CDQT	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 936 of the GDOT Minimum Specifications for CCTV Cameras and all implemented modifications. The requirements listed on this matrix are derived from Section 936, 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:
Manufacturer:	Name (print)
	Signature:

Item, Model No:

GDOT Closed Circuit Television (CCTV) Specification Compliance Matrix

	Requirement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹
936	.2.01 IP-based CCTV Camera Requirements			
Α.	General			
1.	Comply with ISO 9001 or Sigma Six quality manufacturing requirements.			
2.	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.			
3.	Support an open and published application programming interface or software development kit that provides the necessary information for integration of functionality into third party applications and the users' central control system environment.			
В.	CCTV Camera			
1.	Provide camera system with a progressive scan digital CMOS or CCD image sensor.			
2.	Provide camera system with an HDTV user-configurable image resolution of 1080P (1920 x 1080) to 352 x 240- pixel array.			
3.	Provide camera system that allows user-configurable frame rate from 5 up to 30 frames per second (fps) with a default of 30 fps.			
4.	Provide camera system that has removable IR-cut filter, providing day (color) and night (monochromatic) functionality.			

		Requirement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹	
5.	Provide camera system that sup	ports a width to height aspect ratio of 16:	9.			
6.	Provide camera system that mee	ets the following image processing require	ements.			
	a. Automatic and manual elec second at 60 Hz.	tronic shutter speed setting that is user s	electable from 1/2 second to 1/30,000			
	b. Automatic and manual auto	matic gain control that is user selectable				
	c. Automatic and manual whit	e balance control that is user selectable.				
	d. On/off backlight compensa	tion operation with user control.				
	e. On/off wide dynamic range	operation with user controls and manual	override option			
	f. Automatic and manual defo	g mode that is user selectable.				
	g. On/off EIS algorithms integ	rated within the camera assembly syster	n, including:			
	1) Compensation algorithms based on those particular movement wavelengths associated with vibrations present at the roadside or pole movement (e.g., 5 Hz and 10 Hz sinusoidal frequencies at a minimum).	 2) EIS function that automatically pauses while PTZ functions are occurring and restores when no PTZ is occurring. 	 3) Stabilization such that standard Department of Transportation placards with a size of 1 ft. (0.3 m) by 1 ft. (0.3 m) are continuously legible in conjunction with viewing specification and maximum zoom level at a distance of 500 ft. (150 m). 			
7.	Provide a camera system with a	lens that meets the following requiremen	ts:			
	a. Types 1, 1P, 2, and 2P: pro following features:	vide camera with an integrated zoom ler	is assembly for each camera with the			
	i. Aperture f-stop of f/1.6 (wide) or better zoom lens with variable focal lengths.	 ii. Minimum 30X optical zoom and 2X digital zoom. 	 iii. Automatic switching from optical zoom to digital when optical zoom range is exceeded. 			
	iv. Adjustable zoom speed.	 v. Automatic and manual user selectable focus control. 	vi. Automatic and manual user selectable iris control to compensate for changes in scene illumination to maintain constant video-level output within sensitivity specifications.			

		Requi	rement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹		
	b. Types 3 and 3P: provide camera with a varifocal lens for each camera with the following features:							
	i. Aperture f-stop of f/1.4 (wide) or better.	 ii. Horizontal view of appridegrees (wid degrees (tell 	angular field of oximately 46 de angle) to 9 ephoto).		iii. Adjustable zoom remotely through the camera's web interface. Final focus shall be adjustable through camera's web interface.			
8.	Provide camera system sensitiv	ity that has useable v	video at the following	ambie	ent low light conditions:			
	a. Scene Illumination; F-stop set at wide open at 50% video (50 IRE)	□ b. 1.0 Lux (0.1 fc) at 1/30 shutter, color mode			c. 0.1 Lux (0.01 fc) at 1/30 shutter, monochromatic (black and white) mode			
C.	Pan/Tilt (P/T) Positioning Driv	e						
1.	Types 1, 1P, 2, and 2P: provide	P/T Range and Spee	d that meet the follo	wing r	equirements:			
	a. Provide camera system that	at has an integrated F	P/T unit that meets the	ne follo	wing minimum requirements:			
	i. Pan Range: 360 degrees, full endless or continuous rotation movement.	 ii. Pan Manu up to 90 deg (minimum), through the 	 ii. Pan Manual Speed: variable up to 90 degrees per second (minimum), user adjustable through the full speed range. 		iii. Pan Preset Speed: minimum 180 degrees per second.			
	iv. Preset Pan Repeatability: ±0.36 degree, or	 v. Tilt Range degrees tota 1 and 1P ca minimum 18 range for Ty cameras. 	e: minimum of 90 Il tilt range for Type meras and 0 degrees total tilt pe 2 and 2P		vi. Tilt Manual Speed: variable up to 90 degrees per second (minimum), user adjustable through the full speed range.			
	□ vii. Tilt Preset Speed: minimum 180 degrees per second. □ viii. Preset better.			ilt Rep	peatability: ±0.36 degree, or			
	b. Provide camera system with automatic electronic image inversion or "auto flip" functionality that can automatically rotate the image 180 degrees electronically when following a moving object passing under the camera. No mechanical stops are permitted.							
	c. Provide camera system with proportional zoom control allowing variable P/T speeds based on "zoo position. This is to scale the maximum P/T speed, while maintaining variable speed capability throut the zoom range of the camera.							
2.	Types 1, 1P, 2, and 2P: provide requirements:	camera system that	has P/T presets that	meet	the following minimum			

