State of Florida
Department of Transportation

Florida Department of Transportation
District Four

EXHIBIT “A”
SPECIFICATIONS
(SCOPE OF SERVICES)
Definitions, Acronyms, and Abbreviations

API: Application Programming Interface
ATMS: Advanced Traffic Management System
CPU: Central Processing Unit
DGN: MicroStation Design File
DVI: Digital Visual Interface
EOR: Engineer of Record
FDOT: Florida Department of Transportation
ITS: Intelligent Transportation System
HD: High Definition
HDMI: High-Definition Multimedia Interface
HZ: Hertz
IP: Internet Protocol
IVP: Individualized Video Processor
LAN: Local Area Network
LBS: Pounds
LCD: Liquid-Crystal Display
LED: Light-Emitting Diode
MM: Millimeter
NBDVP: Network Based Distributed Video Processor
NEC: National Electric Code
NEMA: National Electrical Manufacturers Association
NPDU: Network-based Power Distribution Unit
NTP: Notice to Proceed
NTSC: National Television System Committee
OS: Operating System
OTA: Over –The-Air
PE: Professional Engineer
RGB: Red, Green, Blue
RTMC: Regional Transportation Management Center (FDOT District 4)
SAON: Stand Alone Output Nodes
SIS: Supporting Infrastructure Servers
TIMSO: Traffic Incident Management Support Office
VAC: Voltage (AC)
VDA: Video Display Assembly
VESPA: Video Electronics Standards Association
VNC: Virtual Network Computing
VWD: Video Wall Display
UL: Underwriter Laboratory
# TABLE OF CONTENTS

1.0 General ........................................................................................................... A-4
2.0 Services To Be Provided By The Vendor ................................................. A-4
3.0 Permitting / Certifications ........................................................................ A-5
4.0 Equipment / Services Specifications ........................................................... A-6

4.1 Video Display Assembly (VDA) ................................................................. A-6
4.2 VDA Technical Requirements ................................................................... A-6
4.3 Display Technology ...................................................................................... A-6
4.4 Display Chassis .............................................................................................. A-7
4.5 Video Wall Electric Requirements .............................................................. A-8
4.6 Structural Characteristics for the VDA Their Frames and Platforms ...... A-8
4.7 Video Wall Management System ................................................................. A-9
4.8 Video Wall Auxiliary Specifications and Equipment List ....................... A-11
4.9 Video Display Assembly (VDA) Replacement Executions ..................... A-12
4.10 Design Services .......................................................................................... A-12
4.11 Design Submittals ....................................................................................... A-13
4.11.1 90% Design Submittals ......................................................................... A-14
4.11.2 Final Plans Submittals .......................................................................... A-14
4.11.3 As Built Plans Submittals ...................................................................... A-14

5.0 Communications Interconnect Block Diagram ............................................. A-15
6.0 Shop Drawings ............................................................................................. A-15
7.0 Project Schedule ........................................................................................... A-15
8.0 Acceptance Test Plan .................................................................................. A-15
9.0 Training ......................................................................................................... A-18

9.1 Operator Training ........................................................................................ A-18
9.2 Technical Training ....................................................................................... A-18
9.3 Course Materials ........................................................................................ A-19

10.0 Guaranty and Warranties Requirements .................................................. A-19
11.0 Smart Sunguide RTMC Control Room Equipment .................................... A-19
12.0 Sever Hardware .......................................................................................... A-22
13.0 TIMSO Control Center Equipment ......................................................... A-22
13.1 Configuration Requirement ....................................................................... A-23
14.0 Project Phases ............................................................................................. A-24
1.0 GENERAL

The Florida Department of Transportation, District Four is seeking the services of a qualified Vendor whom will upgrade the existing SMART SunGuide RTMC Video Wall Display (VWD) in accordance with the requirements defined herein. The existing VWD is configured as a digital video wall manufactured by BARCO. These services will be provided within the SMART SunGuide RTMC located at 2300 W Commercial Blvd, Fort Lauderdale, FL 33309 and Traffic Incident Management Support Office (TIMSO) Control Center, located at 3601 Oleander Ave, Ft. Pierce, FL 34982.

2.0 SERVICES TO BE PROVIDED BY THE VENDOR

The Vendor shall disassemble the existing system and design, construct and install all new hardware and software equipment video wall components for the FDOT District Four RTMC.

The Vendor shall produce a fully functional video wall system for FDOT District Four RTMC that is also integrated with the TIMSO existing video wall. The Vendor will not be responsible for replacing any of the existing LCD Displays at TIMSO. However, the Vendor must provide all new hardware and software equipment that will attach to the existing LCD Displays at TIMSO in order to function in a similar manner to the new Video Wall hardware, software components, and new Monitor Display Technology that will be required for installation at the RTMC.

The Vendor shall provide software application packages installed on top of Vendor provided hardware developed by the manufacturer natively or natively by design. It shall be capable of displaying application windows through receivership of network based content. It shall have the ability to save pre-designed layouts in a layout stack. The application shall also have the capability to be launched via keyboard/mouse set of controls through the use of software installed on top of existing FDOT hardware.

The video wall system shall meet the minimum requirements for each of the following categories described in section 3.0: 3.4: Display Technology, 3.5: Display Chassis, Video Wall Management, Video Processor Solution, Auxiliary Specifications and Equipment List.

The Vendor shall supply a remote control application software package to control the Video Display Assembly (VDA) via a keyboard/mouse over the LAN. This application shall provide access for up to a minimum of 50 simultaneous users with name/password security access centrally controlled and managed.

