

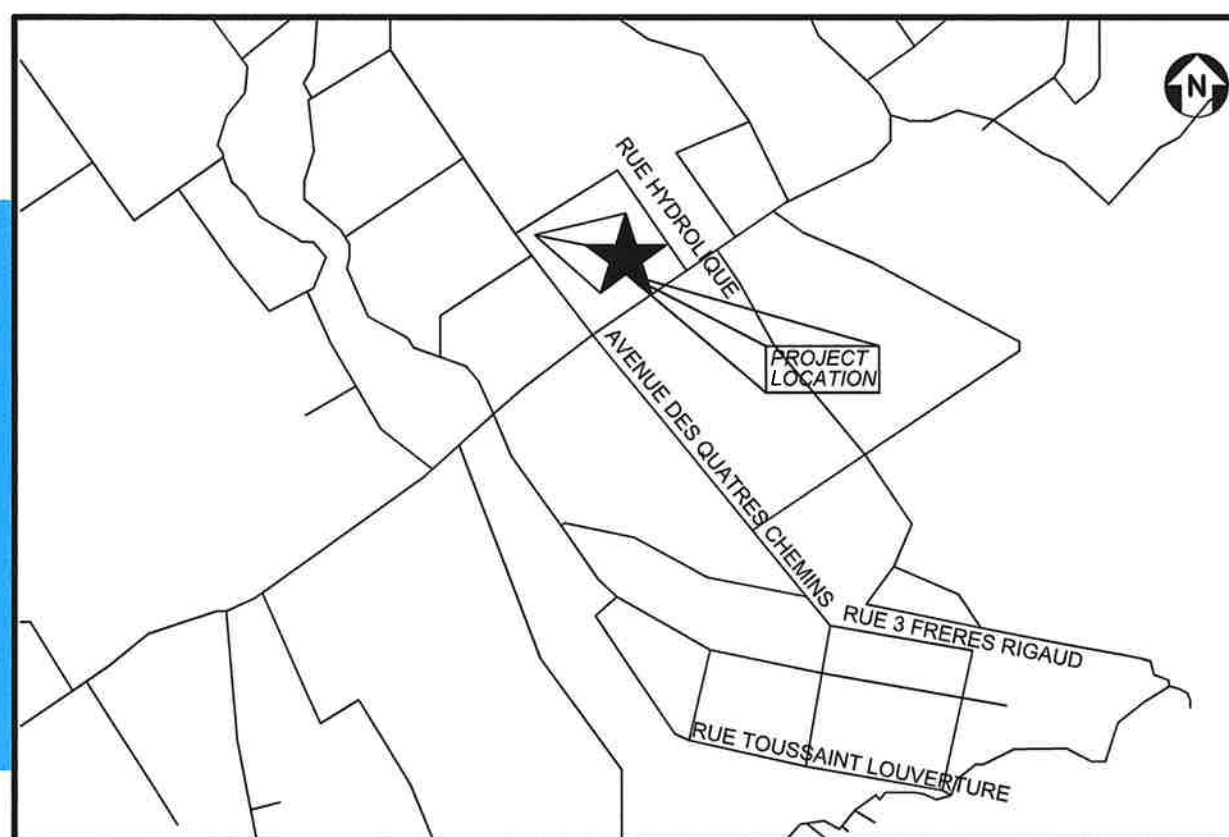


**USAID** | **HAITI**  
FROM THE AMERICAN PEOPLE



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

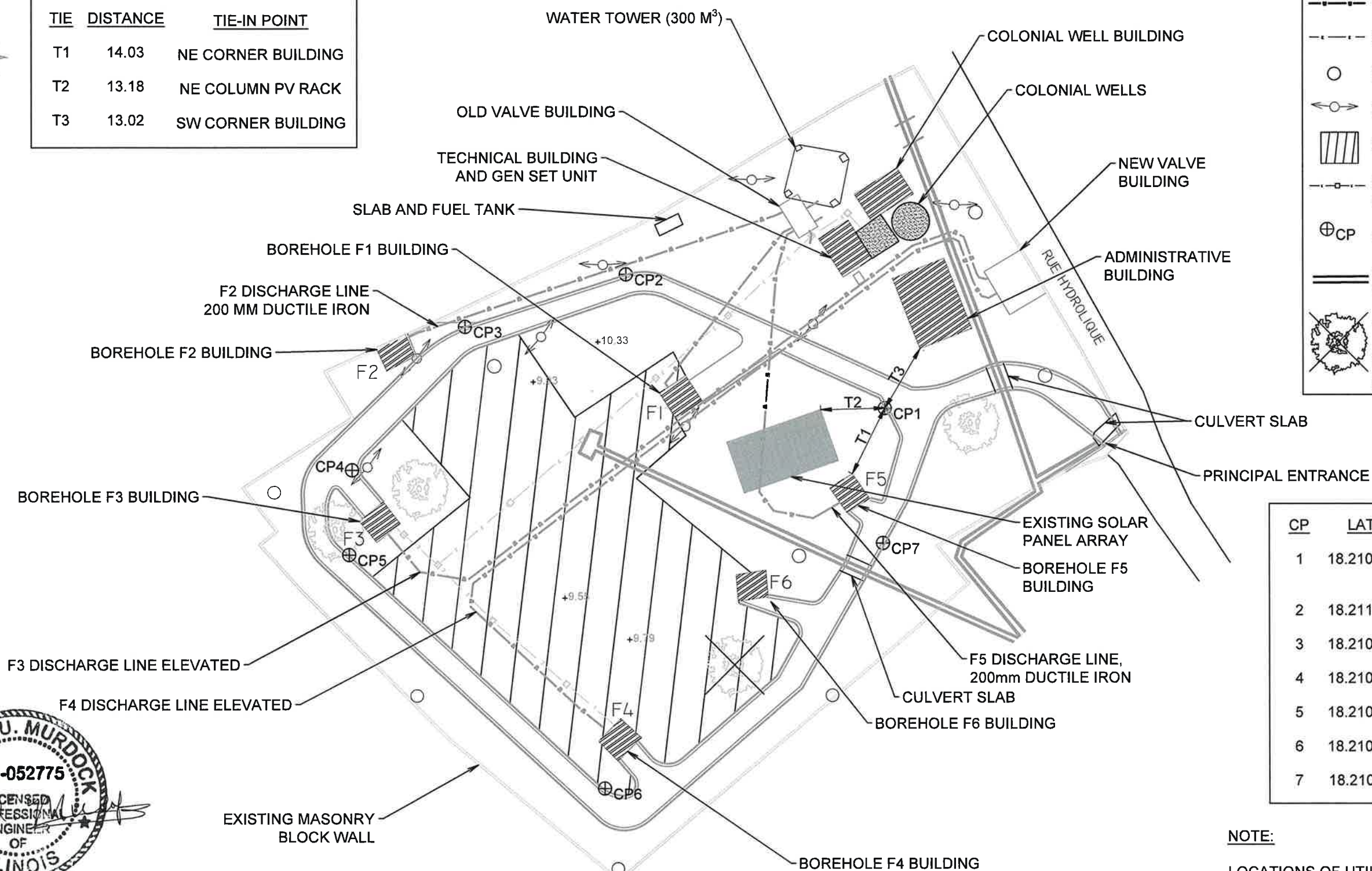
5/3/2019





# 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
- CP 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



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QUICK IMPACT PROJECT

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EXISTING CONDITIONS

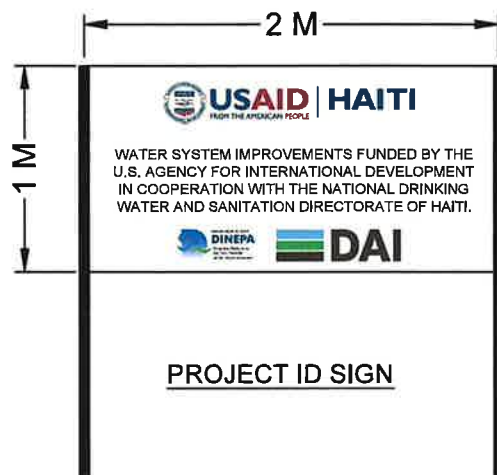
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1.0

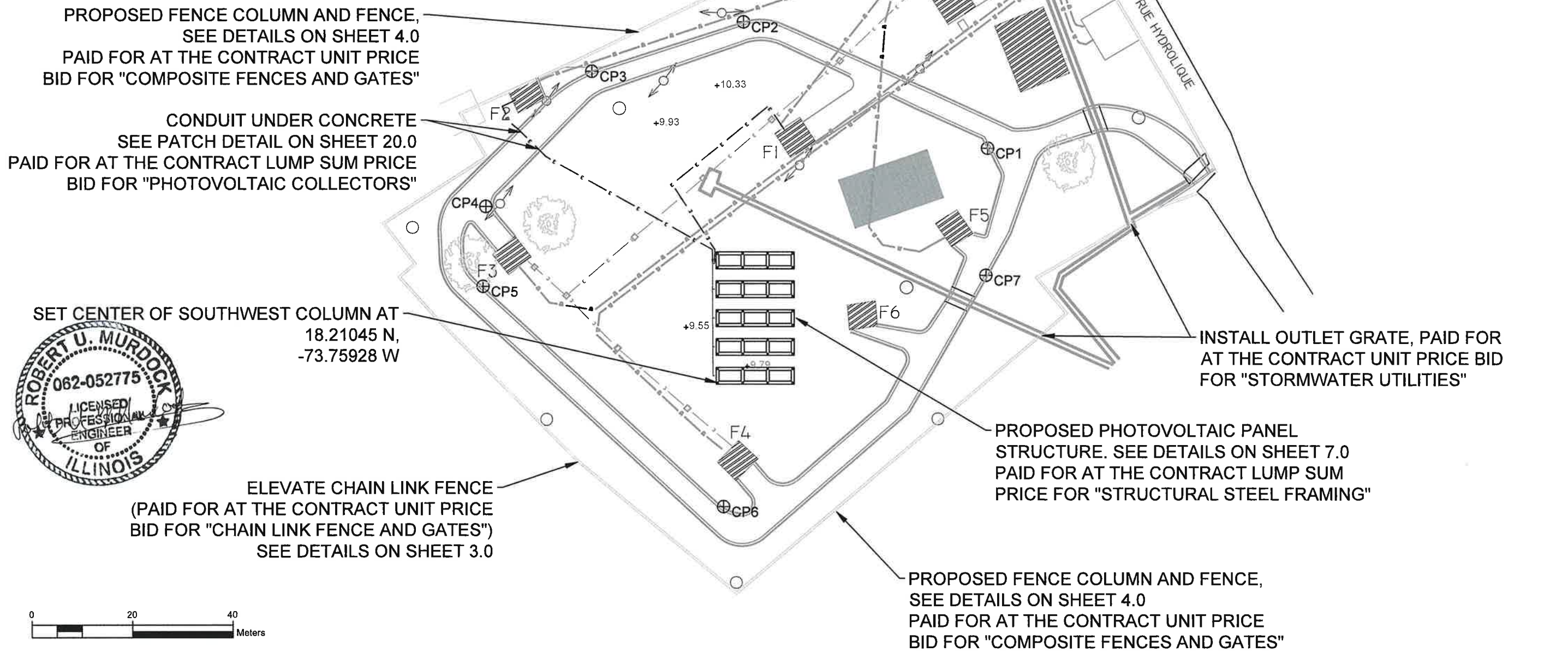
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PROJECT NO.	18025.16.06	
DESIGNED BY:	RB	4/2/2019
DRAWN BY:	LEH	4/2/2019
CHECKED BY:	RUM	4/25/2019
APPROVED BY:	RUM	4/25/2019







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



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

CHARPENTIER SOLAR PUMP STATION  
QUICK IMPACT PROJECT

LES CAYES SUD

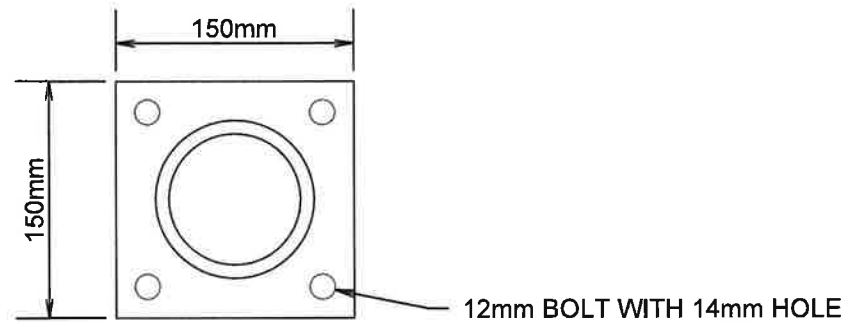
PROPOSED CONDITIONS

DRAWING NO.

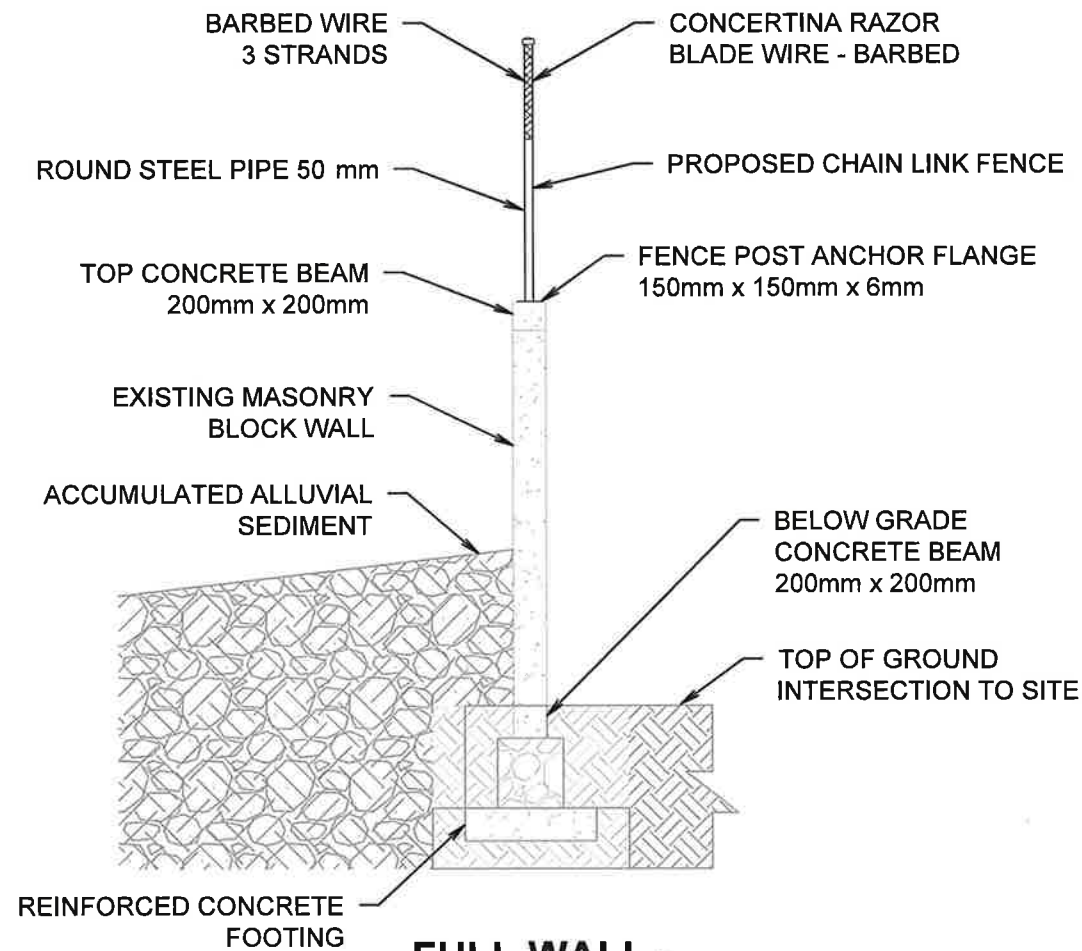
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	NAME	DATE
PROJECT NO.:	18025.16.06	
DESIGNED BY:	RB	4/2/2019
DRAWN BY:	LEH	4/2/2019
CHECKED BY:	RUM	4/25/2019
APPROVED BY:	RUM	4/25/2019

