

Georgia Department of Transportation Transportation Products Qualified Products List (QPL)

By signing this form, the applicant declares that he/she has read and understood the provisions of Section 939 of the GDOT Minimum Specifications for Communications and Electronic Equipment and all implemented modifications. The requirements listed on this matrix are derived from Section 939, which in all cases will be the basis for determining a product's compliance and its acceptability for use on Georgia's roads.

Date:	 Applicant's: Name (print)	
Manufacturer:	 Signature:	
Item, Model No:	 5	

GDOT Communications and Electronic Equipment Specification Compliance Matrix

	Requirement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
939	.2.01 General			
A.	Comply with ISO 9001 or Sigma Six quality manufacturing requirements.			
В.	Provide only equipment and materials that are new and of like kind and function provided by one manufacturer, using the same model, part number, revision, and firmware as shown and specified in the Contract documents.			
939	.2.02 Field Switch Requirements			
Α.	General			
1.	Provide one or more of the field switch types listed in Table 1 as specified in the Contract documents.			

		Requi	rement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
		Table 1 – Fi	ield Switch Types			
Туре	Layer Capability		Ethernet Port Configuration			
Туре А	Layer 2	Minimum 8 ports total in T/TX ports	ncluding 2 Gigabit-Ethernet SFP ports and 6 10/100Base-			
Туре В	Layer 2	Minimum 9 ports total in T/TX ports	ncluding 3 Gigabit-Ethernet SFP ports and 6 10/100Base-			
Туре С	Layer 2	Minimum 8 ports total in T/TX port	ncluding 7 Gigabit-Ethernet SFP ports and 1 10/100Base-			
Туре D	Type D Layer 2 or Layer 3 upgradeable Minimum 8 ports total including 4 dual-purpose uplink or downlink ports that can be used for 10/100/1000BASE-T/TX ports or 100/1000 Mbps SFP ports, and 4 10/100/1000Base-T/TX ports					
Туре Е	Type E Layer 2 or Layer 3 upgradeable Minimum 12 ports total including: 4 dual-purpose uplink or downlink ports that can be used for 10/100/1000Base-T/TX ports or 100/1000 Mbps SFP ports, and 8 10/100/1000Base-T/TX ports					
2. Prov impl	vide field and routing sw ementation of common	itches that are compatible standards that enable sw	e with the existing GDOT network by support of features and itches to work together and minimize integration effort.			
3. Prov	vide field switches with t	the following interfaces:				
□ Prov 100/	vide fiber ports with 1000 1000BaseSFP slot.	DBaseSFP slot or	Provide 10/100Base-T(X) or 10/100/1000Base- T(TX) RJ-45 ports with auto negotiation speed and capable of being manually set to half-duplex or full- duplex.			
 Provide console port along with any adapter cables as needed and approved by the Department. Provide LED indicators including power on/off and network status per port (transmit, receive, link, and speed). 			Provide LED indicators including power on/off and network status per port (transmit, receive, link, and speed).			
4. Prov	vide field switch that car	operate with non-blockin	g, store and forward, switching at full wire speed.			
5. Provide field switch that supports detecting and shutting down one-way link failures using auto-negotiation.						
6. Prov HDE	 Provide field switch with a minimum MTBF of 200,000 hours using Telcordia SR-332, Method 1, Case 3 or MIL- HDBK-217F standards. 					
7. Prov	vide field switch that cor	nplies with IEEE 802.3 for	r 10Base-T standard specifications.			
8. Prov	vide field switch that cor	nplies with IEEE 802.3u fo	or 100Base-T(X) standard specifications.			
9. Prov	vide field switch that cor	nplies with IEEE 802.3ab	for 1000Base-T(X) standard specifications.			

	Requirement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
10.	Provide field switch that complies with IEEE 802.3z for 1000Base-X standard specifications.			
В.	Network Capabilities and Features			
1.	Provide field switch that supports multicast with IGMP v1/v2/v3 snooping and IGMP-filtering.			
2.	Provide field switch that complies with IEEE 802.3x (Flow Control) standard.			
3.	Provide field switch that complies with IEEE 802.1p (Class of Service or Priority Queuing) standard.			
4.	Provide field switch that complies with IEEE 802.1Q (VLAN tagging) standard per port.			
5.	Provide field switch that complies with IEEE 802.1D (Spanning Tree Protocol) and IEEE 802.1w (Rapid Spanning Tree Protocol) standards.			
6.	Provide field switch that complies with IEEE 802.3ad (Link Aggregation or Port Trunk) standard for a minimum of two groups of four ports.			
C.	Security			
1.	Provide field switch that can be configured for static MAC address access.			
2.	Provide field switch that can disable automatic address learning per ports; known hereinafter as Secure Port. Secure Ports only forward statically configured MAC addresses.			
3.	Provide field switch that can trap and provide an alarm upon any unauthorized MAC address and shutdown. Require administrator to manually reset the port before communications are permitted.			
4.	Provide field switch that complies with IEEE 802.1X Port Access Authentication.			
5.	Provide field switch that supports HTTP and HTTPS.			
6.	Provide field switch that supports SSL.			
D.	Network Management			
1.	Provide network management capabilities that are compatible with the existing GDOT network management consisting of Cisco Prime centralized enterprise management software supporting remote management.			
2.	Provide field switch that is password manageable with a minimum of one read-only profile and one full administration profile.			
3.	Provide field switch that fully implements SNMP v1/v2/v3.			
4.	Provide field switch that implements LLDP as defined in IEEE 802.1ab (Station and Media Access Control Connectivity Discovery).			
5.	Provide field switch that fully implements RMON I statistics, history, alarms, and events objects.			

