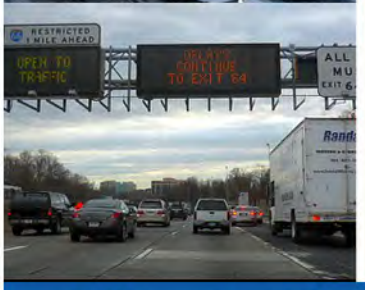

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4.6 Proposed Schedule

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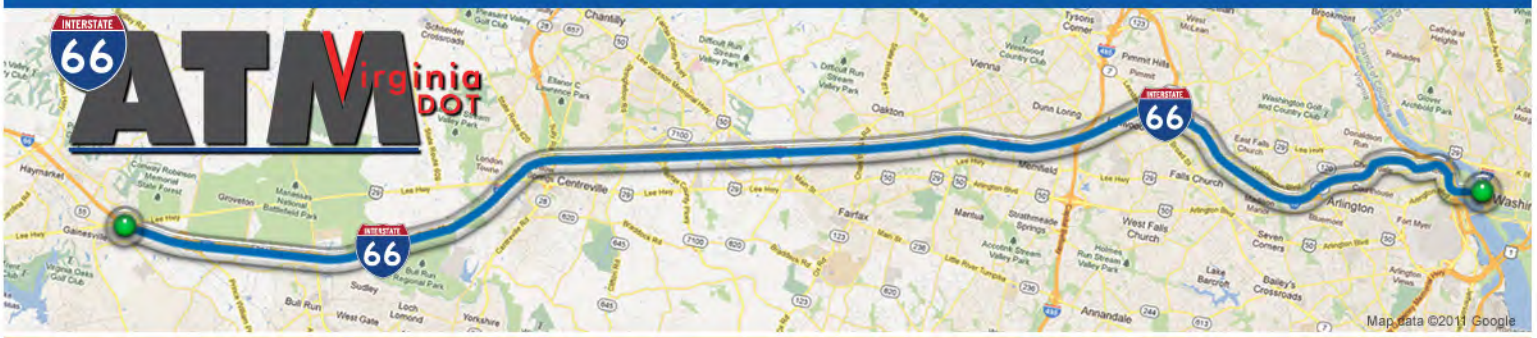

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Technical Proposal

Interstate 66 Active Traffic Management

From: District of Columbia/Virginia Border in Arlington County

To: U.S. 29 (Lee Hwy) in Gainesville, Prince William County

State Project No.: 0066-96A-917, P101, N501

Federal Project No.: IM-5A01 (274)

Contract ID Number: C00098017DB46

Volume I

July 27, 2012

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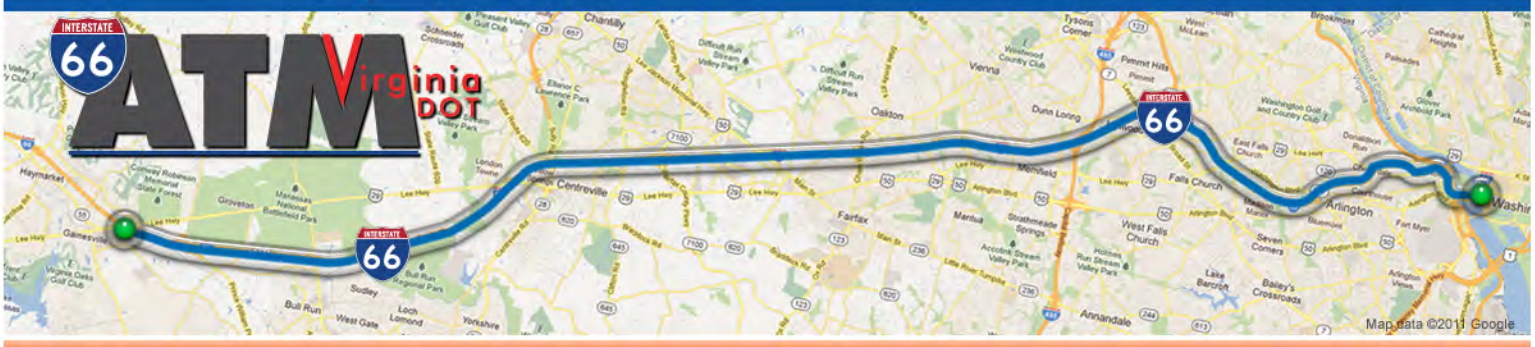

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Forms

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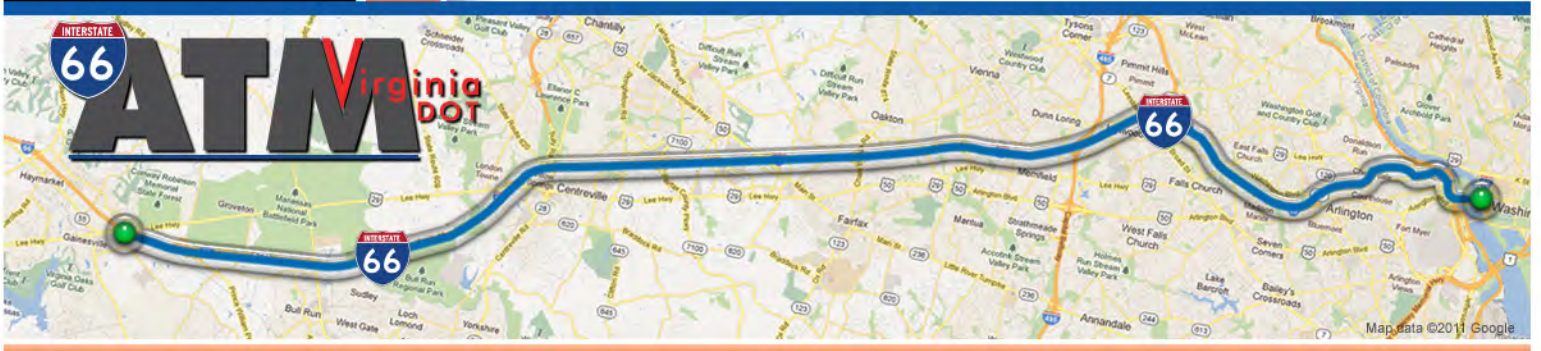


ATTACHMENT 4.0.1.1

I-66 Active Traffic Management

TECHNICAL PROPOSAL CHECKLIST AND CONTENTS

Offerors shall furnish a copy of this Technical Proposal Checklist, including page references, with the Technical Proposal.

Technical Proposal Component	Form (if any)	RFP Part 1 Cross Reference	Included within page limit?	Technical Proposal Page Reference
Technical Proposal Checklist and Contents	Attachment 4.0.1.1	Section 4.0.1.1	no	V.I Forms
Acknowledgement of RFP, Revisions, and/or Addenda	Attachment 3.6 (Form C-78-RFP)	Sections 3.6, 4.0.1.1	no	V.I Forms
Letter of Submittal	NA	Sections 4.1		V.I, Tab 4.1
Letter of Submittal on Offeror's letterhead	NA	Section 4.1.1	yes	V.I-1
Offeror's official representative information	NA	Section 4.1.1	yes	V.I-1
Authorized representative's original signature	NA	Section 4.1.1	yes	V.I-2
Declaration of intent	NA	Section 4.1.2	yes	V.I-2
120 day declaration	NA	Section 4.1.3	yes	V.I-2
Principal Officer information	NA	Section 4.1.4	yes	V.I-2
Proposal Payment Agreement or Waiver of Proposal Payment	Attachment 9.3.1 or 9.3.2	Section 4.1.5	no	V.I Forms
Offeror's Qualifications	NA	Section 4.2		V.I, Tab 4.2
Confirmation that the information provided in the SOQ submittal remains true and accurate or indicates that any requested changes were previously approved by VDOT	NA	Section 4.2.1	yes	V.I-3
Organizational chart with any updates since the SOQ submittal clearly identified	NA	Section 4.2.2	yes	V.I-4

ATTACHMENT 4.0.1.1

I-66 Active Traffic Management

TECHNICAL PROPOSAL CHECKLIST AND CONTENTS

Technical Proposal Component	Form (if any)	RFP Part 1 Cross Reference	Included within page limit?	Technical Proposal Page Reference
Revised narrative when organizational chart includes updates since the SOQ submittal	NA	Section 4.2.2	yes	V.I-4
Design Concept	NA	Section 4.3		V.I, Tab 4.3
Conceptual Project Layout for ITS devices - table and plans	NA	Section 4.3.1	yes	V.II-1 - 8
Structural Design Concept – description and renderings	NA	Section 4.3.2	yes	V.II
Project Approach	NA	Section 4.4		V.I, Tab 4.4
ITS Deployment Management	NA	Section 4.4.1	yes	V.I-13
ITS Operation Continuity	NA	Section 4.4.2	yes	V.I-16
Utilities	NA	Section 4.4.3	yes	V.1-18
Quality Assurance/ Quality Control (QA/QC)	NA	Section 4.4.4	yes	V.1-21
Construction of Project	NA	Section 4.5		V.I, Tab 4.5
Sequence of Construction	NA	Section 4.5.1	yes	V.I-30
Transportation Management Plan	NA	Section 4.5.2	yes	V.I-33
Proposal Schedule	NA	Section 4.6		V.I, Tab 4.6
Detailed Work Plan	NA	Section 4.6.1	no	V.I Section 4.6
Proposal Schedule Narrative	NA	Section 4.6.2	no	V.I-37

ATTACHMENT 4.0.1.1

I-66 Active Traffic Management

TECHNICAL PROPOSAL CHECKLIST AND CONTENTS

Technical Proposal Component	Form (if any)	RFP Part 1 Cross Reference	Included within page limit?	Technical Proposal Page Reference
Proposal Schedule in electronic format (CD-ROM)	NA	Section 4.6	no	Included
Disadvantaged Business Enterprises (DBE)	NA	Section 4.7		V.I, Tab 4.7
Written statement of percent DBE participation	NA	Section 4.7	yes	V.I-44
DBE subcontracting narrative	NA	Section 4.7	yes	V.I-44

ATTACHMENT 3.6

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

RFP NO. C00098017DB46

PROJECT NO.: 0066-96A-917, P101, N501

ACKNOWLEDGEMENT OF RFP, REVISION AND/OR ADDENDA

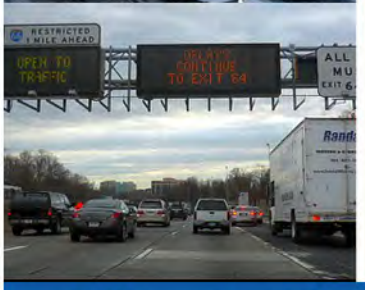
Acknowledgement shall be made of receipt of the Request for Proposals (RFP) and/or any and all revisions and/or addenda pertaining to the above designated project which are issued by the Department prior to the Letter of Submittal submission date shown herein. Failure to include this acknowledgement in the Letter of Submittal may result in the rejection of your proposal.

By signing this Attachment 3.6, the Offeror acknowledges receipt of the RFP and/or following revisions and/or addenda to the RFP for the above designated project which were issued under cover letter(s) of the date(s) shown hereon:

1. Cover letter of April 6, 2012 - RFP
   (Date)
2. Cover letter of June 22, 2012 - Addendum 1
   (Date)
3. Cover letter of July 6, 2012 - Addendum 2
   (Date)

Stephanie DeFazio
SIGNATURE

07/27/12
DATE



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Virginia Department of Transportation

4.1 Letter of Submittal

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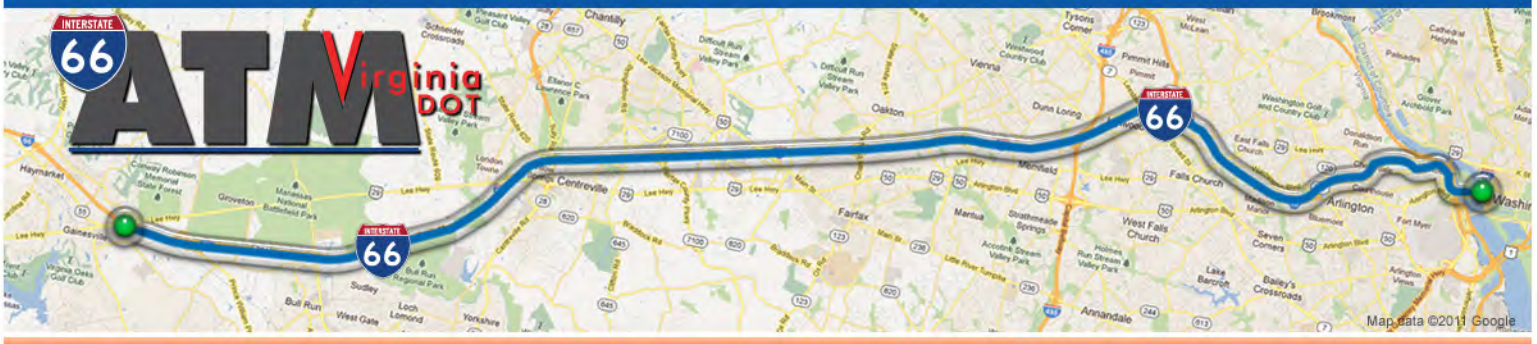

8158 Flannery Court
Manassas, VA 20109
571-208-0088 tel 571-208-0090 fax

July 27, 2012

Mr. Joseph A. Clarke, P.E.
Virginia Department of Transportation
1221 East Broad Street
Main Building, 4th Floor
Richmond, VA 23219

Re: I-66 Active Traffic Management, Contract ID No.: C00098017DB46

Dear Mr. Clarke:

The Virginia Department of Transportation's (VDOT) mission is to "plan, deliver, operate and maintain a transportation system that is safe, enables easy movement of people and goods, enhances the economy and improves our quality of life." The challenges fulfilling that mission along the Interstate 66 corridor in Northern Virginia are significant. Design and construction of state of the art technology provisioned under the I-66 Active Traffic Management (ATM) program will enable VDOT to employ real-time operational strategies and tactics to deal with the dynamic traffic characteristics of the I-66 corridor.

TransCore ITS, LLC, has partnered with *Parsons Brinckerhoff, Inc.*, *Elite Contracting Group*, *Iteris, Inc.*, *Austin Brockenbrough & Associates*, and *Pulsar Advertising, Inc.* (a DBE) to provide a seasoned, experienced team intimately familiar with VDOT standards and local conditions. Our team further brings an array of local, national and international expertise across the life cycle of intelligent transportation systems (ITS).

POINT OF CONTACT

TransCore's point of contact for matters related to the submitted Technical Proposal and this project is Stephanie K. DeFazio, P.E. Ms. DeFazio's contact information is:

Name:	Stephanie K. DeFazio, P.E.
Title:	Department Manager
Address:	8158 Flannery Court Manassas, VA 20109
Phone:	(571) 208-0088
Fax:	(571) 208-0090
E-mail	stephanie.defazio@transcore.com
Cell:	(804) 332-2415

OFFEROR'S INTENT

It is the intent of TransCore ITS, LLC, if selected, to enter into a contract with VDOT for the project in accordance with the terms of this RFP.

VALIDITY OF OFFER

Our team's offer represented by both the Technical and Price Proposals will remain in full force and effect for one hundred and twenty (120) days after the submittal date of the Technical Proposal.

PROPOSAL PAYMENT AGREEMENT

An executed Proposal Payment Agreement, in the form set forth in Attachment 9.3.1, is provided as part of this Technical Proposal submittal.

PRINCIPAL OFFICER FOR CONTRACT

The Principal Officer who will sign a binding contract for TransCore is John Simler. Mr. Simler's contact information for contractual purposes is:

Name: Mr. John Simler
Title: President, TransCore ITS, LLC
Address: 7777 Glades Road, Suite 313
Boca Raton, FL 33434
Phone: (561) 479-2220

TransCore and our team partners have been privileged to work side by side with VDOT and other regional stakeholders for many years. Partnership, commitment, and adherence to standards will serve as the building blocks of a system to be designed with the traveling public in mind. On behalf of all TransCore staff and our partners, I thank you for the opportunity to share our proposed solutions and philosophies. We look forward to the opportunity to work with you closely.

Sincerely,

TransCore ITS, LLC

Stephanie K. DeFazio, P.E.
Department Manager

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Virginia Department of Transportation

4.2 Offeror's Qualifications

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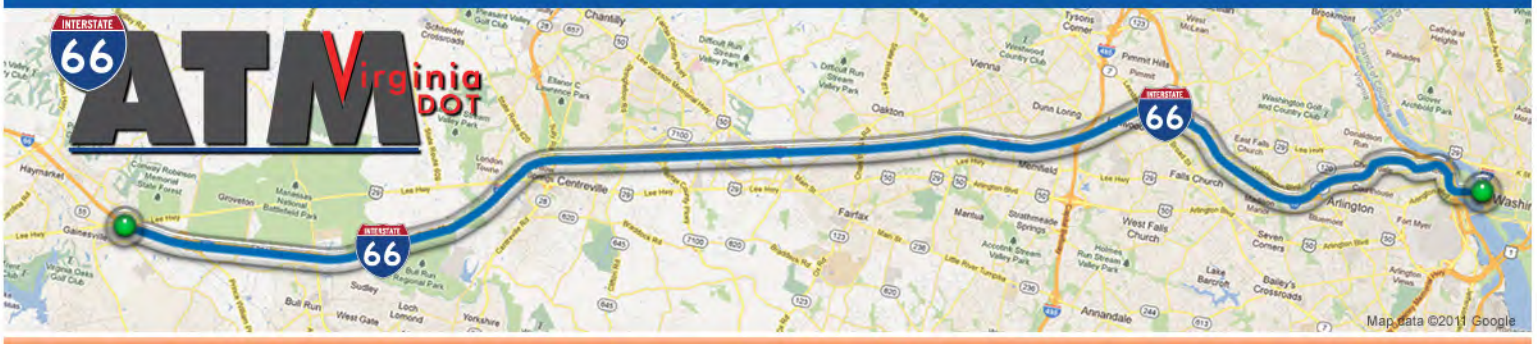

4.2 OFFEROR'S QUALIFICATIONS

As originally presented in the Statement of Qualifications (SOQ) submitted for the I-66 Active Traffic Management program, the TransCore team is comprised of staff members from highly qualified and experienced firms. Team members have worked together in various capacities over the last ten years and have demonstrated our ability to deliver successful systems.

The information previously provided in the SOQ remains true and accurate.

TransCore ITS, LLC (TransCore) is the largest firm in the United States specializing in ITS, providing value with dedicated project staff experienced in ITS that understand the issues surrounding ITS planning and deployment and bring practical experience from other ITS projects across the country. For nearly 40 years, TransCore has been involved in the planning, design, and deployment of Advanced Transportation Management Systems (ATMS), Advanced Traveler Information Systems (ATIS), and ITS. TransCore currently has a staff of over 1,800 people in 60 offices across the country. TransCore will provide all project management and oversight, design management and support, ITS construction, and QC testing services for this project.

Parsons Brinckerhoff, Inc. (PB) is a global consulting firm assisting public and private clients to plan, develop, design, construct, operate, and maintain thousands of critical infrastructure projects around the world. With a strong commitment to technical excellence, a diverse workforce, and service to their clients, PB will lead the ITS, roadway, and structural design of the project, and will be responsible for Quality Assurance of the project construction.

Elite Contracting Group, Inc. (Elite) is a SWaM certified full-service Virginia-based contractor with specialization in ITS, transportation, technology, and physical security solutions for critical infrastructure. Elite has a perfect safety record, despite the challenging conditions encountered over the past five years while working on Northern Virginia freeways. Elite's role for this project will include infrastructure and electrical construction, maintenance of traffic, and safety.

Iteris, Inc. (Iteris) combines the talents of transportation engineers, systems engineers, system integrators and transportation planners to bring to the industry a unique combination of talents and experience when it comes to developing and applying traffic engineering solutions. For this project, Iteris will provide ITS Design services support with specialized roles in ITS Architecture and Systems Engineering.

Austin Brockenbrough & Associates, LLP (Brockenbrough) is a Virginia-based professional services firm founded in 1955. The firm maintains a professional staff of nearly 50 personnel, and is certified with the Virginia Department of Minority Business Enterprise as a Certified Small Business (SWaM). Brockenbrough will support the project design by offering roadway, structural and transportation management plan design services as well as surveying.

Pulsar Advertising, Inc. (Pulsar) is a Virginia-certified small, minority and disadvantaged business, specializing in transportation marketing. Pulsar is a full-service advertising agency providing clients with everything from branding and situation analysis/planning to nationally-recognized creative executions to highly effective public involvement strategies. Pulsar will provide public relations services for the project.

ORGANIZATION CHART AND NARRATIVE

The organization chart as provided in the original SOQ remains true and accurate with one exception: TransCore's Managing Director for the project will be Mr. Timothy Fischer, P.E. As Vice President and Regional Manager for TransCore's Southeast US business, Mr. Fischer brings over 20 years of experience in the design, construction, maintenance and operations of intelligent transportation system. Mr. Fischer brings experience from across the country, including large-scale deployments in Florida, Tennessee, Texas, Iowa, and Wisconsin.

*An updated project organization chart is provided in **Figure 1** illustrating the change of the aforementioned position. All key project personnel, reporting relationships and team structure remain true and accurate.*

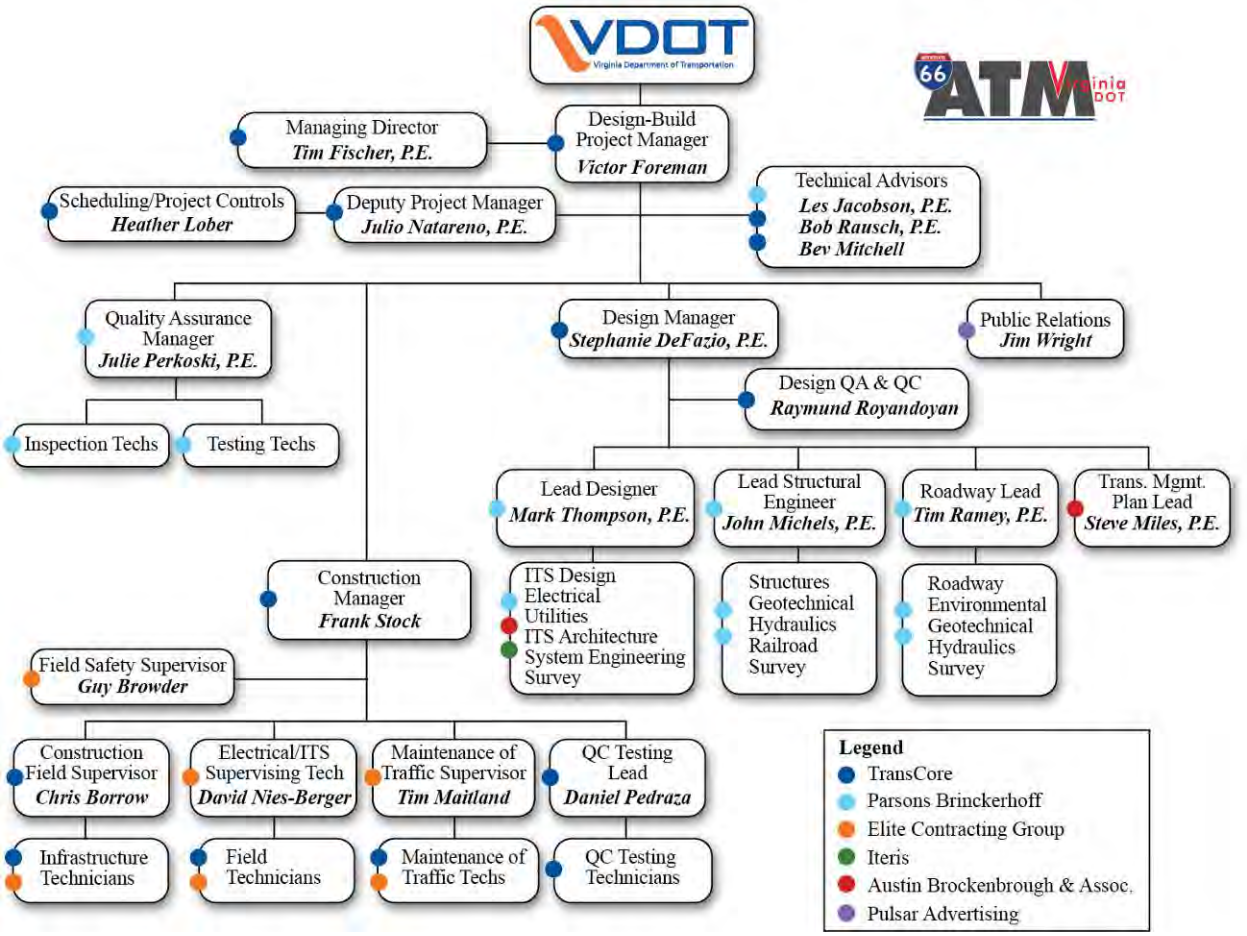

Figure 1 – Revised Project Organization Structure

4.3 Design Concept

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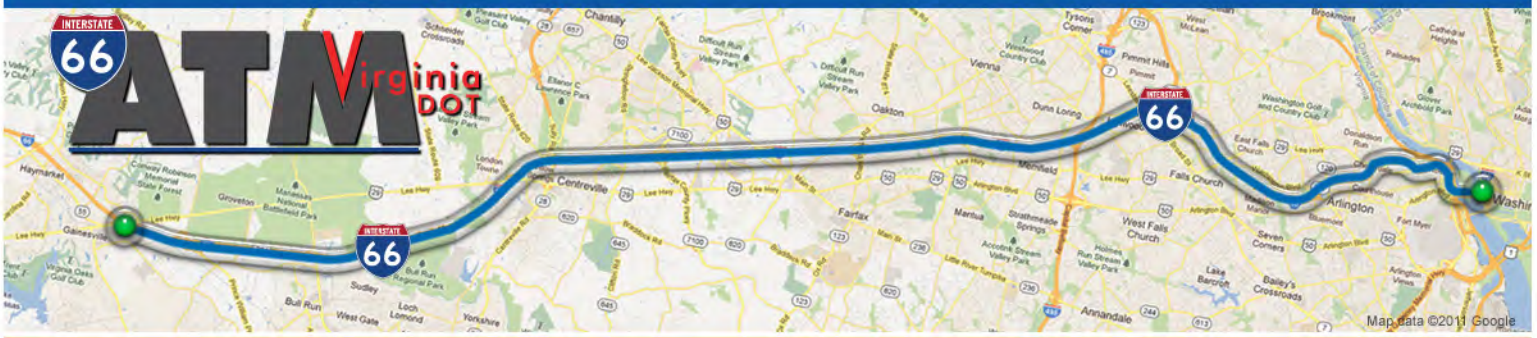


4.3 DESIGN CONCEPT

In preparation of our proposal, the TransCore team has reviewed the preliminary design plans, performed extensive field research; prepared a detailed project schedule; and assessed benefits and risks of a variety of solutions for elements comprising the I-66 ATM project. Throughout this effort, focus has been placed on ensuring compliance with the requirements of the request for proposal and contract documents and compiling a complete and thorough plan to deliver results.

Our design concept focuses around three fundamental principles:

- *Compliance* – Maintain a design proposal in accordance with VDOT standards
- *Efficiency* – Propose solutions that will maximize efficiency of deployment, operations, and long term maintenance.
- *Consistency* – Provide consistency across equipment installation and structure design to provide an aesthetically-pleasing brand to the I-66 corridor.

Volume II of the TransCore team's proposal contains a set of details that illustrates some of our proposed design concepts and is described in *Table 1*.

Table 1- Proposed Design Concept Details

ITEM	DESCRIPTION
Shoulder Monitoring System	A detailed table listing site-specific information is provided, including type of mounting structure proposed. A sample detail for pole extensions to provide nominal 35-ft camera height above the roadway using sign structures (existing and proposed) is provided. Further, we have provided an aerial plan view of the layout to illustrate the proposed design.
Equipment Cabinets	The Type 1 and Type 2 cabinet details are shown consistent with the RFP.
MVD	The typical detail provided in the RFP has been enhanced with a MVD mounting configuration utilized by the TransCore team on multiple ITS installation projects across the country. A device table is also provided.
CCTV	The typical detail provided in the RFP has been enhanced with a CCTV mounting configuration utilized by the TransCore team on multiple ITS installation projects across the country. A device table is also provided.
Ramp Metering	Ramp Metering details are shown consistent with the RFP and VDOT standard detail drawings.
Sign Structures	A concept structure design is provided, which will be used uniformly across all structure types to maintain consistency throughout the corridor.
Lane Control Signs	Sample details of Lane Control Signs and the quick-disconnect mechanism are provided. A device table is also provided.
Dynamic Message Signs	Sample details of proposed DMS products for Type 1 (both walk-in and front-access), Type 2, and 1-line DMS are provided in addition to a device table.

Further information is provided in the following sections on our proposed Shoulder Monitoring System design, sign structure concept design, and lane control / dynamic message sign concept.

ITS Shoulder Lane Monitoring System

The ITS Shoulder Lane Monitoring System (SLMS) will be designed and implemented as part of the design-build process governed by the addenda dated June 22 and July 6, 2012. The design is based on the requirements from the Addendum and Requirements (2.18.7 Shoulder Lane Monitoring) and the Special Provisions for ITS – Shoulder Lane Monitoring.

The SLMS architecture is shown in *Figure 2*. Cameras will be installed to meet or exceed the following basic design criteria:

- I-66 both directions for approximately 7.2 miles of Segment 2 (I-495 to Route 50)
- Coverage will be continuous and overlapping with every section covered by two or more cameras
- Location of cameras will be selected to minimize/prevent occlusion by trucks
- Maximum spacing between devices will be ½ mile

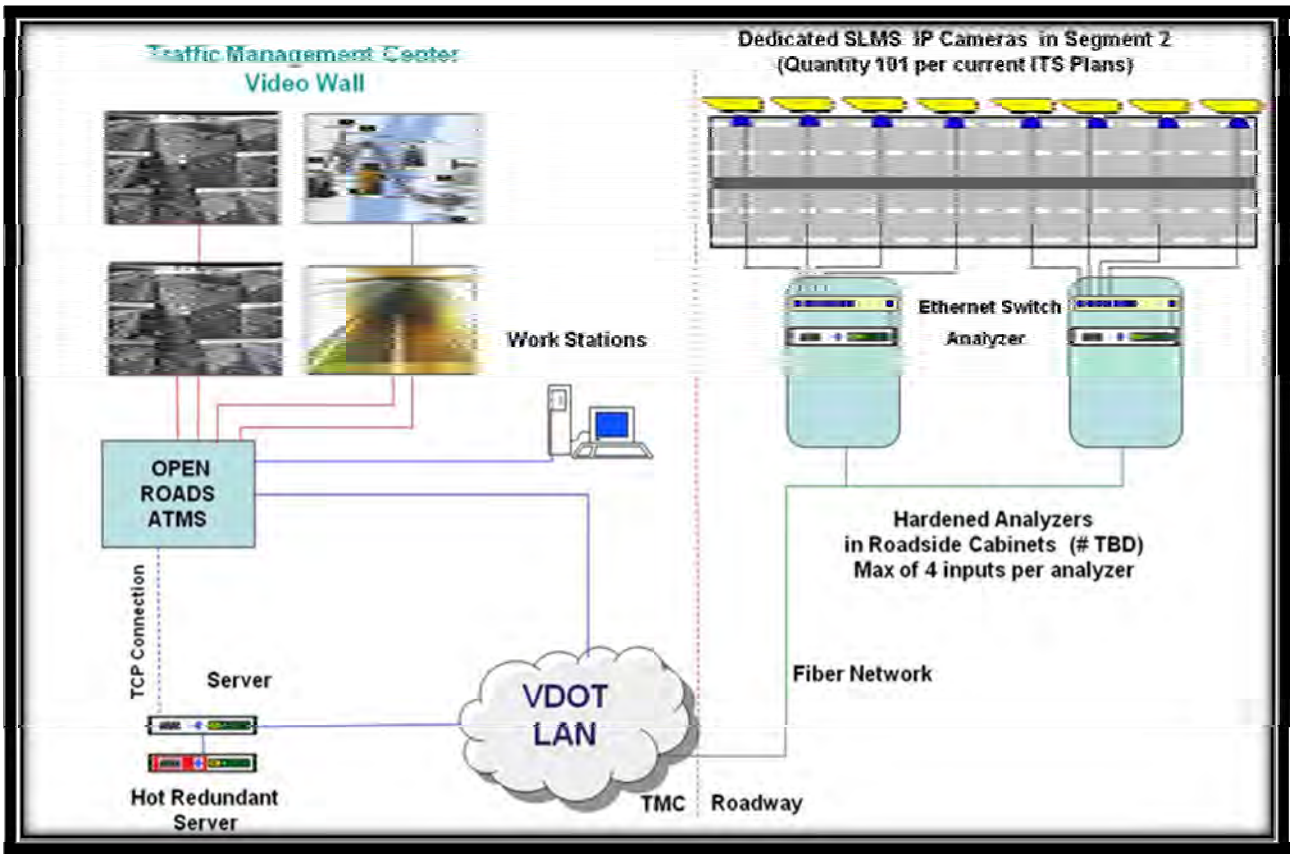


Figure 2 - SLMS Architecture

SLMS will be implemented with standard IP, CCTV fixed "barrel" type cameras with built in encoders. The video is streamed in real time over the local network (field Ethernet/fiber) to a roadside cabinet that houses a hardened analyzer (embedded automation computer.) Live video can be requested at any time or called up by the operator and displayed on the video wall via the Video Management System if VDOT makes the bandwidth available to support the requested video. The live video request is what the operator would use for visual verification and clearance of the shoulder before being opened up to traffic. The video typically includes 15 seconds pre-event, the event and about 60 seconds post event, which is configurable.

Alarms will be generated and sent to the Transportation Management Center (TMC) via the VDOT communication backbone. Upon the detection of one of the "alarm conditions" by the analytics in the roadside analyzer, the alarm data is sent identifying the camera number/location and type of alarm and is received by a server, rack mounted inside the IT Room at the McConnell Public Safety and Transportation Operations Center (MPSTOC). The alarm information is immediately and automatically passed onto the Open Roads ATMS software via an "Active X" or a TCP/IP connection. No video will be transported to the TMC unless requested by the TMC operator. A summary of the functional specifications for the SLMS is provided in *Table 2*.

Field design is based on the camera and video analytics capable of supporting a Field of View (FOV) as shown in the figure below. At a minimum mounting height of 35 feet, with a 22mm lens, the system will monitor 1,000 feet of unobscured shoulder (with a dead zone of about 200 feet below the camera).