		Requi	rement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹	
	a. Minimum of 64 presets for PTZ and focus settings.						
D.	Video Encoding						
1.	Provide camera system that com	plies with the followi	ing video encoding s	tandards:			
	a. ISO/IEC 14496-10, Advanced (H.264), Baseline, Main and High	Video Coding n Profiles	D b. Motion JF	PEG (MJPG)			
2.	Provide camera system that complies with the following HDTV video standards in regard to resolution, frame rate, aspect ratio, and color fidelity:						
	a. SMPTE 296M (HDTV 720P) D. SMPTE 274M (HDTV 1080P)						
3.	Provide camera system that meets the following video stream format and configuration requirements.						
	a. Simultaneous unique video streams that are independently and individually configurable and meet the following minimum requirements:						
	i. Stream 1: H.264 Baseline, Main or High Profile	□ ii. Stream 2: Main or High	H.264 Baseline, n Profile	 iii. Snapshot: JPG full-frame capture 			
	b. Encoding parameters for m configurable by the user for	inimum ranges and o each stream:	operation that can be	e independently and individually			
	i. Target multicast address, port and time-to-live setting ii. Video compression technology and levels of H.264 Baseline, Main or High Profile for video and JPG/MJPG for snapshot captures or full-frame captures from a video stream.						
	iv. Frame rate that is adjustable 5 to 30 fps (North American, 60 Hz).	 v. Bandwidth rate control f rate or const rate/maximu selectable fr Mbps. 	n and encoding bit that is variable bit tant bit um bit rate om 256 Kbps to 6	vi. Group of Pictures length.			

Requ	irement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹	
c. Simultaneous and continuous encoding and st activation of one, two, or three simultaneous an degradation of any video stream, video image, streams shall meet the following minimum requ	reaming for a minimu Id continuous stream control function, or de irements:				
□ i. Stream 1: 4 Mbps/1920 x □ ii. Stream 2 1080/Main Profile/30 fps/RTP 480/Main P	: 384 Kbps/720 x rofile/15 fps/RTP	iii. Snapshot: 1920 x 1080/120 second capture interval			
4. Provide camera system with encoded streams that a decoding system and with VLC (Video LAN Client) V	are fully compatible w ersion 2.1.3.	ith the GDOT Central Software video			
5. Provide camera system that meets the following vide	eo snapshot requirem	ents.			
 a. JPG snapshots from either a dedicated stream or from any of the video streams and image transfer via FTP either by push or pull at a user-defined interval between 60 and 300 seconds. 	□ b. OSD cap				
 c. Target FTP server settings including connection credentials for push function. 	 d. A minimu snapshot file 	m space for 32 characters for the ename for push function.			
6. Provide management system and user interface that	t meet the following re	equirements:			
 a. Manage encoder through HTTP and HTTPS. 	 b. Provide a making vide multiple cliei browser env for any addii player plugir stream of th 	built-in web server user interface o, status, and configuration available to nts in a standard operating system and ironment using HTTP, without the need tional software of any kind, except video ns solely for displaying a live image e video output.			
 c. Provide web server user interface that supports access to all configurable parameters in the CCTV camera system, without the need for any separate textual or line commands of any kind. 	face that supports leters in the CCTV d for any separate kind.				
e. Provide capability to reset or reboot and upload	I firmware via the ma	nagement system requirements.			
 i. Update the firmware in the encoder from a network connection. 	ii. Access the equipment of	e firmware number, IP address, and configuration.			
7. Provide camera system that meets the following mir	imum OSD requirem	ents:			