	Requirement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
6.	Provide field switch that can mirror any port to any other port within the field switch.			
7.	Provide field switch that can be managed remotely by an enterprise software/program for configuration, reporting, updates, and monitoring of alarms.			
8.	Provide field switch with environment monitoring capabilities.			
9.	Provide management capabilities via a serial maintenance/console serial port (local) and over the network (remote).			
10.	Provide field switch that supports HTTP (Embedded Web Server) with SSL.			
11.	Provide field switch that fully implements RFC 783 (TFTP) to allow remote firmware upgrades.			
E.	Additional Requirements for Field Switch Type D and E			
1.	Provide, in the quantity specified in the Contract documents, Gigabit-Ethernet Combo ports, where each Gigabit- Ethernet Combo port is defined as a single interface that can be used as a 10/100/1000Base-T/TX ports or 100/1000Base SFP GBIC socket.			
2.	Provide a card slot for a field removable SD read-write memory card (included) that can store switch operating system modules and switch configuration modules, and is addressable/manageable from the switch's management interface and built-in memory system.			
3.	Provide field switch that can boot from and load configuration from the removable memory card slot or from the built-in memory, as defined by the user.			
4.	Provide field switch that allows push/pull of switch operating system modules and switch configuration settings from the GDOT network management system.			
5.	Provide field switch that can convert from Layer 2 to Layer 3 switch and routing protocols, as specified in Section 939.2.03, with only a change in the switch operating system or license.			
F.	Mechanical and Cabling			
1.	Provide field switches that are capable of rack mounting and DIN rail panel mounting. Rack-mounted DIN rails may be installed if cabinet space is available. Shelf mounting is not permitted.			
2.	Provide hardware and materials for mounting the field switch within the field cabinet.			
3.	Provide rubber dust caps or covers with insertion and removal handles that completely seal the port opening for unused copper and SFP ports.			
4.	Provide field switch with a fan-less (no fan) design.			
G.	Electrical			

		Rec	quirement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
1.	Provide field switch th 50/60 Hz (±5%, maxi	nat is capable of operating over mum).	er minimum input voltage range of 108 VAC to 132 VAC at			
2.	Provide field switch w electronics operation.	ith power conversion as spec	cified herein and provide regulation necessary to support			
3.	Provide field switch th	nat complies with IEC EN 610	00-4-5 surge immunity for network equipment.			
4.	Provide power transfo shall be mountable wi	ormers with a "fastening mecl ith neatly secured power cord	hanism." No plug-in types are permitted. Corded transformers ds.			
Н.	Environmental					
1.	Provide hardened field 2.1.9 temperature, hu	d switch including power sup midity, vibration, and shock t	ply that comply with NEMA TS 2 Sections 2.1.7, 2.1.8, and esting requirements.			
2.	Comply with FCC Par	t 15 emission standard and F	FCC Public Notice 2019-01.			
939	.2.03 Routing Switch F	Requirements				
Α.	General					
1.	Provide one or more of	of the routing switch types lis	ted in Table 2 as specified in the Contract documents.			
		Table 2 – F	Routing Switch Types			
	Туре	Layer Capability	Ethernet Port Configuration			
Тур	be A	Layer 3	Providing a minimum 48 1/10/25 Gbps SFP+ ports + 6 40/100 Gbps QSFP28 uplink ports per switch			
Тур	be B	Layer 3	Providing a minimum 48 10/100/1000 Ethernet copper ports + 4 SFP 1 Gbps ports per switch, stackable			
2.	 Provide routing switches that are compatible with the existing GDOT routing network consisting of Cisco Nexus 93180YC-FX Layer 3 routing switch (Type A) and Cisco Catalyst 2960XR Layer 3 routing switch (Type B) that can be managed by the Department's existing network management software. 					
3.	3. Populate routing switch with optical SFPs meeting the minimum SFP requirements in Section 939.2.04 and as required in the Contract documents.					
4.	 Provide routing switch with a minimum MTBF of 200,000 hours using Telcordia SR-332, latest version, or MIL- HDBK-217J standards. 					
5.	Provide routing switcl	hes for up to 4,096 VLANs.				
6.	Provide routing switcl	h where modules are hot-swa	appable.			

	Requirement					Comments	Evaluation Method ¹
7.	Provide routing switch that can b	e EIA 19 in (483 mm) rack mounted (one	e rack unit per routing switch, typical).			
В.	Network Standards and Protoc	cols					
1.	Provide network that supports La	ayer 2 and 2+ protoco	ols specified in Secti	ion 939.2.02.			
2.	Provide network that supports ac	ditional network Lay	er 3 protocols as foll	lows:			
	IPv4 and IPv6.	□ Full impleme v1/v2/v3.	ntation of IGMP	TACACS Plus (+).			
	RADIUS protocol.	□ Full impleme	ntation of RIP.	□ Full support for BGP.			
	Full implementation of OSPF protocol.	Full impleme	ntation of GMRP.	□ Full implementation of GVRP.]		
	Full implementation of PIM Spars	se Mode.	Full impleme	entation of VRRP.			
C.	Mechanical and Cabling						
1.	Provide routing switches that are	e rack mountable.					
2.	Provide hardware and materials	for mounting within th	he equipment rack th	hat are corrosion resistant.			
3.	Provide rubber dust caps or cove unused copper and SFP/QSFP p	ers with insertion and ports.	removal handles the	at completely seal the port opening for			
D.	Electrical						
1.	Provide field switch that can oper (±5%, maximum).	rate over a minimum	input voltage range	of 108 VAC to 132 VAC at 50/60 Hz			
2.	Provide field switch that complies	s with IEC EN 61000-	-4-5 surge immunity	testing requirements.			
3.	 Provide routing switch with dual redundant power supplies and fans, N+1 configuration, hot swappable, and configured for 120 VAC service. 						
E.	E. Environmental						
1.	 Provide routing switch with power supply that meets following minimum ambient temperature and humidity requirements: 						
	Temperature range from +23°F through +113°F (-5°C to +45°C).	Relative hum through 95%	nidity from 10% , noncondensing.	 Comply with NEMA TS 2 Sections 2.1.8 and 2.1.9 vibration and shock testing requirements. 			

	Requi	rement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
2.	Comply with FCC Part 15 emission standard and FC	C Public Notice 2019-01.			
939	2.04 SFP Fiber Module Requirements				
Α.	General				
1.	Provide SM, dual-fiber SFPs with LC connectors.				
2.	Provide the following types of full duplex, SFP fiber or required:	tical modules as shown in the Contract documents or as			
	Type 1: LX/LH optics for single-mode fiber that is >6.2 miles (10 km) in length (under ideal conditions).	Type 2: ZX optics for single-mode fiber that is >43 miles (70 km) in length (under ideal conditions).			
3.	Provide SFPs that comply with IEEE 802.3x, 1000Bas	e-LX/LH and 1000Base-ZX standards.			
4.	4. Provide fiber optic patch cords as specified in Section 935.2.01.G with integral optical attenuators if required for optical power control per the field switch manufacturer's recommendations.				
5.	 Provide SFPs that are 100% compatible with the field switch or network device in which the SFP is inserted, including any serial number or other identifying information. Only demonstrated proven SFPs that do not require non-default, switch configuration settings are permitted. 				
6.	Provide SFPs that are hot-swappable.				
7.	Provide SFP that operates as its own switched port.				
8.	Provide a quantity of fiber optic patch cords that match in accordance with Section 935.2.01.G, with ST conner on the other end (at the field switch).	thes the number of populated SFP ports on the field switch, actors on one end (at the FPP/FDU) and an LC connector			
В.	Environmental				
Pro	vide SFPs with extended temperature capabilities meet	ing the following minimum requirements:			
	 Ambient temperature range from +23°F through +185°F (−5°C through +85°C). Relative humidity from 10% through 95%, non- condensing. 				
939	2.05 Network Patch Cord Requirements				
Α.	General				
1.	Provide field switch patch cords that meet ANSI/TIA r pair cabling with stranded conductors and RJ-45 conr	equirements for Category 6, four-pair unshielded twisted nectors.			