The Vendor shall add, change and/or relocate power outlets and communication connectors in the RTMC building as necessary to tie the equipment installed by the Vendor to the corresponding connectors. The connections shall be made in such a manner to avoid the use of extension cords and/or cabling in addition to the ones normally provided by the equipment manufacturer, however, where specific cabling requirements are listed within Exhibit “A”, the Vendor may not deviate from said requirements.
The Vendor shall design a custom border that acts as a veneer which shall completely surround the outside of the VWD system. The Vendor shall submit to the FDOT, for review and approval, the final custom veneer border. The border shall be seamless with no visible gap between the border and the edge of the VWD system. No visible gap shall be defined as no visible light escaping between the border and the edge of the VWD system when the lights in the control center are turned off and the lights in the equipment room are turned on. Only the highest standards of craftsmanship and workmanship shall be employed in the creation and construction of the VWD system border veneer. The Vendor shall ensure the video display cubes are installed flush and square with one another and no visible gaps exist between cubes.

The final VWD system upgrade and reconstruction phases shall be subject to the FDOT’s review and approval prior to construction. The Vendor shall submit to the FDOT a migration plan with an associated detailed schedule which shall be separate from the overall project schedule. This shall detail the phased reconstruction and upgrade of the VWD system. The migration plan and associated schedule shall be subject to review and approval by the FDOT at no additional cost.

The Vendor shall be completely responsible for the design, procurement, installation, reconfiguration of existing video wall components to include associated Advanced Traffic Management System (ATMS)/Intelligent Transportation Systems (ITS) control software, configuration of new components, and final complete integration of new and existing into one completely seamless functional VWD system. The Vendor shall make design and financial contingencies for possible software upgrades that may be required of existing equipment to render a fully functional VWD system. For Example on software, if the Vendor is providing a software platform that is running version 1.0, and version 2.0 for the same software platform is released during the middle of the construction process within the Scope of Services, the vendor must implement version 2.0, and not version 1.0. The Vendor shall not be permitted to claim a point of demarcation for responsibility of the new VWD system.

3.0 PERMITTING / CERTIFICATIONS

The Vendor shall be responsible for all engineering reports, testing inspections and make available any inspection certificates during the progress of work.

The Vendor shall pull all required permits as applicable by state or local law if any modifications to the existing building wiring and the video wall electrical wiring plans are required.

The Vendor must have certified vendor reseller/installation certification for the product lines included in their proposal if such certifications exist for a particular product.
4.0 EQUIPMENT / SERVICE SPECIFICATIONS

4.1 Video Display Assembly (VDA)

The Vendor shall design, furnish, install, and integrate with the new video wall system consisting of forty four (44) video display assemblies. The video display assemblies shall consist of color video display cubes configured into one large video wall display area to form one continuous image. Each of the 44 video VDA units shall be designed and configured to display separate NTSC images or one seamless single image with the use of supporting Video Wall Management System described within Section 3.0: 3.8 (Video Wall Management System).

4.2 VDA Technical Requirements

The Vendor shall be required to submit a complete design to include shop drawings and construction plans for review and approval by the FDOT to demonstrate compliance with these technical requirements.

4.3 Display Technology

The Display Technology for the VDA shall at a minimum provide the following Rear Projection LED Display Cube features and characteristics:

- 70" Diagonal
- Native Aspect Ratio 16:9 with 1920 x 1080p HD Resolution
- Rear accessibility and serviceability only
- Display technology must have intelligence to switch between various display input connectors in the event of a detection of loss of signal on the active display.
- Wireless Remote with ability to synchronize remote across multiple displays.
- Air cooling display technology (no liquid).
- Contrast Ratio 1500:1
- Minimum rated LED engine to run in a 24/7 environment for 80,000 hours in a normal operation mode, 100,000 hours in economical mode.
- Screen to Screen Gap Specification Range 0.2 – 2.0mm
- Must have the ability to accept a direct fiber input for native digital video content (not Ethernet data), bypassing the need for a DVI to Fiber converter cable if FDOT wishes to deploy such future implementation technology
- Electrical Components listed by Underwriter Laboratory (UL)
- Weight per cube: Between 235 and 240 Lbs.
- Display technology must have a manufacturer native upgrade path that allows for the removal of the existing LED engine, yet while still maintaining an individualized display technology chassis in order to provide an upgrade path for a future LED engine. Each LED Cube must meet individual standalone specifications listed below.
  - Input Connectors: Display Technology must have modular based replacement and upgrades for input connectors, as well as control system modules installed on each LED Cube.
    - 2 x DVI-D
    - 1 x RS-232C
    - Input and Output DSUB9 connection
    - 1 x RJ45 LAN Connection
4.4 Display Chassis

The Vendor shall furnish and install a custom chassis to mount 4 x 11 Columns of 70” Rear Projection Cubes in a continuous smooth curvature form and fit within the FDOT current designated space reserved for the display chassis, as shown in the conceptual diagram in Figure 1 and Figure 2.

Figure 1 – Conceptual layout of the video wall – overhead view

Figure 2 – Conceptual layout of the video wall – front view

The custom chassis shall hold (and mount) in each column the ability to mount a Network based Power Distribution Unit (NPDU) based on the specifications of said NPDU listed in
Section 10.0 (Smart Sunguide RTMC Control Room Equipment).

