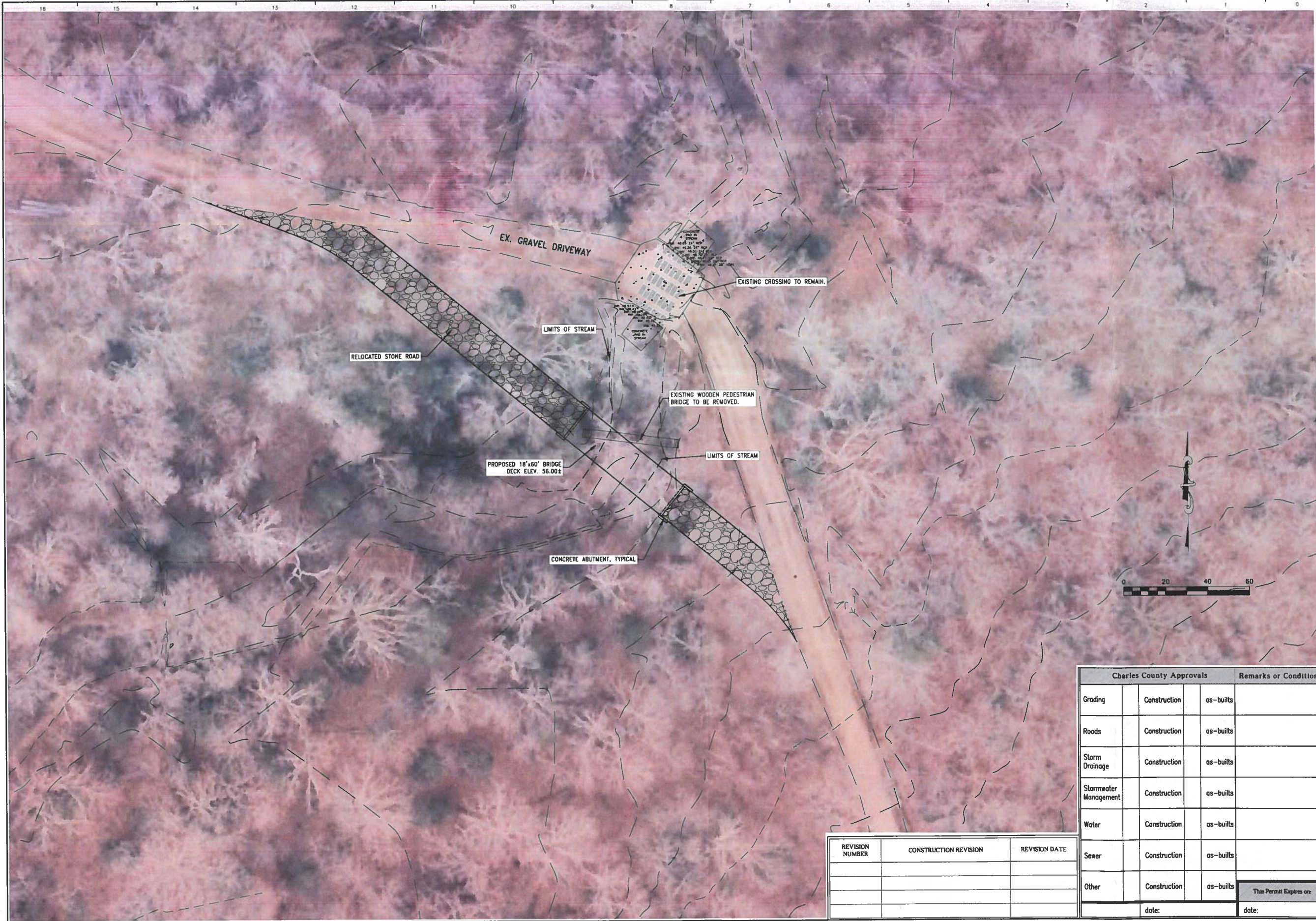


**APPENDIX IV**  
**FEMA FLOOD INSURANCE MAP**

5'000-18-0003

P:\Mail and Bauer Solutions\2390N001 Shugart Valley Place Charles County MD Solar Design\STREAM CROSSING BRIDGE.dwg Sep 11, 2018 - 10:13am hsz



REVISION NUMBER	CONSTRUCTION REVISION	REVISION DATE

Charles County Approvals			Remarks or Conditions
Grading	Construction	as-builts	
Roads	Construction	as-builts	
Storm Drainage	Construction	as-builts	
Stormwater Management	Construction	as-builts	
Water	Construction	as-builts	
Sewer	Construction	as-builts	
Other	Construction	as-builts	
date:			This Permit Expires on: date:

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 31100, Expiration Date 01/31/19.