	Requirement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
2.	Provide network patch cords that are factory assembled, connectorized, and certified by the manufacturer to meet the performance standards specified herein.			
3.	Provide network patch cords that comply with TIA-568-C.2 and UL 444 standards.			
4.	Provide network patch cords with eight (four STP) insulated No. 22 to No. 24 AWG, solid bare copper conductors arranged in four color-coded twisted-pairs.			
5.	Provide network patch cords with modular RJ-45 male connectors with eight-position non-keyed and eight gold anodized pins.			
6.	Provide network patch cord connectors that incorporate mechanical cable strain relief and protective boots.			
7.	Provide network patch cords that characterize to 600 MHz and design margin (headroom) beyond standard Near-End Crosstalk, Power Sum NEXT, Attenuation-to-Crosswalk Ratio, and Power Sum ACR.			
8.	Provide network patch cords with lengths of patching from field switch to equipment inside the field cabinet or equipment rack without strain. Provide custom or standard lengths as required or needed based on final equipment layout and configuration that permits future movement of equipment within the field cabinet or equipment rack.			
9.	Provide network patch cord that is riser-rated.			
939	.2.06 Field Cabinet Requirements			
Α.	General			
1.	Provide one or more of the field cabinet types listed in Table 3 as specified in the Contract documents.			

		Requir	ement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹		
	Та	ble 3 – Field Cabine	t Types and Config					
GDOT	Joint Committee	Minimu	m Cabinet Dimensi	on Range	Number of			
Туре	ITS Cabinet Standard	Height	Width	Depth	Doors			
Туре 1	Modified ITS Cabinet Housing #2	30 in to 36 in (0.76 m to 0.91 m)	23 in to 26 in (0.58 m to 0.66 m)	18 in to 24 in (0.46 m to 0.61 m)	2			
Type 2 ITS Cabinet Housing #2 44 in to 47 in (1.12 m to 1.20 m) 23 in to 26 in (0.58 m to 0.66 m) 18 in to 24 in 0.46 m to 0.6 m)		18 in to 24 in 0.46 m to 0.61 m)	2					
Туре 3	ITS Cabinet Housing #1	64 in to 67 in (1.62 m to 1.70 m)	23 in to 26 in (0.58 m to 0.66 m)	24 in to 30 in (0.61 m to 0.76 m)	2			
Туре 4	ITS Cabinet Housing #3	64 in to 67 in (1.62 m to 1.70 m)	44 in to 46 in (1.12 m to 1.17 m)	24 in to 30 in (0.61 m to 0.76 m)	4			
2. Unless ITS cal Specifi	otherwise specified in the binet (field cabinet) housin cations for Roadside Cabir	Contract documents g assemblies in conf nets. Do not include v	or directed and appropriate or directed and appropriate or the second the sec	oved by the Departmen ction and the JC ITS Ca housing the following:	t, construct all binet Standard			
Police panel and associated wiring. Power distribution assembly and associated flasher units, and signal power contactor. DC power distribution assembly (12 VDC and VDC).			ution IC and 24					
 Input file and associated sensor units, isolator units, and serial interface unit. 		 Output file and serial interfac pack unit. 	d associated auxiliary m e unit, transfer relay uni	nonitor unit, t, and switch				
□ Field c	abinet monitor unit assem	bly.	□ Serial and cor	ntrol bus assemblies an	d wiring.			
3. Mount	field cabinets in the follow	ing configurations:						

		Requirement		Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
	Unless otherwise specified in the Contract documents, configure Type 1 and Type 2 field cabinet housing assemblies for pole mounting and Type 3 and Type 4 field cabinet housing assemblies for ground or base-mounting.	Reinforce the holes for pole mounting with metal plates of adequate size and strength welded longitudinally across the inside depth of the field cabinet.	Where ground or base-mounting of field cabinets is specified, make the field cabinet bottom open and provide an approved concrete pad for mounting the field cabinet along with technician pad in front and back of cabinet doors and base mounting adapter, in accordance with Section 647 and the standard detail drawings.			
В.	Field Cabinet Components					
1.	Equip all field cabinet housings w Cabinet Standard Specifications	vith the standard EIA 19 in (483 mm and as follows:) rack cage as described in the JC ITS			
	Do not use unistruts or other rail types. For Types 1, 2 and 3, equip field cabinet housings with the standard EIA 19 in (483 mm) rack cage. For Type 4, equip field cabinet housings with two standard EIA 19 in (483 mm) rack cages.					
2.	Provide field cabinet with side mo	ounting panel meeting the following	requirements:			
	Fabricate side mounting panels as described in the JC ITS Cabinet Standard Specifications for J Panels. Do not provide pre-punched terminal block/bar or component mounting holes, except holes for mounting the side panel to the rack cage. In all field cabinet types provide one side panel on one side of each rack cage that are the full depth of the rack cage and the rack cage.					
3.	Provide field cabinet with cabinet	t shelf meeting the following requirer	ments:			
	a. Provide perforated and vent	tilated shelf meeting the following m	inimum requirements:			
	 Telescoping guides to allow full extension from the rack cage. Construction that supports a weight of 25 lb (11 kg) when extended. A minimum non-slip work area measuring 12 in (304 mm) by 12 in (304 mm). 					
	b. For Types 2 and 3, equip fie	eld cabinet with one cabinet-sliding i	internal shelf.			
	c. For Type 4, equip field cabin	inet with two sliding internal shelves.				
4.	Provide field cabinet with docum	ent pouch meeting the following req	uirements:			