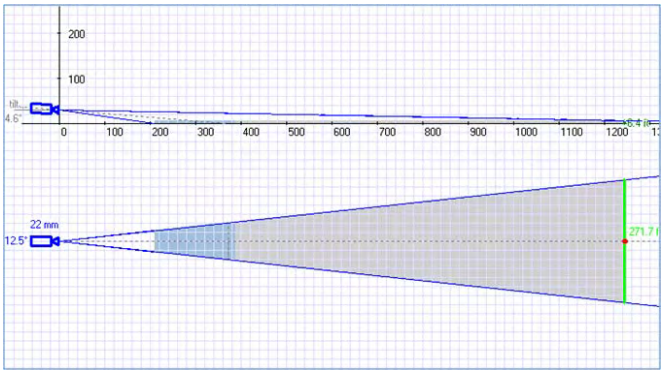


Figure 3 – Detection Field of View

Table 2 – Shoulder Lane Monitoring System (SLMS) Functional Specifications

REQ #	REF	FUNCTIONAL REQUIREMENT DESCRIPTION	REQUIREMENT DISPOSITION
1	SP SLM Pg1	Monitoring and alarming for stationary objects	Meet
2	SP SLM Pg1	Monitoring and alarming for unusual conditions (stopped vehicles, lost cargo, dead animals, wrong way drivers, pedestrians, dense lane occupancy, low speed, high volume, speed drop, under speed)	System will identify "dead animals" as debris
3	SP SLM Pg1	Provide API	Meet
4	SP SLM Pg1	Provide SDK	Meet
5	SP SLM Pg1	Digital Video Encoders (DVE) same as CCTV with analytics	DVE will be imbedded in camera
6	SP SLM Pg1	Camera - fixed zoom	Meet
7	SP SLM Pg1	Environmentally hardened	Meet
8	SP SLM Pg1	Meet or exceed CCTV camera and lens requirements	Meet
9	SP SLM Pg1	SNMP based alarms transmitted to TMC over Ethernet	Meet
10	SP SLM Pg1	Continuous and overlapping coverage	Meet
11	SP SLM Pg1	Operate under prevailing roadway lighting conditions	Meet
12	SP SLM Pg1	Operate all times of day	Meet
13	SP SLM Pg1	Operate in normally expected weather conditions	Meet
14	SP SLM Pg1	Maximum spacing of SMLS cameras is 1/2 mile	Meet
15	SP SLM Pg1	Monitor pull-off sites	Meet
16	SP SLM Pg2	Day (color)/Night (color or monochrome) switchover and iris control, with user-selectable manual and automatic control capabilities	Meet
17	SP SLM Pg2	National Television Standards Committee (NTSC) specification, and produce NTSC compatible composite video	Meet
18	SP SLM Pg2	Resolution of 470 horizontal and 350 vertical TV lines.	Meet
19	SP SLM Pg2	Produce clear, detailed, and usable video images of the areas, objects and other subjects visible from a roadside CCTV field site.	Meet
20	SP SLM Pg2	Provide image quality under all lighting and “normal” weather conditions in both color and monochrome modes	Meet
21	SP SLM Pg2	User-selectable automatic gain control (AGC) that is peak-average adjustable to 30 decibels (dB)	Meet
22	SP SLM Pg2	Minimum signal-to-noise ratio (S/N) of 48 dB, with AGC off, un-weighted, and a 4.5MHz filter	Meet
23	SP SLM Pg2	Automatic color balance that references the white areas of the scene through the lens	Meet

REQ #	REF	FUNCTIONAL REQUIREMENT DESCRIPTION	REQUIREMENT DISPOSITION
24	SP SLM Pg2	Automatic electronic shutter that is user-selectable from 1/60 to 1/10,000 of a second	Meet
25	SP SLM Pg2	Digital signal processor that provides a minimum 10X digital zoom	Meet
26	SP SLM Pg2	Enclosure shall minimize glare and provide overexposure protection for the camera	Meet
27	SP SLM Pg2	Camera provide tilting and masking features, programmable camera title programmable preset titles for each preset position and programmable privacy zones	Meet
28	SP SLM Pg2	Programmable titles shall be a minimum of 18 characters per line, and shall be capable of generating and superimposing lines of English language text on the video image/stream	Meet
29	SP SLM Pg2	Electrical Specifications	Meet
30	SP SLM Pg3	Environmental Specifications	Meet
31	SP SLM Pg3	Management Capability Specifications	Meet
32	RFP Part 2 pg55	Based on advanced analytics that incorporate field of view pixel comparison technologies	Meet
33	RFP Part 2 pg55	Field of view monitor by each unit shall be able to be divided into zones	Meet
34	RFP Part 2 pg55	Alarm shall be capable of being uniquely identified and labeled based upon the alarm condition type, time and location	Meet
35	RFP Part 2 pg55	Provide a Digital Video Encoder (DVE) that is imbedded with the analytics and processing	Meet
36	RFP Part 2 pg55	Design-Builder shall not provide a system that transmits video to a central location, as all processing and analytics shall be performed at the local level	Meet, in conflict with requirement number 38
37	RFP Part 2 pg55	Provide alarms that may be integrated into third party software including the existing NRO's central system software (Open Road's Open TMC)	Meet
38	SP FVE pg 1	SLMS to transmit digital video as well as uniquely identified and labeled alarm conditions, time and location that can be integrated into third party software	Can be met, in conflict with requirement number 36, requires servers at the TMC

Note: Reference for *Table 2* abbreviations:

SP FVE - Special Provision for Intelligent Transportation Systems - Field Video Encoders

SP SLM - Special Provision for Intelligent Transportation Systems - Shoulder Lane Monitoring

RFP Part 2 - RFP – Part 2 for the SLM system (2.18.7 Shoulder Lane Monitoring)

STRUCTURAL DESIGN CONCEPT

The TransCore team has installed every possible structures configuration common on interstates across the country including box trusses in box trusses Tennessee, Florida and Texas, monotubes in Texas and Florida, round cross section tubular in Utah, Texas and California, and tri-chords (triangular shaped cross section trusses similar to box trusses). Based on the following reasons, TransCore has determined that *steel galvanized (and powder coated as required) box trusses* are far and away the best solution for this project.

- These structures have a consistent, economical design meaning that the box is a very efficient shape, and can support the multiple signs and long spans without becoming prohibitively heavy. Further, all the structures, whether spanning the entire freeway or being a cantilever with a single LCS will have an identical cross section size.
- These structures are appealing because they will not only match on this corridor, but they are also found universally throughout the DC metro area. One of our primary vendors for this project is currently delivering several dozen structures for work on the Beltway. This consistent look is appealing in that this project will blend in not only on the corridor but in the entire metro area.
- Due to the consistent cross section size and shape, it is particularly easy to install the DMS, LCS and static signs to these structures. There is no tendency for the devices to pivot on the square face of the structure. Further, because of the familiar cross section, it is very easy to determine appropriate rigging and pick points for the crane crews. There is no unpredictable shifting of devices or structures during the install, which makes for clean safe installations that benefits the traveling public and the project team.
- Traffic control and the dangers of working alongside the freeway will be mitigated by using these structures. We have found that we are able to pre-assemble these structures in long segments and truck them to the job site on semitrailers with expanding back ends. The shapes are consistent geometrically, and being square, lend themselves well to loading on lowboy style trailers. They can be safely loaded, but even more important, safely unloaded roadside in work areas adjacent to the traveling public. Further, what assembly there is in the field is a bolted connection rather than welds that may be required with monotubes. Overall, this leads to less time working roadside and less traffic control.
- There are multiple, proven vendors with decades of history in designing and manufacturing the box trusses commonly used for these applications. This translates to both better pricing for VDOT and mitigates risk of schedule delays. Multiple, proven vendors provide a safer solution on many fronts.
- With the long spans of several of the structures, tolerance during installation is an important design factor. Slight errors in construction are magnified with the rigid nature of both monotubes and round tubular structures for both full span and mid span structures. The connection of the box truss with the end column, along with the presence of leveling nuts on the footing, offer much more flexibility during the installation. Due to the high paced nature of this project and the large quantity of structures, this is critical to maintaining schedule.

- Both galvanization project wide and the powder coating of structures for Arlington County almost dictate a box truss be used on this project. Nearly every galvanization plant in the country, as well as most powder coating facilities, are equipped to handle 50 foot sections. Because the monotube structure must be shipped as one complete unit or field welded, it is nearly impossible to use for full spans that must be galvanized. If it is field welded, a spray galvanization, which is inferior in both function and appearance, would be required at joints as you cannot weld the factory galvanized material.
- These structures offer the added benefit of being easy to adapt pole extensions for cameras and detectors. Structure vendors can also provide extensions by site for the appropriate elevation if desired. In the event there are future changes or additions implemented beyond the life of this project, the proposed structure design makes it simpler to either band or use proven, commercially available off the shelf connection systems to attach additional devices.

As part of the design process, all vendors we have been in contact with for box trusses have Professional Engineers registered in Virginia that commonly design and seal structures and the footing designs for Freeway Projects. As identified in our schedule, we will immediately begin survey and soil analysis at each of the structure locations, starting with the most critical locations first. When it is necessary we will provide traffic control to protect both the traveling public and our workers as we do at any other work zone.

The geotechnical analysis will be provided to the structural foundation designers along with any other environmental and space restraints that we find at each specific site. For all locations possible, which we believe will be most if not all locations, a spread footing design will be prepared, which we will submit in batch packages of roughly 10 structures at a time for review and approval by VDOT. For those structures that it may be questionable to use a spread footing due to subsurface conditions or tight tolerances (such as a tight median) we will receive an additional footing design that is based on two drilled shafts with a cap that resembles a spread footing in appearance. These will be submitted to VDOT with justification for using this type of foundation in the rare event that they are required as an alternative to the spread footing.

The survey information will also be provided to the structures providers as they become available. These profiles will be used to determine the elevation and length of the structures and the design.

Finally, as part of the design process, we will provide the structure vendors with the information for each structure for the individual physical DMS, LCS and static sign sizes at each site. This information will allow the designer to accurately account for wind loading and dead loads for each structure and footing on the project.

LANE CONTROL SYSTEM & DYNAMIC MESSAGE SIGNS

A set of drawings are provided in Volume II by Ledstar. For more than twenty years Ledstar has specialized in providing LED Dynamic Message Sign Systems to Transportation agencies across North America. Since pioneering the use of LED technology in highway Dynamic Message Signs in 1988, Ledstar continues to improve and refine LED DMS technology. Ledstar's commitment to excellence, reliability and customer satisfaction is proven everyday in more than 2,000 successful installations across North America and beyond.

The TransCore team has provided these details as representative samples of the proposed project signs, adhering to the revised requirements as documented in the Special Provision for Dynamic Message Signs (rev. June 22, 2012 via addendum 1). We understand the complexities of dynamic message sign technology, and are open to discussing further with VDOT additional sign options if desired during the initial phases of system design.

The proposed lane control signs (LCS) are 52x52-inch square and include a 36x36 matrix with 33 mm pitch per the requirements of addendum 1. While our proposed structure design is consistent for this project, the proposed LCS mounting mechanism provides a flexible design that can be adapted to most any structure. This provides a long term solution for a host of different configurations and applications. Further, these signs are the lightest of the options reviewed for the I-66 project with a ***published design weight*** of 170 lbs. These considerations make the LCS an attractive option when considering long term maintenance considerations.

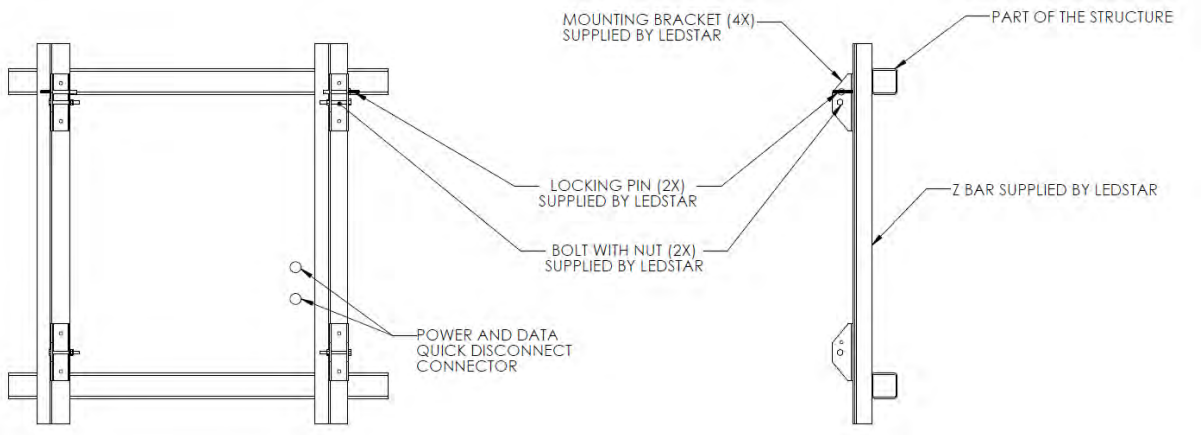


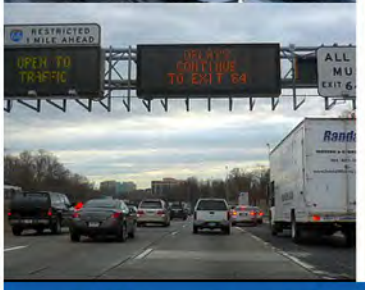
Figure 4 – Lane Control Sign Mounting Configuration

The LCS controller consists of a rack-mount chassis controller system with redundant power supply. Full configuration of the chassis includes full configuration with 6 CPU modules, redundant power supply module and LCD/keypad module. Each CPU module comes equipped with a Remote RS232 port, Local RS232 for laptop, Ethernet 10/100 port with Link / Activity indicators, and Fiber Optic connection to DMS electronics with Rx/Tx indicators.

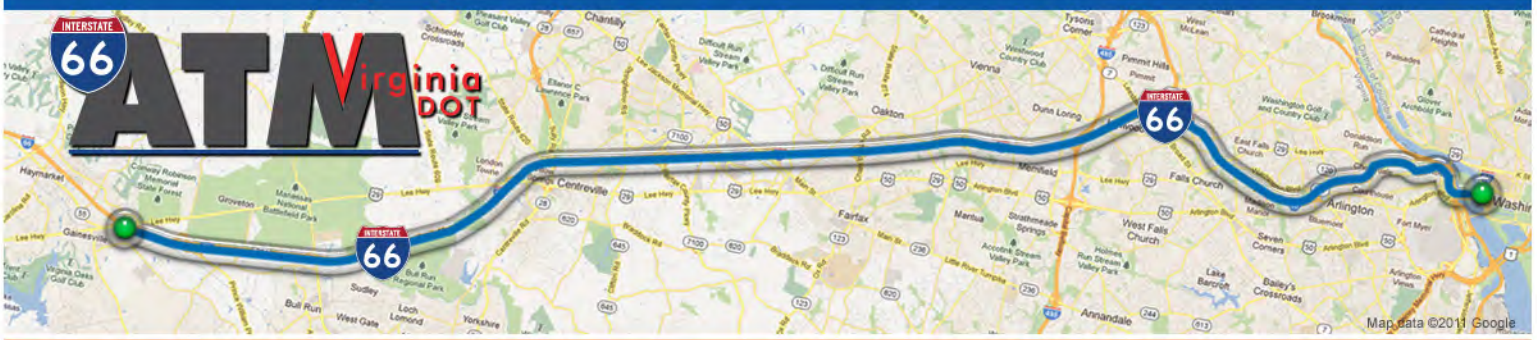
Full color Type 1 DMS are proposed in compliance with the RFP specifications, utilizing a 27x110 matrix with 66 mm pixel pitch. Higher resolution Type 1 dynamic message signs are readily available for consideration and discussion. Type 1 DMS are provided in both walk-in and front-access options as illustrated in the *Volume II* drawings.

Type 2 amber DMS are proposed in compliance with the specifications, utilizing a 45x75 matrix with 46 mm pitch.

Proposed 1-line amber DMS utilize a 7x50 matrix with 66 mm pitch as illustrated in *Volume II*. With a depth of 3 1/8 inches, these signs will fit seamlessly with static signing to provide hybrid signing along I-66.



4.4 Project Approach



4.4 PROJECT APPROACH

4.4.1 ITS DEPLOYMENT MANAGEMENT

Our Proposed Schedule in *Section 4.6* provides a detailed approach to our view of the phases and the successful design, construction, integration and testing of each of the systems within the phases to complete the project on time. Our overall approach to staging the work focuses on completion of the project efficiently with limited disruption to the traveling public. Each phase in our schedule has identified specific strategies to expedite preliminary, construction and testing phases to conserve float and help assure the project completes on time.

Each of the phases discussed below has been addressed to maximize productivity, recognizing this will be a fast paced project with little room for error or repeated work. The following sections identify each of the phases in our schedule, and how we are individually and interoperably working through phases to more quickly complete the project.

Preliminary Phases

Prior to the beginning of any construction, there are four phases (all systems are in each phase- i.e., Shoulder Lane Monitoring System (SLMS), Dynamic Message Signs (DMS), Lane Control System (LCS), Closed Circuit Television (CCTV) cameras, Microwave Vehicle Detectors (MVD), Ramp Metering Systems (RMS) and staging areas) that will be completed. Each of these systems and our concept to expedite are as follows:

Contract Administration - This phase sets the framework for the entire project and defines the coordinated effort required between the TransCore team, VDOT and other stakeholders. Prior to award, we will begin the process of coordinating with ongoing projects, WMATA and VDOT key project personnel to assure that when NTP is given, we are ready to begin our formal partnering meetings with appropriate stakeholders. We will be ready to quickly submit our schedule and all preliminary QA/QC plans, safety plans, and other preliminary documents identified in the schedule and in the RFP. This will quickly set the stage for the project and focus everyone on the importance of the project at hand.

Design Phase - During the design phase, we will do three things to accelerate the start of construction:

- Conduct field investigations thoroughly the first time so it only needs to be done once at most locations.
- Perform our specialty work for surveys and soil test borings quickly in order for the longer lead items of structures design and procurement to begin.
- Complete design packages by device type so that items with quicker design and procurement, such as detectors and cameras, can be approved, ordered and built to both alleviate schedule risk and provide early access to the TMC to those useful devices.

In order to complete the field investigation quickly and correctly in one pass, TransCore and PB will employ the "divide and conquer" technique. We will deploy multiple teams with multiple skill sets in each discipline to eliminate the need to visit sites multiple times to the extent possible. Given the length of the corridor, minimizing trips to each site and gathering all information possible will allow us to get plan sheets started on one end of the corridor while

continuing the fieldwork in the other sections. To this end, we will work from east to west, starting in the more congested and complex areas inside the beltway and moving out towards the western project limits.

Fabrication of structures presents one of the largest risks of external manufacturing delays for the project. We will expedite the geotechnical and survey work necessary to get the foundation and structures designs moving forward. We will support these disciplines as needed with traffic control provided by *Elite*.

We will also break up the design into logical packages. Separating out each element into packages allows us to complete the less complex items expeditiously. We can begin meaningful construction on earlier items (such as cameras and detectors) while waiting for the more complex items (DMS and LCS) to move through the design reviews and equipment procurement processes.

Submittals - Through the RFP process, TransCore has identified all major elements that must be submitted and we have already requested and received this information from our vendors during the proposal process. We will immediately provide these submittals to VDOT for review and approval upon receiving NTP. While there will inevitably be some requests for additional information and resubmittals, schedule acceleration on these elements will greatly benefit the overall project schedule.

Procurement - One of the largest risk areas in the project is procurement, and as such, TransCore will serve as the sole buyer for all major purchases. Being an international company with a centralized procurement department offers us great benefit. We often are able to not only recognize some substantial discount on commodity items, but we are able to identify, through relationships with several national vendors alternative sources for long lead items such as fiber optic cable. We also have direct vendor relationships with several device manufacturers, which allow us to leverage quicker lead times.

An additional procurement strategy that we will employ is to procure partial orders of items that we are certain we will need quickly but that we will not be certain of needed quantities until final design is complete. For items that we cannot order immediately upon submittal approval due to quantity uncertainty, such as wire, boxes and conduit, we will submit segmented orders and release stages as we identify meaningful quantities. This will allow us to avoid delays for basic elements to begin construction once we have an approved plan set.

Construction Phase

Once we are near completion on preliminary phases, we will begin focusing on the construction of the systems. We have conducted extensive field reviews of the corridor, and we plan to employ a three-part strategy for managing the deployment of the work.

First, similar to staging of field investigation and design work, we plan to focus on working from the east end of the project corridor and working west. Inside the beltway, the project offers the most challenges. Traffic control will be very difficult due to congestion and logistics associated with the Metro rail lines, as well as the higher potential for more difficult geotechnical and access issues. Any time lost is likely to occur in these areas.

Second, when possible and practical for both the project team and VDOT, we will set additional crews on the opposite end of the project from where we are working. While some internal coordination, as well as coordination with more agencies and contractors will be required, we believe we can work in parallel along different sections of the project spaced approximately 10 to 15 miles or more apart. The primary focus of our overall maintenance of traffic plan will focus on minimizing disruption to the traveling public while acknowledging the expedited manner in which we will need to execute the construction phase. Initial devices slated for deployment along the east end will be cameras and connective conduit, which will help the TMC to manage the project when they become available early.

Third, we will maximize use of maintenance of traffic and equipment staging by staging all work possible in that area. For example, if we are doing conduit work for a demarcation point, that same crew will be set up to install the boxes and pull and terminate the conductors. If we are pouring a foundation for a structure, then we will simultaneously pour the pad for the cabinet associated with that device. To successfully complete this project, we believe it will be important to complete as many tasks as possible while we have crews in place.

Integration and Testing Phase

We were pleasantly surprised to see the level of testing required by this RFP. TransCore is a strong proponent of completing testing upfront prior to any field deployment, along with continued field testing at logical points of the project's schedule. This results in the final testing of the system being essentially a formality.

The testing for subsystems follows a basic premise that TransCore employs as a strategy on projects and that naturally leads to a successful project. Inspection, integration, and testing will map to the three-tier sequential process that consists of stand alone functionality, system operation, and 60-day acceptance test periods as is highlighted in the RFP documents. An additional layer of testing will consist of a uniform process of pre-installation configuration and testing of equipment.

While not specifically set up as a time saving measure, as the thorough testing is a requirement of the RFP, we believe that our team will accomplish accelerations in schedule simply because when the elements are thoroughly tested early in the project, field deployment and integration tend to occur with fewer issues.

Corridor Partial Acceptance Phase

This phase is the 60-day acceptance test and final system inspection. In TransCore's experience, if the integration and testing phases are done correctly, this is a very smooth process. By completing all of our work properly, and fully testing each element and subsystem as we progress through the project, this test should take the 60 days allotted in the schedule.

Included in this work is the project closeout. During the 60-day test, we will submit all the spare parts, manuals and close out documentation (such as As-Built Plans and Test Binders). In doing this, key people will be closely tied to the project during closeout to assure we can quickly mitigate any issues that may arise.

4.4.2 ITS Operation Continuity

The TransCore team is committed to efficient completion of the project while minimizing impacts to the traveling public and VDOT. Our schedule has been designed to work with as little disruption as possible while bringing devices online as we progress to allow VDOT the benefit of early use of devices. The ideas we specifically will address in this section include:

- We will plan work carefully and adhere to our schedule such that our delays to the traveling public and VDOT are documented in advance and predictable in nature.
- We have fully examined the corridor and will place devices, to the extent possible, in places where they will provide maximum functionality while minimizing the need for lane closures during construction and for future maintenance.
- We will coordinate project construction activities with VDOT staff to maximize continued operation of existing ITS components on I-66.
- Our project approach to construction combined with our desire to have the TMC exercise devices, as they become available will increase monitoring and control opportunities.
- By maintaining consistency in our structures installation, we will be able to quickly close and reopen the corridor to install structures.

General Work Practices

This project is a significant undertaking in a very congested corridor and there will inevitably be periods of delay. However, by working smart, being well prepared, and adhering to our project schedule, we will avoid disruptions to the public to the maximum extent possible. We will work behind guardrail wherever possible, make sure our traffic control is set up properly and ensure all the traffic control devices are in acceptable condition. We will adhere to our Primavera schedule and provide weekly schedule updates, which will enable VDOT to provide accurate meaningful data to the public and the TMC staff.

Design Considerations

TransCore has contracts nationwide dedicated to maintenance, and as such our staff appreciates a responsible design that considers not only the construction of a site but the maintenance. Recognizing the accessibility issues along many parts of the I-66 corridor, we have been identifying locations for devices that not just make sense from a device spacing perspective, but also for constructability and long-term maintenance. As we continue the design process, we will strive to keep installation and long-term serviceability of the devices in the corridor in proper focus to make it as non-intrusive as possible. When working in areas that require us to close lanes, we will be sure to be prepared to do everything in that area in as few of trips as possible, being cognizant that closing lanes creates significant disruption for travelers and increases risk of incidents along the corridor.

Coordination to Maximize Existing System Operations

The TransCore team understands that strong technical knowledge of the existing systems and coordination with VDOT ITS Maintenance managers combined with appropriate advance planning will ensure that ITS device operations of existing and replacement devices will be maintained. For example, installing a new DMS to take the place of an existing DMS will not

only necessitate operability of and communications with the new sign in the new location. Maintaining the trunk fiber communications path to the original site will also be crucial for any other ITS devices communicating over the trunk fibers assigned for the original site. The existing communications channel can be maintained by temporarily using a duplex fiber jumper as a patch in the existing cabinet, with the permanent solution of re-splicing the trunk cable at the site.

Another example of a construction activity requiring signification coordination is the replacement of existing lane control signals for shoulder lanes. Swapping MPSTOC's communications from each original lane control signal to each associated new lane control signal will be critical, especially due to the safety associated with this system. Coordination with a variety of VDOT staff will be crucial to ensuring that communications with and control of each new LCS has been established from MPSTOC prior to turn-on of the new signal and removal of the old one.

The installation of new equipment to upgrade the existing ramp metering systems will also necessitate coordination with VDOT to eliminate down time of existing ramp meters during ramp metering operation periods as well as down time of any other associated ITS equipment. Overall, frequent coordination with VDOT staff will help minimize impacts to existing systems and will ensure that existing devices are only removed from service once all tasks for new replacement systems are complete.

TMC Access to Devices Accelerated through Construction Sequencing

The critical mass of the work on this project will be the installation of the structures and foundations as well as power distribution. It will be necessary to focus on this work to complete the project on time. While the project schedule is built with the idea of working as efficiently as possible from the interior (east end) of the corridor out to minimize risk and allow for schedule recovery, the TransCore team believes that efficient execution of our schedule with some parallel work in the west end of the corridor will allow us to give beneficial use of the traffic management tools we are installing long before the project is accepted.

The CCTV and MVD will be the first design packages and submittals available because they are not nearly as complex as the DMS or LCMS subsystems and do not have the long procurement lead times. As mentioned in *Sections 4.1 and 4.6* of this proposal, it is our intent to work from east to west. However, given the length of the corridor, we believe it will be advantageous to also work on some of the traffic monitoring devices that are on the west end of the corridor independently of our work on the structures. We anticipate that these devices will become available through the network early in the construction phases of the project.

In addition, as we work from the inside out, we will be doing the construction on other devices and power simultaneously to take advantage of getting out of an area and completing all work while we have excavation equipment and traffic and erosion control measures in place. As such, we will be bringing on devices on both ends of the corridor to the extent that traffic control restrictions allow.

As we bring the new traffic monitoring devices online, it is our intention to provide full access to the devices at the TMC. Since it is our intent to fully verify that all devices work through the material bench test, once stand alone testing and individual field location fiber splices are

complete, we will be able to access these devices from the TMC. We will conduct informal training to show the operators how to use the vendor software to connect to the devices and encourage the operators to use these devices as soon as they are available. While these devices might slip out of operation for brief periods as more devices are cut into the channel, it is likely that a large portion of the time they will be sitting idle and we believe they should be used by the TMC. In our experience both the TransCore team and VDOT will benefit from allowing the TMC to use these devices to manage traffic. VDOT gains the benefit of having additional coverage through the corridor, and having the devices exercised and effectively troubleshot prior to engaging in Subsystem testing and the 60-day Acceptance Test.

Crew Consistency

It is our intent to use the same crane operators for all structures. In previous projects we have found that while the excavation teams are efficient regardless of consistency in staff composition, (as long as there is good field leadership) it is essential to have the same crews working the cranes on a daily basis. These teams must be a well-oiled machine to get things done correctly and quickly with as limited disruption as possible. For some of these structures spanning the entire freeway, two cranes will have to work in tandem. In our experience on other projects, once an operator gets used to specific signal people on the ground, specific foundation shapes and bolt patterns, and specific structures with a pattern to the weight distribution of signs, he becomes incredibly efficient at both rigging the load and swinging it in place. For example, on our projects in Tennessee, once a structure is properly rigged in the lane closure, we have had full closures for as little as seven minutes to set a structure. However, consistency in staff and equipment is critical to this construction element.

4.4.3 UTILITIES

A large portion of the construction effort involves ground penetrating construction activities, such as the installation of conduit, pull boxes, and pole and structure foundations for the project. We will utilize the information received from utility companies regarding their existing facilities to minimize conflicts and eliminate the risk of damage to their facilities during construction. All utility procedures will follow the requirements of the Code of Virginia Underground Utility Damage Prevention Act. Close coordination through The Virginia Utility Protection Service (Miss Utility of Virginia) will be managed throughout the design/build process.

During the design phase, Subsurface Utility Engineering (SUE) will be performed for each location to identify any potential conflicts with underground utilities. The TransCore team will comply with established VDOT project utility coordination procedures as applicable. Work under the SUE task includes:

- Notify and furnish preliminary project data to involved utility owners.
- Provide liaison between the Project Team, VDOT, utility owners, and other involved parties.
- Schedule and conduct coordination meetings and field reviews with utility owners.
- Identify and coordinate the resolution or mitigation of utility conflicts.

- Facilitate the incorporation of existing/proposed utility facility information into project plans.
- Prepare construction project documents describing utility activities and coordination requirements.

We anticipate a minimum of three phases where input from potentially affected utilities will be solicited during design:

1. Distribution of base plans, showing the tentative location of ITS devices, to all utilities identified through the corridor so they may identify any underground or above ground facilities within the project limits.
2. Feedback from potentially affected utilities through a formal Utility Coordination Meeting, which will be held after receiving utility agency mark-ups on the base plans.
3. Distribution of 90 percent design plans to all utilities in the area of proposed ITS infrastructure so that they may provide any additional comments on potential impact to their facilities; a final utility coordination meeting will be conducted prior to the submittal of final plans.

In addition, utility owners will be invited to participate in progress meetings and technical meetings in order to address and resolve any specific utility issue that may arise during the design or construction phases. The TransCore team understands that it can be difficult to motivate the utility companies to work to our schedule. As such, we are prepared to support their plan development, and to provide construction up to the hook-up points to expedite the service connections going live.

Electrical Services

Installation of power drops has proven to be a difficult venture adversely affecting numerous tasks within the project schedule. To mitigate this risk, the TransCore team will utilize as many of the existing electrical service panels along I-66 as possible. Three primary alternatives will be considered for providing power to new cabinets deployed under the project:

- Direct cabinet connection to existing service panel
- Establishment of power distribution to multiple cabinets from existing service panel(s)
- Establishment of power distribution to multiple cabinets with new service panel(s)

The first two alternatives – direct cabinet connection and establishment of power distribution to multiple cabinets using existing service panel(s) – will provide the lowest schedule risk, as the majority of work will be self-contained within the TransCore team. With over 100 service panels currently established along I-66 with utility providers Dominion Virginia Power and Northern Virginia Electric Cooperative (NOVEC), the majority of cabinets will be able to be serviced without additional service points. During the design phase, development of a preliminary electrical plan will occur simultaneously with final site locations and will include assessment of existing service panel configuration and capacity. In the event that modifications are required to existing service locations, early provision of this work with the affected utility provider will be made to ensure construction of the project is not delayed.

Establishment of power distribution to multiple cabinets with new service panel(s) induces a medium risk level to the project. While this option does depend on timely provision of new

service by the utility provider, it does limit these occurrences and maximizes the use of each new service panel established under the project.

The design of the electrical system will follow VDOT standards illustrated in *Section 700* of the standard specifications alongside VDOT's standard electrical service installation details.

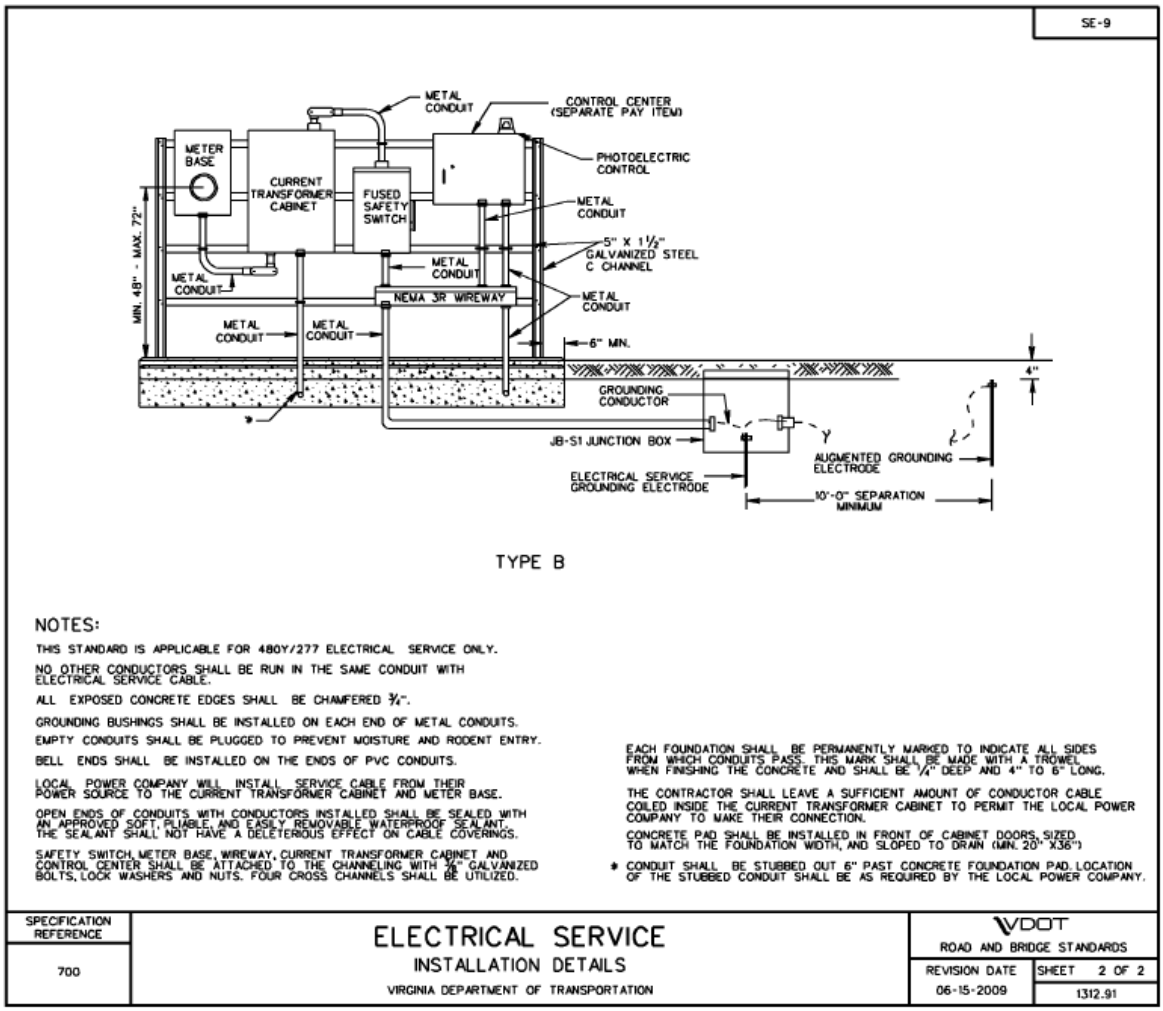


Figure 5 – Example of Electrical Service Installation Details

Early coordination for power and inspections, along with continued diligence will be employed to ensure an on-time deployment of the project power drops. The TransCore team will leverage our expertise alongside local, established contacts with the utility providers to ensure establishment of new services and modifications to existing services are accomplished on time and in accordance with the project schedule.

4.4.4 QUALITY ASSURANCE/ QUALITY CONTROL (QA/QC)

The purpose of QA/QC activities is to provide confidence and objective evidence that the I-66 ATM components, subsystems, systems and processes that comprise the project meet contract requirements. Quality Assurance (QA) is a planned and systematic set of activities that provide evidence that proper requirements have been established and that products and services conform to these requirements. Quality Control (QC) is the process by which product quality is compared with applicable standards and action taken when nonconformance is detected. Whereas QA establishes and evaluates the processes that produce the products, QC verifies whether the product meets or exceeds the defined standards.

The TransCore team's approach to QA/QC is described in three sections:

1. QA/QC as applied to the engineering design of structural elements.
2. QA/QC as applied to the construction of sign structure foundations.
3. QA/QC as applied to the integration and testing of ITS elements.

The TransCore team will prepare a QA/QC Plan covering both design and construction and submit it to VDOT at the meeting held after the Date of Commencement. The TransCore team Project Manager and Quality Assurance Manager (QAM) will present the Plan at that meeting using project-related scenarios including the five scenarios listed in *RFP Section 2.8*.

4.4.4.1 Engineering Design QA/QC

The TransCore team will adhere to the design quality procedures contained in VDOT's Minimum Requirements for Quality Assurance and Quality Control on Design Build and Public-Private Transportation Act Projects (QA/QC Guide), January 2012. The Design Manager will establish and oversee a QA/QC program for all design disciplines, covering design reviews, working plans, shop drawings, specifications and constructability. Design QA will be performed independently of Design QC.

To illustrate our approach, the TransCore team will apply QA/QC procedures to the structural design aspects of the project. While the outlined procedure below highlights structural elements, the same procedure will be used for all disciplines. The purpose of the QA/QC procedures for the structural design elements is to provide quality structural designs and plans in the fast-paced delivery environment of a design-build project. The key element to the success of this process is effective communication among all parties involved with the design.

The goals of the QA/QC design procedure are:

- Design structures that are structurally safe and meet VDOT regulations and Design Manual requirements
- Conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals; AASHTO LRFD Bridge Design Specifications; current structural engineering practices; and geometric criteria of the NOVA Region
- Design structures that meet the requirements of the project, are constructible, durable, economical, inspectable and minimize maintenance
- Meet design schedule, budget, and construction staging requirements
- Minimize structural design costs

- Ensure that an organized and indexed set of design calculations including design criteria and assumptions are provided
- Minimize VDOT's review effort

Checking of Design Deliverables for Structures

It is essential that the design deliverables for the structures show complete information so that the fabrication and construction requirements are clear. The Design Manager and Design QA & QC lead will participate in the preparation of the QA/QC Plan and will be responsible for its implementation related to all design aspects. The processes and procedures defined in the Plan will be strictly enforced and thoroughly documented in order to minimize VDOT's review effort.

Design Preparation

Design deliverables for the structures will be prepared under the supervision of the Lead Structural Engineer. Weekly meetings will be held throughout the design process. These meetings will be led by the Lead Structural Engineer and will include the Design Manager, the Construction Manager or his representative and representatives from the fabricator and erector. VDOT may also participate in these meetings at its discretion. These meetings will reduce overall design and VDOT review time by facilitating coordination of design and construction requirements.

Checking of Design Records

Design deliverables for the structures will come in the form of drawings and calculations. The review starts within the structures discipline before it is reviewed with the Design QA & QC Lead, the Design Manager and others. The review of each deliverable will follow the steps below. At the conclusion of each step, the checkprint stamp is signed. A stamp on each sheet is required for the drawings. A stamp is required on the cover sheet for the calculations.

