Project Information Form

Project Title	Automated Data Collection for Origin/Destination Studies of Freight Movement
University	University of Central Florida
Principal Investigator	Amr A. Oloufa, Ph.D., P.E.
PI Contact Information	Department of Civil, Environmental & Construction Engineering 4000 Central Florida Blvd. Orlando, FL 32816 (407) 823-3592
Funding Source(s) and Amounts Provided (by each agency or organization)	Florida Department of Transportation $150,000.
Total Project Cost	$250,000
Agency ID or Contract Number	DTRT12GUTC12
Start and End Dates	May 2013 - January 2014
Brief Description of Research Project	The collection of reliable Origin/Destination data for freight has profound consequences for a large range of applications in both planning and operations. Indeed, in both research and practice, a large number of applications rely heavily on such data. This project has four major objectives: 1. Assess gantry-mounted cameras and OCR technology for collecting large sets of O/D Data. 2. Develop a database-based system for O/D data archival and analysis. 3. Design and deploy a hardware system for rapid installation in a large number of installation scenarios on highway gantries. 4. Design and deploy a solar-based system for power.

Describe Implementation of Research Outcomes (or why not implemented) (Attach Any Photos)	This project involves 3 different outdoor installations that will supply power to the cameras and computers. Since all installations are located adjacent to I-75, we will require: 1) Approval from Federal Highway Administration (FHWA) to install structures on the right of way of I-75. 2) A construction permit from District 5 of the Florida Department of Transportation. 3) Signed and Sealed drawings for the foundations of the structures that will carry the solar arrays necessary for delivery of electric power. 4) Quotations from general contractors to install the structures supporting the solar panels.
Impacts/Benefits of Implementation (actual, not anticipated)	An inexpensive and automated method for Origin/Destination data collection.
Web Links • Reports • Project website	We will attach a report explaining what was done to date.

Quarterly Progress Report
Technology Deployment for a O-D Study

Submitted By

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August 25th, 2013

Period of Performance: Summer 2013

Solar System Design:

The power requirements were determined from the last reporting period. It was decided to use a Grape Solar (GS-P-280-Fab1) panel for each travel lane. So for location 2 with 4 lanes of traffic, four panels will be used. Specs for the panel are below:

Mechanical Specifications

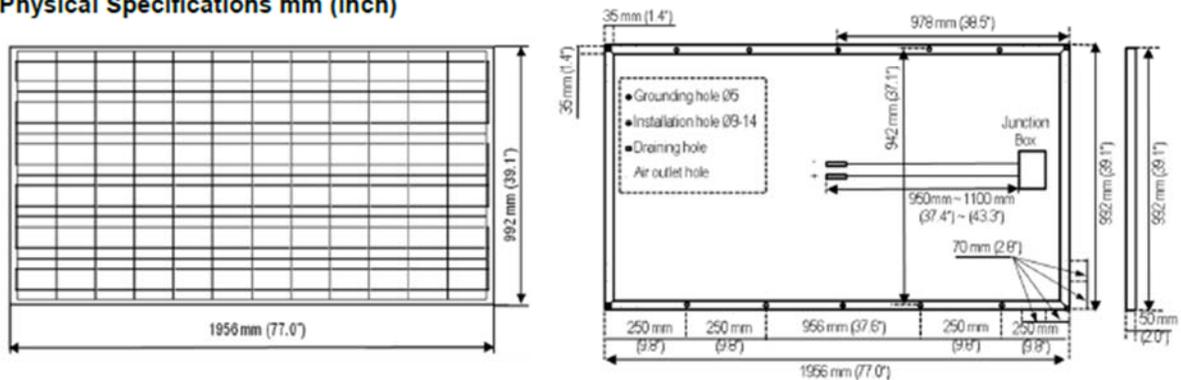| Characteristic	Details
Cell Size	156mm x 156mm (6.14" x 6.14")
Module Dimension (L x W x T)	1956mm x 992mm x 50mm (77.0" x 39.1" x 2.0")
No. of Cells	6 x 12 = 72
Weight	23.2 kg (51.0 lbs)
Cable Length	950mm (37.4") ~ 1100mm (43.3")
Type of Connector	MC-IV
Junction Box	IP65 Rated
No. of Holes in Frame	4 draining holes, 8 installation holes, 2 grounding holes, 16 air outlet holes.

Electrical Specifications
(STC* = 25 °C, 1000W/m² Irradiance, and AM=1.5)

Model	GS-P-280-Fab1
Max System Voltage (IEC/UL)	1000V / 600V
Maximum Power P_{max}	280 W (0%, +3%)
CEC PTC Rating	251.0 W
Voltage at Maximum Power Point V_{mpp}	35.8 V
Current at Maximum Power Point I_{mpp}	7.82 A
Open Circuit Voltage V_{oc}	44.6 V
Short Circuit Current I_{sc}	8.43 A
Module Efficiency (%)	14.5%
Temperature Coefficient of V_{oc}	-0.156 V/°C (-0.35% /°C)
Temperature Coefficient of I_{sc}	5.06×10^{-3} A/°C (0.06% /°C)
Temperature Coefficient of P_{max}	-1.26 W/°C (-0.45% /°C)

*Standard Test Conditions

Physical Specifications mm (inch)

Location Drawings:

