



USAID | **HAITI**
FROM THE AMERICAN PEOPLE



RÉPUBLIQUE D'HAÏTI
DINEPA
Direction Nationale
de l'Eau Potable
et de l'Assainissement

USAID WATER AND SANITATION PROJECT



**CHARPENTIER SOLAR PUMP
STATION QUICK IMPACT PROJECT**

LES CAYES, HAITI

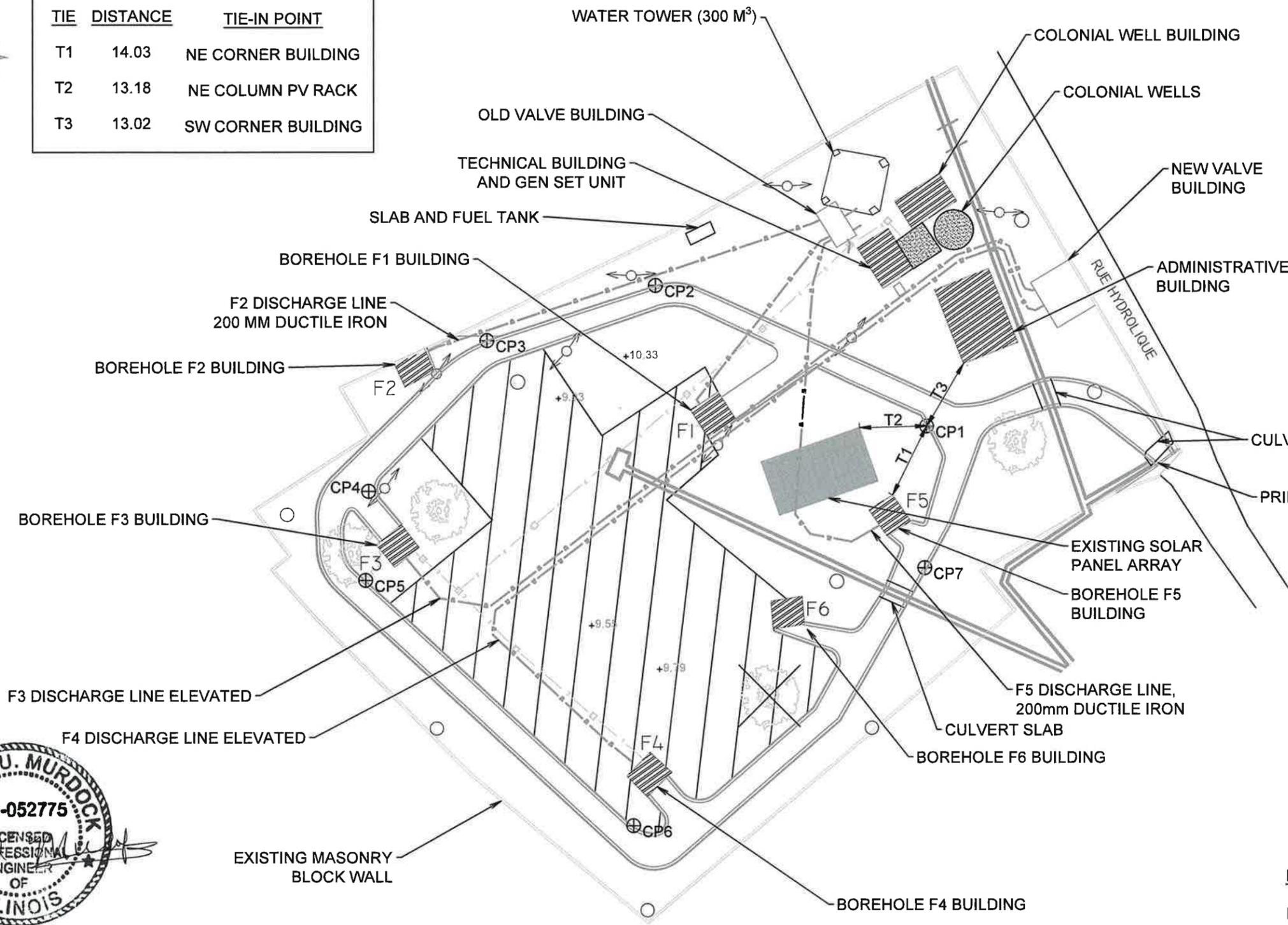
5/3/2019





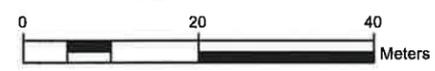
CONTROL POINT 1 TIE-INS		
TIE	DISTANCE	TIE-IN POINT
T1	14.03	NE CORNER BUILDING
T2	13.18	NE COLUMN PV RACK
T3	13.02	SW CORNER BUILDING

LEGEND	
	WATER LINE
	ELECTRICAL CONDUIT
	SOLAR LAMP
	POWER POLE EDH
	CLEARING AND GRUBBING
	ELECTRIC JUNCTION CHAMBER
	CONTROL POINT
	CONCRETE DRAINAGE CHANNEL
	TREE REMOVAL (PAID FOR AT THE LUMP SUM PRICE BID FOR CLEARING AND GRUBBING)

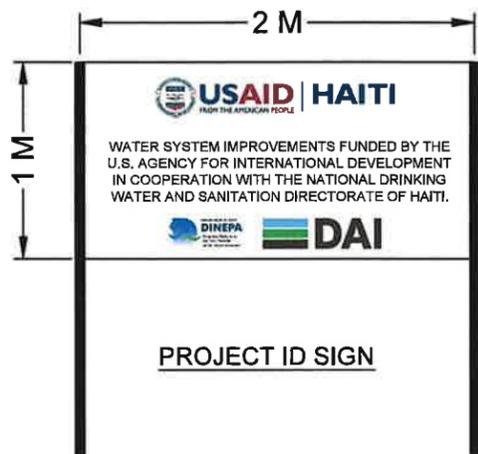


CP	LAT.	LONG.	ELEV.
1	18.210810	-73.758708	10.00 (ASSUMED)
2	18.211040	-73.759166	10.77
3	18.210953	-73.759453	10.76
4	18.210710	-73.759655	10.56
5	18.210566	-73.759662	10.43
6	18.210166	-73.759211	10.13
7	18.210581	-73.758713	9.81

NOTE:
 LOCATIONS OF UTILITIES AND FEATURES ARE APPROXIMATE. CONTRACTOR TO VERIFY.
 DATUM: WSGS 1984 UTM ZONE 18N



		CHARPENTIER SOLAR PUMP STATION QUICK IMPACT PROJECT LES CAYES SUD	EXISTING CONDITIONS 1.0	DRAWING NO.	NAME	DATE
				PROJECT NO.: 18025.16.06	DESIGNED BY: RB	4/2/2019
				DRAWN BY: LEH	4/2/2019	
				CHECKED BY: RUM	4/25/2019	
				APPROVED BY: RUM	4/25/2019	



PROJECT ID SIGN

LEGEND	
	WATER LINE
	ELECTRICAL CONDUIT
	SOLAR LAMP
	POWER POLE EDH
	ELECTRIC JUNCTION CHAMBER
	CONTROL POINT

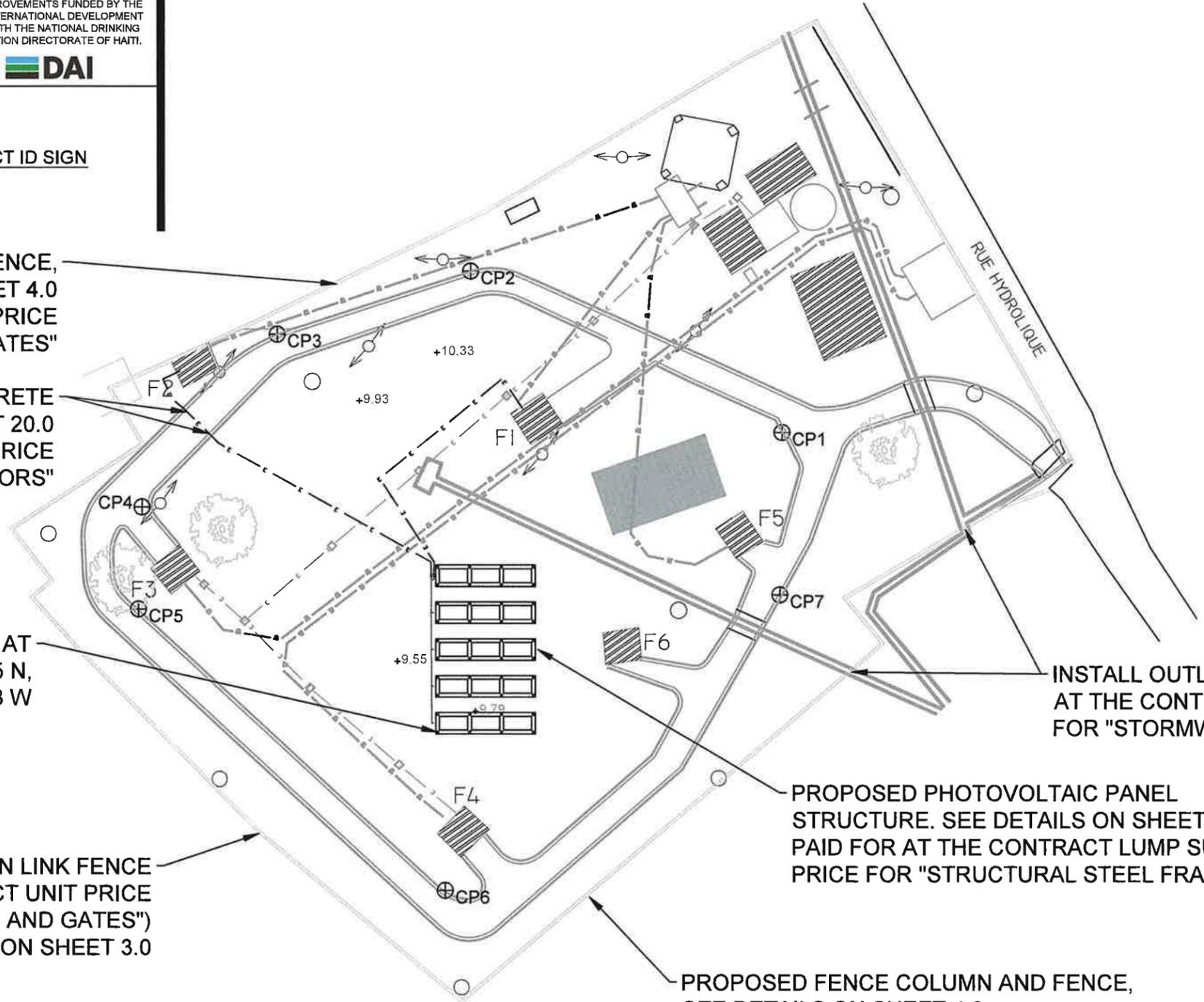
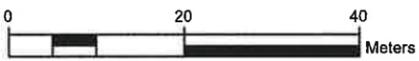
PROPOSED FENCE COLUMN AND FENCE, SEE DETAILS ON SHEET 4.0 PAID FOR AT THE CONTRACT UNIT PRICE BID FOR "COMPOSITE FENCES AND GATES"

CONDUIT UNDER CONCRETE SEE PATCH DETAIL ON SHEET 20.0 PAID FOR AT THE CONTRACT LUMP SUM PRICE BID FOR "PHOTOVOLTAIC COLLECTORS"

SET CENTER OF SOUTHWEST COLUMN AT 18.21045 N, -73.75928 W



ELEVATE CHAIN LINK FENCE (PAID FOR AT THE CONTRACT UNIT PRICE BID FOR "CHAIN LINK FENCE AND GATES") SEE DETAILS ON SHEET 3.0



INSTALL OUTLET GRATE, PAID FOR AT THE CONTRACT UNIT PRICE BID FOR "STORMWATER UTILITIES"

PROPOSED PHOTOVOLTAIC PANEL STRUCTURE. SEE DETAILS ON SHEET 7.0 PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR "STRUCTURAL STEEL FRAMING"

PROPOSED FENCE COLUMN AND FENCE, SEE DETAILS ON SHEET 4.0 PAID FOR AT THE CONTRACT UNIT PRICE BID FOR "COMPOSITE FENCES AND GATES"