The custom chassis shall hold (and mount) in each column a 16 Port Cat6a rated patch panel based on the specifications listed in Section 10.0 (Smart Sunguide RTMC Control Room Equipment).

The custom chassis shall hold in each column the end point of the Individualized Video Processor (IVP) unit based on the specifications listed in Section 10.0 (Smart Sunguide RTMC Control Room Equipment).

4.5 Video Wall Electrical Requirement

All of the equipment to be provided and installed by the Vendor, including the color video wall cubes for the VWD system, associated peripheral controllers and switches, and accessories, shall operate under the following electrical power specifications:

- Voltage 110 - 120 VAC
- Frequency 60 Hz

In addition, the Vendor shall conduct RTMC field reviews to examine the existing electrical distribution panels and panel schedules. The Vendor shall make any changes, additions or corrections to the electrical panels, wiring, outlets, cabinets and connectors that they may deem necessary to adequately power all of the equipment proposed for this project. All proposed locations are subject for approval by the FDOT. The Vendor shall have as part of their staff an electrical engineer registered to work in the State of Florida. Any changes to the electrical building wiring shall meet and be in accordance with any applicable local codes/permits and comply with the latest version of the NEC.

4.6 Structural Characteristics for the VDA, Their Frames, and Platforms

The Vendor shall furnish and install a VDA aluminum, steel (or hybrid of the two) frame platform capable of supporting the color video cubes displays mounted and stacked in the final FDOT approved matrix configuration. The Vendor shall prepare and submit construction plans for the VDA frame and platform. The VDA aluminum or steel frame shop drawings and associated construction plans shall be in agreement with the video color cube manufacturers’ specifications and recommendations. All of these items shall be submitted to the FDOT for review and approval.

The VDA shall be designed so that it can be delivered into the existing RTMC and assembled in-place without making modifications to existing doorways, walls, floors, or ceilings. The only wall modifications allowed will be the main control center wall facing the operators.

The components of the individual video cubes shall be serviceable and shall be replaced without disturbing the integrity of the entire wall. The rear projection cubes shall facilitate parts replacement without the need for readjusting the image being projected on the screen.

The proposed VDA shall include a structural frame in which the cubes are to be installed. This structure shall maintain a maximum horizontal screen gap of 2.0mm and a maximum vertical screen gap of 1.5mm between adjacent video cubes. The Vendor shall ensure a professional quality installation subject to approval by the FDOT. The support structure shall be specifically fabricated to ensure that a continuous accurate image is projected on
the screens without any distortion and unused screen space.

The support structure shall include stackable LED projection cubes delivering a one-to-one relationship between the number of LED projectors and the number of screens. No observable vibrations shall be present in the installed VDA due to normal vibration in an office-building environment.

The VWD, the VDA and any of its components shall comply with the physical dimensions, characteristics and requirements stipulated in this document. The Vendor shall provide all fully connected cabling required with adequate lengths to interconnect the various components and devices of the VWD.

4.7 Video Wall Management System

The Vendor shall furnish and install a Network Based Distributed Video Processor (NBDVP) Solution consisting of multiple NBDVP’s that are connected and configured to work seamlessly with the VDA components described in Section 3.2 (Video Display Assembly (VDA) ) to allow complete control, configuration, and management of multiple styles of video content to be displayed upon any section of the VDA, once or numerous times, in various shapes, sizes, or styles with the following minimum requirements:

- Each Individualized Video Processor (IVP) that makes up the NBDVP will have a maximum of 2 outputs connections per video processor attached to the rear projection display of a LED Cubes. No DVI signal splitter cables are allowed to be used on the NBDVP to allow more than two displays to be managed by a single NBDVP.

- Each IVP must consist of a self-contained “last” connection point plugged directly to the Rear of each LED Cube. The IVP captures sources transported via standards based IP networks and display via the last connection point directly to the display wall.

- IVP may rely on Supporting Infrastructure Servers (SIS) within the following limitations (if applicable).
  - Each SIS must have the ability to be setup in an active/passive configuration in order to create failover services between each SIS to maintain functionality.
  - Each SIS must only communicate with IVP’s via standard Ethernet communication protocols via copper Ethernet connections.
  - Each SIS must have a redundant power supply.

- Each IVP must have its own dedicated and independent CPU, memory, power connector and LAN connection

- The IVP Management System must allow for client collaboration through use of software installed on a personal computer. Direct native content from the personal computer must be allowed to be shared with other users with the same client software installed. Collaboration tools must be included in order to interact with said content.
The IVP Management System must have a central user database internal to the Management System and/or have connectors to third party authentication domain sources.

Each IVP must not rely upon dedicated proprietary Cat5, 6,6A or 7 rated cabling for Image and Data Synchronization daisy chained between the IVP’s.