The research team was informed that approval from both FHWA and permitting from the Florida DOT will be required before system installation.
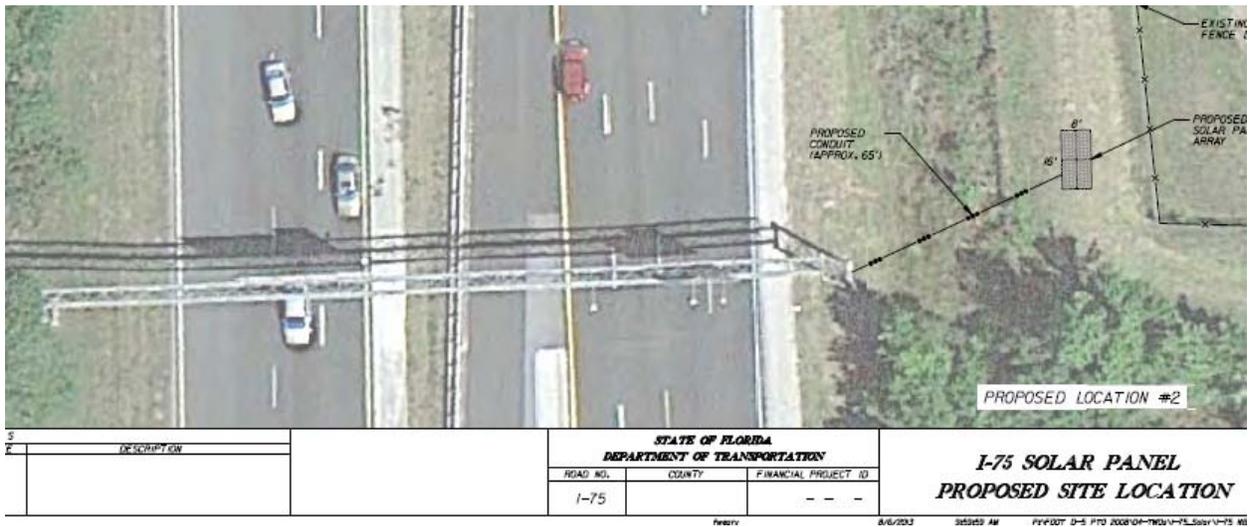
With the leadership and help of our Project Manager, HDR prepared design and location drawings.

The team also shared these results with District Five Structures. Mr. Mark Robinson of the Florida DOT is in charge of contacting FHWA for their approval.

Location drawings provided by HDR are below.

Location 1

Location 2

WARM SPRINGS AVE.

EXISTING FENCE LINE

PROPOSED CONDUIT (APPROX. 50')

PROPOSED SOLAR PANEL ARRAY

SWALE

16'

8'

GUARDRAIL

PROPOSED LOCATION #3

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
I-75		– – –

I-75 SOLAR PANEL
PROPOSED SITE LOCATION

Location 3

<u>Ground Mounting System for Solar Panels</u>:

The research team contacted Haticon Solar who provided system design and specifications for the structure that will carry the solar cells. Overall system architecture is shown below.
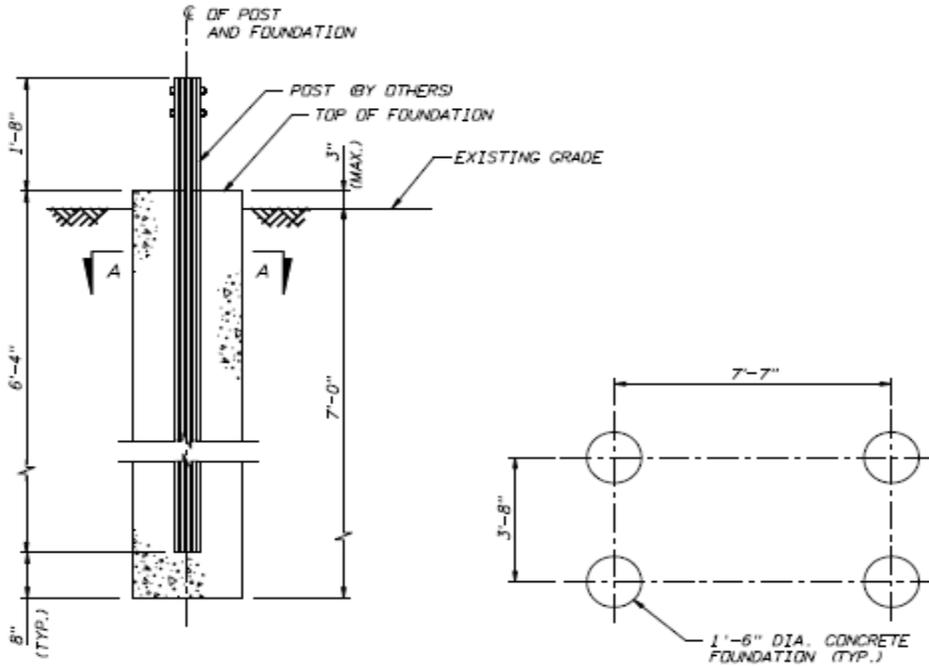

Ground Mount System

- Fixed, two post, structure provides a solid foundation with shallow embedment
- Posts can rammed, set in concrete, or ballast
- Smaller, lighter, posts are easier to transport, handle and install
- Proprietary Bearing Block provides ±35° of tilt and ±8° side to side movement
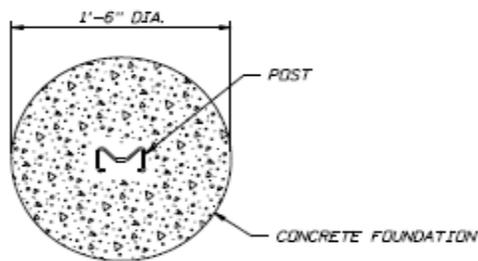- 12 inches of on-site vertical adjustability

Design of Structure Foundations:

With the help of the Project Manager, HDR prepared a design for the foundations that wil carry the solar structure. Sample drawings are below.

CONCRETE FOUNDATION ELEVATION

FOUNDATION LAYOUT

SECTION A-A