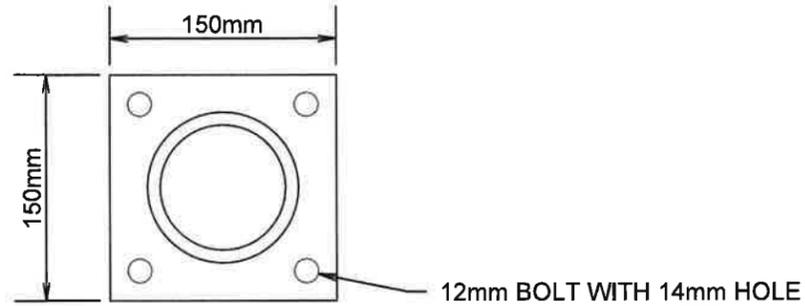
USAID WATER AND SANITATION PROJECT

CHARPENTIER SOLAR PUMP STATION
QUICK IMPACT PROJECT

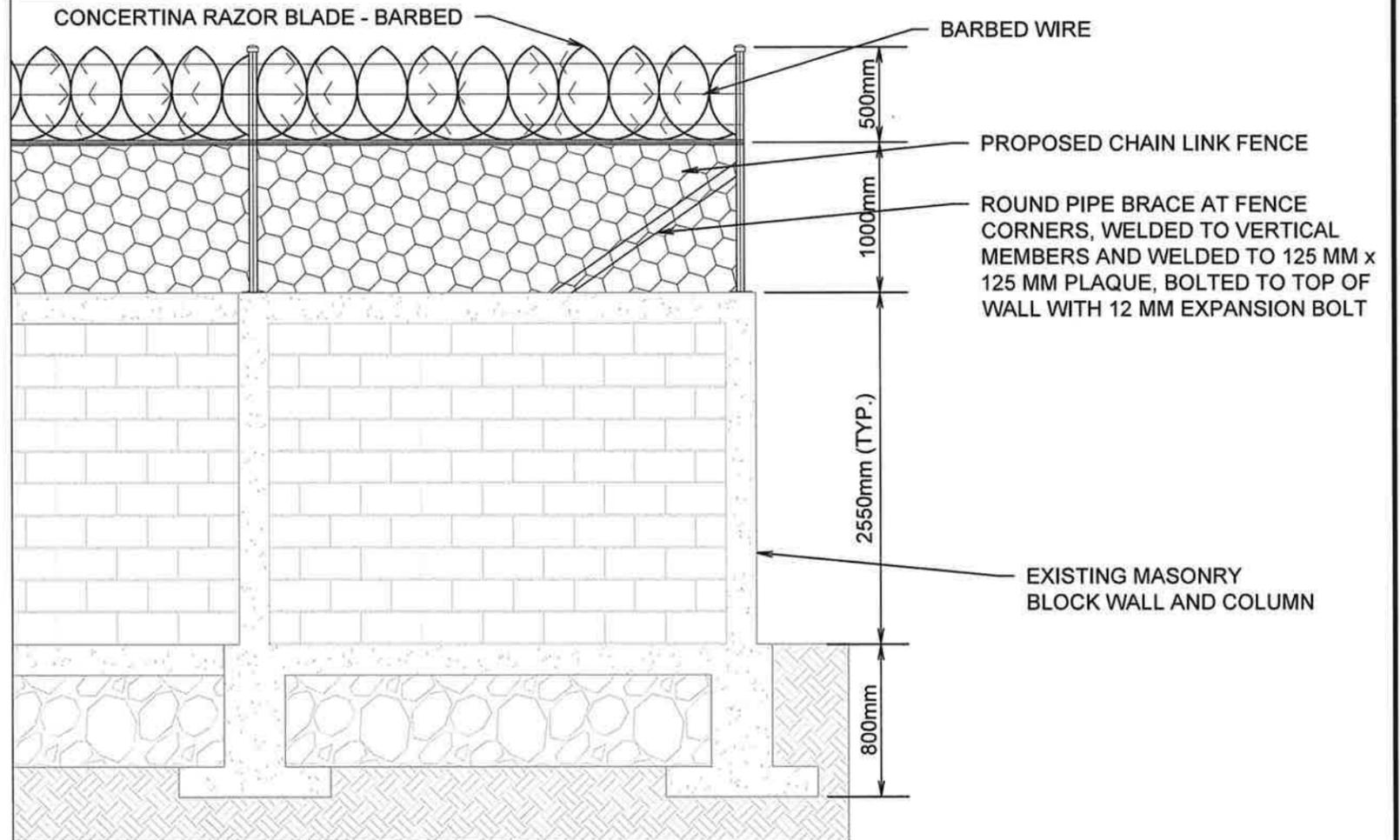
LES CAYES SUD

PROPOSED CONDITIONS

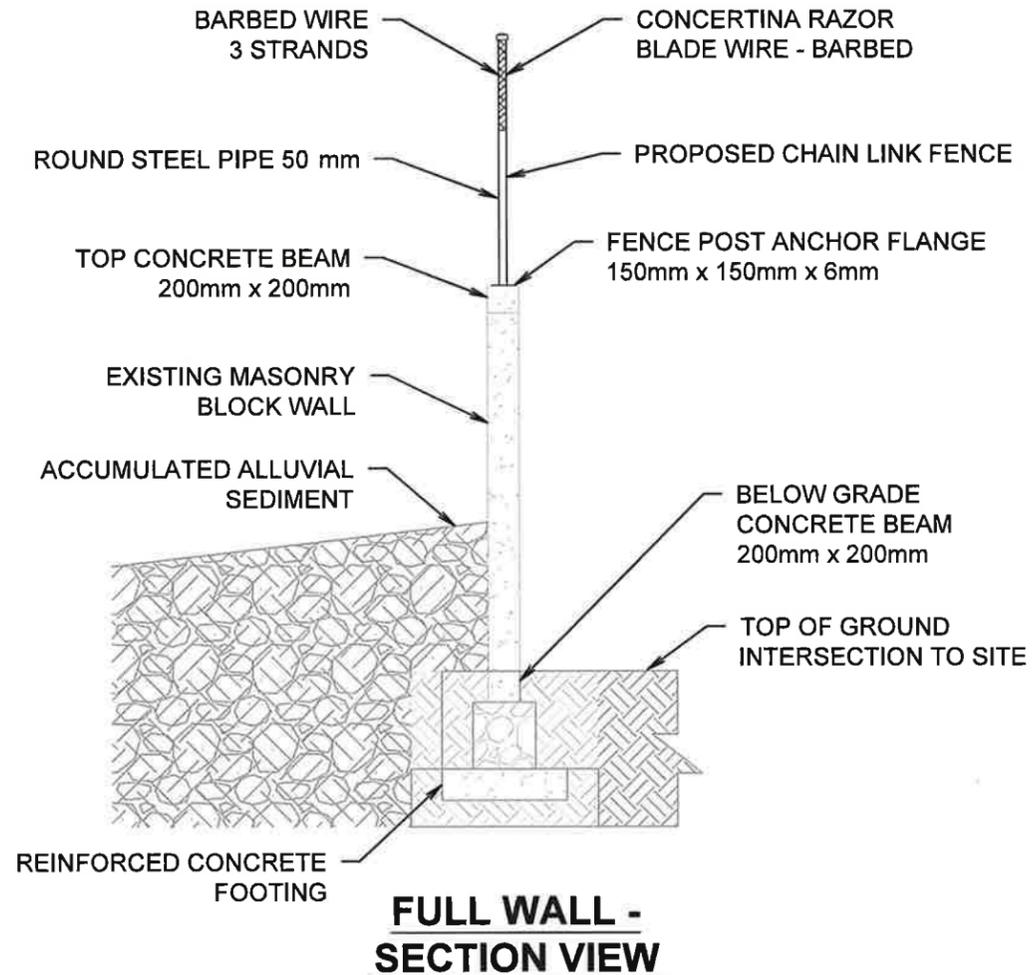
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	DRAWN BY:	LEH 4/2/2019
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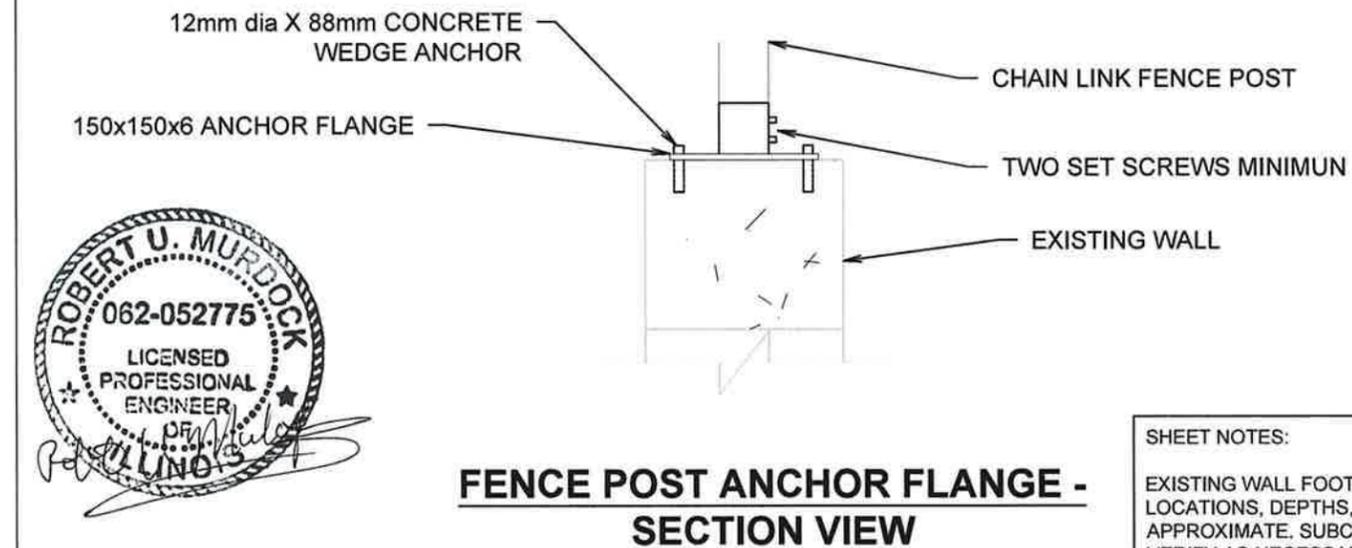
**FENCE POST ANCHOR FLANGE -
PLAN VIEW**



FENCE CONSTRUCTION - FOR TOP OF WALL APPLICATION



**FULL WALL -
SECTION VIEW**



**FENCE POST ANCHOR FLANGE -
SECTION VIEW**

SHEET NOTES:

EXISTING WALL FOOTING AND GRADE BEAM LOCATIONS, DEPTHS, AND DIMENSIONS ARE APPROXIMATE. SUBCONTRACTOR SHALL VERIFY AS NECESSARY.



CHARPENTIER SOLAR PUMP STATION
QUICK IMPACT PROJECT
LES CAYES SUD

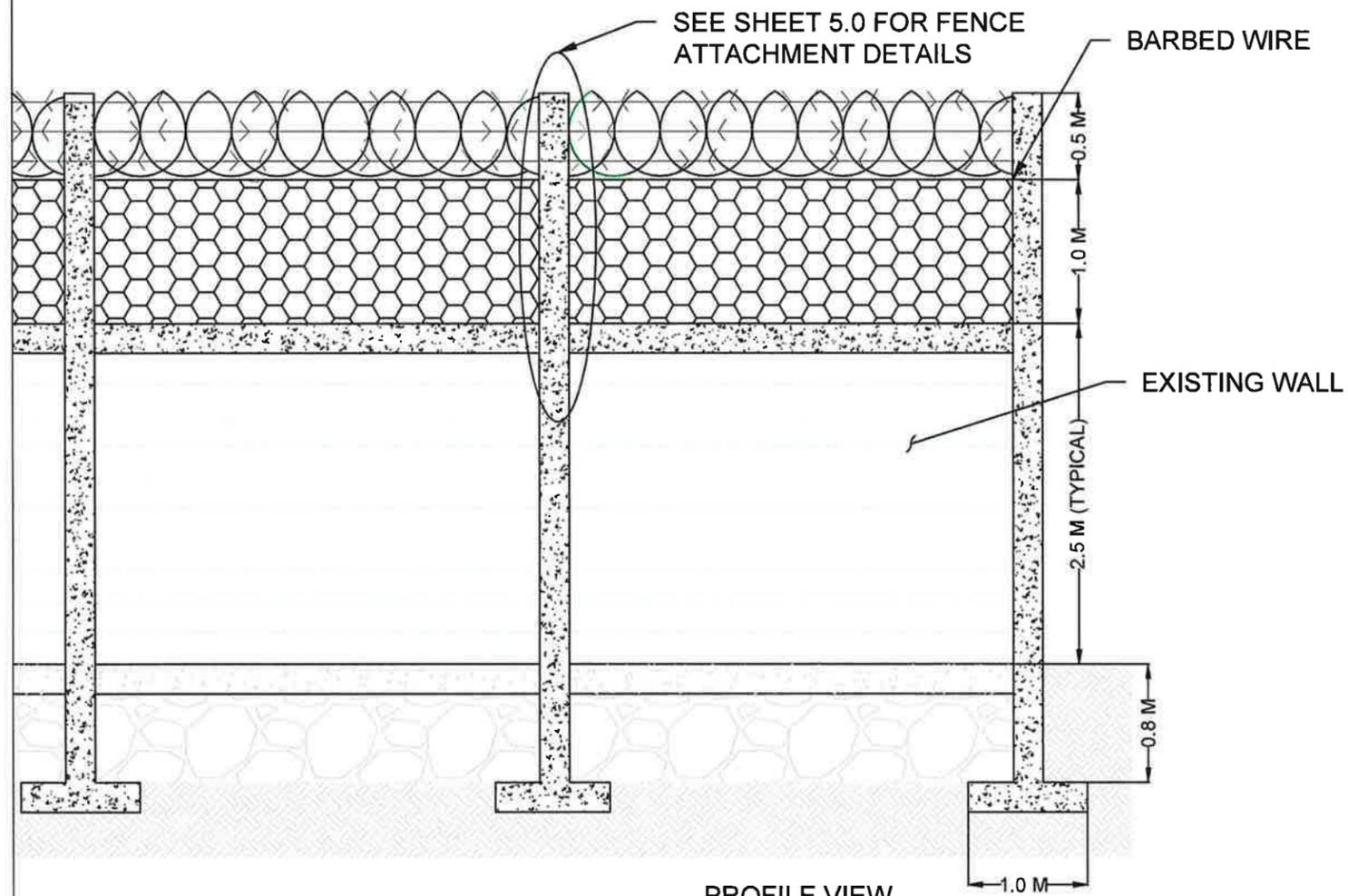
PROPOSED FENCE DETAILS

DRAWING NO.
3.0

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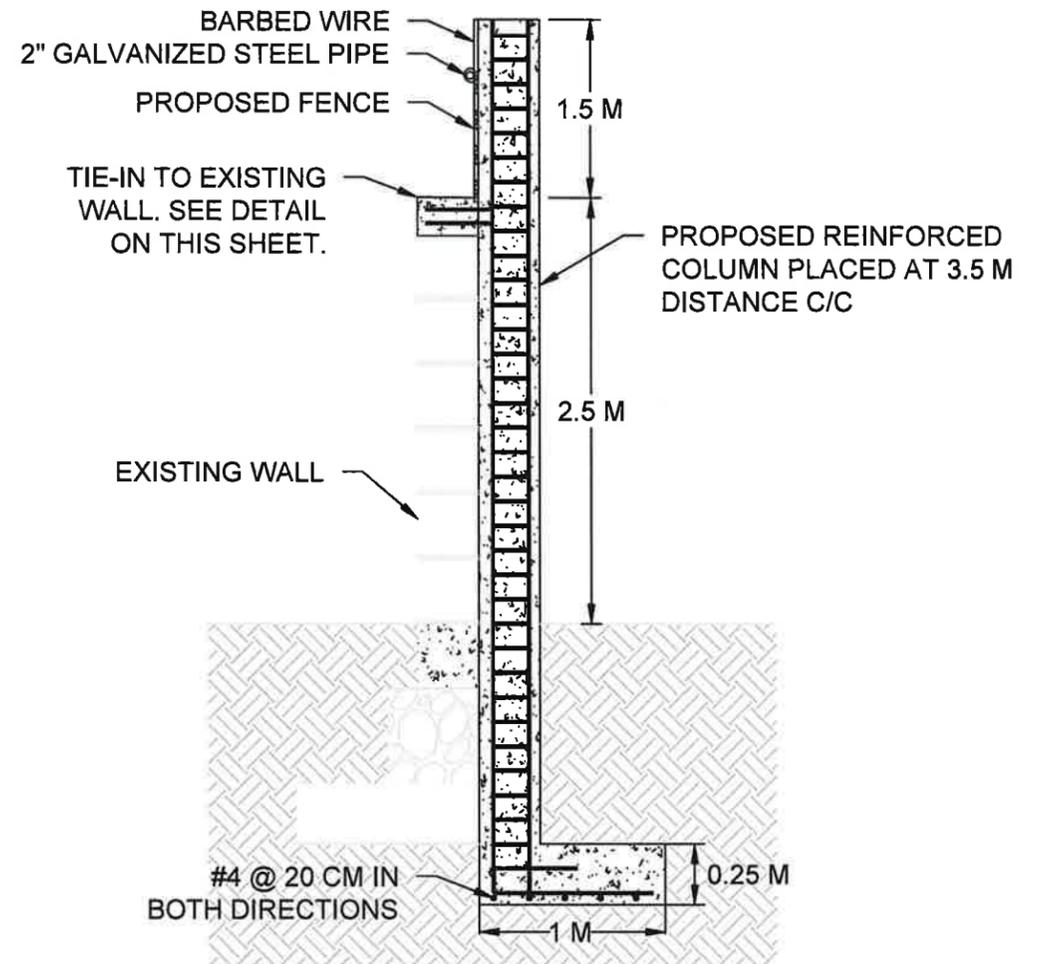


PROPOSED REINFORCED FENCE COLUMN



PROFILE VIEW

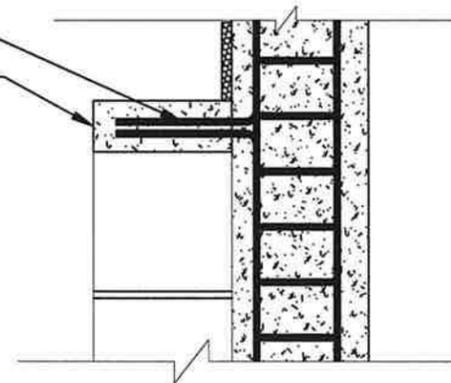
PROPOSED REINFORCED COLUMN



SECTION VIEW

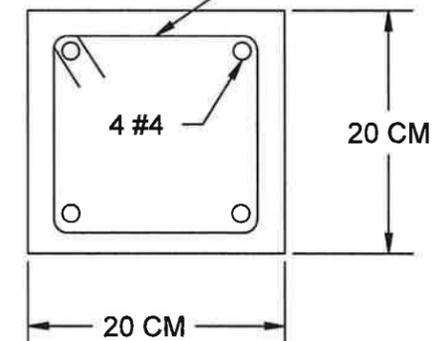


2 #4 X 30 CM REBAR
CHAINAGE 15x15 CM



TIE-IN TO EXISTING WALL

#3 @ 20 CM



COLUMN REBAR DETAIL

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CHARPENTIER SOLAR PUMP STATION
QUICK IMPACT PROJECT

LES CAYES

SUD

PROPOSED FENCE COLUMNS

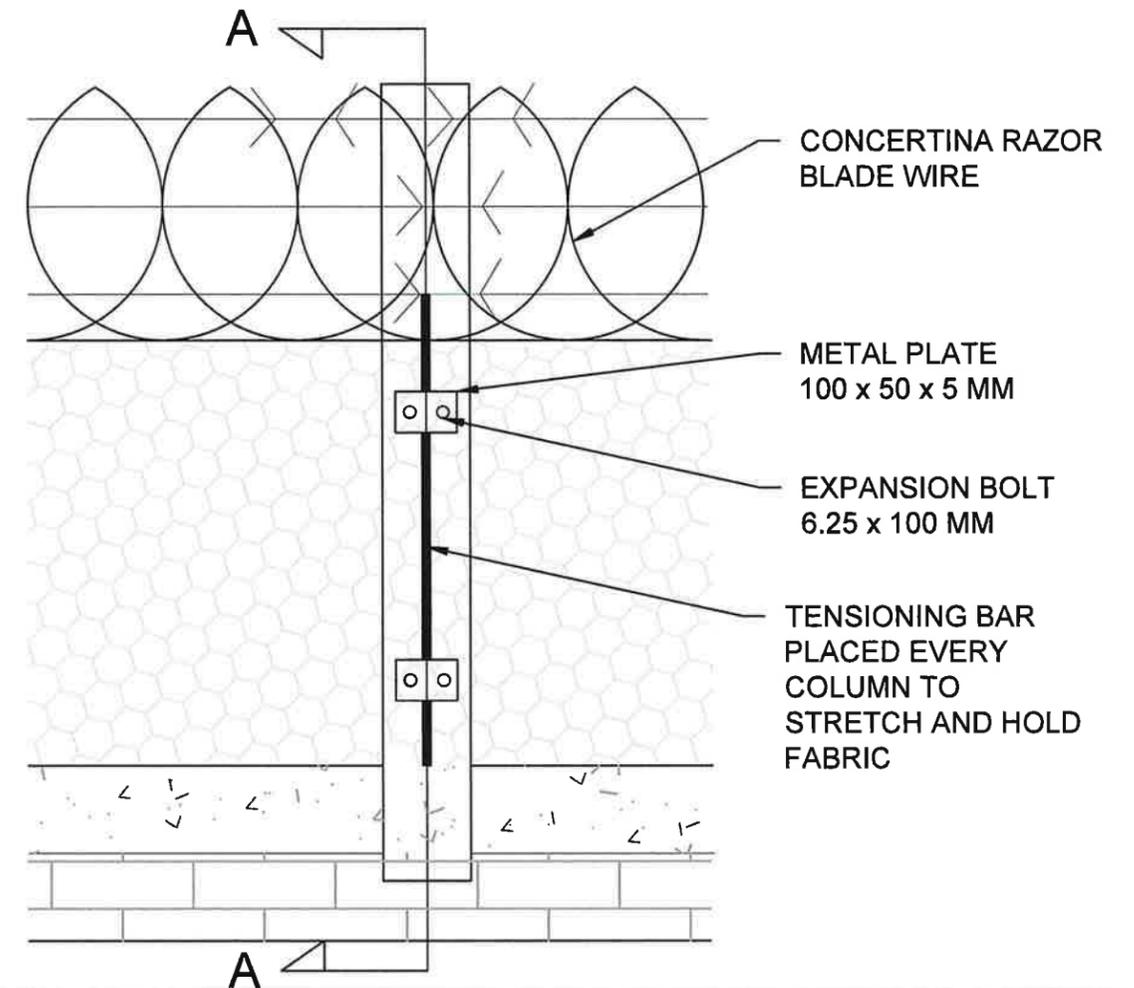
DRAWING NO.

4.0

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DRAWN BY: RB	4/2/2019
CHECKED BY: RUM	4/25/2019
APPROVED BY: RUM	4/25/2019



FENCE ATTACHMENT DETAIL



DETAIL - PIPE MOUNTING BRACKET

PIPE MOUNTING BRACKET
2" DIA PIPE
SEE DETAIL ON THIS SHEET

CHAIN LINK FENCE

TENSIONING BAR
CLAMPED UNDER
METAL PLATES

METAL PLATE AND
BOLT ASSEMBLY

6.25 MM X 37 MM
EXPANSION ANCHOR WITH
25 MM DIAMETER WASHER
FOR WIRE ATTACHMENT

6.25 MM X 37 MM
EXPANSION ANCHOR

CROSS SECTION A-A



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CHARPENTIER SOLAR PUMP STATION
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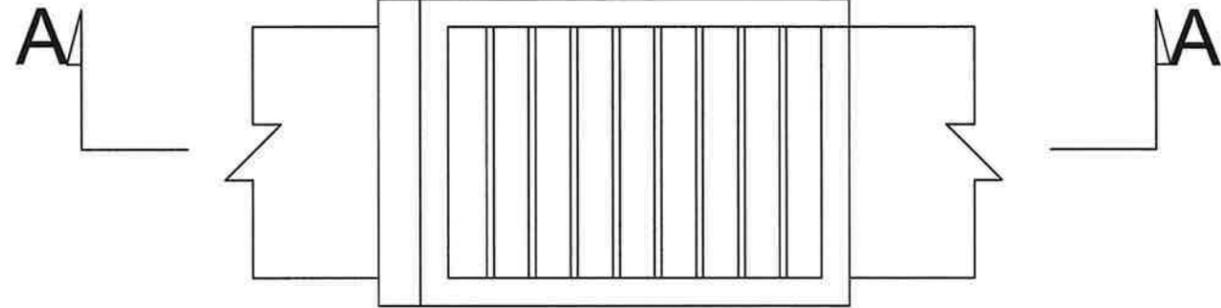
PROPOSED FENCE COLUMNS

DRAWING NO.