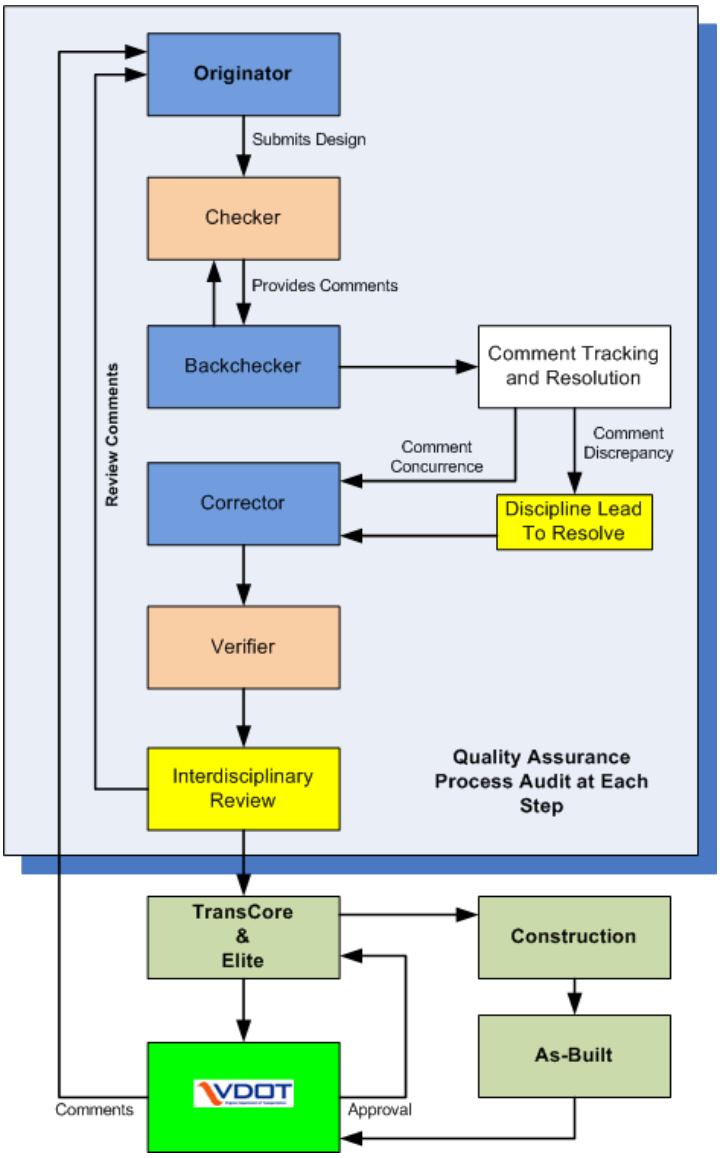


Figure 6 – Structural Design QA/QC Workflow Diagram

Originator – The originator is responsible for the initial preparation of the deliverable to be checked. The originator has the primary responsibility for accuracy and adequacy of the deliverable, prepared in accordance with the requirements outlined in the applicable design codes. It is not intended that the originator rely on the checking process to complete the deliverable.

Checker – The checker is independent of the originator and responsible for checking the deliverable. The checker reviews every aspect of the deliverable, including input required for design programs that are a part of the calculation set. The checker marks up the stamped deliverable set with comments and returns the set to the originator. The checker is a senior staff member with the experience to check the design.

Backchecker – The backchecker is responsible for reviewing the checked deliverable and confirming that the items marked for revision are in need of revision, and that the corrections noted are indeed correct. The backchecker is also the originator. If the backchecker disagrees with a correction from the checker, they must coordinate to resolve the disagreement prior to the next step. If both people continue to disagree, the Lead Structural Engineer will resolve the difference.

Corrector – The corrector is responsible for ensuring that the changes marked on the checkprint are addressed and revised on the original deliverable. The corrector is either the originator or a drafter. A drafter can be the corrector for drawings.

Verifier – The verifier is responsible for reviewing a copy of the corrected deliverable against the checkprint and verifying that the corrections marked have been properly addressed and incorporated. The verifier is also the checker.

Interdisciplinary Review – Once the checking of the design deliverable is complete, the Design Manager organizes all discipline leads (ITS, structures, roadway) to review the submittal. Concurrently, the Construction Manager reviews the submittal for constructability. If there are comments resulting from the Interdisciplinary Review, the checking procedure starts from the beginning for the affected portions of the deliverable.

Quality Assurance – The Design QA & QC Lead is responsible for auditing that the quality control checking process is being followed by the design team. In addition, when required a peer review of the structural design will be performed by a senior technical member of the team.

Submit to Contractor and VDOT – The Lead Structural Engineer signs a form that all QA/QC efforts have been performed in accordance with the required procedures and transmits the form to the Design Manager. The Project Manager submits this form to VDOT for its information and documentation. At this time, the deliverables are ready to be signed and sealed by the Lead Structural Engineer as a Professional Engineer registered in the Commonwealth of Virginia.

VDOT will review the design and submit any comments back to the TransCore team. If comments are provided by VDOT, the Team will address and incorporate them into the final design and resubmit the design for VDOT approval. The approved plans will be used to construct the ATM project.

Changes to the design during construction will be reviewed using the same process as the original design. Changes, such as field design changes and nonconformance evaluations, will be maintained in a database to track revisions and update the as-built documents.

The Lead Structural Engineer will verify that all Quality Control procedures were performed for the structures discipline. The Design QA & QC Lead and the Design Manager are ultimately responsible for Quality Assurance. Copies of the documents for each submittal, including revisions, will be kept for the duration of the project. Final design records of the required forms and checkprints are maintained by the Design Manager in the project files.

Critical Project Element – Anchor Bolt Connections

The design team recognizes that the bolted anchorages at the interface of the sign structures and the foundation are critical structural elements. In addition to meeting all structural design requirements of VDOT and AASHTO, the details for these anchorages must be clearly shown on the foundation drawings, and checked that they are consistent with the details and requirements at the base of the sign structure. The process of checking the design deliverables described above will be used to check the drawings and calculations for the bolted anchorages. Upon the completion of the calculations, anchor bolt locations and sizes are determined. The results of the calculations will be relayed onto the design drawings used for construction. It is imperative that the anchor bolt information in the design calculations and the drawings match.

The engineer will design the anchor bolt connections in accordance with the *Request for Proposals, Part 2, Technical Information and Requirements*, and the *2010 AASHTO LRFD Bridge Design Specifications, Section 6.13.2*. Additional details for anchor bolts are provided in the *2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals with 2010 Interims, Section 5.17*. Upon completion of the design, the engineer starts the internal review at the originator step. The engineer will stamp the cover sheet of the calculations as well as each page of the drawings. The checking engineer will be a senior level structural engineer. The checking process will be completed as described above through the check, backcheck, correction and verification steps.

At the conclusion of the discipline review, the updated set of drawings will be given to the Design Manager. The Design Manager will organize all of the design disciplines (ITS, structures, roadway) as well as the Construction Manager for the Interdisciplinary Review. If there are comments from this review, they will be sent to the Design Engineer to be incorporated. The review process will be completed again to verify incorporation of all comments. The Design QA & QC Lead and the Design Manager are responsible for confirming that the checking process has been followed properly before sharing the final submittal with the Project Manager for submittal to VDOT.

Once the QA/QC process has been completed and the submittal is ready, the QA/QC review form and the signed and sealed deliverables will be sent to VDOT. At the conclusion of the review process, the design drawings will be ready for construction with minimal additional review effort required by VDOT.

4.4.4.2 Construction QA/QC

The construction portion of the QA/QC Plan will also be prepared in accordance with VDOT's January 2012 QA/QC Guide. Key features of the TransCore team's approach to construction QA/QC are:

- *Quality Assurance:* The QA Manager, a Parsons Brinckerhoff employee, reports directly to the TransCore team Project Manager. The QAM is completely independent of the construction crews and organization. All QA personnel and functions including QA testing will report to the QAM. The QAM will:
  - Establish quantities prior to construction and provide to VDOT for purposes of determining the number of Owner's Independent Assurance (OIA) and Owner's Independent Verification Sampling and Testing (OVST) tests to be performed by VDOT.
  - Observe construction in progress and ensure that QA and QC testing and inspection proceed as per Contract requirements.
  - Maintain a Materials Notebook.
  - Use her authority to enforce requirements of the contract documents when materials or finished products fail to conform to those requirements.
  - Establish and maintain a Quality Assurance Auditing and Nonconformance Recovery Plan (AR Plan) for uniform reporting, control, correction, disposition and resolution of nonconformance.
  - Document and resolve issues associated with Non-Conformance Reports (NCRs).
- *Quality Control:* Construction Quality Control will be performed under the direction of the TransCore team's Construction Manager who will have a QC Testing Lead separately reporting to him. TransCore will have overall responsibility for all Construction QC activities, including sampling and testing of materials and inspecting and documenting the work performed on the project. These activities will be distinctly separate from QA activities, including use of two independent, AMRL certified testing laboratories for materials testing (one for QA testing and the other for QC testing).

All construction QA and QC personnel will hold current VDOT certifications for the types of inspection and materials testing that they are assigned to perform in accordance with *Section 3.6 of the January 2012 QA/QC Guide*, and for the safety and use of nuclear testing equipment as required by the Road and Bridge Specifications.

As per *RFP Section 2.8.2*, a complete set of project records will be provided prior to Final Application for Payment.

Overhead sign structure foundations – both spread footing and drilled shaft – present a critical need for thorough QA/QC procedures. Once the crews have placed the concrete, all the subsurface conditions are buried. The TransCore team approach to Construction Quality Management (CQM) is one that will minimize the need for additional VDOT QA/QC effort.

The specific QA and QC functions for construction of an overhead sign structure foundation are detailed in *Table 3*.

Table 3 – QC Functions

Quality Assurance Functions	Quality Control Functions
Pre-Construction	
Verify the completeness and accuracy of the work package	Prepare the 'work package' for the element of work that consists of the latest and current revision of every applicable document: plans, specs, material submittals and shop drawings. Includes up to date RFIs, RFCs, responses and change directives. Ensure that the foremen and QC inspectors are using that work package in each shift.
Prepare QA sample plan per QA plan	Prepare Construction QC pour plans per QC plan
Attend Pre-Construction Conference	Hold Pre-Construction Conference and safety talk
Review Pour Card	Develop Pour Card and Checklist
Assure all materials and mix designs are approved	Obtain all materials and mix design approvals
Verify and sample preparations for pouring	Verify all curing materials, reinforcing steel, embedments and subgrades are correctly prepared
Witness batch plant inspection and sample testing per plan	Perform batch plant inspections and assure staffing as required
Construction	
Verify that QC has documented location verification for as-built drawings. Sample check or witness sample inspection of selected dimensions.	Verify foundation location (station, offset, elevation). Document dimensions for as-built drawings.
Verify that QC has been performed. Spot check sample of foundations.	For spread footings, subgrade check and improvements must be done before forming. For drilled shafts, verify depth, cleanout, bottom strength and rebar cage support.
Verify and sample preparations, forms, reinforcing steel, and anchor bolts	Verify forms are ready for pour including clean, proper placement, conformance to drawings, shoring, reinforcing steel, and anchor bolt size and pattern
Verify contractor has contingency plans	Assure contingency plans, backup equipment are in place
Witness preparations and pour controls	Control actual pour for rate, height, timing, water control, temperature, vibration, etc.
Witness and test all truck inspections and tests for small lots. Develop sample plan for large lots.	Verify every truck delivery ticket for mix design and batch time; perform testing for slump and air entrainment
Prepare Inspectors daily reports with details of first truck, last truck, weather conditions, and work performed. Include details of witness, testing and sample plan (reduce sample if large quantities).	Document all trucks and work performed
Verify all measurements are performed and checked	Perform all inspections, measurements and calculations per pour card and plans
Take QA test samples and cylinders as required in specification and QA plan. Testing by independent and certified QA staff. Verify QC samples are taken correctly. For small quantities do 100% testing.	Take QC test samples and cylinders as required in specification and QC plan. Testing by independent and certified QC staff. For small quantities do 100% testing.
Verify documentation of as-built details and document any deficiencies	Document all changes and details for As-Built Plans
Verify concrete protection and curing methods employed, per plan	Ensure concrete protection and curing methods employed, per plan
Note last day and time of work	Document all work and times as needed

4.4.4.3 ITS QA/QC

A third important aspect is the application of QA/QC procedures to the integration and testing of the project's ITS elements. In this case, QA ensures that proper test plans have been developed and test results are properly executed and documented to provide confidence that the tested elements meet project requirements. QC represents the documentation and tracking of the ITS elements throughout the system development, implementation and testing process. The TransCore team will ensure quality through a three-tier sequential testing process that is designed to catch defects early and test the ITS components throughout the implementation process protecting the project schedule, controlling cost and verifying requirement conformance.

Stand-Alone Testing will be performed by the supplier of each ITS infrastructure component, device and network component as defined in *RFP Sections 2.17, 2.18 and 2.19*, respectively. Each supplier will be required to certify that its equipment meets manufacturer specifications and all applicable industry and RFP requirements. Individual components and devices will also be tested by the QC Testing staff upon receipt at the project facility and prior to installation in the field. A log of the testing and certifications will be created and maintained for each element and tracked throughout the implementation process. The TransCore team will cooperate with the VDOT central software supplier during this period to enable them to test their software against the field equipment being installed.

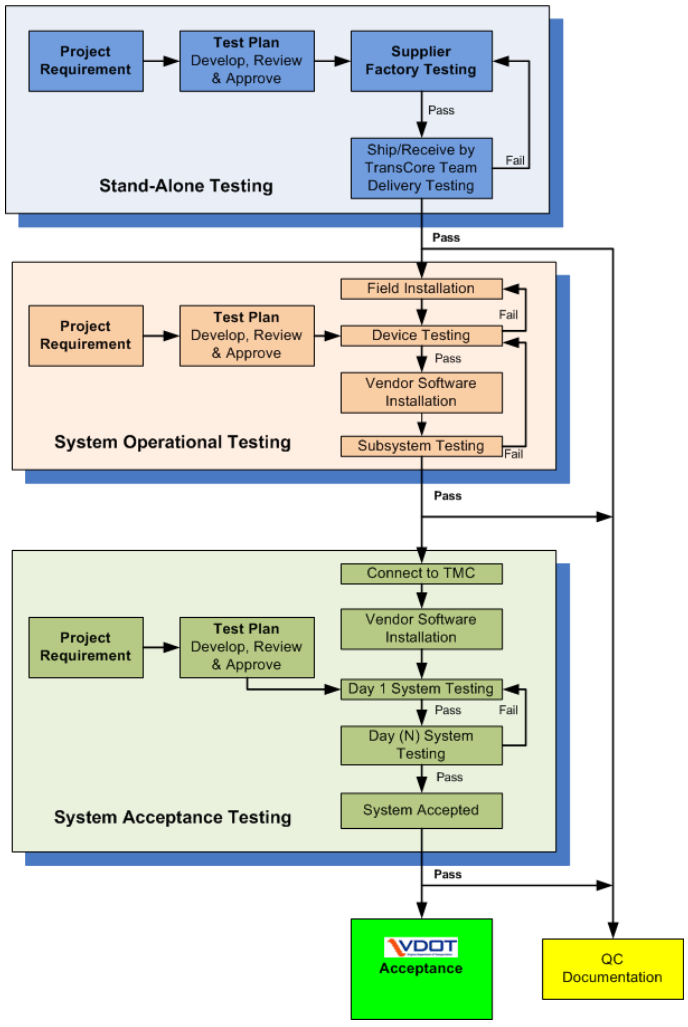


Figure 7 – ITS QA/QC Workflow Diagram

System Operational Testing will be performed by the QC Testing staff. System Operational Testing will be designed to ensure that the TMC can successfully communicate with and control all aspects of the ATM system. Individual ITS devices will be tested after installation in the field in combination with other components. For example, System Operational Testing involving CCTV cameras will also include video encoders, Ethernet switches, cabinets and the fiber optic cable system. System Operational Testing will be conducted through use of vendor-supplied software running on a test workstation installed at the TOC.

System Acceptance Testing will be performed by the QC Testing staff. As per *RFP Section 2.20*, Acceptance Testing will be performed over a sixty (60) consecutive day period under real-world operating conditions without system failure. Acceptance Testing will also be conducted through use of vendor-supplied software running on a test workstation installed at the TOC.

Test Plans will be prepared for each tier of the process and submitted to VDOT for approval a minimum of thirty (30) days before testing is started.

The Test Plans will consist of elements such as:

- Introduction
  - Purpose
  - Reference documents
  - Traceability matrix
  - Points of contact
- Testing Process and Methodology
  - Test plan objectives
  - Testing methods
  - Assumptions
  - Source documents
  - Environmental needs
  - Training needs
  - Testers
  - Organizational responsibilities
  - Problem identification and resolution
  - Test scripts
  - Issue tracking
  - Disposition of signed scripts and final acceptance signature sheet
  - Estimated schedule for testing and locations
- Final Acceptance Sign Off Block (when all scripts are accepted)

The traceability matrices will array supplier specifications and/or RFP requirements against the specific test(s) that will demonstrate whether that specification or requirement has been met.

The Test Plans will include provisions for training personnel identified by VDOT who will have eventual responsibility for operating and maintaining the ATM.

The test scripts will be a systematic description of the operator actions required to execute the test with a description of the expected outcome. Each test script will include a sign off block for the tester, VDOT observer and an indication of ”Pass,” “Fail,” “Could not be Completed,”

"Accepted As Is" and a comment area. A testing log will be created and maintained by the party responsible for the test.

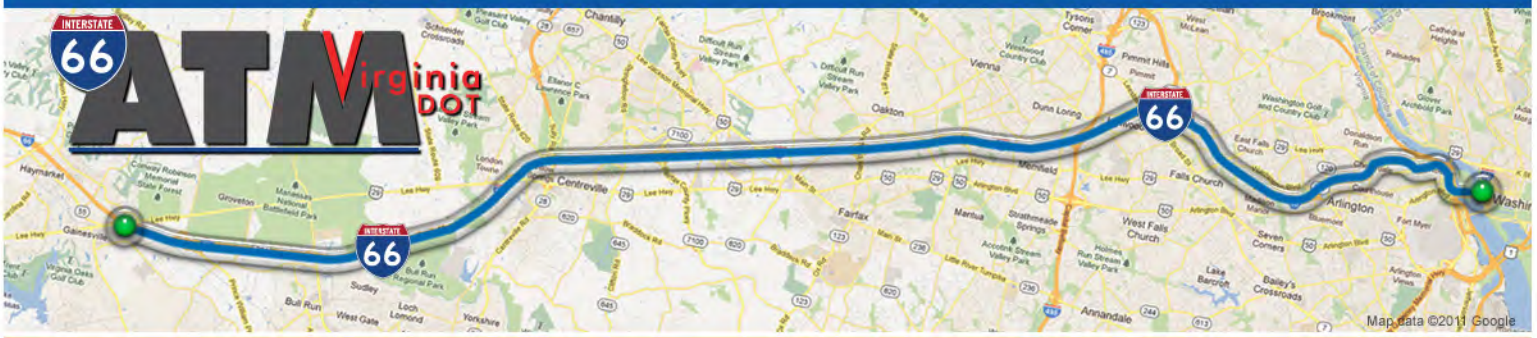
Notifications of scheduled tests will be provided to VDOT at least seven (7) days before scheduled tests and accommodations will be made for participation by VDOT staff or representatives. Reports will be prepared and submitted to VDOT documenting the results of all testing activities. These reports will verify that test plans and procedures were followed, present the results recorded and follow-up actions required and associated timetable. The reports will contain certification signatures of both the Design-Build Project Manager, the Quality Assurance Manager and any VDOT representative, if present and witness to the testing.

During Acceptance Testing, it is understood that any system failure of supplied equipment or discovery of deficiency that causes a system failure will be cause to halt and repeat Acceptance Testing in its entirety for a full 60-day period after correction of the problem. The TransCore team will respond to VDOT notification of issues within four (4) hours and complete all repairs within 48 hours, with the exception of communication failures that will be completed within 24 hours.

The Quality Assurance Manager will ensure that proper Test Plans are prepared, appropriate notifications provided to VDOT, reports thoroughly documenting the results of testing activities promptly submitted to VDOT and follow-up actions taken within the required timeframes.

The TransCore team will provide manufacturer's warranties on all furnished equipment for material and workmanship that are customarily issued by the equipment manufacturer. The TransCore team will also provide a sample unit for all ATM ITS devices to be controlled by the central software platform (lane control, vehicle detection and shoulder lane monitoring) and all supporting communications protocols/API's/SDK's for these devices to VDOT so that this equipment can be integrated into VDOT's ATMS software.

4.5 Construction of the Project



4.5 CONSTRUCTION OF THE PROJECT

4.5.1 SEQUENCE OF CONSTRUCTION

TransCore has provided a complete CPM schedule and a detailed explanation of our phasing in *Section 4.6*. This schedule accounts for all of the elements requested in the RFP, and the phasing of work has been developed taking into account the logistics involved in completing this project on time with safety at the forefront.

Our general approach to working through the most congested, inaccessible areas from start to finish is driven by the safety and operations each step of the way. Working in the manner we have identified, we will take care of the difficult areas early in the schedule. These areas have challenging traffic control and environmental constraints. The reality of any construction effort of this size is that we may need to accelerate schedules by adding additional crews during periods of high volume construction activities. This will be much easier and safer in the more open areas west of the project and after we have repeated the construction sequence for each element of the project several times.

Specific safety and operations for deploying each phase of the project are discussed in the remainder of this section and map directly to the RFP requirements of the Evaluation Criteria identified in *RFP Section 4.5.1*.

Geotechnical Investigation

Our geotechnical work needs to address safety on two fronts: the actual field work and proper use of the reports that are generated from the investigation. With regards to the actual soil bores, TransCore will have a small, dedicated soil bore crew that will begin work immediately. As the geotechnical team will have some of the first crews to work on site for the project, it is particularly important to provide information to the public and stakeholders concerning the upcoming activity and to have proper traffic control in place for that team. Our team will get this work done quickly, but will also have its own traffic control to assure the process is safe.

The second consideration regarding safety and the geotechnical analysis is the proper use of the soil analysis to determine the structural stability and characteristics at each location and to use this information in the design of foundations. The geotechnical analysis will be used at each site, and these reports will be submitted to VDOT for their review along with our foundation designs.

Environmental Compliance

Our team is very aware of the environmental rules and regulations of both VDOT and the State of Virginia and has an outstanding record of compliance. Both TransCore and Elite have the VDOT Erosion and Sediment Control Contractor Certification and the Virginia Responsible Land Disturber Certification and will adhere to the rules and regulations of both VDOT and the State of Virginia.

Existing ROW Constraints

The corridor has several instances where the Right of Way will be challenging. The TransCore team will work with VDOT and its stakeholders through our entire design and construction process to mitigate these constraints to the extent possible. When we are going to encounter extremely difficult situations in the field, we will work to inform the public well in advance and

assure that all stakeholders are as comfortable as possible with the proposed construction activity and MOT plan for that site.

Warehousing

An important element in our phasing of the project that will help assure safety will come through the use of a warehouse. In addition to our local facilities, TransCore intends to establish a project specific warehouse centralized to the corridor. This will have key impacts on the safety and operations of the entire project. All operations at this warehouse, including receiving, assembly and testing, will be completely open and transparent to VDOT and appropriate stakeholders.

The warehouse will provide additional space to receive and preassemble structures. Preassembling our structures in a centralized location and delivering them to the site will minimize our impacts on MOT. Furthermore, when we encounter a problem in assembly, we will be dealing with it in a controlled environment.

The warehouse will also provide a central location to receive, inspect and test all elements that come in the system which will streamline operations. By properly inventorying and verifying each and every element, and staging all elements by site while at a facility we will avoid unnecessary additional trips to the field, and the impacts associated with those trips.

Staging and Storage Areas

Each of the staging areas is tracked individually in the schedule. These can be installed as environmental permitting is cleared and sequenced at the convenience of VDOT. We will begin this work as early in the project as possible; however, it is worth noting that at a few of these locations there may be wetland challenges and during our preliminary investigation we determined that these areas may take more time. These issues will be dealt with in accordance with the appropriate environmental compliance.

Construction Activities

Safety and streamlined operations are critical to each and every activity in the project. These elements were taken into account in our proposal schedule and they were at the forefront of our internal conversations as we reviewed the corridor.

Prior to any construction activity, our team will establish a safe working environment to include the required MOT on a site by site basis. Since we will have pre-staged all of our structures, poles and devices to the fullest extent possible in our warehouse prior to deploying to the field, we will assure that we are at each site for only the time necessary to complete it. Our foremen will verify that crews have all necessary tools and equipment necessary when on site, and they will monitor the crews for safe and efficient work practices. Once we are in the work area for each site, our team will utilize the latest equipment and technology necessary to complete the activities for each site whether it be excavating, forming and pouring a footing, erecting a structure, or testing a detector. We will have the correct people with the appropriate tools and equipment at each site.

Our entire team is dedicated to MOT and will watch over each other and self monitor to ensure 100% compliance. We will follow our internal company safety plan which emphasizes safety through weekly tailgate safety meetings, monthly meetings and mandatory annual training.

Maintenance and Protection of Traffic

As with any type of highway project of any magnitude, one of the most important factors to consider is the potential impact on traffic. In regards to maintenance of traffic, our team has performed countless closures in this very busy corridor with zero incidents and no violations. We have achieved this success by providing the most up to date training and equipment to our crews. By following the policy of strictly adhering to all local and federal regulations, holding regular training sessions with our certified safety and maintenance of traffic supervisors, we have the highest levels of confidence in our ability to perform this task successfully.

Public Involvement/ Stakeholder Coordination and QA/QC Reviews

The TransCore team's approach to QA/QC is detailed in *Section 4.4.4 Quality Assurance/Quality Control*. While TransCore has a comprehensive internal program for both Design and Construction, VDOT also plays a critical role in these functions. Stakeholder meetings will be held to address general project concerns, and feedback from that process will guide the project per VDOT's direction from those meetings. Through design, VDOT and the appropriate stakeholders will provide input in the design packages for all systems. Further, through the construction process, VDOT will provide critical input on construction processes and MOT plans. Finally, through the process of overseeing construction, testing and integration, VDOT will provide input at every step of the installation process from pouring of foundations to the final testing of the system.

Delay Mitigation

The TransCore team recognizes that delay mitigation is key to this project due to its size and complexity. We have assembled a team of individuals who are intimately familiar with the design-build process for large, fast paced systems and who know how to mitigate delays. In planning the project, we have consistently identified ways to manage delays including the following:

- Our entire design and construction phasing is aligned with planned early completion of the riskiest sections of the corridor.
- We have done extensive field review and significant pre-design activities to assure our success.
- We have a significant amount of submittal information gathered as we qualified vendors during the proposal process, and we will be ready to issue material submittals immediately upon Notice to Proceed.
- Our procurement department has national access to multiple outlets for nearly all elements of this project and long relationships with the vendors we will work with. This national presence and buying power allows us to often move to the front of the line if we encounter problems in the manufacturing cycle. For higher risk areas, such as structures, we have alternative vendors if issues were to arise.
- For design, we have dedicated multi discipline teams to investigate sites quickly, as well as dedicated crews for power, soil bores and surveys, which are the critical and near critical path elements in our schedule.
- We have planned multiple crews for tasks such as power and foundations during construction.

- Our warehouse will be set up to assemble and test all elements prior to their installation in the field.
- We have an unparalleled understanding of the network and system integration.

We have provided VDOT a detailed CPM schedule, as well as several pages of supporting text in *Section 4.6* of this proposal. TransCore embraces the scheduling process. Our managers work directly with an assigned project scheduler to regularly update, track and monitor the schedule based on actual input from the job superintendents, foremen and VDOT representatives. This scheduling is regularly submitted for review and meetings are set specifically to address the schedule. This process is the most important factor in the successful identification and mitigation of risk, and it will be actively managed from Notice to Proceed to Final Acceptance.

Operations of Existing Systems

The TransCore team recognizes that keeping the existing systems up and running is of the highest importance to VDOT and we will do everything in our power to ensure that any disruption in service is preceded by advance warning and assurance that the service is restored as quickly as possible. We also recognize that these tools are valuable for us as well, as the DMS and cameras play a role in protecting our crews and helping VDOT disseminate delay information and advise travelers of our presence and impact beyond our traffic control. We are keenly aware of the existing elements of the system, and our response to any outages will be the best possible scenario for returning service to VDOT.

4.5.2 TRANSPORTATION MANAGEMENT PLAN

A Transportation Management Plan (TMP) accompanies the design of a project and presents a set of transportation management strategies, describing how they will be applied to address the work zone impact of a roadway object. In November of 2004, FHWA published updates to the Work Zone Safety and Mobility Rule, which states that the TMP for all projects must include a Temporary Traffic Control (TTC) Plan that addresses traffic safety and control throughout the work zone. If a project is considered significant, as this project is, then the TMP must also contain both transportation operations and public information components, and be integrated with the TTC Plan into a single document detailing the site specific issues and project requirements.

In addition to FHWA requirements, the TMP for this project will be written pursuant to VDOT's updated Work Zone Safety and Mobility / Transportation Management Plan Requirements / IIM-LD-241.5 procedure, dated September 19, 2011. It will address Maintenance of Traffic (MOT) issues and details pertinent to the I-66 ATM.

The I-66 ATM TMP will comply with the following standards:

- VDOT Technical Requirements
- VDOT Virginia Work Area Protection Manual (VWAPM), 2011
- Manual of Uniform Traffic Control Devices, 2009
- Virginia Supplement to MUTCD, 2011
- Instructional & Information Memoranda, IIM-LD-241.5
- TED 351.3

The TMP will primarily be developed concurrent to the Sequence of Construction (SOC) plans. However, portions of the TMP, specifically the Public Communications Plan and Transportation Operations Plan, will be developed independent of the SOC plans.

The TMP will consist of a report documenting the operations of the final SOC phases, as determined through this iterative process. Detours, traffic control modifications, flagging operations, closures, and other significant changes in traffic flow may also be discussed or evaluated.

In addition to the report, a TMP plan sheet will highlight the significant elements from the TMP report, as well as critical contact information and procedures identified in the TMP report. The TMP plan sheet will be included with the set of SOC/MOT plans.

There are several distinct components of the project. The Temporary Traffic Control measures for each of the components as they relate to the TMP are as follows:

- ATM LCS and DMS structure and gantry installations
  - Full Short-Term/Nighttime Closures
  - Partial Closures
  - Shoulder Work
  - Detours
- Ramp Metering Installations
  - Shoulder Work
  - Partial Ramp Closures
- Shoulder Lane Monitoring Systems, Vehicle Detection Systems, and CCTV Camera Installation
  - Shoulder Work
  - Partial Lane Closures

Temporary Traffic Control Plan / Sequence of Construction

This project is classified by VDOT as a Type C project, which is considered significant by VDOT, as defined by VDOT's IIM-241.5 project criteria. Typical Type C projects involve a long duration construction or maintenance on Interstates and freeways that occupy a location for more than three days with intermittent or continuous lane closures, primarily in metropolitan areas, including Northern Virginia. This type of project also includes Interstate and Principle Arterial Roadways with complex multi-phase construction, high accident rates, full closures, or multiple work zones (two or more) within two miles of each other.

The SOC for Type C projects consists of lane closures with several traffic shifts that may include temporary pavement or detours for the duration of the work. The impact to traffic operations extends beyond the work zone and affects alternate and/or detour routes.

Temporary Traffic Control Plans (TTCP) consist primarily of plan sheets, as well as supplemental information in the TMP, and will include the following:

- Detail Plans / Detail Drawings
- Access
- Detours
- Traffic Control Changes
- Miscellaneous Intersection / Location Details
- Flagging Operations
- Reduced Lane Width Locations
- General Notes

- Typical Sections
- Special Detail

The TMP will detail the work zone time restrictions for I-66 mainline and ramps, as well as identify the Temporary Traffic Control (TTC) details from the 2011 Virginia Work Area Protection Manual applicable to each work zone location.

Impact on Traffic (Traffic Operations Analysis)

The Traffic Operations Analysis will utilize existing traffic volume information from VDOT's online database in addition to hourly volume information obtained from continuous count stations in order to determine daytime and nighttime traffic volumes.

While it may be possible to perform shoulder work on ramps or along the interstate with no lane closures, it will be necessary to completely close an entire direction of I-66 to erect gantries to span the entire roadway. As a result, an analysis of traffic management techniques will be necessary, including the assessment of temporary detour routes and/or the assessment of queues on I-66 because of a temporary 15-minute complete closure during nighttime hours.

The Traffic Operations Analysis will be an iterative process, in that the designers will determine the appropriate sequence of construction, which will then be analyzed as necessary to determine how well each phase operates. Traffic engineers will then determine if the SOC provides acceptable traffic operations (not significantly worse than baseline conditions), or if the SOC needs to be modified due to significant capacity limitations.

The operations analyses will consist of the following, only at applicable locations in which capacity is limited by construction:

- Traffic Data Collection (from online database or other sources)
- Analysis Methodology
- Existing Traffic Conditions
- Baseline Conditions (Before Construction)
- Sequence of Construction Analysis

Public Communications Plan

VDOT and the project team both have a role to play informing the public of project related traffic impacts. Together, they are responsible for producing and implementing an overall communications plan for the project. The Public Communications Plan ensures that:

- Stakeholders are aware of the project and its impacts
- Communications issues are identified to VDOT and the project team
- Groups directly impacted by specific phases of the project (local residents, businesses, etc.) are appropriately informed
- The traveling public are informed in a timely manner of events that may negatively affect traffic movement
- First responders, law enforcement, etc. are informed in a timely manner of events that may negatively impact traffic movement

The Public Communications Plan identifies actions and procedures to inform the traveling public, project stakeholders, and others of current traffic operations and planned changes to traffic operations. The Public Communications Plan will be modified throughout the project life cycle to address issues as they arise.

The Contractor will provide information regarding full roadway closures, temporary detours, and lane closures to VDOT. VDOT will then manage public information and communications.

VDOT will communicate this plan to its employees, contractors, and subcontractors, as well as make it available to the public. VDOT will also establish procedures to receive and respond to inquiries, and alert potentially affected entities up upcoming closures, detours, etc. VDOT and the Contractor both have a role to play informing the public of project-related traffic impacts. Together, they are responsible for producing and implementing an overall communications plan for the project. A Public Communications Plan ensures that: stakeholders are aware of the project and its impacts; communications issues are identified by VDOT and the Contractor; groups directly impacted by specific phases of the project are appropriately informed; the travelling public are informed in a timely manner of events that may negatively affect traffic flow; and first responders, law enforcement, etc. are informed in a timely manner of events that may negatively affect traffic flow.

Transportation Operations Plan

The Transportation Operations Plan identifies actions and procedures for the Contractor to inform stakeholders, emergency personnel, regional transportation operators, etc. of incidents, planned and unplanned lane and road closures during construction.

The Transportation Operations Plan includes the procedures and notification for the Contractor to identify planned construction using VDOT's Lane Closure Advisory Management System (LCAMS).

According to the IIM-LD-241.5 procedure, the Transportation Operations Plan includes:

- Notification Process to Transportation Operations Center
- Emergency Response Agencies Contact List
- Procedures to Respond to Traffic Incidents in Work Zones
- Notification Process for Incidents and Related Traffic Delays
- Procedures to Clear Incidents
- Process to Review Incidents

4.6 PROPOSED SCHEDULE

We have provided a detailed project schedule that illustrates our approach to this project. Our project schedule shows a final completion of 742 calendar days, which is a Final Completion Date of November 28, 2014. We believe we have developed a schedule that is not dangerously aggressive or overly conservative, but rather that is based on realistic, achievable milestones with reasonable crew sizes and construction durations to deliver the project on time.

While this schedule has been customized to this project, it is based on a proven work breakdown structure (WBS) that is the template for TransCore's approach to all ITS projects that has proven successful to track, manage and deliver a project within the time constraints of the contract. The baseline project schedule we have submitted reflects milestones and key tasks of each subsystem and phase of the VDOT I-66 ATM that influence the completion efforts of the project. These milestones and key tasks will be tracked through updates in coordinated meetings to help our project management team assess and formulate mitigation options if variance in the target dates of those efforts causes favorable or unfavorable impacts to the project schedule.

TransCore uses Primavera, the industry standard for Critical Path Management (CPM) through regularly scheduled updates with the entire project team including stakeholders, to allow us to manage and control the constantly changing conditions in the construction environment. Our project schedule included herein illustrates a layout to show our phasing of the project by major work areas and has a Gantt chart, which displays the critical path in red for easy identification. Using Primavera, we can generate multiple views of the schedule utilizing various filters and custom views for VDOT, as well as running any reports on specific elements of the schedule to provide whatever elements and viewpoints that VDOT as well as other stakeholders are focused on at any point in time.

Our project schedule is fully compliant with the RFP. We have based this schedule on our own proven WBS, using project specific activities with actual forecast durations based on the crew hours assigned for each of the major tasks. We have incorporated all of the milestones identified in the project and allowed for reasonable periods for design and submittal reviews by stakeholders, procurement times and influences by third parties (i.e., power companies and permits) that can potentially derail a project workflow and consume float.

Our critical path flows through the power system for the project (not unexpected on a project covering this much area) and follows a path through design, permitting, procurement construction and testing. As this is a critical path schedule, the interrelationship between activities is very apparent and as the workflow progresses, it is possible and in fact probable that other high risk, low float activities like the structures path will become critical or near critical. The possible impacts and inter-relationships of the activities are illustrated in the schedule to the extent that they can be reasonably viewed, and further discussed in the *Critical Path* section of this proposal. Further, the CD included with this proposal provides the entire schedule electronically, which will allow the evaluation team to clearly view our schedule details beyond what can be shown in print.

To analyze overall schedule progress, TransCore's Project Scheduler, Project Manager and team task leads will review and update the schedule at a minimum on a monthly basis. Throughout the month, progress will be recorded by task leads into a monthly update template.