		Requirement		Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
	Provide a plastic documentation pouch that is side- opening, resealable, opaque, and of a heavy-duty plastic material to store the field cabinet and equipment documentation.					
	Provide a pouch has the size and strength 200 sheets of 8.5 in (215 mm) by 11 in (27 paper.	th to hold 279 mm) Provide f the inside plastic do opening	ield cabinets with metal hooks welded to e of the front cabinet door, for hanging the ocumentation pouch securely when and closing the front cabinet door.			
5.	Provide field cabinet with wiring, conducto	tors, and terminal blocks that	neet the following requirements:			
	a. Provide component mounting DIN ra	rail meeting the following requ	rements:			
	 Mount all 120 VAC service entrance, power distribution, grounding, and surge protection components on standard DIN rails mounted on recessed rack mounted panels or on rack side panels as shown in the standard detail drawings. Devices include terminal blocks, circuit breakers, and surge protection devices. Other components and devices that may be DIN rail mounted include network switches, power supplies, and PoE injectors. Provide 1.38 in (35 mm) wide by 0.3 in (7.5 mm) high by 0.04 in (1 mm) thick standard DIN rails perforated and cut to length for flexible mounting. 					
	Provide DIN rail that is burr free with no sl edges or deformation from the standard p	DIN rail that complies with IEC EN 50022 EC EN 60715, and DIN 46277.				
	Provide nut, bolt, and start washers to mo panel for low resistance electrical connect	ount to Provide a and long DIN rail a	n anti-corrosion paste to provide a solid lasting electrical connection between the nd the mounting panel.			
	b. Provide terminal blocks meeting the	e following requirements:				
	 Use terminal blocks with voltage and current ratings greater than the voltage and current ratings of the wires that are terminated on the blocks. Terminate conductors on terminal blocks using insulated terminal lugs large enough to accommodate the conductor to be terminated. 		 Terminate field wiring terminal block screws using a terminal ring lug for termination when two or more conductors are terminated. 			
	Use metallic terminal block connection hardware and components that are non- ferrous copper or nickel/tin- plated copper alloy or equivalent.	Provide terminal blocks and v that comply with the following colors: Black – Line White – Neutral Green or Green/Yellow – Gro	vires Provide a ground terminal that is the same size and pitch as the power terminals and provides positive electrical and mechanical connection to the mounting rail.			

		Requi	rement		Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
	Provide terminal blocks that comply with UL 1059.	 Provide term are capable mounted. 	ninal blocks that of being DIN-rail	Provide the type and quantity of terminals as shown in the Contract documents.			
	c. Provide service entrance te	rminal blocks meetir	ng the following requi	rements:			
	Make the terminal block for the 1 cabinet service entrance a 0.39 i level screw type device.	20 VAC field n (10 mm) single	 Provide a te to No. 4 AW and outputs. 	rminal block that accommodates No. 18 G wiring for terminating electrical inputs			
	d. Provide distribution termina	I blocks meeting the	following requiremer	nts:			
	Make the terminal blocks for dist VAC and ground a 0.24 in (6 mm screw type located on the protec power service panel assembly.	ribution of 120 n) single level ted side of the	 Provide term to No. 6 AW specified her 	ninal block that accommodates No. 22 G wiring and provide in colors as rein.			
	e. Provide circuit breakers me	eting the following re	equirements:				
	Provide enclosed, thermal magnetic molded case circuit breakers of the types, sizes, and quantities listed in the Contract documents.	Provide a de an additiona breakers.	esign that allows for I three circuit	 Provide two-pole (2P) breakers for 120/240 VAC and single- pole (1P) for 120 VAC single- phase operating voltages. 			
	Provide molded case circuit breakers that comply with and are listed with UL 489.	 Provide mole breakers that NEMA AB-1 	ded case circuit it comply with	Provide circuit breakers that have the amperage rating indicated on the face of the breaker or handle.			
	Provide circuit breakers that have a quick-make, quick- break over center toggle-type mechanism and a position between "ON" and "OFF" when tripped automatically.	Provide circuit breakers that are 120 VAC rated with a minimum symmetrical interrupting short circuit capacity of 10 kA.		 Use only circuit breakers that are DIN rail mounted. 			
	f. Provide fuses meeting the f	ollowing requiremen	ts:				
 Provide DIN rail-mounted switch or disconnect type fuse holders and fuses for low voltage AC and DC circuits in the proper capacity and configured. Provide fuse with size rating labeled on the holder or on the panel adjacent to the holder. 							
	g. Provide end brackets and s	pacers meeting the	following requiremen	ts:			

		Requirement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹	
	Provide screw-clamp end brackets for DIN rail mounting.	Provide spacers or dividers between terminal blocks and other components as shown in the Contract documents for visual separation.	Provide spacers that snap on to DIN rail that are approximately 0.20 in (5 mm) to 0.71 in (18 mm) thick and match the size of the terminals they separate.			
	h. Provide safety cover meetin	ng the following requirements:				
	Provide safety covers on termina contact with exposed conductors components. This cover will prov visual separation between termin other rail-mounted devices.	Il blocks to prevent or any metallic Provide safe ide electrical and in (2 mm) th blocks and blocks they				
	i. Provide internal wiring meet	ting the following requirements:				
	Provide insulated wiring that is an between terminal blocks and atta	ppropriately sized internal bran with the NEC	N-THWN, stranded, copper wiring for ich circuits. Wire size shall be compliant C.			
	Use a minimum No. 12 AWG grounding of each SPD, or larger if recommended by the SPD manufacturer or indicated on the Contract documents.	 Use insulated green wire to connect the ground wire directly to the ground terminals. 	 Do not splice together different device grounding wires including surge protectors. 			
	j. Provide GFI service outlet r	neeting the following requirements:				
	Provide one duplex, NEMA 15A, (convenience service outlet) with box, and cover plate able to be a installed within the field cabinet.	5-15R, GFI duplex receptacle ground-fault circuit interrupters, ccessed after equipment is				
	k. Provide a ground buss bar of positions where a No. 2 AW	of copper alloy material compatible with o /G stranded copper wire can be attached				
	I. Provide field cabinets that c 682.3.05.N and as required	comply with the NEC and grounding and l and recommended by the cabinet manu				
6.	Provide field cabinet with surge p	protection meeting the following SPD requ	uirements:			
	a. Provide a Type 1 SPD for th breaker. Other surge protect	ne field cabinet's main AC power input or stinn devices are covered under individua	n the load side of the field cabinet circuit I device specifications.			