- Each IVP must run its own individualized and separate guest OS independent of any SIS or other IVP.
- Each IVP must be able to be centrally managed.
- Each IVP must be able to display video content natively (or native by nature of design) with direct hardware decoding while displaying content without added multimedia bordering. A seamless view from display content to wall must be ensured.
- This central management solution must have an active/passive fault tolerance to ensure central management is available in case of a critical failure.
- Each IVP must be able to work in dynamic synchronization with each node, including but not limited to the following:
  - Spanning a single continuous and related image across multiple IVP’s in order to create a single image not limited to a specific portion of the VDA.
  - Able to move real time images between multiple IVP’s onto any point on the VDA.
- Each IVP must be able to display natively (or natively by design through use of 3rd party software) any video display source that is outputted via multicast or unicast addressing.
- Each IVP must not rely solely upon a proprietary hardware made by the IVP in order to encode, encrypt, or rebroadcast video to the IVP directly.
- Each IVP must be able to natively display content via all native web browsers running on Guest OS’s within FDOT computer environment.
- Each IVP must not function by design (or ability) natively as an active or pass through DVI encoder or decoder for a desktop workstation or any video device with a DVI output.
- Each IVP must be able to display remote real time images from a PC running a windows OS through the dependency of a software client only (not hardware).
- Each IVP must be able to natively crop or manipulate real time images to display portions of the real time images displayed from a PC through the use of software display coordinate or proprietary software client cropping that can crop from all 4 sides of a single real time image.
- Each IVP must be able to receive via a command line or other automated method from within a windows PC automation signals and commands to allow the, addition,
removal, and editing of the Display wall attached to the IVP, current and future layout of active images at set interval times or on demand, determined by FDOT.

- Each IVP must not depend on proprietary network Ethernet routers or switches that cannot be repurposed without the needed of custom modification of router and switch firmware from original manufacturer for FDOT normal Ethernet options in order to function properly.

In addition, the Vendor shall ensure the installation of a centralized control system that utilizes RS-232 ports on the 44 Rear Projection LED Cubes to allow centralized system control. FDOT also will have 10 existing HD Projectors that will require interface with this same centralized control solution. The centralized control system should be accessible through the network via a RJ45 LAN interface. The 10 existing auxiliary HD overhead projectors are required to be installed with same NBDVP hardware technology that the 44 LED Cubes will be using. Vendor must procure and install all necessary hardware and software to achieve this goal.

The Vendor shall only use Cat6a rated cable for all copper cable runs used for Ethernet or IP based communications. The Vendor will be required to run and terminate all Cat6a cables from each 16-port patch panel installed within the VDA to a designated patch panel of choice by FDOT under following specifications (Vendor will provide patch panel for the termination point rated at Cat6a or higher). All copper cable runs must adhere to the following colors only:

- 10 Yellow
- 4 Dark Green
- 2 Blue

All cabling used by the Vendor that is connected to the patch panels shall use the same color scheme as the backbone cable terminated on the patch panel. No deviation from this color scheme is allowed. All cabling must use cable management equipment at all times possible. All cable ties must be reusable. All cabling must be properly rated for use in its environment, including but not limited to all standards for fire, electrical, and conduits requirements.

4.8 Video Wall Auxiliary Specifications and Equipment List

The Vendor shall provide the following auxiliary specifications and equipment, unless specifically mentioned. The minimum requirements for each are:

- 130 x VNC Enterprise Licenses with a centralized management to track all VNC active connections in order to centrally manage and connect to individual VNC sessions. Must include a site license and two years of service and support. Vendor only has to furnish license information and installation files for VNC Enterprise. Vendor will purchase a copy of VNC Enterprise under the licensing information provided by FDOT.
25 DVI single port standard alone encoder.
   o Encoder must allow pass through access for a PC to connect to encoder and a monitor to display content.
   o Must be rated for full motion video at 1080p.
   o 3 year original manufacture warranty

11 x 16 Port Cat6a rated patch panel

4 x 48 Port Black Cat6a rated patch panel

4.9 Video Display Assembly (VDA) Replacement Executions

The Vendor shall furnish and install the equipment in accordance with the Technical Special Provisions, the equipment supplier recommendations, and the Vendor submitted design plans and specifications that will be reviewed and approved by the FDOT.

The VWD equipment items furnished and installed hereunder shall be connected, terminated, and interconnected with the existing video display system and the existing ATMS/ITS control system software. All VDA components shall be demonstrated to be functional, operational and compatible with the existing SMART Sunguide RTMC systems and subject to approval by the FDOT.

The Vendor shall provide all cabling of adequate length, compatible connectors, and ancillary equipment necessary to fully interconnect the Video Wall Supporting Infrastructure Servers (SIS), if applicable, with the VDA video cubes, to achieve the functionality required herein. The Vendor shall use cable management straps and bundling equipment that is reusable in nature. FDOT defines reusable as being able to remove the cable management equipment and reattaching it as needed. No single use zip ties will be allowed. All interconnecting cables that either directly attaches to a patch panel or to a NPDU must have a minimal 12” “Slack” cabling.

The Vendor shall minimize the impact of construction to the existing control room operations. No dry wall work shall be allowed during the rush hours and all dusts shall be contained within the work area. The rush hours are defined as 7:00 am to 9:00 am and 5:00 pm to 7:00 pm during the week days.

4.10 Design Services

The Vendor shall design the video wall display in conjunction with the existing RTMC video wall display and within the space available inside the control center. The drawings shall depict the different viewing angles from the operator eye perspective while stationed at the existing Console Desk Furniture based on the existing control center layout. In this manner, the video wall images shall be visible and recognizable by the Control Center operators in its entirety while sitting at their existing locations.

Under no circumstances shall any part of the procurement, construction or installation of the VDA commence prior to approval of the construction plans by the FDOT. Only stamped
signed and sealed plans are valid and all work that the Vendor performs in advance of FDOT’s release of Plans will be at the Vendor’s risk.

4.11 Design Submittals

The Vendor shall submit detailed construction plans for the entire video wall space. The FDOT will review and approve all plans before construction. The architect shall take into consideration equipment provisions, installation, and layout in order to ensure an aesthetic appearance is attained. This includes paying close attention to installation details and cover/blend/color-match any gaps between the control room wall opening and the VWD system.