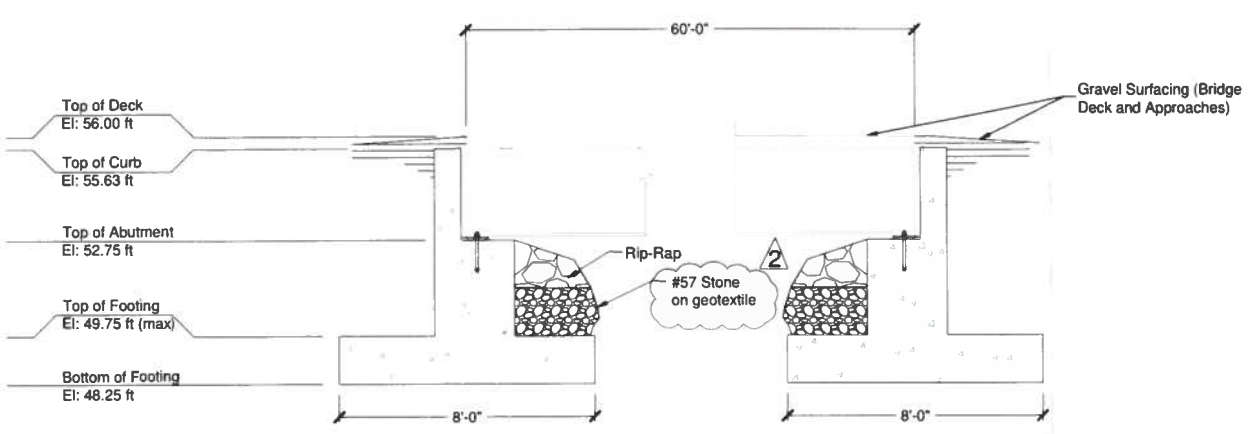
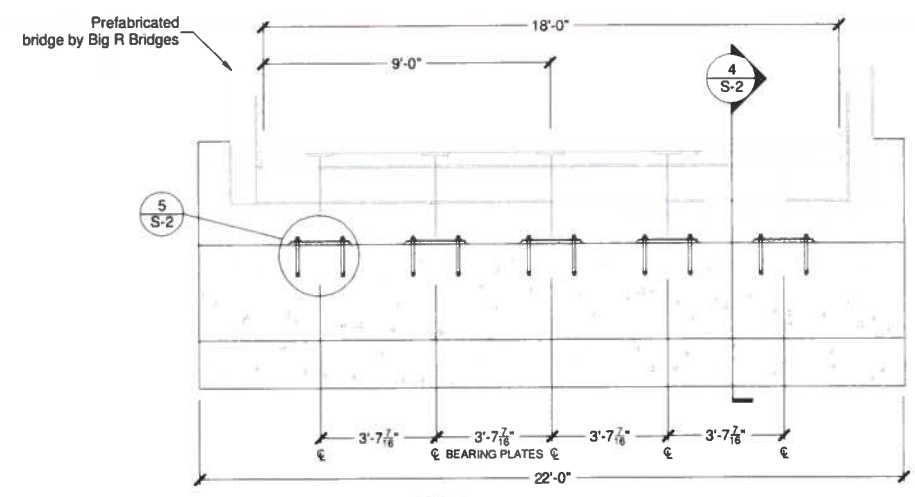
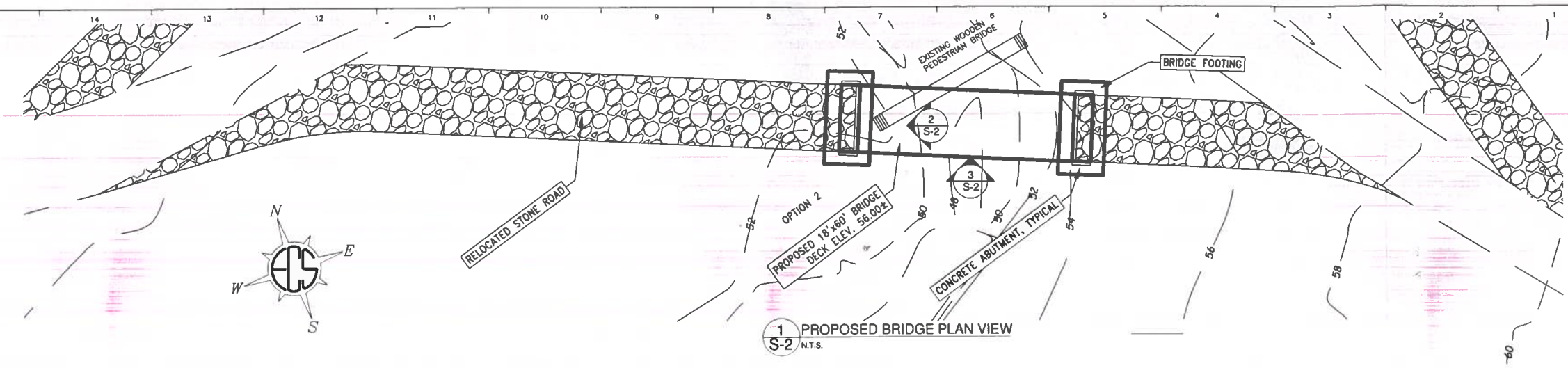
**DAVIS, BOWEN & FRIEDEL, INC.**  
ARCHITECTS ENGINEERS SURVEYORS  
BALTIMORE, MARYLAND (LIC) 843-9881  
ANNAPOLIS, MARYLAND (LIC) 276-1744  
GAITHERSBURG, MARYLAND (LIC) 276-1744

**BRIDGE SITE PLAN**

**SHUGART VALLEY PLACE SOLAR**  
MD SOLAR 1, LLC  
CHARLES COUNTY, MARYLAND  
SECOND ELECTION DISTRICT  
TAX MAP 41, GRID 11, PARCEL NUMBER 24