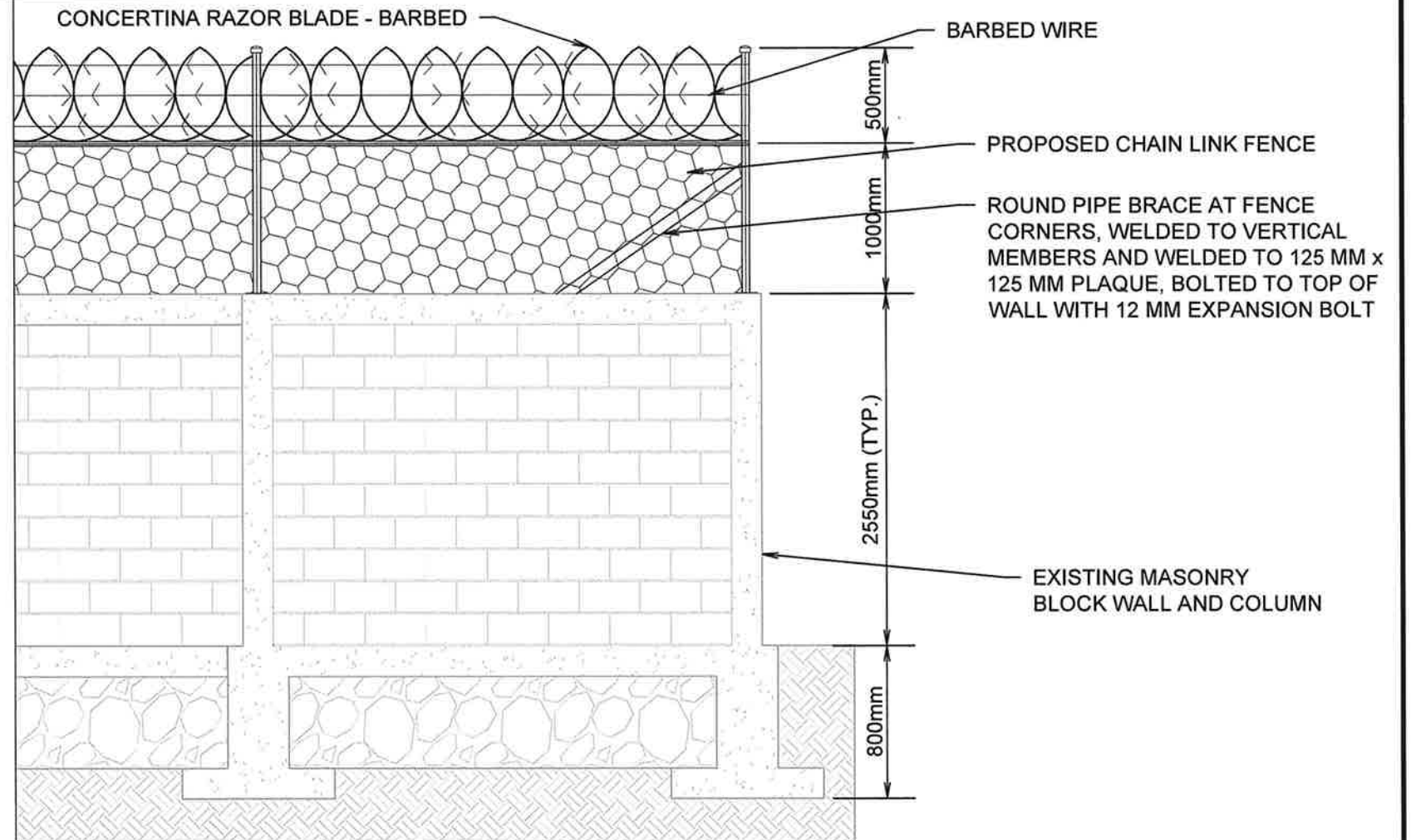




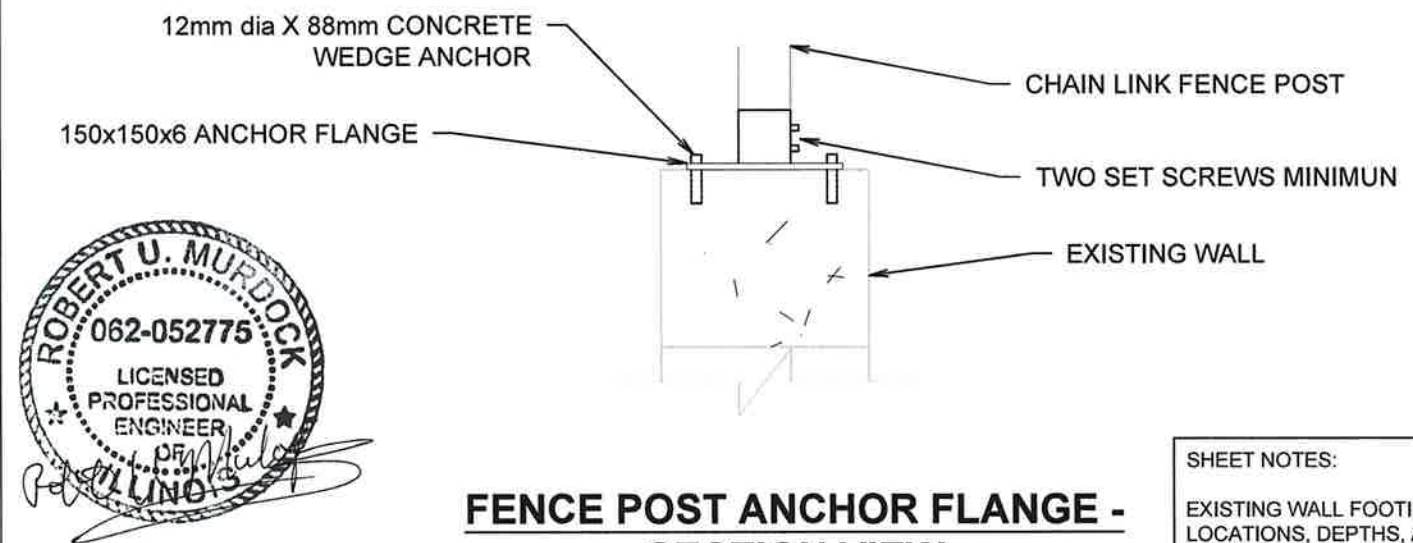
**FENCE POST ANCHOR FLANGE -  
PLAN VIEW**



**FULL WALL -  
SECTION VIEW**



**FENCE CONSTRUCTION - FOR TOP OF WALL APPLICATION**



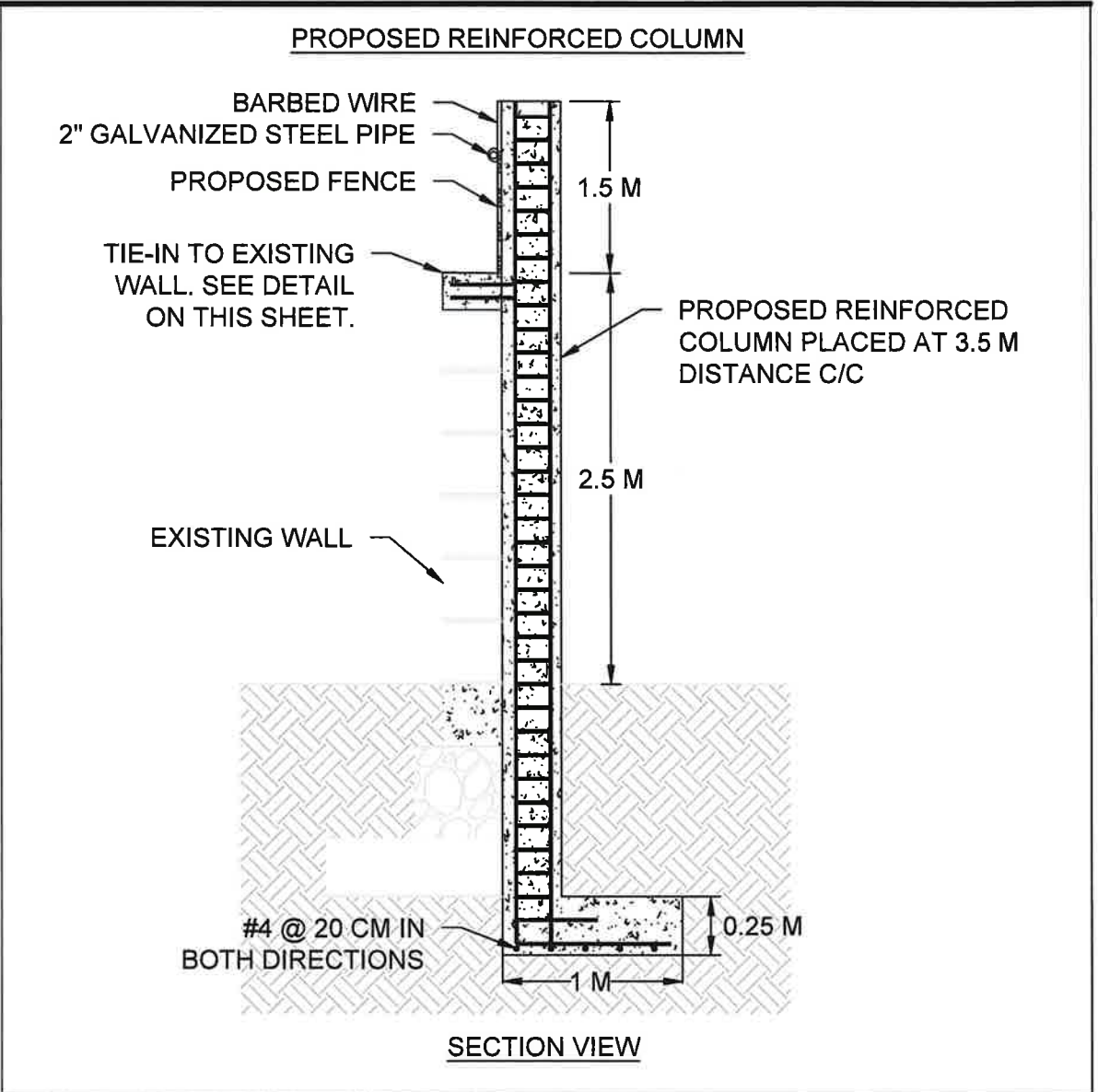
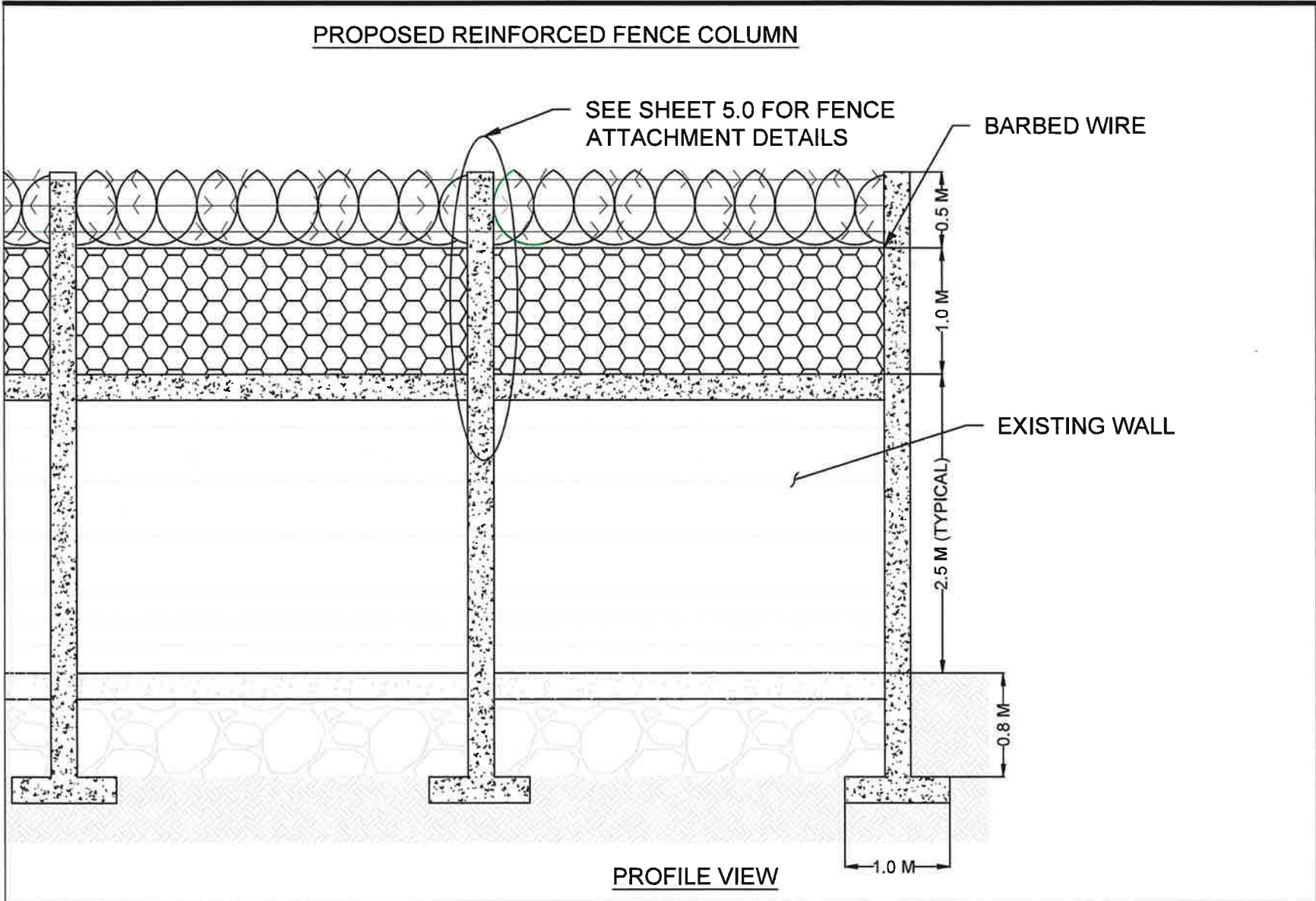
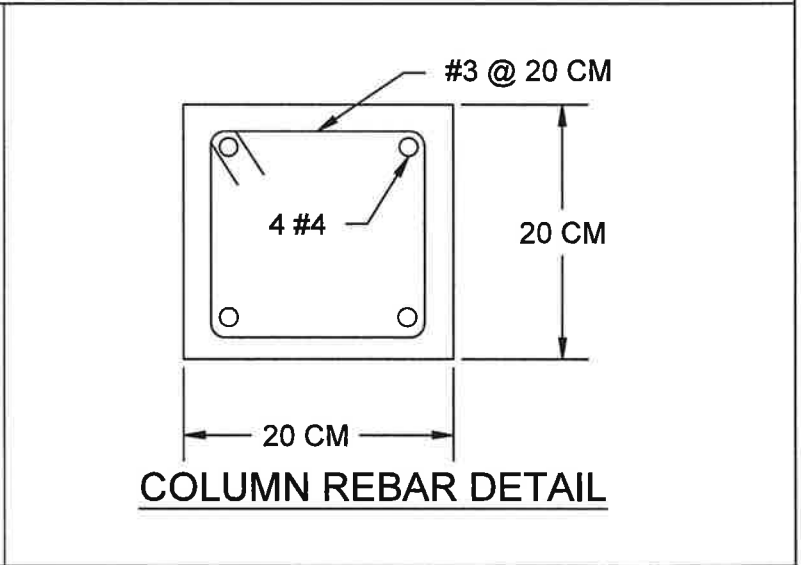
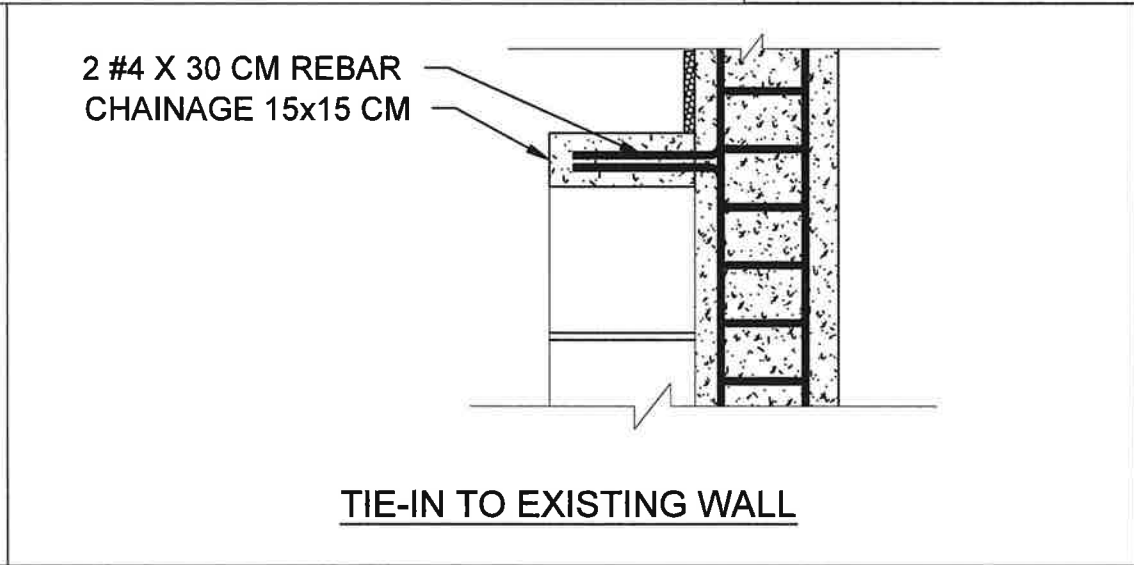
**FENCE POST ANCHOR FLANGE -  
SECTION VIEW**