	Requi	rement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹
	a. Static text insertion on streams and snapshots inserting a minimum of two lines of user configurable text messages with support for date, time and cardinal angle/compass of at least 30 ASCII characters in length.	 b. Text insertion that scales appropriately or is independently configurable for different video image size and snapshot resolutions. 			
	 c. JPG, BMP, GIF, or PNG image insertion on streams and snapshots in the upper portion of the image, using image file(s) uploaded by the user and stored in the encoder's memory and configuration. Text display on the side of the image is prohibited. d. Image insertion that scales appropriately for different video image size and snapshot resolutions, or the ability to insert a different image file for each stream and snapshot. 				
8.	Provide configuration backup providing automatic rec power has returned to the tolerance values specified h	overy from an over or under voltage condition when prime herein.			
	 a. Store configuration parameters in non-volatile memory. b. Provide a camera system that requires no reprogramming or manual adjustments upon power recovery. 				
E.	Communications and Network				
1.	Provide a network format that complies with IEEE 802 sensing full and half-duplex operations.	2.3, 802.3u, and 802.3x; 10/100 Mbps or higher, auto			
2.	Provide network hardware interface including a minim using an IP66 rated RJ-45 weathertight connector and connector and coupler.	um of one 10BASE-T/100BASE-TX PoE Ethernet-port d coupler or other Ethernet-compatible locking weathertight			
3.	Provide video encapsulation of each of the video stread configuration, for network transmission.	ams in UDP packet and TCP packets, depending on stream			
4.	Support network protocol standards RTP, RTSP, TCF QoS DiffServ, DNS, DHCP, FTP, Network Time Proto IP Multicast features for digital video transmission, inc	P/IP, UDP, IPv4, IGMP v2, SNMP v1/v2c/v3, HTTP, HTTPS, ocol or Standard Network Time Protocol, SSL, Unicast, and dividually and independently for each stream.			
5.	Support communications protocols including NTCIP 1	205 and ONVIF requirements.			
6.	Provide video network transmission that meets the fol	llowing requirements:			
	a. Support both unicast (one-to-one) and multi-cas	t (one-to-many) streams simultaneously.			
	b. Allow for video to be transported over:				
	i. RTP (Unicast and Multicast)	ii. RTP over RTSP (Unicast)			

		Requi	irement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹	
iii. RTP over RTSP over HTTP (Unicast)							
7.	Provide network IP addressing c	apabilities that meet	the following require	ments:			
	a. Support both fixed IP addresses and dynamically assigned IP addresses provided by a DHCP server.	 b. Support s interface IP (classes A, I 	tatic management addressing B, and C).	 c. Support static IP addressing of the multi-cast group individually and independently for each stream. 			
F.	Mechanical						
1.	General						
	a. Mount CCTV camera and o unless otherwise specified i	other required compo in the Contract.	onents on a single ex	isting or new support structure or pole,			
	 Provide new support brackets, mounting hardware, and ancillary materials to mount CCTV camera and components. 						
	c. Provide housing that protect intrusion into the camera ca	ets the camera and h asing or housing.	ousing against wate	r, dust, corrosive elements, and insect			
	d. Provide housing that is sec	ure from unauthorize	ed entries and vanda	s.			
	e. Provide a camera assembly system with no water penet	y that secures to the tration into any enclo	camera mounting ar sure of the camera a	m with a completely weathertight assembly.			
2.	Types 1, 2 and 3: Provide non-pr	ressurized camera c	asing or enclosure th	at meets the following requirements:			
	a. Provide a casing or enclosure ratings or greater.	that is manufactured	d in compliance with	IEC 60529 IP66, NEMA 4X, and IK08			
	b. Provide camera assembly that additional components such as mo	t meets or exceeds t unting brackets and	he requirements stat hardware to achieve	ed above without the need for the stated ratings.			
	c. Provide a light-colored externa	al casing or enclosur	e.				
	d. Provide high-impact, non-meta coating or powder coating.	allic UV-stabilized ma	aterial or an aluminur	n material with a heat-cured paint			
	e. Protect interior of casing by pro	oviding weathertight	glands or grommets	for cabling to maintain IP rating.			
3.	Types 1P, 2P, and 3P: Provide p	pressurized camera c	casing or enclosure t	hat meets the following requirements:			
	a. Meet the casing or enclosu	re requirements spe	cified in Section 936.	2.01.F.2.			

		Requi	rement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹	
	b. Meet the following minimum	pressurization requ	irements:				
	i. Schrader inlet valve for pressurized extra dry nitrogen.	ii. Operating 3 to 7 psi (21	pressure range of I to 48 kPa).	 iii. Pressure relief valve for protection against overpressure. 			
4.	Provide protection of viewing wind to UV rays:	dows against degrac	dation of materials a	nd yellowing due to prolonged exposure			
	a. Optically correct material with infused inhibitors.	□ b. Material th resistant.	nat is scratch	 c. Polycarbonate, acrylic, or nylon material for the viewing windows. 			
5.	Provide camera system with heat	ting and ventilation t	hat meets the follow	ing requirements:			
	a. Provide a heater and blower fur internal temperatures within the m operating temperatures for tempe internal to the camera unit not cor environmental requirements in Se c. Types 2, 2P, 3, and 3P: an alte keep internal camera casing temp approved by the Department.	nction to maintain nanufacturer's erature ranges nforming to the ection 936.2.01.K. ernative method may peratures to within o	 b. Types 1 a mechanical circulating b keep the ca operational condensatio be provided to prev perational tolerance 	and 1P: provide a conventional thermostat-controlled heater and lower fan system that is designed to mera equipment within the required temperature range and to prevent on to maintain a clear viewing window. vent dust and humidity build-up and to s defined by the manufacturer as			
6.	Provide CCTV camera system wi	ith mounting bracket	that meets the follo	wing requirements:			
	 a. Attach the CCTV camera system to the camera mounting arm as shown in the Contract and in compliance with the camera manufacturer's recommendations. b. Provide the Type 1 and 1P CCTV camera system enclosure with a mounting couplin 1/2 in. male pipe thread coupling in comp the camera manufacturer's recommendations. 			he Type 1 and 1P CCTV camera losure with a mounting coupling with 1- pipe thread coupling in compliance with manufacturer's recommendations to e camera mounting arm.			
	c. Provide the Type 2 and 2P CC enclosure with a mounting base p that bolts to a mating plate on the arm, in compliance with the came recommendations.	TV camera system plate mechanism e camera mounting pra manufacturer's	d. Provide the system ence either the Ty camera mar equivalent the thread coup manufacture	he Type 3 and 3P CCTV camera losure with a mounting equivalent to ype 1 or Type 2, in compliance with the nufacturer's recommendations. If o the Type 1, use a 1-1/2 in. male pipe ling in compliance with the camera er's recommendations.			