		Requi	rement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹	
b.	Provide SPD that by NRTL.	t is listed per UL 1449 4th edition	on, Open-Type 1, or latest editi	ion. The SPD shall be listed			
C.	Provide SPD that	t meets the following minimum	performance requirements:				
Pos nor	 Posted at UL.com under certification with 20 kA I- nominal rating. Does not exceed the VPR and MCOV requirements listed in Table 4. 						
SCCR that equals or exceeds 100 kA.			 Maximum surge current rating (Imax) that equals or exceeds 50 kA per mode and 100 kA per phase (sum of L-N plus L-G). 				
		Table 4 – VPR and M	ICOV Surge Requirements				
		L-N	L-G	N-G			
VPR		800V	1,500V	1,200V			
MCOV		150V	150V	150V			
d.	Provide SPD that	t has no leakage current to grou	und.	•			
е.	Provide SPD that	t supports bi-directional operation	on.				
f.	Include directly c	onnected thermally protected M	IOVs.				
g.	Provide pluggable	e SPD modules.					
h.	Provide SPD that and humidity req	t complies with IEEE C62.45, C uirements.	C62.41.1, and C62.41.2 rated for	or NEMA TS 2 temperature			
i.	Provide SPD enc	losure with a NEMA 4 rating.					
j.	Provide SPD that	t can be either wall/panel or DI	N rail mounted.				
k.	Provide SPDs that	at are equipped with a visual in	dicator for each MOV and remo	ote alarm monitoring.			
I.	Provide parts tha aluminum, brass	t are made of corrosion-resista , or gold-plated metal.	ant materials, such as plastic, s	tainless steel, anodized			
7. Pro	ovide field cabinet w	vith rack-mounted power strip m	neeting the following requireme	ents:			
a.	Provide power st	rip with a maximum ampere rat	ting of 15A, 120 VAC, 60 Hz.				
b.	Provide power st	rip with integrated surge protec	tion meeting the following mini	mum requirements:			

	Requirement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
	Listed per UL 1449 4th edition, or latest edition.			
	Minimum AC suppression joule rating of 600 J. C AC suppression surge current rating of 20,000A.			
	Minimum UL 1283 EMI/RFI noise filtering protection LED status indicators.			
	c. Provide minimum of eight NEMA 5-15R receptacles or as specified in the Contract documents. Provide spacing to accommodate a minimum of four plug-in power supplies without covering up remaining outlets.			
	d. Mount the power strip on the rear near the top of the standard TIA-310-D rack cage. Mount the power strip facing toward the back of the field cabinet providing a minimum spacing of 3 in (76 mm) between the outlet's face and the field cabinet door when the door is closed.			
	e. Provide power strip that does not hinder accessibility to the back of existing electrical equipment.			
8.	Provide field cabinet with interior lighting meeting the following requirements:			
	a. Provide field cabinet with LED lights at the front and back.			
	b. Equip the field cabinet with a manual on/off switch for the LED lights that are connected to a door switch that allows the lights to be powered when the field cabinet door is open.			
9.	Provide field cabinet with mechanical locks meeting the following requirements:			
	a. Equip the main field cabinet door with mechanical locks that accept No. 2 Corbin keys. Provide two sets of keys with each field cabinet.			
	Provide door that has a lockable three-point latch mechanism and can accept a cyber lock with 3/8 in shackle.			
10.	Provide field cabinet with temperature system meeting the following requirements:			
	a. Provide a thermostatically controlled ventilation blower fan(s) to maintain internal temperatures below the upper operating temperature thresholds for installed equipment and components that are operating continuously at full capacity.			
	b. Provide the field cabinet with the capability for the user to set temperature thresholds that automatically activate the fan(s) to turn on or off when the internal field cabinet temperature exceeds the threshold.			
11.	Provide field cabinet with ventilation and air filter system meeting the following requirements:			
	a. Provide ventilation and air filter system that is designed so that openings prevent the entrance of dust, insects, and other foreign matter.			

		Requi	rement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
	b.	Provide washable, removable, and reusable air	filters.			
	C.	Provide ventilation and air filter system with bot of the field cabinet.	tom trough to drain any accumulated moisture to the outside			
	d.	For Type 1, provide one 100 cubic feet (2.83 cu exhaust fan mounted near the top of the field ca	bic meters) per minute (cfm) (minimum) 120 VAC blower binet.			
	e.	For Types 2, 3 and 4, provide two 100 cfm (2.83 exhaust fans mounted near the top of the field c	3 cubic meters per minute) (minimum) 120 VAC blower abinet.			
12.	Pro	vide field cabinet with cable and wire managemer	t system meeting the following requirements:			
	a.	Provide vertical and horizontal cable management the Department.	ent as shown in the Contract documents or as approved by			
	b.	Provide field cabinet with a cable and wire mana communications/data wiring within the field cabi	agement system for AC branch, low-voltage power, and net.			
	C.	Provide cable and wire management componen adhesive or self-stick mounting is permitted.	ts attached to the field cabinet/rack cage with screws. No			
	d.	Provide separate wire management for power a wiring.	nd other field cabinet low-voltage and communications			
	e.	Type 4 cabinet only, provide a minimum of four panels to permit patch cords to pass between th	wiring pass-through holes on the inside side-mounting le two cabinet sides:			
	 Provide 5 in (127 mm) pass-through holes that are outfitted with grommets for patch cord protection, with the holes positioned with two in the cabinet front and two in the cabinet rear and aligning horizontally between the two side panels. Provide plastic- or rubber-coated J-hooks or D-rings, minimum 1 in (25 mm) depth and height, on the inside rails of the rack cabinet cages, to organize patch cords passing between the two cabinet sides. 					
939	.2.07	Field UPS Requirements				
Α.	Gei	neral				
1.	Pro	vide an industrial-grade UPS that is a double-conv	version, on-line type.			
2.	Pro	vide UPS that is UL-listed and complies with UL 1	778 standard.			
3.	Pro	vide one or more of the field UPS types listed in T	able 5.			