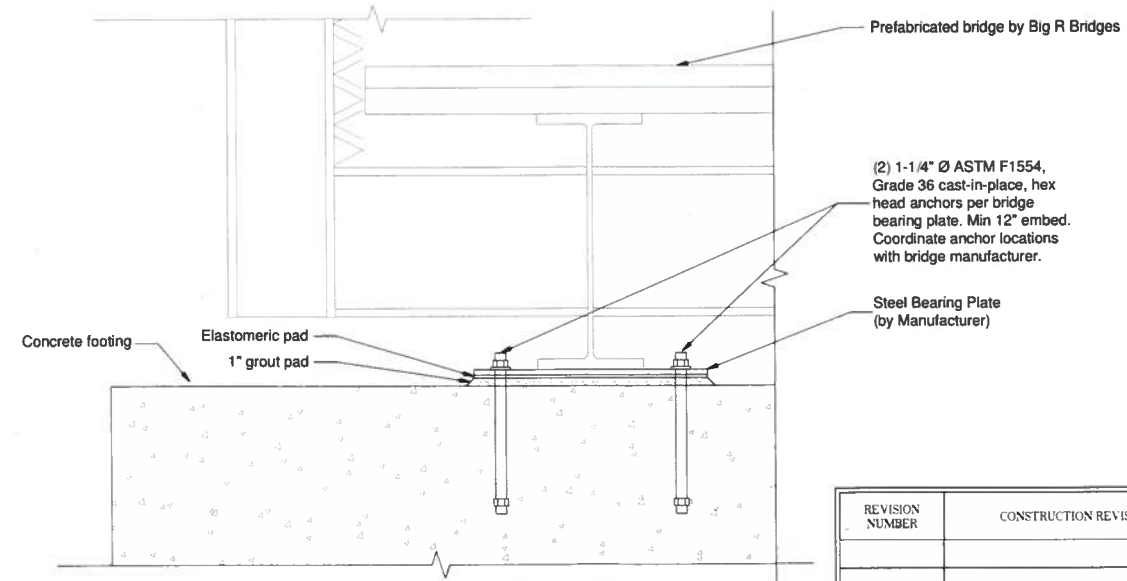
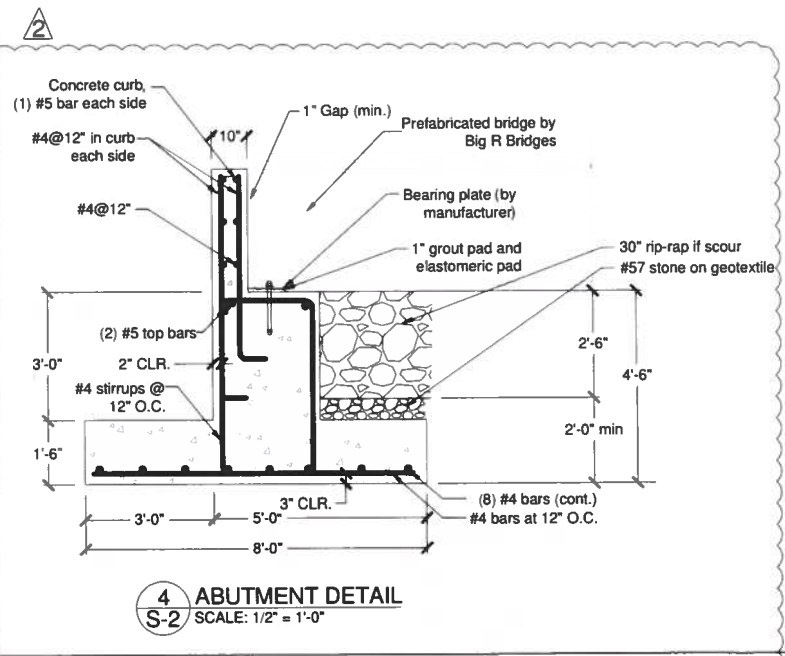
Revisions:

Date: **AUGUST 2018**  
Scale: **1"=20'**  
Drawn By: **RJL**  
Proj No.: **2390N001**  
Dwg No.: **2**



**BRIDGE FOOTING PROFILES AND ELEVATIONS**  
SCALE: 3/8" = 1'-0"

- Notes  
 1) Foundation sized based on assumed loading.  
 2) See Civil drawings for additional information.  
 3) If dimensional discrepancies with Civil drawings exist, the Civil drawings govern.



REVISION NUMBER	CONSTRUCTION REVISION	REVISION DATE

Charles County Approvals			Remarks or Conditions
Grading	Construction	as-builts	
Roads	Construction	as-builts	
Storm Drainage	Construction	as-builts	
Stormwater Management	Construction	as-builts	
Water	Construction	as-builts	
Sewer	Construction	as-builts	
Other	Construction	as-builts	
date:			date:



ECS MID-ATLANTIC, LLC  
 14026 Thunderbolt Place  
 Suite 100  
 Chantilly, VA 20151  
 703-471-8400  
 (FAX) 703-834-5527

ARCHITECTS ENGINEERS  
 SALISBURY, MARYLAND  
 BALTIMORE, DELAWARE  
 COLTON, MARYLAND  
 (410) 343-9001  
 (301) 424-1441  
 (301) 424-1441  
 (410) 770-1044