**SHEET NOTES:**

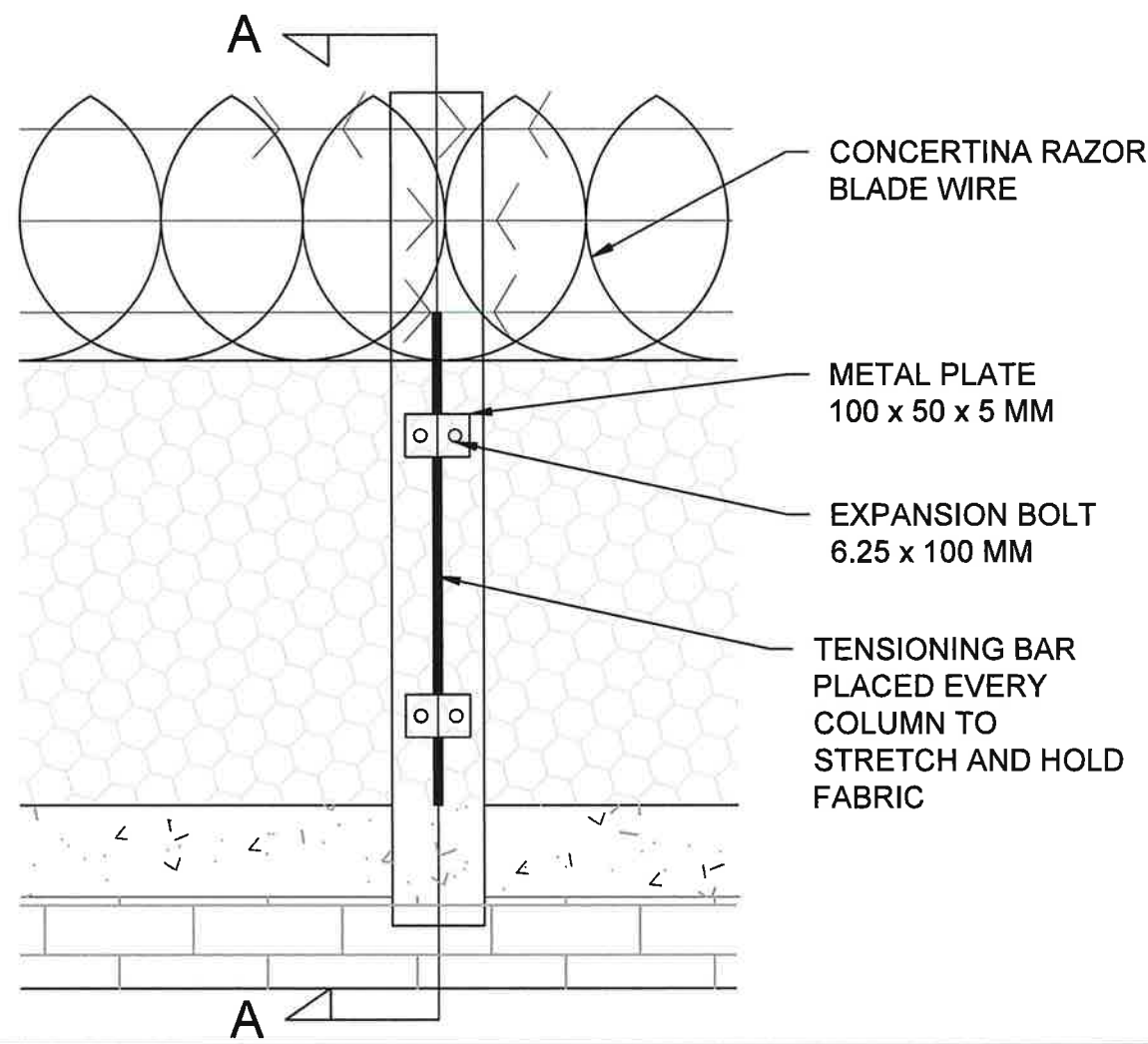
EXISTING WALL FOOTING AND GRADE BEAM LOCATIONS, DEPTHS, AND DIMENSIONS ARE APPROXIMATE. SUBCONTRACTOR SHALL VERIFY AS NECESSARY.

PROJECT NO.:	NAME	DATE
18025 16 06		
DESIGNED BY:	RB	4/2/2019
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

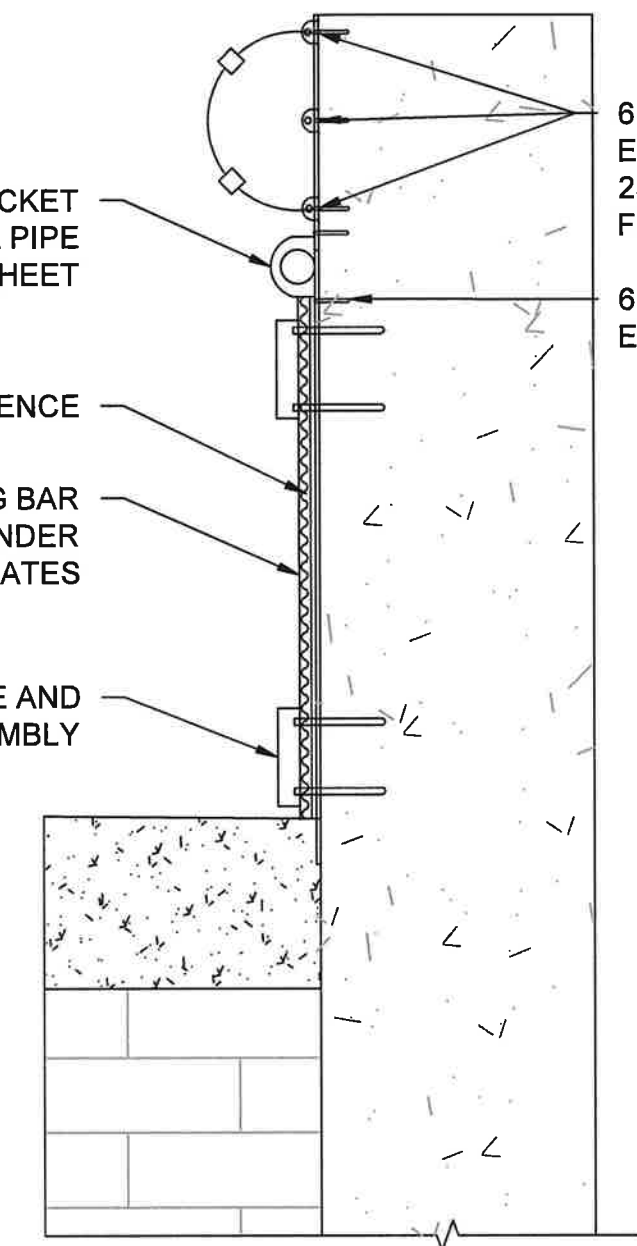
CHAIN LINK FENCE

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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PROPOSED FENCE COLUMNS

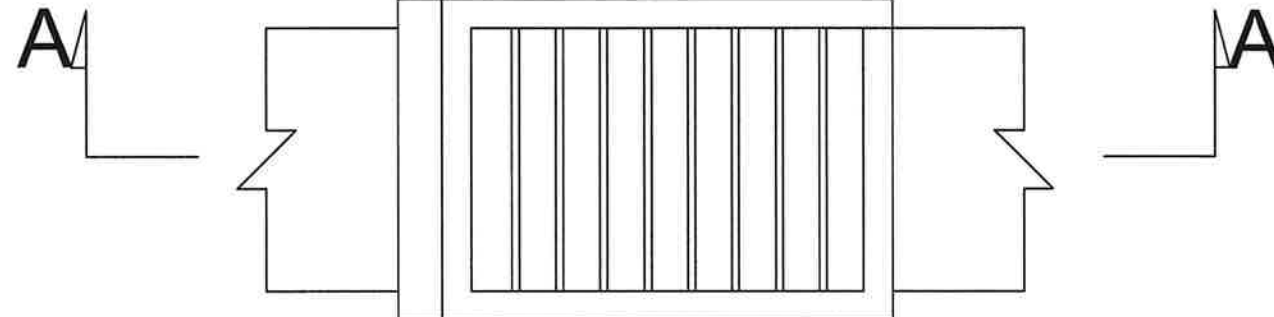
DRAWING NO.

5.0

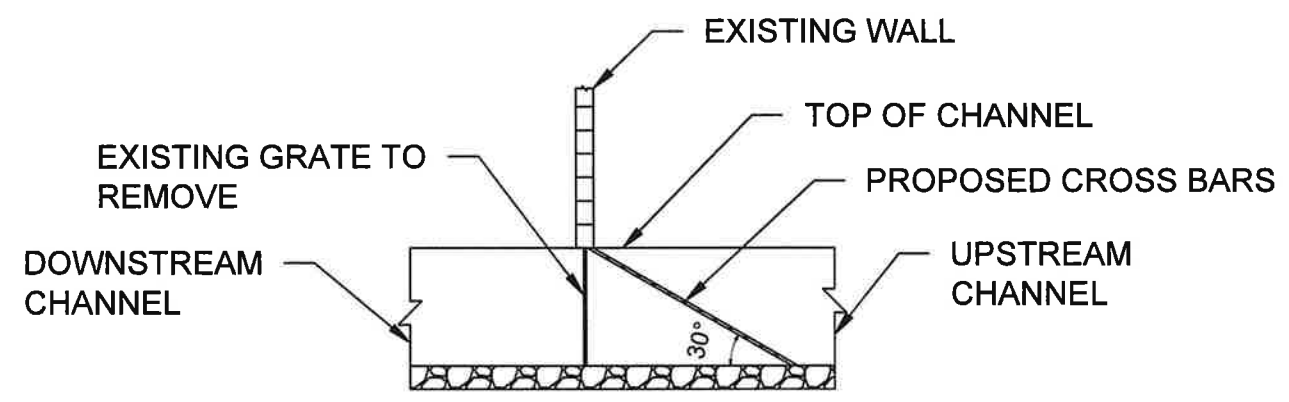
PROJECT NO.	NAME	DATE
18025.16.06	RB	4/2/2019
DESIGNED BY:	RB	4/2/2019
DRAWN BY:	RUM	4/25/2019
CHECKED BY:	RUM	4/25/2019
APPROVED BY:	RUM	4/25/2019



