Installation Manual
6/26/2025

Quarterhill

iTHEIA™ Permanent Installation

DWG No.: **3902-00213-00102**



Rev #: B

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1 ABOUT THIS MANUAL

1.1 QUARTERHILL

Quarterhill Inc., a leading provider of tolling and enforcement solutions in the Intelligent Transportation System (ITS) industry, has vested the operational responsibilities of its safety and enforcement division to its subsidiary, International Road Dynamics Inc. (IRD). Quarterhill's safety and enforcement division is legally operated by IRD. This legal designation ensures that the safety and enforcement division's activities are executed in accordance with prescribed legal and regulatory frameworks within Quarterhill's organizational structure. For the purpose of this manual, "Quarterhill" refers to both entities.

1.2 PURPOSE

Quarterhill's Artificial Intelligence (AI) Traffic Data System uses video and machine learning to collect data for vehicle traffic counting and classification. This system utilizes high performance AI hardware to perform the vehicle counting and classification without uploading video for third-party processing.

The Permanent version of the iTHEIA™ system is intended for long term installation, providing rugged, high-performance components that will operate in a wide range of environments. This manual contains instructions on the assembly, installation and maintenance of the permanent iTHEIA™ system, as well as troubleshooting advice and hardware specifications.

1.3 RELATED DOCUMENTS

Technical Data Sheet – Permanent Installation	*3902-00213-00104*
Operator's Manual	*3902-00213-00108*
Installation – Cable Pole Entry	*81303501*
Assembly – Network Cable	*81303502*

The most up-to-date documents are available at the following links:

https://pages.quarterhill.com/itheia-permanent

1.4 POINTS OF CONTACT

Please contact Quarterhill for any support or assistance needed.

Customer Service Hotline: (306) 653-6626
Toll Free: 1(877) 444-4473
E-mail: support@quarterhill.com

1.5 DOCUMENT OVERVIEW

Specific conventions and abbreviations are used throughout this document. Terms and general definitions are provided for quick reference.

1.5.1 Document Conventions



Indicates a potentially concerning situation that, if not avoided, may result in minor to moderate loss of data or software functionality.



Indicates *Important* information about equipment or procedures that can impact future decisions and/or actions.



Indicates a *best practice* procedure.

1.5.2 Acronyms

Quarterhill List of Abbreviations

Abbrev.	Refers To
AC	Alternating Current
AWG	American Wire Gauge
DC	Direct Current
IP	Internet Protocol
NEMA	National Electrical Manufacturers Association
UI	User Interface
URL	Uniform Resource Locator or web address.

2 HARDWARE AND SYSTEM OVERVIEW

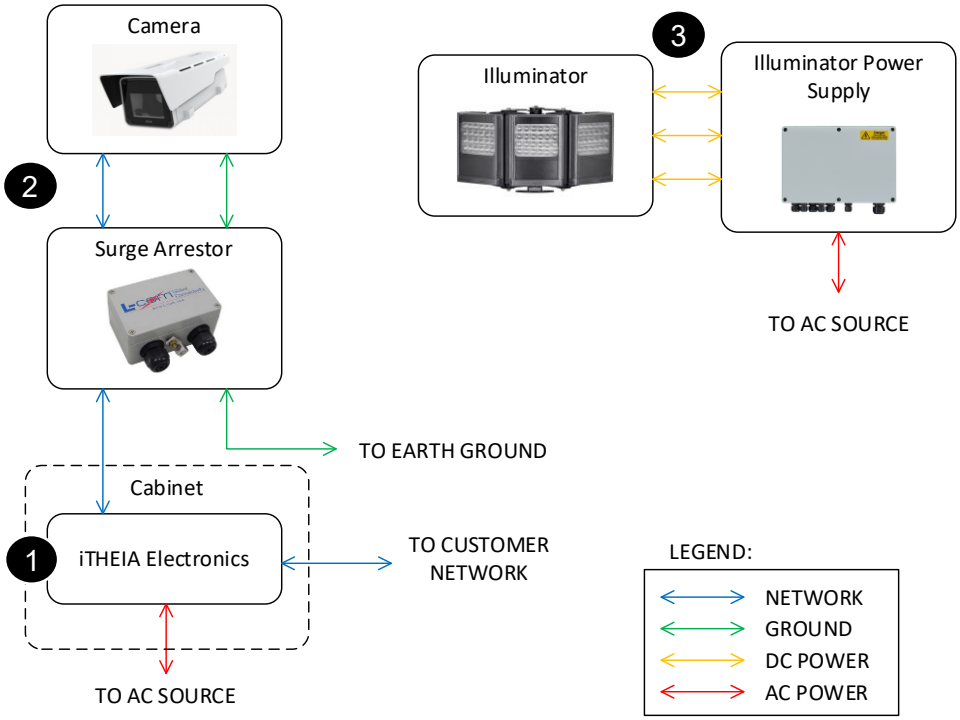


Figure 2-1 iTHEIA Permanent System Components

The iTHEIA Permanent system consists of three (3) main systems.

❶ iTHEIA Electronics

❷ Camera(s) and Surge Arrestor

❸ Illuminator(s) and Power Supply

2.1 COMPONENT LIST

Quarterhill PART NUMBER	DESCRIPTION
1002-00232-000	iTHEIA Permanent Electronics in Pole Mount Enclosure
or 2000-00907-006	iTHEIA Permanent Electronics Panel 14.2"x14.2" for mounting in separate or existing cabinet
2000-00359-002	iTHEIA Camera and Mounting Arm
2001-00166-000	Camera Pole Mount Bracket
3400-00068-001	Camera Surge Arrestor
3404-00152-004	Illuminator
3401-00291-001	Illuminator Power Supply
3404-00110-008	Illuminator Power Supply Mounting Plate
3404-00153-001 x 2	Illuminator and Power Supply Pole Mount Brackets
3205-00233-001	300ft Outdoor Network Cable
MISC.	Miscellaneous Connectors and Cabling

3 TOOLS AND EQUIPMENT

The installer must bring the following tools, equipment and materials to site to install the iTHEIA:

Required

- Traffic Safety Devices and Personal Protective Equipment appropriate for the jurisdiction and site conditions
- A lift or equivalent for accessing recommended equipment mounting height
- Laptop and Ethernet cable to access the iTHEIA User Interface and configure the system
- Cleaning cloth and lens cleaner
- Banding tool (BAND-IT® C00169, or similar)
- ¾” stainless steel banding
- Wire crimpers for fully insulated lugs 22-10 AWG (PA-1305 Paladin wire crimper or similar)
- RJ45 connector crimp tool (Ideal® FT-45™, or similar)
- Cordless drill/driver with 5/16 nut driver for gear clamps
- Any tools required for AC wiring and installation
- All conduits, fittings, and cable management
- All necessary equipment for pole, cabinet, or foundation installations

Optional

- Ethernet cable tester (recommended)
- Gear band clamp (hose clamp) larger than pole (recommended)
- Torx® T20 screwdriver or bit (included with camera)
- Torx® T25 screwdriver or bit (included with camera)
- Allen® 9/64” narrow-shank key with minimum length 2” (included with camera)
- Allen® 3/16” key (included with camera)
- ½” stainless steel banding (for illuminator mounting)

4 SITE SELECTION AND INSTALLATION

Refer to the iTHEIA PERMANENT INSTALLATION TECHNICAL DATA SHEET 3902-00213-00104 for more site selection considerations.

4.1 SITE SELECTION

To optimize the accuracy of classification we recommend that the iTHEIA Permanent system camera be installed a minimum of 30 ft (9 m) from the edge of the closest lane. This distance provides the best balance of field-of-view and image quality for most vehicles. A larger offset distance may be required for longer vehicles such as multi-trailer trucks.

For systems where detection of longer vehicles such as trucks with double or triple trailers is required, the camera should be installed further from the roadway. As an approximation, the camera can see a vehicle 3x as long as the distance from the lane. For example, a camera installed 45 ft from the roadside can see a 120 ft (36.5 m) long vehicle.

The camera mounting height is dependent on the pole offset distance. Refer to the iTHEIA PERMANENT INSTALLATION TECHNICAL DATA SHEET 3902-00213-00104 and the POLE MOUNT DETAIL - PERMANENT INSTALLATION IN APPENDIX B for more details.

The maximum recommended operating distance of the iTHEIA Permanent system is 150 ft (46 m). Beyond this distance, reduction of image quality may result in degraded classification and the shallow viewing angle will hinder lane discrimination, leaving the system susceptible to occlusion.

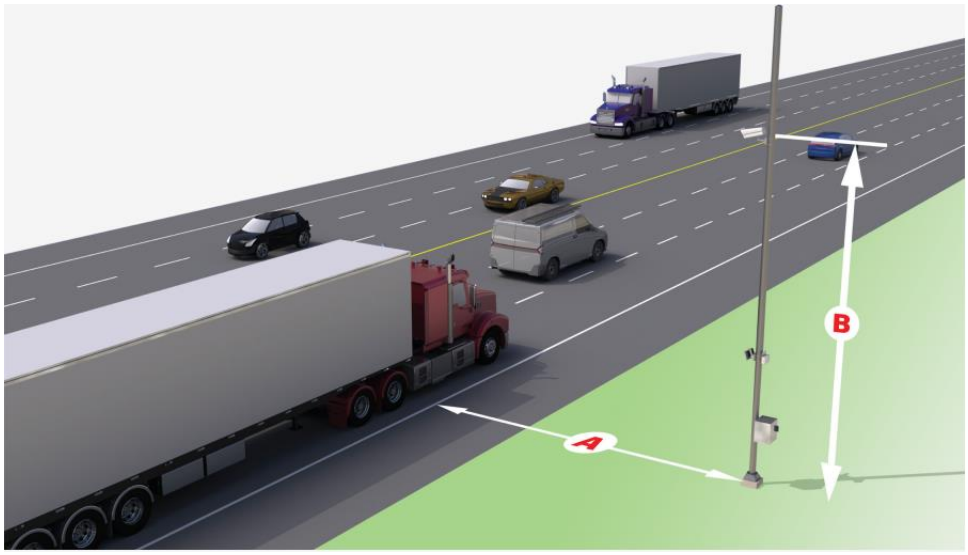


Figure 4-1 Pole Offset Distance

A) Pole Offset Distance (from painted edge of road)	B) Camera Mounting Height
30 ft (9 m) to 150 ft (46 m)	Recommend 25ft (8m) to 35ft (11m) depending on A) pole offset.