	Requi	rement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹
	e. Allow for cabling to be routed inside the poles and mounting hardware and protected from exposure to the outside environment.	 f. Provide stainless steel mounting hardware and straps in accordance with MIL-STD-810F (3) Method 509 Procedure 1 for exterior salt atmospheres. 			
	g. Provide opening in mounting bracket that fully encloses the cables. Provide non-metallic cable protection grommets for cable entrances.	 h. Provide camera casing mounts that can accommodate a weight load capacity of no less than 40 lb. (18 kg). 			
7.	Provide mechanical CCTV camera components inclu corrosion protection following requirements:	ding attachment and mounting hardware that meet the			
	a. Stainless steel external screws, nuts, and locking washers. Self-tapping screws are not permitted.	 b. Parts that are made of corrosion resistant material; examples include plastic, stainless steel, anodized aluminum, or brass. 			
	 c. Protect materials used in construction from fungus growth and deterioration due to sustained moisture 	 d. Separate dissimilar metals by an inert dielectric material. 			
G.	Electrical				
1.	Provide a standalone PoE injector. PoE service throu permitted.	gh the use of a PoE capable Ethernet switch is not			
2.	Select PoE injectors that are based on power require camera manufacturer conforming to the following Pol	ments of the camera system as recommended by the CCTV E standards:			
	a. PoE+ in compliance with IEEE 802.3at	b. PoE++ in compliance with IEEE 802.3bt			
3.	Mount PoE injectors to wall or panel or DIN-rail mour	t within the field cabinet as approved by the Department.			
Н.	Field Cabinet				
1.	Provide system components that are compatible with is not included in the pay items defined in Section 93	the field cabinets shown in the Contract. The field cabinet 5.5			
١.	Cabling and Surge Protection				
1.	Provide outdoor-rated, shielded Category-6 cabling fr meets the following minimum requirements:	om the PoE injector to the internal camera encoder that			

	Requi	rement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹
	a. Comply with TIA-568-C.2 standard.	b. Comply with ICEA S-56-434 standard or equivalent industry standard as approved by the Department for communications cables for outdoor use including weathertight, outdoor CMX UV-rated, abrasion-resistant polyethylene jacket.			
	c. Provide cable that is UL 444 sunlight resistant listed.	d. Provide insulated No. 22 to No. 23 AWG, solid bare copper conductors with polyolefin insulation, arranged in four color-coded twisted-pairs with drain wire incorporating a cross-web separator design.			
	 e. Provide modular IP66-rated weathertight RJ-45 8P position non-keyed and eight gold anodized pins or of and coupler. 	8C male push-pull connectors and couplers with eight- ther Ethernet-compatible locking weathertight connector			
2.	Provide category-6 Ethernet PoE surge protection that	t meets the following minimum SPD requirements:			
	a. Provide SPD that is listed per UL 497B.	b. Comply with TIA-568-A/B.			
	c. Comply with IEEE 802.3af and IEEE 802.3at or 802.3bt.	 d. Support 10Base-T, 100Base-T, and 1000Base-T transmission speeds. 			
	e. Provide a peak surge current rating (Imax) of a minimum of 10 kA (8/20 μs waveform).	 f. Provide a clamping voltage of up to 90V ±20% for line-ground (L-G) and 20V ±20% for line-line (L-L). 			
	g. Provide protection for all connector pins.	 h. Provide input and output connections with shielded RJ-45 connectors. 			
	i. Provide an in-line, series-connected configuration.	j. Provide system capable of being either wall/panel or DIN-rail mounted.			
	k. Provide an SPD that is constructed of aluminum me	etal housing.			
3.	Provide bonding for SPDs, hardware, and other comp buss bar.	ponents within the field cabinet to the field cabinet ground			
J.	Environmental				
1.	Provide equipment that meets the following operating	ambient temperature range and humidity levels:			
	a. Camera Assembly, Power Supplies and PoE Inj	ectors			
	i. −4°F (-20°C) through +140°F (+60°C, maximum).	ii. Up to 95% relative humidity (non-condensing).			