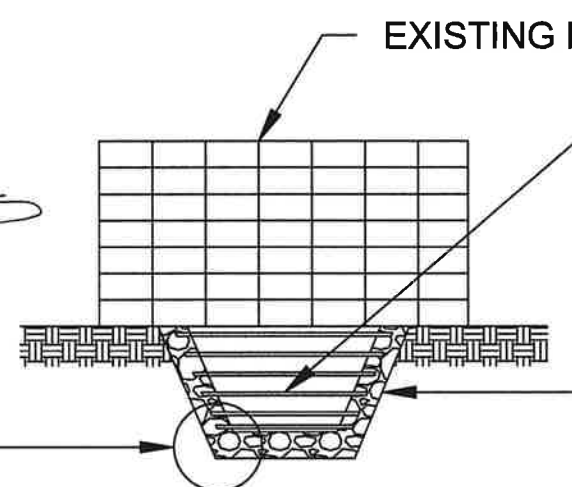




**PLAN VIEW GRATE**



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

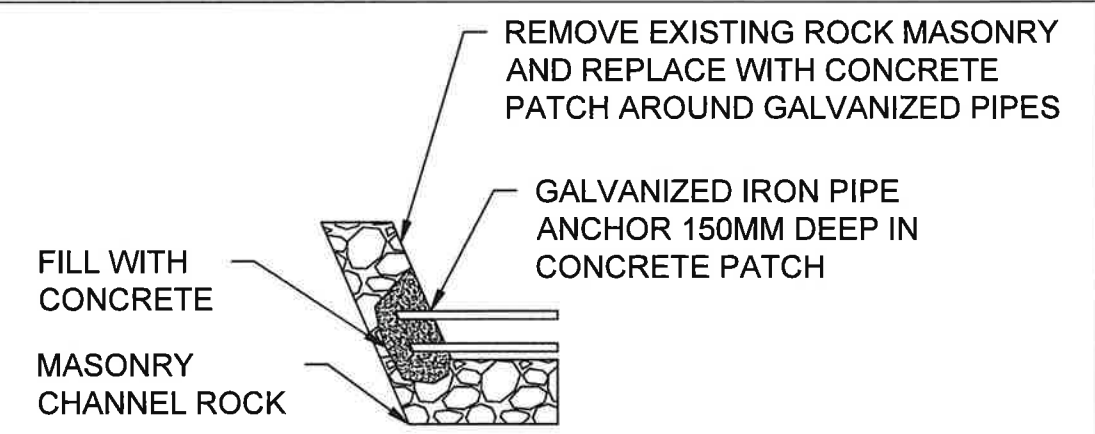


**CHANNEL SECTION**

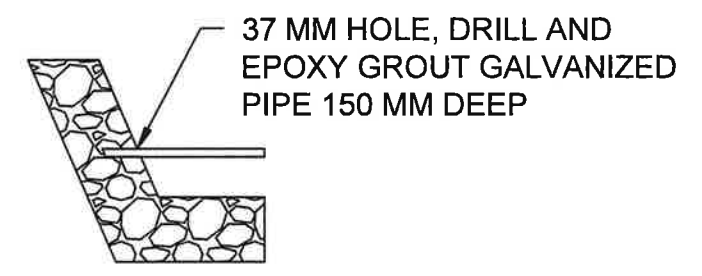
**EXISTING MASONRY WALL**

**GALVANIZED IRON PIPE 25MM DIAMETER SCHEDULE 40, AT 150MM C/C, ANCHOR IN CHANNEL WALL 150MM DEEP WITH CONCRETE PATCH**

**EXISTING ROCK MASONRY CHANNEL APPROXIMATE DIMENSIONS:  
0.8 M WIDE AT BASE  
1.2 M WIDE AT TOP OF WALL  
1 M DEEP**



**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.



**CHARPENTIER WATER SYSTEM  
IMPROVEMENT QUICK IMPACT  
PROJECT**

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**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:
- |                       |      |     |
|-----------------------|------|-----|
| Rebar, ties, stirrups | ASTM | MPa |
| Cement (type1)        | A615 | 414 |
| Aggregate             | A150 |     |
|                       | 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

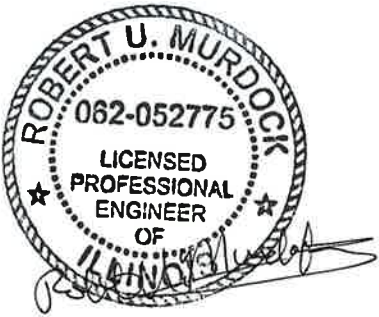
1. The materials and construction will comply with the project specifications:
2. The high capacity bolts shall be installed in accordance with the standards presented by the "Research Council on Structural Connections", with ASTM 325 or A 490 bolts, endorsed by the AISC, inside standard holes. The bolted 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

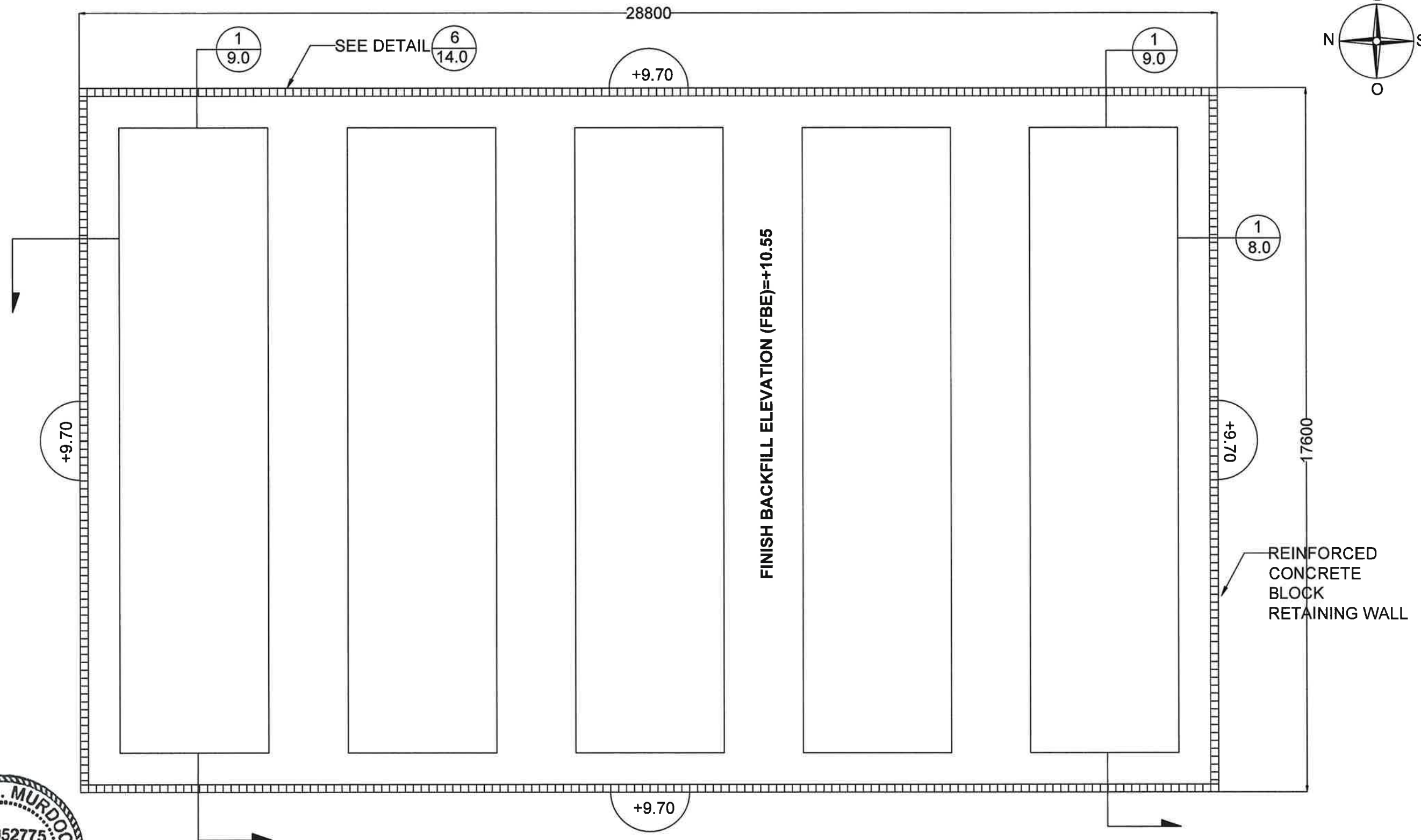
1. The steel of the joists (purlin) will have the properties, the thickness "gauge or inch or mm" and the dimensions indicated in accordance with the standards of the AISI "specification for the design of cold formed steel structural members".
2. All components will be held in place until they have been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

MISCELLANEOUS

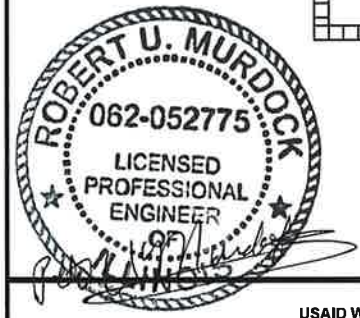
1. Do not apply a scale to the drawings. Only use the indicated dimensions.
2. Communicate any discrepancies with the design and existing site conditions with the engineer. Corrective action will be issued where appropriate.
3. Regardless of the process of revising shop drawings or inspections, or observing 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.









SOLAR PANEL STRUCTURES PLAN VIEW 1/7.0





USAID WATER AND SANITATION PROJECT

CHARPENTIER SOLAR PUMP STATION  
QUICK IMPACT PROJECT



LES CAYES

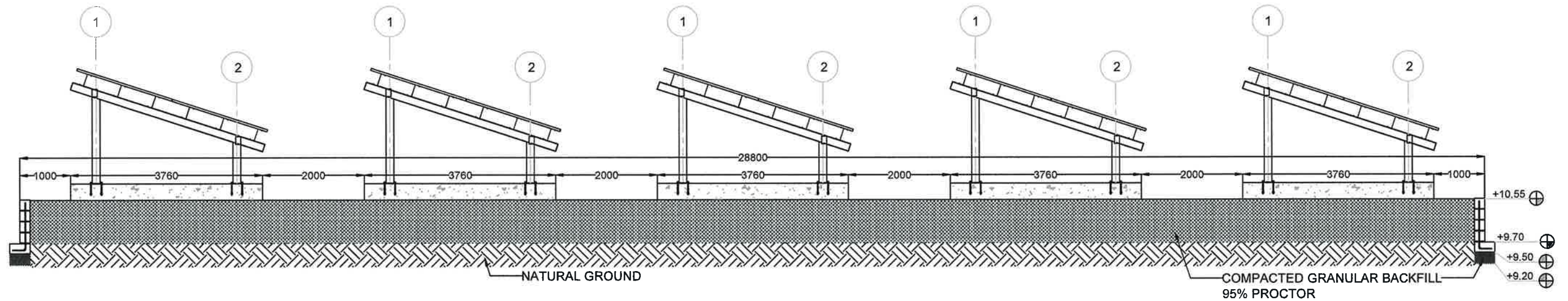
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DRAWING NO.

7.0

	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





SOLAR PANEL STRUCTURES LONGITUDINAL SECTIONS 1  
8.0



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CHARPENTIER SOLAR PUMP STATION  
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SOLAR PANEL STRUCTURES  
LONGITUDINAL SECTIONS

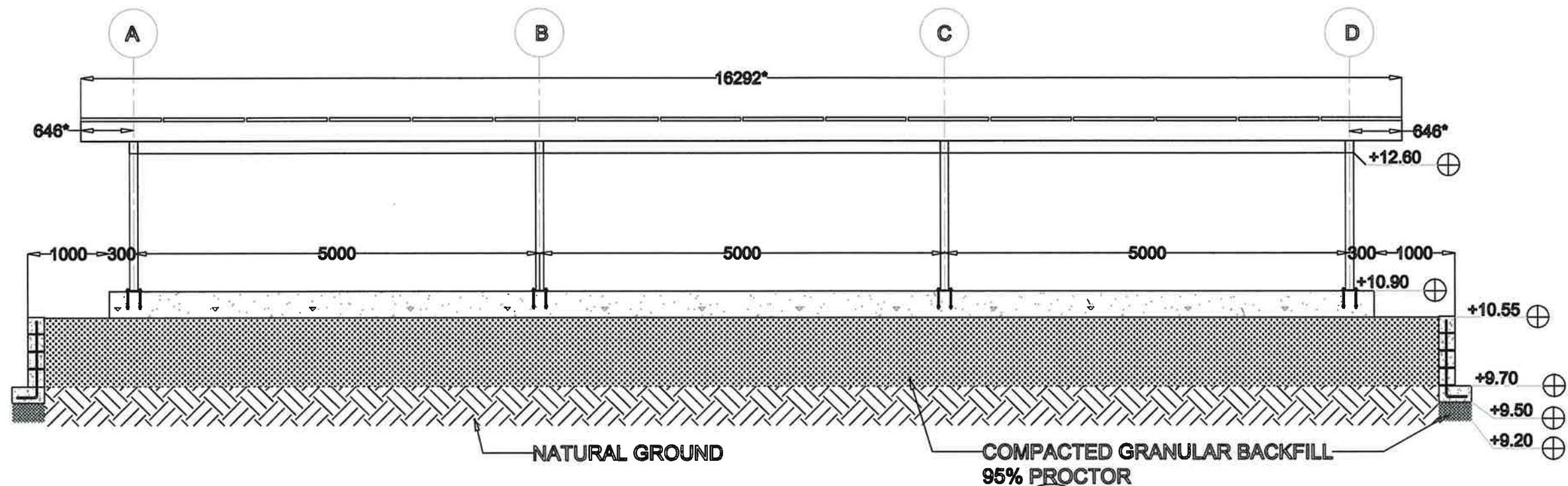
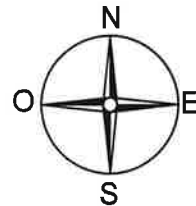
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8.0

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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