The system should be installed where the camera has an unobstructed field of view of at least 90 ft (27.4 m) of all lanes.

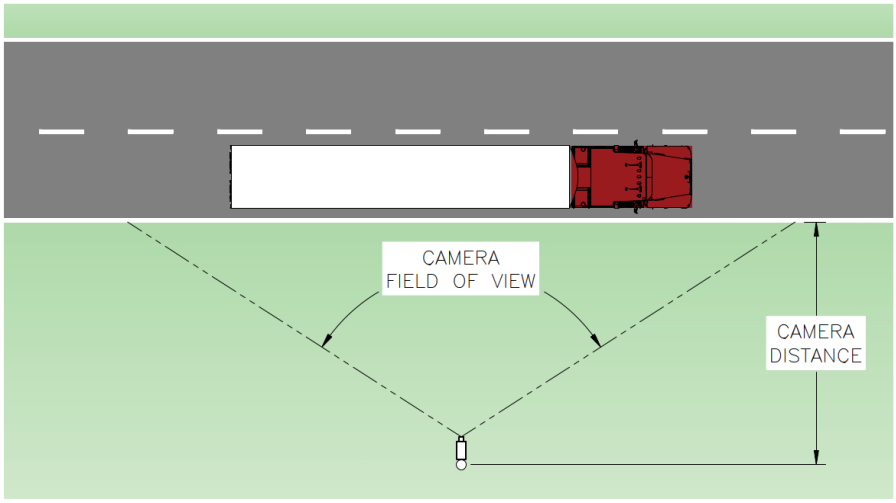


Figure 4-2 Camera Field of View

Refer to the POLE MOUNT DETAIL - PERMANENT INSTALLATION 3902-00213-00106 drawing for more installation considerations and details.

The camera needs a clear view of the whole side of vehicles including long trucks travelling horizontally in the camera view, so areas with obstructions such as trees, shrubs, barriers, signs, overhead lines or poles should be avoided if possible.

Selecting a pole location with street lighting beside or behind the camera is recommended as this increases performance of the system at night by augmenting the supplied illuminator.

Caution: Ensure there are no overhead power lines when choosing a site for safety reasons. Look up when working at heights to ensure there is no dangerous contact with power lines.

The following conditions should be avoided as performance may be reduced or impacted by these items:

- Camera views with bright light sources such as the sun, headlights, building lights, or parking lot lighting in the background.
- Backgrounds with reflective surfaces such as lakes, rivers, or glass/shiny buildings.
- Areas with adverse weather conditions like nearby water bodies where fog may develop or hills where it may be very windy.
- Active backgrounds with moving objects – especially vehicles or equipment.
- Dusty areas like bare dirt fields or construction sites.

4.2 DESIRED CAMERA VIEW

To optimize system performance, striving to achieve a good camera view is best practice.

Table 4.1 Achieving the Best Camera View

	**Correct View** ▪ Vehicles are perpendicular to the camera view. ▪ All lanes are visible. ▪ Lane lines are horizontal.
	**Poor View** ▪ Vehicles are too high in the frame. ▪ Adjust the camera angle up.
	**Poor View** ▪ Road is too sloped. ▪ Pan to the right by rotating the camera pole.
	**Poor View** ▪ Road is too sloped. ▪ Pan to the left by rotating camera pole.

	**Poor View** ▪ Too much sky is in the frame; the sun may blind the camera if facing east, west or south. ▪ Road and vehicles are too low in the frame. ▪ Adjust camera angle down.

4.3 POWER

The site should have reliable AC power that can be accessed and connected to the iTHEIA electronics and the illuminator.

Refer to the 3902-00213-00107 – 120VAC CABINET POWER DETAIL - PERMANENT INSTALLATION drawing for more power requirements and details. The drawing is included with product shipment and is available in APPENDIX C.

5 ON-SITE INSTALLATION

The installation instructions below will highlight installing the following equipment:

- iTHEIA electronics
- Camera
- Illuminator and power supply

The instructions do not include installation of the AC service, which should follow applicable electrical codes. They also do not include installation of the foundation and pole, which should follow applicable road construction codes.

Refer to the 3902-00213-00105 – SITE TERMINATION - PERMANENT INSTALLATION drawing included with the product shipment; it is also available in APPENDIX A.
Refer to the 3902-00213-00106 – POLE MOUNT DETAIL - PERMANENT INSTALLATION drawing included with the product shipment; it is also available in APPENDIX B.

5.1 ELECTRONICS INSTALLATION



Figure 5-1 Electronics Installation

5.1.1 Mount Electronics Enclosure/Panel

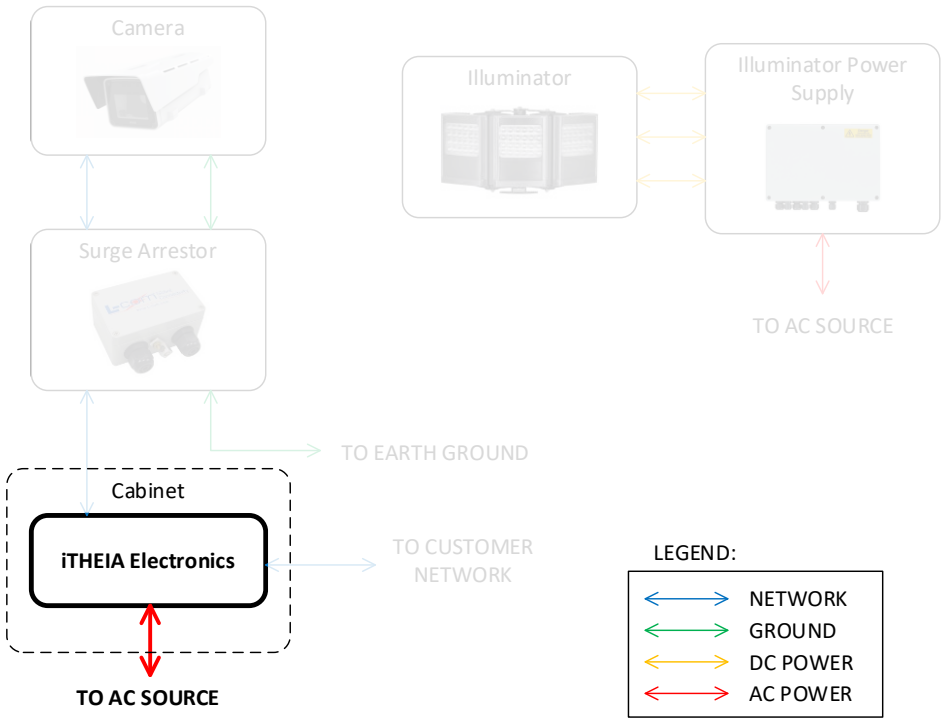


Figure 5-2 iTHEIA Electronics

This section provides instructions on how to mount the electronics enclosure/panel.

For systems with a Quarterhill provided iTHEIA enclosure:

- Mount the enclosure to the camera pole at a serviceable height. The Quarterhill iTHEIA enclosure comes with channels on the back of the enclosure for mounting to a pole (banding not included). Feed ¾" banding through the slots in the channels and around the pole to secure the enclosure to the pole.

For systems with an iTHEIA panel:

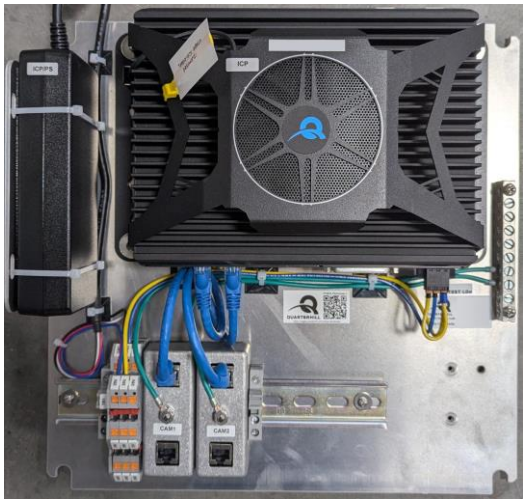


Figure 5-3 iTHEIA Electronics Panel

- Mount the panel to the inside of the available enclosure, as needed.

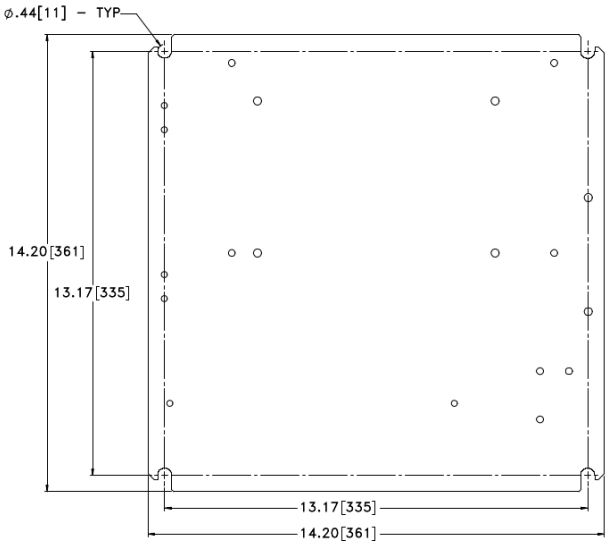


Figure 5-4 iTHEIA Panel Mounting Dimensions

5.2 CAMERA INSTALLATION



Figure 5-5 Camera Installation

It is recommended to pre-assemble as much of the camera and bracket assembly as possible on the ground. The entire camera, arm, surge arrestor and bracket can be assembled on the ground. All wiring from the camera to the surge arrestor may also be done.

The upper end of the Ethernet cable from the cabinet to the camera may also be attached if you can approximate the right cable length and hide the excess in the pole base.