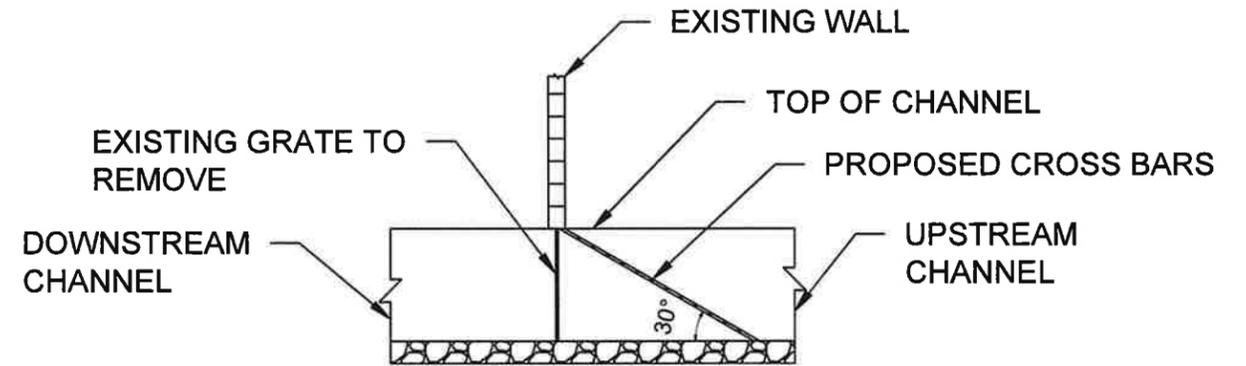
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APPROVED BY:	RUM	4/25/2019

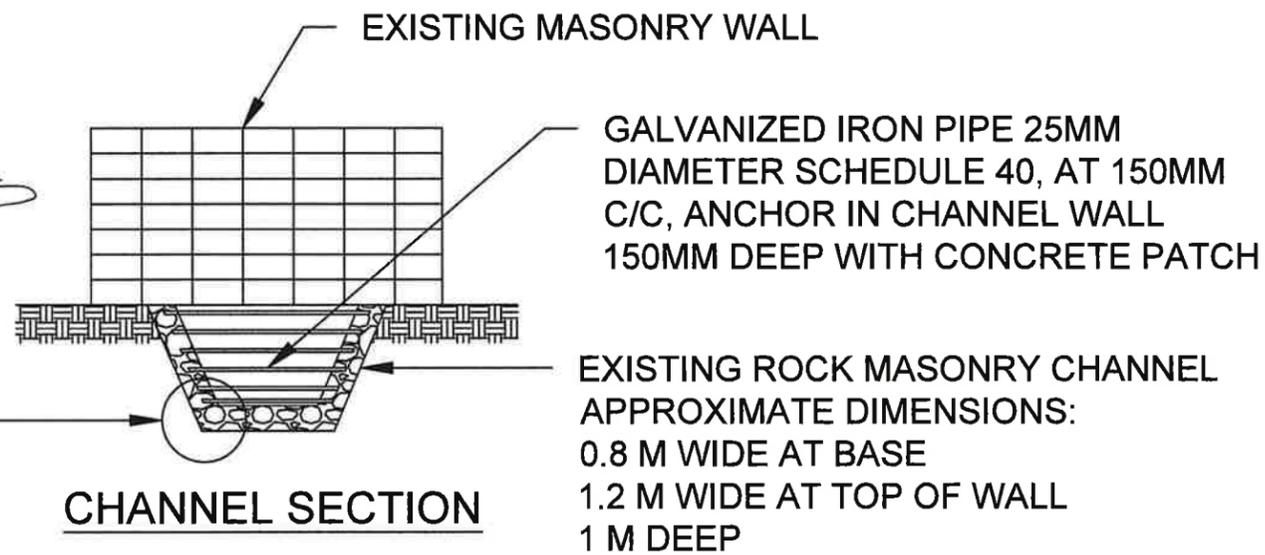




PLAN VIEW GRATE

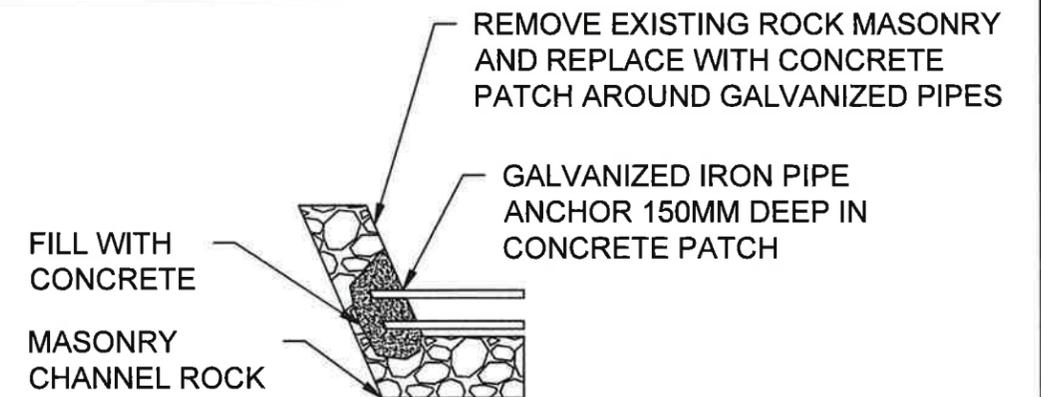


**SECTION A-A
CHANNEL PROFILE AND GRATE**



SEE DETAIL A

CHANNEL SECTION



DETAIL A-2



DETAIL A-1

NOTE: SUBCONTRACTOR SHALL ATTEMPT INSTALLATION USING DETAIL A-1. SHOULD THE STONE HARDNESS EXCEED CUTTING ABILITY OF DIAMOND CORE BIT, SUBCONTRACTOR SHALL NOTIFY THE ENGINEER WHO MAY AUTHORIZE USE OF DETAIL A-2.

USAID WATER AND SANITATION PROJECT



CHARPENTIER WATER SYSTEM
IMPROVEMENT QUICK IMPACT
PROJECT

LES CAYES

SUD

OUTLET CHANNEL GRATES

DRAWING NO.

6.0

	NAME	DATE
PROJECT NO.:	18025.16.06	
DESIGNED BY:	RP	3/28/2019
DRAWN BY:	RP	3/28/2019
CHECKED BY:	RUM	4/25/2019
APPROVED BY:	RUM	4/25/2019



GENERAL NOTES

1. Design load : Wind
 - a. Velocity =65m/s
 - b. Les Cayes : zone IV
 - c. Importance factor = 1
 - d. Exposure category : B
 - e. Topography factor : 1
 - f. enclosure classification :open Building
 - g. All of the work must be executed in accordance with the National Haitian Building Code (CNBH 2012) and the International Building Code (IBC 2012).
2. The Contractor shall provide temporary mounting brackets during the installation of all structures and during evacuation as required.
3. The Subcontractor must verify all conditions of the site, dimensions and level before starting work.
4. The Subcontractor shall discover and verify the type of location of any water, electrical, communication, control, sewer and other pipelines discovered, buried or concealed on the site and protect them against any damage or inconvenience, for the duration of the works except that they can be moved if authorized by the Engineer. The Subcontractor will be responsible for any damage incurred.
5. The Subcontractor shall remove or modify all existing structures in accordance with the requirements of the Engineer for the installation of new structures and to complete the work. Any existing structures that do not have to be removed or modified must not be damaged.
6. The Subcontractor must limit its activities and operations to the site and perimeter of the construction site in accordance with the engineer requirements.

SHOP DRAWINGS

1. All the shop drawings must be submitted by the Subcontractor for validation before starting work on the site.

EXCAVATION, GRANULAR BACKFILL AND FOUNDATION

1. Before backfilling, remove all loose and soft organic material, topsoil, or loose landfill encountered on the surface. Excavation of firm or soft soil must be backfilled with engineering approved backfill. All foundations shall be placed on undisturbed soil or granular material graded and uniformly spread in continuous layers up to 20cm thick and compacted to 95% of maximum density, established according to modified Proctor tests as written in ASTM D1557.
2. Protect excavations from adverse meteorological conditions and ensure that excavations are kept dry until backfilling is completed.

CONCRETE BLOCK

1. All concrete structures will comply with ACI 530 latest edition standards.
2. All walls will be built with CMU. All vertical, horizontal, and side joints will be filled with mortar. The joints will be smoothed and left slightly concave.
3. The materials will comply with the standards for open-cavity CMUs
 - a. Class N type 1 ASTM (90) standard resistance 1840Kg / m3
 - b. Class B12 capacity = 1 MPa
 - c. Mortar and grout: portland cement type 1 ASTM (C150)
 - d. Grout (ASTM C270)
 - e. Rebar: (ASTM A 615), grade 414 MPa
4. All joints will be 1.5cm thick, full coverage on mortar shells horizontal and vertical face.

CONCRETE

- | | | |
|---------------------------|------|-----|
| 1. Property: | ASTM | MPa |
| Rebar, ties, stirrups | A615 | 414 |
| Cement (type1) | A150 | |
| Aggregate | A33 | |
| Concrete 20.7MPa @ 28days | | |
2. All concrete preparatory work will comply with the ACI 318 "Building Code Requirements for Structural Concrete" and the ACI301 "Concrete Structural Specification" latest edition.
 3. The reinforcement will be detailed in accordance with the standards of ASI 315, latest edition.
 4. The minimum development and overlap lengths shall be in accordance with ACI318 standards for

20.7MPa concrete. See the following requirements:

BAR	OVERLAP	HOOK 90 DEG	IN TENSION
# 4	70cm	55cm	20cm
# 5	90cm	68cm	25cm

5. Concrete coating for reinforcing steel should be:

- a. Poured concrete in permanent contact with the ground: 7.5cm.
- b. Concrete in contact with the ground or exposed to the weather:
 - i. # 6 and over 5cm
 - ii. # 6 and under, 4cm
- c. Concrete not exposed to the weather or in contact with the ground 4cm.

DEFORMED STEEL BARS

US	METRIC	INCHES	mm
#3	---	0.375	9.5
#4	10M	0.500	12.7
#5	15M	0.625	15.9
#6	20M	0.750	19.1
#7	---	0.875	22.2
#8	25M	1.00	25.4
#9	30M	1.128	28.7
#10	---	1.270	32.3

TESTING AND CONTROL OF CONCRETE

1. The preparation, curing and testing of concrete cylinder will be in accordance with ASTM C31.C172 and C39 standards.
2. Take a set of six cylinders for every 10 cubic meters of poured concrete. At least three cylinders will be taken per day. Cylinder preparation must include slump tests. The maximum slump will be: 7.5 cm for the foundations, and 10 cm for columns and beams.
3. Cylinder for capacity test.
 - a. 3 @ 7 days;
 - b. 3 @ 28days;
 - c. slump test (ASTM) C143, once for each set;
 - d. ASTM C1064 temperature, once for each batch;
4. The Subcontractor shall be solely responsible for the storage, assembly and connection of the cylinders to the test laboratory and shall provide the Engineer with all required material data, water-cement ratio, the proportions sagging, etc.
5. For each mixture the minimum compression resistance will be acceptable if both of the following criteria are met:
 - a. the average of the three consecutive tests is equal to or greater than the minimum required.
 - b. the result of any test is not higher than 3.5MPa before reaching the required minimum.

STEEL CONSTRUCTION

1. The materials and construction will comply with the project specifications:
2. The high capacity bolts shall be installed in accordance with the standards presented by the "Research Council on Structural Connections", with ASTM 325 or A 490 bolts, endorsed by the AISC, inside standard holes. The bolted connections will be of type supports (STMA325N) and will use bolts of 16mm, 10mm and 6.25mm.
3. All construction welds shall be in accordance with AWS D1.1 "Structural welding code-steel" latest edition and executed only by certified welders.
4. All welds on surfaces, sharp corners and column splices should be ground and smooth.
5. All steel should be cleaned, primed and retouched with the same primer on site. Assemblies exposed to the weather will be retouched with a high zinc paint.
6. Seal open tube ends "HSS" using 1cm thick plates and welds, or as shown on plans.

LIGHT-COLD FORMED STEEL FRAME

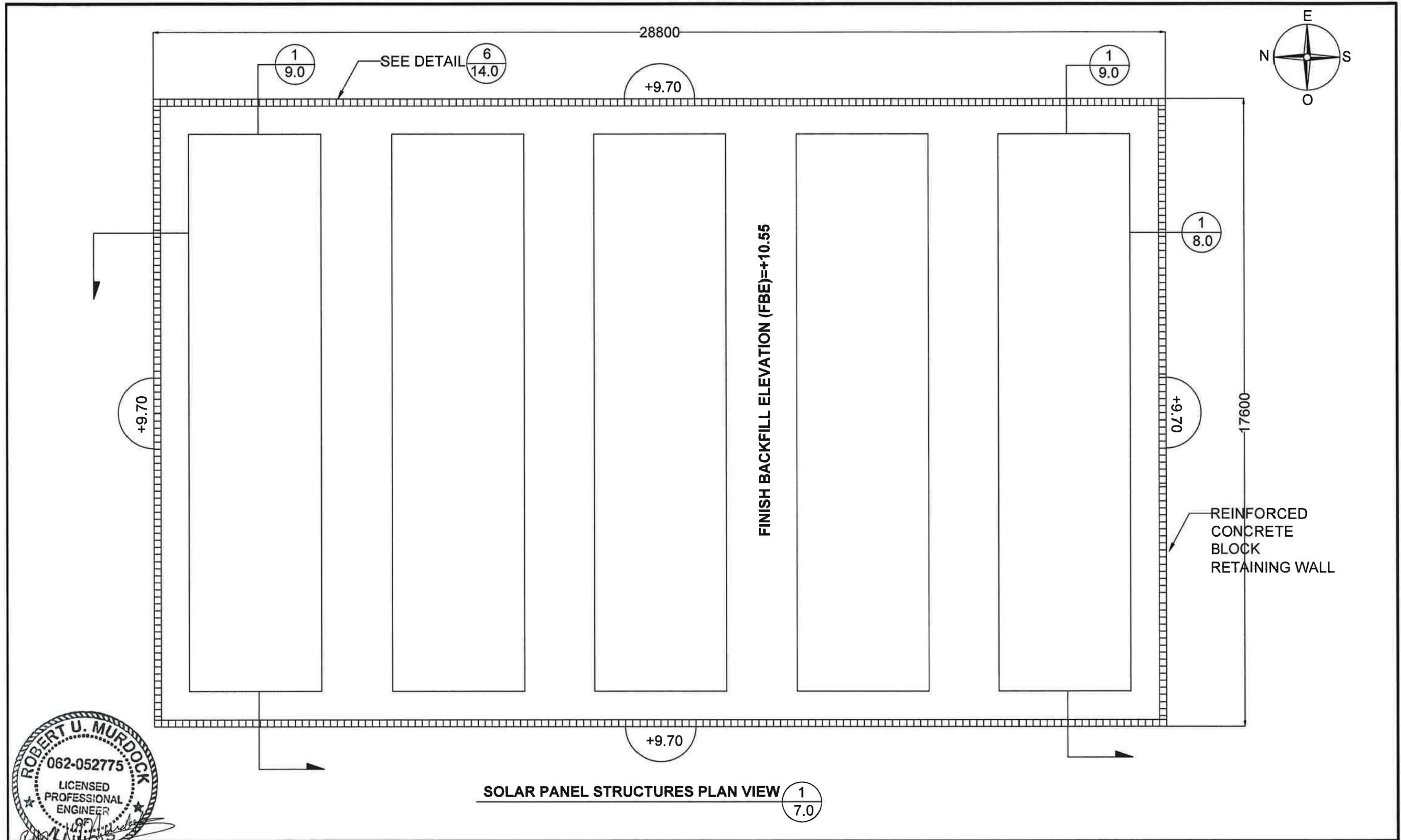
1. The steel of the joists (purlin) will have the properties, the thickness "gauge or inch or mm" and the dimensions indicated in accordance with the standards of the AISI "specification for the design of cold formed steel structural members".
2. All components will be held in place until they have been bolted permanently.
3. Fy = 55 KSI

MISCELLANEOUS

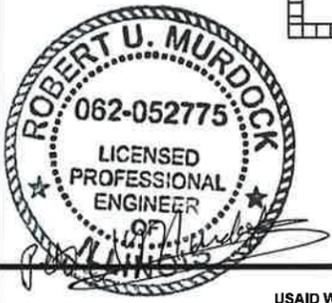
1. Do not apply a scale to the drawings. Only use the indicated dimensions.
2. Communicate any discrepancies with the design and existing site conditions with the engineer. Corrective action will be issued where appropriate.
3. Regardless of the process of revising shop drawings or inspections, or observing work, the subcontractor will have the responsibility to ensure that the work conforms to plans and specifications, coordination between all drawings, sequence and process of manufacture, assembly and construction, supervision and coordination of various trades; so that the site, excavation, and construction methods are safe.
4. All footings must be poured on undisturbed or compacted structural fill with a minimum safe bearing capacity of 1500 pounds per square foot. The subcontractor shall have a qualified testing agency test bearing and provide recommendations to obtain bearing capacity if the soil is unsuitable.