Weekly meetings will also be used to review activities and discuss progress. Towards the end of the month, updates are entered reflecting the actual start and finish dates, revised start and finish dates and increased/decreased remaining durations, external constraints and revised sequencing of work. The Project Manager will review the draft monthly schedule update in detail. Any changes will be identified and schedule impact mitigation planning will occur as necessary.

WORK PLAN

A CPM schedule for a project of this magnitude is a complex, necessary tool to appropriately plan for all aspects of the project. This project schedule has been developed based on our experience on similar scope projects with significant input from our key subcontractors while incorporating the key dates set forth by VDOT in the contract documents. Through this effort, key phases have been identified and committed by the appropriate members of the team. These phases and the key players who will carry out the phases are detailed in the schedule and are summarized in the following table:

PHASE OF WORK	RESPONSIBLE PARTY
Contract Administration	TransCore team, VDOT, Stakeholders
Design Phase	TransCore and PB
Submittal Phase	TransCore, PB and Elite
Procurement Phase	TransCore and Elite
Construction Phase	TransCore and Elite
Integration and Testing Phase	TransCore
Training Phase	TransCore
Acceptance Phase	TransCore and VDOT

These phases are designed in a logical order while still providing the ability to overlap in many instances so that overall project delays are minimized. The responsible party for each phase of work has been distributed to maximize the overlaps and take the greatest possible advantage of the allotted time for the project.

Contract Administration – The key step and foundation of this project will be the Project Administration phase. Key players include the entire TransCore team, VDOT, FHWA and other stakeholders in the project. This phase would include:

- Meetings
- Coordination and information sharing between stakeholders
- Traffic control (and notification of traffic control to travelers)
- Quality Control/Quality Assurance
- Safety

Design Phase – The immediate start of the design phase is critical to maintaining the schedule for the project. To ensure the timely completion of this work, the work will be completed by both TransCore and PB staff, with review and approval by appropriate stakeholders. This spreads the workload so that the other stages can begin as soon as possible. However, TransCore and PB will work hand in hand with VDOT to ensure comprehensive design packages are developed, including the following areas:

- Underground Conduit/Boxes
- Structural
- Electrical
- ITS Devices
- Communication System

For each of those packages, draft component plans and final plans will be developed and distributed for review and comment to both VDOT and the TransCore team members constructing the project.

Submittal Phase – The submittal phase will consist of providing VDOT the equipment cut sheets of the proposed equipment for the project for review and approval as well as testing and training procedures for each of the appropriate elements. This phase can be conducted mostly in parallel to the design phase. The submittal groups will be prepared by the entire TransCore team. These items will be submitted in logical groups to minimize the required reviews. A submittal log will be kept by TransCore to document the entire process.

It is our experience that the submittal process is often drawn out, directly affecting the project schedule. Therefore, to streamline the project, TransCore has completed most of the submittals for these items already and will be prepared to turn them in immediately upon issuance of NTP.

Procurement Phase – This phase will overlap with the design and construction phases. This phase of the project is often times where inexperienced teams get behind in schedule, not fully realizing the varying lead times associated with the different ITS equipment. To aid in properly tracking the equipment arrivals and how they affect the schedule, the equipment will be tracked by TransCore and will be part of the schedule. TransCore, as the prime, will procure all major materials required for this project, ensuring proper tracking and delivery of all project items.

Construction Phase – The construction phase has been broken down into several distinct areas in the CMP as this is how they are best mapped to the interrelated activities of design, submittals, procurement and testing. In general, the Construction Phase and staging of the construction are broken into distinct sections:

- *Fiber Optic Communications Construction* - This work consists of underground construction and the installation, termination, splicing of fiber and termination panels.
- *Power System Construction* - Conduit systems, conductors, transformers, LP work, terminations, coordination with local utilities and energizing systems are the primary components of the Power Systems.
- *DMS Construction* - Guardrail as needed, foundations and pads, erecting structures, installing the DMS and proper grounding make up the DMS construction.

- *Lane Control Signals Construction* - Guardrail as needed, foundations and pads, erecting structures, installing the DMS and proper grounding make up the LCS construction.
- *CCTV Construction* - Foundations and pads, installation of the pole, devices and cabinets (and cabinet equipment) as well as proper grounding are the key components of CCTV Construction.
- *MVD Construction* - Foundations and pads, installation of the pole, devices and cabinets (and cabinet equipment) as well as proper grounding are the key components of MVD Construction.
- *Ramp Meter System Construction* - Guardrail extension, foundations and pads, installation of the pole, devices and cabinets (and cabinet equipment) as well as proper grounding are the key components of RMS construction.
- *Shoulder Lane Monitoring System Construction* - Foundations and pads, installation of the pole, devices and cabinets (and cabinet equipment) as well as proper grounding are the key components of SLMS Construction.
- *Static Guide Sign Construction* - Installation of the foundations, structures, signs and removal of existing signs and structures are the keys components of Static Guide Sign Construction.
- *Staging/Pull-Out Area Construction* - Each of the staging areas are tracked individually in the schedule. These can be installed as environmental permitting is cleared and sequenced at the convenience of VDOT.
- *Communication Equipment Construction* - Establishing a test environment for proof of concept, installing field switches and installing the hub equipment are the key elements of the Communication equipment.

Integration and Testing – The integration and testing phase of the project is where TransCore will ensure proper functionality of the new ITS devices and the communications network. Prior to the comprehensive testing of each device and subsystem, TransCore will integrate devices and systems to make sure they are operating properly prior to beginning testing.

The project identifies the testing for each of the devices and systems identified in the RFP. This includes factory tests, material bench test, stand-alone test, central control/system operational subsystem testing for each device as well as pre-installation field test for LCS and DMS and design approval test for RMS and MVD.

Integration and Testing will be done as soon as possible for each device and system and intertwined with the Construction phase to assure the project progresses as quickly as possible.

Training – The training phase accounts for the operational and maintenance training for each device and subsystem identified in the RFP.

Corridor Partial Acceptance – This has been broken out into a separate phase in our project schedule. This phase and the associated milestones represent the completion of the project and tie the entire system together. In addition to the actual acceptance period, during this time we will prepare any final close out documentation for the project.

CRITICAL PATH

Our project scheduled shows a final completion of 742 calendar days, which is a Final Completion Date of November 28, 2014. This schedule is driven by a complex interrelationship of each of the phases discussed in the previous section. As one would expect in a project this large and complex, the critical path lies squarely on the construction of the power system. However, it is also worth noting that the DMS and LCS systems are near critical, and that if the power system goes more smoothly than anticipated and there is a hiccup in the procurement, foundations or traffic control, that it is likely that the DMS and LCS will become the critical item. Therefore, we will briefly discuss the path of the power and the DMS/LCS, what we see as the risks, and how we will mitigate and manage those risks to the extent possible.

The power, DMS, and LCS systems are likely to be critical path items.

Power – In most ITS projects, power often becomes a critical path item even if it is not that way at the start. There are usually one or two demarcation points that are outside of the control of the project team and in the hands of the power company that for some reason becomes a sticking point. In this project, due to the size of the corridor, the number of power points, and the lack of accessibility of some locations, our schedule has driven this out as the critical path prior to starting the project.

Beginning with the design effort, we will need to visit each site and identify power demarcation points suitable for the power loads associated with each element and identify the path from that demark to the cabinet. In many cases these may be existing, however, it must be determined if there is suitable power at existing sites. In some cases, it will be necessary to work with the power company to get new power lines - whether through new conduit or a new pole line - to the location. Once designed, we must secure permits, order and receive materials, and being construction. During construction, to the extent possible, we must maintain clearance from existing infrastructure to avoid reworking existing utilities and avoiding having to excavate and repair shoulders and lanes. Finally we must terminate power demarks and hold inspections as necessary prior to energizing the devices. Construction is typically difficult, and coordinating with Dominion Virginia Power and Northern Virginia Electric Cooperative (NOVEC) to energize devices can be a lengthy process. As such, we have allocated a long duration of 269 calendar days to accomplish all of this work.

To mitigate the risks, it is important for TransCore to be aggressive and to have the full support from VDOT in the areas we can control. Design and submittals will be done as expeditiously as possible, and we will be pressing for reasonable turnaround times on submittals. For common conductors and obvious transformer locations, we must begin procurement as soon as possible. We will also construct the conduit path as quickly as possible and will leverage experience with local utility contacts to facilitate the permitting and inspection process as quickly as possible.

DMS and LCS – The DMS and LCS are high-risk items that are "near critical" and as such worth mentioning here. The complexities of the interrelated phases put this work at risk:

- *Structures:* Prior to ordering structures, each site must be staked, test borings drilled, have a soil analysis and be surveyed to assure proper information is available for design. Then a structures design must be submitted and approved. Only then can the process of manufacturing begin. In the case of this project, with the traffic control and work area requirements being restricted, especially in the east end of the corridor, we must allow enough time to overcome additional challenges in the installation. We will mitigate risk to the extent possible by receiving structures in staged deliveries in the order we want to install. The structures component has many potential pitfalls that must be addressed.
- *Foundations:* Foundations go hand in hand with the structure. Soil borings and surveys not only dictate the structure design but also the foundation design which must be completed consecutively. The foundation construction is also going to be difficult due to the traffic restrictions and night work in the area. The subsurface conditions are also likely to be difficult, with crowded utilities and difficult excavating conditions. Finally, the foundation must be coordinated with both the structures delivery and the sign delivery.
- *Signs:* The DMS and LCS themselves are a long lead item and the quantities are significant which lends to schedule risk. Prior to ordering the signs, they must go through a submittal and review process. Then a factory test will be required (which also must be submitted and approved) prior to releasing the entire order. Next, the signs must be tested, and delivered in a coordinated manner with the appropriate structure throughout the life of the construction period. Finally, they must be integrated and tested appropriately.

To mitigate the risk, we are working with proven, quality vendors that we have a long history with on projects where large quantities are required in short durations. We have commitments from these vendors to complete staged orders aggressively so that we can complete this task as efficiently as possible. More importantly, the progress of these interrelated activities must be monitored and updated in the schedule by the project team to assure that all the steps come together at the right time for a successful system to be installed.

In our electronic submittal of the schedule, we have included the Primavera XER file for full disclosure of our schedule concerning activities, WBS, critical path analysis and relationship between activities. Further, we have included a variety of key reports in various formats so that anyone with or without a full working knowledge of Primavera can fully understand our approach. We believe in our schedule for this project and in our path to Final Acceptance within the Contract time. We want VDOT to be confident in our ability to deliver the project on time. A summary of schedule documents and files provided under the TransCore team submittal is shown in *Table 4.*

Table 4 – Schedule Documents

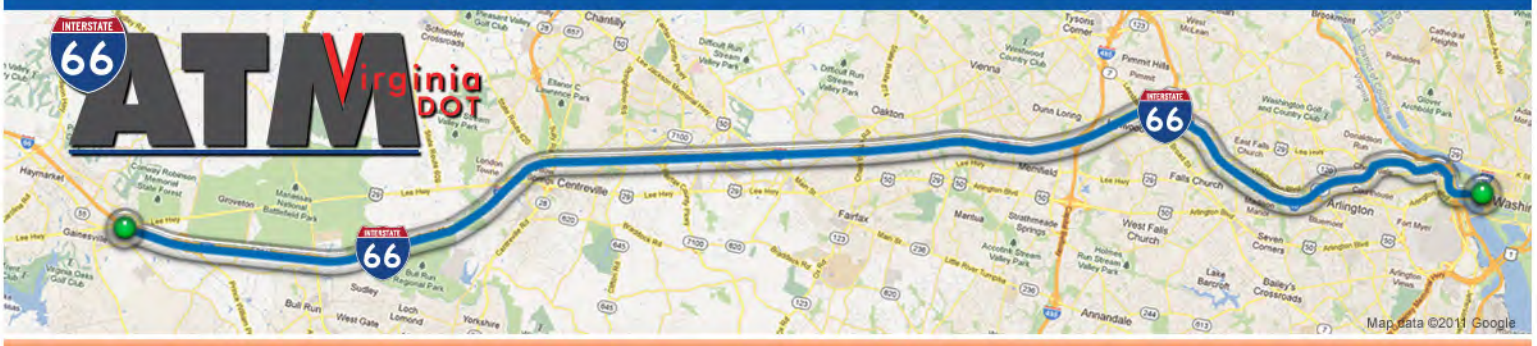
SCHEDULE DOCUMENT	FORMAT PROVIDED
Proposal Schedule (All Activities)	Print Copy, Electronic Primavera, Electronic Adobe Acrobat
Proposal Schedule (Longest Critical Path)	Print Copy, Electronic Adobe Acrobat
Proposal Schedule (Near Critical Path Activities)	Print Copy, Electronic Adobe Acrobat
Proposal Schedule (WBS Summary)	Print Copy, Electronic Adobe Acrobat
Schedule Activities Report	Electronic Adobe Acrobat
Predecessor / Successor Report	Electronic Adobe Acrobat & Microsoft Excel

As a corporation and contractor, TransCore has embraced the CPM scheduling process as perhaps the most valuable tool outside of utilizing superior staff in managing, tracking and completing projects. Our company has a dedicated server network and network support staff that maintains our Primavera systems. Our Project Managers are regularly trained on scheduling and Primavera, and they are supported by some of the best schedulers in the construction industry. We firmly believe this approach to managing projects sets us apart from the typical ITS contractors who view scheduling as an unavoidable task that they must do only to comply with contract requirements.

VDOT
Virginia Department of Transportation

4.7 DBE

TRANSCORE



4.7 DISADVANTAGED BUSINESS ENTERPRISES ("DBE")

TransCore recognizes the importance and fully supports disadvantaged business enterprise programs and is committed to achieving the 15% participation goal for this contract. Given the contract size, our strategy will include DBE participation from a blend of different companies at different stages in both design and construction. We anticipate DBE participation to occur in the following areas of the contract:

- Public relations
- Geotechnical engineering and testing
- Construction of staging areas
- Supply of materials

With participation from multiple companies across both design and construction, TransCore is committed to achieving the fifteen percent (15%) DBE participation goal for the entire value of the contract.

Pulsar Advertising, Inc. (Pulsar), is a Virginia-certified small, minority and disadvantaged business, specializing in transportation marketing. Pulsar is a full-service advertising agency providing clients with everything from branding and situation analysis/planning to nationally recognized creative executions to highly effective public involvement strategies. Pulsar will provide public relations services for this project.

TransCore proposes to subcontract geotechnical engineering and testing to a DBE. One company under consideration is GeoConcepts Engineering, Inc., a Commonwealth of Virginia Disadvantaged Business Enterprise (DBE) and Small, Women- and Minority-owned business. GeoConcepts has worked closely with Parsons Brinckerhoff on past VDOT projects, and will bring synergy to the time-critical design process.

Construction of the staging areas is a target area for DBE contract participation. The staging areas consist of self-contained work elements consistent with more traditional highway construction. Based upon review of the Virginia Department of Minority Business Enterprise website, multiple companies are certified under NAICS 237310 HIGHWAY, STREET, AND BRIDGE CONSTRUCTION (et al.).

An example of DBE utilization for supply of materials includes Transportation Equipment & Services, Inc. (TES). Combining technology and the highest level of customer service, TES provides safer and more efficient travel systems using the finest quality products.

Final evaluation and determination of DBE participants will continue throughout the contract procurement process. However, TransCore is fully committed to the 15% participation goal for this contract.

PROJECT MANAGER _ _ _ _ _ _ _ _ _
SURVEYED BY _ _ _ _ _ _ _ _ _ _
DESIGN SUPERVISED BY _ _ _ _ _ _ _
DESIGNED BY _ _ _ _ _ _ _ _ _ _ _

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	0066-96A-917, P101, N-501	V.II-01

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TRANSCORE
PARSONS BRINCKERHOFF

VDOT

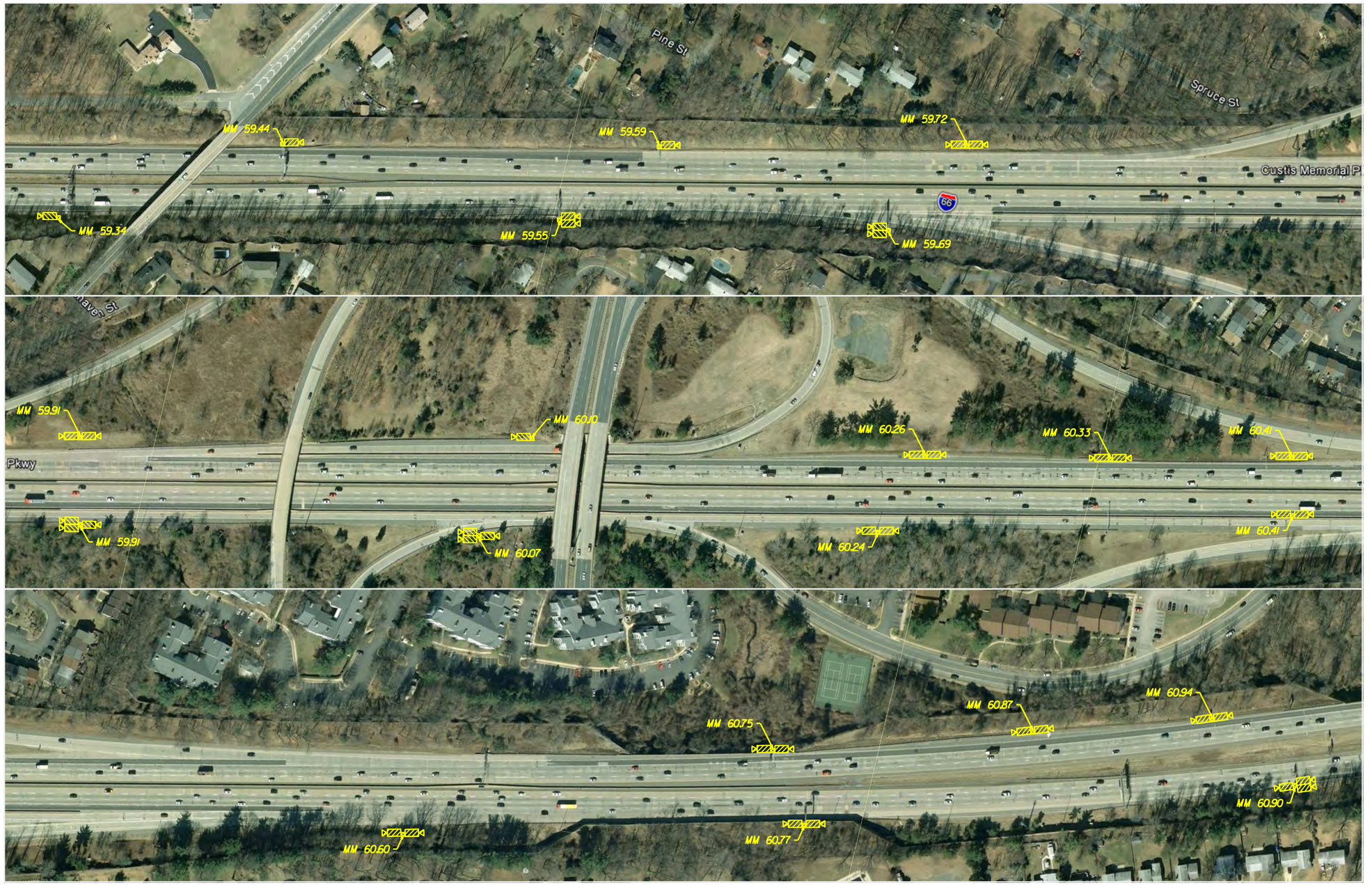
I-66 ATM

SLMS LAYOUT

SCALE: NONE	DATE: JULY 24, 2012	SHEET 1 OF 15
PLAN NO.	PROJECT 0066-96A-917	SHEET NO. V.II-01

PROJECT MANAGER _ _ _ _ _ _ _ _ _
SURVEYED BY _ _ _ _ _ _ _ _ _ _
DESIGN SUPERVISED BY _ _ _ _ _ _ _
DESIGNED BY _ _ _ _ _ _ _ _ _ _ _

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	0066-96A-917, P101, N-501	V.II-02



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I-66 ATM

SLMS LAYOUT

SCALE: NONE	DATE: JULY 24, 2012	SHEET 2 OF 15
PLAN NO.	PROJECT 0066-96A-917	SHEET NO. V.II-02

PROJECT MANAGER _ _ _ _ _ _ _ _ _
SURVEYED BY _ _ _ _ _ _ _ _ _ _
DESIGN SUPERVISED BY _ _ _ _ _ _ _
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REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	0066-96A-917, P101, N-501	V.II-03

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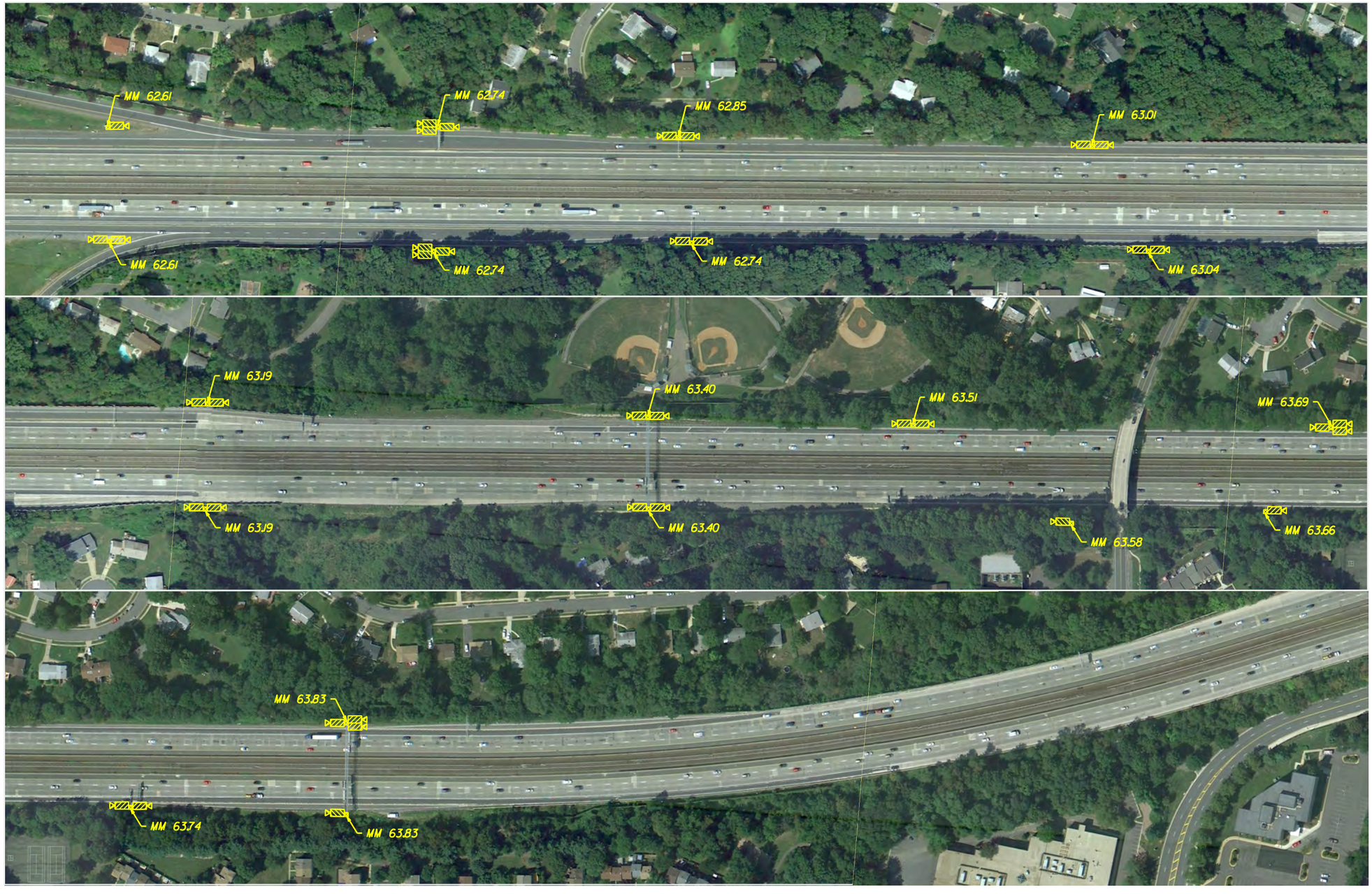
I-66 ATM

SLMS LAYOUT

SCALE: NONE	DATE: JULY 24, 2012	SHEET 3 OF 15
PLAN NO.	PROJECT 0066-96A-917	SHEET NO. V.II-03

PROJECT MANAGER _ _ _ _ _ _ _ _ _
SURVEYED BY _ _ _ _ _ _ _ _ _ _
DESIGN SUPERVISED BY _ _ _ _ _ _ _
DESIGNED BY _ _ _ _ _ _ _ _ _ _ _

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	0066-96A-917, P101, N-501	V.II-04



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VDOT

I-66 ATM

SLMS LAYOUT

SCALE: NONE	DATE: JULY 24, 2012	SHEET 4 OF 15
PLAN NO.	PROJECT 0066-96A-917	SHEET NO. V.II-04

$DATE$ $TIME$ $FILE$

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

I66 EB Shoulder Lane Monitoring System Locations

No.	Sheet No.	Nearest Mile Marker	Distance East of MM (feet)	Distance from Previous (feet)	Cameras Facing East	Cameras Facing West	Proposed CCTV Pole	Proposed Pole Extension	Proposed Cantilever Structure	Proposed Barrier Mounted	Prop. Sign Gantry or Existing	Notes
1	62	57.7		-	1			1			1	Eliminate Planned Site #1 (at 57.72)
2	62	57.9	20	1000	1	1			1			Move Planned Cantilever and Camera #2 (at 57.98) 380' Upstream
3	63	58	430	930	1	1			1			New Site
4	63	58.1	420	530	1	1			1			Planned Site #3. Use Existing MVD Pole?
5	64	58.3	180	940	1	1		1			1	Move 280' Downstream. Eliminate Planned Site # 4 at 58.41
6	65	58.5	120	870	1	1		1			1	
7	66	58.7	30	960	1	1					1	If we can, move sign gantry downstream 630'. Otherwise, move stand alone site at 58.66 to 58.70
8	66	58.8	370	870	1	1			1			Move Planned Cantilever and Camera #6 (at 58.7) 20' Downstream
9	67	59	300	990	1	1		1			1	Eliminate Planned Site #7 (at 59.11)
10	67	59.2	20	780	2	1					1	
11	68	59.3	220	610		1		1			1	Planned Site #8. Eliminate Planned Site #9 (at 59.35)
12	69	59.5	240	1090	2			1	1			Planned Site #10
13	70	59.6	440	720		2		1			1	Eliminate Planned Site #11 (at 59.68)
14	70	59.9	40	1200	1	2		1			1	
15	71	60	380	820	1	2			1			Eliminate Planned Site #12 (at 60.03)
16	71	60.2	220	890	1	1			1			Move Planned Cantilever and Camera #13 (at 60.22) 90' Downstream
17	72	60.4	80	930	1	1	1					Move Planned Pole and Camera #14 (at 60.40) 90' Downstream
18	73	60.6	15	980	1	1		1			1	Planned Site #15
19	74	60.7	370	870	1	1		1			1	
20	74	60.9	0	700	2	1		1			1	Eliminate Planned Site #16 (at 60.86)
21	75	61	450	1000	2	1		1			1	Move Planned Gantry and Camera #18 (at 61.07) 100' Upstream
22	76	61.4	170	1800	2				1			Move Planned Cantilever and Camera #20 (at 61.37) 240' Downstream
23	77	61.5	175	530		2		1			1	Planned Site #21. Eliminate Planned Site #22 (at 61.55)
24	77	61.7	180	1060	2			1	1			Planned Site #23
25	78	61.8	440	790	1	2			1			Eliminate Planned Site #24
26	79	62.1	200	1320	1	1		1			1	Proposed Camera #25
27	80	62.2	490	810	1	2				1		New Site
27A	80	62.4	260	800		1		1			1	
28	81	62.6	80	870	1	1		1			1	Planned Site #27
29	82	62.7	200	660	1	2				1		New Site
30	82	62.8	310	630	1	1		1			1	Planned Site #28
31	83	63.0	220	970	1	1		1			1	
32	83	63.1	490	800	1	1		1			1	Move Planned Gantry and Camera # 29 (at 63.13) 330' Downstream
33	84	63.4	10	860	1	1		1			1	Planned Site #30
34	85	63.5	450	970		1		1			1	Planned Site #31
35	85	63.6	280	370	1				1			New Site
36	85	63.7	230	450	1	1		1			1	
37	86	63.8	180	470		1		1			1	Planned Site #32
				TOTAL	**78**		**1**	**24**	**11**	**2**	**24**	

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VDOT

I-66 ATM

TRANSCORE
PARSONS BRINCKERHOFF

SCALE: NONE	DATE: JUNE 25, 2012	SHEET	OF
PLAN NO.	PROJECT 0066-96A-917	SHEET NO V.II-05	

$DATE$ $TIME$ $FILE$

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

I66 WB Shoulder Lane Monitoring System Locations

No.	Sheet No.	Nearest Mile Marker	Distance West of MM (feet)	Distance from Previous (feet)	Cameras Facing East	Cameras Facing West	Proposed CCTV Pole	Proposed Pole Extension	Proposed Cantilever Structure	Proposed Barrier Mounted	Prop. Sign Gantry or Existing	Notes
1	86	63.9	450	-	2	1		1			1	Site #1 (at 64.00)
2	85	63.7	70	715	2	1		1			1	Planned Site #3
3	84	63.6	480	970	1	1	1					Move Planned Pole and Camera #4 (at 63.46) 260' Upstream
4	84	63.5	520	570	1	1		1			1	
5	83	63.2	40	950	1	1		1			1	Move Proposed Gantry 330' Upstream. Eliminate Planned Site #5 (at 63.21)
6	82	63.1	490	990	1	1				1		New site at (63.01) Eliminate Planned Site #6 (at 62.98)
7	82	62.9	275	840	1	1			1			New Site
8	81	62.8	320	570	1	2		1			1	Planned Site #7
9	81	62.7	450	660	1			1			1	Eliminate Planned Site #8 (at 62.52)
10	80	62.4	60	1200		1		1			1	Planned Site #9
11	80	62.4	460	400	2	2				1		New site
12	79	62.2	330	920	1	1		1			1	Eliminate Planned Site #10 (at 62.08)
13	78	61.9	30	1300	1	1	1					Eliminate Planned Site #11 (at 62.01)
14	77	61.8	340	820	2	1	1					Move Planned Pole and Camera #12 (at 61.85) 600' Downstream
15	77	61.6	60	780	1			1			1	Planned Site #13
16	76	61.5	250	910	1	1			1			New Site
17	76	61.4	130	410	1	1	1					New Site
18	76	61.3	170	570	1	1		1			1	
19	75	61	280	1700	1	1	1					Move Planned Pole and Camera #13A (at 61.14) 1000' Downstream
20	74	60.9	170	410	1	1		1			1	Move Proposed Gantry and Planned Camera #14 (60.88) 70' Upstream
21	74	60.8	250	680	1	1		1			1	Eliminate Planned Site #15 (at 60.61))
22	72	60.5	460	1790	1	1			1			Planned Site #16
23	72	60.4	340	410	1	1	1					New Site
24	72	60.3	220	410	1	1	1					Eliminate Planned Site #17 (at 60.18)
25	71	60.1	15	900		1				1		New Site. Eliminate Planned Site #18 (at 60.00)
26	70	60	510	1020	1	1			1			Planned Site # 19. Move 20' Downstream and consider extending Proposed Sign Gantry on the Eastbound Side
27	70	59.8	430	1000	1	1			1			Move Planned Cantilever and Camera #20 (59.68) Upstream 250'
28	69	59.6	60	680	1			1			1	
29	68	59.5	330	800	1			1			1	Proposed Camera #21
30	68	59.3	180	920	2		1					New Site
				TOTAL	**60**		**8**	**14**	**5**	**3**	**14**	

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VDOT

I-66 ATM

TRANSCORE
PARSONS BRINCKERHOFF

SCALE: NONE
PLAN NO.
DATE: JUNE 25, 2012
SHEET
OF
PROJECT
0066-96A-917
SHEET NO.
V.II-06

REVISED
STATE
VA.
ROUTE
66
STATE PROJECT
0066-96A-917, P101, N-501
SHEET NO.

$DATE$ $TIME$ $FILE$

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

LANE CONTROL SIGN SITE SUMMARY

Route	Direction	Milepost	LCS Type	Structure	Protection NORTH	Protection SOUTH
I-66	EB	52.47	Type 1	New Gantry	Existing Guardrail	Existing Barrier
I-66	WB	52.60	Type 1	New Gantry	Existing Barrier	EXTENSION
I-66	EB	52.97	Type 1	New Gantry	Existing Guardrail	NEW GUARDRAIL
I-66	WB	53.04	Type 1	New Gantry	EXTENSION	EXTENSION
I-66	EB / WB	53.70	Type 2C	New Gantry	NEW GUARDRAIL	Existing Retain. Wall
I-66	WB	54.19	Type 1	New Gantry	Existing Guardrail	NEW GUARDRAIL
I-66	EB	54.23	Type 1	New Gantry	Existing Guardrail	Existing Guardrail
I-66	EB / WB	54.84	Type 2	New Gantry	Existing Guardrail	Existing Guardrail
I-66	EB / WB	55.49	Type 2	New Gantry	NEW GUARDRAIL	NEW GUARDRAIL
I-66	EB / WB	55.96	Type 2	New Gantry	NEW GUARDRAIL	NEW GUARDRAIL
I-66	EB / WB	56.50	Type 2	New Gantry	Existing Guardrail	EXTENSION
I-66	WB	56.98	Type 1	New Gantry	NEW GUARDRAIL	NEW GUARDRAIL
I-66	EB	57.06	Type 1	New Gantry	Existing Guardrail	EXTENSION
I-66	EB	57.53	Type 1	New Gantry	Existing Guardrail	NEW GUARDRAIL
I-66	WB	57.74	Type 1	New Gantry	EXTENSION	BARRIER WALL MOD
I-66	EB	57.92	Type 3	New Cantilever	N/A	Existing Guardrail
I-66	EB / WB	58.35	Type 2	New Gantry	wall	Existing Guardrail
I-66	EB	58.59	Type 1	New Gantry	BARRIER WALL MOD	Existing Barrier
I-66	WB	58.72	Type 1	New Gantry	Existing Guardrail	BARRIER WALL MOD
I-66	EB	58.89	Type 3	New Cantilever	N/A	Existing Guardrail
I-66	EB	59.20	Type 1	New Gantry	Existing Guardrail	NEW GUARDRAIL
I-66	EB	59.34	Type 3A	Ex. Structure	N/A	N/A
I-66	WB	59.43	Type 1	New Gantry	Existing Guardrail	Existing Guardrail
I-66	WB	59.72	Type 3	New Cantilever	NEW GUARDRAIL	N/A
I-66	EB	59.91	Type 1	New Gantry	BARRIER WALL MOD	Existing Guardrail
I-66	WB	60.00	Type 1	New Gantry	Existing Guardrail	BARRIER WALL MOD
I-66	EB	60.24	Type 3	New Cantilever	N/A	NEW GUARDRAIL
I-66	WB	60.41	Type 3	New Cantilever	EXTENSION	N/A
I-66	EB	60.60	Type 1	New Gantry	BARRIER WALL MOD	NEW GUARDRAIL
I-66	WB	60.88	Type 1	New Gantry	NEW GUARDRAIL	NEW GUARDRAIL
I-66	EB	60.96	Type 3	New Cantilever	N/A	Existing Guardrail
I-66	EB	61.10	Type 1	New Gantry	NEW GUARDRAIL	EXTENSION
I-66	WB	61.27	Type 1	New Gantry	EXTENSION	EXTENSION
I-66	EB	61.38	Type 3	New Cantilever	N/A	Existing Guardrail
I-66	EB	61.53	Type 1	New Gantry	EXTENSION	NEW GUARDRAIL
I-66	WB	61.59	Type 1	New Gantry	Existing Guardrail	EXTENSION
I-66	EB	61.87	Type 3	New Cantilever	N/A	Existing Guardrail
I-66	WB	61.89	Type 3	New Cantilever	Existing Guardrail	N/A
I-66	EB / WB	62.19	Type 2	New Gantry	Existing Retain. Wall	Existing Retain. Wall
I-66	EB	62.29	Type 3	New Cantilever	N/A	Existing Retain. Wall
I-66	WB	62.39	Type 3	New Cantilever	Existing Guardrail	N/A
I-66	EB / WB	62.61	Type 2	New Gantry	NEW GUARDRAIL	NEW GUARDRAIL
I-66	EB	62.80	Type 3	New Cantilever	N/A	Existing Retain. Wall
I-66	WB	62.85	Type 3	New Cantilever	Existing Barrier	N/A
I-66	EB / WB	63.18	Type 2	New Gantry	Existing Guardrail	Existing Barrier
I-66	EB	63.40	Type 2B	New Gantry	EXTENSION	EXTENSION
I-66	EB	63.66	Type 3	New Cantilever	N/A	Existing Guardrail
I-66	EB / WB	63.83	Type 2A	New Gantry	EXTENSION	EXTENSION
I-66	EB / WB	64.50	Type 2	New Gantry	Existing Barrier	Existing Barrier

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY KIND OF CONSTRUCTION

VDOT
I-66 ATM

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SCALE: NONE
PLAN NO:
DATE: JUNE 25, 2012
SHEET
OF
PROJECT
0066-96A-917
SHEET NO.
V.II-07

REVISED
STATE
VA.
ROUTE
66
STATE PROJECT
0066-96A-917, P101, N-501
SHEET NO.