5.2.1 Preparing the Camera and Mounting Arm

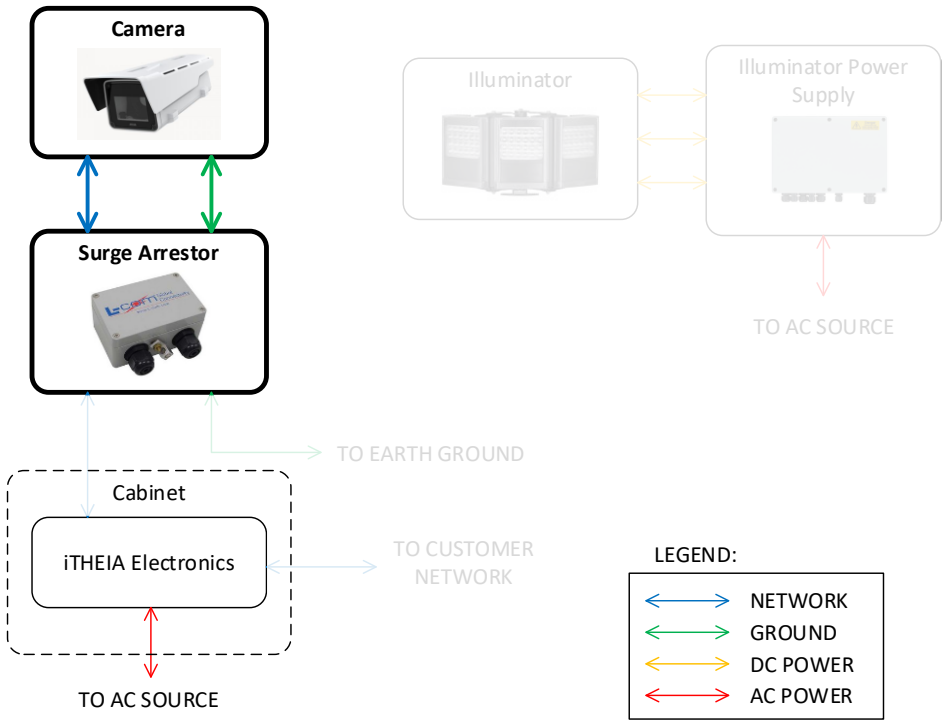


Figure 5-6 Preparing the Camera and Mounting Arm

Follow the Axis installation documentation included with the camera and mount arm. The highlights of that procedure, along with additional instructions, are shown below.

To prepare the camera and mounting arm:

1. Prepare the network and ground cable between the camera and surge arrestor.

Put an RJ45 connector on the Ethernet cable's camera end. Quarterhill recommends soldering the Ethernet drain wire to the connector shield to ensure long-term connection without corrosion. Crimp lug on the ground wire.

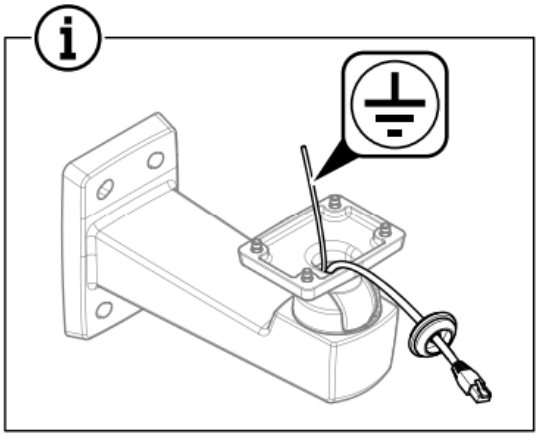


Figure 5-7 Camera Arm Cable Routing

2. Connect the provided green 10 AWG ground wire (3205-00470-001 and ground lug 460021) to the marked stud on the camera base and push the provided

network cable (3205-00233-001) through the cable gasket by placing the red connector guard over the end of the cable first to prevent tearing of the gasket.

Use a sufficient length of network and ground cable to get from the camera, through the arm, and into the bottom of the surge arrestor while leaving a drip loop. Route the network cable and ground cable through the arm before attaching connectors.

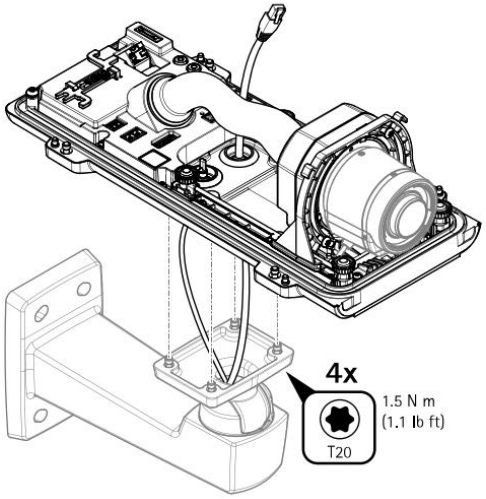


Figure 5-8 Camera Cable Connections

3. Pull the network cable back slightly so that the cable gasket adjusts itself on the cable.

Not pulling the cable back could cause water to seep in and damage the product. The rubber lip should be pointing to the outside of the camera (down in the final installation).

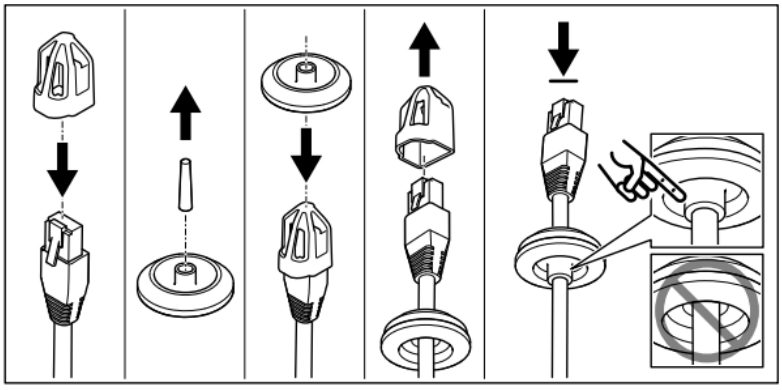


Figure 5-9 Camera Network Cable Gasket

4. Connect the network cable to the ethernet connector.

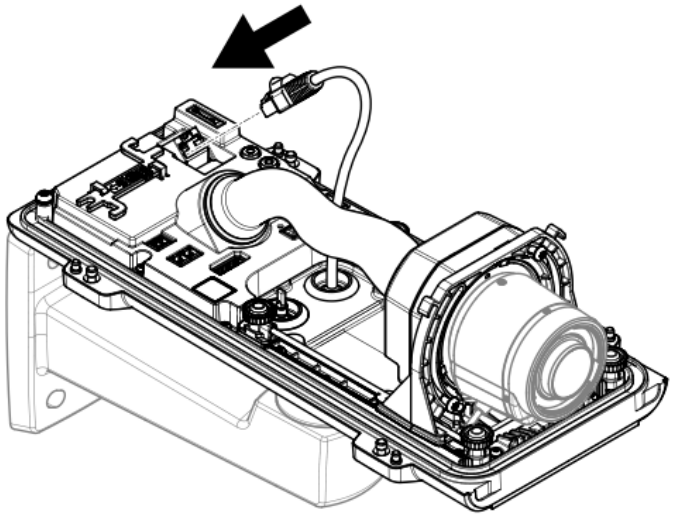


Figure 5-10 Camera Network Port

5. Fasten the bottom cover to the mount adapter.
6. Adjust the weather shield on the top of the camera as far forward as possible to give maximum protection and secure the top half of the camera to the bottom (torque 2 Nm).

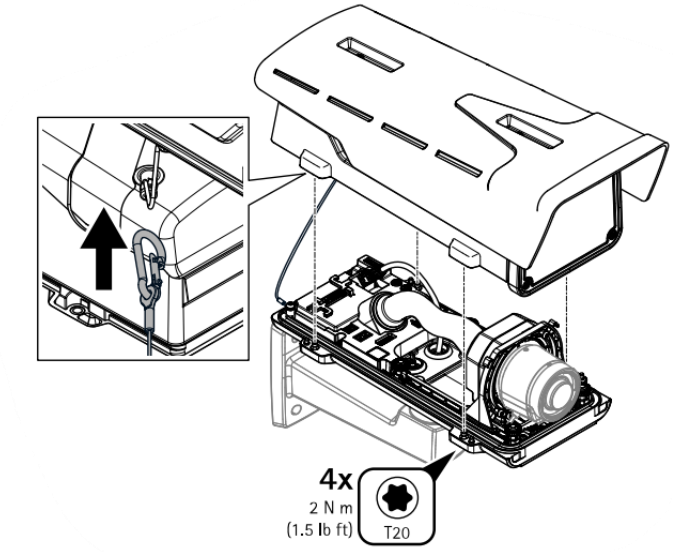


Figure 5-11 Closing Camera

7. Adjust the camera's vertical and horizontal position to be approximately correct and then partially lock it by tightening the screw (torque 5-6 Nm). Note that final aiming will require the complete system to be operating; this screw will be completely tightened then.

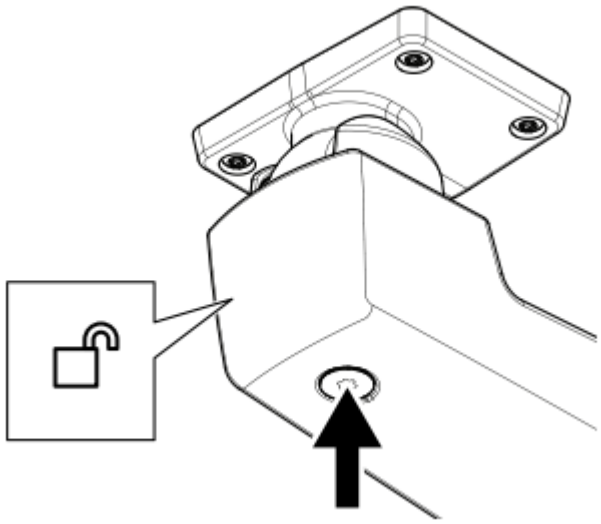


Figure 5-12 Camera Mount Adjustment

5.2.2 Assemble Mounting Bracket

To assemble the mounting bracket:

1. Follow the assembly diagram included with the mounting bracket kit (2001-00166-000) to mount the surge arrestor and camera/arm assembly using the provided hardware.