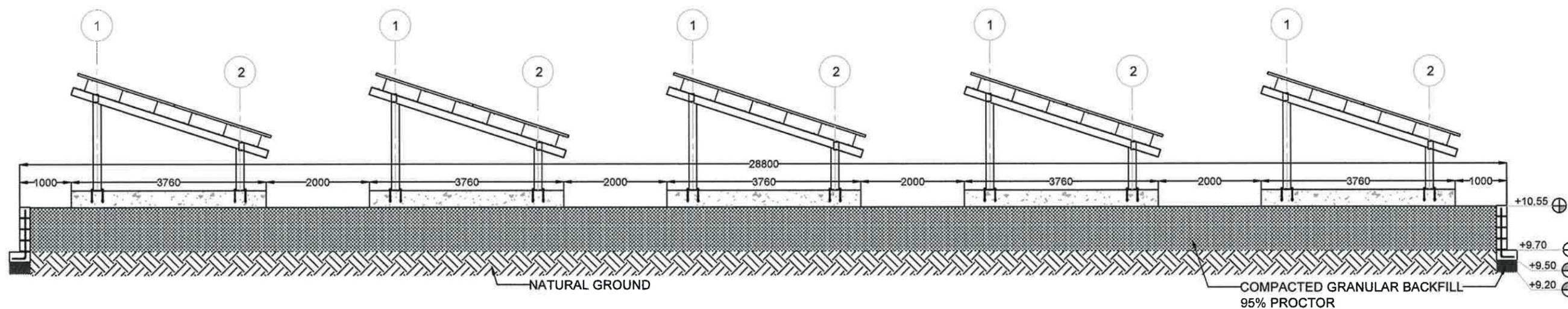
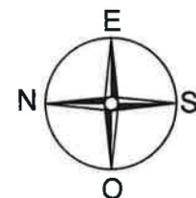
	CHARPENTIER SOLAR PUMP STATION QUICK IMPACT PROJECT LES CAYES SUD	GENERAL STRUCTURAL NOTES 7.N1	DRAWING NO.	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>PROJECT NO.</th> <th>NAME</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>18025.16.06</td> <td>EE</td> <td>4/2/2019</td> </tr> <tr> <td>DESIGNED BY:</td> <td>EE</td> <td>4/2/2019</td> </tr> <tr> <td>DRAWN BY:</td> <td>CB</td> <td>4/25/2019</td> </tr> <tr> <td>CHECKED BY:</td> <td>RUM</td> <td>4/25/2019</td> </tr> <tr> <td>APPROVED BY:</td> <td></td> <td></td> </tr> </tbody> </table>	PROJECT NO.	NAME	DATE	18025.16.06	EE	4/2/2019	DESIGNED BY:	EE	4/2/2019	DRAWN BY:	CB	4/25/2019	CHECKED BY:	RUM	4/25/2019	APPROVED BY:			
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SOLAR PANEL STRUCTURES PLAN VIEW 1
7.0



USAID WATER AND SANITATION PROJECT 	CHARPENTIER SOLAR PUMP STATION QUICK IMPACT PROJECT LES CAYES SUD	SOLAR PANEL STRUCTURES PLAN VIEW 7.0	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="font-size: 0.8em;">DRAWING NO.</th> <th style="font-size: 0.8em;">NAME</th> <th style="font-size: 0.8em;">DATE</th> </tr> </thead> <tbody> <tr> <td style="font-size: 0.8em;">PROJECT NO.:</td> <td style="font-size: 0.8em;">18025.16.06</td> <td></td> </tr> <tr> <td style="font-size: 0.8em;">DESIGNED BY:</td> <td style="font-size: 0.8em;">EE</td> <td style="font-size: 0.8em;">4/2/2019</td> </tr> <tr> <td style="font-size: 0.8em;">DRAWN BY:</td> <td style="font-size: 0.8em;">EE</td> <td style="font-size: 0.8em;">4/2/2019</td> </tr> <tr> <td style="font-size: 0.8em;">CHECKED BY:</td> <td style="font-size: 0.8em;">CB</td> <td style="font-size: 0.8em;">4/25/2019</td> </tr> <tr> <td style="font-size: 0.8em;">APPROVED BY:</td> <td style="font-size: 0.8em;">RUM</td> <td style="font-size: 0.8em;">4/25/2019</td> </tr> </tbody> </table> <div style="text-align: right; margin-top: 10px;"> </div>	DRAWING NO.	NAME	DATE	PROJECT NO.:	18025.16.06		DESIGNED BY:	EE	4/2/2019	DRAWN BY:	EE	4/2/2019	CHECKED BY:	CB	4/25/2019	APPROVED BY:	RUM	4/25/2019
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SOLAR PANEL STRUCTURES LONGITUDINAL SECTIONS

1
8.0



USAID WATER AND SANITATION PROJECT



CHARPENTIER SOLAR PUMP STATION
QUICK IMPACT PROJECT

LES CAYES

SUD

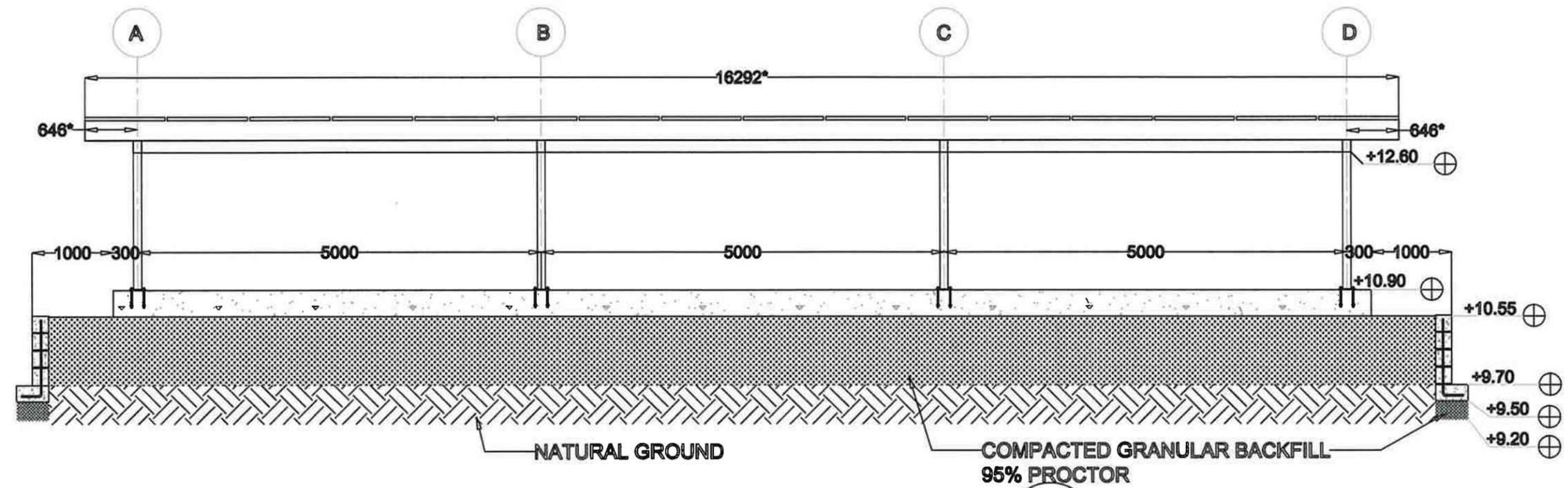
SOLAR PANEL STRUCTURES
LONGITUDINAL SECTIONS

DRAWING NO.

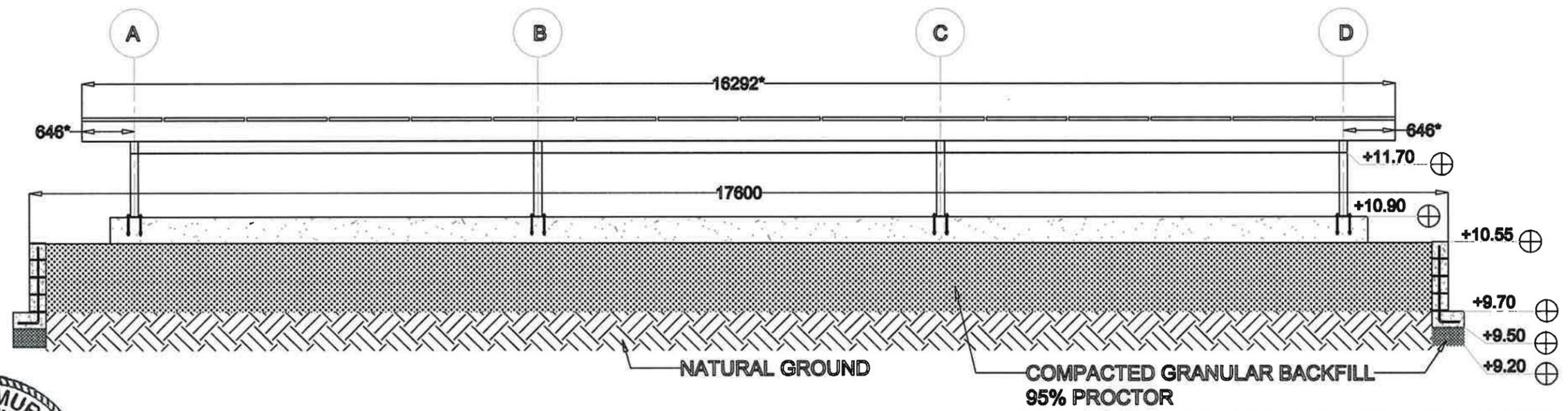
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SOLAR PANEL STRUCTURES :TRANSVERSAL SECTIONS AXIS 1 1a
9.0



SOLAR PANEL STRUCTURES :TRANSVERSAL SECTIONS AXIS 2 1b
9.0

NOTE: *PURLIN LENGTH AND ASSOCIATED DIMENSIONS ARE APPROXIMATE AND WILL BE ADJUSTED BY THE SUBCONTRACTOR TO ACCOMMODATE PANEL INSTALLATION MOUNTING REQUIREMENTS OF THE MANUFACTURER.



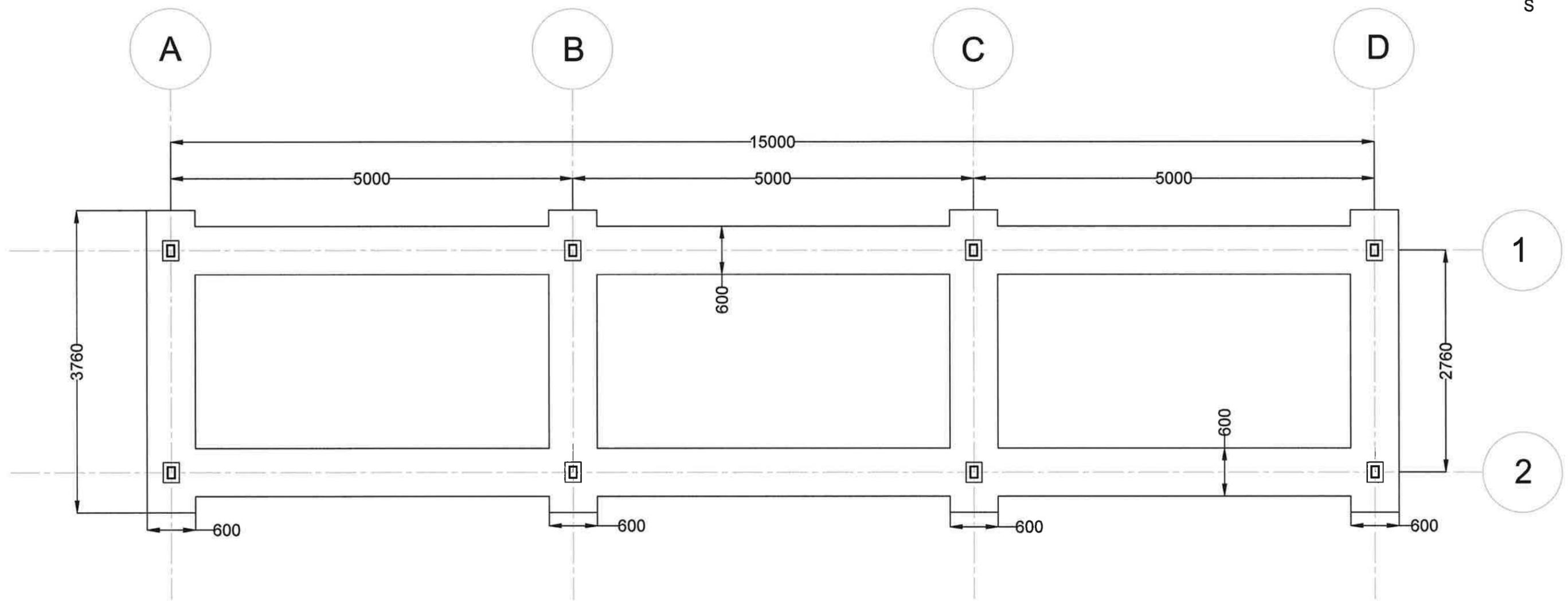
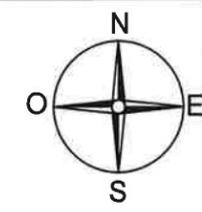
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SOLAR PANEL STRUCTURES
TRANSVERSE SECTIONS

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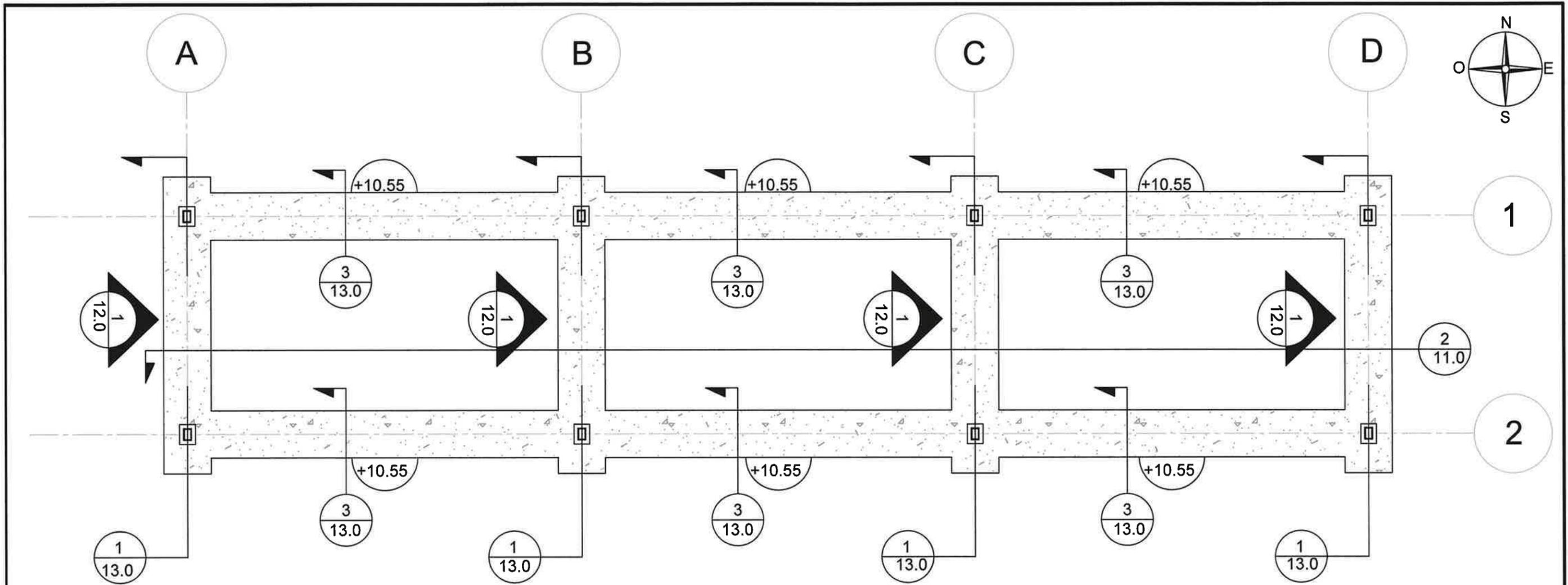
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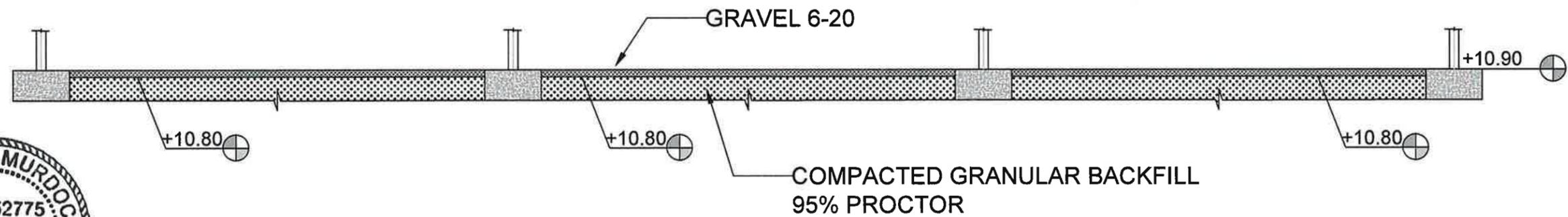
FOUNDATION FORMWORK PLAN 1
10.0



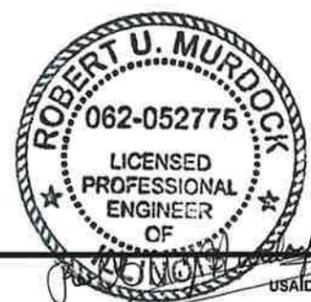
<p>USAID WATER AND SANITATION PROJECT</p>	<p>REPUBLIQUE D'HAÏTI DIRECTION NATIONALE de l'Eau Potable et de l'Assainissement</p>	<p>CHARPENTIER SOLAR PUMP STATION QUICK IMPACT PROJECT</p> <p>LES CAYES SUD</p>	<p>FOUNDATION PLAN</p>	<p>DRAWING NO.</p> <p style="font-size: 24pt;">10.0</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">NAME</th> <th style="width: 50%;">DATE</th> </tr> </thead> <tbody> <tr> <td>PROJECT NO.: 18025.16.06</td> <td></td> </tr> <tr> <td>DESIGNED BY: EE</td> <td>4/2/2019</td> </tr> <tr> <td>DRAWN BY: EE</td> <td>4/2/2019</td> </tr> <tr> <td>CHECKED BY: CB</td> <td>4/25/2019</td> </tr> <tr> <td>APPROVED BY: RUM</td> <td>4/25/2019</td> </tr> </tbody> </table>	NAME	DATE	PROJECT NO.: 18025.16.06		DESIGNED BY: EE	4/2/2019	DRAWN BY: EE	4/2/2019	CHECKED BY: CB	4/25/2019	APPROVED BY: RUM	4/25/2019	
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SOLAR PANEL STRUCTURE FOUNDATION PLAN 1
11.0