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	0066-96A-917, P101, N-501	

MICROWAVE VEHICLE DETECTOR SITE SUMMARY

Route	Direction	Milepost	MVDS	MVDS Pole or Cabinet Pole Extension	Comments
I-66	EB	47.83	1.00	1.00	
I-66	WB	52.60	1.00		MVDS on sign gantry
I-66	EB	52.97	1.00		MVDS on sign gantry
I-66	EB	53.29	1.00	1.00	
I-66	WB	53.58	1.00	1.00	Possible move 400 feet east to LCS Type 2 Site 53.70
I-66	EB	54.15	1.00	1.00	
I-66	EB	55.13	1.00	1.00	
I-66	EB	55.49	1.00		MVDS on sign gantry
I-66	WB	55.82	1.00		MVDS on sign gantry
I-66	WB	56.50	1.00		MVDS on sign gantry or existing CCTV pole
I-66	WB	56.81	1.00		MVDS on sign gantry
I-66	EB	57.17	1.00	1.00	
I-66	WB	57.17	1.00	1.00	
I-66	EB	57.40	1.00	1.00	Reuse existing cabinet
I-66	EB	57.70	1.00		MVDS on sign gantry
I-66	EB	66.76	1.00	1.00	
I-66	EB	67.40	1.00	1.00	
I-66	EB	67.73	1.00	1.00	Connect MVDS to RM cabinet at Leesburg Pike
I-66	EB	68.21	1.00	1.00	Investigate ROW constraints
I-66	EB	68.69	1.00		MVDS on static sign cantilever
I-66	EB	69.33	1.00	1.00	
I-66	EB	69.70	1.00	1.00	Connect to RM cabinet at Sycamore St.
I-66	WB	70.93	1.00	1.00	Connect to RM cabinet at George Mason
I-66	WB	71.28	1.00	1.00	
I-66	EB	71.69	1.00	1.00	
I-66	EB	72.12	1.00	1.00	Connect to RM cabinet at Glebe Rd.
I-66	WB	72.68	1.00	1.00	Connect to RM cabinet at Lee Hwy WEST
I-66	EB	73.15	1.00	1.00	
I-66	WB	73.69	1.00	1.00	Connect to RM cabinet at Lee Hwy EAST
I-66	WB	73.98	1.00	1.00	Retaining wall on WB lanes - move site to EB side
I-66	WB	74.24	1.00	1.00	
I-66	WB	74.73	1.00	1.00	Possible move 300 feet east to existing VMS Site 74.81

INCIDENT MANAGEMENT (PTZ) CCTV SITE SUMMARY

Route	Direction	Milepost	CCTV Pole Type	Comments
I-66	EB	49.22	50-ft	CCTV elevated near bridge behind barrier wall.
I-66	WB	51.49	50-ft	Position behind existing guardrail.
I-66	WB	61.27	50-ft	Position behind existing guardrail near existing VMS
I-66	EB	62.45	50-ft	Final placement TBD based on video survey and other design considerations.
I-66	EB	65.74	50-ft	New guardrail required if east of sound wall atop barrier wall.
I-66	WB	65.99	50-ft	Position behind existing guardrail.
I-66	WB	67.22	80-ft	Final placement TBD based on video survey and other design considerations.
I-66	EB	67.80	50-ft	New guardrail required
I-66	EB	68.33	50-ft	Final placement TBD based on video survey and other design considerations.
I-66	EB	69.03	50-ft	Final placement TBD based on video survey and other design considerations.
I-66	EB	72.49	50-ft	Place outside of clear zone E. of Lincoln.

DYNAMIC MESSAGE SIGN SITE SUMMARY

Route	Direction	Milepost	DMS Type	Structure	Protection NORTH	Protection SOUTH
I-66	WB	66.16	Type 1 Walk-in	New Gantry (or Cantilever)	NEW GUARDRAIL	Existing Guardrail
I-66	EB	66.56	Type 1 Walk-in	New Gantry	GUARDRAIL EXTENSION	NEW GUARDRAIL
I-66	EB	67.98	Type 1 Walk-in	New Gantry	Existing Guardrail	NEW GUARDRAIL
I-66	EB	70.53	Type 1 Front Acc.	Cantilever	N/A	Existing Barrier
I-66	WB	72.32	Type 1 Front Acc.	New Butterfly	NEW GUARDRAIL	N/A
I-66	EB	72.46	Type 1 Front Acc.	New Butterfly	N/A	NEW GUARDRAIL

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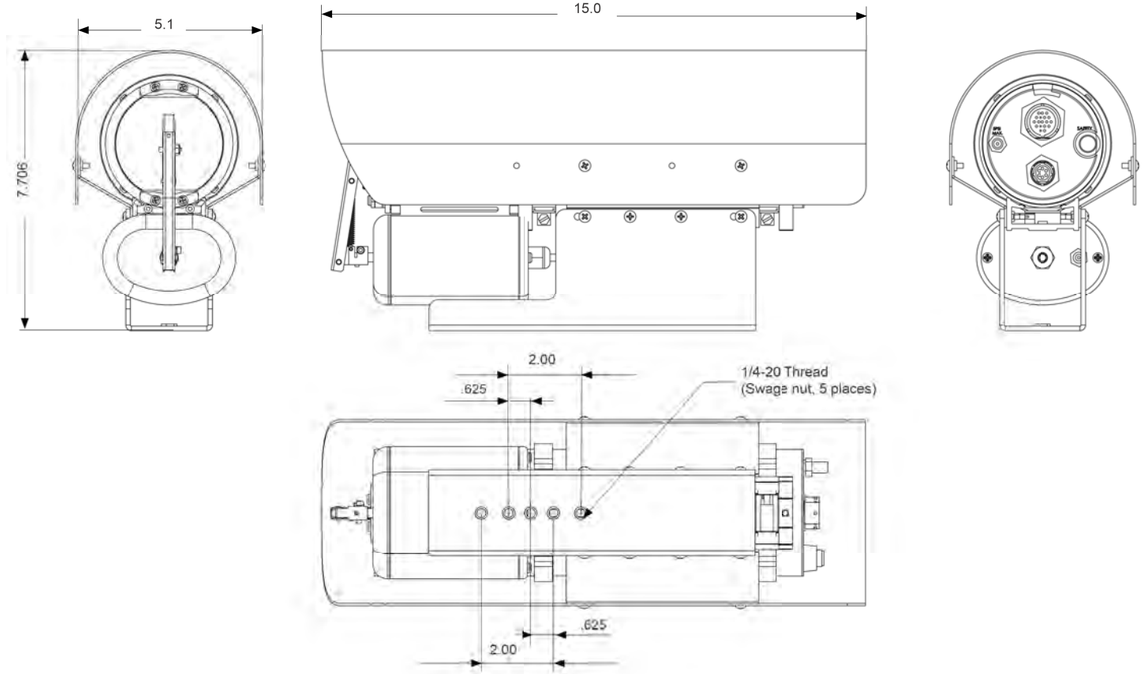
SCALE: NONE	DATE: JUNE 25, 2012	SHEET	OF
PLAN NO.	PROJECT 0066-96A-917	SHEET NO. V.II-08	

$DATE$ $TIME$ $FILE$

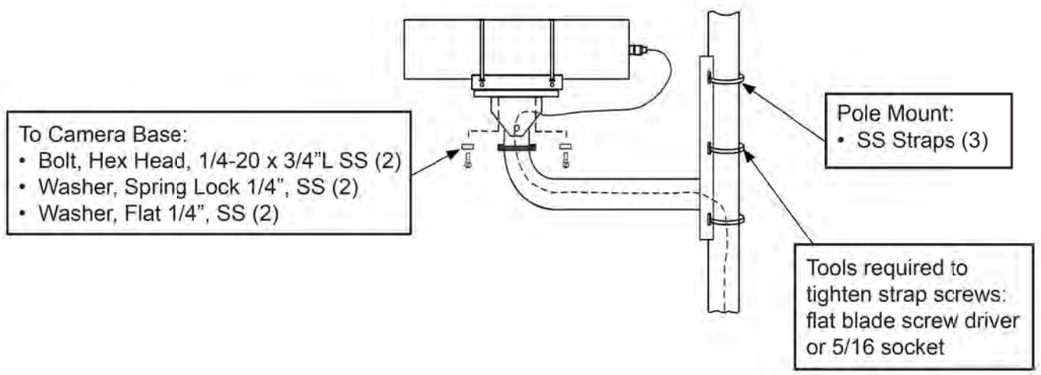
PROJECT MANAGER_ _ _ _ _ _ _ _ _ .
SURVEYED BY _ _ _ _ _ _ _ _ _ _
DESIGN SUPERVISED BY_ _ _ _ _ _ _
DESIGNED BY _ _ _ _ _ _ _ _ _ _

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	66	0066-96A-917, P101, N-501	V.II-09

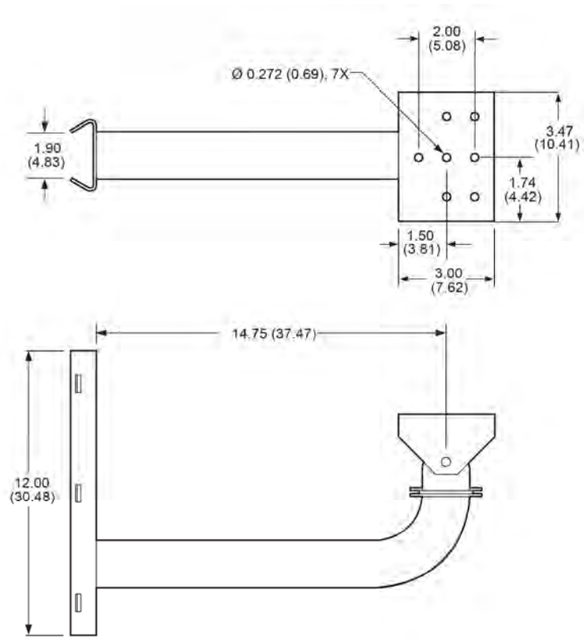
NOTES:
1. SEE SHEET XX FOR NEW POLE DETAILS
2. ALL DIMENSIONS ARE IN INCHES WITH CENTIMETERS SHOWN IN PARENTHESES.
3. ALLOW 4" TO 5" CLEARANCE BEHIND THE CAMERA FOR THE MATING CABLE.



FIXED POSITION CAMERA DETAILS



VERTICAL POLE MOUNT DIAGRAM



VERTICAL POLE MOUNT DETAILS

NOT TO SCALE

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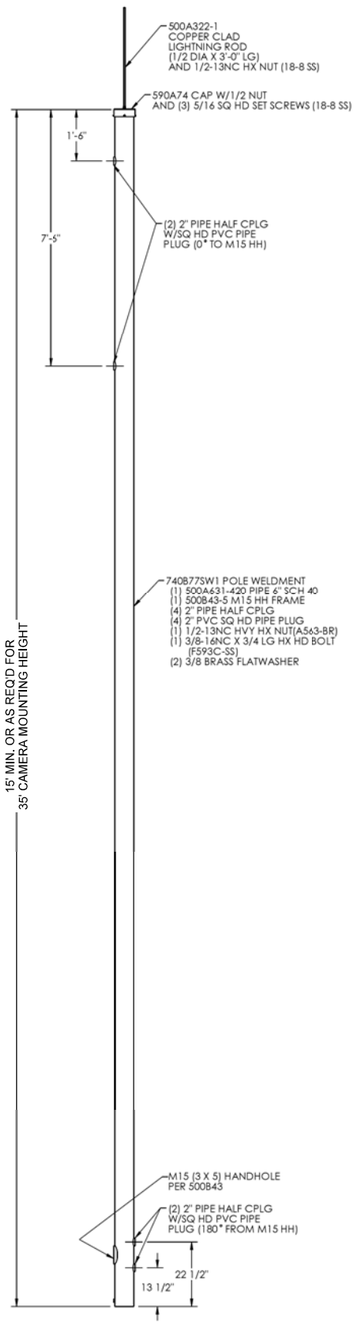
SHOULDER MONITORING SYSTEM CAMERA DETAILS

SCALE: NONE	DATE: JULY 24, 2012	SHEET OF	
PLAN NO.	PROJECT 0066-96A-917	SHEET NO. V.II-09	

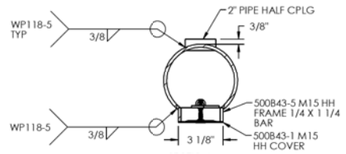
$DATE$ $TIME$ $FILE$

PROJECT MANAGER _ _ _ _ _ _ _ _ _ .
SURVEYED BY _ _ _ _ _ _ _ _ _ _
DESIGN SUPERVISED BY _ _ _ _ _ _ _
DESIGNED BY _ _ _ _ _ _ _ _ _ _

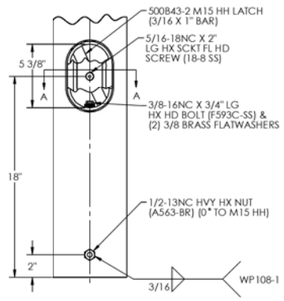
REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	0066-96A-917, P101, N-501	V.II-10



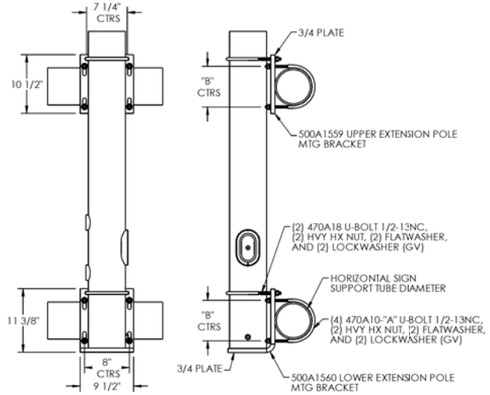
ROUND EXTENSION POLE



SECTION A-A

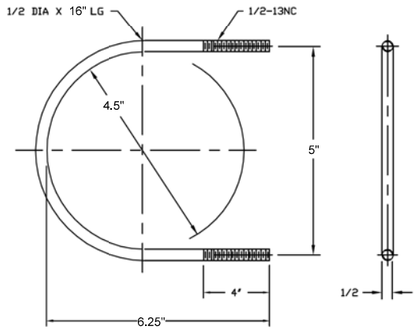


EXTENSION POLE BASE END AND HANDHOLE DETAIL

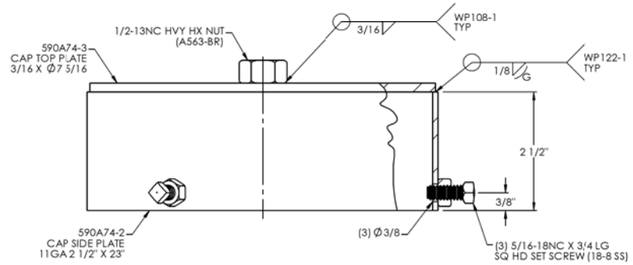


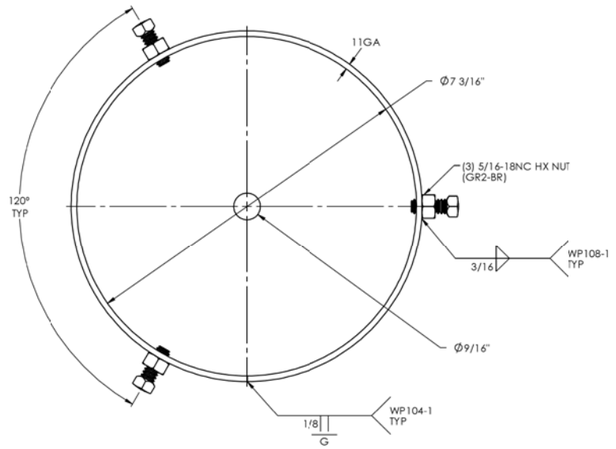
HORIZONTAL SIGN SUPPORT TUBE DIAMETER	"A" 470A10 U-BOLT	"B" U-BOLT CTRS
4.0	-1	4 1/2
4.5	-3	5"
5.5	-7	6"
5.63	-8	6 1/4
6.625-6.75	-12	7 1/4

EXTENSION POLE INSTALLATION DETAIL

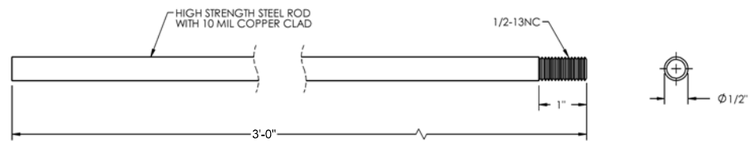


½ U-BOLT





ROUND POLE CAP W/ LIGHTNING ROD MT



COPPER CLAD LIGHTNING ROD

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I-66 ATM

VERTICAL POLE EXTENSION DETAILS

SCALE: NONE	DATE: JULY 24, 2012	SHEET 1 OF 2
PLAN NO.	PROJECT 0066-96A-917	SHEET NO. V.II-10

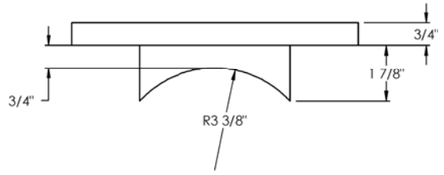
NOT TO SCALE

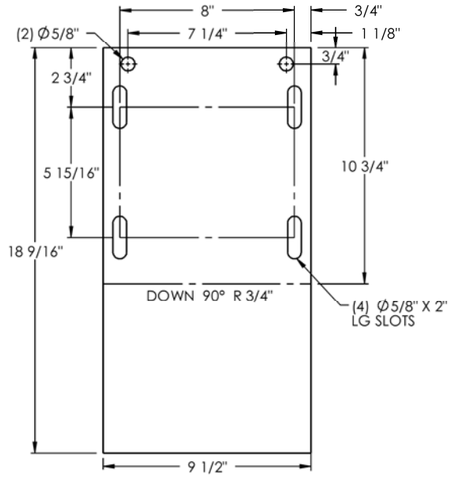
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY KIND OF CONSTRUCTION

$DATE$ $TIME$ $FILE$

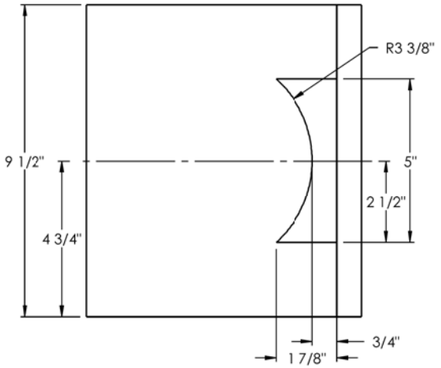
PROJECT MANAGER_____
SURVEYED BY _____
DESIGN SUPERVISED BY_____
DESIGNED BY _____

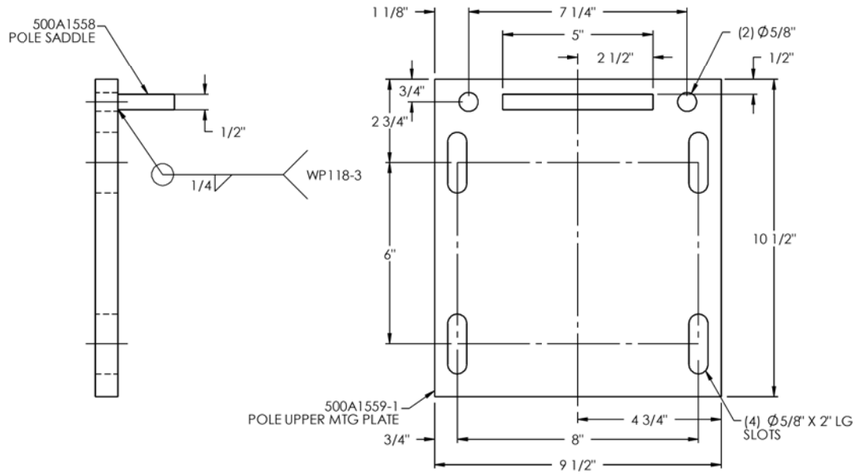
REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	0066-96A-917, P101, N-501	V.II-11



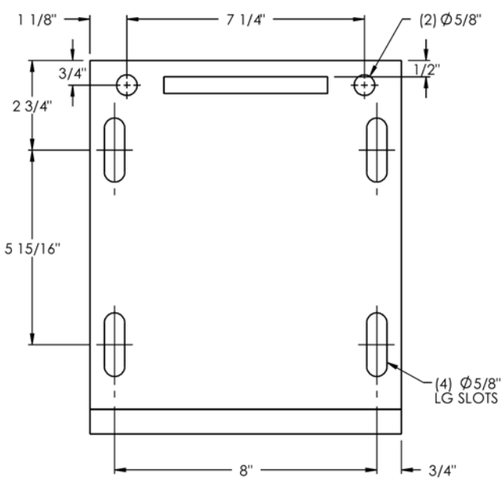


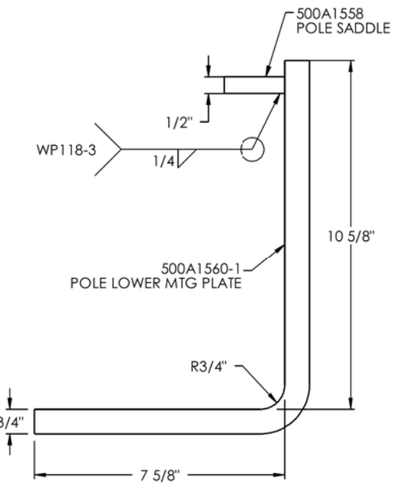
500A1560-1 FLAT PATTERN





EXTENSION POLE UPPER MOUNTING BRACKET





EXTENSION POLE LOWER MOUNTING BRACKET

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I-66 ATM

VERTICAL POLE EXTENSION DETAILS

SCALE: NONE	DATE: JULY 24, 2012	SHEET 2 OF 2
PLAN NO.	PROJECT 0066-96A-917	SHEET NO. V.II-11

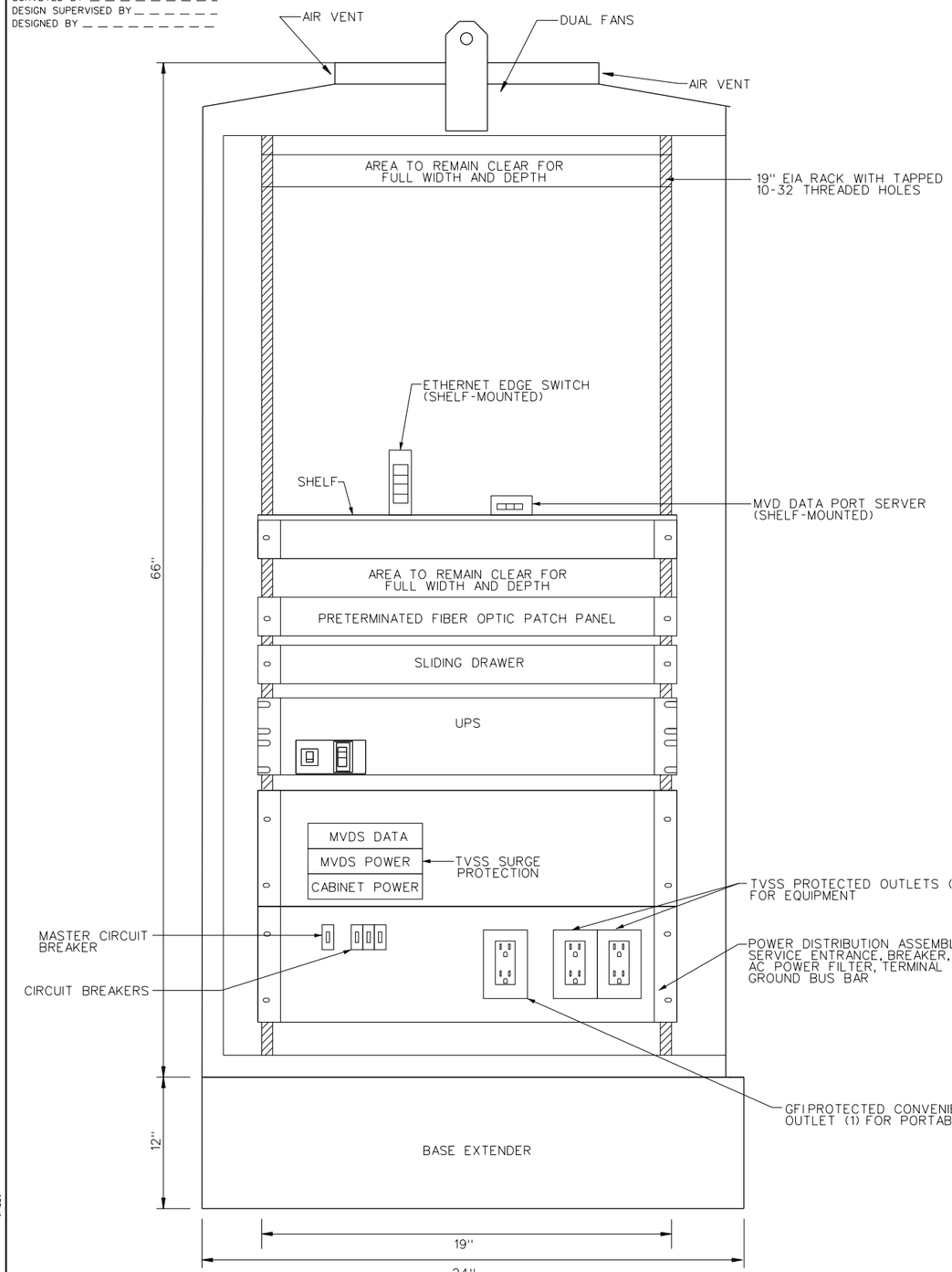
NOT TO SCALE

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY KIND OF CONSTRUCTION

$DATE$ $TIME$ $FILE$

PROJECT MANAGER_ _ _ _ _ _ _ _ _ .
SURVEYED BY _ _ _ _ _ _ _ _ _ _
DESIGN SUPERVISED BY_ _ _ _ _ _ _
DESIGNED BY _ _ _ _ _ _ _ _ _ _

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	0066-96A-917, P101, N-501	V.II-12

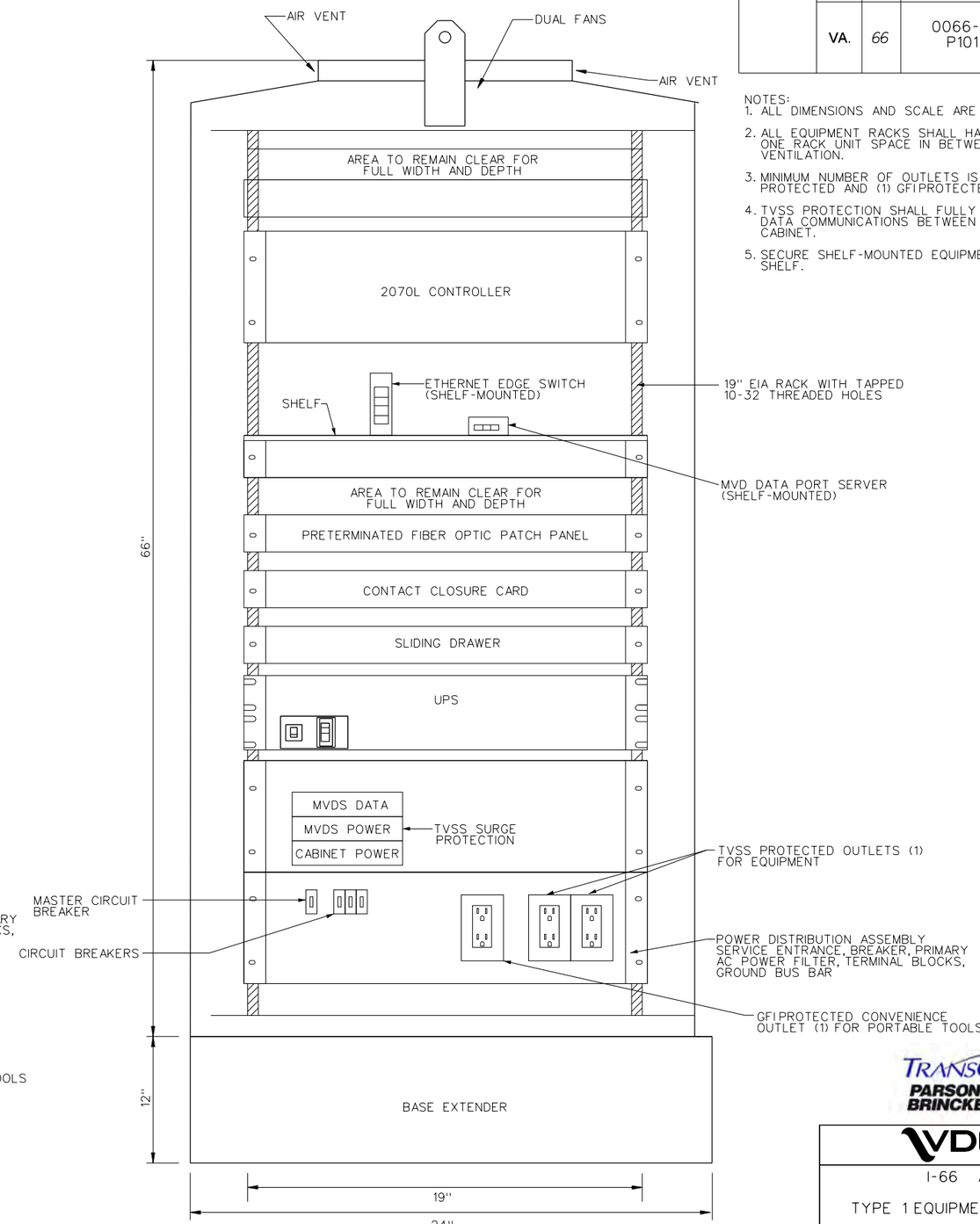


FRONT ELEVATION (TYPICAL)

TYPE 1 EQUIPMENT CABINET ELEVATION
(OUTFITTED FOR MVD) (TYPICAL)

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY KIND OF CONSTRUCTION

NOT TO SCALE



FRONT ELEVATION (TYPICAL)

TYPE 1 EQUIPMENT CABINET ELEVATION
(OUTFITTED FOR MVD) (TYPICAL)

NOTES:
1. ALL DIMENSIONS AND SCALE ARE APPROXIMATE.
2. ALL EQUIPMENT RACKS SHALL HAVE A MINIMUM OF ONE RACK UNIT SPACE IN BETWEEN THEM FOR VENTILATION.
3. MINIMUM NUMBER OF OUTLETS IS THREE, (1) TVSS PROTECTED AND (1) GFI PROTECTED.
4. TVSS PROTECTION SHALL FULLY PROTECT ALL DATA COMMUNICATIONS BETWEEN MVD AND CABINET.
5. SECURE SHELF-MOUNTED EQUIPMENT SECURELY TO SHELF.

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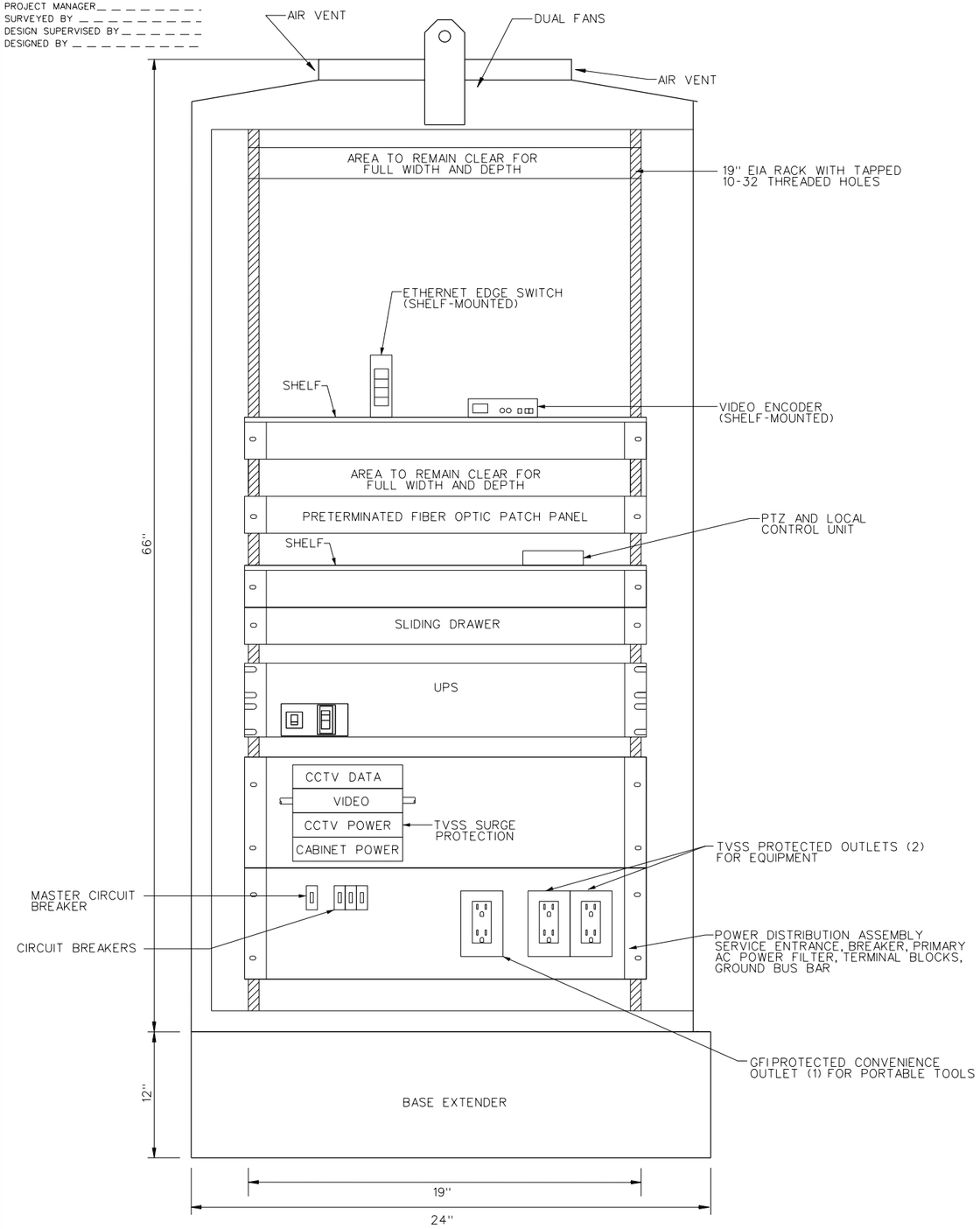
TYPE 1 EQUIPMENT CABINETS

SCALE: NONE	DATE: JULY 24, 2012	SHEET OF
PLAN NO.	PROJECT 0066-96A-917	SHEET NO. V.II-12

$FILE$
$TIME$
$DATE$

PROJECT MANAGER_____
SURVEYED BY _____
DESIGN SUPERVISED BY_____
DESIGNED BY _____

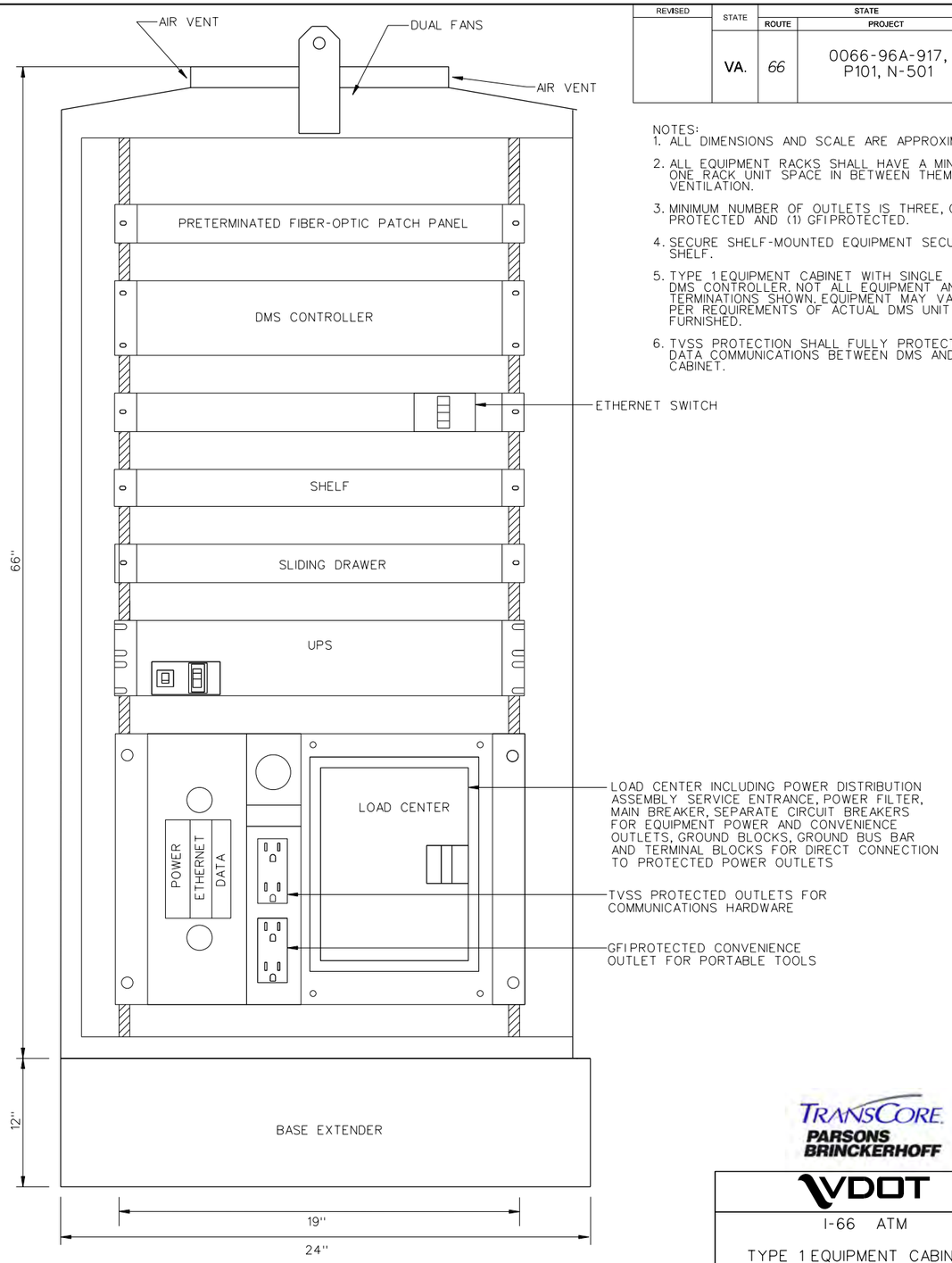


FRONT ELEVATION (TYPICAL)

TYPE 1 EQUIPMENT CABINET ELEVATION
(OUTFITTED FOR CCTV) (TYPICAL)

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY KIND OF CONSTRUCTION

NOT TO SCALE



FRONT ELEVATION (TYPICAL)

TYPE 1 EQUIPMENT CABINET ELEVATION
(OUTFITTED FOR DMS) (TYPICAL)

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	0066-96A-917, P101, N-501	V.II-13

NOTES:
1. ALL DIMENSIONS AND SCALE ARE APPROXIMATE.
2. ALL EQUIPMENT RACKS SHALL HAVE A MINIMUM OF ONE RACK UNIT SPACE IN BETWEEN THEM FOR VENTILATION.
3. MINIMUM NUMBER OF OUTLETS IS THREE, (2) TVSS PROTECTED AND (1) GFI PROTECTED.
4. SECURE SHELF-MOUNTED EQUIPMENT SECURELY TO SHELF.
5. TYPE 1 EQUIPMENT CABINET WITH SINGLE DMS CONTROLLER. NOT ALL EQUIPMENT AND TERMINATIONS SHOWN. EQUIPMENT MAY VARY PER REQUIREMENTS OF ACTUAL DMS UNIT FURNISHED.
6. TVSS PROTECTION SHALL FULLY PROTECT ALL DATA COMMUNICATIONS BETWEEN DMS AND CABINET.