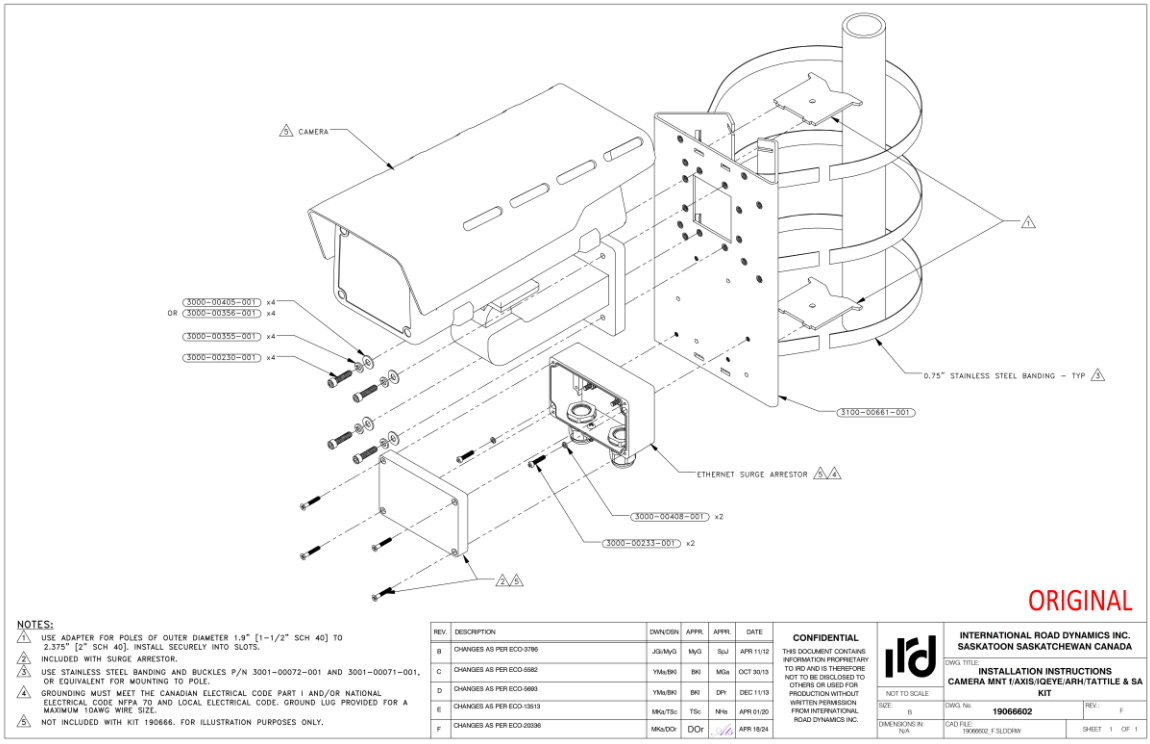


Figure 5-13 Assembling Mounting Bracket

2. Route the camera cables previously connected to the camera around the bottom of the bracket and into the surge arrestor. Remember to leave a drip loop. Attach connectors and terminate the cables to the surge suppressor.

The surge arrestor will later accept an additional 10 AWG ground wire (3205-00470-001) from the pole base

5.2.3 Mount Bracket to Pole

To mount the bracket to the pole:

1. Band the bracket assembly to the pole as shown in the installation document included with the bracket (shown above).
2. Install the camera at the correct height and with the arm pointing towards the road, pointing with or against the traffic. This allows a slight camera roll adjustment if required.

You might find it convenient to have one large hose clamp to assist with the aiming and banding operation. Get the one hose clamp snug holding the bracket to the pole. Then adjust the bracket as necessary for height and orientation. Finally use the ¾" stainless banding to firmly complete the mounting. Then remove the hose clamp.

5.2.4 Install Network Cable and Ground Cable from Camera to Base

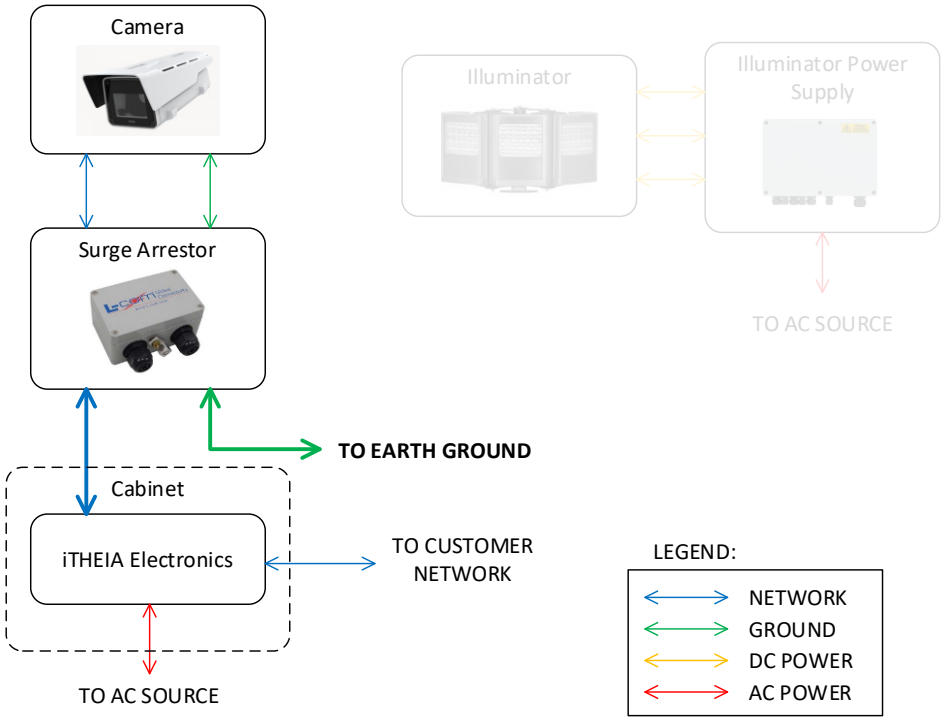


Figure 5-14 Installing Network Cable and Ground Cable from Camera to Base

To install the network cable and ground cable from camera to base:

1. Install a 10 AWG ground wire (3205-00470-001) from the surge arrestor to earth ground connection.

2. Install a network cable (3205-00233-001) from the surge arrestor to the iTHEIA electronics.
3. Connect the camera network cable to one of the network ports labelled ‘CAM’ on the iTHEIA electronics panel.



Figure 5-15 Network Ports

5.3 ILLUMINATOR INSTALLATION



Figure 5-16 Illuminator

5.3.1 Mount Illuminator Power Supply

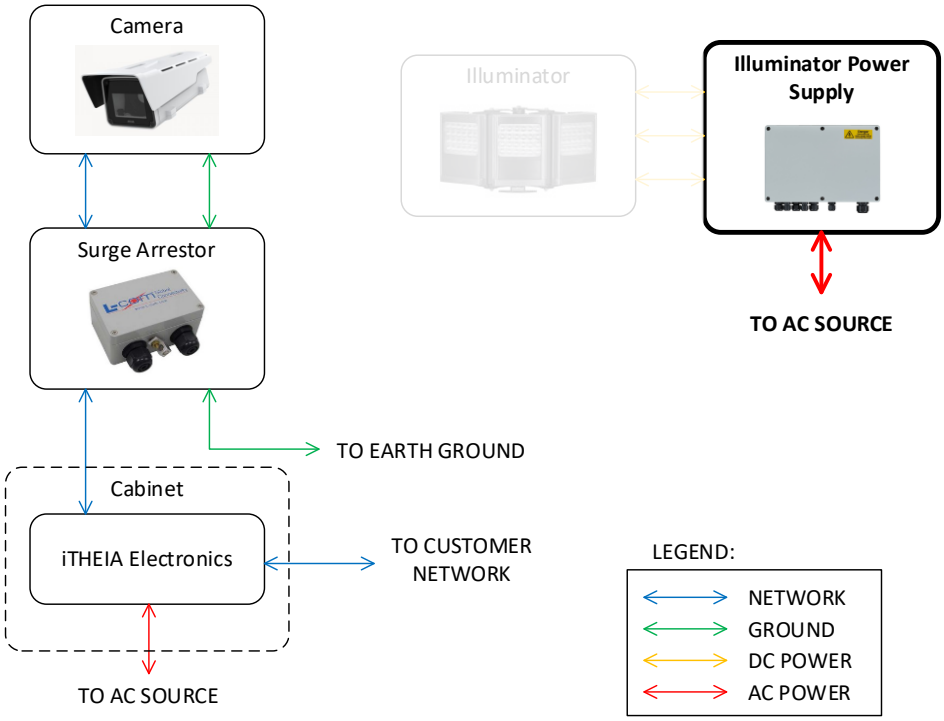


Figure 5-17 Mounting Illuminator Power Supply

To mount the Illuminator power supply:

1. Follow the instructions for mounting the illuminator power supply included with the illuminator supplies. Use the included brackets and hardware.
2. Secure the pole mount bracket to the mounting plate first, then secure the power supply to the mounting plate.