COMPACTED GRANULAR BACKFILL AND GRAVEL 2
11.0



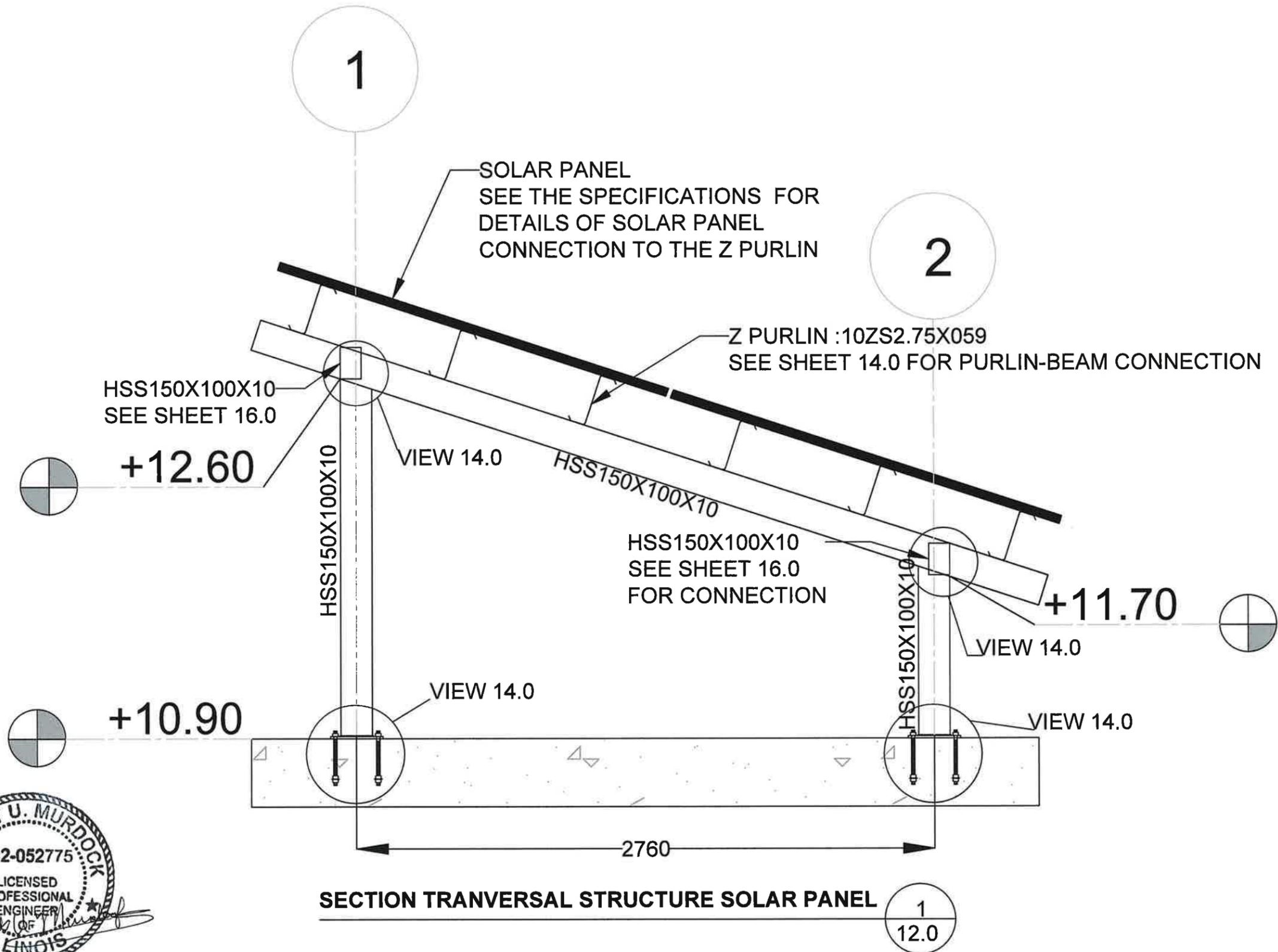
USAID WATER AND SANITATION PROJECT

CHARPENTIER SOLAR PUMP STATION
 QUICK IMPACT PROJECT
 LES CAYES SUD

SOLAR PANEL STRUCTURE
 FOUNDATION PLAN

DRAWING NO.
11.0

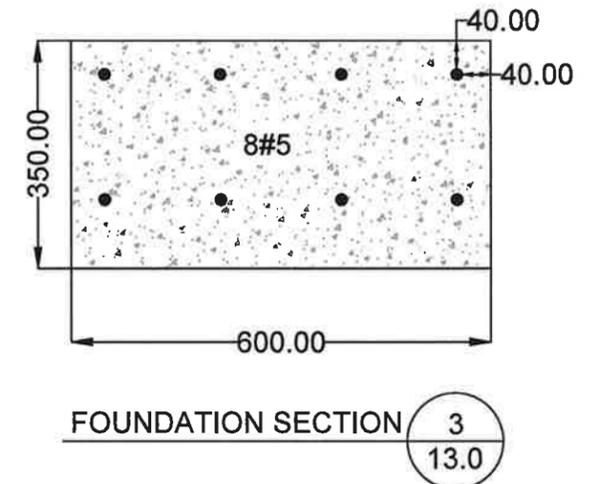
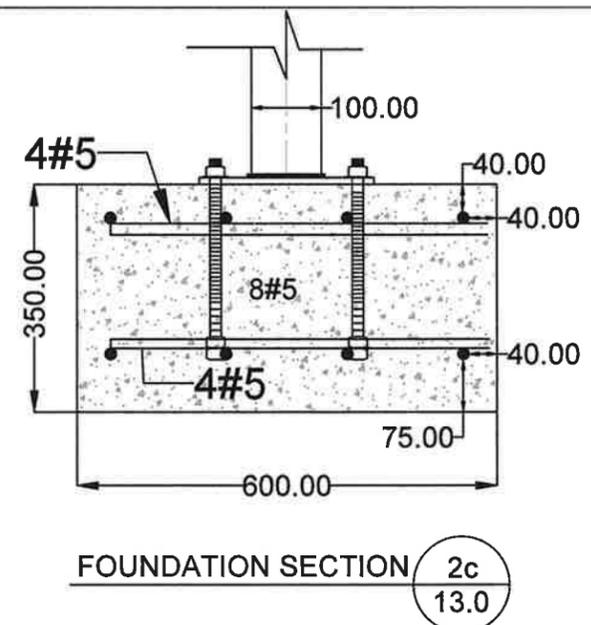
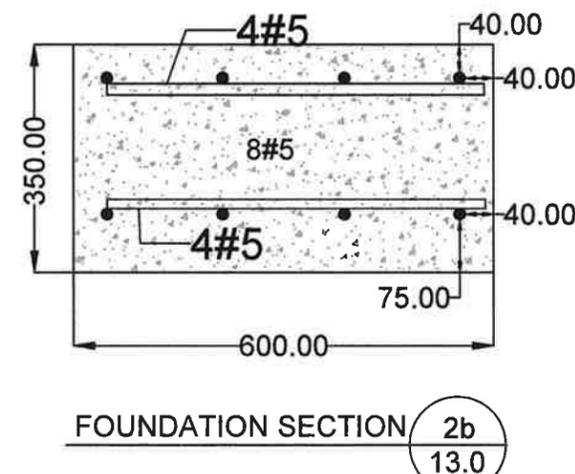
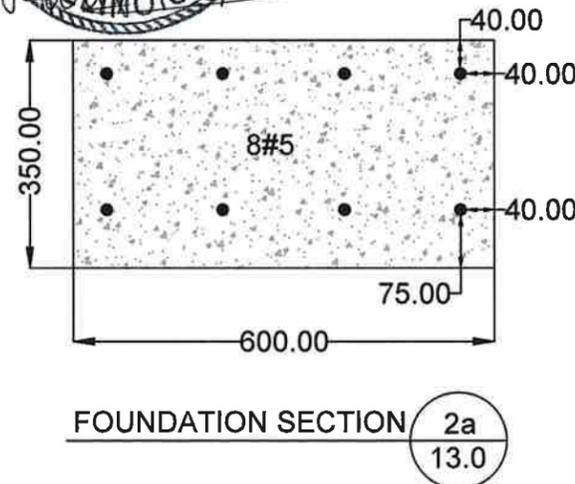
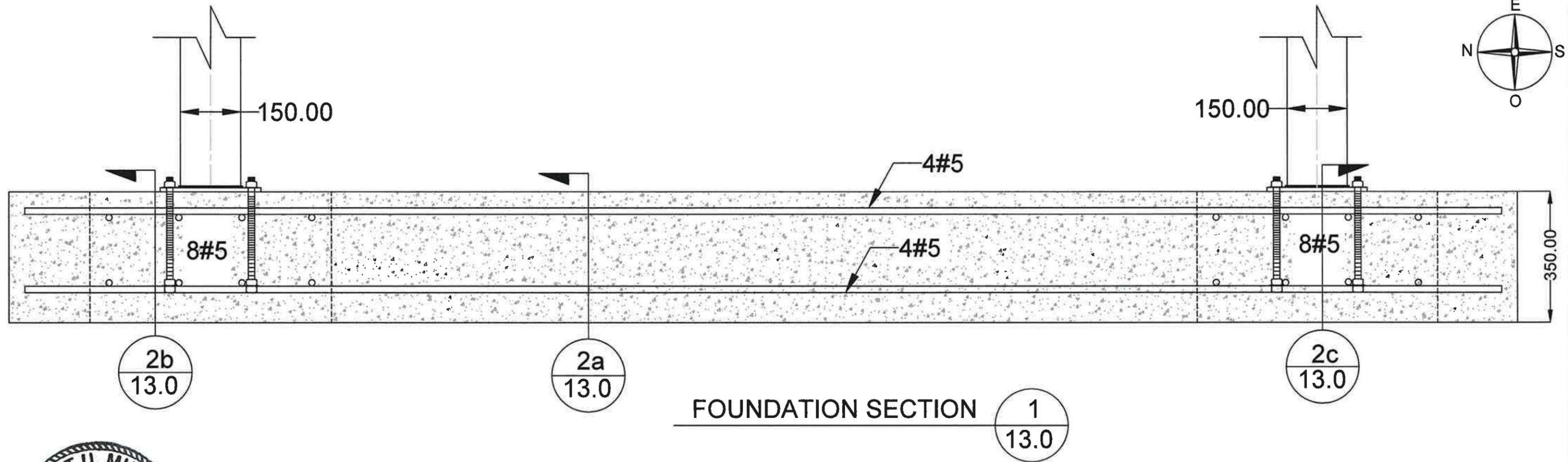
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DESIGNED BY:	EE	4/2/2019
DRAWN BY:	EE	4/2/2019
CHECKED BY:	CB	4/25/2019
APPROVED BY:	RUM	4/25/2019



SECTION TRANVERSAL STRUCTURE SOLAR PANEL 1
12.0



				CHARPENTIER SOLAR PUMP STATION QUICK IMPACT PROJECT		SECTION TRANVERSAL STRUCTURE SOLAR PANEL		DRAWING NO. 12.0		<table border="1"> <thead> <tr> <th>NAME</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>PROJECT NO.: 18025.16.06</td> <td></td> </tr> <tr> <td>DESIGNED BY: EE</td> <td>4/2/2019</td> </tr> <tr> <td>DRAWN BY: EE</td> <td>4/2/2019</td> </tr> <tr> <td>CHECKED BY: CB</td> <td>4/25/2019</td> </tr> <tr> <td>APPROVED BY: RUM</td> <td>4/25/2019</td> </tr> </tbody> </table>		NAME	DATE	PROJECT NO.: 18025.16.06		DESIGNED BY: EE	4/2/2019	DRAWN BY: EE	4/2/2019	CHECKED BY: CB	4/25/2019	APPROVED BY: RUM	4/25/2019		
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				LES CAYES		SUD		DRAWING NO. 12.0																	



USAID WATER AND SANITATION PROJECT

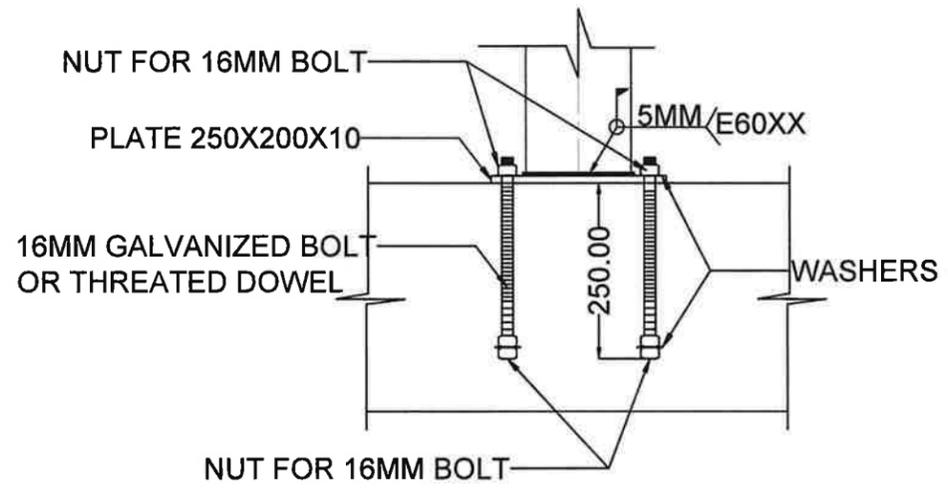
Direction Nationale de l'Eau Potable et de l'Assainissement

CHARPENTIER SOLAR PUMP STATION
QUICK IMPACT PROJECT

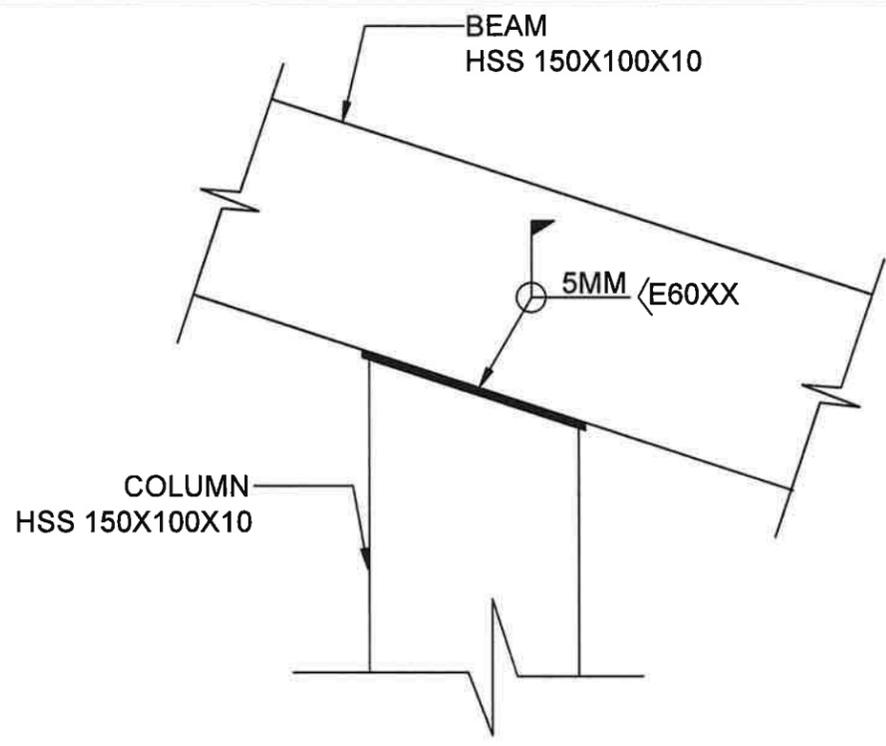
LES CAYES SUD

FOUNDATION DETAILS

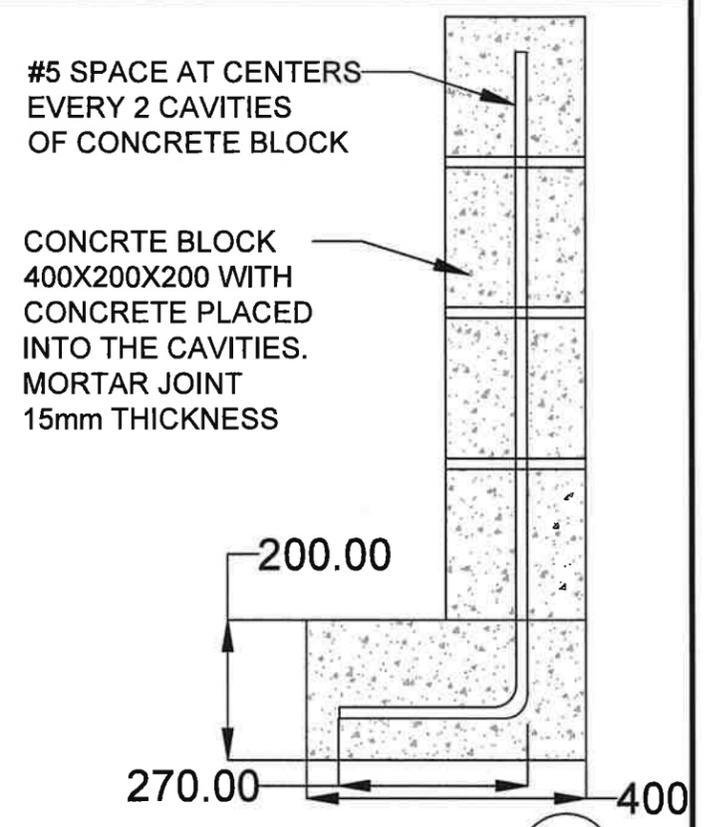
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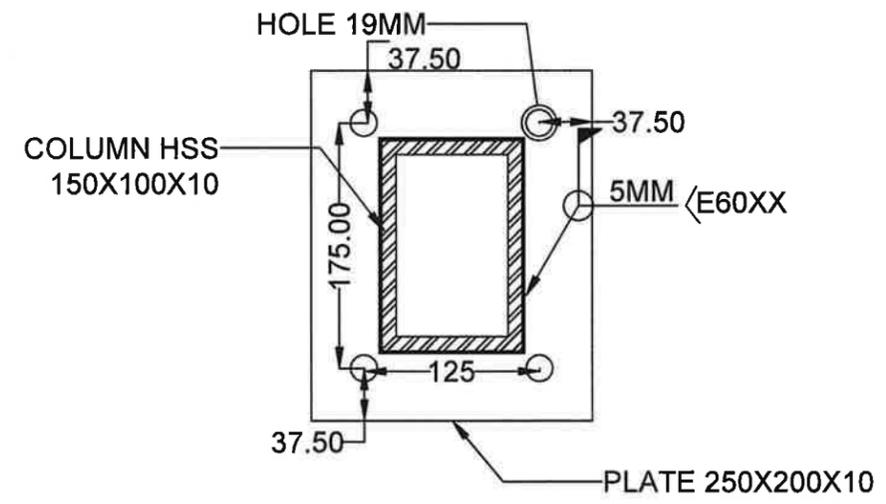
ANCHOR BOLT- PLATE DETAIL 1
14.0