The Vendor shall provide Design Documentation to FDOT with each submittal consisting of design calculations and other supporting documentation developed during the development of the plans. The design calculations submitted shall adequately address the complete design of all elements.

The final design calculations shall be signed and sealed by a Florida Registered Professional Engineer. A cover sheet indexing the contents of the calculations shall be included and the Engineer shall sign and seal that sheet. All computer programs and parameters used in the design calculations shall include sufficient backup information to facilitate the review task.

Plans must meet the minimum contents of a particular phase submittal prior to submission for review. Component submittals must be accompanied by sufficient information for adjoining components or areas of work to allow for proper evaluation of the component submitted for review.

The Vendor’s schedule shall allow for a fourteen (14) calendar days review time for FDOT’s review of each design component submittal or re-submittal. The review time will begin upon receipt of a complete submittal or re-submittal and terminates upon the transmittal of the submittal back to the Vendor.

The Vendor shall provide satisfactory written responses to all review comments for each submittal or re-submittal, within fourteen (14) calendar days of the date FDOT’s Review Comments are provided to the Vendor. Any delays to progress on the project due to incomplete submittals or re-submittals or due to clarifications or corrections in response to Review Comments, shall be the responsibility of the Vendor, and will not be considered sufficient reason for time extensions.

Final signed and sealed plans will be delivered to FDOT’s Project Manager a minimum of five (5) working days prior to commencement of work of that component.

FDOT’s review is not meant to be a complete and detailed review. Only stamped signed and sealed plans are valid and all work that the Vendor performs in advance of FDOT’s release of Plans will be at the Vendor’s risk.
The Vendor shall provide copies of the required documents as listed below for each review as following:

4.11.1 90% Design Submittals

5 sets of design plans, 1/8”=1’ Scale

4.11.2 Final Plans Submittals

5 sets of design plans, 1/8”=1’ Scale, and

5 copies of reproducible CD/DVD in native format (DGN and VSD for CADD) format and also pdf format versions of all documents, including but not limited to:

- Signed and Sealed Plans (DGN, VSD and PDF)
- Signed and Sealed Structural Analysis (PDF) (if applicable)
- Approved Test Procedures (PDF)
- Specification Package

4.11.3 As Built Plans Submittals

The Vendor shall submit as-built plans per FDOT’s Procedures.

The Vendor shall furnish to FDOT, upon project completion, the following:

- One (1) set of signed and sealed as-built plans
- Five (5) sets of copies of the signed and sealed as-built plans
- Five (5) sets of final documentation (if different from final component submittal)
- Two (3) sets of all final file on reproducible CD/DVD in native format (DGN and VSD for CADD) and also pdf format versions

The Vendor’s Professional Engineer and/or Architect in responsible charge of the project’s design shall professionally endorse (signed and sealed and certified) the record prints, and all reference and support documents. The professional endorsement shall be performed in accordance with FDOT’s Plans Preparation Manual.

As-built plans must be submitted prior to final acceptance of the project.

All changes to the final plans, design documentation and reports shall be signed and sealed by the Engineer and/or Architect of Record (EOR) and submitted to FDOT no less than five (5) days.
5.0 COMMUNICATIONS INTERCONNECT BLOCK DIAGRAM

The Vendor shall submit to the FDOT for review and approval a communications interconnect block diagram design. This design shall depict the video wall display equipment configuration and interconnections by identifying all of the connections to and between the different video wall assemblies. The communications diagram shall also clearly show the existing system components, as well as the upgraded and re-configured system. At a minimum, this detailed block diagram shall identify the following new and existing subsystem components:

- Video Wall Display
- Individual Video Processors
- Supporting Infrastructure Servers (If Applicable)
- Video Windowing Processors
- Operator Work Station Monitors and Workstations
- Video Wall Display Control System
- Video Wall Management System

The Vendor shall clearly identify all cable quantities, lengths and communication signal types at each cable connector end and on all corresponding patch panels.

6.0 SHOP DRAWINGS

The Vendor shall submit to the FDOT, for review and approval, shop drawings and manufacturer's product specification sheets for all subsystems and components.

The Vendor shall submit the manufacturer's product specification sheets and a line-by-line description of the item's functionality, confirming that it meets or exceeds the specification requirements for the VWD. The FDOT will review and approve all submittals. No products may be fabricated or procured prior to review and acceptance of the subsystem or component shop drawing.

7.0 PROJECT SCHEDULE

The Vendor shall submit a project schedule as part of the Bid Package to establish contract duration as part of the Bid.

8.0 ACCEPTANCE TEST PLAN

The Vendor shall submit a detailed system acceptance test plan to the FDOT for review and approval. The Vendor's system acceptance test plan shall at a minimum consider the following:

- Standalone Video Wall Test Plan
- Testing after integration between the existing video wall and the new video wall, and existing ATMS/ITS control systems.

The Vendor's test plans shall test all areas of system functionality described herein and
shall be in accordance with the various equipment manufacturer recommendations. The testing shall, at a minimum, include the following functions:

1. Configurations of client side agents for 50 simultaneous users to operate 60 Windows PC in order to add, modify, or change aspects of any portion of video walls throughout District 4 Network.