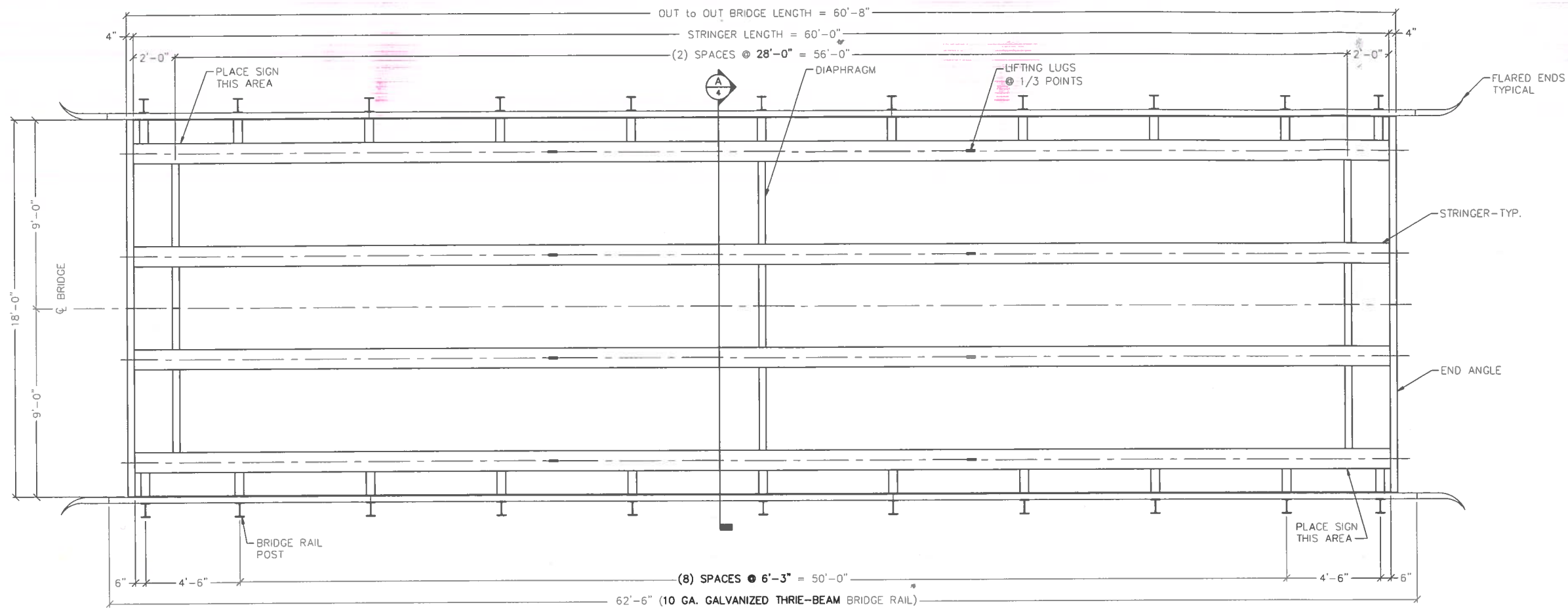
**SHUGART VALLEY PLACE SOLAR**  
**MD SOLAR 1, LLC**  
**CHARLES COUNTY, MARYLAND**  
**SECOND ELECTION DISTRICT**  
**TAX MAP 41, GRID 11, PARCEL NUMBER 24**

ECS Revisions:  
 AUGUST 16, 2018  
 AUGUST 17, 2018

Date: **SEPTEMBER 2018**  
 Scale:  
 Dwn. By: **J. CAMPOS**  
 Proj. No.: **46:4287**  
 Dwg. No.:

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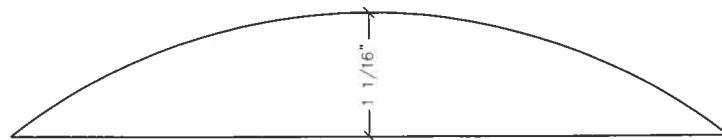
C000-18-CSA # W01d



FRAMING PLAN

NOTE:  
ALL LONGITUDINAL DIMENSIONS  
MEASURED ALONG GRADE.

MEMBERS	DESCRIPTION
STRINGER	W 33
STEEL BRIDGE DECK	4 1/4" x 12" x 7 GA. GALV.
DIAPHRAGM	W 18
POST BLOCK	W 14
SIDE DAM	R 1/4"
CENTER SPLICE PLATE	R 1/4"
END ANGLE	L 4x4



CAMBER DETAIL

REVISION NUMBER	CONSTRUCTION REVISION	REVISION DATE

Charles County Approvals			Remarks or Conditions
Grading	Construction	as-builts	
Roads	Construction	as-builts	
Storm Drainage	Construction	as-builts	
Stormwater Management	Construction	as-builts	
Water	Construction	as-builts	
Sewer	Construction	as-builts	
Other	Construction	as-builts	
date:			This Permit Expires on: date:

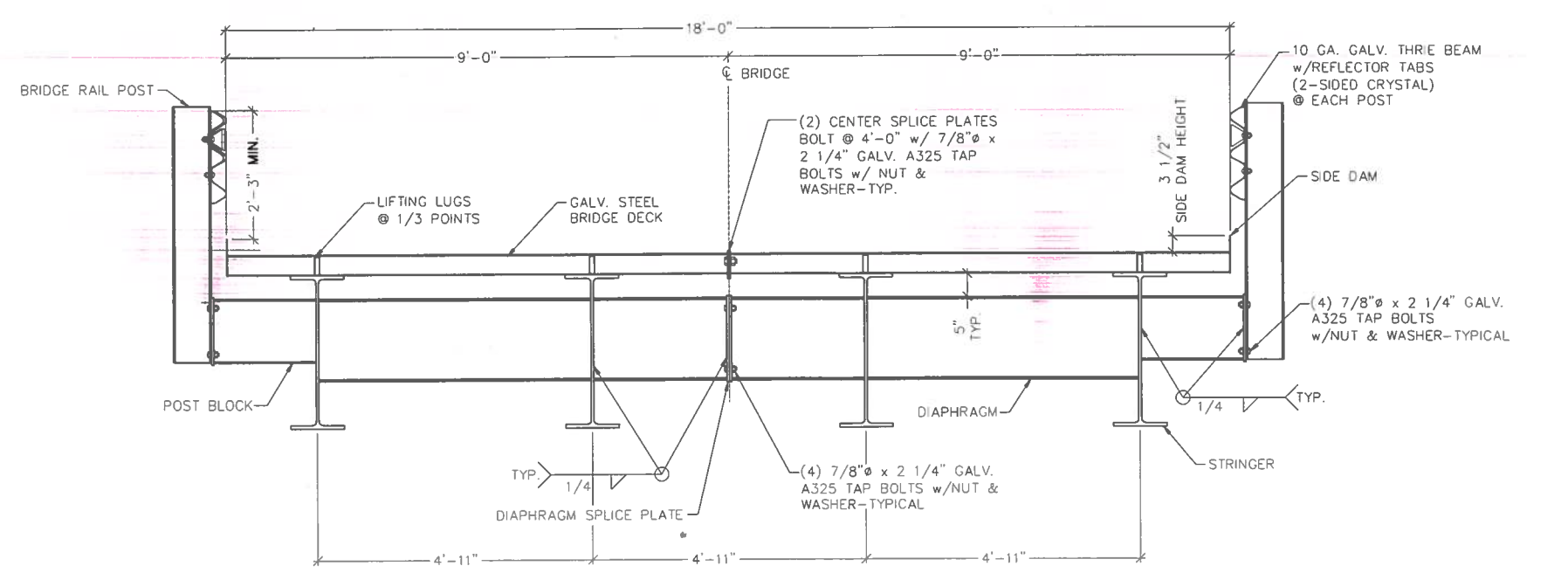
**SHUGART VALLEY PLACE SOLAR**  
**MD SOLAR 1, LLC**  
**CHARLES COUNTY, MARYLAND**  
**SECOND ELECTION DISTRICT**  
**TAX MAP 41, GRID 11, PARCEL NUMBER 24**