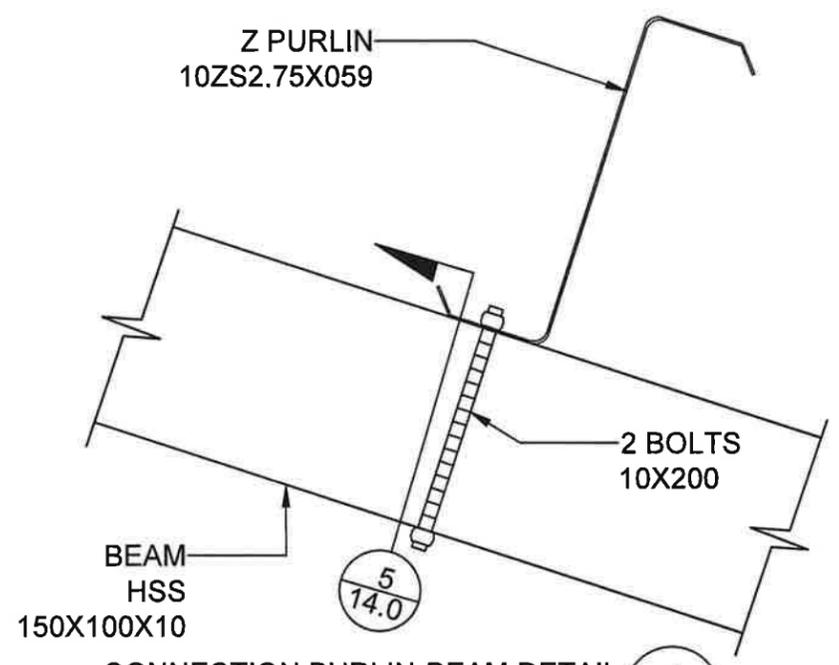
CONNECTION BEAM-COLUMN DETAIL 3
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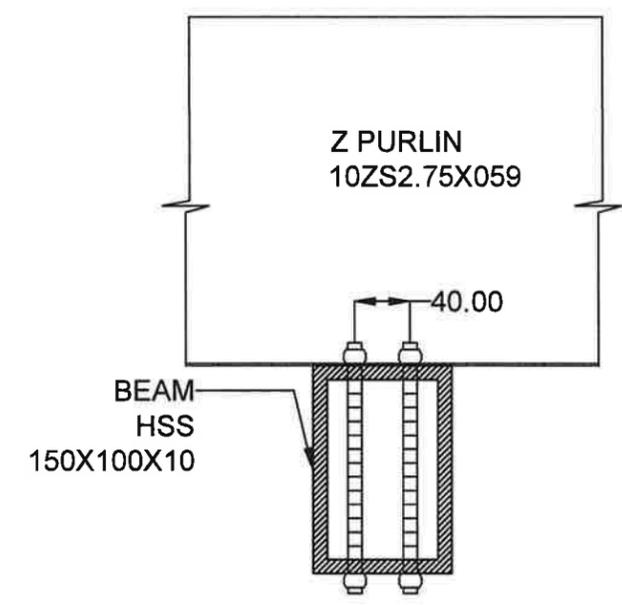
REINFORCEMENT BLOCK DETAIL 6
14.0



CONNECTION PLATE-COLUMN DETAIL 2
14.0



CONNECTION PURLIN-BEAM DETAIL 4
14.0



SECTION VIEW PURLIN-BEAM DETAIL 5
14.0



USAID WATER AND SANITATION PROJECT



CHARPENTIER SOLAR PUMP STATION
QUICK IMPACT PROJECT

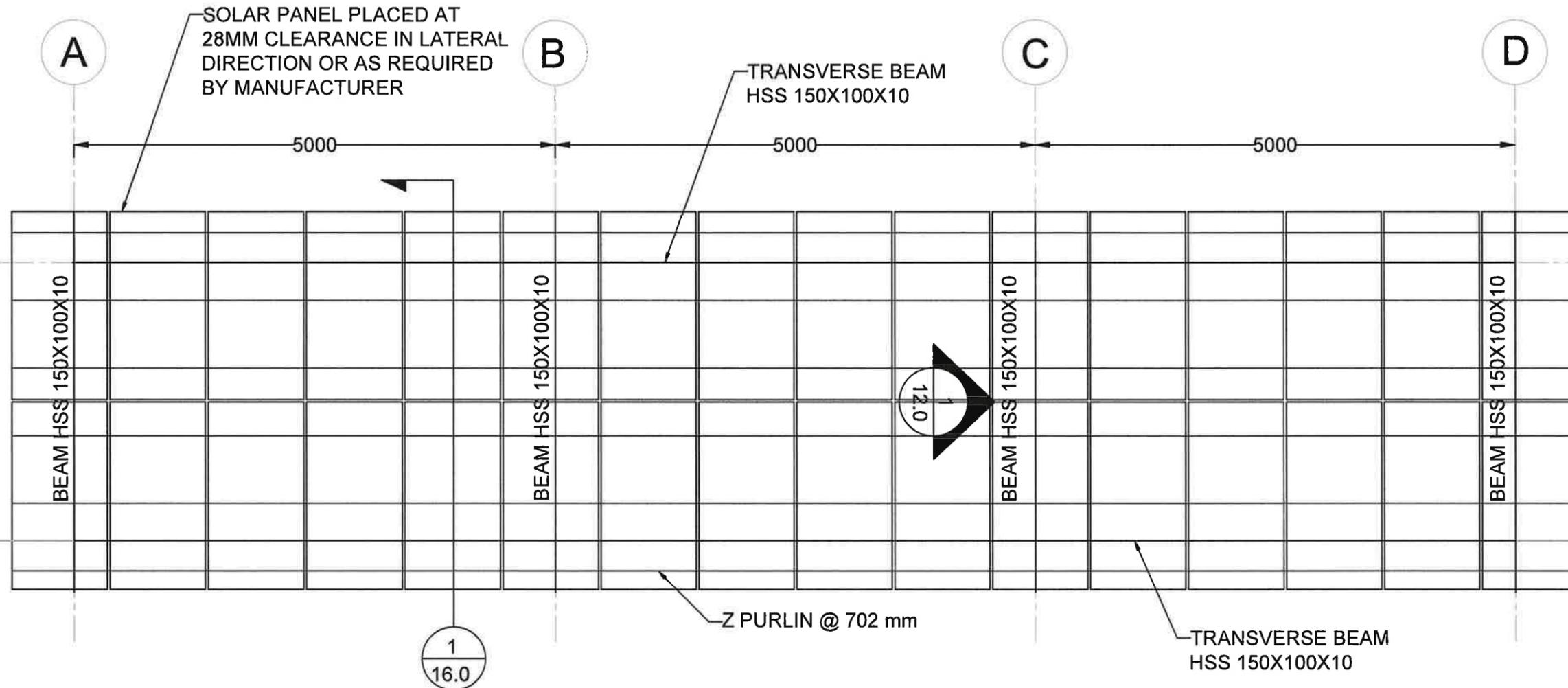
LES CAYES SUD

CONNECTIONS DETAILS

DRAWING NO.
14.0

	NAME	DATE
PROJECT NO.:	18025.16.06	
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DRAWN BY:	EE	4/2/2019
CHECKED BY:	CB	4/25/2019
APPROVED BY:	RUM	4/25/2019





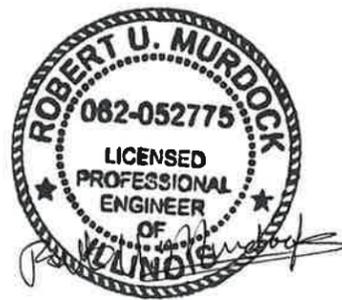
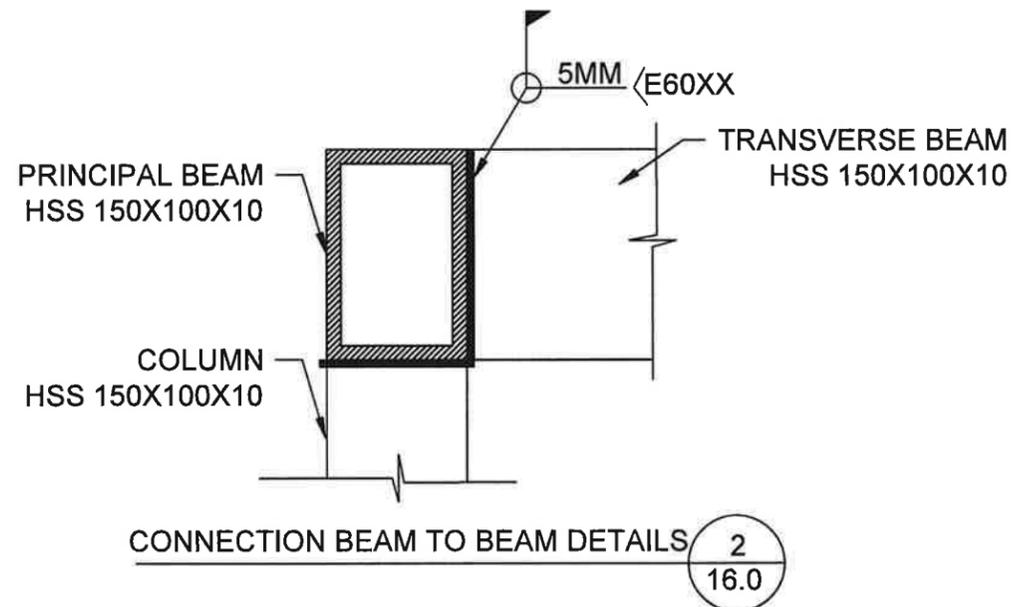
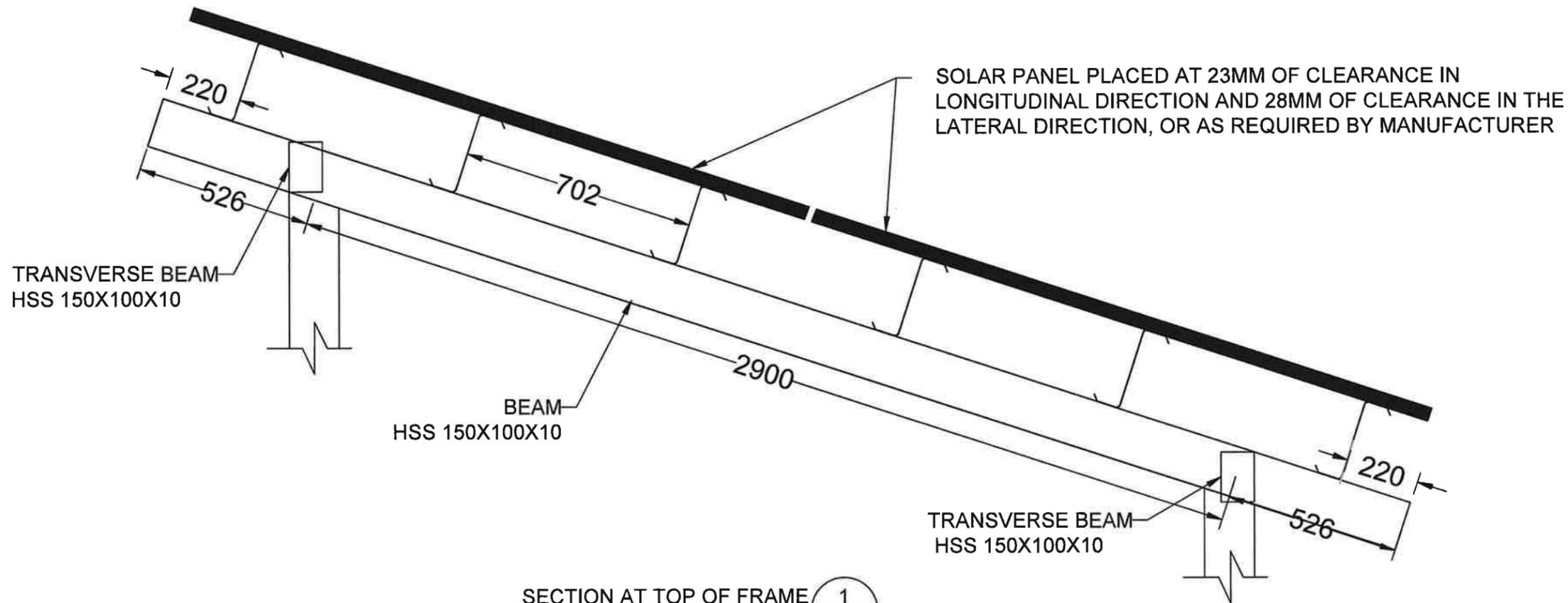
SOLAR PANELS AND FRAMING PLAN LAYOUT 1 / 15.0



NOTE :
 PURLIN PLACEMENT IS DEPENDENT ON
 SOLAR PANEL SELECTION AND SHALL BE
 VERIFIED IN THE FIELD

USAID WATER AND SANITATION PROJECT 	CHARPENTIER SOLAR PUMP STATION QUICK IMPACT PROJECT LES CAYES SUD	SOLAR PANEL AND PURLIN LAYOUT 15.0	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="font-size: 0.8em;">DRAWING NO.</th> <th style="font-size: 0.8em;">NAME</th> <th style="font-size: 0.8em;">DATE</th> </tr> </thead> <tbody> <tr> <td style="font-size: 0.8em;">PROJECT NO.:</td> <td style="font-size: 0.8em;">18025.16.06</td> <td></td> </tr> <tr> <td style="font-size: 0.8em;">DESIGNED BY:</td> <td style="font-size: 0.8em;">EE</td> <td style="font-size: 0.8em;">4/2/2019</td> </tr> <tr> <td style="font-size: 0.8em;">DRAWN BY:</td> <td style="font-size: 0.8em;">EE</td> <td style="font-size: 0.8em;">4/2/2019</td> </tr> <tr> <td style="font-size: 0.8em;">CHECKED BY:</td> <td style="font-size: 0.8em;">CB</td> <td style="font-size: 0.8em;">4/25/2019</td> </tr> <tr> <td style="font-size: 0.8em;">APPROVED BY:</td> <td style="font-size: 0.8em;">RUM</td> <td style="font-size: 0.8em;">4/25/2019</td> </tr> </tbody> </table>	DRAWING NO.	NAME	DATE	PROJECT NO.:	18025.16.06		DESIGNED BY:	EE	4/2/2019	DRAWN BY:	EE	4/2/2019	CHECKED BY:	CB	4/25/2019	APPROVED BY:	RUM	4/25/2019
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USAID WATER AND SANITATION PROJECT



CHARPENTIER SOLAR PUMP STATION
QUICK IMPACT PROJECT

LES CAYES

SUD

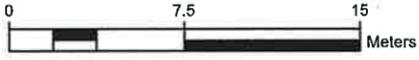
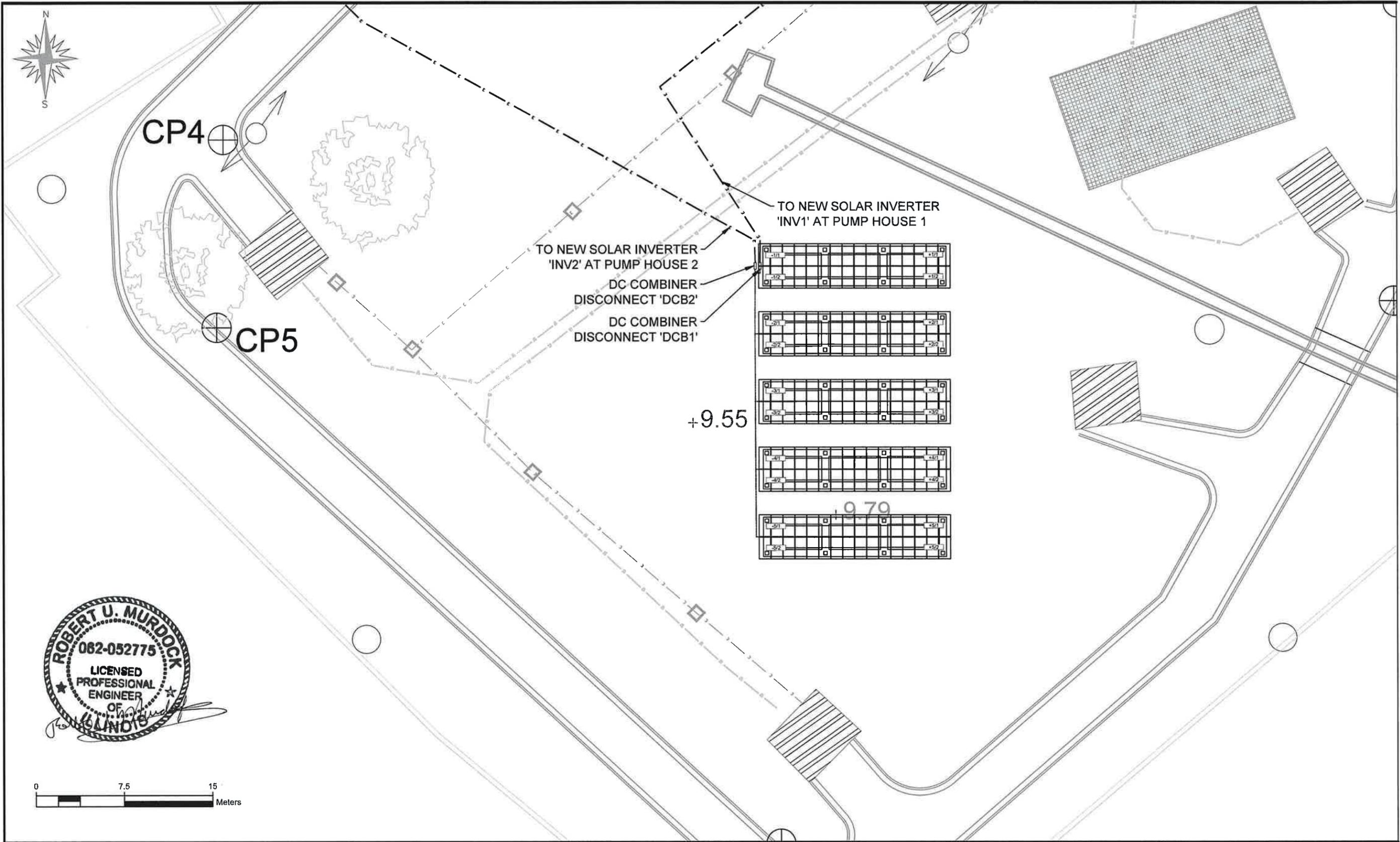
ROOF PLAN : SECTION VIEW

DRAWING NO.