		Requi	rement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
		Table 5	– UPS Types			
Type Location UPS Output Power Capacity (minimum, full load)						
Type 1	Field Cabinet	350W				
Туре 2	Field Cabinet	800W				
Hub	Hub Building	1900W				
B. Functional Re	quirements					
1. Provide UPS the	at is a buck / boost, line	-interactive sy	stem.			
The buck / boos minimum range	t mode of the BBS sha of 90-150 VAC	ll have a	 Buck/ Boost mode shall not have a user configurable transfer set point. 			
 Buck / Boost mode shall regulate the system output between 100-130 VAC. When the output of the system can n maintained within that range, the UP- to backup mode. 						
2. Provide UPS ou	Itput that is a pure sine	wave at 120 V	AC ±3% at 50/60 Hz (±0.3% maximum).			
3. Provide UPS wi	th a total harmonic dist	ortion of <3% (resistive load).			
4. Provide a minin	num of four output recep	otacles type NB	EMA 5-15R.			
5. Provide UPS wi	ith an external, make-be	efore-break ma	intenance bypass capability.			
6. Provide UPS wi	ith a minimum of 85% e	fficiency (AC-t	o-AC).			
7. Provide UPS the bypass and reve	at supports a minimum erse.	transfer time o	f 0 ms for line fails/recovers, and 5 ms or less for UPS to			
8. Provide UPS wi	th LCD display for mon	itoring unit.				
9. Provide UPS wi	th four dry contact clos	ures.				
10. Provide UPS wi	th automatic low-batter	y and high tem	perature shutdown features.			
11. Provide UPS the	at will return to normal o	operations with	nout a manual reset.			
12. Provide UPS wi	th a maximum audible i	noise of <50 dB	3A at 3ft. (0.9m)			
13. Provide UPS wi units.	th a battery bank(s) tha	t mount on EIA	A 19in. (483 mm) rack using a maximum space of five rack			
C. Battery System	<u></u> ו					

	Requi	rement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
1.	Provide maintenance-free sealed batteries that can b	e serviced and replaced separately from the UPS.			
2.	Provide batteries that are rated for extreme temperat	ures that have been field proven and tested.			
3.	Provide UPS batteries that maintain 80% of original c	apacity for a minimum of five years.			
4.	Provide a maximum battery recharge time of 8 hours	to 90% of full charge.			
5.	Provide battery charger with a minimum of three-stag batteries above a minimum depth of discharge point of	e, temperature compensated charging and keeps the of 50% or as recommended by the manufacturer.			
6.	Provide user-replaceable and hot-swappable battery	packs.			
7.	Provide batteries with non-conductive terminal covers	5.			
8.	Provide battery bank that meets the following minimu	m runtimes:			
	For Type 1 and 2 field UPS, minimum runtime of 1 hour under full load as shown in Table 5.	S only, minimum hours under full vn in Table 5.			
D.	Environmental				
Prov	vide a UPS system including battery bank that meets fo	ollowing minimum requirements:			
	For Types 1 and 2 field UPS, ambient temperature range from -4°F through +131°F (-20°C through +55°C).	□ For hub UPS, ambient temperature range from +32°F through +104°F (0°C through +40°C).			
	Relative humidity from 10% through 95%, noncondensing.	 Comply with FCC Part 15 emission standard and FCC Public Notice 2019-01. 			
Е.	Remote Monitoring Requirements				
1.	Provide UPS that supports local and remote monitoring	ng and control via Ethernet port interface.			
2.	Provide remote environmental sensing hardware and temperature and including generating alarms for low l temperature.	software integrated with SNMP minimally capable of battery, over/under voltage, over/under frequency, and high			
3.	Provide an addressable SNMP command set includir	ng, at a minimum:			
	UPS state.	Battery condition (voltage, sampling temperature of one battery.			
	Current AC input conditions (voltage, frequency).	 Current AC output conditions (voltage, AC amps, frequency). 			

		Requi	rement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
Diagnostic/s	elf-test control and statu	JS.				
939.2.08 Solar Po	wer System Requiren	nents				
A. General						
1. Provide sola configuration	r power system that car ı.	n be mounted in a	permanent configuration or in a temporary portable type			
2. Provide one	or more of the solar pov	ver system types	listed in Table 6 as specified in the Contract documents.			
		Table 6 – Solar	Power System Types			
Туре	Location	Site	e Output Power Capacity (minimum, full load)			
Туре 1	Field Cabinet	350W				
Туре 2	Field Cabinet	800W				
B. System Rec	uirements					
1. Provide DC-	to-DC and DC-to-AC co	onversion equipme	ent, as specified herein.			
2. Provide grou	nding that meets NEC a	ampacity requirer	nents.			
3. Provide syst	em cabling that meets N	NEC ampacity rec	quirements.			
4. Provide over inverter, and	-current protection devi load for safety and mai	ces (OCPD) betw ntenance.	een each of the solar array, solar controller, battery bank,			
5. Provide syst life using 3 d	em that maintains the b ays of autonomy (DoA)	attery depth of dis	scharge (DoD) between 20% and 50% to maximize battery			
6. Recharge ra	tio					
□ ITS application	ons: minimum of 4 time	S	□ Lighting: minimum of 3 times			
C. Solar Panel						
1. Provide high sized to prov	efficiency, photovoltaid ide full charging of batt	c solar panel(s) m eries within a one	ade from tempered glass with an anodized aluminum frame, day full sunlight cycle while under operation in December.			
2. Provide sola average wini inefficiencies	r panels that deliver pov ter insolation values for s.	ver for the equipn the area in which	nent at the site such that it operates using the lowest the system is installed, accounting for system			
3. Provide IP67	'-rated junction boxes of	n the backside of	the panel.			

	Requirement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
4.	Provide bypass diodes to minimize power drop caused by shade and provide better performance in low-light conditions.			
5.	Provide a power max rating of 70% minimum at nominal operating cell temperature (NOCT).			
6.	Provide a 25-year degradation that has a minimum 80% efficiency rating.			
D.	Battery			
1.	Provide batteries that are individually replaceable (hot-swappable), completely sealed, and maintenance free, requiring no watering.			
2.	Provide battery capacity (amp-hours) and type that will keep field cabinet equipment operating for a minimum of 72 hours without sunlight or charging of the batteries. Include a 20% safety factor to ensure operation in unseasonable weather conditions and battery degradation over time.			
3.	Provide batteries that maintain 80% of original capacity for a minimum of five years.			
4.	Provide batteries with non-conductive terminal covers.			
5.	Provide ventilated enclosure with positive and negative air flow for the batteries.			
6.	Provide temperature sensors that are mounted to the side of the battery case and generally in the middle of the battery bank.			
E.	Charge Controller			
1.	Provide a minimum 30A rated PWM charge controller that charges 12, 24, and 48V batteries.			
2.	Provide charge controller that supports the selected battery type.			
3.	Provide charge controller with built-in energy LCD monitor to track and indicate the state of charge, voltage level of the batteries, and output of the solar panels.			
4.	Provide charge controller that keeps the batteries above the minimum depth of discharge point of 50% or as recommended by the battery manufacturer.			
5.	Provide charge controller with data logging capabilities that can be viewed over the network.			
6.	Provide charge controller that disconnects the equipment from the batteries at a variable percentage load and allows the batteries to reach a higher state of charge, commonly referred to as a low voltage disconnect feature.			
F.	Power Inverter			
1.	Provide power inverter that outputs a true sine wave DC to 120 VAC ±5% rated for off-grid solar application.			
2.	Provide power inverter that meets the continuous power wattage (total load capacity) requirements of the field cabinet equipment and components.			