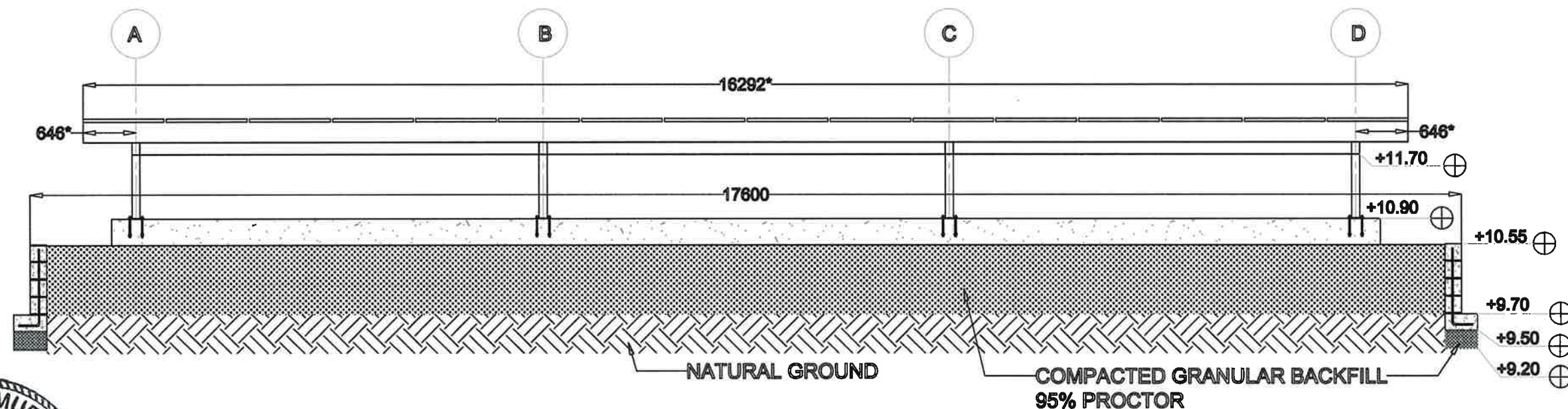






SOLAR PANEL STRUCTURES :TRANSVERSAL SECTIONS AXIS 1

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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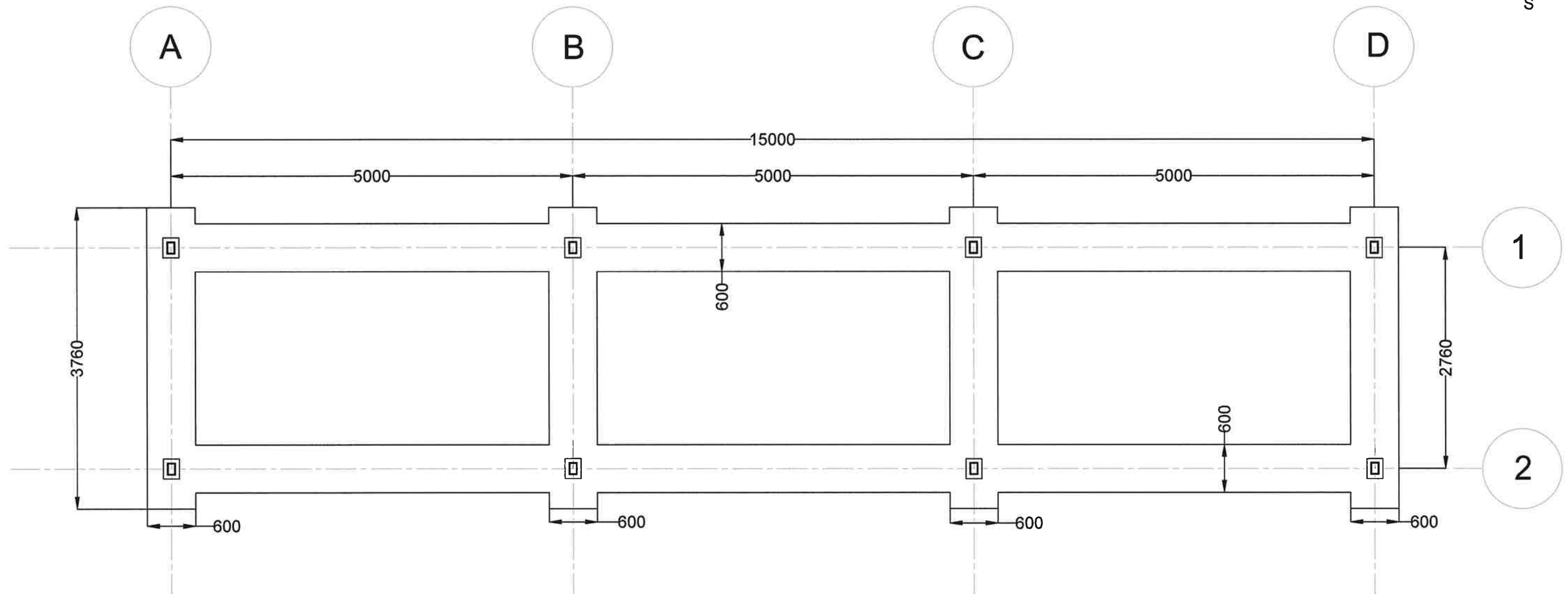
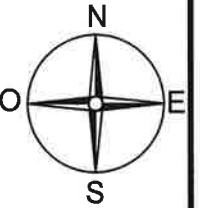
SOLAR PANEL STRUCTURES  
TRANSVERSE SECTIONS

DRAWING NO.