16.0

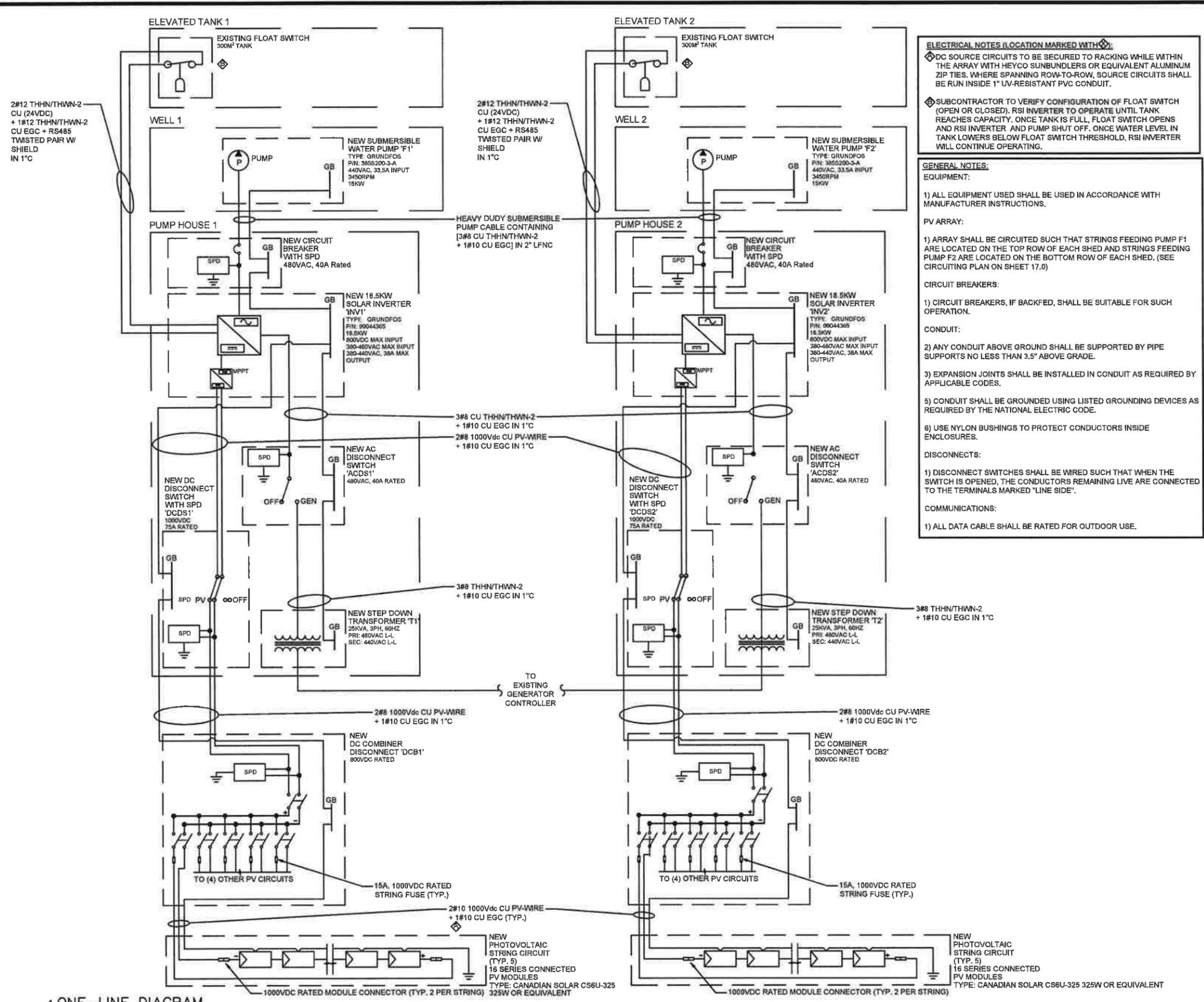
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DESIGNED BY:	EE	4/2/2019
DRAWN BY:	EE	4/2/2019
CHECKED BY:	CB	4/25/2019
APPROVED BY:	RUM	4/25/2019





USAID HAITI <small>FROM THE AMERICAN PEOPLE</small>	REPUBLIQUE D'HAÏTI DINEPA <small>Direction Nationale de l'Eau Potable et de l'Assainissement</small>	CHARPENTIER SOLAR PUMP STATION QUICK IMPACT PROJECT LES CAYES SUD	PROPOSED CONDITIONS SOLAR PANEL ARRAY DRAWING NO. 17.0																		
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>PROJECT NO.</th> <th>NAME</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>18025.16.06</td> <td>FB</td> <td>4/2/2019</td> </tr> <tr> <td>DESIGNED BY:</td> <td>FB</td> <td>4/2/2019</td> </tr> <tr> <td>DRAWN BY:</td> <td>FB</td> <td>4/3/2019</td> </tr> <tr> <td>CHECKED BY:</td> <td>RUM</td> <td>4/24/2019</td> </tr> <tr> <td>APPROVED BY:</td> <td>RUM</td> <td>4/25/2019</td> </tr> </tbody> </table>		PROJECT NO.	NAME	DATE	18025.16.06	FB	4/2/2019	DESIGNED BY:	FB	4/2/2019	DRAWN BY:	FB	4/3/2019	CHECKED BY:	RUM	4/24/2019	APPROVED BY:	RUM	4/25/2019
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DRAWN BY:	FB	4/3/2019																			
CHECKED BY:	RUM	4/24/2019																			
APPROVED BY:	RUM	4/25/2019																			





ELECTRICAL NOTES (LOCATION MARKED WITH Ⓢ):

Ⓢ DC SOURCE CIRCUITS TO BE SECURED TO RACKING WHILE WITHIN THE ARRAY WITH HEYCO SUNBUNDLERS OR EQUIVALENT ALUMINUM ZIP TIES. WHERE SPANNING ROW-TO-ROW, SOURCE CIRCUITS SHALL BE RUN INSIDE 1" UV-RESISTANT PVC CONDUIT.

Ⓢ SUBCONTRACTOR TO VERIFY CONFIGURATION OF FLOAT SWITCH (OPEN OR CLOSED), RSI INVERTER TO OPERATE UNTIL TANK REACHES CAPACITY. ONCE TANK IS FULL, FLOAT SWITCH OPENS AND RSI INVERTER AND PUMP SHUT OFF. ONCE WATER LEVEL IN TANK LOWERS BELOW FLOAT SWITCH THRESHOLD, RSI INVERTER WILL CONTINUE OPERATING.

GENERAL NOTES:

EQUIPMENT:

1) ALL EQUIPMENT USED SHALL BE USED IN ACCORDANCE WITH MANUFACTURER INSTRUCTIONS.

PV ARRAY:

1) ARRAY SHALL BE CIRCUITED SUCH THAT STRINGS FEEDING PUMP F1 ARE LOCATED ON THE TOP ROW OF EACH SHED AND STRINGS FEEDING PUMP F2 ARE LOCATED ON THE BOTTOM ROW OF EACH SHED. (SEE CIRCUITING PLAN ON SHEET 17.0)

CIRCUIT BREAKERS:

1) CIRCUIT BREAKERS, IF BACKFED, SHALL BE SUITABLE FOR SUCH OPERATION.

CONDUIT:

2) ANY CONDUIT ABOVE GROUND SHALL BE SUPPORTED BY PIPE SUPPORTS NO LESS THAN 3.5" ABOVE GRADE.

3) EXPANSION JOINTS SHALL BE INSTALLED IN CONDUIT AS REQUIRED BY APPLICABLE CODES.

5) CONDUIT SHALL BE GROUNDED USING LISTED GROUNDING DEVICES AS REQUIRED BY THE NATIONAL ELECTRIC CODE.

6) USE NYLON BUSHINGS TO PROTECT CONDUCTORS INSIDE ENCLOSURES.

DISCONNECTS:

1) DISCONNECT SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED, THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE".

COMMUNICATIONS:

1) ALL DATA CABLE SHALL BE RATED FOR OUTDOOR USE.

SYSTEM SPECIFICATIONS		
NUMBER OF MODULES	160	NUMBER OF MODULES PER SOURCE CIRCUIT
NUMBER OF SOLAR PUMPS	2	NUMBER OF PV CIRCUITS
DC SYSTEM SIZE (KW)	62.00	TILT (DEG)
AC SYSTEM SIZE (KW)	44.00	AZIMUTH (DEG)

EQUIPMENT SPECIFICATIONS		
MODULE: Canadian Solar CS6U-325	RATED DC POWER (W)	325
	SHORT CIRCUIT CURRENT (A)	8.34
	OPEN CIRCUIT VOLTAGE (V)	45.50
	OPERATING CURRENT (A)	8.78
	OPERATING VOLTAGE (V)	37.00
Grundfos RSI Inverter	RATED AC POWER (KW)	18.5
	MAX OUTPUT (A)	38

DESIGN SPECIFICATIONS		
ASHRAE STATION		Les Cayes
ASHRAE EXTREME ANNUAL MEAN MINIMUM DRY BULB TEMP (DEG C)		20
ASHRAE 2% DRY-BULB TEMP (DEG C)		36

ELECTRICAL SYMBOLS & ABBREVIATIONS

	TRANSFORMER	A	AMPERE
	CIRCUIT BREAKER (RATING/PHASE INDICATED)	AL	ALUMINUM
	CONDUIT	C	CONDUIT
	GROUND	C/T	CURRENT TRANSFORMER
	SINGLE METER WITH CT	CU	COPPER
	FUSIBLE SWITCH	EGC	EQUIPMENT GROUNDING CONDUCTOR
	FUSE	EMT	ELECTRICAL METALLIC TUBING
	SOLAR PV MODULE	FU	FUSE
	NEUTRAL BAR	GEC	GROUNDING ELECTRODE CONDUCTOR
	GROUND BAR	GFP	GROUND FAULT PROTECTION TRACKER
	TERMINAL BLOCK	MPPT	MAXIMUM POWER POINT TRACKER
	UTILITY INCOMING LINE	NEU	NEUTRAL
	DC/AC CONVERTER	PNL	PANEL
	DC/DC CONVERTER	PRI	PRIMARY
	TRANSFORMER	SEC	SECONDARY
	NUMBER OF CONDUCTORS & AWG SIZE	TYP	TYPICAL
	CONDUIT DIAMETER & TYPE	VA	VOLT-AMPERE
	KIRK KEY INTERLOCK	VAC	ALTERNATING CURRENT VOLT.
	VDC	VDC	DIRECT CURRENT VOLT.



1 ONE-LINE DIAGRAM
SCALE= NTS

		CHARPENTIER SOLAR PUMP STATION QUICK IMPACT PROJECT	SINGLE LINE DIAGRAM 18.0	DRAWING NO.	PROJECT NO:	18025.16.06
				DESIGNED BY:	FB	03/04/19
		LES CAYES	SUD	DRAWN BY:	FB	03/04/19
				CHECKED BY:	RUM	4/25/2019
				APPROVED BY:	RUM	4/25/2019





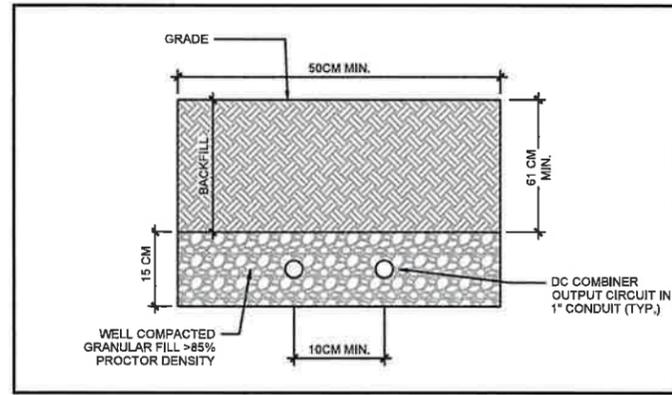
SYSTEM SPECIFICATIONS			
NUMBER OF MODULES	160	NUMBER OF MODULES PER SOURCE CIRCUIT	16
NUMBER OF SOLAR PUMPS	2	NUMBER OF PV CIRCUITS	10
DC SYSTEM SIZE (kW)	52.00	TILT (DEG)	18
AC SYSTEM SIZE (kW)	44.00	AZIMUTH (DEG)	180
EQUIPMENT SPECIFICATIONS			
MODULE: Canadian Solar CS6-325	RATED DC POWER (W)	325	
	SHORT CIRCUIT CURRENT (A)	9.34	
	OPEN CIRCUIT VOLTAGE (V)	45.50	
	OPERATING CURRENT (A)	8.78	
	OPERATING VOLTAGE (V)	37.00	
Grundfos RSI Inverter	RATED AC POWER (kW)	18.5	
	MAX OUTPUT (A)	38	
DESIGN SPECIFICATIONS			
ASHRAE STATION	Les Cayes		
ASHRAE EXTREME ANNUAL MEAN MINIMUM DRY BULB TEMP (DEG C)	20		
ASHRAE 2% DRY-BULB TEMP (DEG C)	36		

PV MAX SYSTEM VOLTAGE - 690.7				
LOWEST EXPECTED AMBIENT TEMPERATURE	MODULES PER STRING (STRLEN)	MODULE OPEN CIRCUIT VOLTAGE (Voc)	VOLTAGE CHANGE PER TEMPERATURE CHANGE (TCVoc)	CALCULATION
20° C	16	45.5	-0.31%/°C	$(V_{oc} + ((T_{min} - 25) * TC_{Voc} * V_{oc}) * STRLEN) = V_{max}$ $(45.5 + ((20 - 25) * -0.0031 * 45.5) * 16) = 739.28V$

CIRCUIT	VOLTAGE/CURRENT				OCPD/EGC			DE-RATE FACTORS			CONDUCTOR	CONDUCTORS			VOLTAGE DROP		CONDUIT FILL		
	OPERATING VOLTAGE (V)	SHORT CIRCUIT CURRENT - I _{sc} (A)	MAX CURRENT (A)	MAX CURRENT * 1.25 (A)	MIN. OVERCURRENT PROTECTION DEVICE - OCPD (A)	MIN. EGC CU	MIN. EGC AL	TEMPERATURE DE-RATE	CURRENT-CARRYING CONDUCTOR DE-RATE	CONDITIONS OF USE CURRENT (A)		TOTAL CONDUCTOR 90° C AMPACITY (A)	TOTAL CONDUCTOR 75° C AMPACITY (A)	ADJUSTED CONDUCTOR AMPACITY (A)	MIN CONDUCTOR VOLTAGE RATING	MAX OCPD RATING ALLOWED (A)		MAX DISTANCE (METERS)	VOLTAGE DROP
PV SOURCE CIRCUITS																			
SECURED TO RACKING	592.00	9.34	11.68	14.59	15	#14	N/A	0.91	1	12.83	2#10 CU PV-WIRE + 1#12 CU EGC EXPOSED	40	35	36.4	1000VDC	35	40	0.44 V (0.07%)	N/A
IN PVC CONDUIT	592.00	18.68	23.35	29.19	30	#12	N/A	0.91	0.8	32.07	4#10 CU PV-WIRE + 2#12 CU EGC EXPOSED IN 1.25" UV-RESISTANT PVC	40	35	28.12	1000VDC	30	40	0.44 V (0.07%)	N/A
DC COMBINER BOX OUTPUT CIRCUIT	592.00	23.35	29.19	36.48	40	#10	N/A	0.91	1	32.07	2#8 CU PV-WIRE + 1#10 CU EGC IN 1" PVC	55	50	50.05	1000VDC	50	40	0.68 V (0.12%)	13%
INVERTER OUTPUT CIRCUITS																			
INV1	440	N/A	38	47.5	60	#8	N/A	0.91	1	41.76	HEAVY DUDE SUBMERSIBLE PUMP CABLE CONTAINING [3#8 CU THHN/THWN-2 + 1#10 CU EGC] IN 2" LFNC	55	50	50	440VAC	50	34	4.6 V (1.09%)	5%
INV2	440	N/A	38	47.5	60	#8	N/A	0.91	1	41.76	HEAVY DUDE SUBMERSIBLE PUMP CABLE CONTAINING [3#8 CU THHN/THWN-2 + 1#10 CU EGC] IN 2" LFNC	55	50	50	440VAC	50	25	3.53 V (0.8%)	5%
STEP DOWN TRANSFORMER OUTPUT CIRCUIT																			
T1	440	N/A	34	41.875	40	#10	N/A	0.91	1	36.81	3#8 CU THHN/THWN-2 + 1#10 CU EGC IN 1" PVC	45	40	41	440VAC	40	20	3.79 V (0.86%)	19%
T2	440	N/A	34	41.875	40	#10	N/A	0.91	1	36.81	3#8 CU THHN/THWN-2 + 1#10 CU EGC IN 1" PVC	45	40	41	440VAC	40	20	3.79 V (0.86%)	19%

1 ELECTRICAL CALCULATIONS
SCALE= NTS

	USAID WATER AND SANITATION PROJECT CHARPENTIER SOLAR PUMP STATION QUICK IMPACT PROJECT LES CAYES SUD	ELECTRICAL CALCULATIONS 19.0	DRAWING NO.	NAME	DATE	
			PROJECT NO.: 18025.16.06	DESIGNED BY: FB	5/3/2019	
			DRAWN BY: FB	5/3/2019		
			CHECKED BY: RUM	5/3/2019		
			APPROVED BY: RUM	5/3/2019		