2. Provide documentation and demonstrate through the documentation on FDOT systems the use of automation command tools native to the NBDVP solution in order to perform the ability to:
   - Delete an active display source on the video wall, Stand Alone Output Node (SAON), and any secondary display walls.
   - Add a new display source on the video wall, SAON, and any secondary display walls.
   - Change an existing active display source with a new display source in the same location on the video wall, SAON, and any secondary display walls.

3. Communicate with all Stand Alone Output Nodes (SAONs) and Add, Delete, and Change content.

4. Provide ability to natively display real time video content without added multimedia bordering (not native to the original display source that is being transmitted) to the Display wall, directly on the NBDVP without the use of intermediary hardware equipment or software to screen crop the image or utilize a desktop sharing application. Display will be considered a success after the following tests:
   a. 44 simultaneous videos (one video on each cube) displayed edge to edge of each LED cube without a noticeable gap of bordering generated by the NBDVP operating environment between each LED cube.
   b. 176 Simultaneous videos (four videos within each cube) displayed edge to edge of each LED cube without a noticeable gap of bordering generated by the NBDVP operating environment between each LED cube.
   c. 10 simultaneous videos (one video spread out over 4 cubes in a 2 x 2 fashion) displayed edge to edge of each LED cube without a noticeable gap of bordering generated by the NBDVP operating environment between each LED cube, as well as color and display alignments between the gaps of the LED cubes showing a proper and seamless video without alignment errors in display.
5. Demonstrate failover and recovery of SIS (if applicable) between disaster recovery site (TIMSO) and SMART SunGuide RTMC.

6. Demonstrate failure and recovery of a NBDVP individual device by replacing a NBDVP with a non-configured NBDVP and bringing the NBDVP configuration to the same configuration level as the similar failed NBDVP.

7. Demonstrate communication between Primary video wall, and all auxiliary and standalone display devices attached on the FDOT network. Ability to push, publish, add, remove, and delete content onto each wall at will to SAON’s as well as the primary video wall or any secondary video walls mentioned there in.

8. Demonstration of the startup, shutdown of single, multiple, and complete video wall and auxiliary devices through use of serial based centralized control system. Provide documentation on instructions and demonstrate through documentation.

9. Demonstrate displaying a borderless video and non-video stream natively with the use of cropping tools from pulling an image from a third party PC or Server.

10. Perform a texted based alignment test utilizing some and all of the LED cubes simultaneously by displaying stretched out words across the entire display wall. All words should align correctly without any noticeable misalignments of letterings as they display across numerous LED cubes. A conceptual diagram of one of many examples of texts that needs to be displayed is described in Figure-3, FDOT reserves the right to perform as many different text based tests on the system until satisfied.
9.0 TRAINING

The Vendor shall conduct training classes for the systems installed. The Vendor shall submit to the FDOT, for review and approval, the training courses in accordance with these requirements and the manufacturer’s recommendations.

Provide two training courses covering operation and maintenance of the video wall and associated subsystems. One of the courses will train the FDOT personnel to properly operate the video wall and associated subsystems described in the Scope of Services. The other course will train maintenance technicians in maintaining and repairing the video wall and associated subsystems. The manufacturer’s representatives, and/or personnel approved by the FDOT, will conduct the training courses.

Each course will be presented twice, so that half the intended audience can attend one session and half in the other session.

At least 30 days prior to commencement of the training courses, the Vendor shall submit detailed course curriculums, draft handouts, and resumes of the instructors.

Training courses shall not exceed more than six hours of training in any day (i.e., 12 hours of training would be conducted over at least a two-day period).

The courses will be conducted at a FDOT provided location, and at a time agreed upon by the FDOT. The training material generated for each course shall contain manuals and other handouts for each attendee, which will serve not only as subject guidance, but as quick reference material for future use by the students. All course material, in reproducible form, will be delivered to the FDOT immediately following course completion.

Each training course shall be video recorded, using DVD media to run natively on a standard DVD player, as well as a separate DVD that contains individual video MP4 and AVI files referencing the same video content. The DVD shall be delivered to the FDOT at the conclusion of the training. The DVD media contents shall be separated by specific topics covered.

9.1 Operator Training

The Operator Training course will train FDOT personnel to use all features and functions of the video wall system and associated subsystems. This training course will be a minimum of six (6) hours in duration, and will include “hands-on” activities with the equipment and software.

9.2 Technician Training

The technician-training course shall be designed to train technician-level personnel in the detection and correction of malfunctions in the video wall system and
associated subsystems. It shall also cover the preventive maintenance recommended by the manufacturer. The course shall be a minimum of twelve (12) hours in duration. The course content shall range from basic equipment operation theory to identification of malfunctions in the equipment through use of diagnostic programs inherent in the maintenance software. The course shall include board level troubleshooting.

The course shall consist of a classroom presentation of the control and monitoring of the signs, followed by a "hands-on" workshop. A second classroom presentation shall cover routine maintenance and troubleshooting procedures. This shall be followed by a "hands-on" workshop wherein personnel troubleshoot simulated faults to the board level. These courses shall cover proper installation of all mission critical spare parts provided under this Contract.

9.3 Course Materials

The Vendor shall furnish thirty (30) sets of approved training course materials. All materials, including any figures and drawings, shall also be submitted in electronic format on CD-ROM. Ten (10) copies of the CD-ROM shall be submitted to the FDOT and shall adhere to the CD-ROM Requirement and CADD deliverable sections.