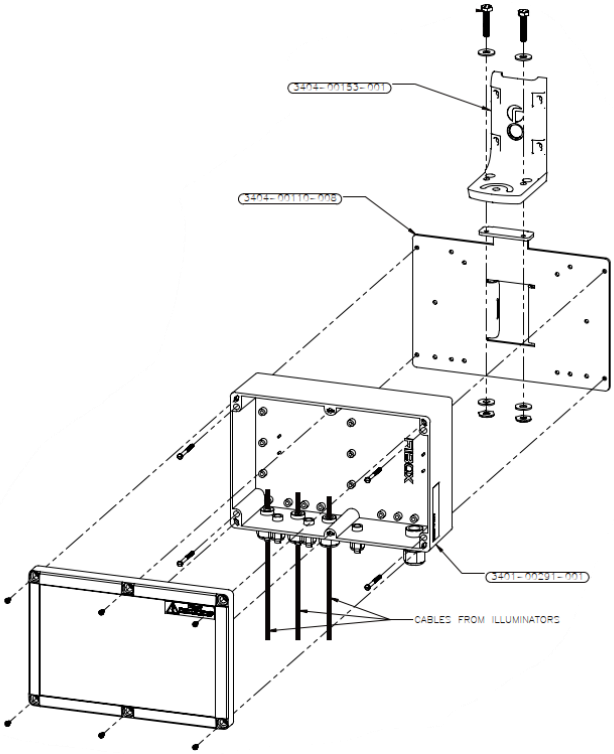


Figure 5-18 Mounting Illuminator Power Supply

3. Band the assembly to the pole with ½" steel banding.

5.3.2 Mount Illuminator

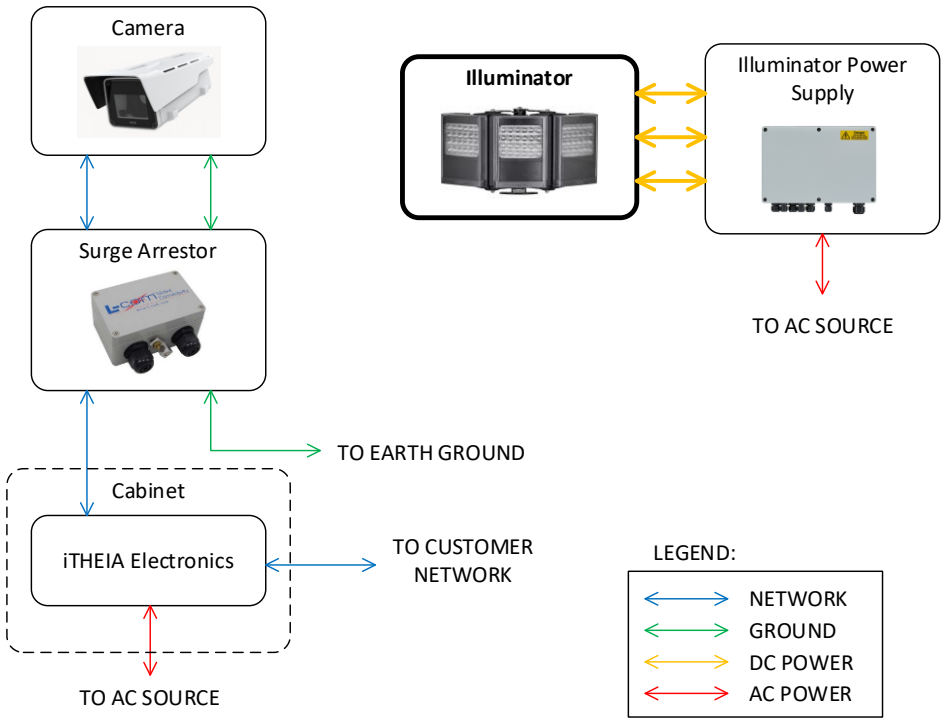


Figure 5-19 Mounting Illuminator

Follow the instructions for mounting the illuminator included with the illuminator pole mount bracket.



Figure 5-20 Illuminator

1. Secure the illuminator assembly (3404-00152-004) to the pole mount bracket (3404-00158-001) using the provided screws.
2. Fan out the illuminator panels slightly to illuminate the lanes of interest for the iTHEIA system.
3. Select and install the appropriate diffuser in each illuminator according to the site geometry. Refer to the POLE MOUNT DETAIL - PERMANENT INSTALLATION 3902-00213-00106 drawing for more details.

The factory default diffuser in the illuminator is 35 x 10°, and 60 x25° diffusers are included in the box.



4. Secure the pole mount bracket and illuminator to the pole using the included steel straps.

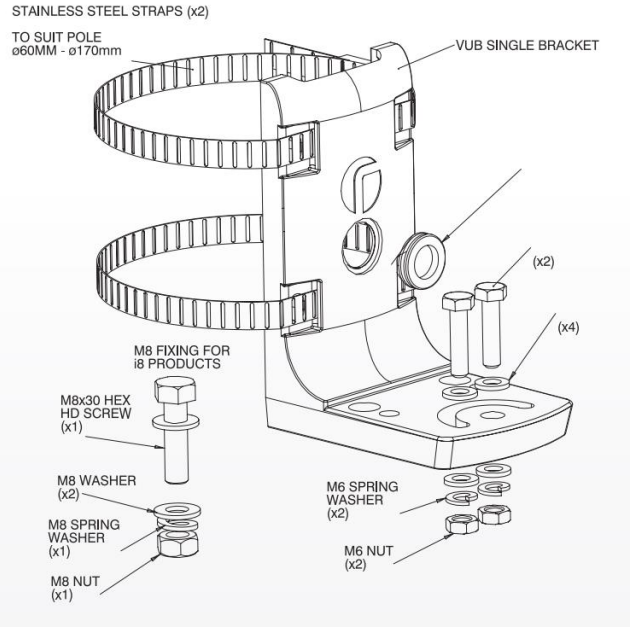


Figure 5-21 Mount Bracket and Stainless Steel Straps

5.3.3 Wire Illuminator

To wire the illuminator:

1. Wire the illumination panels to the illuminator power supply. Connect one RED wire to a positive power terminal and one BLACK wire to a negative terminal on the DC outputs (labelled Output 1, Output 2, Output 3) for each of the illuminator panels. Follow the drawing *3902-00213-00105 – Site Termination - Permanent Installation* in APPENDIX A.

   If cutting the cable to length, re-splice the purple and orange wires together. The purple and orange wires must stay connected for the illuminator to function.

2. Connect the AC input power into the live (L), ground (G), and neutral (N) terminals of the unit. Follow all applicable electrical codes and standards.

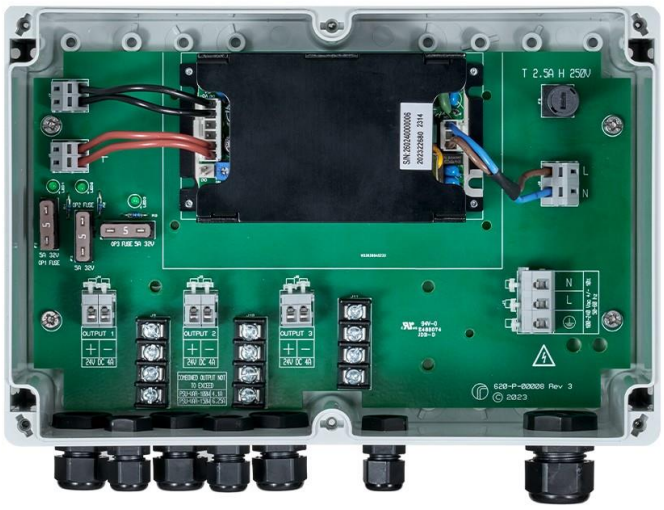


Figure 5-22 Connecting Power

5.3.4 Aim Illuminator

1. Aim the illuminator panels towards the lanes of interest. Measure a tilt angle to roughly match that of the camera.

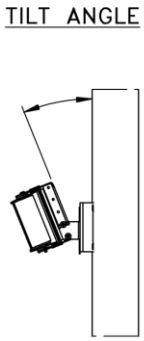


Figure 5-23 Illuminator Tilt Angle

2. Spread the illuminators as needed. The goal is for the panels to illuminate the entire field of view of the camera.

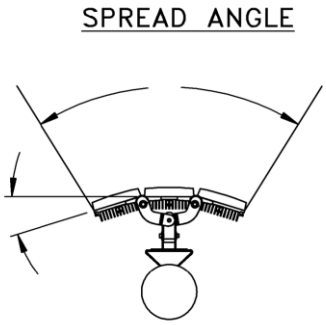


Figure 5-24 Illuminator Spread Angle

3. For systems with two cameras, aim the illuminators separately for each camera.

5.4 FINAL CONNECTIONS AND ACCESS

5.4.1 Connect the Camera to the Electronics

To connect the camera to the electronics:

1. Ensure that the camera network cable is connected to one of the network ports labelled “CAM.”



Figure 5-25 Network Ports

5.4.2 Powering up the iTHEIA Electronics

Power up the iTHEIA electronics by following the steps below:

1. Plug the AC power cable from the iTHEIA electronics into an AC outlet.
2. The high-performance edge AI hardware will turn on within 10-20 seconds as indicated by the three indicator lights on the bottom lighting up.

5.4.3 Connecting an Interface Device to the iTHEIA

To connect an interface device to the iTHEIA:

1. Use a web browser to navigate to the iTHEIA URL (using the instructions below) and then log in with valid credentials.

Connecting to the Quarterhill iTHEIA web user interface requires:

- The iTHEIA URL:

  When connecting locally, use port 4 and the URL will be:

  - https://itheia.quarterhill.local/

  When connecting remotely, the URL will appear as:

  - https://<modem-ip> (if using IP assigned to modem)
- A valid username (account) and password (*as assigned by administrator*)

See *3902-00213-00108 – Operator's Manual* for more detail on connecting to and configuring the iTHEIA Web UI.

5.5 ADJUSTING CAMERA ORIENTATION

Once the camera is installed and you have access to the iTHEIA web user interface, the camera angle may need to be physically adjusted for proper lane alignment.

This is an iterative process which may require adjusting a few times.

Please observe the following rules when determining and adjusting camera alignment:

- The vehicles of interest should be centred vertically in the image frame. This is not the same as the lanes of interest. Make sure to leave enough room at the top of the frame to capture the full height of tall vehicles in the farthest lane of interest.
- The edge line of the nearest lane must be visible for the full length of the longest vehicle. The camera zoom needs to be set so that a minimum of 90’ can be seen in the closest lane. It may be convenient to place a small bright mark or cone on the shoulder 45’ upstream and 45’ downstream from the camera to give guidance during zooming.
- The lanes of interest should run perpendicular to the camera view (horizontal in the image frame). If the lane alignment is off, this can affect performance of the system.

- Try to eliminate or reduce the amount sky in images to prevent sun glare from reducing performance at certain times or seasons depending on the compass direction of the camera.

5.6 SECURING THE SYSTEM

1. Before leaving the site, lock all enclosures and ensure the system is secure.

6 MAINTENANCE

6.1 CLEANING THE CAMERA LENS

The iTHEIA camera lens may become dirty over time. Inspect the camera and, if necessary, gently clean the lens with a damp microfiber cloth. It is recommended to clean the lens annually, or more often as needed if performance degrades.

The illuminator may need cleaning as well to ensure the output is not reduced.

6.2 VISUAL CHECKS

Routine visual checks should be performed to ensure that no system components have become damaged or need maintenance.

- Visual check inside of the enclosure to ensure there are no signs of moisture ingress, corrosion, or loosening.
- Visual check of overall system for signs of cracks or other damage.

6.3 SOFTWARE UPDATES

iTHEIA software updates will be available when enrolled in one of the optional maintenance programs.

7 TROUBLESHOOTING

7.1 ITHEIA™ APPLICATION ISSUES

Issue	Action
Trouble Accessing the Login Page	▪ Check physical network connection between system and laptop. ▪ Ensure laptop network port is set up correctly. ▪ Check that the network port on the AI hardware that is connected to the laptop has a flashing or solid amber light. ▪ Try an alternate web browser. ▪ Try restarting the AI hardware unit. ▪ If the problem persists, please contact your administrator.
Live View not Working	▪ Disconnect and reconnect the camera. ▪ Check that the camera has power. A power light should be visible within the camera enclosure for a few moments while the camera is powering up. ▪ Check that the network port on the AI hardware that is connected to the camera has flashing or solid amber light.
Camera Video Quality Issues (Stutter, artifacts, broken images, or intermittent connection lost)	▪ If viewing remotely, the video feed will be limited by the available bandwidth of the connection. ▪ If image is blurry or dirty, clean the camera lens. Unplug and plug the camera back in. The camera may correct its focus on reboot.