	Requi	rement	Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
3.	Provide power inverter with a minimum surge rating t support equipment start-up power needs (peak powe	hat is double the continuous power wattage calculation to r).			
4.	Provide power inverter with a power factor of 0.9 to 1	.0.			
5.	Provide circuit breakers sized for the system and place	ed between the inverter and battery bank.			
6.	Provide power inverter with a minimum of three NEM	A 5-15R, 15A outlet receptacles.			
7.	Provide a power distribution panel in conjunction with	the inverter.			
G.	Environmental				
Pro hum	vide solar panels, charge controller, inverter, and batter iidity requirements:	y bank that meet the following minimum temperature and			
	Ambient temperature range from −4°F through +131°F (−20°C through +55°C).	 Relative humidity from 10% through 95%, noncondensing. 			
	Provide battery bank that is ventilated with fans that push and pull air within the enclosure.	 Comply with FCC Part 15 emission standard and FCC Public Notice 2019-01. 			
939	2.09 Field Power Controller Requirements				
Α.	General				
1.	Provide field power controller that is IP-addressable (static) and accessible over a network.			
2.	Provide field power controller with a 10/100 autosens	ing, port selectable, RJ-45 Ethernet interface.			
3.	Provide field power controller that can reboot and cor browser.	trol outlet receptacles in remote locations from a web			
4.	Provide secure control through a user web interface,	including SSL and multi-user password secure access.			
5.	Provide a minimum of 18 NEMA 5-15R, 15A outlet re receptacles.	ceptacles with eight switched pairs and two un-switched			
6.	Provide a user-configurable automatic ping feature th receptacles.	at monitors and automatically cycles power on one or more			
7.	Provide a minimum surge protection using dual 3,600	J MOVs to clamp power surges and spikes.			
8.	Provide field power controller with configurable event	data logging.			
9.	Provide field power controller that mounts on an EIA inside a standard field cabinet or hub building rack.	19 in (483 mm) rack (maximum space of two rack units)			

	Requirement								Comments	Evaluation Method ¹
В.	. Environmental									
1.	Provide field power controller including power supply that comply with NEMA TS 2 Sections 2.1.7, 2.1.8, and 2.1.9 temperature, humidity, vibration, and shock testing requirements.									
2.	Comply with FCC Part 15	emissio	n standard and FC	C Public Not	ice 2019-01.					
939	9.2.10 Security Lock Requi	irements	5							
Α.	Provide security lock that	at meets	s the following rec	quirements:						
	Provide a wireless electronic key security lock system that is compatible with the Department's existing programming equipment. The Department's existing security lock system uses Cyberlock equipment.			n that is ing ystem	 Provide controls cabinet 	secur acces (s) on a	ity lock system that ss to specific field an individual basis.			
	Provide security lock system that has no pick-able C Pro cab			Prov cabi	ide cylinder tha net mechanical	it can i lock h	retrofit existing field ardware.			
	Provide electronic key with key memory that stores access schedules and a list of locks it can open. Provide cylinder at key that are manu unique ID that can changed or duplica			d electronic actured with a not be ted.		Provide rechargeable batteries.				
939	9.2.11 Miscellaneous Equip	pment R	equirements							
A.	Fiber Optic Video Trans	smitter a	nd Receiver, Type	A						
1.	Provide fiber optic video tr	ransmitte	ers and receivers th	at meet the	following requir	ement	s:			
	Provide transmitter and receiver units with full-motion uncompressed video transmission or reception capability.			Provide pu modulatior	lse frequency 1.		Provide external ST compatible fiber optic connector.			
	 Provide external female video 75-ohm BNC connector with gold-plated center pin. Provide external indicat for power. 			ernal indicato	r LED	Provie of 850 1,310 requir	de operating wavelengths 0 nm and 1,300 nm MM or 0 nm SM per project rements.			
	 Meet minimum 14 dB power budget. Provide receiver dynamic range that is a m dB greater than the manufacturer's specifi budget. The transceiver shall fully maintair operational performance characteristics th full receiver dynamic range. including a 0 c 			t is a minimum specified powe naintain all stics throughou g a 0 dB path I	of 2 r t the oss.	Comply with EIA/TIA RS-250C Medium Haul transmission.				

		Requirement		Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
	Provide transmitter and receive temperature and humidity, po- with equivalent environmental	ver units that meet NEMA TS 2 enviror wer service transients, non-destruct tr I standards by other entities may be su	nmental standards for power interruption, ransients, vibration, and shock. Conformance ubmitted for consideration.			
2.	Provide fiber optic video trans requirements:	smitters in the field cabinet assemblies	that meet the additional following			
	Provide transmitters that oper a plug-in 120 VAC external transformer, with mounting sc plugged into an equipment ou the field cabinet.	rate from Provide SM transmi crew, units that incorporat diode optical emitte	itter te laser rs. Provide standalone metal enclosure capable of horizontal or vertical mounting.			
	Provide transmitter unit that o EIA/TIA RS-250C Medium Ha path loss to the maximum spe temperature range of the NEM other approved environmenta	operates in full compliance with the aul transmission from 0dB optical ecified optical path loss over the full MA TS-2 environmental standard or al standard.	 Provide transmitter with maximum dimensions of 2.00 in (51 mm) (H) x 5.5 in (140 mm) (W) x 7.0 in (180 mm) (L). 			
3.	Provide fiber optic video recei requirements:	ivers in the control center or communio	cations hub that meet the additional following			
	Provide receivers that can be a card cage with a self-contain	permanently rack mounted within ined rack power supply.	Provide card cage as required.			
В.	Fiber Optic Video/Data Trar	nsmitter and Receiver, Type B				
1.	Provide fiber optic video/data	transmitters and receivers that meet t	he following requirements:			
	Provide asynchronous, full duplex RS-232 communications.	Provide one-way full-motio uncompressed video transmission or reception.	Provide pulse frequency modulation.			
	 Provide external ST compatible fiber optic connector. Provide external female D DB9 or terminal block RS-connector. 		325,Provide external female video23275-ohm BNC connector with gold-plated center pin.			
	 Provide external indicator LEDs for video and control signals. Provide wave division multiplexing with operating wavelengths: 850 nm and 1,300 nm MM (minimum 13 dB power budget) or 1,310 and 1,550 nm SM (minimum 23dB power budget) per project requirements. 		Provide receiver dynamic range that is a minimum of 2 dB greater than the manufacturer's specified power budget. The transceiver shall fully maintain all operational performance characteristics throughout the full receiver dynamic range, including a 0 dB path loss.			