10.0 GUARANTY AND WARRANTIES REQUIREMENTS

The Display Technology and Video Wall Management System shall be warranted for a minimum of 5 years, covering all costs of repairs and maintenance for both the LED Cubes, NBDVP included related accessories described and listed in section 3.4, 3.5, 3.8, 12.0, and 12.1. All other equipment, software, and warranties, shall consist of factory based warranties included in the purchase of said equipment, unless otherwise expressively described in specific detail. Warranty shall also include all software and firmware patches as well as technical issues that may arise due to malfunction or feature changes that require Vendor intervention to update the technology to meet contractual obligations. Warranty shall also include preventative maintenance measures as well as assistance in patch updates to bring the NBDVP and LED Cube operating environment to its latest version and feature set. The 5-year warranty may consist of standard or extended manufacturer warranty and additional guaranty from the Vendor or any combination thereof.

11.0 SMART SUNGUIDE RTMC CONTROL ROOM EQUIPMENT

The Vendor shall furnish and install the following equipment for the SMART SunGuide RTMC control room. The minimum requirements for each are:

- 160 x 16:9 flat panel 1080P LED monitors
  - Minimum 22” Display
  - Must be compatible with VESA 75mm or 100mm
  - Must have Display Port and DVI native connection
  - 3 Year Warranty rated for 24/7 Environment
Silver chassis.
All 160 flat panel LED monitors must be same brand, make and model

- Network Based Power Distribution Unit (NPDU)
  - Input plug needs to include both NEMA 5-20P and L5-20P (an included adapter is allowed)
    - 24 Outlet Ports
    - Outlet Control at a per port level.
    - 0U Vertical Mountable
    - Environmental Monitor and Voltage Monitoring
  - Must have central management console that has access to following:
    - Centralized Firmware Deployment
    - Centralized tracking of Environmental Monitoring around NPDU
    - API Plugin for integration with vCenter

- 10 x 42” 1080P 16:9 Ratio LED Monitor with Wall Mounts
  - Must be wall mountable
  - Must have Display Port, HDMI, DVI, RGB native connection
  - Black chassis

- 2 x Network based Enterprise TV Tuner
  - Support for 8 Channels of simultaneous broadcasting via Multicast IP Address
  - Native support with Windows 7 and Higher
  - Support for nonproprietary player that supports multicast address.

- 4 x Outdoor rated HDTV Antenna for reception of Digital OTA TV.
  - Vendor shall connect HDTV Antenna to Enterprise TV Tuners.
  - Vendors shall mount Outdoor HDTV Antenna at area specified by FDOT.

- 18 x Stand Alone Output Nodes (SAON) that can natively interface with existing NBDVP attached to the video wall and SIS if applicable in order to display the same content from the NBDVP onto each SAON. Users of the NBDVP must be able to output source devices to the SAON through the same interface that they use to manipulate the primary NBDVP video wall. Each SAON software and hardware must run on Windows 8.1 Professional and Windows 7 Professional, or the same native operating system used by the NBDVP. The SAON hardware must have a smaller footprint than 12” x 12” x 4”. SAON must be able to display up to 4 simultaneous H.264 720p video display at a time. SAON must be able to interface with HDMI, Display Port or DVI-D natively or through use of converter cables provided by Vendor. Each SAON must have a minimum 7200rpm rated hard drive.
Each SAON must have an accompany wireless keyboard and mouse controller. The SAON must be warranted for 3 years per the same terms described in Section 8.0.

Spare IVP: Vendor shall provide a minimum number of spare IVP devices in the event of a failure based on the following specifications.

If the Vendor provides an IVP that supports two simultaneous display connections: Two spare devices or 10% of total IVP’s in production (rounded down) whichever greater.

If the Vendor provides an IVP that supports a single display connector: Four spare devices or 10% of the total IVP’s in production (rounded up) whichever greater

Spare LED Engine: Vendor shall provide one spare LED engine of same make and model used in the VDA.

- Cisco Networking Equipment:
  - 2 x Cisco WS-C3850-48T-E
  - 2 x SmartNet 8x5NBD Cisco Catalyst 3850 48 Port
  - 2 x Data IP Service
  - 2 x PWR-C1-350WAC/2
  - 2 x Stack-T1-50CM cable
  - 2 x CAB-SPWR-30CM Power Cable
  - 2 x C3850-NM-2-10G Network Module
  - 2 x SFP-10G-SR Fiber Modules
  - 2 x SFP-1G-SR Fiber Modules
  - 12 x 15m SC to LC Fiber Cables
  - 2 x X2-10GB-SR
  - 2 x MEM-2900-512U2.5GB
  - 2 x VWIC3-2MFT-T1/E1
  - 2 x PVDM3-32U64
  - 2 x RPS-ADPTR-2921-51
  - 2 x C2921-CME-SRST/K9
  - 2 x CISCO3925E/K9
  - 2 x SL-39-SEC-K9
  - 2 x SL-39-APP-K9
  - 1 x CON-SNT-CT08250 Smartnet for Existing FDOT AIR-CT5508-250-K9
IP Phones and accessories:
- 20 x Cisco 8851 IP Phones
- 20 x MDA200 Plantronics MDA200
- 10 x AC Power Supply for MDA200
- 36 x Plantronics Blackwire 500 C520 (Standard)
- 20 x Plantronics HL10
- 20 x EHS Cable APU-71 Cable

Software Licenses:
- 2 x vSphere Remote Office Branch Office Advance with 1 year SnS Production.
- 2 x Cisco UC Virtual Foundation 5.x (2 Socket): R-VMW-UC-FND5-K9 with 1 year SnS Production CON-ESW-UCFND5.
  - FDOT will provide Vendor with current Microsoft Agreement Number to add entitlement to.