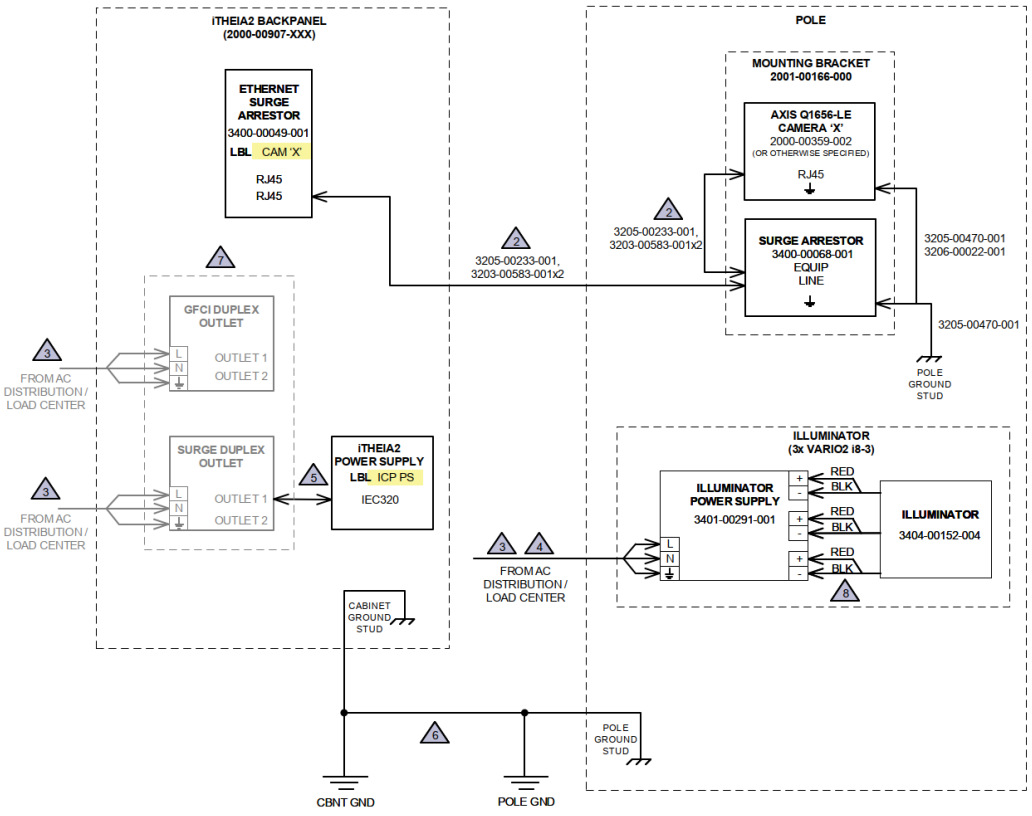
7.2 QUARTERHILL SUPPORT

REQUESTING SUPPORT

Quarterhill Phone:	**1-877-444-4473** **(1-877-444-4IRD)**
E-mail:	**support@quarterhill.com**

8 APPENDICES

Appendix A SITE TERMINATION – PERMANENT INSTALLATION



Notes

1. MAIN POWER CONNECTION, CABLE ENTRIES TO CABINET AND POLE AND ALL RELATED HARDWARE TO BE PROVIDED AND INSTALLED ACCORDING TO LOCAL ELECTRICAL CODES BY QUALIFIED ELECTRICIAN.
2. REFERENCE DRAWING 81303502 FOR CAT5e TERMINATION DETAIL.
3. REFERENCE DRAWING 3902-00213-00107 FOR CIRCUIT PROTECTION AND LOAD CENTER WIRING DETAILS.
4. POWER CABLE TO ILLUMINATOR TO BE PROVIDED AND INSTALLED ACCORDING TO LOCAL ELECTRICAL CODES BY QUALIFIED ELECTRICIAN.
   AC CABLE OUTER DIAMETER: 0.24"-0.47" [6MM -12MM] FOR INCLUDED M20 CABLE GLAND.
   MAX CONDUCTOR SIZE: 14AWG/2.5MM^2
5. CONNECT INCLUDED AC POWER CABLE TO AN OUTLET.
6. EQUIPMENT SHOULD BE CONNECTED TO EARTH GROUND IN COMPLIANCE WITH NATIONAL ELECTRICAL CODE AND LOCAL STANDARDS.
7. OUTLETS ONLY INCLUDED WITH QUARTERHILL JBOX FORMAT.
8. CUT CABLE TO LENGTH, AS DESIRED. RE-SPLICE THE PURPLE AND ORANGE WIRES TOGETHER IF THEY ARE CUT. THE ILLUMINATOR WILL ONLY WORK IF THE PURPLE AND ORANGE WIRES ARE CONNECTED.

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C	CHANGES AS PER ECO-21013	MAY 20/25

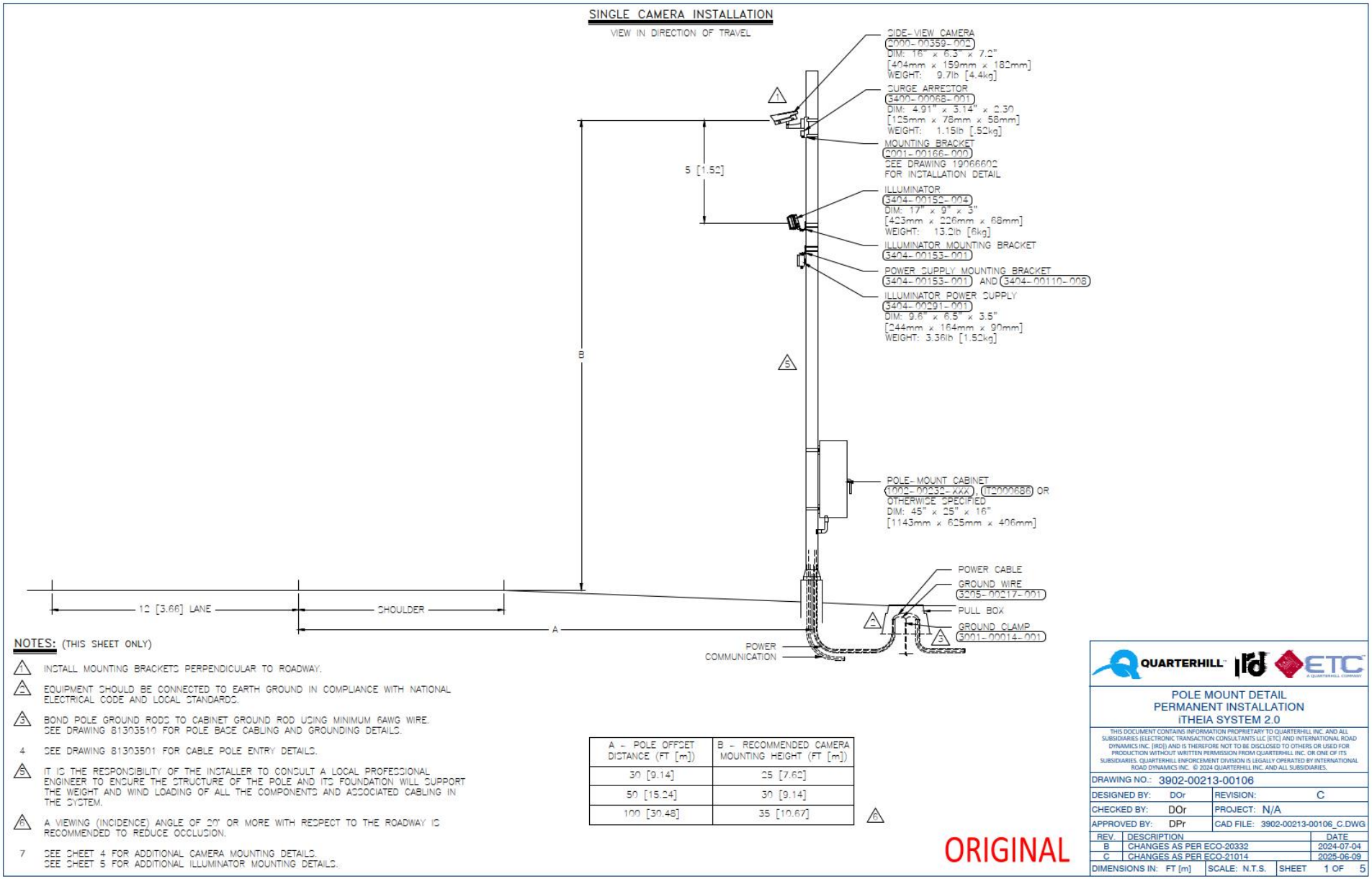
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SITE TERMINATION - PERMANENT INSTALLATION
iTHEIA 2.0 SYSTEM

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Appendix B POLE MOUNT DETAIL - PERMANENT INSTALLATION



NOTES: (THIS SHEET ONLY)

1. INSTALL MOUNTING BRACKETS PERPENDICULAR TO ROADWAY.
2. EQUIPMENT SHOULD BE CONNECTED TO EARTH GROUND IN COMPLIANCE WITH NATIONAL ELECTRICAL CODE AND LOCAL STANDARDS.
3. BOND POLE GROUND RODS TO CABINET GROUND ROD USING MINIMUM 6AWG WIRE. SEE DRAWING 81303510 FOR POLE BASE CABLING AND GROUNDING DETAILS.
4. SEE DRAWING 81303501 FOR CABLE POLE ENTRY DETAILS.
5. IT IS THE RESPONSIBILITY OF THE INSTALLER TO CONSULT A LOCAL PROFESSIONAL ENGINEER TO ENSURE THE STRUCTURE OF THE POLE AND ITS FOUNDATION WILL SUPPORT THE WEIGHT AND WIND LOADING OF ALL THE COMPONENTS AND ASSOCIATED CABLING IN THE SYSTEM.
6. A VIEWING (INCIDENCE) ANGLE OF 20° OR MORE WITH RESPECT TO THE ROADWAY IS RECOMMENDED TO REDUCE OCCLUSION.
7. SEE SHEET 4 FOR ADDITIONAL CAMERA MOUNTING DETAILS.
   SEE SHEET 5 FOR ADDITIONAL ILLUMINATOR MOUNTING DETAILS.