**DAVIS, BOWEN & FRIEDEL, INC.**  
**ARCHITECTS ENGINEERS SURVEYORS**  
 SALESVILLE, MARYLAND  
 (410) 843-0001  
 (410) 294-1444  
 (410) 294-1444  
 (410) 775-1444

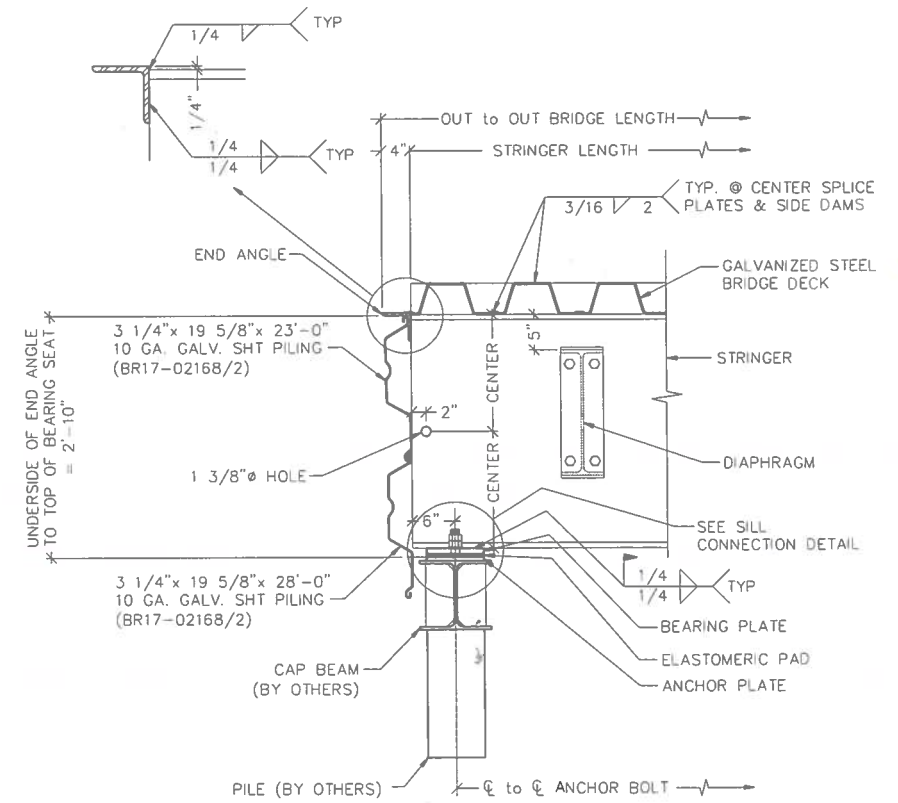
Date: **AUGUST 2018**  
 Scale: **3/8"=1'**  
 Drawn By: **RJL**  
 Proj No.: **2390N001**  
 Dwg No.: **3**

P:\H&B and Beam Solutions\2390N001 Shugart Valley Place Charles County MD1 Solar Design\2018-07-18-07-18 Preliminary Drawing - Shugart Valley Bridge (07-13-2018) dwg Sep 11, 2018 - 10:07 am lbc

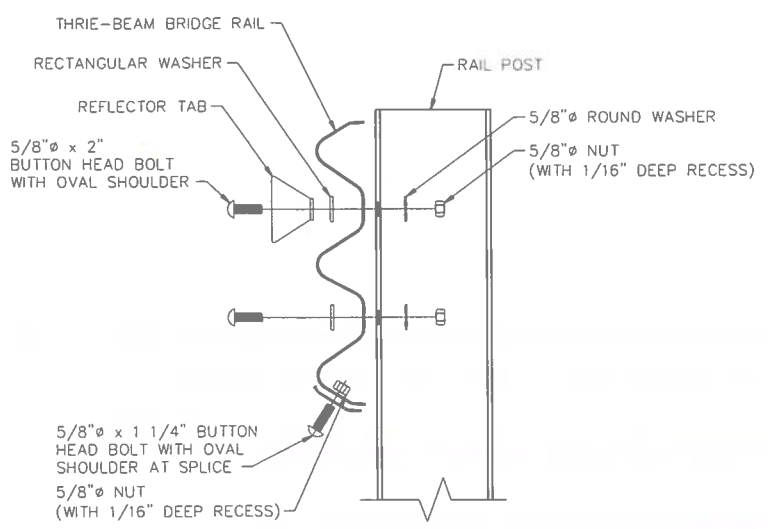
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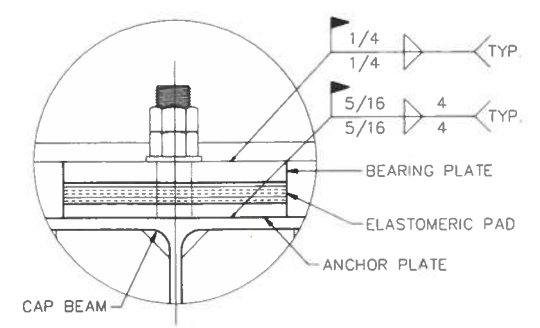
SECTION A  
3