12.0 SERVER HARDWARE

The Vendor shall furnish the following components and equipment for the RTMC server room. The minimum requirements for each are:

- Server Hardware:
  - 2 x Cisco BE7000 UCS Model BE7K-K9
  - 15 x HP Z230 SFF Model F1M16UT

13.0 TIMSO CONTROL CENTER EQUIPMENT

The Vendor shall furnish and install the following components and equipment for the Traffic Incident Management Support Office (TIMSO) Control Center, located at 3601 Oleander Ave, Ft. Pierce, FL 34982.

- Using existing 17 LCD Monitors, create a secondary display wall using the same NBDVP technology at the SMART SunGuide RTMC described in section 2. FDOT will provide Server Rack space to mount all equipment. Existing Fiber to DVI converter cables will be available to be utilized (Currently 17 available, however the
• Vendor will be responsible for providing replacement converter cables if existing cable is found to be faulty).

• SIS (if applicable) must be linked to the same SIS system within TMC Control Center. Rackspace as well as Keyboard, Video and Mouse will be provided by FDOT.

Vendor may use a DVI splitter cable to allow no more than 6 LCD monitors to be connected to a single NBVDP.

• Through use of Existing LCD Monitors RS-232 ports, provide a centralized control system of all 17 monitors in order to control system functions of LCD monitors through a single point of control. Provide a secondary method of configuration and control of LCD monitors through use of existing remote controls that FDOT will provide that have yet to be programmed. Centralized control system that utilizes RS-232 ports should be accessible through the network for remote control of centralized control system. Centralize control system should natively interact with centralized control system listed in the TMC control center to allow remote management and configurations.

Vendor shall maintain the same color cabling standards at TIMSO as described at the RTMC.

13.1 Configuration Requirements

The Vendor shall meet the following configuration requirements at the TIMSO Control Center:

1. Configurations of client side agents for 6 simultaneous users to operate 15 Window PCs in order to add, modify, or change aspects of any portion of the video walls throughout District 4 Network.

2. Provide documentation and demonstrate through the documentation on FDOT systems use of automation command tools native to the NBDVP in order to perform the ability to:

3. Delete an active display source on the video wall
4. Add a new display source on the video wall
5. Change an existing active display source with a new display source in the same location.
6. Must be able to show Primary Display Wall, along with auxiliary systems within the RTMC.
7. Demonstrate failover and recovery of SIS (if applicable) between disaster recovery site (TIMSO) and SMART SunGuide RTMC.
8. Demonstrate failure and recovery of NBDVP individual device.

9. Demonstrate communication between Primary video wall, and all auxiliary and standalone display devices attached on the FDOT network. Ability to push, publish, add, remove, and delete content onto each wall at will.

10. Demonstration of the startup, shutdown of single, multiple, and complete video wall and auxiliary devices through use of serial based centralized control system. Provide documentation on instructions and successful completion of listed tasks.

11. Provide documentation and demonstrate through the documentation on FDOT systems the use of automation command tools native to the NBDVP in order to perform the ability to:
   - Delete an active display source on the video wall
   - Add a new display source on the video wall
   - Change an existing active display source with a new display source in the same location.

14.0 PROJECT PHASES

Project Phase 1: (5%)

Upon execution of the contract, the Vendor will meet with the Departments Project Manager to discuss design plans. These plans will include drywall modification, structural frame build, LED cube curvature design plan, Qualifications listed in Section 3.0 - 3.1, Technical Documentation of LED cube, NBVDP, SIS and supporting equipment that will be utilized in all sections of Exhibit “A” – Specifications (Scope of Services) as listed in all sections of 3.4: Display Technology, 3.8 Video Wall Managed System, and Documentation that includes how the LED cube, NBVDP, SIS and supporting equipment meets or exceed the requirements described within all sections of Exhibit “A” – Specifications (Scope of Services).

Project Phase 2: (10%)

The Vendor completes the furnishing and installation of drywall modification and structural frame build to the specifications submitted and approved by FDOT in project phase 1 that meet the requirements listed in section 3.5: Display Chassis.

Project Phase 3: (35%)

The Vendor completes the furnishing and installation of all equipment, resources, parts, and materials listed in section 3.2: Video Display Assembly, 3.3: VDA Technical Requirements, 3.4: Display Technology, and 3.7: Structural Characters for VDA, Their Frames, and Platforms to the specifications submitted per section 3.10: Video Display Assembly (VDA) Replacement Executions and approved by FDOT described in Exhibit “A” – Specifications (Scope of Services).
Project Phase 4: (20%)

The Vendor completes the furnishing and installation of all equipment, resources, parts, and material both tangible and intangible listed in Section 3.8: Video Wall Management System, 10.0: Smart Sunguide RTMC Control Room Equipment, 11.0: Server Hardware, and Section 12.0 TIMSO Control Center Re-equipment, (excluding Section 12.1: Configuration Requirements) to the specifications submitted in project phase 1 and approved by FDOT described in Exhibit “A” – Specifications (Scope of Services).

Project Phase 5: (10%)

The Vendor completes all requirements listed in sections 4.0: Communications Interconnect Block Diagram, 5.0: Shop Drawings and 3.1.

Project Phase 6: (20%)

Upon completion of all required services in Section 7.0 Acceptance Test Plan, 12.1: Configuration Requirements, All sections and subsections within 8.0: Training.