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VDOT

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TYPE 1 EQUIPMENT CABINETS

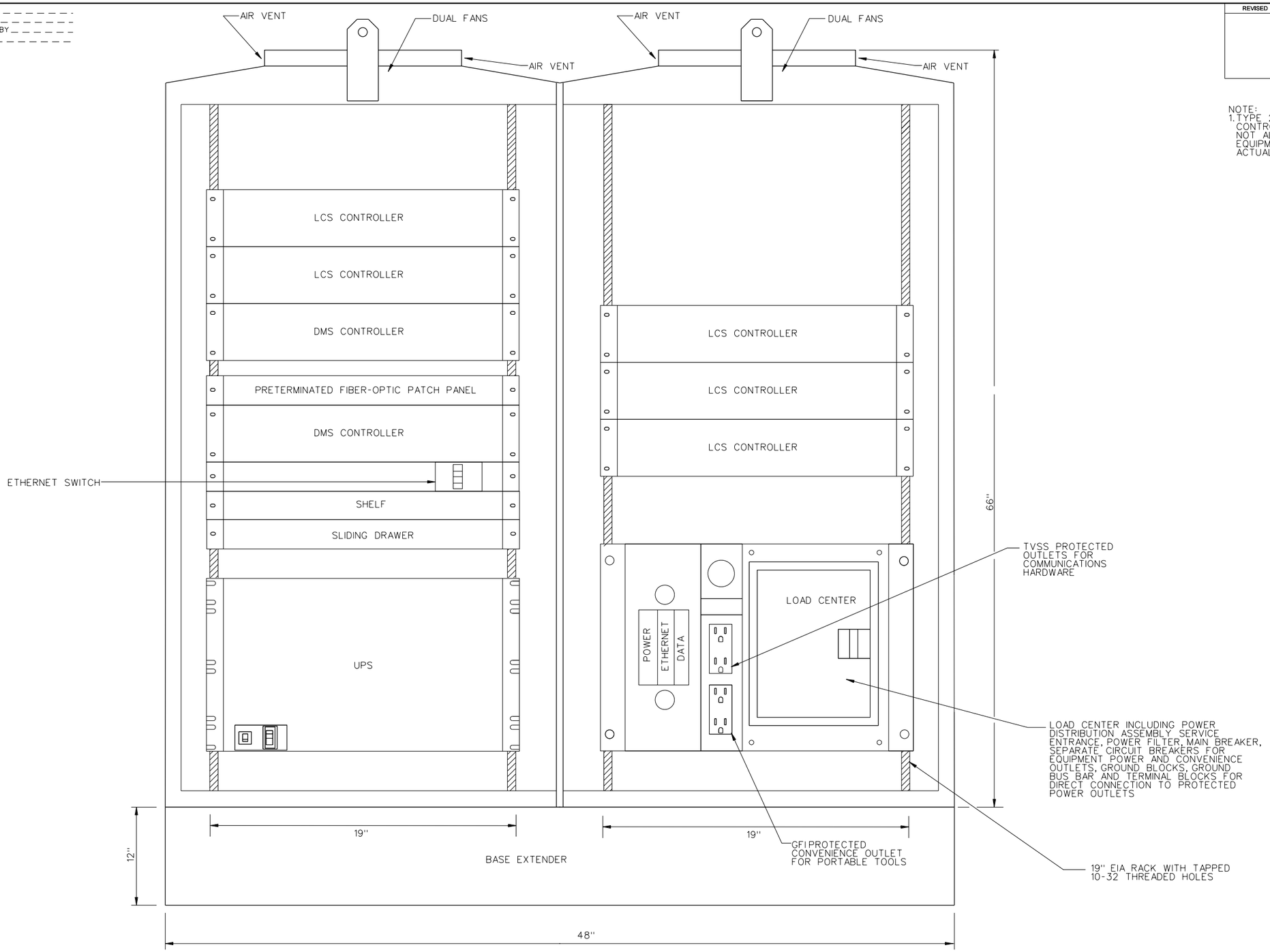
SCALE: NONE	DATE: JULY 24, 2012	SHEET OF
PLAN NO.	PROJECT 0066-96A-917	SHEET NO. V.II-13

$DATE$ $TIME$ $FILE$

PROJECT MANAGER_ _ _ _ _ _ _ _ _ .
SURVEYED BY _ _ _ _ _ _ _ _ _ _
DESIGN SUPERVISED BY_ _ _ _ _ _ _
DESIGNED BY _ _ _ _ _ _ _ _ _ _

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	0066-96A-917, P101, N-501	V.II-14

NOTE:
1. TYPE 2 EQUIPMENT CABINET WITH TWO DMS CONTROLLERS AND FIVE LCS CONTROLLERS. NOT ALL EQUIPMENT AND TERMINATIONS SHOWN. EQUIPMENT MAY VARY PER REQUIREMENTS OF ACTUAL DMS UNIT FURNISHED.



FRONT ELEVATION (TYPICAL)

TYPE 2 EQUIPMENT CABINET ELEVATION
(OUTFITTED FOR LCS AND DMS) (TYPICAL)

NOT TO SCALE

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY KIND OF CONSTRUCTION

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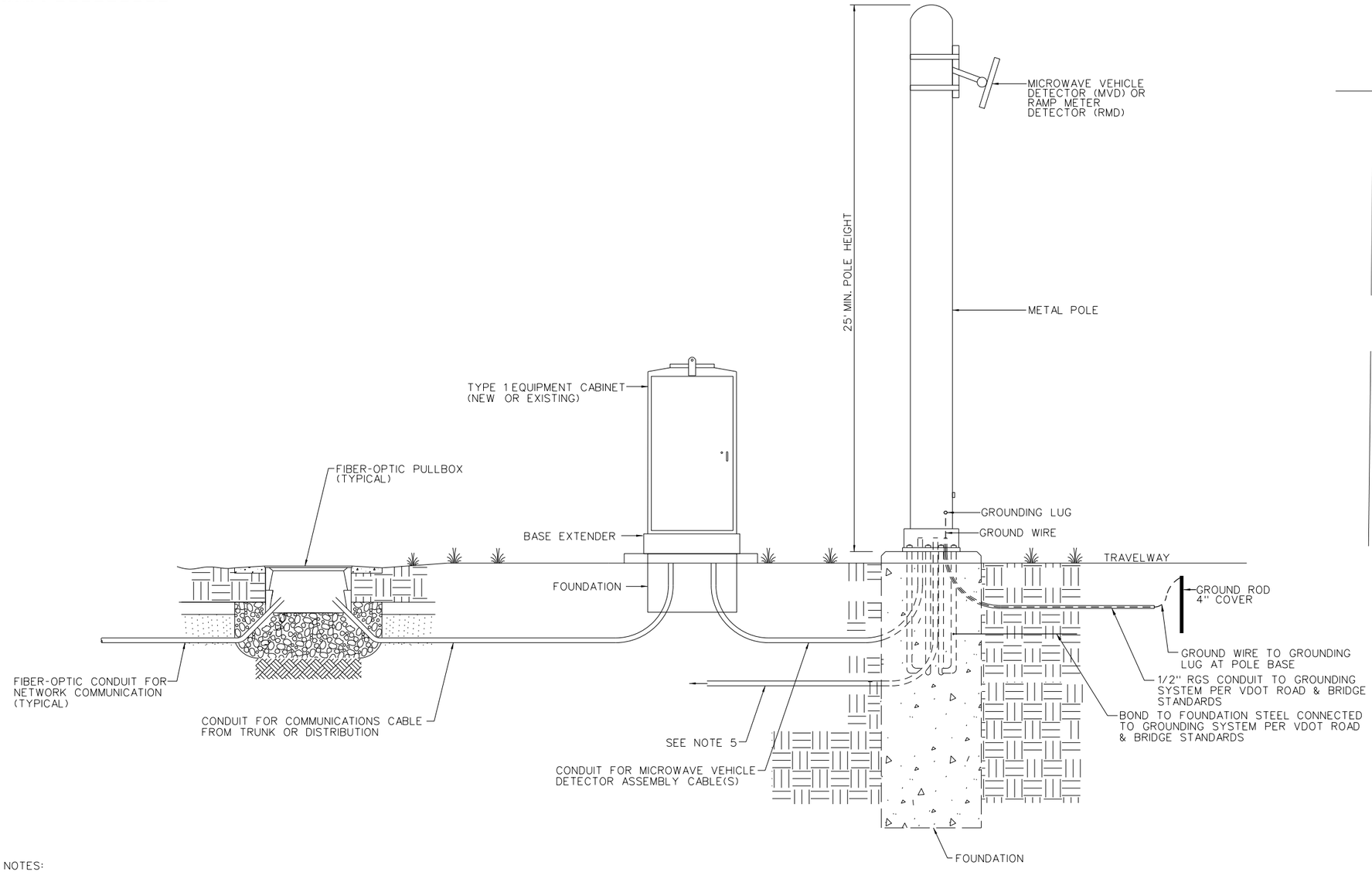
TYPE 2 EQUIPMENT CABINETS

SCALE: NONE	DATE: JULY 24, 2012	SHEET OF
PLAN NO.	PROJECT 0066-96A-917	SHEET NO. V.II-14

$DATE$ $TIME$ $FILE$

PROJECT MANAGER_ _ _ _ _ _ _ _ _ .
SURVEYED BY _ _ _ _ _ _ _ _ _ _
DESIGN SUPERVISED BY _ _ _ _ _ _ _
DESIGNED BY _ _ _ _ _ _ _ _ _ _

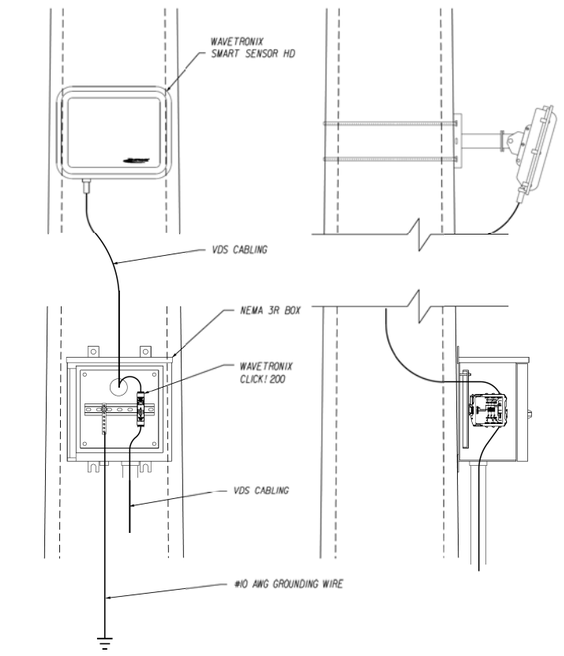
REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	0066-96A-917, P101, N-501	V.II-15



TYPICAL MICROWAVE VEHICLE DETECTOR ASSEMBLY ON NEW STRUCTURE

FRONT VIEW
N.T.S.

SIDE VIEW
N.T.S.



MVDS MOUNTING DETAILS FOR NEW AND EXISTING STRUCTURES

NOTES:

1. CONTRACTOR SHALL TERMINATE FIBER-OPTIC CABLES IN CABINET.
2. FURNISH AND INSTALL THE TVSS PROTECTION ON ALL DATA AND POWER CABLING INTO CABINET IN ACCORDANCE WITH VDOT STANDARD SPECIFICATIONS.
3. FURNISH AND INSTALL SECONDARY TVSS PROTECTION ON CONVENIENCE OUTLETS FOR EQUIPMENT HARDWARE IN CABINET IN ACCORDANCE WITH VDOT STANDARD SPECIFICATION 703.02.
4. INSTALL ALL CONDUIT AND JUNCTION BOXES IN ACCORDANCE WITH VDOT STANDARDS.
5. CONDUIT TO POWER SERVICE ASSEMBLY. SEE VDOT STD. DRAWING SE-5 (1301.36) OR SE-9 (1312.91) FOR ELECTRICAL SERVICE DETAIL. POWER SERVICE ASSEMBLY NUMBER AND TYPE SHALL BE DETERMINED BY THEDESIGN-BUILDER BASED ON POWER REQUIREMENTS OF EQUIPMENT COMPONENTS.
6. INSTALL GROUNDING SYSTEM INCLUDING GROUND RODS IN ACCORDANCE WITH VDOT STANDARD.
7. DETAIL IS TYPICAL BASED UPON INSTALLATION OF NEW CABINET, CONDUIT AND POWER ACCESS. IF ANY OF THESE COMPONENTS ARE REUSED, INSTALLATION WILL VARY FROM THIS DETAIL.

$FILES
$TIMES
$DATES

NOT TO SCALE

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY KIND OF CONSTRUCTION

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PARSONS BRINCKERHOFF

VDOT

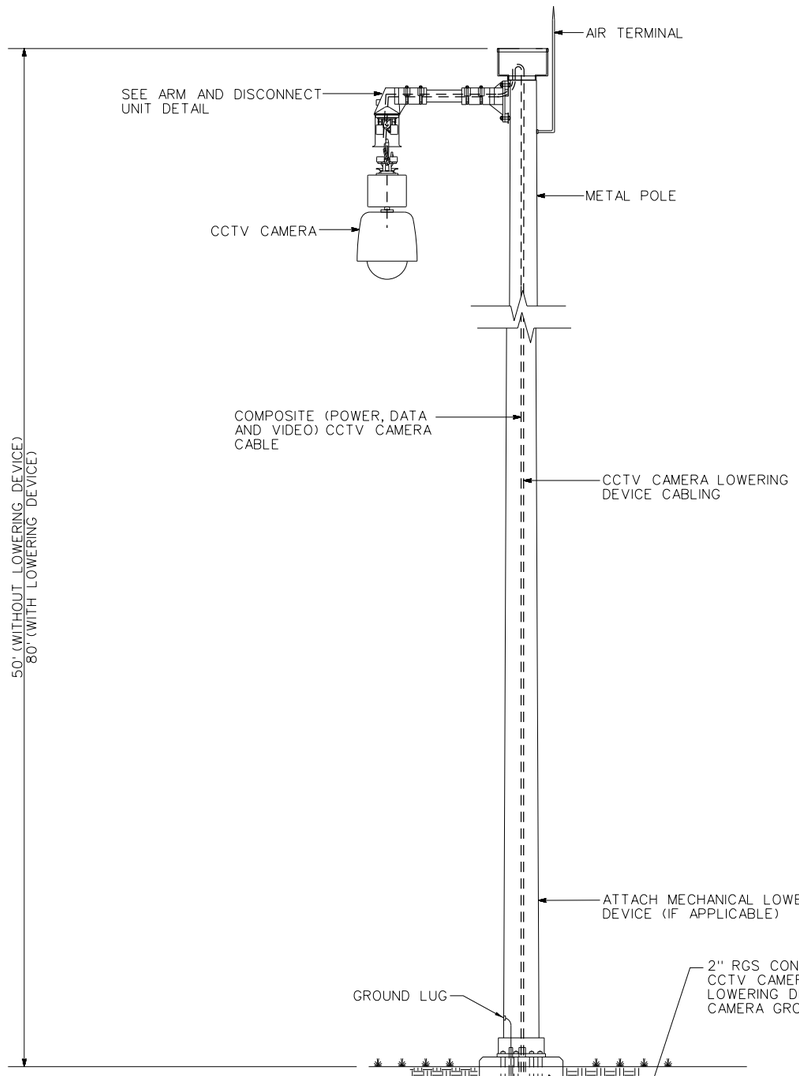
I-66 ATM

MVDS MOUNTING DETAIL

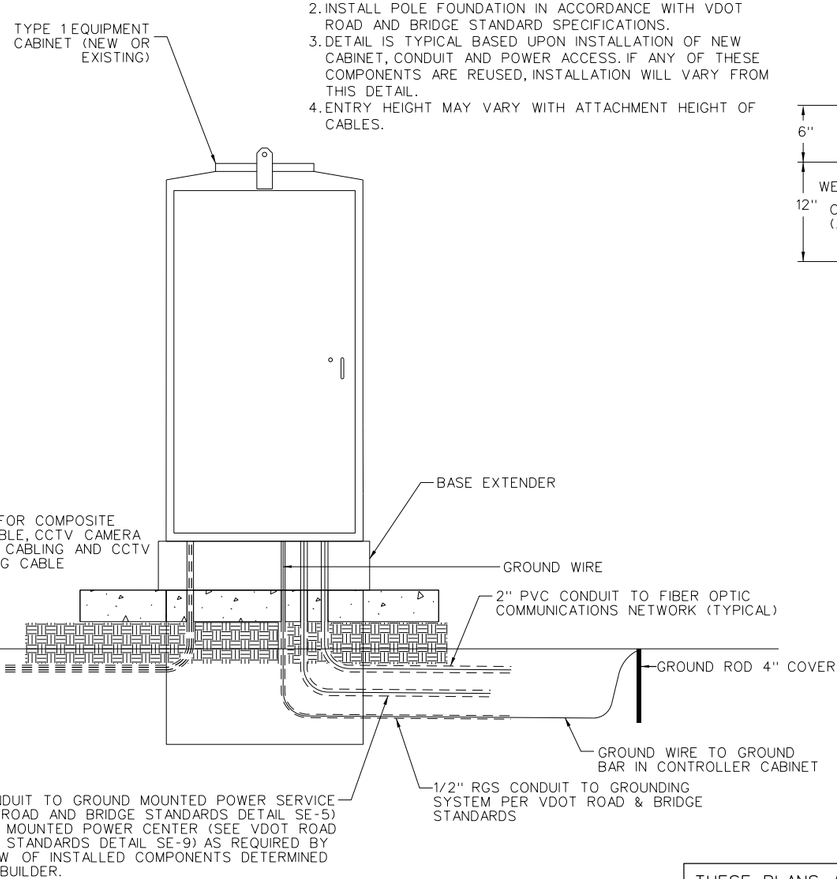
SCALE: NONE	DATE: JULY 24, 2012	SHEET OF
PLAN NO.	PROJECT 0066-96A-917	SHEET NO. V.II-15

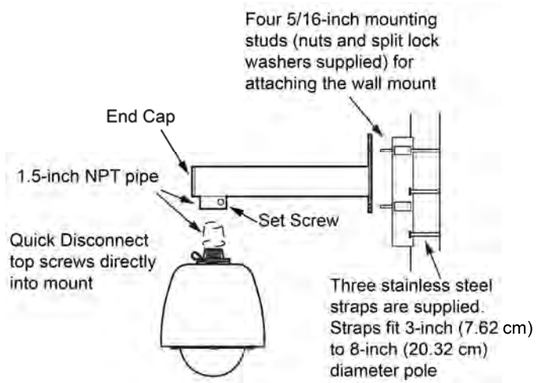
PROJECT MANAGER_ _ _ _ _ _ _ _ _ .
SURVEYED BY _ _ _ _ _ _ _ _ _ _
DESIGN SUPERVISED BY _ _ _ _ _ _ _
DESIGNED BY _ _ _ _ _ _ _ _ _ _

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	0066-96A-917, P101, N-501	V.II-16



CCTV CAMERA ELEVATION DETAIL

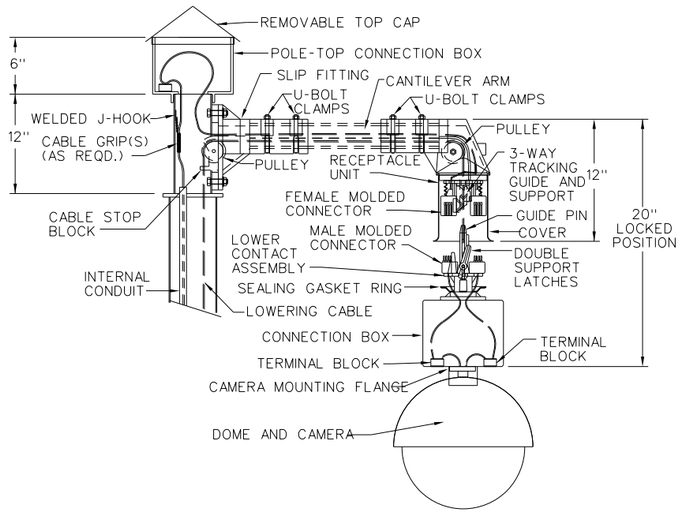




CCTV MOUNTING DETAILS WITHOUT LOWERING DEVICE

NOTES:
1. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.
2. INSTALL POLE FOUNDATION IN ACCORDANCE WITH VDOT ROAD AND BRIDGE STANDARD SPECIFICATIONS.
3. DETAIL IS TYPICAL BASED UPON INSTALLATION OF NEW CABINET, CONDUIT AND POWER ACCESS. IF ANY OF THESE COMPONENTS ARE REUSED, INSTALLATION WILL VARY FROM THIS DETAIL.
4. ENTRY HEIGHT MAY VARY WITH ATTACHMENT HEIGHT OF CABLES.

GENERAL NOTES:
1. LOWERING DEVICE TO BE SHIPPED READY FOR POLE ATTACHMENT TO INCLUDE 100 FT. OF COMPOSITE POWER AND SIGNAL CABLE PREWIRED TO LOWERING DEVICE AT THE FACTORY.
2. THE LOWERING DEVICE MANUFACTURER SHALL SUPPLY BOTH A PORTABLE LOWERING TOOL WITH A MANUAL HAND CRANK AND A PORTABLE ELECTRIC DRILL MOTOR WITH CUSTOM CLUTCH ADAPTER. ONE LOWERING TOOL PER EVERY 10 LOWERING DEVICES IS REQUIRED.
3. THE LOWERING DEVICE MANUFACTURER SHALL PROVIDE AN ON-SITE INSTALLATION INSPECTION AND OPERATOR INSTRUCTION AND CERTIFICATION. THIS ENSURES THE PRODUCT IS ASSEMBLED CORRECTLY AND, MORE IMPORTANTLY, THAT ALL NECESSARY PERSONS ARE TRAINED IN THE PROPER, SAFE OPERATION OF THE SYSTEM. BEFORE ERECTING THE FIRST POLE THE CONTRACTOR MUST CONTACT THE LOWERING DEVICE SUPPLIER AND SCHEDULE A FACTORY REPRESENTATIVE TO BE ON-SITE.
4. LOWERING DEVICE CONNECTION TO TOP OF POLE SHALL BE CAPABLE OF SERVICE TENSION AND SHEAR OF 1 KIP MINIMUM. THE CONTRACTOR SHALL PROVIDE PRODUCT CUT SHEET AND CAPACITY DATA FOR THE ENGINEER'S REVIEW AND APPROVAL PRIOR TO INSTALLATION.
5. CAMERA TO BE MOUNTED TO CAMERA JUNCTION BOX AND STABILIZING WEIGHT VIA 1 1/2" STANDARD NPT PIPE THREAD.
6. USE AIR TERMINAL EXTENSION WHEN THE POLE TOP JUNCTION BOX IS WIDER THAN TOP OF POLE.
7. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.



CCTV MOUNTING DETAILS WITH LOWERING DEVICE

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PARSONS BRINCKERHOFF

VDOT

I-66 ATM

CCTV CAMERA DETAILS

SCALE: NONE	DATE: JULY 24, 2012	SHEET OF
PLAN NO.	PROJECT 0066-96A-917	SHEET NO. V.II-16

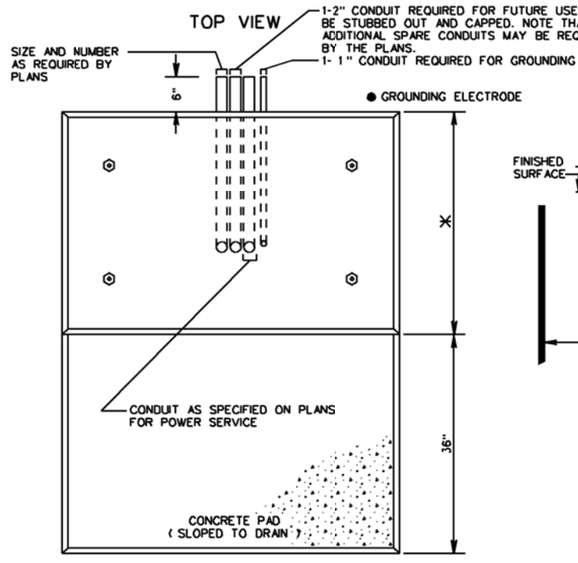
NOT TO SCALE

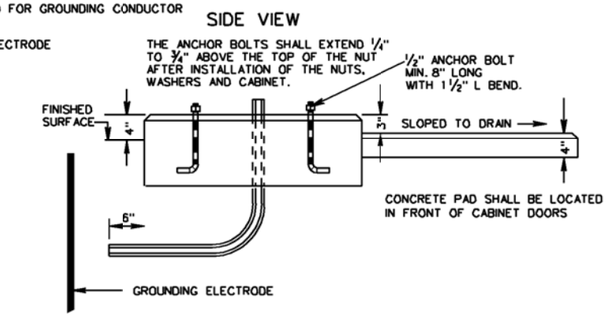
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY KIND OF CONSTRUCTION

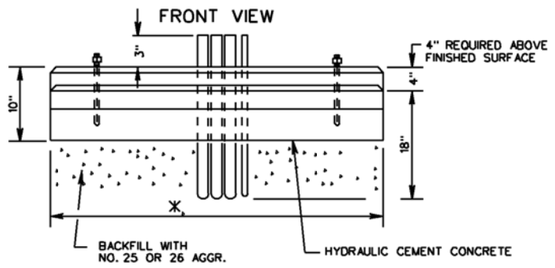
$DATE$ $TIME$ $FILE$

PROJECT MANAGER_ _ _ _ _ _ _ _ _ .
SURVEYED BY _ _ _ _ _ _ _ _ _ _
DESIGN SUPERVISED BY _ _ _ _ _ _ _
DESIGNED BY _ _ _ _ _ _ _ _ _ _

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	0066-96A-917, P101, N-501	V.II-17







NOTES:

IN ADDITION TO ELECTRICAL SERVICE GROUNDING ELECTRODE SYSTEM, EACH STRUCTURE SHALL UTILIZE ITS OWN GROUNDING ELECTRODE.

ALL EXPOSED CONCRETE SURFACE EDGES SHALL BE CHAMFERED 3/4".

* FOUNDATION LENGTH AND WIDTH SHALL BE AS REQUIRED TO PROJECT NO LESS THAN A MINIMUM 4" BEYOND ALL SIDES OF THE CABINET.

ANCHOR BOLTS AND BOLT CIRCLE TEMPLATE SHALL BE FURNISHED WITH CABINET.

CABINET SHALL BE CENTERED ON FOUNDATION.

EACH FOUNDATION SHALL BE PERMANENTLY MARKED TO INDICATE ALL SIDES FROM WHICH CONDUITS PASS. THIS MARK SHALL BE MADE WITH A TROWEL WHEN FINISHING THE CONCRETE AND SHALL BE 1/4" DEEP AND 4" TO 6" LONG.

THE CONTROL CENTER CABINET AT THE INSIDE AND OUTSIDE FOUNDATION JOINTS SHALL BE SEALED WITH A SILICONE SEALANT.

BELL ENDS SHALL BE INSTALLED ON EACH END OF PVC CONDUITS.

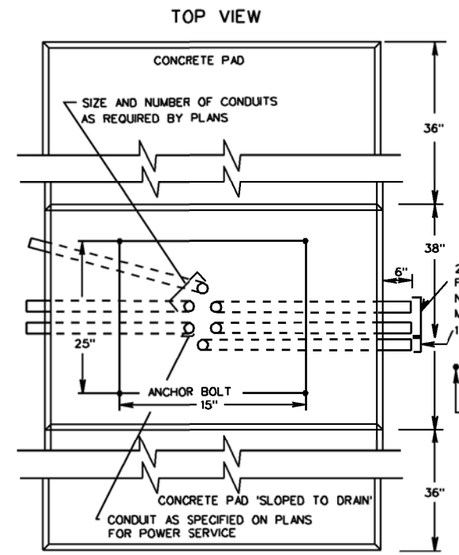
EMPTY CONDUITS SHALL BE PLUGGED TO PREVENT MOISTURE AND RODENT ENTRY.

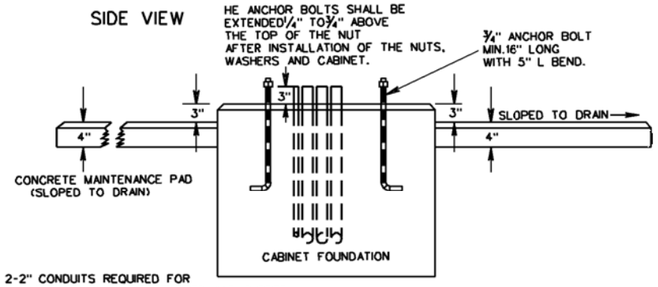
GROUNDING BUSHINGS SHALL BE INSTALLED ON EACH END OF METAL CONDUITS.

TWO - 1/2" DIAMETER WEEPHOLES SHALL BE PROVIDED IN THE FOUNDATION AND LOCATED 2" INSIDE THE BACK OR SIDE EDGES OF THE CONTROLLER CABINET. WEEPHOLES SHALL BE SLOPED TO ALLOW OUTLET TO BE 3" BELOW THE TOP OF THE FOUNDATION. TWO INCHES OF THE OUTLET END SHALL BE FIBER FILLED.

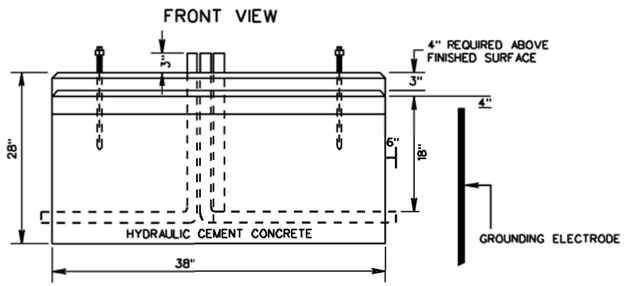
OPEN ENDS OF CONDUITS WITH CONDUCTORS INSTALLED SHALL BE SEALED WITH AN APPROVED SOFT, PLIABLE, AND EASILY REMOVABLE WATERPROOF SEALANT. THE SEALANT SHALL NOT HAVE A DELETERIOUS EFFECT ON CABLE COVERINGS.

CONTROL CENTER CABINET FOUNDATION





CONCRETE PAD SHALL BE LOCATED IN FRONT OF CABINET DOORS



NOTES:

IN ADDITION TO ELECTRICAL SERVICE GROUNDING ELECTRODE SYSTEM, EACH STRUCTURE SHALL UTILIZE ITS OWN GROUNDING ELECTRODE.

ALL EXPOSED CONCRETE SURFACE EDGES SHALL BE CHAMFERED 3/4".

ANCHOR BOLTS, BOLT CIRCLE TEMPLATE AND METAL RISER SHALL BE FURNISHED WITH CABINET.

CABINET SHALL BE CENTERED ON FOUNDATION WITH RISER ATTACHED TO FOUNDATION & CABINET ON METAL RISER.

CONDUITS ENTERING THE FOUNDATION SHALL BE ARRANGED IN A CIRCULAR PATTERN. THE CONTRACTOR SHALL SUBMIT A CONDUIT ARRANGEMENT PLAN FOR APPROVAL PRIOR TO PLACEMENT.

EACH FOUNDATION SHALL BE PERMANENTLY MARKED TO INDICATE ALL SIDES FROM WHICH CONDUIT PASS. THIS MARK SHALL BE MADE WITH A TROWEL WHEN FINISHING THE CONCRETE AND SHALL BE 1/4" DEEP AND 4" TO 6" LONG.

THE CONTROLLER CABINET AT THE INSIDE AND OUTSIDE FOUNDATION JOINTS SHALL BE SEALED WITH A SILICONE SEALANT.

BELL ENDS SHALL BE INSTALLED ON EACH END OF PVC CONDUITS.

EMPTY CONDUITS SHALL BE PLUGGED TO PREVENT MOISTURE AND RODENT ENTRY.

GROUNDING BUSHINGS SHALL BE ON EACH END OF METAL CONDUITS.

TWO- 1/2" DIAMETER WEEPHOLES SHALL BE PROVIDED IN THE FOUNDATION AND LOCATED 2" INSIDE OF THE BACK OR SIDE EDGES OF THE CONTROLLER CABINET. WEEPHOLES SHALL BE SLOPED TO ALLOW OUTLET TO BE 3" BELOW TOP OF FOUNDATION. TWO INCHES OF THE OUTLET END SHALL BE FIBER FILLED.

OPEN ENDS OF CONDUITS WITH CONDUCTORS INSTALLED SHALL BE SEALED WITH AN APPROVED SOFT, PLIABLE, AND EASILY REMOVABLE WATERPROOF SEALANT. THE SEALANT SHALL NOT HAVE A DELETERIOUS EFFECT ON CABLE COVERINGS.

CONTROLLER CABINET FOUNDATION

$FILE$
$TIME$
$DATE$

NOT TO SCALE

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY KIND OF CONSTRUCTION

TRANSCORE
PARSONS BRINCKERHOFF

VDOT

I-66 ATM

RAMP METERING CABINET ASSEMBLIES

SCALE: NONE	DATE: JULY 24, 2012	SHEET OF
PLAN NO.	PROJECT 0066-96A-917	SHEET NO. V.II-17

PROJECT MANAGER_ _ _ _ _ _ _ _ .
SURVEYED BY _ _ _ _ _ _ _ _ _ _
DESIGN SUPERVISED BY_ _ _ _ _ _ _
DESIGNED BY _ _ _ _ _ _ _ _ _ _

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	0066-96A-917, P101, N-501	V.II-18

NOTES:

EACH FOUNDATION SHALL BE PERMANENTLY MARKED TO INDICATE ALL SIDES FROM WHICH CONDUITS PASS. THIS MARK SHALL BE MADE WITH A TROWEL WHEN FINISHING THE CONCRETE AND SHALL BE 1/4" DEEP AND 4" TO 6" LONG.

WHEN FOUNDATION EXTENDS 2" ABOVE FINISHED GRADE, ALL EDGES SHALL BE CHAMFERED 3/4".

GROUNDING BUSHINGS SHALL BE INSTALLED ON EACH END OF METAL CONDUITS.

EMPTY CONDUITS SHALL BE PLUGGED TO PREVENT MOISTURE AND RODENT ENTRY.

BELL ENDS SHALL BE INSTALLED ON EACH END OF PVC CONDUITS.