BEARING DETAIL



THREE-BEAM RAIL ATTACHMENT DETAIL  
(W 8x18 POSTS)



SILL CONNECTION DETAIL

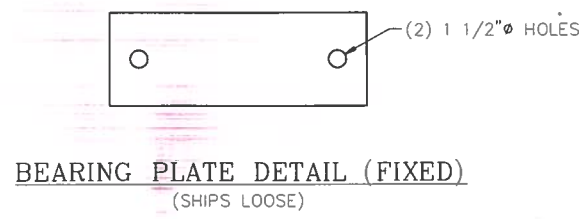
REVISION NUMBER	CONSTRUCTION REVISION	REVISION DATE

Charles County Approvals		Remarks or Conditions
Grading	Construction	as-builts
Roads	Construction	as-builts
Storm Drainage	Construction	as-builts
Stormwater Management	Construction	as-builts
Water	Construction	as-builts
Sewer	Construction	as-builts
Other	Construction	as-builts
date:		This Permit Expires on: date:

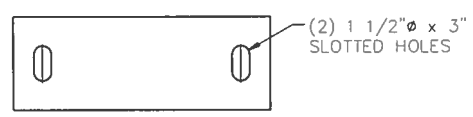
**SHUGART VALLEY PLACE SOLAR**  
**MD SOLAR 1, LLC**  
 CHARLES COUNTY, MARYLAND  
 SECOND ELECTION DISTRICT  
 TAX MAP 41, GRID 11, PARCEL NUMBER 24

Date: **AUGUST 2018**  
 Scale: **AS SHOWN**  
 Drawn By: **RJL**  
 Proj. No: **2390N001**  
 Dwg. No: **4**

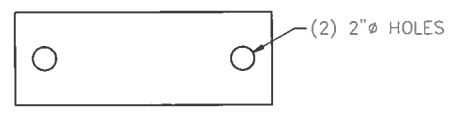
**DAVIS, BOWEN & FRIEDEL, INC.**  
 ARCHITECTS, ENGINEERS, SURVEYORS  
 1000 W. WASHINGTON ST.  
 ANNAPOLIS, MD 21401  
 (410) 291-1111  
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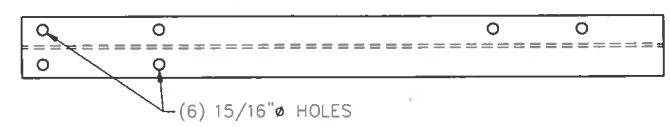
**BEARING PLATE DETAIL (FIXED)**  
(SHIPS LOOSE)



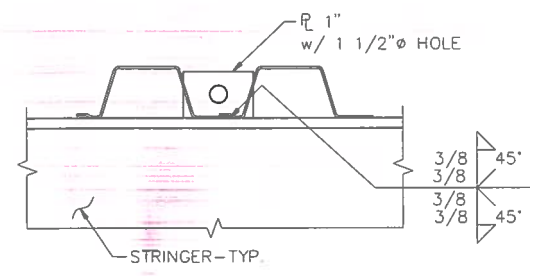
**BEARING PLATE DETAIL (EXPANSION)**  
(SHIPS LOOSE)



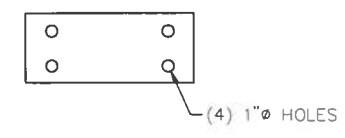
**ELASTOMERIC PAD DETAIL**  
(SHIPS LOOSE)



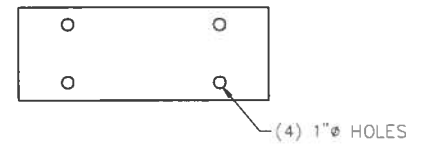
**BRIDGE RAIL POST DETAIL**  
(SHIPS LOOSE)



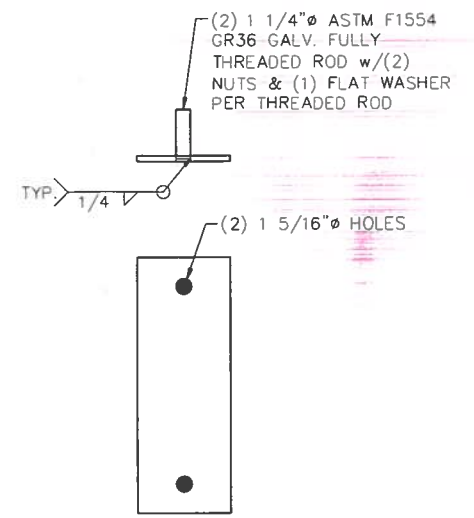
MAX. 24,000 # @ 45° LIFT ANGLE  
**LIFTING LUG DETAIL**



**POST BLOCK PLATE DETAIL**



**DIAPHRAGM PLATE DETAIL**



**ANCHOR PLATE**  
(SHIPS LOOSE)

REVISION NUMBER	CONSTRUCTION REVISION	REVISION DATE

Charles County Approvals			Remarks or Conditions
Grading	Construction	as-builts	
Roads	Construction	as-builts	
Storm Drainage	Construction	as-builts	
Stormwater Management	Construction	as-builts	
Water	Construction	as-builts	
Sewer	Construction	as-builts	
Other	Construction	as-builts	
date:			This Permit Expires on: date:

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License No. 31102 - Expiration Date 01/21/19

**DAVIS, BOWEN & FRIEDEL, INC.**

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**SHUGART VALLEY PLACE SOLAR**  
**MD SOLAR 1, LLC**  
 CHARLES COUNTY, MARYLAND  
 SECOND ELECTION DISTRICT  
 TAX MAP 41, GRID 11, PARCEL NUMBER 24