	Requirement		Item Comply? (Yes/No)	Comments	Evaluation Method ¹
	b. Category-6 PoE Surge Protector				
	i. −40°F (−40°C) to +149°F (+65°C, maximum)	ii. Up to 95% relative humidity (non-condensing).			
	c. SPD				
	i. −30°F (−34°C) to +165°F (+74°C, maximum)	ii. Up to 95% relative humidity (non-condensing).			
2.	Provide a camera assembly that meets the following	environmental and emission requirements:			
	a. Comply with NEMA TS 2 Sections 2.1.9, 2.2.3, and 2.2.8 and meet the specified requirements during and after being subjected to a vibration of 5 Hz to 30 Hz up to 0.5 g applied in each of three mutually perpendicular planes for 30 minutes.	b. Comply with NEMA TS 2 Sections 2.1.10, 2.2.4, and 2.2.9 and do not yield permanent mechanical deformation or any damage that renders the unit inoperable when subjected to a shock of 10 g applied in each of three mutually perpendicular planes for 30 minutes.			
	c. Comply with IEC 60529 Section 14.2.6 for IP66 or greater rating	 d. Comply with NEMA 250, Type 4X corrosion requirements for salt environments (i.e., coastal regions). 			
	 e. Provide CCTV camera system installed on a camera pole that has a maximum allowable pole top deflection of 1 in. (25 mm), with camera(s) and CLD (if required) installed and a 0.5 in. (12 mm) ice coating under sustained 30 mph (48 kph) wind gusts. Provide CCTV camera system including the CLD system (if required) that can withstand wind forces of 100 mph (161 kph) with a 20% gust factor with a 1.65 safety factor. 				
	f. Provide the following EMC emission approvals:				
	i. FCC Part 15, Subpart B, Class A and FCC Public Notice 2019-01.	ii. IEC EN 61000-6-4			
936	936.2.02 Type B Analog CCTV Camera Requirements				
Α.	Provide downward-looking circular dome-shaped enc	losure assembly.			
В.	Provide camera unit that has a progressive scan digit	al CMOS or CCD image sensor.			
C.	Provide camera unit with an integrated camera senso	r and zoom lens assembly.			
D.	Provide camera unit that has a minimum resolution of	720 horizontal by 480 picture elements.			

	Requirement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹
E.	Provide camera unit that includes on/off selectable automatic gain control and manual/automatic selectable white balance.			
F.	Provide camera unit that includes an electronic shutter mode with user-selectable speeds of a minimum range from 1/60 second to 1/10,000 second.			
G.	Provide camera unit that has an on/off selectable day/night function where the image sensing and output automatically switch between color and black-and-white imaging. Fixed color or black-and-white imaging shall be user-controllable.			
Н.	Provide camera unit with sensitivity that is no less than 3.0 lux in color mode (1/60 second) and 0.5 lux in black- and-white mode (1/60 second, IR cut removed).			
Ι.	Provide camera unit with an integrated zoom lens of a minimum of 20X optical zoom and a minimum of 4X digital zoom. The camera shall not employ any digital zoom functionality unless the lens is at the full limit of optical zoom and the zoom command continues to be applied, in which case the camera unit shall automatically switch from optical to digital zoom.			
J.	Provide camera unit that includes on/off selectable automatic focus and manual/automatic selectable iris control.			
K.	Provide pan/tilt drive for the camera unit that is fully-contained within the enclosure assembly.			
L.	Provide P/T drive that is capable of 360 degree panning and at least 0 degree horizontal to 90 degree vertical looking downward tilting.			
М.	Provide camera unit and P/T drive that have automatic 180-degree image output flip at the bottom of the tilt travel.			
N.	Provide camera unit and P/T drive that have a minimum of eight privacy blackout zones, each zone being individually programmable to be on/off by the user.			
0.	Provide camera system with panning speed, when a pan-left or pan-right command is applied by the user, up to 40 degrees per second.			
Ρ.	Provide camera system with tilting speed, when a tilt-up or tilt-down command is applied by the user, up to 40 degrees per second.			
Q.	Provide system control interface to the camera system assembly that physically and logically supplies the user commands to and monitoring from the camera system assembly, including but not limited to pan, tilt, zoom, focus, position reporting, and configuration.			
R.	Provide camera system with system control interface that physically connects the camera system assembly to the cabinet interface.			
S.	Provide camera system with system control interface that is in compliance with NEC and all of the physical and operational requirements specified for a camera system.			