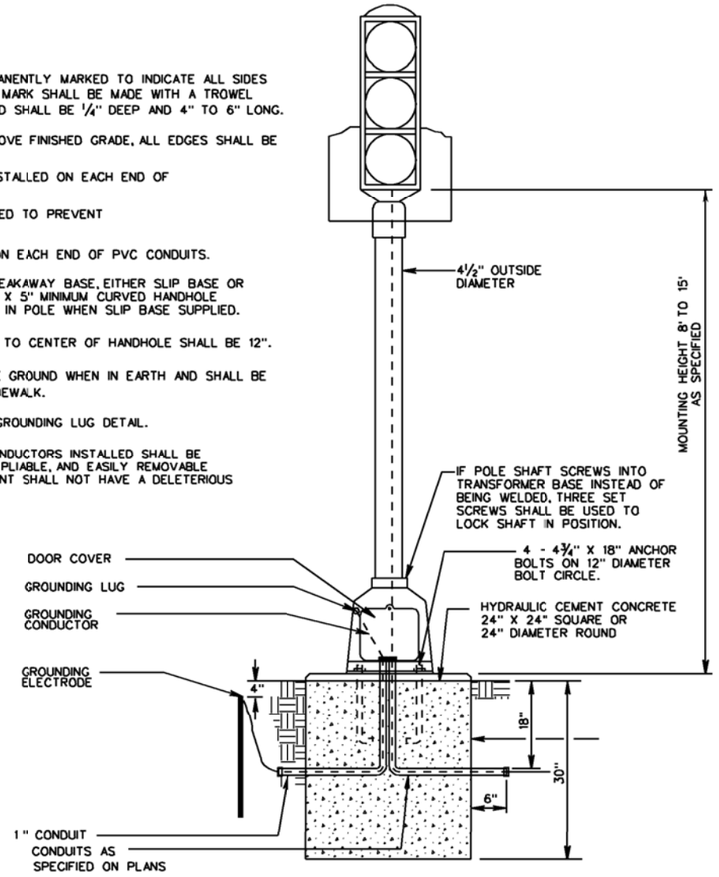
PEDESTAL POLE SHALL HAVE A BREAKAWAY BASE, EITHER SLIP BASE OR FRANGIBLE TRANSFORMER TYPE, 3" X 5" MINIMUM CURVED HANDHOLE WITH FRAME AND COVER REQUIRED IN POLE WHEN SLIP BASE SUPPLIED.

DISTANCE FROM BOTTOM OF POLE TO CENTER OF HANDHOLE SHALL BE 12".

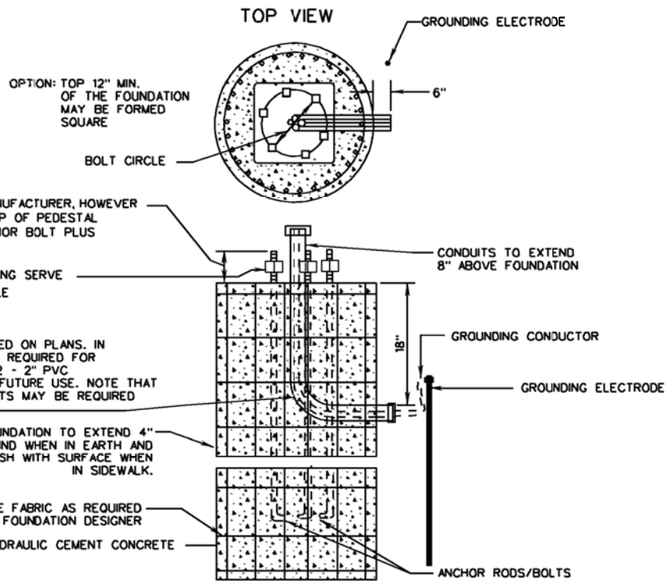
FOUNDATION TO EXTEND 2" ABOVE GROUND WHEN IN EARTH AND SHALL BE FLUSH WITH SURFACE WHEN IN SIDEWALK.

REFER TO STANDARD MP-2 FOR GROUNDING LUG DETAIL.

OPEN ENDS OF CONDUITS WITH CONDUCTORS INSTALLED SHALL BE SEALED WITH AN APPROVED SOFT, PLIABLE, AND EASILY REMOVABLE WATERPROOF SEALANT. THE SEALANT SHALL NOT HAVE A DELETERIOUS EFFECT ON CABLE COVERINGS.



PEDESTAL POLE AND FOUNDATION



NOTES:

ANCHOR BOLTS AND BOLT PATTERN SHALL BE FURNISHED WITH POLE. POLE SHALL BE CENTERED ON FOUNDATION.

EACH FOUNDATION SHALL BE PERMANENTLY MARKED TO INDICATE ALL SIDES FROM WHICH CONDUITS PASS. THIS MARK SHALL BE MADE WITH A TROWEL WHEN FINISHING THE CONCRETE AND SHALL BE 1/4" DEEP AND 4" TO 6" LONG. LOCATIONS OF EMPTY CONDUITS SHALL HAVE AN ADDITIONAL 2" LONG MARK MADE PERPENDICULAR TO AND CENTERED ON THIS MARKING.

WHEN FOUNDATION EXTENDS 4" ABOVE FINISHED GRADE ALL EDGES SHALL BE CHAMFERED 3/4" AND FOR SIDEWALKS SHALL BE FLUSH.

GROUNDING BUSHINGS SHALL BE INSTALLED ON EACH END OF METAL CONDUITS.

EMPTY CONDUITS SHALL BE PLUGGED TO PREVENT MOISTURE AND RODENT ENTRY.

BELL ENDS SHALL BE INSTALLED ON EACH END OF PVC CONDUITS.

OPEN ENDS OF CONDUITS WITH CONDUCTORS INSTALLED SHALL BE SEALED WITH AN APPROVED SOFT, PLIABLE, AND EASILY REMOVABLE WATERPROOF SEALANT. THE SEALANT SHALL NOT HAVE A DELETERIOUS EFFECT ON CABLE COVERINGS.

NO MORTAR, GROUT, OR CONCRETE SHALL BE PLACED BETWEEN BOTTOM OF BASE PLATE AND TOP OF FOUNDATION.

HEIGHT, WIDTH, AND DEPTH OF FOUNDATION SHALL BE AS REQUIRED BY FOUNDATION DESIGNER

SIDE VIEW

CIRCULAR FOUNDATION

FOUNDATION INSTALLATION DETAILS

NOT TO SCALE

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TRANSCORE
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I-66 ATM

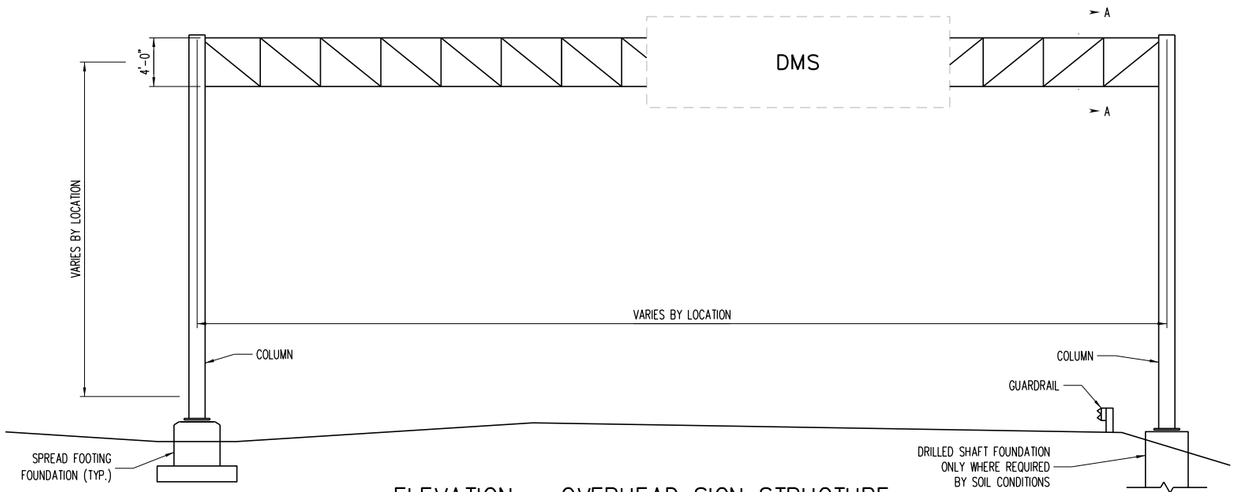
RAMP METERING SIGNAL ASSEMBLIES

SCALE: NONE	DATE: JULY 24, 2012	SHEET OF
PLAN NO.	PROJECT 0066-96A-917	SHEET NO. V.II-18

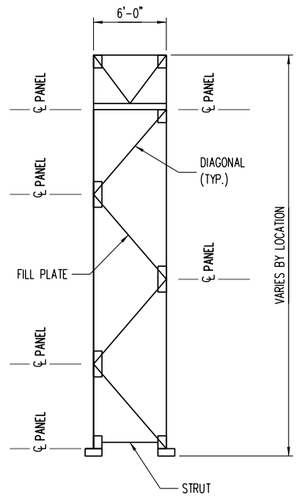
$FILE$
$TIME$
$DATE$

PROJECT MANAGER_____.
SURVEYED BY _____
DESIGN SUPERVISED BY_____
DESIGNED BY _____

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	0066-96A-917, P101, N-501	V.II-19



ELEVATION – OVERHEAD SIGN STRUCTURE



SIDE ELEVATION

GENERAL NOTES

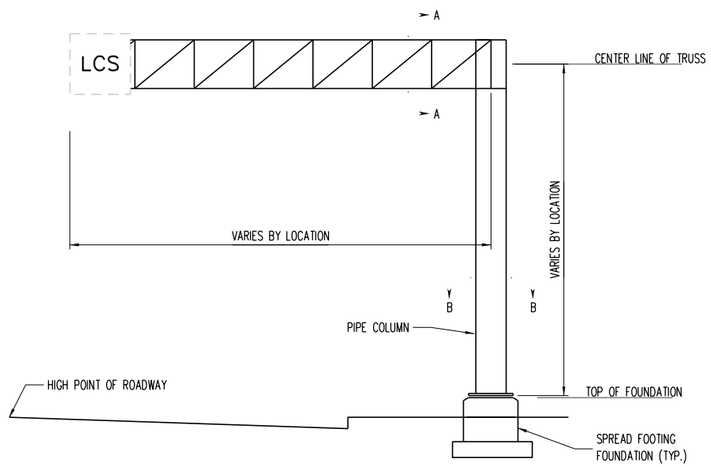
1. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE VDOT ROAD AND BRIDGE STANDARDS. DESIGN-BUILD CONTRACTOR SHALL USE STANDARD VDOT TRUSS STRUCTURE OR MONO TUBE STRUCTURE THAT MEETS ADDITIONAL STRUCTURAL DESIGN REQUIREMENTS AS LISTED BELOW.
2. VERTICAL CLEARANCE SHALL BE AS PER CURRENT VDOT ROAD AND BRIDGE STANDARDS.
3. LANE CONTROL SIGNALS (LCS) SHALL VERTICALLY ALIGN WITH CENTER OF LANE BELOW.
4. THE SIGN STRUCTURES DESIGN AND ANALYSIS SHALL BE DONE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES AND TRAFFIC SIGNALS FIFTH EDITION DATED 2009 AND 2010 INTERIMS WITH THE FOLLOWING EXCEPTIONS:

   BASIC WIND SPEED SHALL BE USED IN DESIGN. THE ALTERNATE METHOD FOR WIND PRESSURES PROVIDED IN APPENDIX C SHALL NOT BE USED.

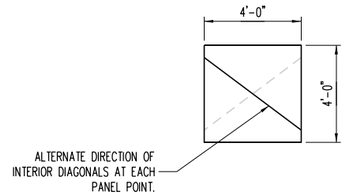
   WHEN INSTALLATION LOCATION OF STRUCTURE LIES BETWEEN ISOTACHS, THE BASIC WIND SPEED SHALL BE DETERMINED BY USING THE HIGHER ADJACENT ISOTACHS.

   ANY OPTIONAL DESIGN PARAMETER INDICATED IN THE AASHTO SPECIFICATIONS THAT ARE ALLOWED WHEN ACCEPTABLE TO OWNER SHALL NOT BE USED FOR DESIGN.

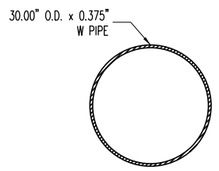
   STRUCTURE SHALL BE DESIGNED AS CATEGORY I FOR FATIGUE DESIGN.
5. WEATHERING STEEL SHALL NOT BE ALLOWED DUE TO HEAVY DEICING SALT USAGE IN THE NOVA DISTRICT.
6. THE STEEL SHALL BE DOMESTICALLY PRODUCED AND FABRICATED MEETING CFR 23 REQUIREMENTS.
7. POLE SHALL NOT BE SPLICED.
8. FIELD WELDS WILL NOT BE ALLOWED.
9. THE STRUCTURE SHALL BE STEEL AND HOT DIPPED GALVANIZED.
10. THE STRUCTURE SHALL BE DESIGNED TO HAVE NO FATIGUE ISSUES.



ELEVATION – CANTILEVER SIGN STRUCTURE



SECTION A–A



SECTION B–B

NOT TO SCALE

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PARSONS BRINCKERHOFF

VDOT

I-66 ATM

SIGN STRUCTURE RENDERING

SCALE: NONE	DATE: JULY 24, 2012	SHEET OF
PLAN NO.	PROJECT 0066-96A-917	SHEET NO. V.II-19

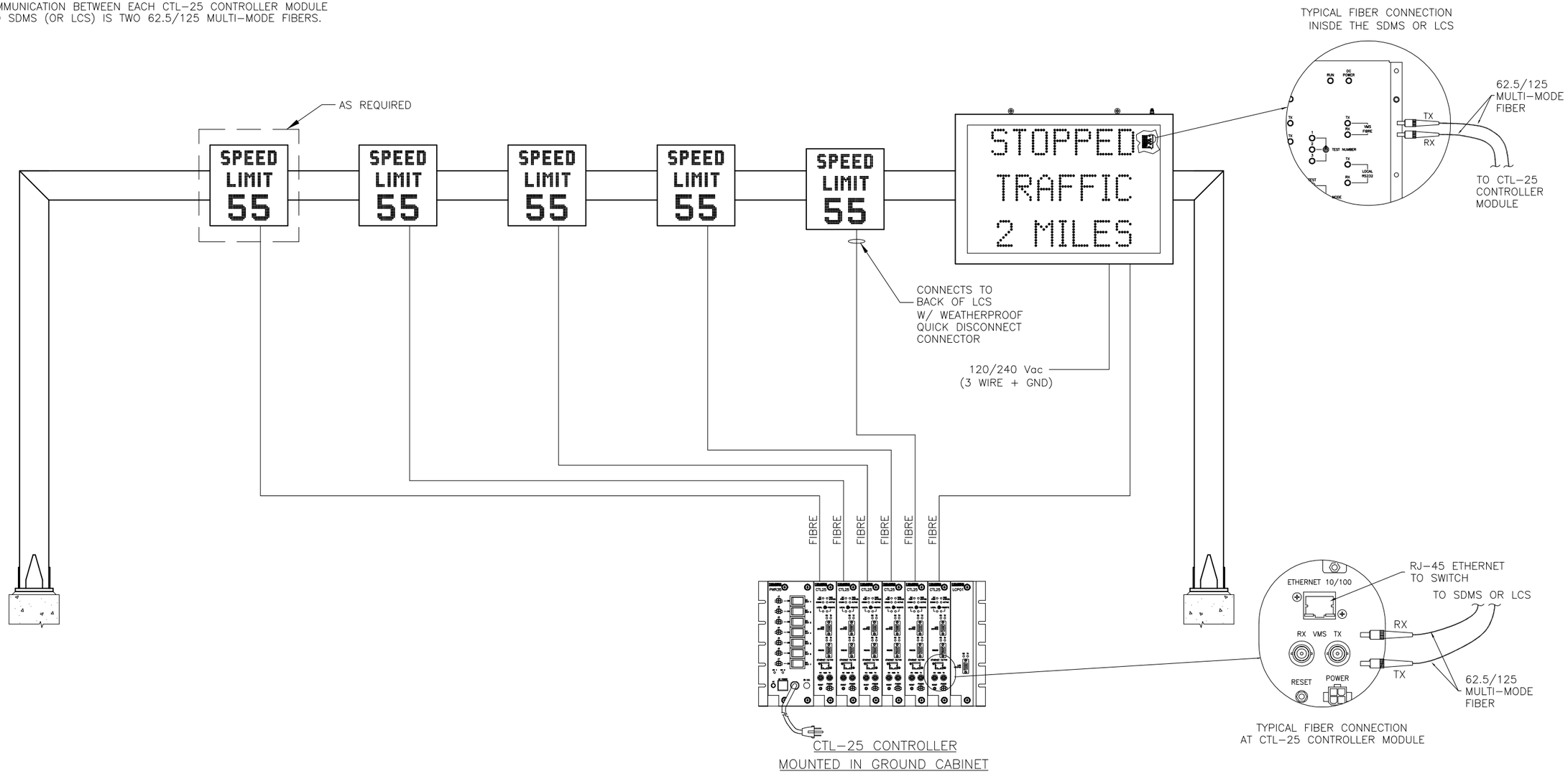
$DATE$ $TIME$ $FILE$

NOTES:

1) EACH CONTROLLER RACK CAN ACCOMODATE A MAXIMUM OF 6 CTL–25 CONTROLLER MODULES.

2) A MAXIMUM OF 6 SDMS OR LCS CAN BE CONTROLLED BY 1 CONTROLLER RACK.

3) COMMUNICATION BETWEEN EACH CTL–25 CONTROLLER MODULE AND SDMS (OR LCS) IS TWO 62.5/125 MULTI–MODE FIBERS.



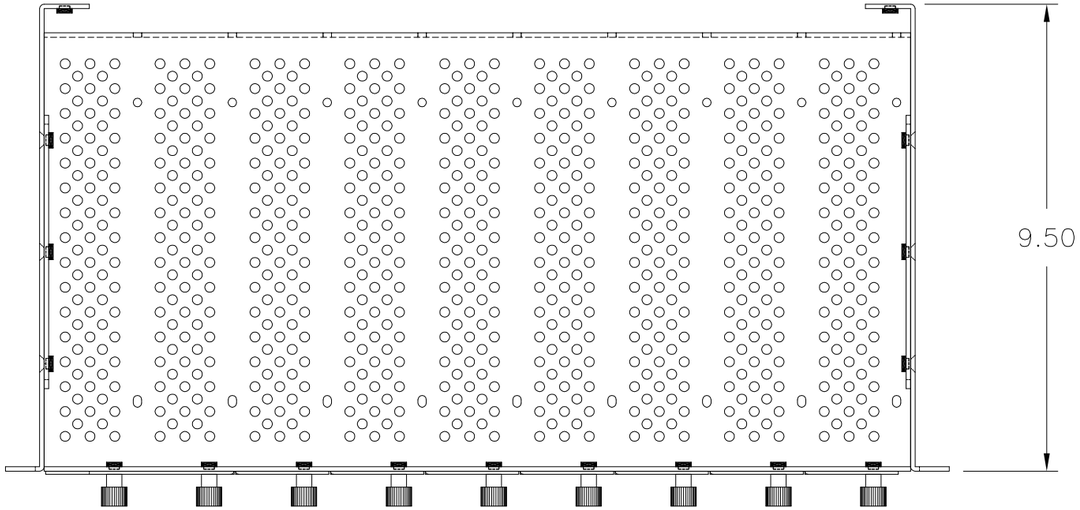
NO.	DESCRIPTION	DATE

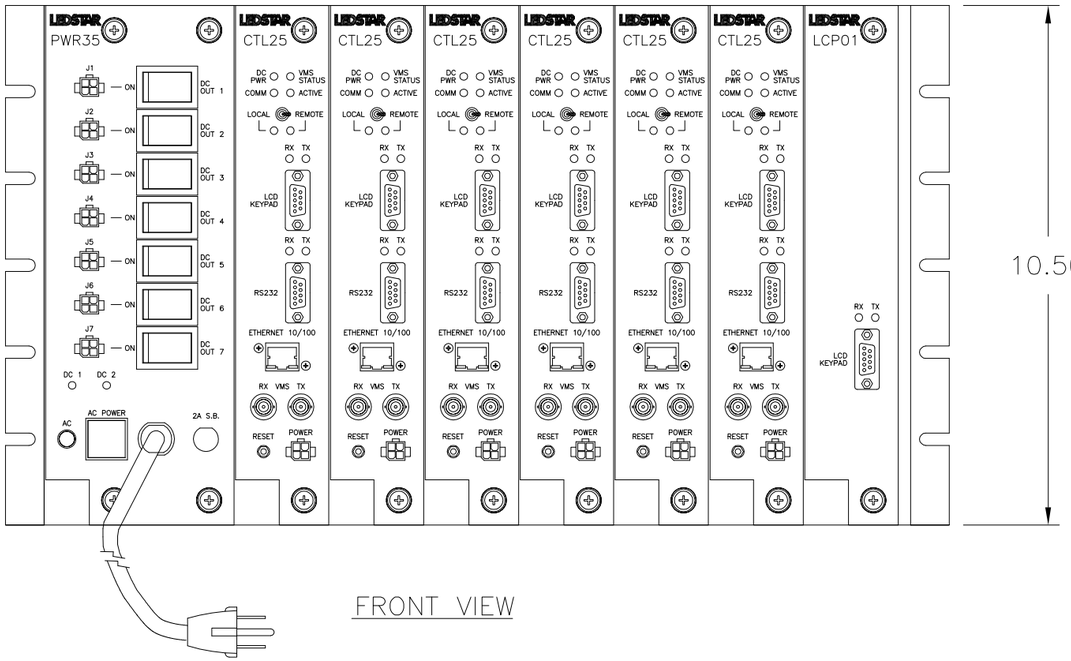
REVISION RECORD

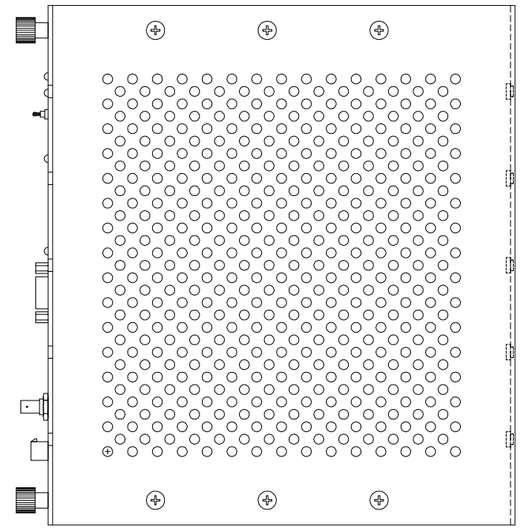
TITLE:
SYSTEM CONNECTION DIAGRAM
CTL–25 CONTROLLER TO SDMS AND LCS

DRAWN BY: R POON	DATE: 25 MAY 2012	LEDSTAR PART NUMBER	
APPROVED BY:	DATE:	DRAWING NUMBER: CTL25R_CON_A02	DWG REV: 0.2
SCALE: NONE	UNITS:	FILE: CTL25R_CON_A02_R02.DWG	PAGE: 1 OF: 1

TOP VIEW







19.00

9.50

10.50

9.50

FRONT VIEW

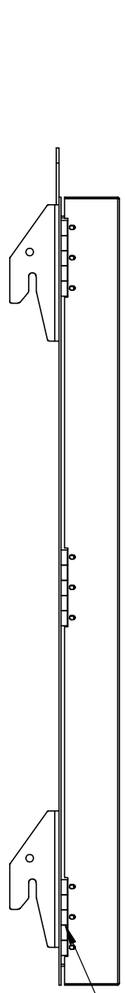
SIDE VIEW

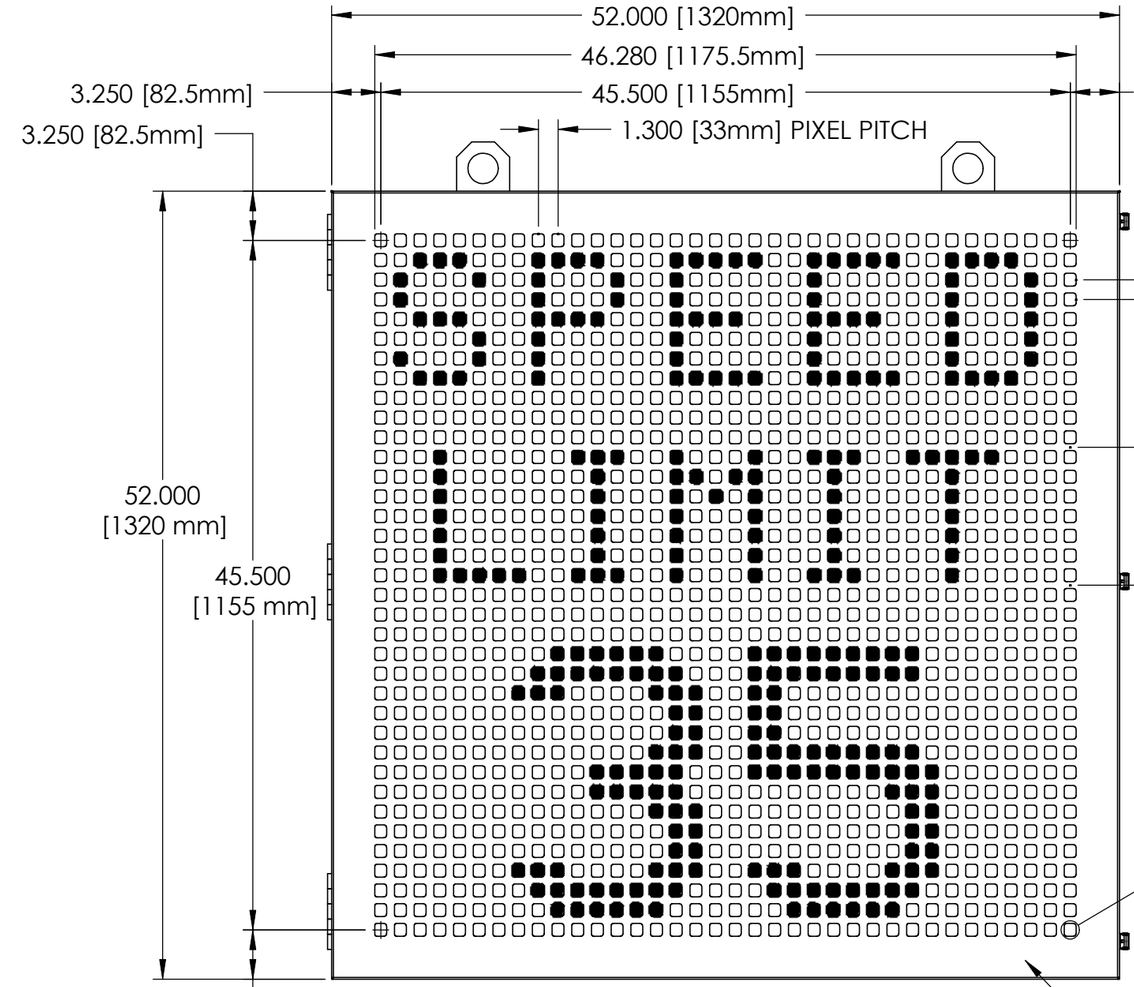
NO.	DESCRIPTION	DATE

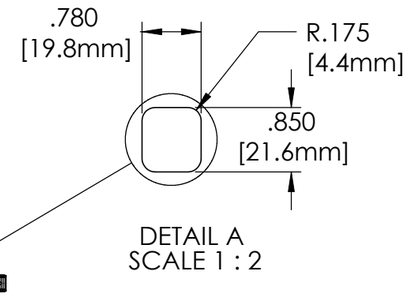
REVISION RECORD

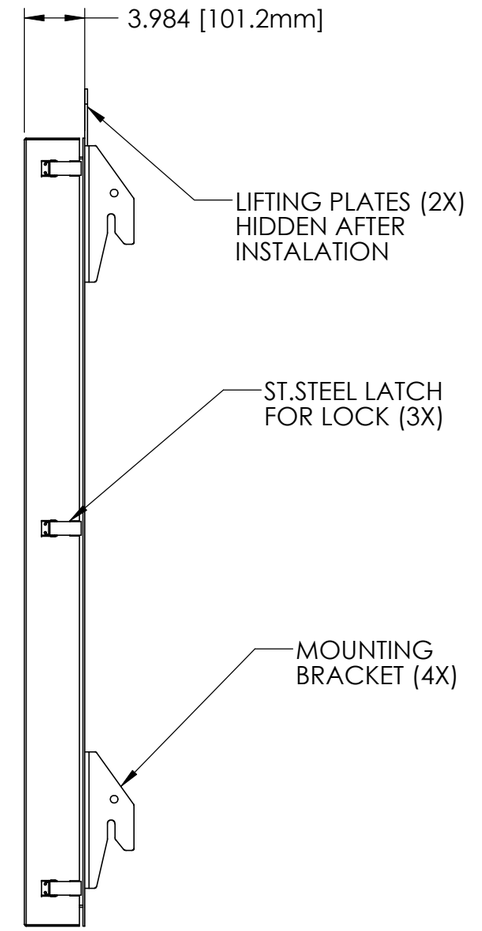
LEDSTAR

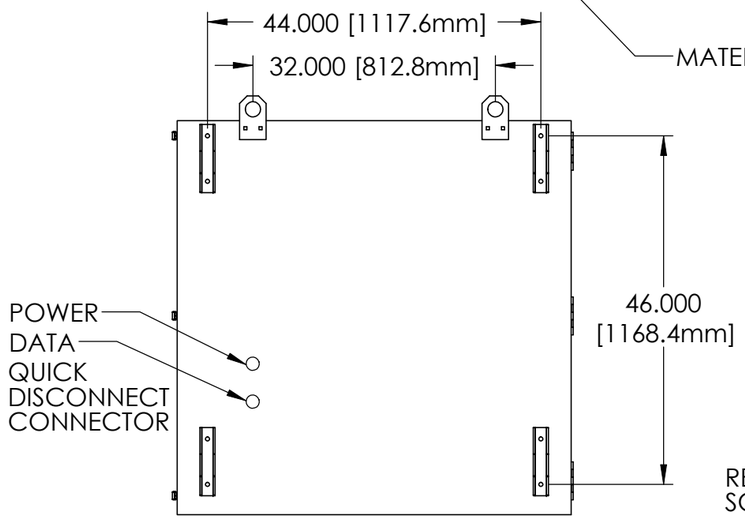
TITLE: MODEL NO. CTL-25R DMS CONTROLLER			
CUSTOMER: LEDSTAR		COMP.DWG.#: CTL25RPI.DWG	
SCALE: 1:3	REF.DWG.#:	DRAWING NUMBER: CTL25A01	REV.NO.: 1.0
DRAWN BY: RP	DATE: 6 Jul 12		
UNITS: INCHES	APPROVAL:	SHEET: 1 OF 1	PAGE:











REAR VIEW
SCALE 1:20

DESIGN LOADING:

THE DESIGN AS PER AASHTO STANDARD SPECIFICAIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS, 2009

PAINT & COLOR SPECIFICATIONS:

FRONT FACE:
BLACK - KYNAR 500
SIDE, TOP, BACK AND BOTTOM:
BLACK
INTERNAL AREA:
NATURAL ALUMINUM

SURFACE PREPARATION:
SURFACE MUST BE DRY, CLEAN AND FREE OF ALL CONTAMINATION INCLUDING DUST, DIRT, OIL, GREASE OR RUST.

NOTES:

- WELDING:
  ALL EXTERIOR SEAMS SHALL BE CONTINUOUSLY WELDED AND EACH WELD SHALL BE UNIFORM FLOW. ALL WELDS SHALL BE NEATLY FORMED AND FREE OF CRACKS, BLOW HOLES, AND OTHER IRREGULARITIES.
  WELDING ON ALUMINUM HOUSING SHALL BE DONE BY MIG OR TIG PROCESS USING BARE ALUMINUM WELDING ELECTRODES.
  WELDING ELECTRODES TO BE ER5356 AL. ALLOY.
  PROCEDURES, WELDERS AND WELDING OPERATORES SHALL BE QUALIFIED IN ACCORDANCE WITH THE REQUIREMENTS OF AWS D1.2 IN ALUMINUM.

- WORKAMNSHIP:
  HOUSING SHALL BE CONSTRUCTED TO PRESENT A CLAEN, NEAT APPEARANCE. ALL SURFACES SHALL BE FREE OF DENTS, SCRATCHES, BURRS, WELD BURNS, OR ABRASIONS. ALL SHARP EDGES AND CORNERS SHALL BE ROUNDED.

WEIGHT OF THE LCS - 170 LB

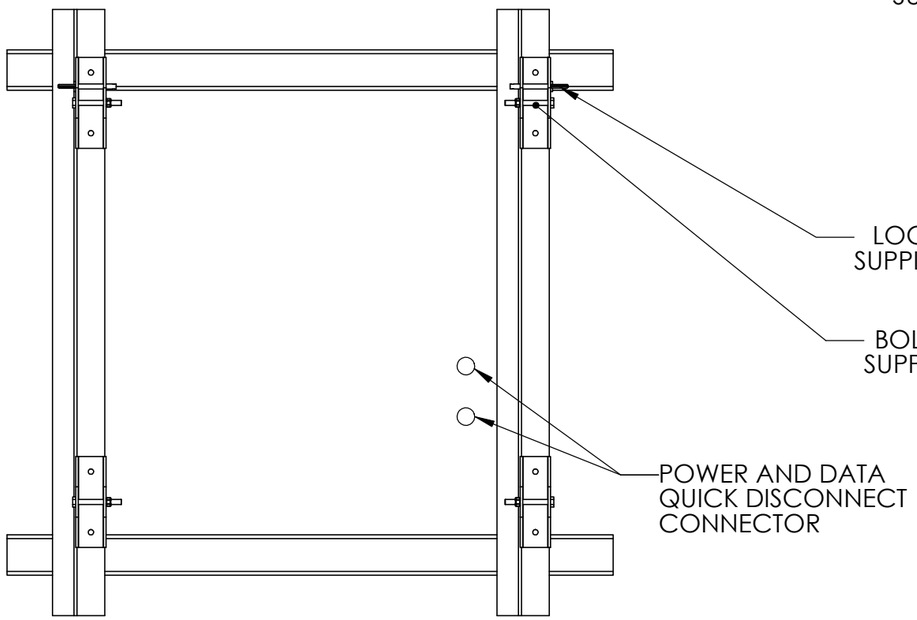
No.	Description	Date
REVISION RECORD		

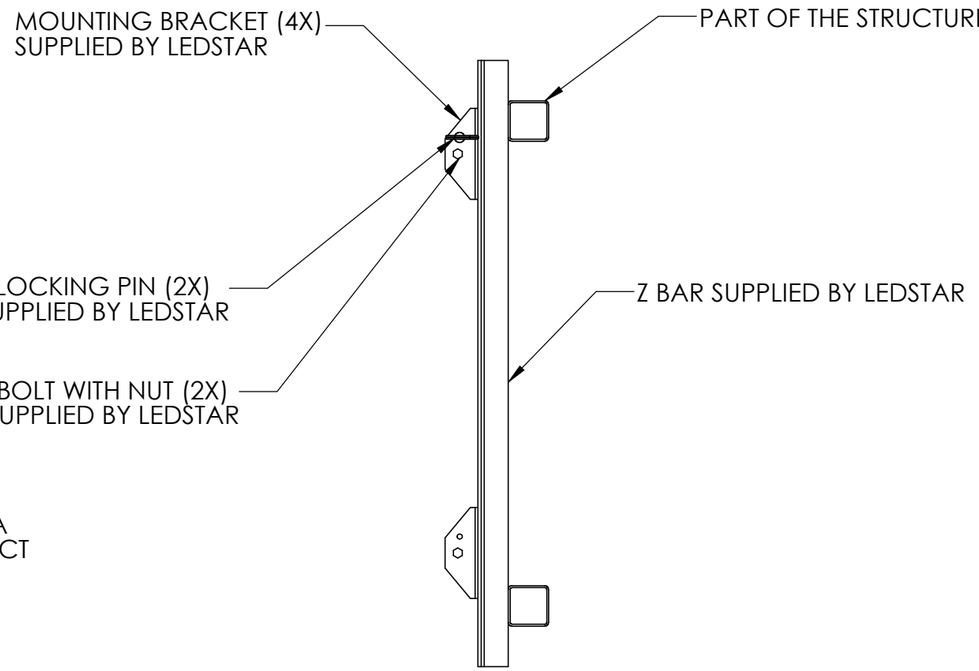
Customer	Comp.dwg#
VDOT (I-66ATM)	

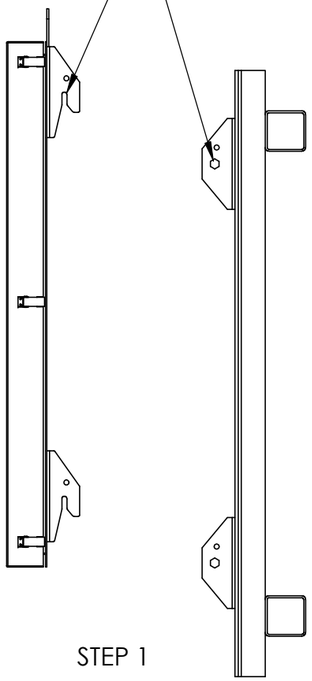
Title: VMS-833-36x36C, FULL COLOR, 33mm PITCH, FRONT ACCESS - LCS

Drawn by:	Date	Ref.Dwg	Drawing Number	Rev No.
Dusan Popovic	July 6, 2012		120702D	0
Scale 1:10	Issued	Customer Approval		

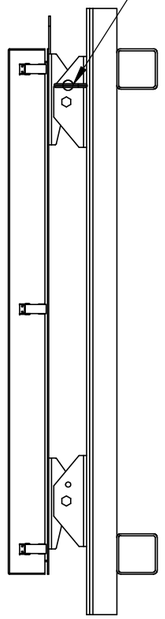
V.II-22



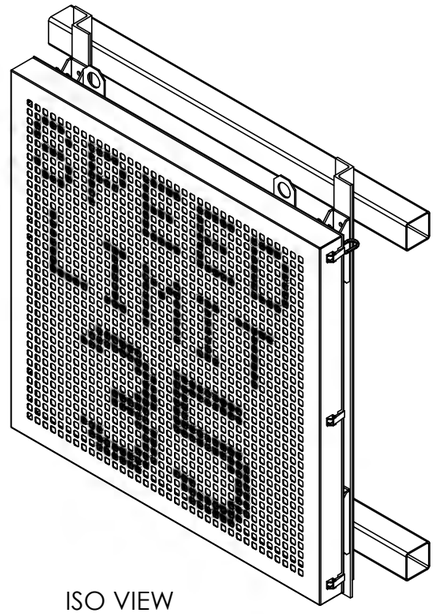




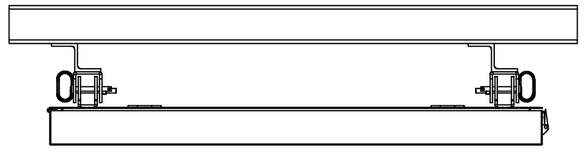
STEP 1



STEP 2



ISO VIEW



TOP VIEW

No.	Description	Date
REVISION RECORD		

LEDSTAR

Customer: VDOT (I-66ATM)	Comp.dwg#
Title: MOUNTING OF LCS TO THE STRUCTURE - VMS-833-36x36C	

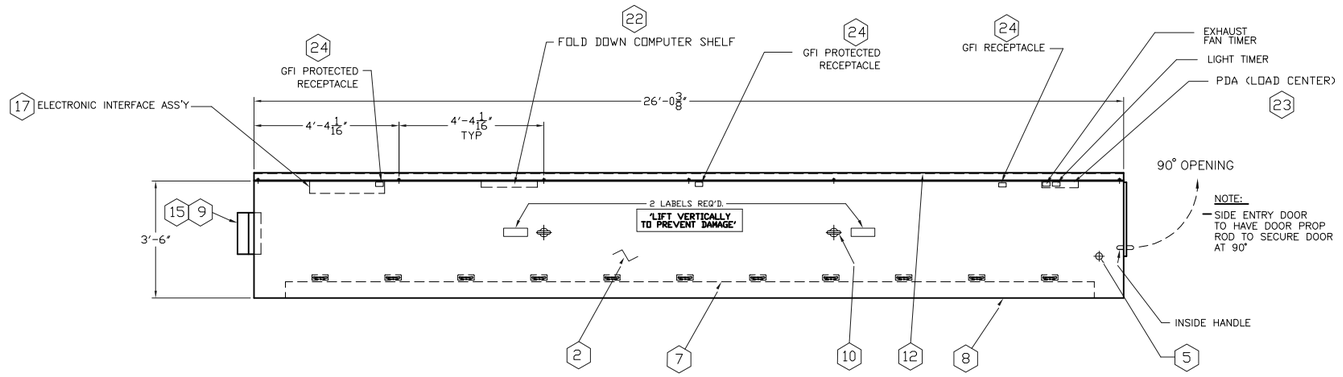
Drawn by:	Date	Ref.Dwg	Drawing Number	Rev No.
Dusan Popovic	July 6, 2012		120703D	0
Scale: 1:15	Issued	Customer Approval		

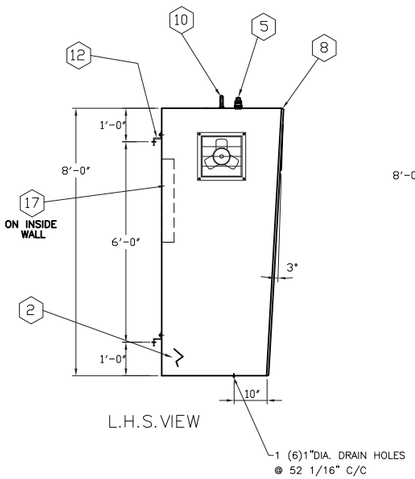
DESIGN LOADING:

THE DESIGN AS PER AASHTO 'STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS, 2009.