9.0

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

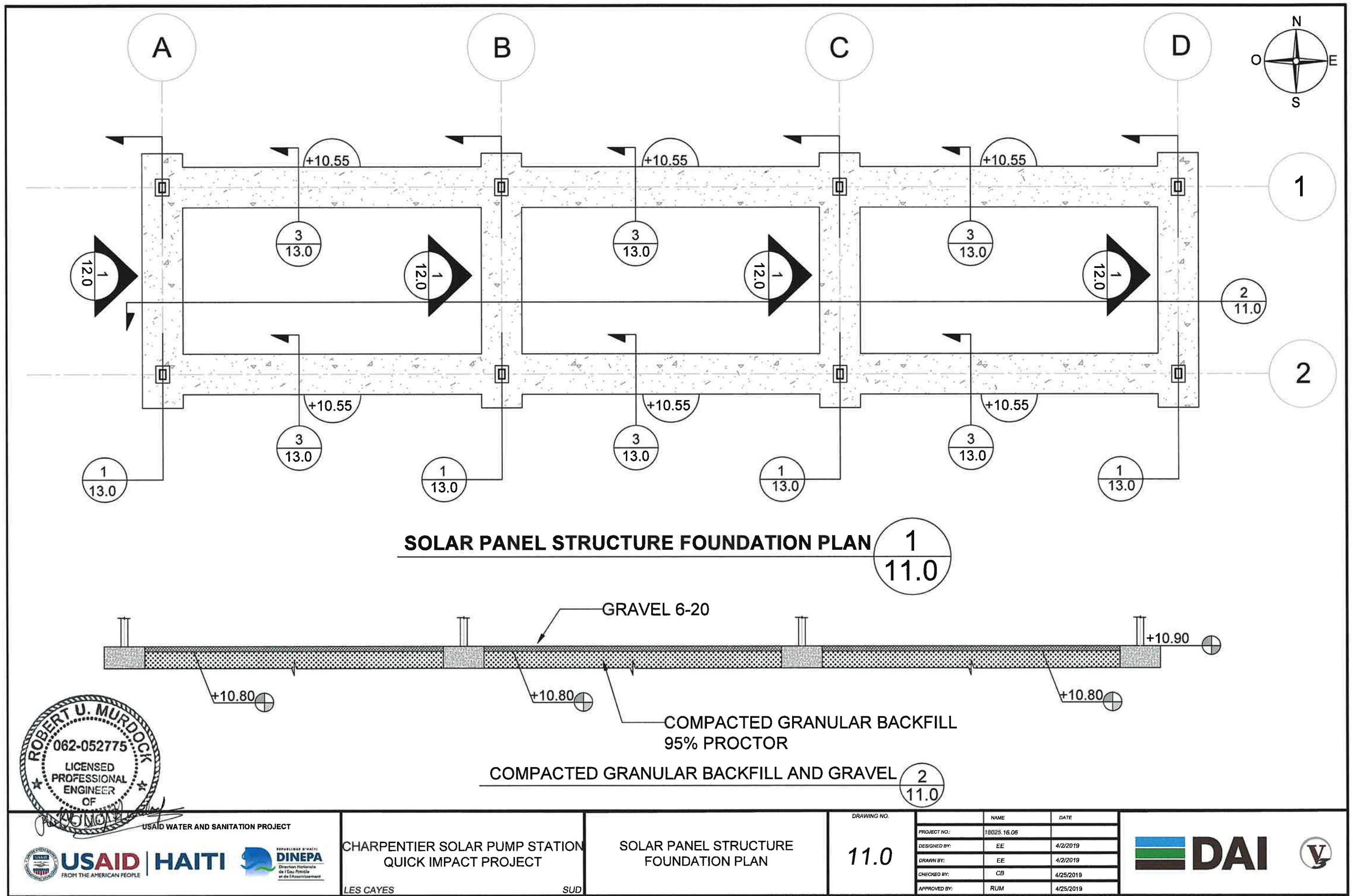


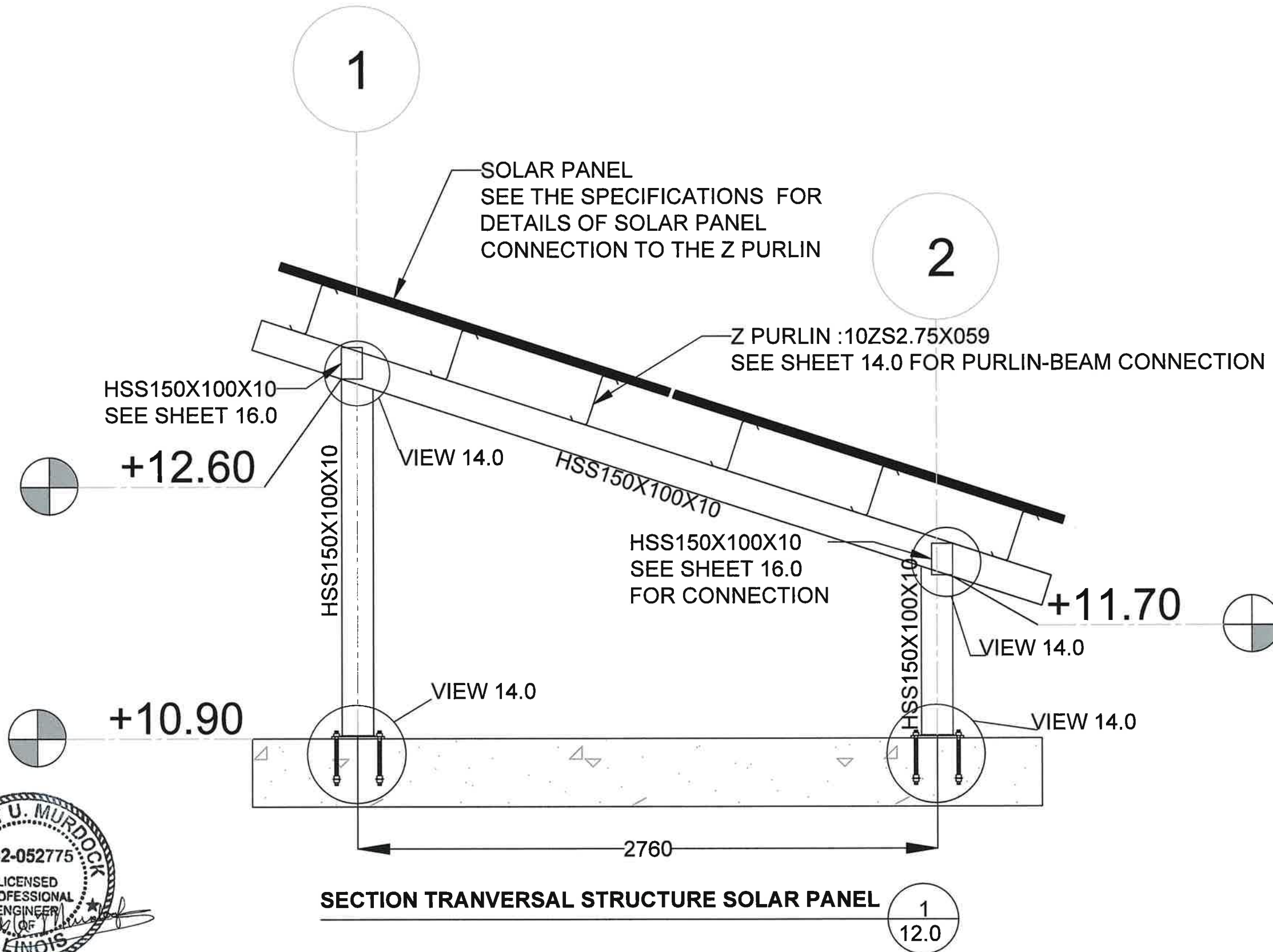


FOUNDATION FORMWORK PLAN 1  
10.0









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CHARPENTIER SOLAR PUMP STATION  
QUICK IMPACT PROJECT

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SUD

SECTION TRANSVERSAL STRUCTURE  
SOLAR PANEL

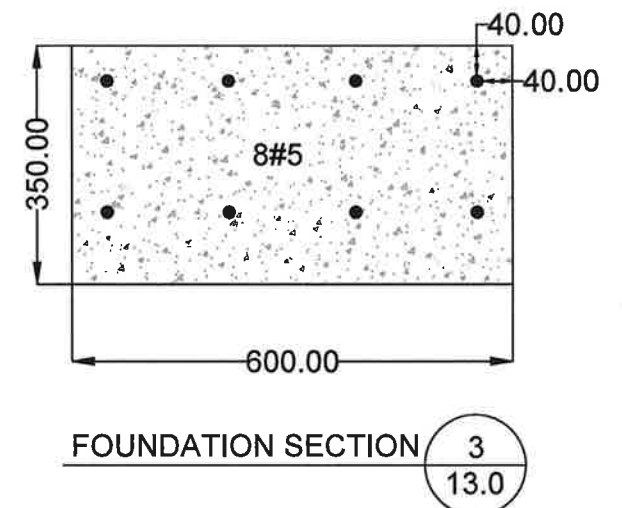
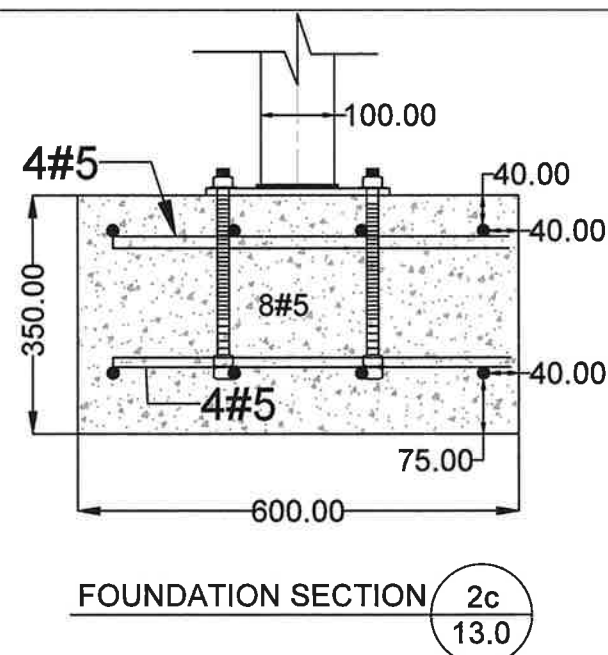
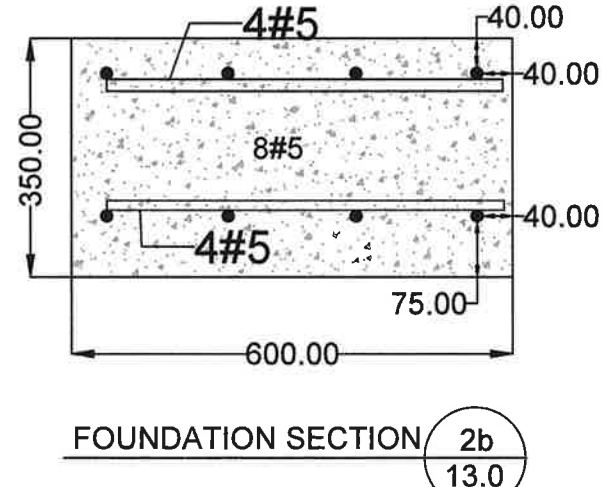
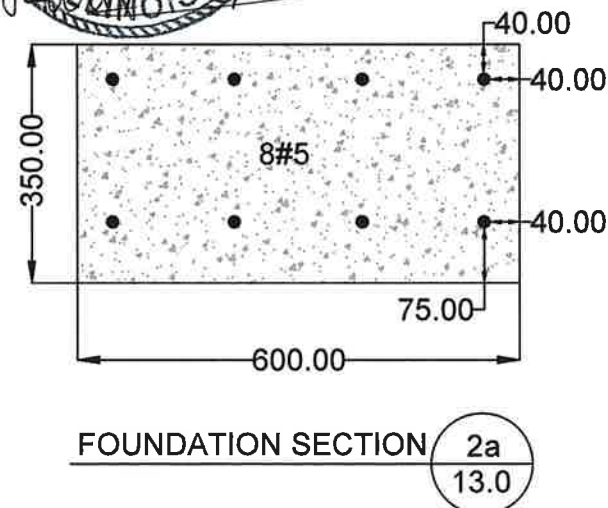
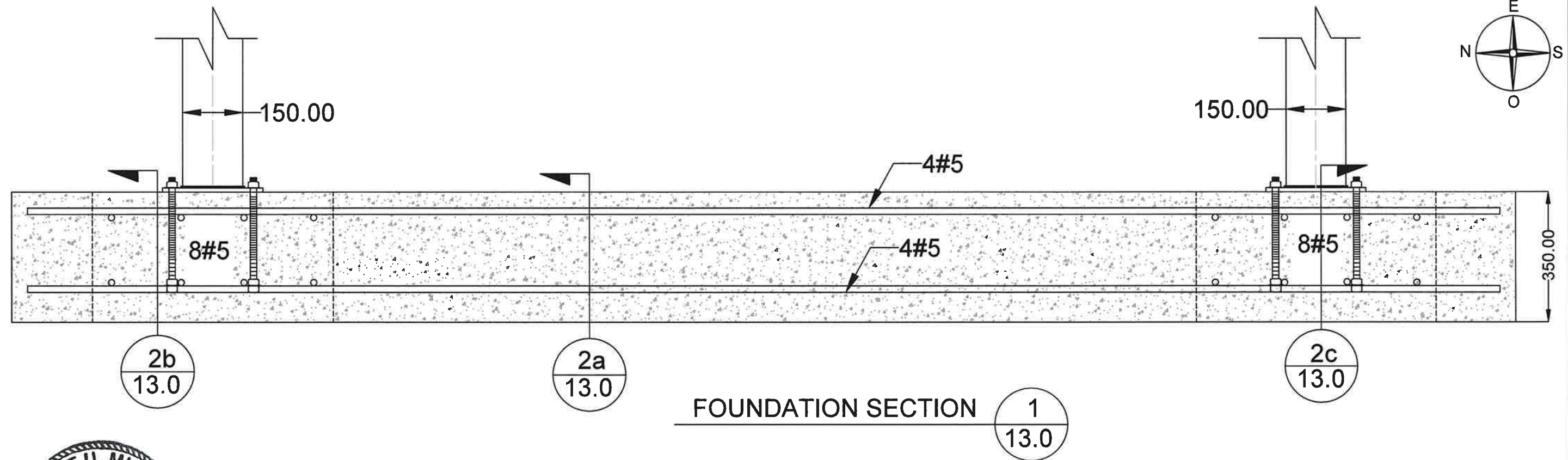
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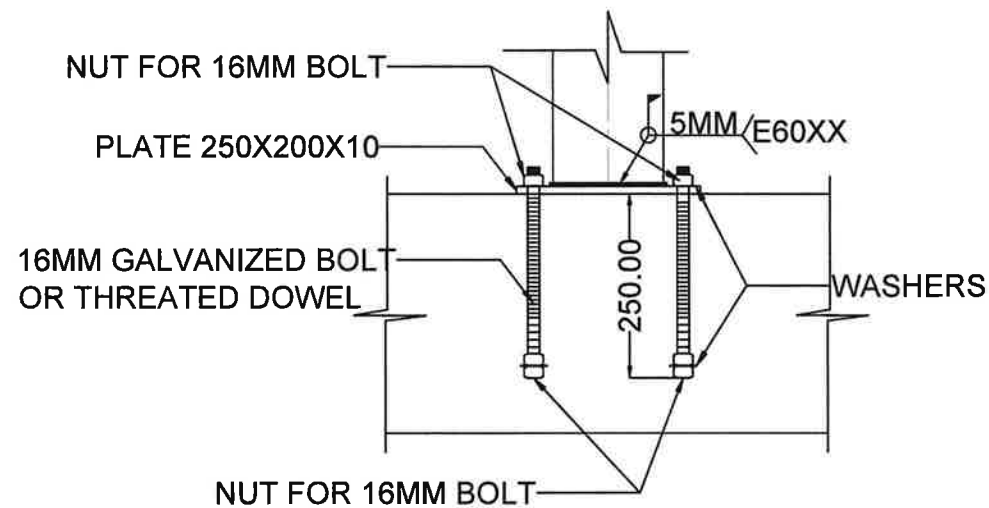
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	NAME	DATE
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DRAWN BY:	EE	4/2/2019
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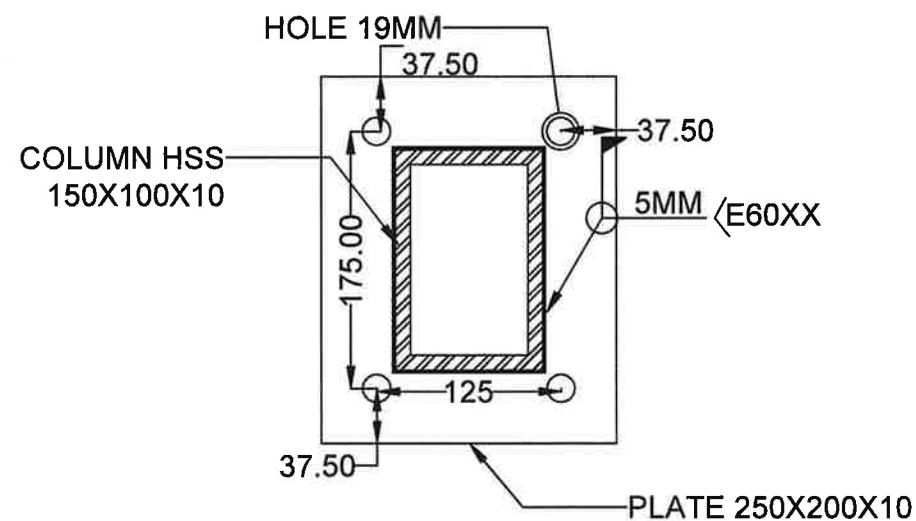






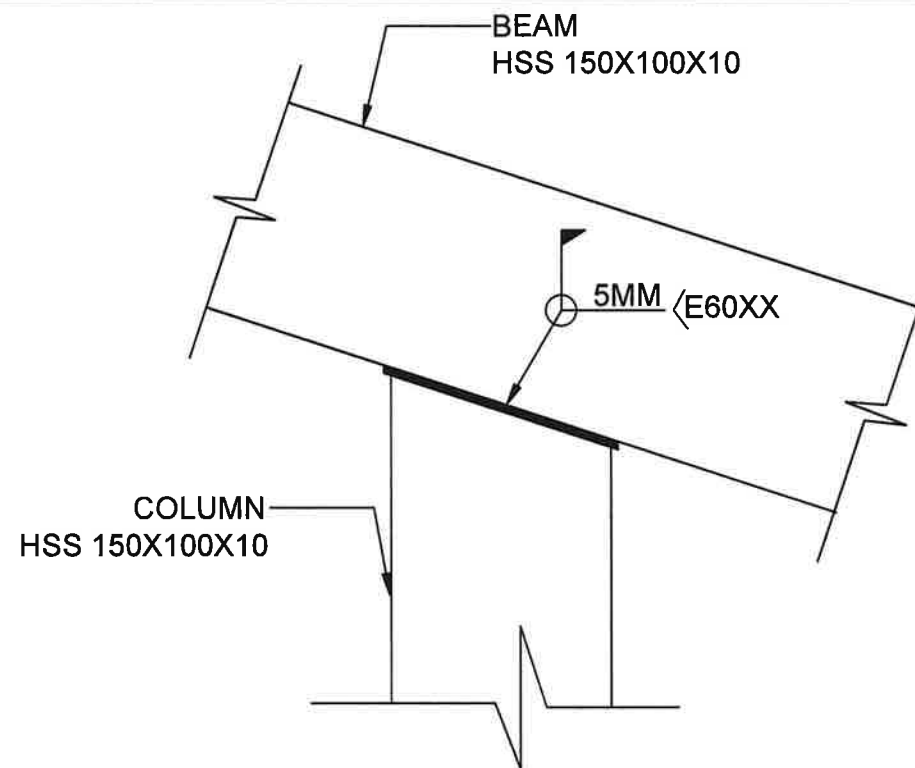
ANCHOR BOLT- PLATE DETAIL

1  
14.0



CONNECTION PLATE-COLUMN DETAIL

2  
14.0

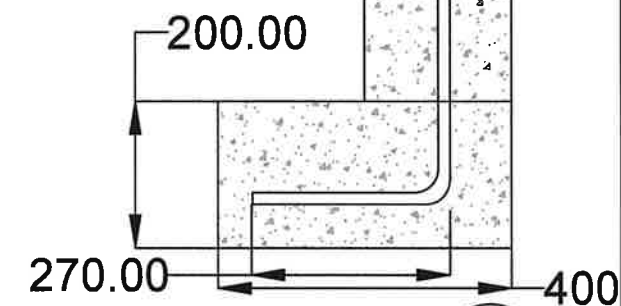


CONNECTION BEAM-COLUMN DETAIL

3  
14.0

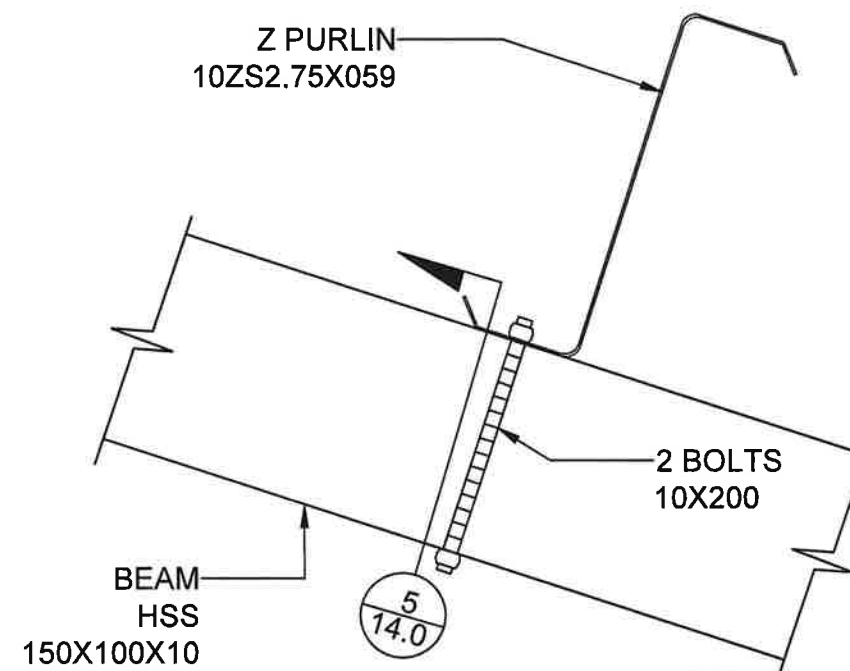
#5 SPACE AT CENTERS  
EVERY 2 CAVITIES  
OF CONCRETE BLOCK

CONCRTE BLOCK  
400X200X200 WITH  
CONCRETE PLACED  
INTO THE CAVITIES.  
MORTAR JOINT  
15mm THICKNESS



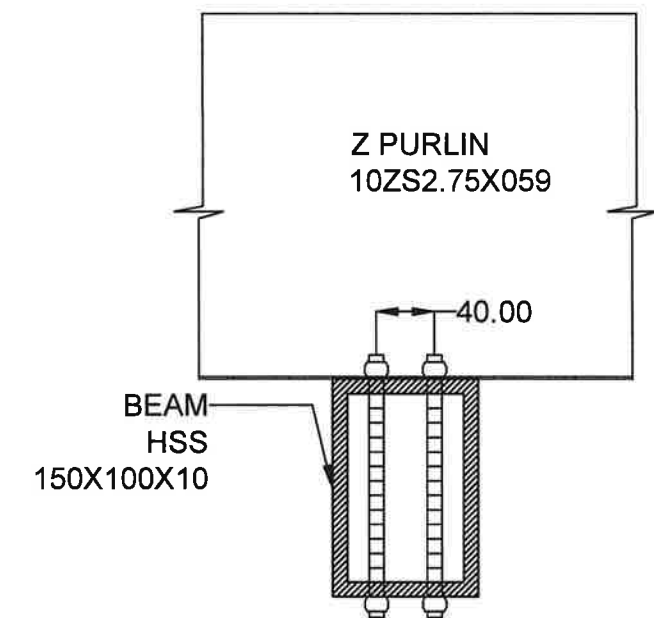
REINFORCEMENT BLOCK DETAIL

6  
14.0



CONNECTION PURLIN-BEAM DETAIL

4  
14.0



SECTION VIEW PURLIN-BEAM DETAIL

5  
14.0



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CHARPENTIER SOLAR PUMP STATION  
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SUD

CONNECTIONS DETAILS

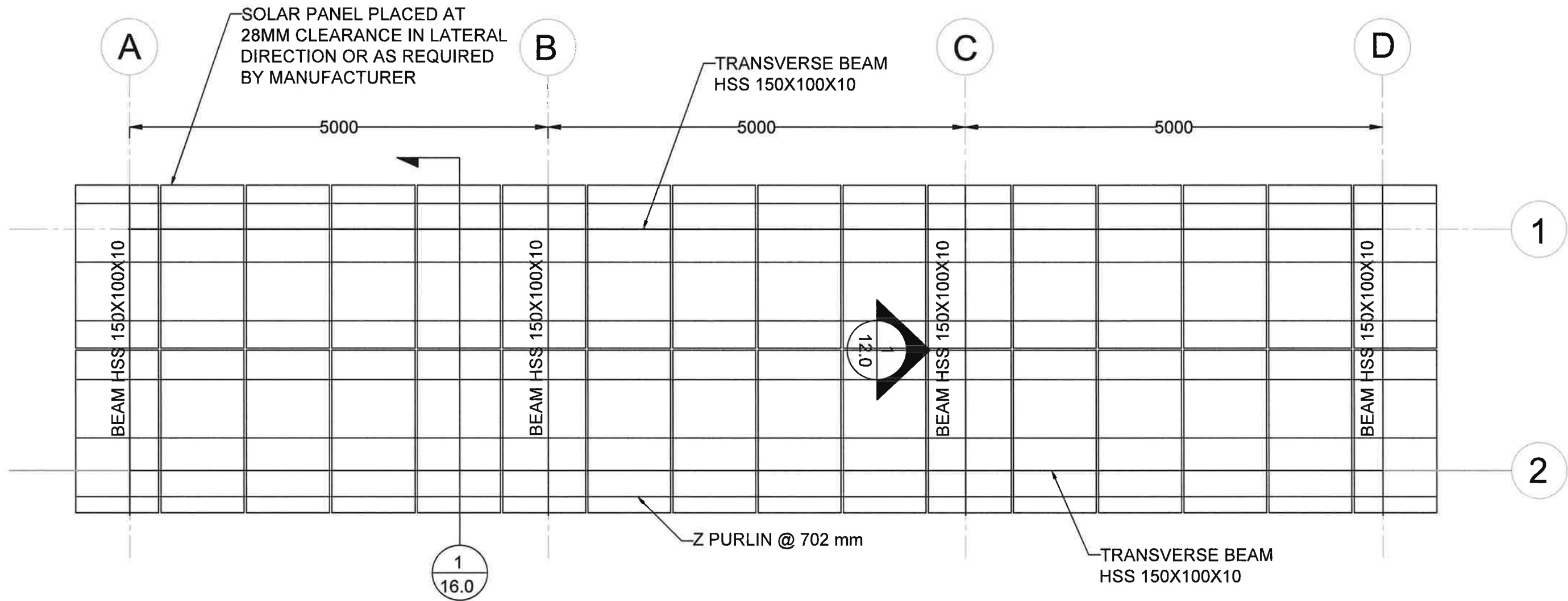
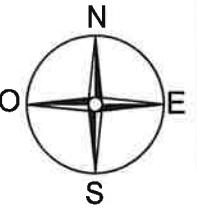
DRAWING NO.