	Requirement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹
T.	Provide camera system with the capability to set the communications through the system control interface or through the user control interface in the field cabinet. Do not require the opening/disassembly of the camera system enclosure to set the communications address.			
U.	Provide camera system that can store all user configurable settings in non-volatile memory that is retained indefinitely upon loss of power.			
V.	Provide camera system that produces an analog NTSC-compliant composite video output with a minimum signal-to-noise ratio of 50dB.			
W.	Provide camera system that can operate using 120 VAC (\pm 10%) 50/60 Hz (\pm 5%). Supply DC-to-DC or AC-to-DC conversion and power supplies as required and voltage converters for camera and components that require 12 or 24 VAC/DC (\pm 10%). Do not use a dual voltage power supply.			
Х.	Provide surge protection for power, video, and control as recommended by the manufacturer.			
Y.	Provide a camera system assembly mount that includes bracket, camera enclosure mount and disconnect, mounting straps, and incidental fastening hardware. All fastening and mounting hardware shall be stainless steel.			
Z.	Provide cabling and connectors between the camera system assembly and the cabinet interface assembly as shown in Contract. Label all cables. Provide cables that meet industry and manufacturer recommendations.			
AA.	When required for the camera application, provide coaxial video signal cables with labels attached at both ends of each cable.			
BB.	Provide coaxial cables that use BNC connectors with gold-plated center pins on the video signal cables. Use only connectors recommended by the cable manufacturer.			
CC.	Provide control cable with labels attached at both ends of the cable. Terminate control cable in the equipment field cabinet as shown in the Contract and as recommended by the CCTV system manufacturer.			
DD.	Ground or bond any pair shielding and any unused conductors in accordance with the CCTV system manufacturer's recommendations.			
EE.	Provide camera system with housing that protects the camera and other internal components from rain, dust, corrosive elements meeting the environmental requirements in Section 936.2.01.K.			
FF.	Provide camera system that meets the mechanical requirements in Section 936.2.01.F.			
GG.	If non-pressurized CCTV camera system is provided, provide camera casing or enclosure that meets the following requirements:			

	Requi	rement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹
	1. Provide a casing or enclosure that is manufactured in compliance with IEC 60529 IP66, NEMA 4X, and IK08 ratings or greater.	2. Provide camera assembly that meets or exceeds the requirements stated above without the need for additional components such as mounting brackets and hardware to achieve the stated ratings.			
	3. Provide high-impact, non-metallic UV-stabilized material of a light color or an aluminum material with a heat-cured paint coating or powder coating of an equivalent color.	 4. Protect interior of casing by providing weathertight glands or grommets for cabling. 			
HH.	If pressurized CCTV camera system is provided, prov following requirements:	vide pressurized camera casing or enclosure that meets the			
	1. Meet the casing or enclosure requirements specified in Section 936.2.02.GG.	 2. Meet the following minimum pressurization requirements: 			
	3. Schrader inlet valve for pressurized extra dry nitrogen.	 4. Operating pressure range of 3 to 7 psi (21 to 48 kPa) 			
	5. Pressure relief valve for protection against overpre	ssure.			
936	2.03 Camera Mounting Arm				
А.	Provide camera mounting arm that with the CCTV ca mph (161 kph) with a 20% gust factor with a 1.65 saf	mera system attached can withstand wind forces of 100 ety factor.			
В.	Provide camera mounting arm with the proper mating the Contract.	mounting mechanism for the CCTV camera type shown in			
C.	Provide camera mounting arm as shown in the Contr mast arm to the centerline of the camera mounting m	act. Measure horizontal separation from the face of pole or echanism.			
1.	For Type 1, short arm, mount camera at a position be separation from the pole, and less than 6 in. (150 $\rm mm$	etween 1.5 ft. (450 mm) and 2.5 ft. (750 mm) horizontal n) vertical change from the pole attachment point.			
2.	For Type 2, long arm, mount camera mounting at a p separation from the pole, and less than 5 ft. $(1.5 \text{ m}) \text{ v}$	osition between 15 ft. (4.6 m) and 20 ft. (6.1 m) horizontal ertical change from the pole attachment point.			
3.	For Type 3, short vertical extension, mount camera a change from the attachment point, and less than 2 ft. The attachment point may be a vertical pole or horizo and 24 in. (600 mm).	t a position between 2 ft. (0.6 m) and 4 ft. (1.2 m) of vertical (0.6 m) of horizontal separation from the attachment point. ntal pole with a dimension ranging between 2 in. (51 mm)			

	Requi	rement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹
4.	For Type 4, long vertical extension, mount camera at change from the attachment point, and less than 2 ft. The attachment point may be a vertical pole or horizo (51 mm) and 24 in. (600 mm).	a position between 4 ft. (1.2 m) and 8 ft. (2.4 m) of vertical (0.6 m) of horizontal separation from the attachment point. Intal pole with a diameter dimension ranging between 2 in.			
936	.2.04 Type B Video Encoder Requirements				
Α.	Provide a Type B Video Encoder that meets Section 9	936.2.01.D, except as follows:			
1.	Provide a standalone, environmentally hardened vide use.	eo encoder for a single video signal, suitable for field cabinet			
2.	Provide new video encoders from the same manufact type provided.	turer and ensure compatibility and interoperability with each			
3.	Provide video encoders that have a minimum MTBF	of 20,000 hours.			
4.	Provide video encoder with end-to-end system latence than 300 ms, not including network delays. The encode latency.	by between the encoder and decoder appliances of no more ders shall support various frame adjustments to minimize			
5.	Provide video equipment that supports the NTSC sign	nal format.			
6.	Provide encoder with the following ports:				
	a. Network: 10/100 Mbps RJ-45 or as directed by Department.	b. Video Connector: BNC.			
	c. Serial Data Interface: One (1) minimum RJ-45 port/connector.	 d. Serial port may utilize D-sub connectors or terminal block connections as approved by the Department. 			
7.	In locations where there is more than one video source Department, each video input port shall meet all the v independently.	ce and encoders with multiple video ports are approved by video and data requirements of video encoder Type B			
8.	Provide video encoder with video input performance r including the EIA-170 standard, with a nominal comp shall have an electrical impedance of 75 ohms.	measures that comply with NTSC and EIA requirements, osite video of 1-volt peak-to-peak (Vp-p). The equipment			
9.	Ventilation fans are not permitted.				
10.	Provide video encoders with LED status indicators for interface activity, network interface activity and powe	r local status display of analog video input, serial data r.			