A – POLE OFFSET DISTANCE (FT [m])	B – RECOMMENDED CAMERA MOUNTING HEIGHT (FT [m])
30 [9.14]	25 [7.62]
50 [15.24]	30 [9.14]
100 [30.48]	35 [10.67]

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POLE MOUNT DETAIL
PERMANENT INSTALLATION
iTHEIA SYSTEM 2.0

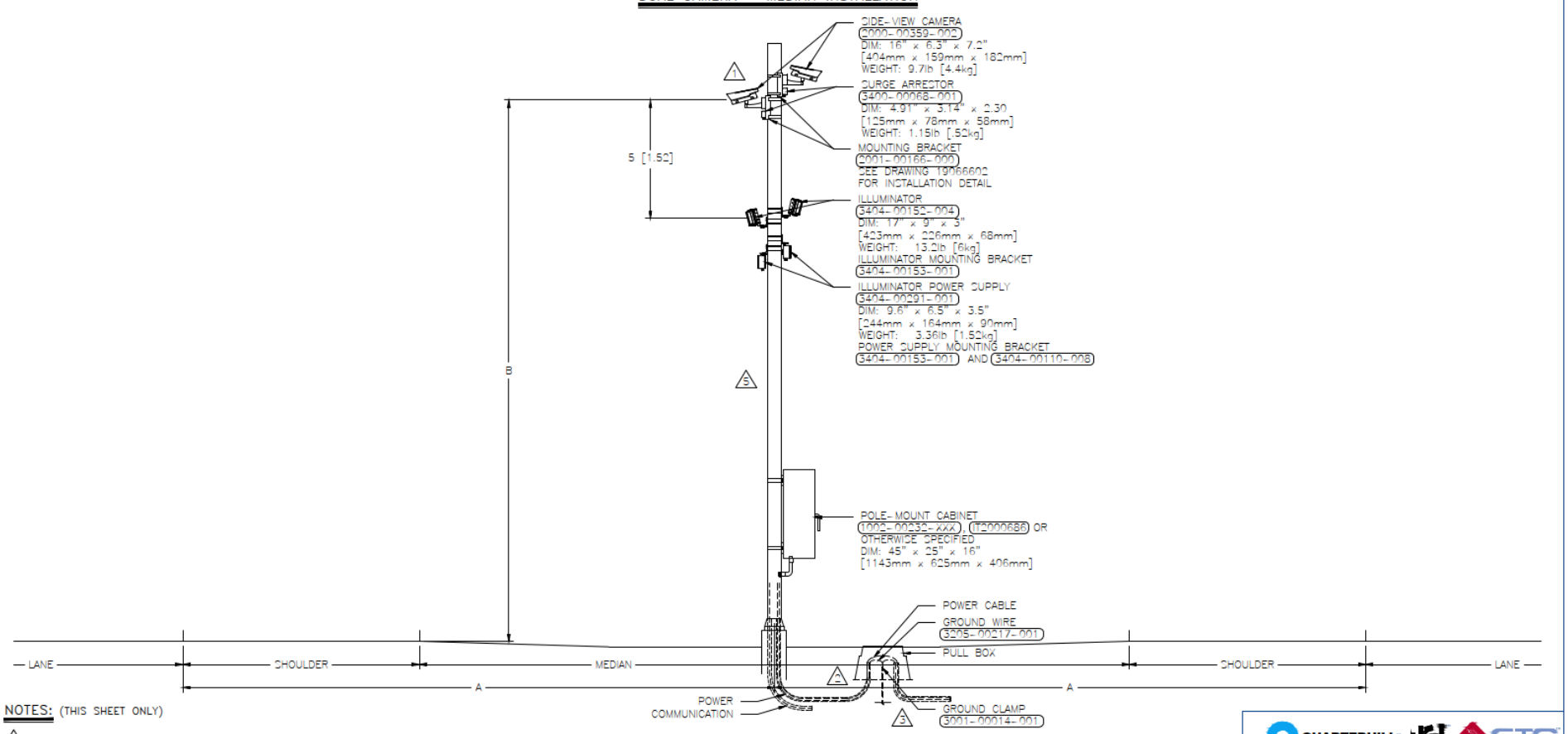
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C	CHANGES AS PER ECO-21014	2025-06-09

DIMENSIONS IN: FT [m] | SCALE: N.T.S. | SHEET 1 OF 5

DUAL CAMERA – MEDIAN INSTALLATION



NOTES: (THIS SHEET ONLY)

1. INSTALL MOUNTING BRACKETS PERPENDICULAR TO ROADWAY.
2. EQUIPMENT SHOULD BE CONNECTED TO EARTH GROUND IN COMPLIANCE WITH NATIONAL ELECTRICAL CODE AND LOCAL STANDARDS.
3. BOND POLE GROUND RODS TO CABINET GROUND ROD USING MINIMUM 6AWG WIRE. SEE DRAWING 81303510 FOR POLE BASE CABLING AND GROUNDING DETAILS.
4. SEE DRAWING 81303501 FOR CABLE POLE ENTRY DETAILS.
5. IT IS THE RESPONSIBILITY OF THE INSTALLER TO CONSULT A LOCAL PROFESSIONAL ENGINEER TO ENSURE THE STRUCTURE OF THE POLE AND ITS FOUNDATION WILL SUPPORT THE WEIGHT AND WIND LOADING OF ALL THE COMPONENTS AND ASSOCIATED CABLING IN THE SYSTEM.
6. A VIEWING (INCIDENCE) ANGLE OF 20° OR MORE WITH RESPECT TO THE ROADWAY IS RECOMMENDED TO REDUCE OCCLUSION.
7. SEE SHEET 4 FOR ADDITIONAL CAMERA MOUNTING DETAILS.
   SEE SHEET 5 FOR ADDITIONAL ILLUMINATOR MOUNTING DETAILS.

A – POLE OFFSET DISTANCE (FT [m])	B – RECOMMENDED CAMERA MOUNTING HEIGHT (FT [m])
30 [9.14]	25 [7.62]
50 [15.24]	30 [9.14]
100 [30.48]	35 [10.67]

6

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POLE MOUNT DETAIL
PERMANENT INSTALLATION
iTHEIA SYSTEM 2.0

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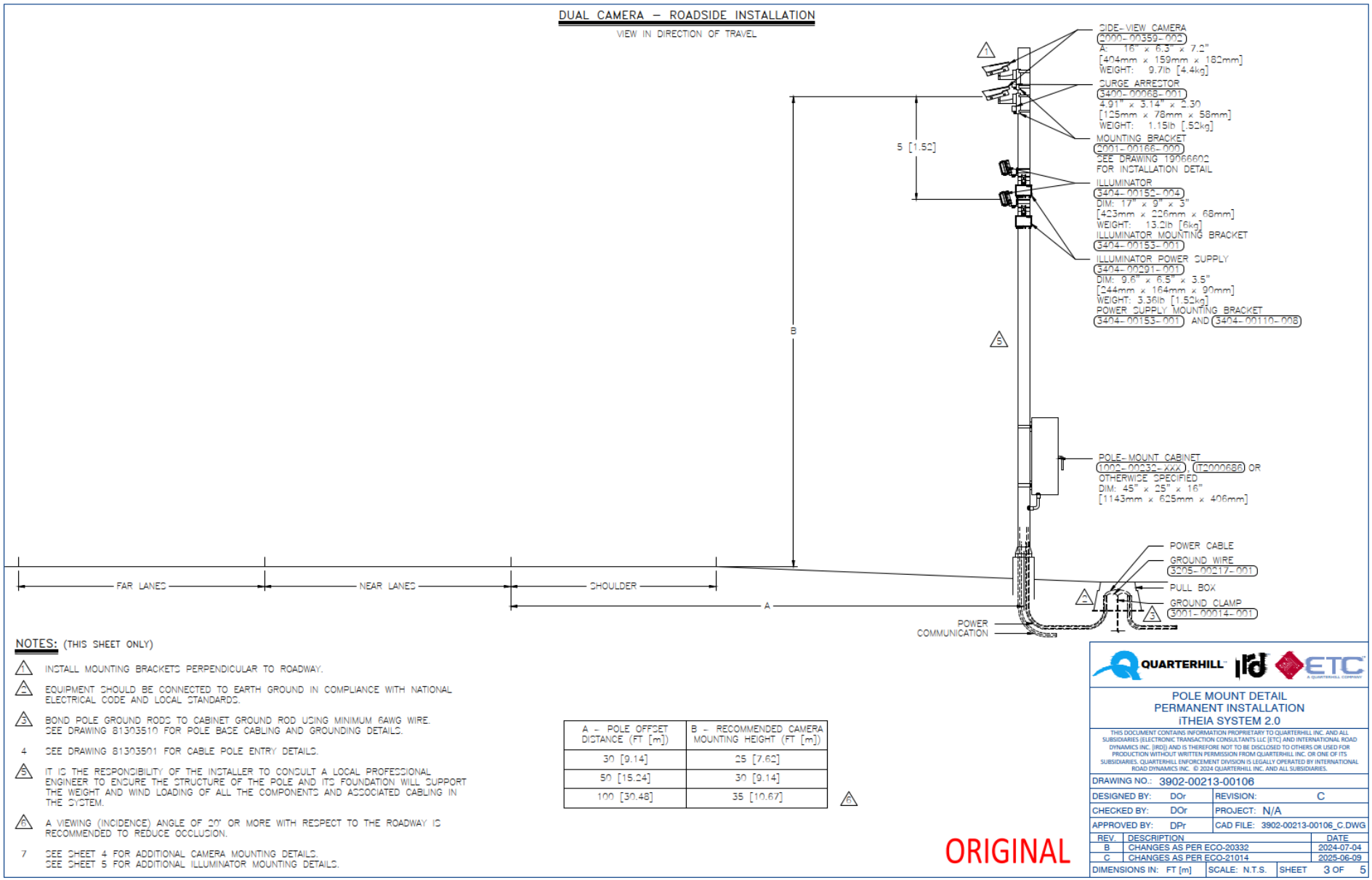
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DUAL CAMERA – ROADSIDE INSTALLATION

VIEW IN DIRECTION OF TRAVEL



NOTES: (THIS SHEET ONLY)

1. INSTALL MOUNTING BRACKETS PERPENDICULAR TO ROADWAY.
2. EQUIPMENT SHOULD BE CONNECTED TO EARTH GROUND IN COMPLIANCE WITH NATIONAL ELECTRICAL CODE AND LOCAL STANDARDS.
3. BOND POLE GROUND RODS TO CABINET GROUND ROD USING MINIMUM 6AWG WIRE. SEE DRAWING 81303510 FOR POLE BASE CABLING AND GROUNDING DETAILS.
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6. A VIEWING (INCIDENCE) ANGLE OF 20° OR MORE WITH RESPECT TO THE ROADWAY IS RECOMMENDED TO REDUCE OCCLUSION.
7. SEE SHEET 4 FOR ADDITIONAL CAMERA MOUNTING DETAILS.
   SEE SHEET 5 FOR ADDITIONAL ILLUMINATOR MOUNTING DETAILS.