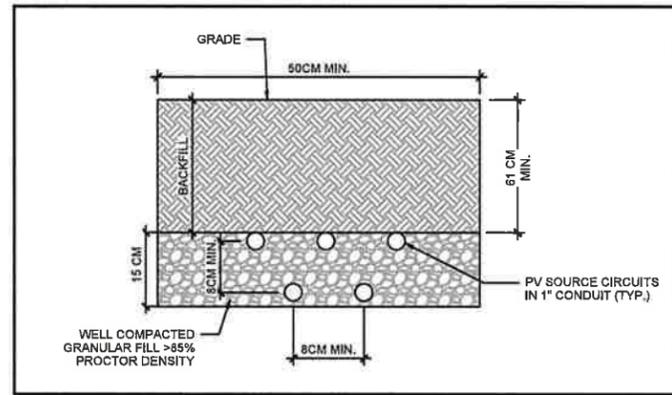


7 DC COMBINER OUTPUT TRENCH SECTION

NOT TO SCALE

NOTES:

1. ANY MODIFICATIONS TO PLAN SHALL BE CONSULTED AND VERIFIED BY THE ENGINEER PRIOR TO INSTALLATION.

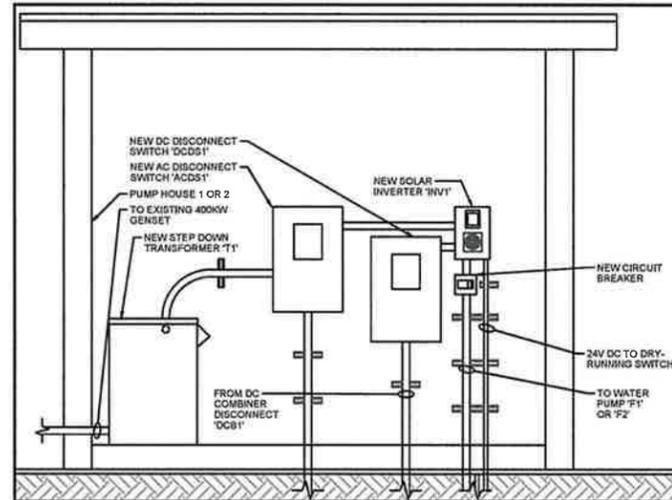


6 PV SOURCE CIRCUIT TRENCH SECTION

NOT TO SCALE

NOTES:

1. ANY MODIFICATIONS TO PLAN SHALL BE CONSULTED AND VERIFIED BY THE ENGINEER PRIOR TO INSTALLATION.

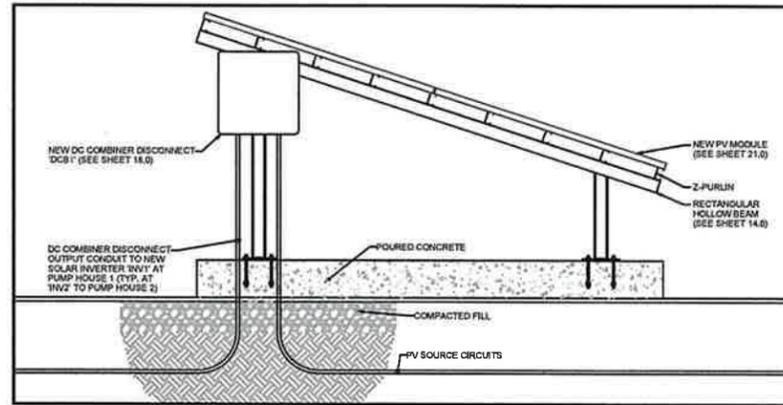


5 PV EQUIPMENT AT INTERIOR ROOM - ELEVATION (TYP.) - F1 OR F2

SCALE: NOT TO SCALE

NOTES:

1. ANY MODIFICATIONS TO PLAN SHALL BE CONSULTED AND VERIFIED BY THE ENGINEER PRIOR TO INSTALLATION.
2. SEE SHEET 18.0 FOR MORE DETAILS OF TYPICAL DESIGN AT PUMP HOUSE 2.
3. SET BOTTOM ON TRANSFORMER AND ALL NEW CABLE AT ELEVATION 11.20 MINIMUM. CONSTRUCT CONCRETE PAD UNDER TRANSFORMER IF REQUIRED WITH 14.0 MPa CONCRETE. CONCRETE PADS SHALL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE CONTRACT LUMP SUM PRICE FOR SUBMERSIBLE CENTRIFUGAL WELL PUMPS.

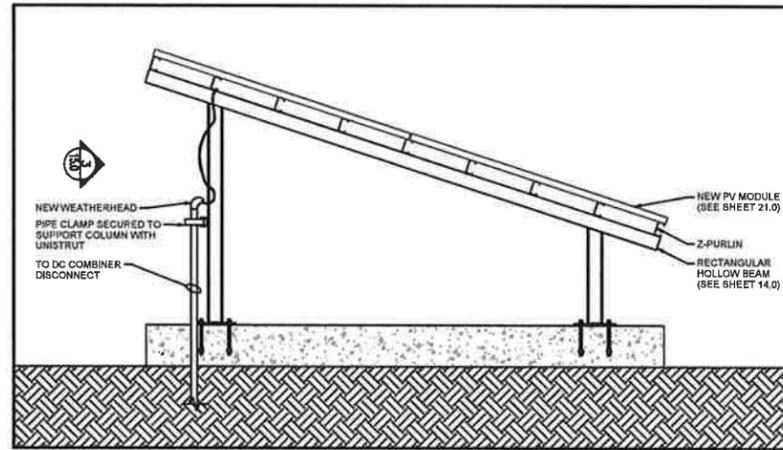


4 DC COMBINER BOX CABLE ENTRIES

SCALE: NOT TO SCALE

NOTES:

1. ANY MODIFICATIONS TO PLAN SHALL BE CONSULTED AND VERIFIED BY THE ENGINEER PRIOR TO INSTALLATION.

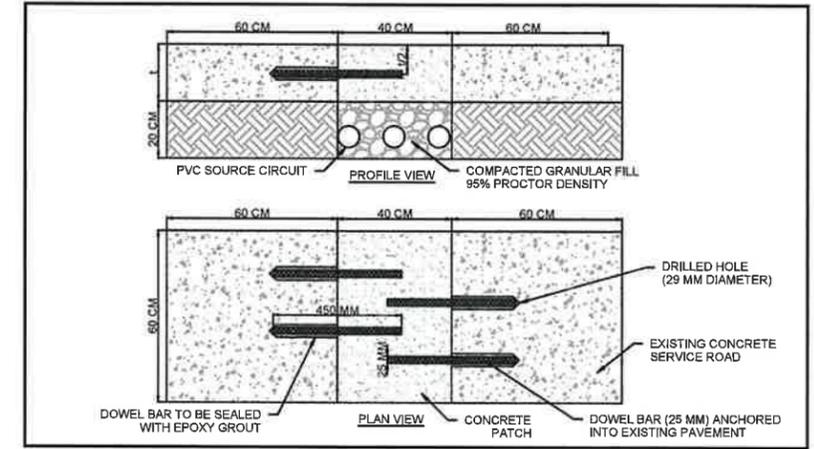


2 DC SOURCE CIRCUIT EXITING ARRAY

NOT TO SCALE

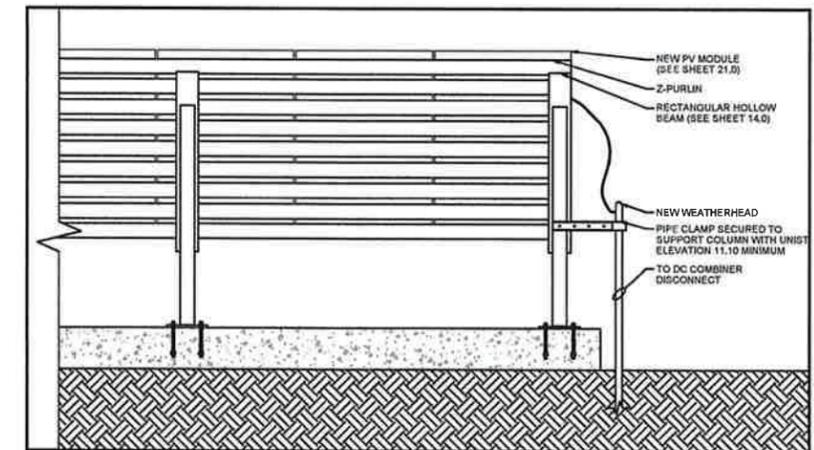
NOTES:

1. ANY MODIFICATIONS TO PLAN SHALL BE CONSULTED AND VERIFIED BY THE ENGINEER PRIOR TO INSTALLATION.



8 CONCRETE PATCH

NOT TO SCALE

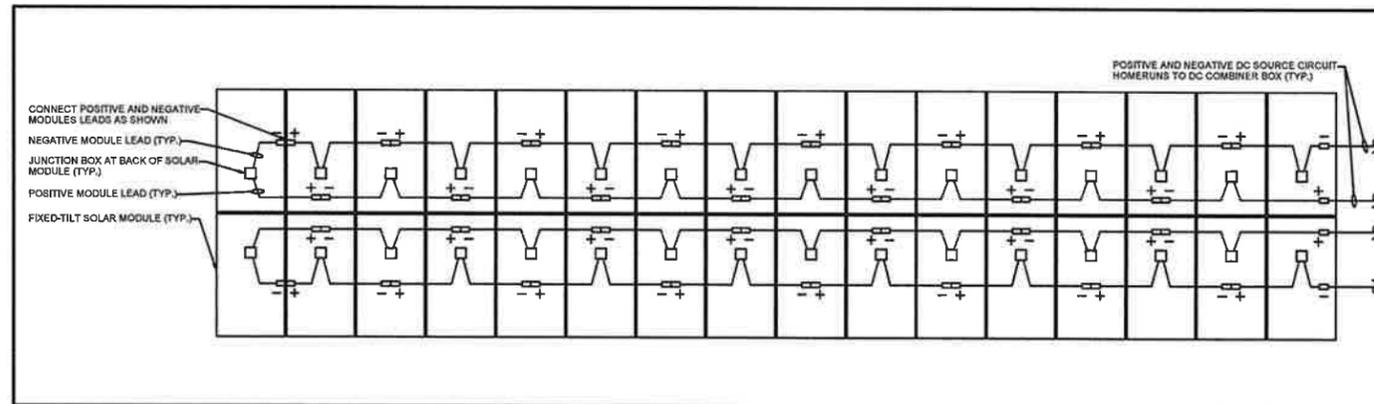


3 DC SOURCE CIRCUIT EXITING ARRAY

NOT TO SCALE

NOTES:

1. ANY MODIFICATIONS TO PLAN SHALL BE CONSULTED AND VERIFIED BY THE ENGINEER PRIOR TO INSTALLATION.



1 DC SOURCE CIRCUITING DETAIL

SCALE: NOT TO SCALE

NOTES:

1. ANY MODIFICATIONS TO PLAN SHALL BE CONSULTED AND VERIFIED BY THE ENGINEER PRIOR TO INSTALLATION.



USAID WATER AND SANITATION PROJECT



CHARPENTIER SOLAR PUMP STATION
QUICK IMPACT PROJECT

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INSTALLATION DETAILS

DRAWING NO.

20.0

PROJECT NO.:	NAME	DATE
18025.16.06	FB	5/3/2019
DESIGNED BY:	FB	5/3/2019
DRAWN BY:	RUM	5/3/2019
CHECKED BY:	RUM	5/3/2019
APPROVED BY:	RUM	5/3/2019



GRUNDFOS SOLAR WATER SOLUTIONS

Increasing capacity for SOLAR WATER SOLUTIONS with RS1

The intelligent IP66 off-grid Solar Inverter (RS1) is designed to run with larger Grundfos pumps, greatly expanding possibilities for solar water solutions offering low (or nearly no) operating costs.

The RS1 is incredibly easy to setup and install, and pairs easily with IP submersible pumps as well as a broad range of Grundfos pumps, creating a modular system which allows maximum components flexibility.

Weatherproof for outdoor installation
With an IP66 enclosure class rating, the RS1 is resistant to rain, dust and sand, meeting the requirements for weather-resistant cabinet with ventilation and air flow. The RS1 can handle ambient temperatures up to 50 °C, in addition to substantial load savings for installation, placing the solar inverter beneath the solar panel array means only a very short DC cable is required, and this can instantly improve safety advantages for users and personnel.

Continuous system optimization
Advanced MPPT software automatically optimizes the system by compensating for environmental effects on solar panel array, improving power and water output by up to 10 %. Environmental effects cover:
1) temperature compensation,
2) handling of multiple local power peaks due to partial shading, and
3) protection against power oscillations due to light cloud movement.

Quick setup with Grundfos pump motors
The quick setup Wizard gives the RS1 flexibility with a broad range of Grundfos pumps. With a built-in Grundfos motor library all that is required is confirmation of motor type and per set value, no parameter input is necessary for Grundfos pumps. This means:
1) setup completed in less than 5 minutes, and
2) with the setup of the RS1 in the web browser prior to a plug-and-pump experience on site.

AC/DC compatible
The RS1 can be used to either connect to mains power or generate if required, because the device is compatible to both AC and DC power input, without the need to change any parameter settings. Simply connect the line power directly via an external substation box, and you take advantage of solar energy during the day and return power to generation during the night.

AN INVESTMENT THAT PAYS FOR ITSELF
There are substantial savings to be made when installing a solar water solution and Grundfos makes it so easy to get the most out of it.
1) The RS1 through its an MPPT algorithm and can see just how much energy and power you can generate from the solar panel array, and can see just how much energy and power you can generate from the solar panel array, and can see just how much energy and power you can generate from the solar panel array.
2) The RS1 through its an MPPT algorithm and can see just how much energy and power you can generate from the solar panel array, and can see just how much energy and power you can generate from the solar panel array.
3) The RS1 through its an MPPT algorithm and can see just how much energy and power you can generate from the solar panel array, and can see just how much energy and power you can generate from the solar panel array.




be think innovate

Use with Grundfos pumps up to 37 kW

The RS1 is designed to work with a broad range of submersible and surface pumps. A solar energy water supply system with a solar inverter (RS1) and Grundfos pumps up to 37 kW is available.

A complete solar energy water supply system package with a solar inverter includes:

- Grundfos pump 50/60 Hz
- RS1 solar inverter
- Sine wave filter
- Solar panel
- Circuit breaker
- Surge protection
- Dry running sensor

Technical specifications

Parameter	RS1 1000-111 V	RS1 1500-111 V	RS1 2000-111 V	
Installation	Max. Ambient Temperature	-20 °C	50 °C	50 °C
Environment	Max. Ambient Temperature	60 °C	60 °C	60 °C
	Max. Relative Humidity	100 %	100 %	100 %
	Min. MPPT Voltage	420 VDC	232 VDC	232 VDC
Electrical Data	Max. Input Voltage	800 VDC	800 VDC	800 VDC
	Max. Frequency	3 Hz	3 Hz	3 Hz
	Max. Frequency	60 Hz	60 Hz	60 Hz
Output, Phase	1 Phase	3Phase	3Phase	3Phase
	Output, Rated Voltage	415 VAC	220 VAC	220 VAC
Enclosure class	IP66			

Product selection grundfos.com

Power Unit, kW	Product Number	Rated Output, Control, Amp
1.5	99044148	8
2.2	99044149	11
3.0	99044150	15
4.0	99044151	20
5.5	99044152	27
7.5	99044153	36
11	99044154	48
15	99044155	63
22	99044156	84
30	99044157	111
37	99044158	148



GRUNDFOS Submittal Data

PROJECT: _____ UNIT TAG: _____ QUANTITY: _____
 REPRESENTATIVE: _____ TYPE OF SERVICE: _____ DATE: _____
 ENGINEER: _____ SUBMITTED BY: _____ DATE: _____
 CONTRACTOR: _____ APPROVED BY: _____ DATE: _____
 ORDER NO.: _____

385S200-3-A

Submersible pumps in stainless steel, EN 1.4301 (AISI 304), EN 1.4401 (AISI 316), EN 1.4539 (AISI 904L). Typical application: Ground water, Irrigation, Mining, Fountain, Off-shore etc.

Conditions of Service

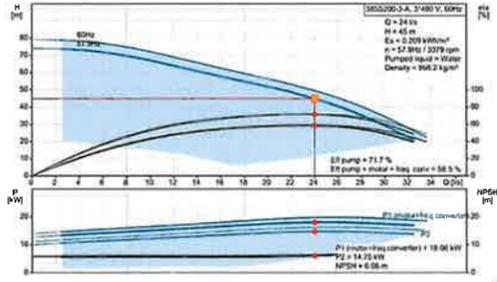
Flow:	24 l/s
Head:	45 m
Efficiency:	58.5 %
Liquid:	Water
Temperature:	10 °C
NPSH required:	6.00 m
Viscosity:	
Specific Gravity:	

Pump Data

Product number:	On request
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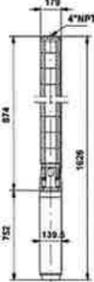
Motor Data

Rated power - P2:	15 kW
Rated voltage:	440-480-480 V
Main frequency:	60 Hz
Enclosure class:	IP68
Insulation class:	F
Motor protection:	NONE
Thermal protection:	external
Motor type:	M55000



Materials:
 Pump: Stainless steel EN 1.4301 AISI 304
 Impeller: Stainless steel EN 1.4301 AISI 304
 Motor: Stainless steel DIN W-Nr. 1.4301 AISI 304

GRUNDFOS Submittal Data



213

1 **GRUNDFOS INVERTER**
EQUIPMENT SPECIFICATION SHEET
SCALE= NTS

2 **GRUNDFOS SUBMERSIBLE PUMP**
EQUIPMENT SPECIFICATION SHEET
SCALE= NTS



CHARPENTIER SOLAR PUMP STATION
QUICK IMPACT PROJECT
LES CAYES SUD

EQUIPMENT SPEC SHEETS

DRAWING NO. **21.0**

	NAME	DATE
PROJECT NO.:	18025.16.06	
DESIGNED BY:	PS	3/04/19
DRAWN BY:	PS	3/04/19
CHECKED BY:	RUM	4/25/2019
APPROVED BY:	RUM	4/25/2019