		Requirement Item Comply? Comments	Evaluation Method ¹
	Comply with EIA/TIA 250C Medium Haul video transmission.	 Provide transmitter and receiver units that meet NEMA TS 2 environmental standards for power interruption, temperature and humidity, power service transients, non-destruct transients, vibration, and shock. Conformance with equivalent environmental standards by other entities may be submitted for consideration. 	
2.	Provide video/data transmitters ir	in the field cabinet assemblies that meet the additional following requirements:	
	Operate from a plug-in 120 VAC external transformer, with mounting screw, plugged in to an equipment outlet in the field cabinet.	 Provide SM transmitter units that incorporate laser diode optical emitters. Provide standalone metal enclosure capable of horizontal or vertical mounting. 	
	Provide transmitter unit that opera in full compliance with the EIA/TI RS-250C Medium Haul transmiss from 0 dB optical path loss to the maximum specified optical path lo over the full temperature range of NEMA TS-2 environmental stand or other approved environmental standard.	Provide transmitter unit that meets NEMA TS 2 environmental standards for power interruption, temperature and humidity, power loss of the dard al Provide transmitter unit that meets NEMA TS 2 environmental standards for power interruption, temperature and humidity, power service transients, non-destruct transients, vibration, and shock. Conformance with equivalent environmental standards by other entities may be submitted for consideration.	
3.	Provide video/data receivers in th requirements:	the control center or communications hub that meet the additional following	
	Provide receivers that can be per a card cage with a self-contained	ermanently rack mounted within In Provide card cage as required.	
C.	Fiber Optic External Transceiv	ver	
1.	Provide external transceivers that	at meet the following requirements:	
	Provide daisy chained, linear multi-drop configuration.	 Provide asynchronous, full duplex RS 232 communication. Provide external female ST connectors with T1, R1, T2, and R2 ports for fiber connection. 	
	Provide external female DB-25, DB-9, or terminal block RS 232 connector.	 Provide external indicator LEDs for power, transmit and receive (each channel). Provide MM transceiver that operates at 1,300 nm (minimum 14 dB power budget). 	

Requirement							Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
	Provide SM transceiver that operates at 1,310 nm (minimum 21 dB power budget).			mic range that is a minimum of 2 dB Ifacturer's specified power budget. fully maintain all operational ristics throughout the full receiver ling a 0 dB path loss.		Provide anti- streaming communicatio ns.			
	Provide SM transmitter units that incorporate laser diode optical emitters.		, nickel-cadmium trickle charge battery for a minimum of six eration. The battery shall be designed to have minimized reliability during extended periods of trickle charge operation. esistant battery contacts.						
	Provide metal housing with maximum dimensions of 8 in x 5 in x 2 in (203 mm x 127 mm x 51 mm). The metal housing shall have flanged mounting brackets to allow for permanent mounting with screws.		Provide transceiver unit that meets NEMA TS 2 environmental standards for power interruption, temperature and humidity, power service transients, non-destruct transients, vibration, and shock. Conformance with equivalent environmental standards by other entities may be submitted for consideration.						
2.	Do not use internal card-type units in field devices, such as traffic signal controllers, CCTV system controllers, and CMS controllers.								
3.	. Provide external transceivers in the control center or communications hub that meet the additional following requirements:								
	Provide transceivers that can be permanently rack mounted within a card cage with a self-contained rack power supply.								
D.	Fiber Optic External Star Transceiver								
1.	Provide an RS232 data optical star transceiver that meets the following requirements:								
	Provide star transceiver designed for multi-drop configuration with three optical data ports and one electrical equipment data connection port, to be applied in a drop-and-repeat optical three-way to "T" installation.								
2.	Do not include internal battery for backup operation.								
3.	3. Provide transceiver unit that meets NEMA TS 2 environmental standards for power interruption, temperature and humidity, power service transients, non-destruct transients, vibration, and shock. Conformance with equivalent environmental standards by other entities may be submitted for consideration.								
E.	E. Serial Data Terminal Server								

Requirement						Item Comply? (Yes, No, N/A)	Comments	Evaluation Method ¹
1.	Provide multiport Serial Data Te Central Software serial port coni terminal servers (Digiboard Port	erminal Servers (termin htrol system. The existi tServer) addressed wit	nal servers) that are c ing GDOT serial port (h the Digiboard Reall	ompatibl control sy Port syst				
2.	Provide terminal servers that me	neet the following requir	ements:					
	Provide terminal servers that are compatible with the existing GDOT Central Software serial port control system.				 Provide RS-232 serial ports with RJ- 45 ports. 			
	Provide management access by HTTP, telnet, and console ports, and password protected.			rovide serial ports with dividually configurable ommunication settings and CP/UDP socket support.				
	Provide RS-232/422/485 Provide serial ports with minimum 230 Kbps throughput with 64 Kbps buffering and data capture.			Provide firmware that is upgradeable by FTP/TFTP.				
	Provide upload/download of con	nfiguration settings.	Provide diagn and unit statu	ostic LEE s.				
	 Provide terminal server units that meet NEMATS environmental standards for power interruption, temperature and humidity, power service transients, non-destruct transients, vibration, and shock. Conformance with equivalent environmental standards by other entities may be submitted for consideration. 							
3.	Provide Serial Data Terminal Se	erver, 16 Port, that mee	ets the following addit	tional req	quirements:			
	Provide EIA 19 in (483 mm) rack- mounted units with maximum vertical height of 1.75 in (44.4 mm).							
4.	Provide Serial Data Terminal Se	erver, Type B, that mee	ets the following addit	tional req				
	Provide units that have conform boards.	nal-coated circuit	Provide units mounted, or s	that can l helf-mou				
	Provide minimum of two RS-232 ports mounted on the front of the unit.				ernal 120 VAC power supply.			
5.	Provide fiber optic patch cords t	that meet all requireme	ents of Section 935.2.	01.G.				

Note 1:

Evaluation Method:

- 1. Physical Inspection a vision inspection of the product
- 2. Compliance Matrix Review a review of the matrix comments column itself to see if all required statements were made
- 3. Document Review a review of all specs, lab test reports, etc.
 - a. Independent 3rd Party Facility Test results
 b. 1st Party (Manufacturer) Test results
- 4. Functional Review / Inspection GDOT Lab and/or Field Trial testing