and plumbed in accordance with the manufacturers installation manual.
4. Each solar collectors shall be secured with a (4) Stainless Steel Brackets connected directly into existing roof trusses
5. All hardware (hose clamps, screws etc.) to be ANSI 304 stainless steel.
6. Lag bolt capacities and embedment are based on USDA General Technical Report FPL-GTR-190 "Wood Handbook - Wood as an Engineering Material"
- 7.

Business Authorization Number - EB 00006579

Unroe Engineering, Inc.
 Engineering/Planning/Scientific Evaluations
 PO Box 690942, Orlando, FL 32869 ◀ PH 407-299-0560 ◀ FX 407-429-7639

Date: 05/16/12
 Scale: ---
 File: SOLARIS

Drawing No.
HW2

Darcy Unroe PE 60929

Solar Hotwater Panel Installation Details
Typical Tile Roof Installation
SOLARIS Energy - (772) 419-0047