	Requirement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹
11.	Provide cable connections (data/video/power) that require no tools for installation or removal and designed with positive locking devices such that they will not vibrate loose.			
12.	Provide external markings for all connectors and indicators. Replaceable components shall be permanently marked and traceable to the supplied documentation, including schematics and parts list.			
13.	Provide external markings with the product function name, model number, serial number, and manufacturer's name.			
14.	Provide parts made of corrosion-resistant materials, such as stainless steel, anodized aluminum, brass, or gold- plated metal.			
15.	Provide individual video encoders that can be mounted on a field cabinet shelf, 19 in. (483 mm) equipment rack, rack-mounted chassis, or DIN rail. Other mounting options may be submitted for review and approval by the Department. Provide all mounting hardware.			
16.	Provide video encoder that supports nominal power input voltage of 120 VAC, 60 Hz. ±3 Hz.			
17.	 If the device requires operating voltages of less than 120 VAC, the appropriate voltage converter shall be supplied. All voltage conversion devices shall also be temperature hardened as specified herein for location (field or central). 			
18.	Provide equipment or voltage converter that operates within a voltage range of 90 VAC to 135 VAC.			
19.	Provide encoders that support automatic recovery from an over or under voltage condition when prime power has returned to the tolerance values specified herein. All configuration parameters shall be stored in nonvolatile memory and no reprogramming or manual adjustments shall be required upon power recovery.			
20.	Provide video encoder that meets environmental requirements in Section 936.2.01.K.			
21.	21. Provide video encoder that meets video encoding requirements in Section 936.2.01.D			
22.	Provide video encoder that meets communications and network requirements in Section 936.2.01.E.			
23.	Provide video encoder that meets the following serial data interface requirements:			
	a. Provide bi-directional serial communications over Ethernet 10/100 Base-TX via the following methods:			
	i. Encoder serial port to decoder serial port data stream.			

	Requi	Requirement		Comments	Evaluation Method ¹
	b. Provide full-duplex serial interface and data rates up to 115.2 Kbps (minimum) for each port.	c. Provide serial port that is software configurable, locally or over the network, to EIA-232/422/485 mode of operation as defined by the EIA for data format, data rate, and data structure (e.g., baud rate, the number of bits, parity, stop bits, flow control, etc.) via the management software provided.			
	d. No serial adaptors or interface converters are permitted.	 e. Provide video encoders that are capable of using the serial interface port to support PTZ camera control functions. 			
	f. Provide video encoder serial port that provides IP a capability to establish an IP connection directly from a and socket number to transport serial data, independent being viewed.	ddressing and socket number selection and provide the an operator workstation or server to any encoder IP address ent of whether any video stream for that video encoder is			
936.2.05 Type C-Card Video Encoder Requirements					
Α.	Provide Type C-Card encoders that meet Section 936	0.2.03 video encoder requirements.			
В.	Provide Type C-Card encoders that are compatible w Chassis specified in Section 936.2.06.	ith, and of the same make as, the Video Encoder, Type C –			
C.	Provide a high-density encoder unit (card) for multiple for control center use in a slot based chassis.	e video signals, with one encoder per video signal, suitable			
D.	Provide a minimum of four encoders per card with a c	corresponding number of BNC ports per encoder.			
E.	Provide Type C-Card with a minimum of one RJ-45 networks	etwork port: 10/100 Mbps.			
F.	Provide Type C-Card that is fully contained and obtain	n power from the Video Encoder, Type C-Chassis.			
936.2.06 Type C-Chassis Video Encoder Requirements					
A.	Provide Type C-Chassis that is compatible with, and o specified in Section 936.2.05.	of the same make as, the Video Encoder, Type C – Cards			
В.	Provide a high-density rack mount unit that supports r center use.	nultiple Video Encoder Type C cards suitable for control			
C.	Provide support for up to 12 Video Encoder, Type C c	cards.			
D.	Provide a chassis that is seven rack units or less and	19 in. rack mountable.			
E.	Provide chassis that is capable of operating on one in	ternal power supply			