MATERIAL LIST

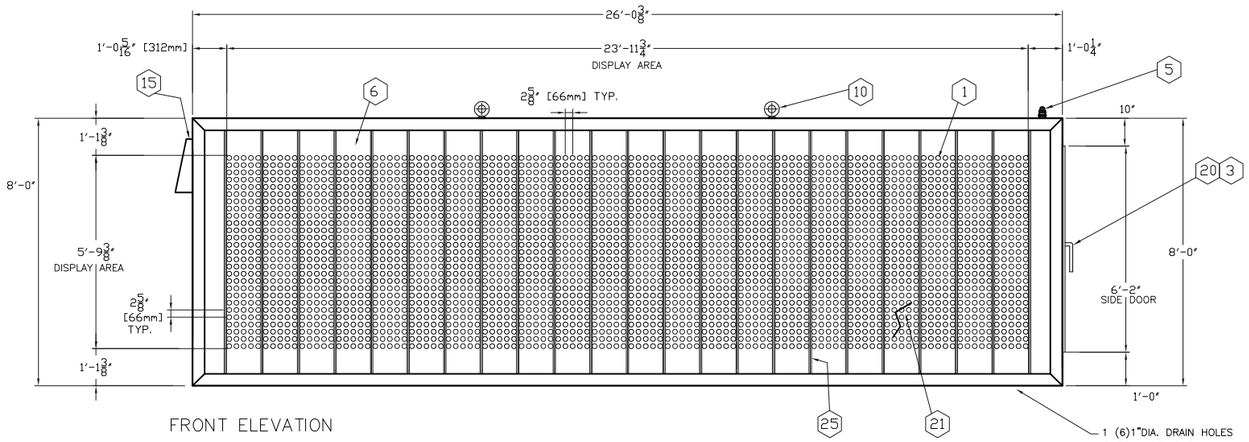
No.	Part #	Description	Material Size		Qty
1	LMM 85	LED MODULES			66
2	5052-H32	SIGN SKIN	0.125"THK.ALUM.	ALL AROUND	1
3		3 POINT LOCK	3/4"DIA. ST.STEEL	HANDLE	1
4		SIDE ENTRY DOOR	.125"THK.ALUM.	80 1/2"x27 1/2"x1"THK.	1
5	PST11A01R10	PHOTO SENSOR UNIT			1
6		1/8"POLYCARBONATE FACE	CLEAR	BEHIND EXTERNAL MASK	11
7		MODULE DISPLAY AREA			1
8		FRONT WINDOW FRAME	1/8"THK. AL.EXT.	29'-3 3/4"x 8'-0"	1
9		EXHAUST FAN	1650 CFM	MODEL S12-E2 (12")	1
10	GALVANIZED	LIFTING EYE BOLTS	2"I.D.OF EYE\EYB-18	1030 STEEL HEAT TREATED	2
11		INTAKE AIR FILTER	ALUM. FRAME	FILTER SIZE 16"x25x2"	2
12	6061-T6	'Z'BARS 3"x3"x5/16"THK.	ALUM.EXTRUSION		2
13		AIR INLET LOUVERS			2
14		REPLACEABLE FILTER			2
15		EXHAUST RAIN HOOD	1/8"THK. ALUM.		1
16		HEX BOLTS ASS'Y	5/8-11	18-8 STAINLESS STEEL	21
17		ELECTRONIC INTERFACE	EIA UNIT		1
18		POWER & DATA INLETS	1 1/4 CONDUIT	FITTINGS	2
19		SIDE DOOR HINGE	5"LONG 14 GA S.S.	1/4"ST.STEEL FIXED PIN	4
20	2 KEYS REQ'D.	SIDE DOOR LOCK	CORBIN	Key #9	1
21		FACE MASK	KYNAR BLACK FINISH	.090"THK. ALUM.	22
22	0.125"THK.AL.	COMPUTER SHELF	WELDED TO SKIN		1
23	PDA	LOAD CENTER			1
24		GFI RECEPTACLE			3
25		FACE MULLION	KYNAR BLACK FINISH	3/4"WIDE	23



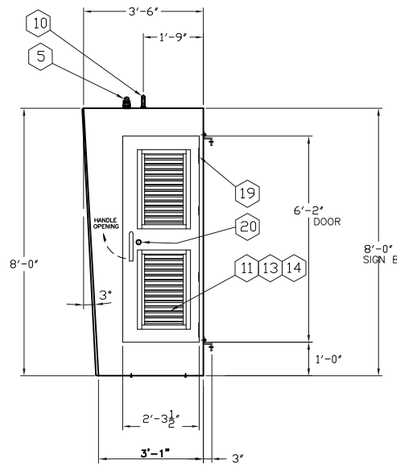


L.H.S.VIEW

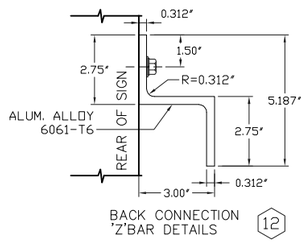
TOP VIEW



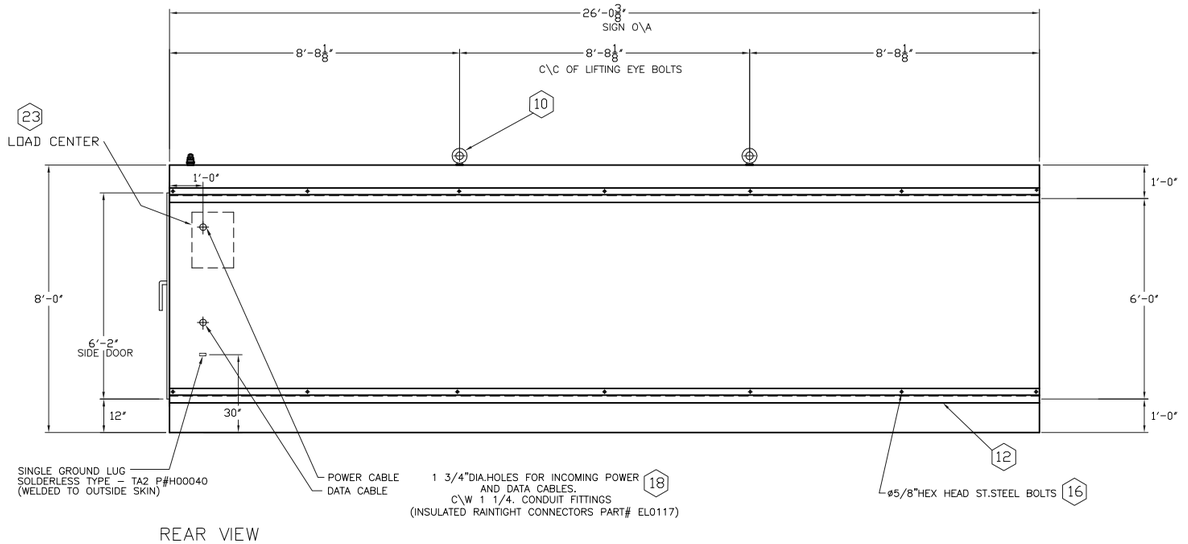
FRONT ELEVATION



R.H.S.VIEW



BACK CONNECTION 'Z'BAR DETAILS 12



REAR VIEW

FRONT BORDER OF SIGN PAINTED:
BLACK - KYNAR FINISH

BACK, SIDES, TOP & BOTTOM:
NATURAL ALUM. - MILL FINISH

INSIDE:
NATURAL ALUM. - MILL FINISH

FACE MASK:
SEMI-GLOSS BLACK - KYNAR FINISH

SURFACE PREPARATION:
SURFACE MUST BE DRY, CLEAN, AND FREE OF ALL CONTAMINATION, INCLUDING DUST, DIRT, OIL, GREASE OR RUST.

TOTAL SIGN WEIGHT: 3600 LB.

ALL DIMENSION UNITS IN INCHES

NOTES:

- WELDING:
  ALL EXTERIOR SEAMS SHALL BE CONTINUOUSLY WELDED AND EACH WELD SHALL BE UNIFORM FLOW. ALL WELDS SHALL BE NEATLY FORMED AND FREE OF CRACKS, BLOW HOLES, AND OTHER IRREGULARITIES.
  WELDING ON ALUMINUM HOUSING SHALL BE DONE BY MIG OR TIG PROCESS USING BARE ALUMINUM WELDING ELECTRODES.
  WELDING ELECTRODES TO BE ER5356 AL. ALLOY. PROCEDURES, WELDERS, AND WELDING OPERATORS SHALL BE QUALIFIED IN ACCORDANCE WITH THE REQUIREMENTS OF AWS D1.2 IN ALUMINUM.
- WORKMANSHIP:
  HOUSING SHALL BE CONSTRUCTED TO PRESENT A CLEAN, NEAT APPEARANCE. ALL SURFACES SHALL BE FREE OF DENTS, SCRATCHES, BURRS, WELD BURNS, OR ABRASIONS. ALL SHARP EDGES AND CORNERS SHALL BE ROUNDED.

No.	Description	Date

REVISION RECORD

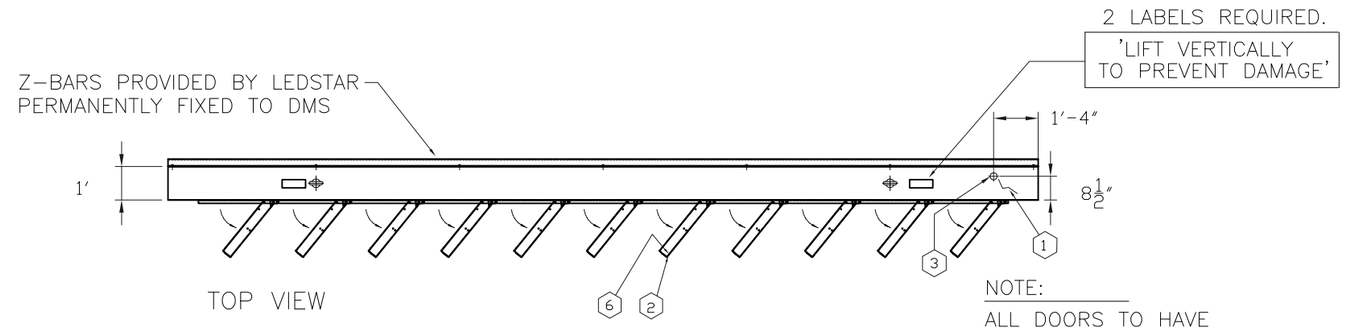
LEDSTAR

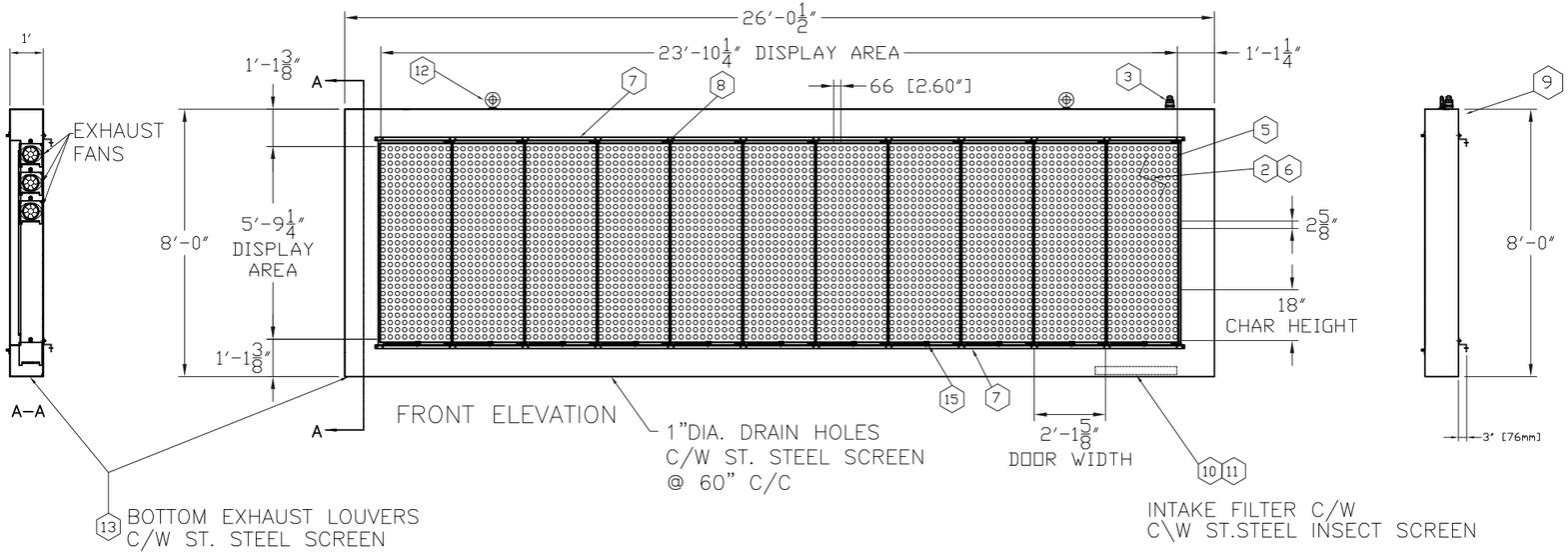
Customer: VIRGINIA DEPARTMENT OF TRANSPORTATION (I-66 ATM)			Comp.dwg.#
Title: VMS-826-27X110C, Full Color, 66mm Pitch, Walk-in Large DMS (TYPE 1 - 3 LINES OF 18 CHARACTERS, 18")			
Drawn by: R. Poon	Date: 21 MAY 12	Ref.Dwg.	Drawing Number: VMS826PI
Scale:	Issued	Customer Approval	Rev.No. 0

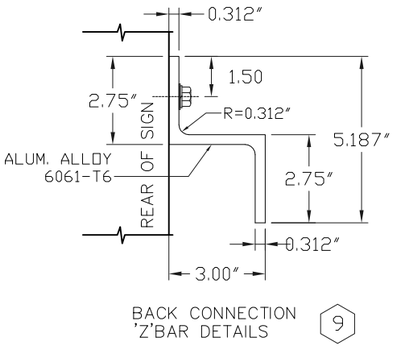
DESIGN LOADING:

THE DESIGN AS PER AASHTO 'STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS, 2009.

MATERIAL LIST					
No.	Part #	Description	Material Size		Qty
1		SIGN SKIN	1/8"THK.ALUM.	5052-H32 ALLOY	1
2		ACCESS DOOR	KYNAR PAINTED	WITH PIXEL APERTURE	11
3		PHOTO SENSOR UNIT	PST12A01R20		1
4					
5	LMM85	LED MODULE	LMM LED MATRIX		66
6		1/8" THK. POLYCARBONATE	CLEAR	INSIDE DOOR	11
7		TOP AND BOTTOM ANGLE	1 1/4" x 1 1/4"	x 1/4"	2
8		DOOR HINGES	5/16"ALUM.PLATE		22
9		'Z' BAR EXTRUSION	2.75"x3"x2.75"x1/4"	6061-T6 ALLOY	2
10		INTAKE AIR FILTER	8"x24"x2"THK.		1
11		AIR INTAKE SCREEN	BOTTOM OPENING		1
12		LIFTING EYE BOLTS	2" EYE I.D.	1030 GAL. STEEL	2
13		BOTT. EXHAUST LOUVERS		5.25"x 12"	1
14		POWER & DATA INLETS	1-1/4" NIPPLE		2
15		LOCKING SYSTEM			11
16					







BACK CONNECTION 'Z'BAR DETAILS 9

PAINT & COLOR SPECIFICATIONS:

BACK, SIDES, TOP, BOTTOM:
NATURAL ALUMINUM

INTERNAL AREA:
NATURAL ALUMINUM

FRONT FACE:
FACE WINDOW ASS'Y BLACK KYNAR 500 SYSTEM

FRONT BORDER OF SIGN:
BASF- LEDSTAR BLACK

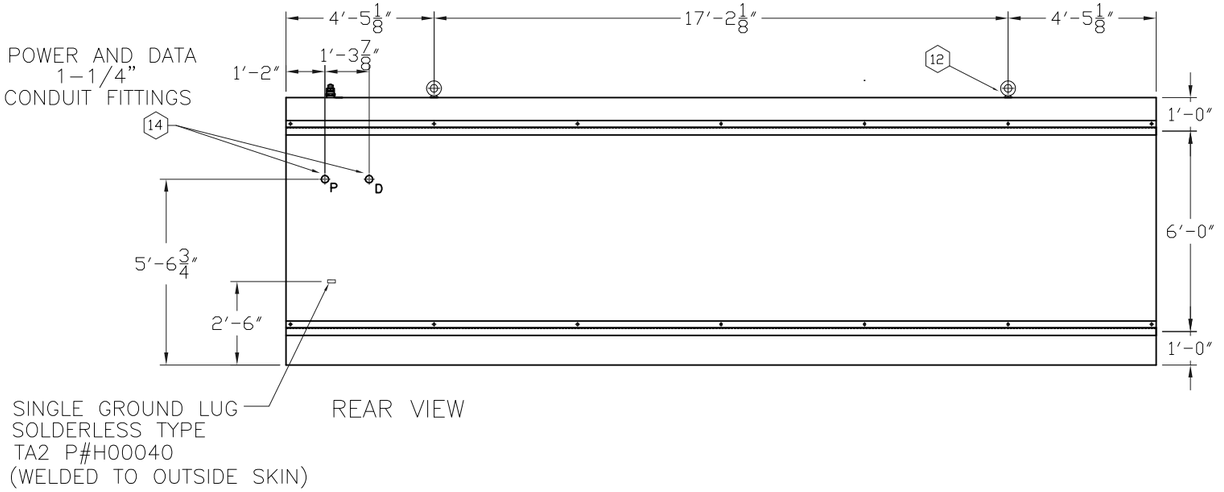
SURFACE PREPARATION:
SURFACE MUST BE DRY, CLEAN, AND FREE OF ALL CONTAMINATION, INCLUDING DUST, DIRT, OIL, GREASE OR RUST.

TOTAL SIGN WEIGHT: 2500 LB.

ALL DIMENSION UNITS IN INCHES

NOTES:

- WELDING:
  ALL EXTERIOR SEAMS SHALL BE CONTINUOUSLY WELDED AND EACH WELD SHALL BE UNIFORM FLOW. ALL WELDS SHALL BE NEATLY FORMED AND FREE OF CRACKS, BLOW HOLES, AND OTHER IRREGULARITIES.
  WELDING ON ALUMINUM HOUSING SHALL BE DONE BY MIG OR TIG PROCESS USING BARE ALUMINUM WELDING ELECTRODES.
  WELDING ELECTRODES TO BE ER5356 AL. ALLOY. PROCEDURES, WELDERS, AND WELDING OPERATORS SHALL BE QUALIFIED IN ACCORDANCE WITH THE REQUIREMENTS OF AWS D1.2 IN ALUMINUM.
- WORKMANSHIP:
  HOUSING SHALL BE CONSTRUCTED TO PRESENT A CLEAN, NEAT APPEARANCE. ALL SURFACES SHALL BE FREE OF DENTS, SCRATCHES, BURRS, WELD BURNS, OR ABRASIONS. ALL SHARP EDGES AND CORNERS SHALL BE ROUNDED.



No.	Description	Date

REVISION RECORD

LEDSTAR

Customer	VIRGINIA DEPARTMENT OF TRANSPORTATION (I-66 ATM)		Comp.dwg.#
Title	VMS-827-27X110C, Full Color, 66mm Pitch, Front Access Large DMS (TYPE 1 - 3 LINES OF 18 CHARACTERS, 18")		
Drawn by: R. Poon	Date 21 MAY 12	Ref.Dwg.	Drawing Number VMS827PI / Rev.No. 0
Scale:	Issued	Customer Approval	

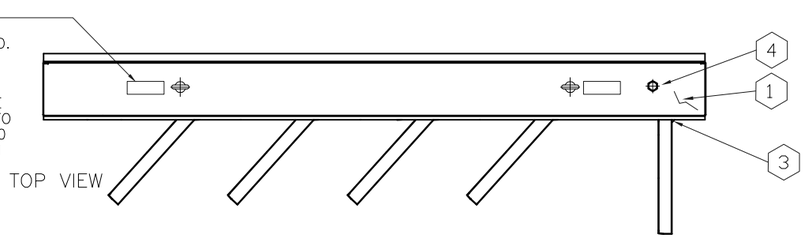
NOTES:

- WELDING:
  ALL EXTERIOR SEAMS SHALL BE CONTINUOUSLY WELDED AND EACH WELD SHALL BE UNIFORM FLOW. ALL WELDS SHALL BE NEATLY FORMED AND FREE OF CRACKS, BLOW HOLES, AND OTHER IRREGULARITIES.
  WELDING ON ALUMINUM HOUSING SHALL BE DONE BY MIG OR TIG PROCESS USING BARE ALUMINUM WELDING ELECTRODES.
  WELDING ELECTRODES TO BE ER5356 AL. ALLOY. PROCEDURES, WELDERS, AND WELDING OPERATORS SHALL BE QUALIFIED IN ACCORDANCE WITH THE REQUIREMENTS OF AWS D1.2 IN ALUMINUM.

- WORKMANSHIP:
  HOUSING SHALL BE CONSTRUCTED TO PRESENT A CLEAN, NEAT APPEARANCE. ALL SURFACES SHALL BE FREE OF DENTS, SCRATCHES, BURRS, WELD BURNS, OR ABRASIONS. ALL SHARP EDGES AND CORNERS SHALL BE ROUNDED.

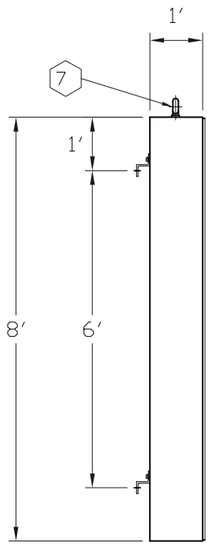
'LIFT VERTICALLY TO PREVENT DAMAGE'
2 LABELS REQUIRED.

NOTE:
ALL DOORS TO HAVE DOOR PROP RODS TO SECURE DOOR AT 90 LOCATED AT BOTTOM OF DOOR.

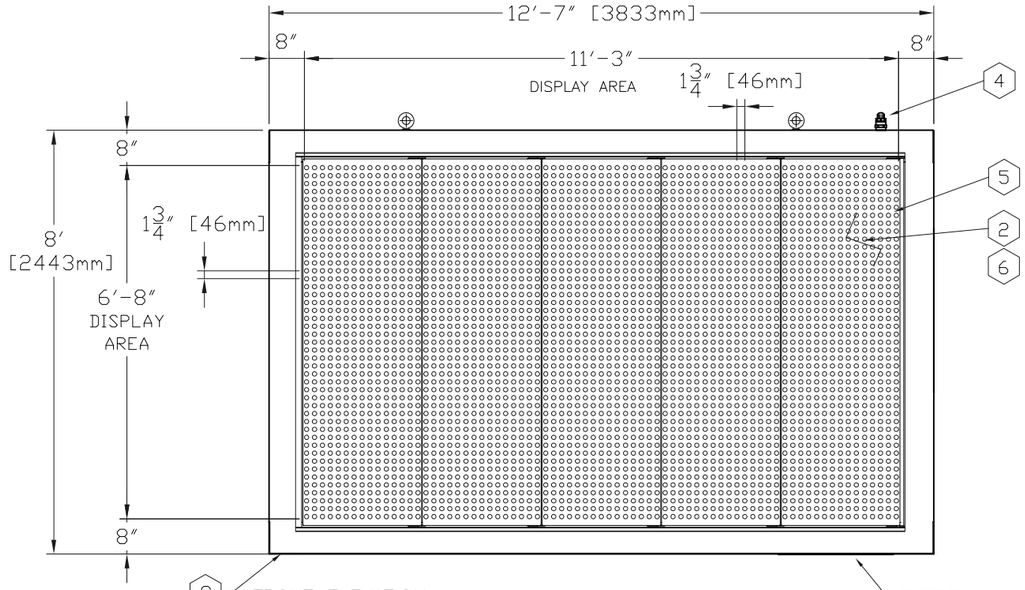


TOP VIEW

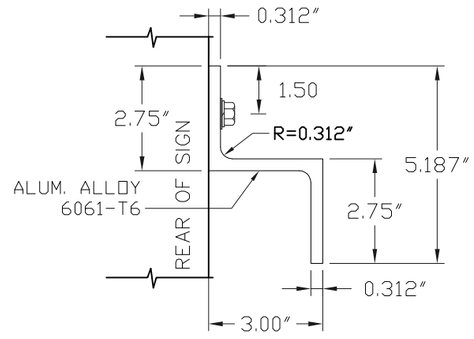
MATERIAL LIST					
No.	Part #	Description	Material Size		Qty
1		ALUM. SIGN SHEETING	1/8"THK.ALUM.	5052-H32 ALLOY	1
2		FRONT WINDOW	.		5
3		DOOR HINGE			10
4		PHOTO SENSOR UNIT	PST12A01R20		1
5		LED MODULE	LMM LED MATRIX	9R X 5C PIXELS	75
6		1/8"THK. POLYCARBONATE		.	5
7		LIFTING EYE BOLTS	44.5mm (1.75") I.D.		2
8		EXHAUST PORT			1
9		POWER & DATA INLETS	CONDUIT FITTING	32mm (1-1/4")	2
10		'Z' BAR EXTRUSION		2.75" x 3" x 5/16"	2



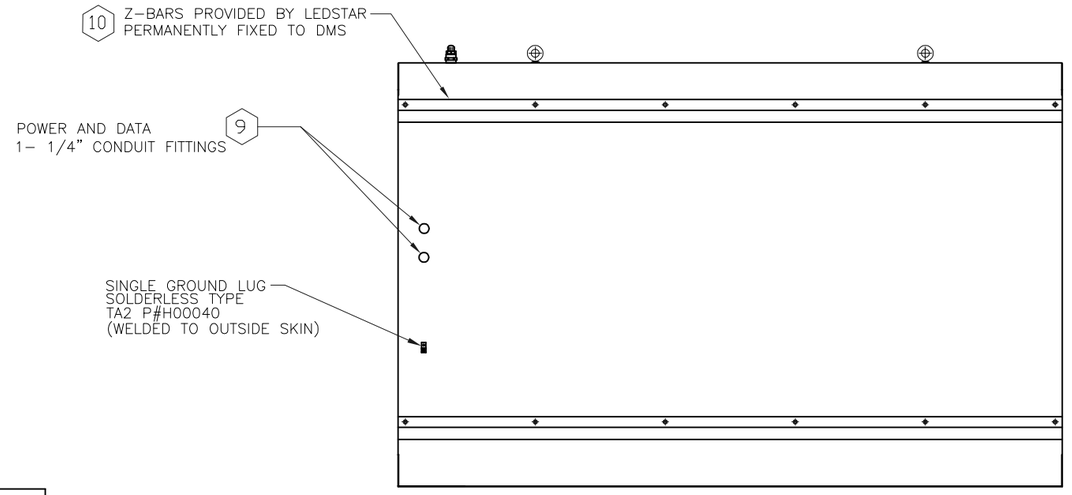
SIDE VIEW



FRONT ELEVATION



BACK CONNECTION
'Z'BAR DETAILS (10)



REAR VIEW

DESIGN LOADING:

THE DESIGN AS PER AASHTO 'STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS, 2009.

PAINT & COLOR SPECIFICATIONS:

BACK, SIDES, TOP, BOTTOM:
NATURAL ALUMINUM

INTERNAL AREA:
NATURAL ALUMINUM

FRONT FACE:
FACE WINDOW ASS'Y
BLACK KYNAR 500 SYSTEM

FRONT BORDER OF SIGN:
BASF- LEDSTAR BLACK

SURFACE PREPARATION:
SURFACE MUST BE DRY, CLEAN, AND FREE OF ALL CONTAMINATION, INCLUDING DUST, DIRT, OIL, GREASE OR RUST.

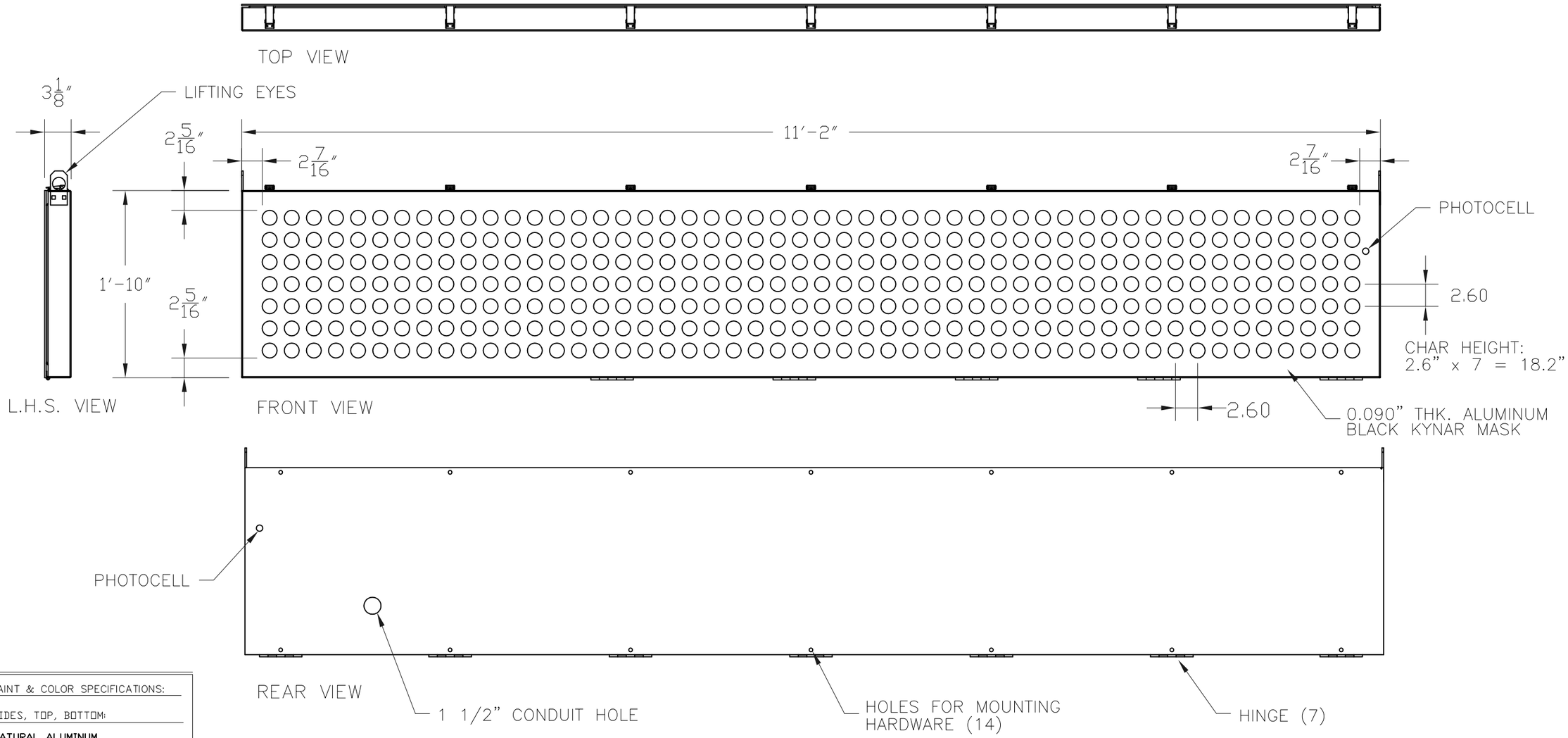
TOTAL WEIGHT OF SIGN:
1400 LBS.

No.	Description	Date

REVISION RECORD

LEDSTAR

Customer: VIRGINIA DEPARTMENT OF TRANSPORTATION (I-66 ATM)				Comp.dwg.#
Title: VMS-829-45x75, Amber, 46mm Pitch, Front Access Small DMS (TYPE 2 – 3 LINES OF 9 CHARACTERS – 18" CHAR HEIGHT)				
Drawn by: R. POON	Date: 7 Jul 12	Ref.Dwg.	Drawing Number: VMS829PI	Rev.No: 0
Scale:	Issued	Customer Approval		



PAINT & COLOR SPECIFICATIONS:

SIDES, TOP, BOTTOM:

NATURAL ALUMINUM

BACK AND INTERNAL AREA:

NATURAL ALUMINUM

FRONT FACE:

FACE WINDOW ASS'Y
BLACK KYNAR 500 SYSTEM

FRONT BORDER OF SIGN:

BASF- LEDSTAR BLACK

SURFACE PREPARATION:

SURFACE MUST BE DRY, CLEAN, AND FREE OF ALL CONTAMINATION, INCLUDING DUST, DIRT, OIL, GREASE OR RUST.

TOTAL SIGN WEIGHT:
100 LB.

ALL DIMENSION UNITS
IN INCHES

No.	Description	Date

REVISION RECORD

LEDSTAR

Customer	VIRGINIA DEPARTMENT OF TRANSPORTATION (I-66 ATM)			Comp.dwg.#	
Title	VMS-830-7x50, Amber, 66mm Pitch, Front Access One Line Front Access DMS (1 LINE OF 10 CHARACTERS, 18")				
Drawn by: R. Poon	Date 21 MAY 12	Ref.Dwg.	Drawing Number VMS830PI	Rev.No. 0	
Scale:	Issued	Customer Approval			