14.0

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:		







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



CHARPENTIER SOLAR PUMP STATION  
QUICK IMPACT PROJECT

LES CAYES

SUD

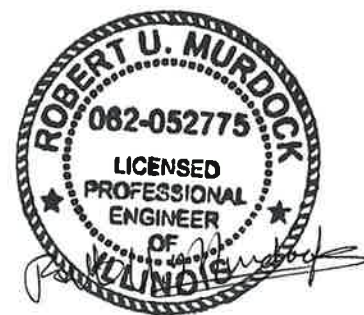
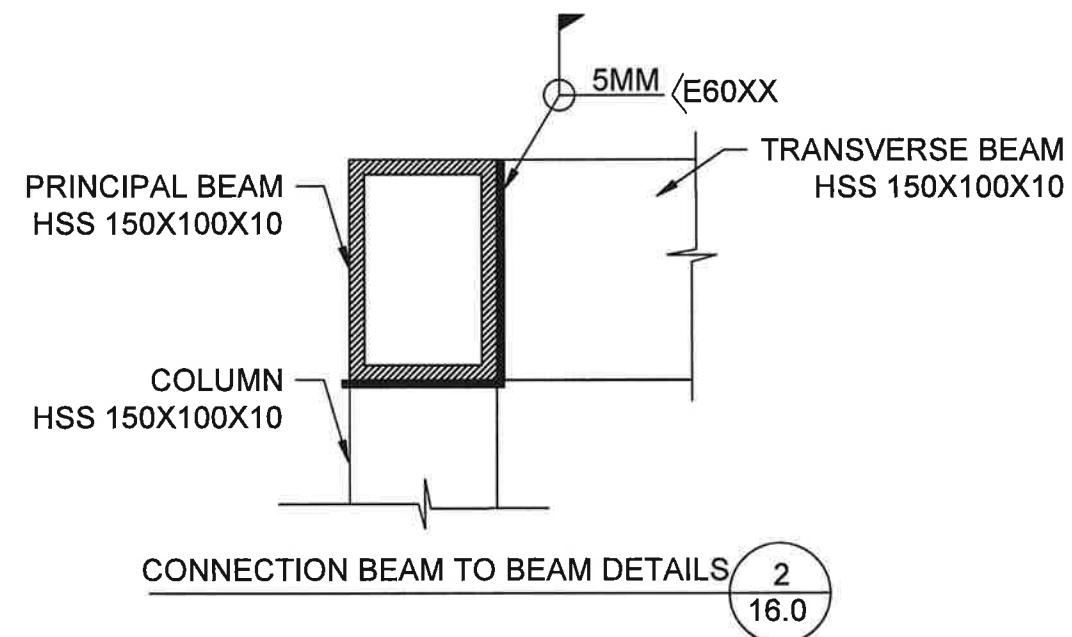
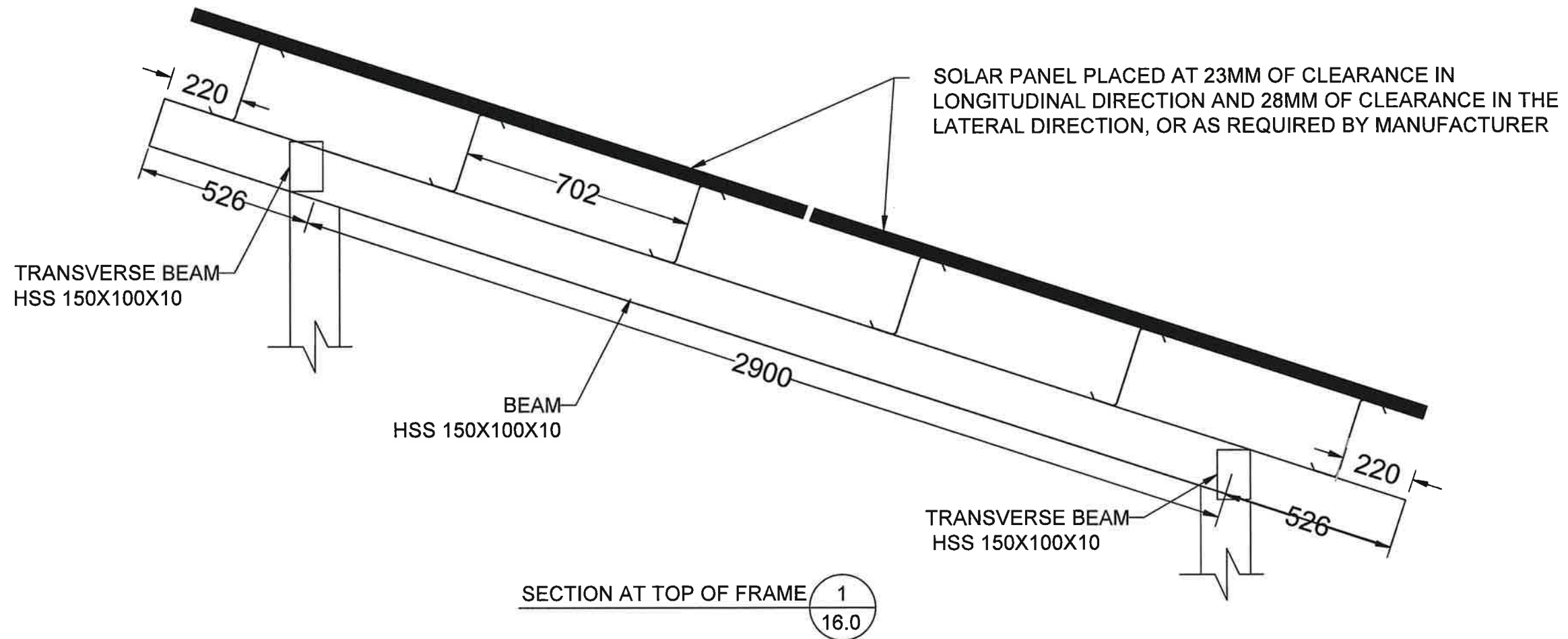
SOLAR PANEL AND PURLIN LAYOUT

DRAWING NO.

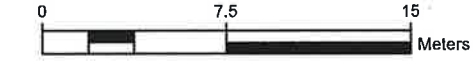
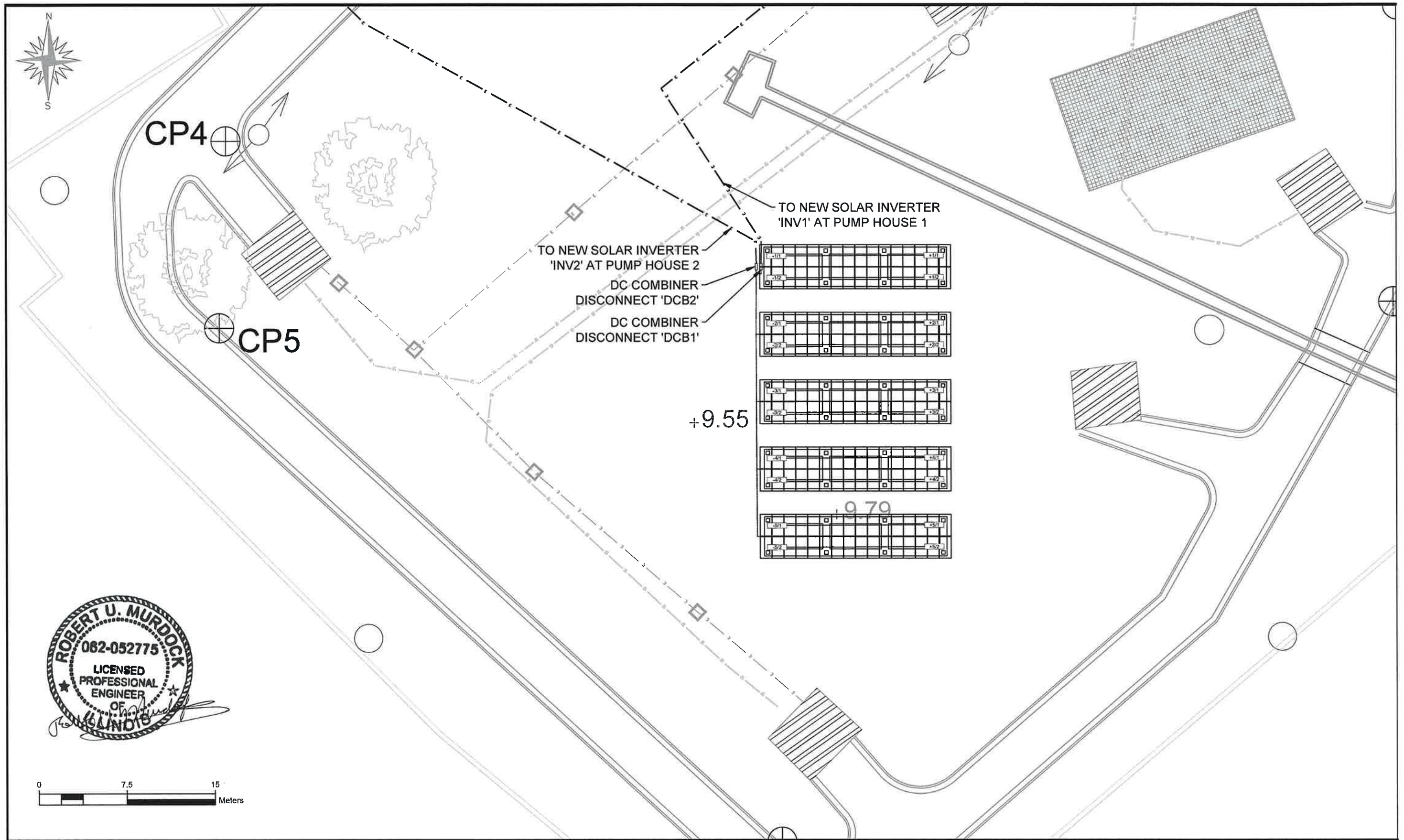
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	NAME	DATE
PROJECT NO.:	18025.16.06	
DESIGNED BY:	EE	4/2/2019
DRAWN BY:	EE	4/2/2019
CHECKED BY:	CB	4/25/2019
APPROVED BY:	RUM	4/25/2019









<div><div><b>USAID</b>   <b>HAITI</b></div><div><small>FROM THE AMERICAN PEOPLE</small></div></div> <div><div><b>DINEPA</b></div><div><small>Direction Nationale de l'Eau Potable et de l'Assainissement</small></div></div>		<div>CHARPENTIER SOLAR PUMP STATION</div> <div>QUICK IMPACT PROJECT</div> <div><div>LES CAYES</div><div>SUD</div></div>	<div>PROPOSED CONDITIONS SOLAR</div> <div>PANEL ARRAY</div>	<div>DRAWING NO.</div> <div>17.0</div>	<table><tr><td></td><td>NAME</td><td>DATE</td></tr><tr><td>PROJECT NO.:</td><td>18025.16.06</td><td></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></table>		NAME	DATE	PROJECT NO.:	18025.16.06		DESIGNED BY:	FB	4/2/2019	DRAWN BY:	FB	4/3/2019	CHECKED BY:	RUM	4/24/2019	APPROVED BY:	RUM	4/25/2019	<div></div>
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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 CHAGNE PER TEMPEARTURE CHAGNE (TCVoc)	CALCULATION
20° C	16	45.5	-0.31%/°C	$V_{oc} + ((T_{min} - 25) * TC_{Voc} * V_{oc}) * STRLEN = V_{max}$ $(45.5 + ((20 - 25) * -0.0031 * 45.5)) * 16 = 739.28V$

WIRE SIZING																			
CIRCUIT	VOLTAGE/CURRENT				OCPD/EGC			DE-RATE FACTORS			CONDUCTOR	CONDUCTORS			MIN CONDUCTOR VOLTAGE RATING	MAX OCPD RATING ALLOWED (A)	VOLTAGE DROP		CONDUIT FILL
	OPERATING VOLTAGE (V)	SHORT CIRCUIT CURRENT - I <sub>sc</sub> (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)			MAX DISTANCE (METERS)	VOLTAGE DROP	CONDUIT FILL
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	29.12	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	4.8 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



CHARPENTIER SOLAR PUMP STATION  
QUICK IMPACT PROJECT

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ELECTRICAL CALCULATIONS

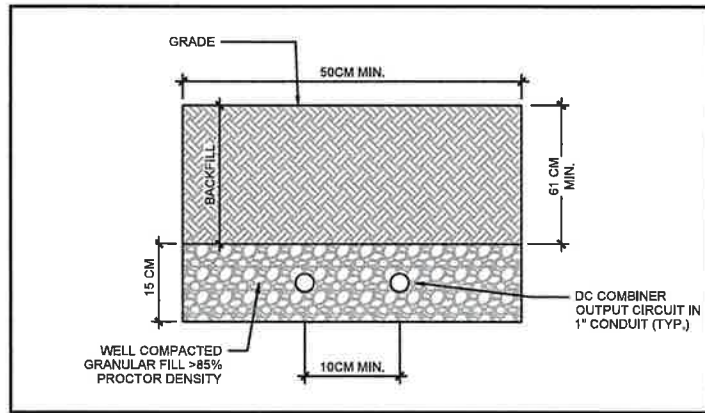
DRAWING NO.