BRIDGE DETAILS

Date: AUGUST 2018  
 Scale: AS SHOWN  
 Dwn. By: RJL  
 Proj. No: 2390N001  
 Dwg. No: **5**

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PGM # VSC 18-0003

Structural Notes:

- General**
- The bridge foundations have been designed in compliance with the 2015 Maryland Building Performance Standards and the 2015 International Building Code (IBC).
  - Bridge Foundation has been designed using the following bridge reactions provided by the bridge manufacturer (AASHTO LFRD Bridge Design Specifications, 7th Edition 2014):
 

Dead Load (Bridge)	26.39 kips
Dead Load (Wear Surface)	43.20 kips
Vehicle and Dynamic Live Load	99.68 kips
Wind Load (Horizontal)	5.11 kips
Wind Load (Uplift)	-10.80 kips
Thermal Load	12.02 kips
Seismic Load	8.03 kips
- Seismic**
- Risk Category I  
 Importance Factor 1.00  
 Design Category D  
 Ss= 0.123g S1= 0.052g  
 Sds= 0.131g Sd1= 0.083g
- Do not scale from drawings. Refer to Civil plans for road plan and elevations.
  - Means and methods of construction are to be determined by General Contractor.
  - General Contractor is to verify field conditions and dimensions prior to commencing work.
  - Shop drawings are to be submitted to the Owner/Engineering prior to commencing work.

- Foundations**
- Foundations elements are to be shallow concrete foundations as per the ECS Geotechnical Report dated August 16, 2018.
  - Soils shall have a minimum bearing capacity of 2000psf.
  - Soft, organic, or unsuitable soils shall be removed from the area of the foundations.
  - Rip-rap to provide armor against scour at the footing is needed unless a study of scour is performed (by others) and provides other recommendations. Minimum armor is to be 30 inches of rip-rap on top of 6 inches of #57 on a rip-rap geotextile.

- Soil Fill Material**
- All fills should consist of an approved material, free of organic matter, debris and cobbles greater than 4-inches, and have a Liquid Limit (LL) and Plasticity Index (PI) less than 40 and 20, respectively.
  - Unacceptable fill materials include topsoil and organic material (OH, OL), and high plasticity silts and clays (CH, MH). Under no circumstances shall high plasticity soils be used as fill material in proposed structural areas or close to site slopes.
  - The near surface on-site materials classifying as (SC, SM) and (CL) may be reused as fill materials; however, they will likely require moisture content adjustment to comply with the LL and PI requirements.
  - Fill materials should be placed in lifts not to exceed 8 inches in loose thickness and moisture conditioned to within +/- 2% of the optimum moisture content. Controlled fill soils should be compacted to a minimum of 95% of the maximum dry density obtained in accordance with ASTM D1557. A minimum of one compaction test per 2,500 square foot area should be tested in each lift placed.
  - Fill materials should not be placed on frozen soils or frost-heaved soils and/or soils which have been recently subjected to precipitation. All frozen and frost-heaved materials should be removed prior to continuation of fill operations.

- Concrete**
- Concrete shall have a natural sand fine aggregate and normal weight coarse aggregate conforming to ASTM-C150, and shall have a minimum compressive strength of 4,000 psi at 28 days with 6% ±1% air entrainment.
  - Concrete shall achieve a minimum compressive strength of 3,000 psi prior to placement of the prefabricated bridge.
  - Unless submitted and approved otherwise, ASTM C150, Type I cement shall be used.
  - Concrete shall be air-entrained as specified above and shall have a slump of 5" ± 1". Concrete shall be placed with a maximum batch-to-placement time of 90 minutes and an ambient temperature range of 55 to 90 degrees Fahrenheit. Vibrate concrete in accordance with ACI-C309.
  - Materials used for forming shall be straight, smooth, and - where possible from a constructibility standpoint - be continuous with the number of provided joints and seams minimized.

- Reinforcement:**
- Reinforcing bars shall conform to ASTM-A615, Grade 60 (unless welding of rebar is required/ anticipated - whereby ASTM-A706, Grade 60 is required). Reinforcing bars shall not be tack welded, welded, heated, or cut without prior approval by ECS.
  - Horizontal reinforcing shall be continuous around corners (or "bends") and shall be properly lap spliced as indicated on the drawings. Lap splice lengths are to be 48BD, where BD denotes bar diameter.
  - Detailing of concrete reinforcing bars and accessories shall conform to the recommendations of ACI 315, "Details and Detailing of Concrete Reinforcement" and ACI SP-66, "Detailing Manual". Placing of reinforcing bars shall conform to the recommendations of ACI 315R, "Manual of Engineering and Placing Drawings for Reinforced Concrete Structures" and CRSI, "Manual of Standard Practice".

- Additional Notes:**
- Owner shall retain the services of independent agencies to perform inspections of the following items in accordance with Chapter 17 of IBC 2015: Engineered Fills, Soils, Concrete and Structural Steel. As construction proceeds, provide copies of field reports to the design team.
  - General Contractor to provide shop drawings for the following: concrete mix design, anchor bolt layout, rebar and bearing plate design. Provide electronic copies for review and approval.