	Requirement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹
F.	Provide chassis that is capable of supporting a minimum of two internal power supplies.			
936	2.07 Camera Lowering Device (CLD)			
Α.	General			
1.	Provide CLD system that includes, but is not limited to, the following components: camera junction connection box, electrical and disconnect unit, self-aligning divided support arm, pole top aluminum housing with access panel mounted to the pole, lowering cable, external conduit mounted to existing camera pole for lowering cable, and mounting attachment hardware.			
2.	Provide CLD system as a retrofit to an existing CCTV camera pole as shown in the Contract.			
3.	Provide CLD system that is capable of lowering the camera to the ground without contacting the pole or anything attached to the pole			
4.	Provide CLD system design that does not cause damage or degradation of camera operations or viewability.			
5.	Provide the capability for connecting and disconnecting video, communications and electrical connections between the field cabinet and the camera assembly installed on the CLD.			
6.	Provide CLD system that provides electrical and signal connections between the fixed and movable CLD components to support Category-6 Ethernet-based PoE camera operations.			
7.	Provide aluminum housing with access panel mounted to existing camera pole to house cable strain relief and provide access to all cables.			
8.	Provide CLD system including lowering tool and all other external components that are corrosion-resistant powder-coated, galvanized materials, stainless steel, or otherwise protected from the environment by industry-accepted coatings that can withstand exposure to a corrosive environment in accordance with NEMA 250 Section 5.10 or MIL-STD-810F for exterior salt atmospheres.			
9.	Provide all mounting hardware, clamps, straps, and parts made out of stainless steel or corrosion-resistant galvanized materials.			
10.	Provide a pulley mechanism for the lowering tool that are sealed with self-lubricating bearings.			
11.	Provide 120 VAC electrical power for the complete CLD assembly per the manufacturer's recommendations.			
12.	Provide CLD that meets the environmental requirements as specified in Section 936.2.01.K.			
13.	All materials, components and mechanisms of the CLD system shall be provided by or in compliance with the CLD system manufacturer's recommendations.			
В.	Lowering Cable			

	Requirement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹
1.	Provide a lowering cable that consists of a minimum 1/8-in. diameter (3.25 mm) marine-grade Type 316 stainless steel aircraft cable with a minimum breaking strength of 1,740 lb. (790 kg) with seven strands of No. 19 AWG wire each.			
2.	Provide lowering cable that is located inside an external CCTV pole-mounted GRS conduit to avoid cable twisting. Only the lowering cable shall be in motion when the CLD is operated. All other cables are to remain separate from the lowering cable and stable and secure during lowering and raising operations.			
3.	Provide lowering cable that is designed so that the lifting cable does not come into contact with the camera cables.			
4.	Provide lowering cable accessories, such as connecting links that have a minimum workload rating that meet or exceed that of the lowering cable.			
5.	Provide weights or counterweights so that the alignment for the camera connection can be raised into position without binding and it can be lowered.			
C.	Disconnect Unit			
1.	Provide a disconnect unit with a minimum load capacity of 200 lb. (90.7 kg) with a 4:1 safety factor.			
2.	Provide locking mechanism between the fixed and movable components of the disconnect unit.			
3.	Provide minimum of two mechanical latches for the movable assembly to remove all weight from the lowering cable when latched.			
4.	Provide the fixed unit with a heavy-duty cast tracking guide and a means for latching in the same position each time.			
5.	Provide capability of securely holding the CLD and the equipment installed on the CLD.			
6.	Provide weathertight suspension contact unit with a gasket to seal the interior from dust and moisture without the use of pressurization.			
7.	Provide connectors that are resistant to UV light degradation.			
8.	Provide disconnect unit that will not twist under high wind conditions.			
9.	Provide male and female matched parts that mate together to make a weathertight, non-corrosive electrical connection between the cable and the camera housing when the camera is fully raised and locked.			
10.	Provide cable and wire leads from both the male and female contacts that are permanently fastened into a weathertight, non-corrosive body.			
11.	Provide disconnect unit that is designed to keep contacts protected or provide a method to displace surface contaminants.			

	Requir	rement	Item Comply? (Yes/No)	Comments	Evaluation Method ¹
D.	Divided Support Arm				
1.	Provide a divided arm that separates control and elec	trical / signal wires.			
2.	Provide divided support arm and receiver brackets the installation.	at are designed to self-align the contact unit during			
E.	Lowering Tool				
1.	Provide CLD with a permanent mount lowering tool wi enclosure as recommended by the manufacturer mee	ith winch in a pole-mounted heavy-duty aluminum ting the material requirements in Section 939.			
	a. Enclosure sized to house lowering tool and winch.	 b. Enclosure to hinge down to allow cabinet to be mounted to the right or left of pole 			
	c. Operates 90 degrees from camera mounting arm.	d. Provide key lock as approved by the Department.			
2.	 Provide an adapter to allow the lowering tool to operate the lowering device by a portable drill using a clutch mechanism. 				
3.	Provide winch with a minimum 3:1 gear reduction to reduce the effort required to raise and lower the camera assembly				
4.	Equip lowering tool with a positive locking or breaking lowering operations and to prevent freewheeling or free	mechanism to secure the cable reel during the raising and befall.			
F.	Drill Motor with Clutch				
1.	Provide an industrial-grade portable drill with clutch us	sing an adjustable safety clutch mechanism.			
2.	Provide a drill that is heavy-duty, reversible variable s	peeds with "D" handle.			
3.	Equip drill with a 0.5 in. (12.7 mm) key chuck size with	h key.			
4.	Provide drill with a minimum of 0.5 horsepower (0.49	metric horsepower).			

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