19.0

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





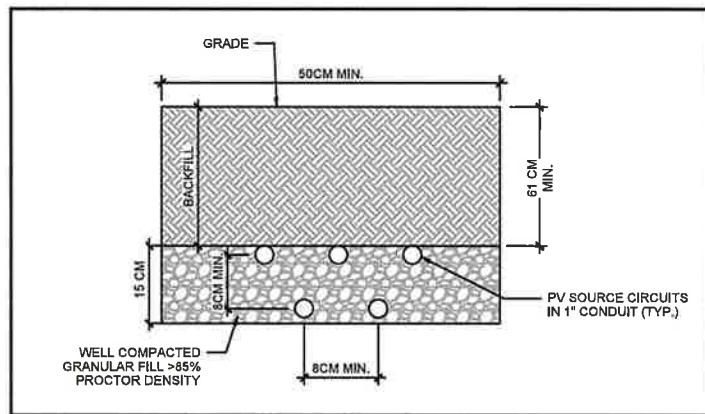


7 DC COMBINER OUTPUT TRENCH SECTION

NOT TO SCALE

NOTES:

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

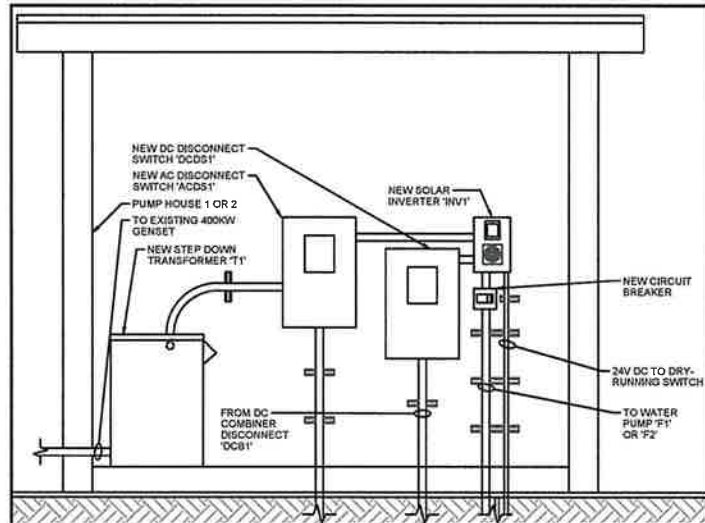


6 PV SOURCE CIRCUIT TRENCH SECTION

NOT TO SCALE

NOTES:

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

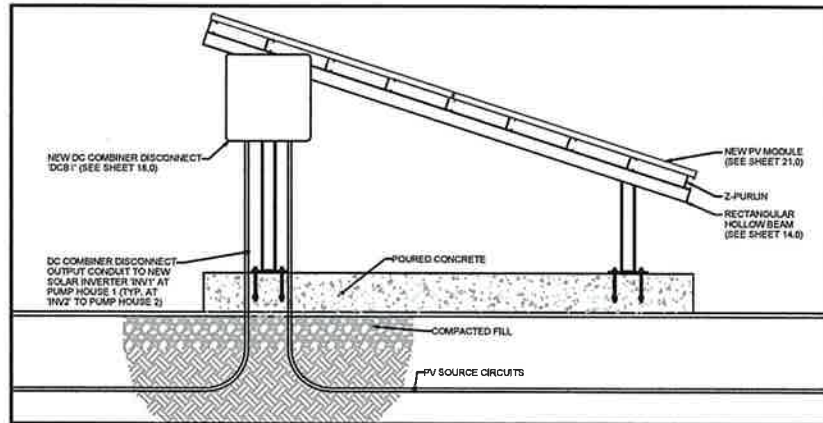


5 PV EQUIPMENT AT INTERIOR ROOM - ELEVATION (TYP.) - F1 OR F2

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.

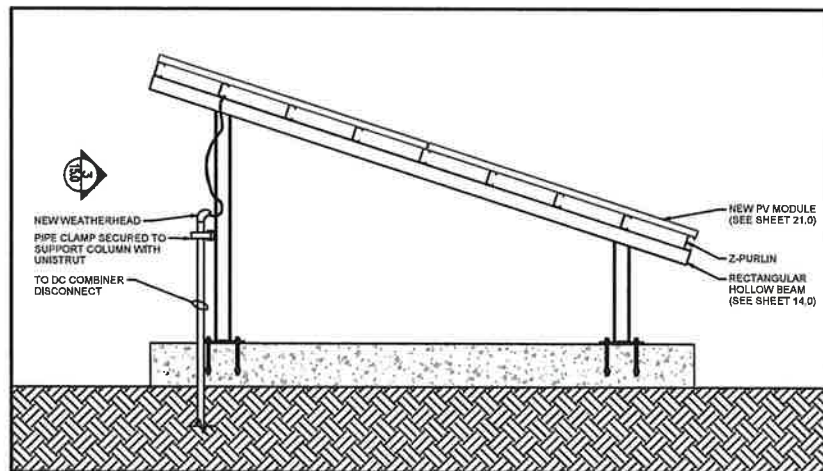


4 DC COMBINER BOX CABLE ENTRIES

SCALE: NOT TO SCALE

NOTES:

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

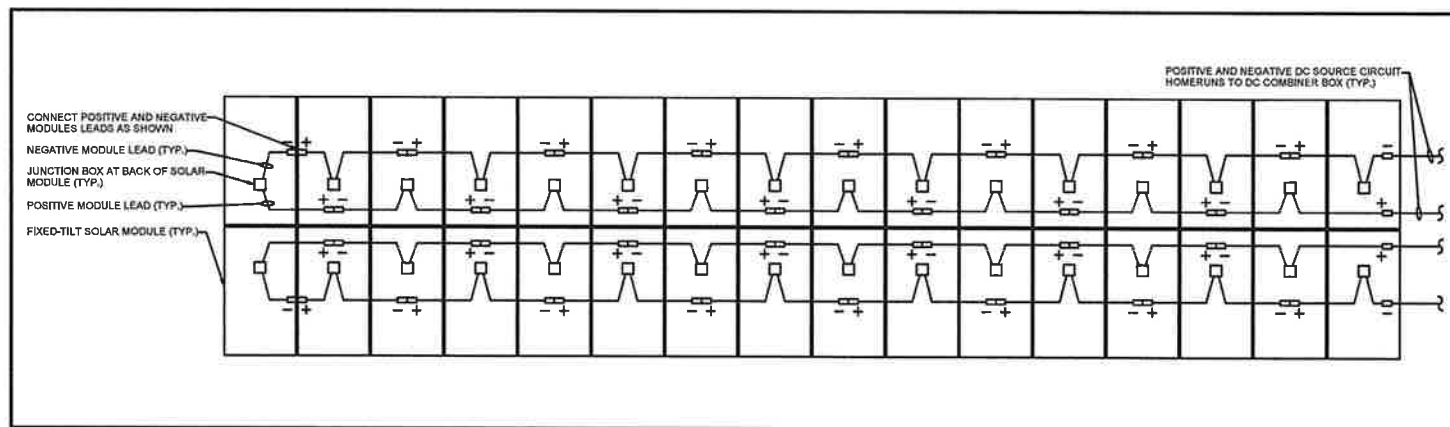


2 DC SOURCE CIRCUIT EXITING ARRAY

NOT TO SCALE

NOTES:

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

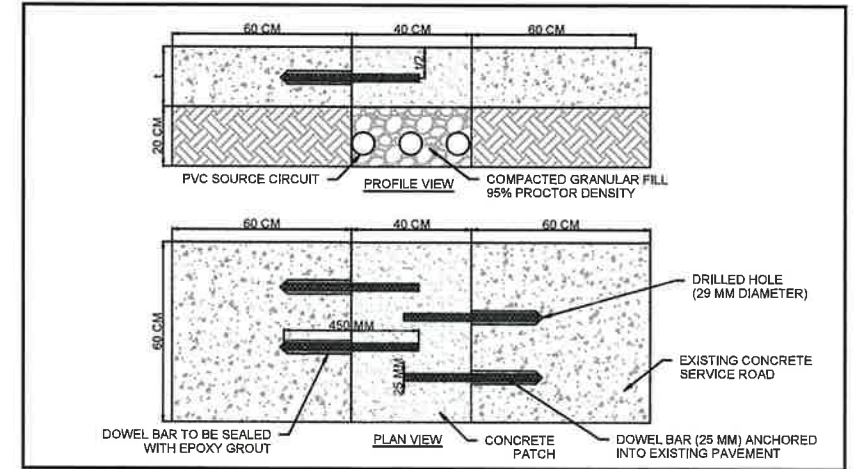


1 DC SOURCE CIRCUITING DETAIL

SCALE: NOT TO SCALE

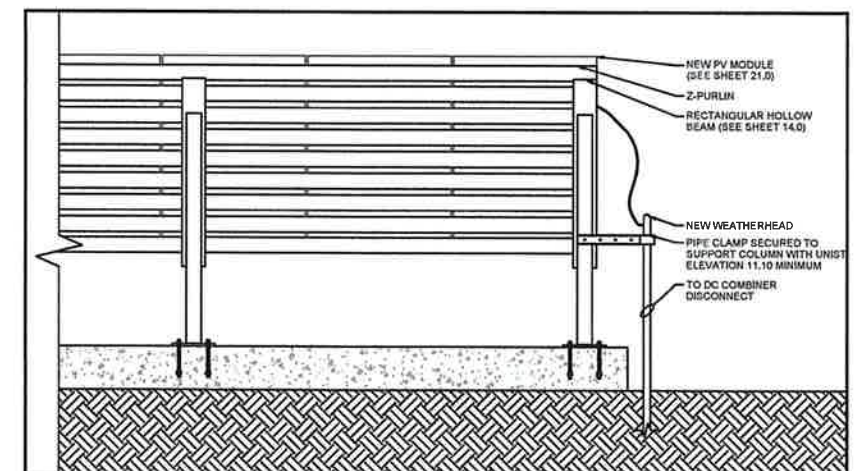
NOTES:

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



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.





**GRUNDFOS SOLAR WATER SOLUTIONS**

## Increasing capacity for SOLAR WATER SOLUTIONS with RSI

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

The RSI is incredibly easy to setup and install, and pairs easily with 10 submersible pumps as well as a broad range of Grundfos pumps, creating a modular system which allows maximum component flexibility.

**Weatherproof for outdoor installation**  
With an IP66 enclosure rating, the RSI is resistant to rain, dust and sand, meaning there is no requirement for a weather-proof cabinet with ventilation and air flow. The RSI can handle ambient temperatures up to 50 °C. In addition to substantial cost savings for installation, placing the solar inverter beneath the solar panel array means only a very short DC cable is required, and this is an extremely important safety advantage for users and personnel.

**Continuous system optimisation**  
Adaptive MPPT software continuously optimises 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 oscillation due to rapid cloud movement.

**Quick setup with Grundfos pump motors**  
The quick setup Wizard guides the RSI quickly with a broad range of Grundfos pumps. With a built-in Grundfos motor library all that is required is confirmation of motor type and pre-set values, 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 RSI in the workshop prior to a plug-and-pump installation on site.

**AC/DC compatibility**  
The pump controls the solar inverter to ensure power is generated 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 switchable 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 an investment that pays for itself.  
The technology has an 18-year warranty and can be used for many years. The primary fuel is sunlight, which is free. The solar energy solution is a solar water pump. With a solar water pump, the solar energy solution is a solar water pump. The cost of the solar water pump is a solar water pump. The cost of the solar water pump is a solar water pump.

**GRUNDFOS**

be think innovate

## Use with Grundfos pumps up to 37 kW

The RSI is designed to work with a broad range of submersible and surface pumps. A solar energy water supply system with a solar inverter can be a Grundfos pump up to 37 kW in size.

The RSI is available in two models:

Power (P2)	DC Input (V)	AC Output (V)
2.2 to 37 kW	Max. 800 VDC	3 x 380-415 V
3.5 to 15 kW	Max. 400 VDC	3 x 208-240 V

**Correct wiring of your solar energy water supply system**  
Getting pump wiring right is important and should always start with the specific application and a focus on the entire system. Taking into consideration the seasonal, climate and geographical fluctuations, or the availability of solar energy is also necessary.  
For this reason, you need to look to Grundfos to ensure correct wiring of your solar energy water supply system and use our wiring tree available on Grundfos Product Center.

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

- Grundfos pump 50/60 Hz
- RSI solar inverter
- Solar panel
- Surge protection
- Dry running sensor

**Technical specifications**

Category	Parameter	3 x 380-415 V	3 x 208-240 V
Installation	Min. ambient temperature	-30 °C	-30 °C
	Max. ambient temperature	60 °C	60 °C
	Max. relative humidity	100 %	100 %
	Min. wind speed	420 VDC	230 VDC
Electrical Data	Max. input voltage	800 VDC	400 VDC
	Max. input current	3.5 A	3.5 A
	Max. frequency	60 Hz	60 Hz
	Output phase	3 Phase	3 Phase
Enclosure class	Output, rated voltage	415 VAC	240 VAC
	Enclosure class	IP66	IP66

Power (P2) kW	Product Model		Rated Output Current, Amp	
	3 x 380-415 V	3 x 208-240 V	3 x 380-415 V	3 x 208-240 V
2.2	99044148	99044149	8	11
3.5	99044150	99044151	12	17
5.5	99044152	99044153	18	25
11	99044154	99044155	36	50
15	99044156	99044157	48	66
22	99044158	99044159	72	100
30	99044160	99044161	96	132
37	99044162	99044163	120	165

**GRUNDFOS**

**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 14301 (AISI 304), EN 14401 (AISI 316), EN 14539 (AISI 904L). Typical application: Ground water, Irrigation, Mining, Fountain, Off-shore etc.

Conditions of Service	Pump Data	Motor Data
Flow: 24 l/s Head: 45 m Efficiency: 58.5 % Liquid: Water Temperature: 15 °C NPSH required: 6.06 m Viscosity: _____ Specific Gravity: _____	Product number: On request	Rated power - P2: 15 kW Rated voltage: 440-480-480 V Main frequency: 60 Hz Enclosure class: IP68 Isolation class: F Motor protection: NONE Thermal protection: external Motor type: M55000

**Product photo (not part of the actual product)**

**Performance curves**

Head (m) vs. Flow (l/s) and Power (kW) vs. Flow (l/s) curves for the 385S200-3-A pump. The head curve shows a maximum head of 45 m at 0 l/s flow. The power curve shows a maximum power of 15 kW at 24 l/s flow.

**GRUNDFOS**

## Submittal Data

**Materials:**  
 Pump: Stainless steel  
 EN 14301  
 AISI 304  
 Impeller: Stainless steel  
 EN 14301  
 AISI 304  
 Motor: Stainless steel  
 DIN W-Nr. 1.4301  
 AISI 304

**Dimensions**

Overall height: 179 mm  
 Overall width: 179 mm  
 Overall depth: 179 mm

### GRUNDFOS INVERTER EQUIPMENT SPECIFICATION SHEET SCALE= NTS

### GRUNDFOS SUBMERSIBLE PUMP EQUIPMENT SPECIFICATION SHEET SCALE= NTS



CHARPENTIER SOLAR PUMP STATION  
QUICK IMPACT PROJECT  
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EQUIPMENT SPEC SHEETS

DRAWING NO.	NAME	DATE
21.0	18025.16.06	3/04/19
DESIGNED BY:	PS	3/04/19
DRAWN BY:	PS	3/04/19
CHECKED BY:	RUM	4/25/2019
APPROVED BY:	RUM	4/25/2019