REQUIRED VERIFICATION AND INSPECTION OF CONCRETE CONSTRUCTION IBC 2012 (TABLE 1705.3)

VERIFICATION AND INSPECTION	C	P	REF. STANDARD	IBC REFERENCE	COMMENTS	REQ. ON PROJ.
1. INSPECTION OF REINFORCING STEEL INCLUDING PRESTRESSING TENDON AND PLACEMENT.	-	X	ACI 318: 3.5, 7.1-7.7	1910.4	PRIOR TO STARTING POURS WHERE CONCRETE IS TO BE SAMPLED	Y
2. INSPECTION OF REINFORCING STEEL WELDING IN ACCORDANCE WITH TABLE 1705.2.2, ITEM 2B	X	-	AWS D1.4, ACI 318: 3.5.2	-	PRIOR TO ENCLOSING	N
3. INSPECTION OF ANCHORS CAST IN CONCRETE WHERE ALLOWABLE LOADS HAVE BEEN INCREASED OR WHERE STRENGTH DESIGN IS USED.	X	-	ACI 318: 8.1.3, 21.2.8	1908.5, 1909.1		Y
4. INSPECTION OF ANCHORS POST INSTALLED IN HARDENED CONCRETE MEMBERS.	X	-	ACI 318: 3.8.6, 8.1.3, 21.2.8	1909.1	WHEN INSTALLED	Y
5. VERIFYING USE OF REQUIRED DESIGN MIX.	-	X	ACI 318: CH 4, 5.2-5.4	1904.2, 1910.2, 1910.3	EACH TIME FRESH CONCRETE IS SAMPLED	Y
6. AT THE TIME FRESH CONCRETE IS SAMPLED TO FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE.	X	-	ASTM C 172, ASTM C 31, ACI 318: 5.6, 5.8	1910.10	EACH TIME CONCRETE CYLINDERS TAKEN	Y
7. INSPECTION OF CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES	X	-	ACI 318: 5.9, 5.10	1910.6, 1910.7, 1910.8	EACH TIME FRESH CONCRETE IS SAMPLED	Y
8. INSPECTION FOR MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES.	-	X	ACI 318: 5.11-5.13	1910.9	(1) UNANNOUNCED INSPECTION FOR EVERY 250 CY. OF CONC PLACED FOR ENTIRE PROJ	Y
9. THE INSPECTION OF PRESTRESSED CONCRETE	X	-				
a. APPLICATION OF PRESTRESSING FORCE.	X	-				
b. GROUTING ON BONDED PRESTRESSING TENDONS IN THE SEISMIC-RESISTING SYSTEM.	X	-	ACI 318: 18.20, 18.18.4			N
10. ERECTION OF PRECAST CONCRETE MEMBERS	-	X	ACI 318: CH. 16		PRIOR TO ENCLOSING	N
11. VERIFICATION OF IN-SITU CONCRETE STRENGTH, PRIOR TO STRESSING OF TENDONS IN POST TENSIONED CONCRETE & PRIOR TO REMOVAL OF SHORES & FORMS FROM BEAMS & STRUCTURAL SLABS.	-	X	ACI 318: 6.2			N
12. INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED.	-	X	ACI 318: 6.1.1			Y

C = CONTINUOUS  
P = PERIODIC

REQUIRED VERIFICATION AND INSPECTION OF SOILS IBC 2012 (TABLE 1705.6)

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	REQ. ON PROJECT
1. VERIFY MATERIALS BELOW SHALLOW FOUNDATIONS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY	-	X	Y
2. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL	-	X	Y
3. PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS	-	X	Y
4. VERIFY USE OF PROPER MATERIALS, DENSITIES AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL	X	-	Y
5. PRIOR TO PLACEMENT OF COMPACTED FILL, OBSERVE SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY	-	X	Y

REQUIRED VERIFICATION AND INSPECTION OF STEEL CONSTRUCTION IBC 2012 (TABLE 1705.2.2)

VERIFICATION AND INSPECTION	C	P	REF. STANDARD	IBC REFERENCE	COMMENTS	REQ. ON PROJECT
1. MATERIAL VERIFICATION OF COLD-FORMED STEEL DECK:						
a. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS	-	X	APPLICABLE ASTM MATERIAL STANDARDS			N
b. MANUFACTURER'S CERTIFIED TEST REPORTS	-	X				N
2. INSPECTION OF WELDING:						
a. COLD FORMED STEEL DECK						
1. FLOOR AND DECK WELDS	-	X	AWS D1.3			N
b. REINFORCING STEEL						
1. VERIFICATION OF WELDABILITY OF REINFORCING STEEL OTHER THAN ASTM A 706	-	X				N
2. REINFORCING STEEL RESISTING FLEXURAL AND AXIAL FORCES IN INTERMEDIATE AND SPECIAL MOMENT FRAMES, AND BOUNDARY ELEMENTS OF SPECIAL STRUCTURAL WALLS OF CONCRETE AND SHEAR REINFORCEMENT	X	-	AWS D1.4, ACI 318: SEC. 3.5.2			N
3. SHEAR REINFORCEMENT	X	-				Y
4. OTHER REINFORCING STEEL	-	X				N

C = CONTINUOUS  
P = PERIODIC

NOTE: SPECIAL INSPECTION FOR STRUCTURAL STEEL SHALL BE ACCORDANCE WITH THE QUALITY ASSURANCE INSPECTION REQUIREMENTS OF AISC 360

REVISION NUMBER	CONSTRUCTION REVISION	REVISION DATE

Charles County Approvals			Remarks or Conditions
Grading	Construction	as-built	
Roads	Construction	as-built	
Storm Drainage	Construction	as-built	
Stormwater Management	Construction	as-built	
Water	Construction	as-built	
Sewer	Construction	as-built	
Other	Construction	as-built	This Permit Expires on date: _____ date: _____

**ECS**

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 (FAX) 703-834-5527

ARCHITECTS ENGINEERS  
 DAVIS, BOWEN & FRIEDEL, INC.

SHUGART VALLEY PLACE SOLAR  
 MD SOLAR 1, LLC  
 CHARLES COUNTY, MARYLAND  
 SECOND ELECTION DISTRICT  
 TAX MAP 41, GRID 11, PARCEL NUMBER 24

ECS Revisions:  
 AUGUST 16, 2018  
 AUGUST 17, 2018

Date: SEPTEMBER 2018  
 Scale: N.T.S.  
 Dwn. By: J. CAMPOS  
 Proj. No.: 46:4287  
 Dwg. No.: 1