A – POLE OFFSET DISTANCE (FT [m])	B – RECOMMENDED CAMERA MOUNTING HEIGHT (FT [m])
30 [9.14]	25 [7.62]
50 [15.24]	30 [9.14]
100 [30.48]	35 [10.67]

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POLE MOUNT DETAIL
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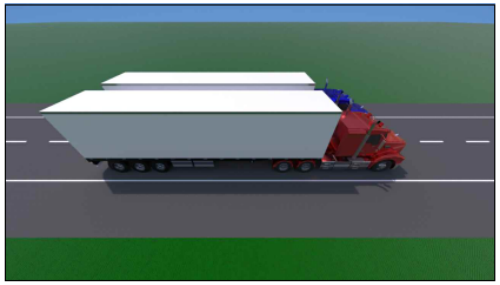
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ADDITIONAL CAMERA MOUNTING DETAILS

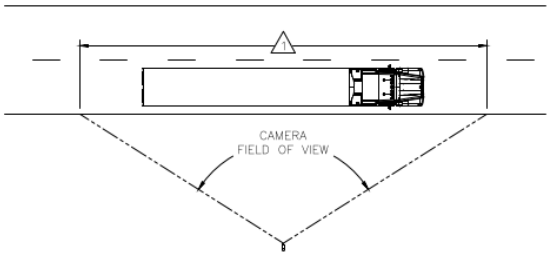
EXAMPLE VIEW: Θ = 20°



EXAMPLE VIEW: Θ = 40°



OVERHEAD VIEW



A – POLE OFFSET DISTANCE (FT [m])	B – RECOMMENDED CAMERA MOUNTING HEIGHT (FT [m])	Θ – APPROXIMATE ANGLE (DEGREE)
30 [9.14]	25 [7.62]	40°
50 [15.24]	30 [9.14]	30°
100 [30.48]	35 [10.67]	20°

NOTES: (THIS SHEET ONLY)

1. A TYPICAL 'A – POLE OFFSET DISTANCE' OF 30 [9.14] ALLOWS FOR DETECTION OF VEHICLES UP TO 80 [27.43] LONG BY GIVING A 90 [27.4] VIEW WIDTH OF THE CLOSEST LANE. FOR DETECTION OF LONGER VEHICLES, INCREASE 'A – POLE OFFSET DISTANCE' PROPORTIONALLY.
   FOR EXAMPLE, A 45 [13.7] OFFSET ALLOWS FOR DETECTION OF VEHICLES UP TO 120 [36.5] LONG BY GIVING A 134 [40.8] VIEW WIDTH.
2. IT IS RECOMMENDED THAT THE CAMERA BE INSTALLED AT LEAST 30 [9.14] FROM THE CLOSEST LANE OF TRAVEL TO ACHIEVE A SUFFICIENT HORIZONTAL FIELD OF VIEW.
3. ITHEIA CAN COUNT AND CLASSIFY VEHICLES AT A DISTANCE OF 150 [45.72], THOUGH THIS INCREASES THE RISK OF OCCLUSION AND REDUCES OR ELIMINATES THE ABILITY TO DISCRIMINATE BETWEEN LANES
4. FOR OPTIMAL OPERATION, TILT ANGLE Θ SHOULD BE BETWEEN 20° AND 40°.
   ANGLES LESS THAN 20° INCREASE THE POSSIBILITY VEHICLES WILL NOT BE DETECTED DUE TO OCCLUSION, AND DECREASE THE ABILITY OF THE SYSTEM TO DIFFERENTIATE LANES.
   ANGLES GREATER THAN 40° MAY SKEW VEHICLES DETAILS, REDUCING THE ITHEIA SYSTEM'S ABILITY TO IDENTIFY VEHICLE CLASS.
5. FOR SITES WHERE GLARE FROM THE SUN IS A RISK, FOR EXAMPLE AN EAST OR WEST FACING ORIENTATION, THE CAMERA CAN BE TILTED DOWN BELOW THE HORIZON TO REDUCE THE GLARE.

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POLE MOUNT DETAIL
PERMANENT INSTALLATION
iTHEIA SYSTEM 2.0

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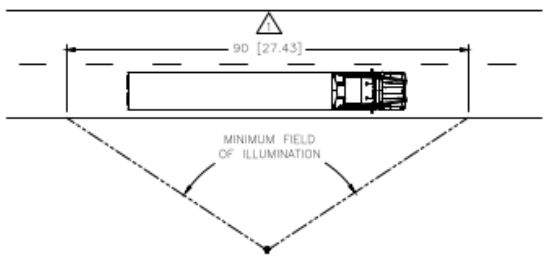
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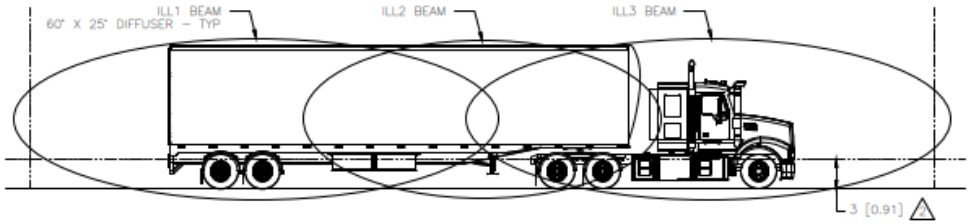
ADDITIONAL ILLUMINATOR MOUNTING DETAILS

OVERHEAD VIEW

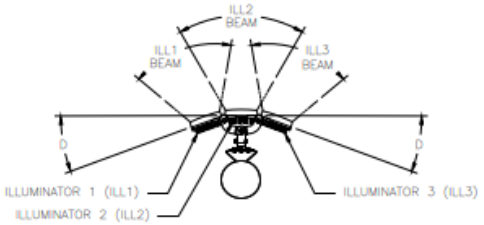


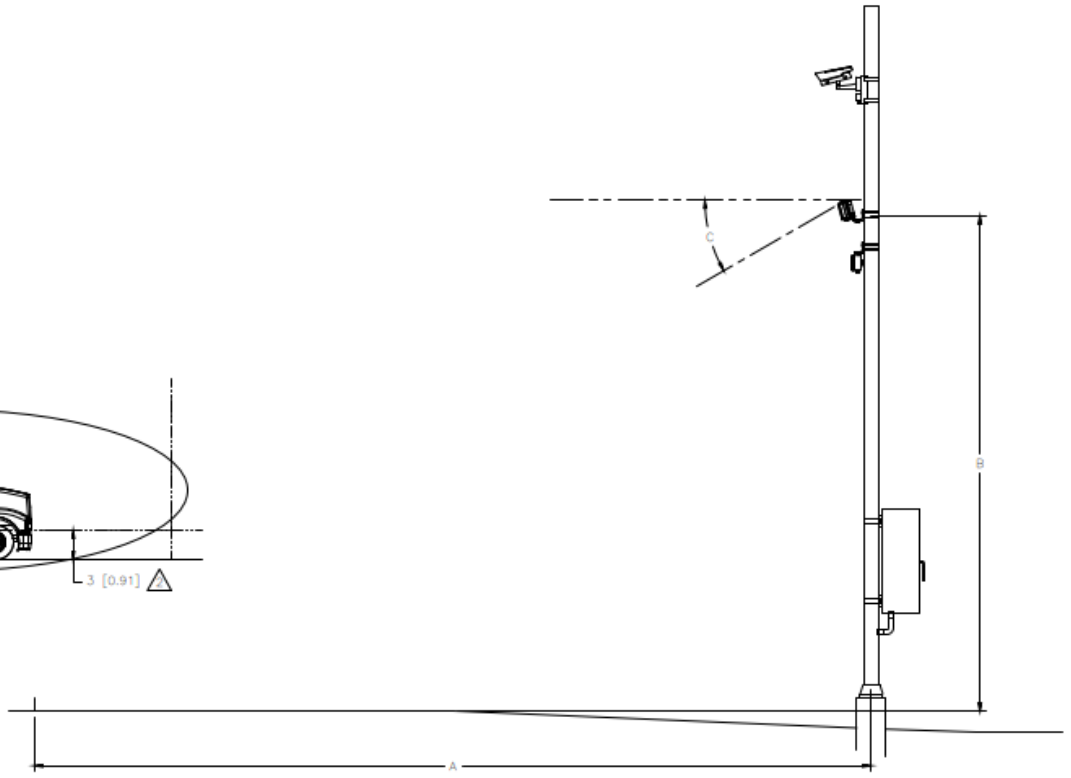
SIDE VIEW – NEAR LANE

FOR DEMONSTRATION, A = 30 [9.14] B = 20 [6.1]



ILLUMINATOR PANEL PAN ANGLE





A – POLE OFFSET DISTANCE (FT [m])	B – RECOMMENDED ILLUMINATOR MOUNTING HEIGHT (FT [m])	C – APPROXIMATE TILT ANGLE (DEGREE)	D – APPROXIMATE PAN ANGLE (DEGREE)	ILLUMINATOR PANEL DIFFUSER (HORIZ. x VERT.)
30 [9.14]	20 [6.1]	30°	30°	60° x 25°
50 [15.24]	25 [7.62]	20°	15°	60° x 25°
100 [30.48]	30 [9.14]	12°	10°	35° x 10°

NOTES: (THIS SHEET ONLY)

1. ILLUMINATION MUST MATCH OR EXCEED CAMERA FIELD OF VIEW REQUIREMENT OF 90 [27.43] OF ROADWAY IN CLOSEST LANE OF TRAVEL.
2. VERTICAL RANGE OF ILLUMINATION SHOULD INCLUDE FULL HEIGHT OF STANDARD COMMERCIAL VEHICLE WHERE POSSIBLE, BUT MUST PRIORITIZE LOWER HALF FOR CLASSIFICATION IF FULL ILLUMINATION CANNOT BE ACHIEVED BASED ON SITE GEOMETRY.

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POLE MOUNT DETAIL
PERMANENT INSTALLATION
iTHEIA SYSTEM 2.0

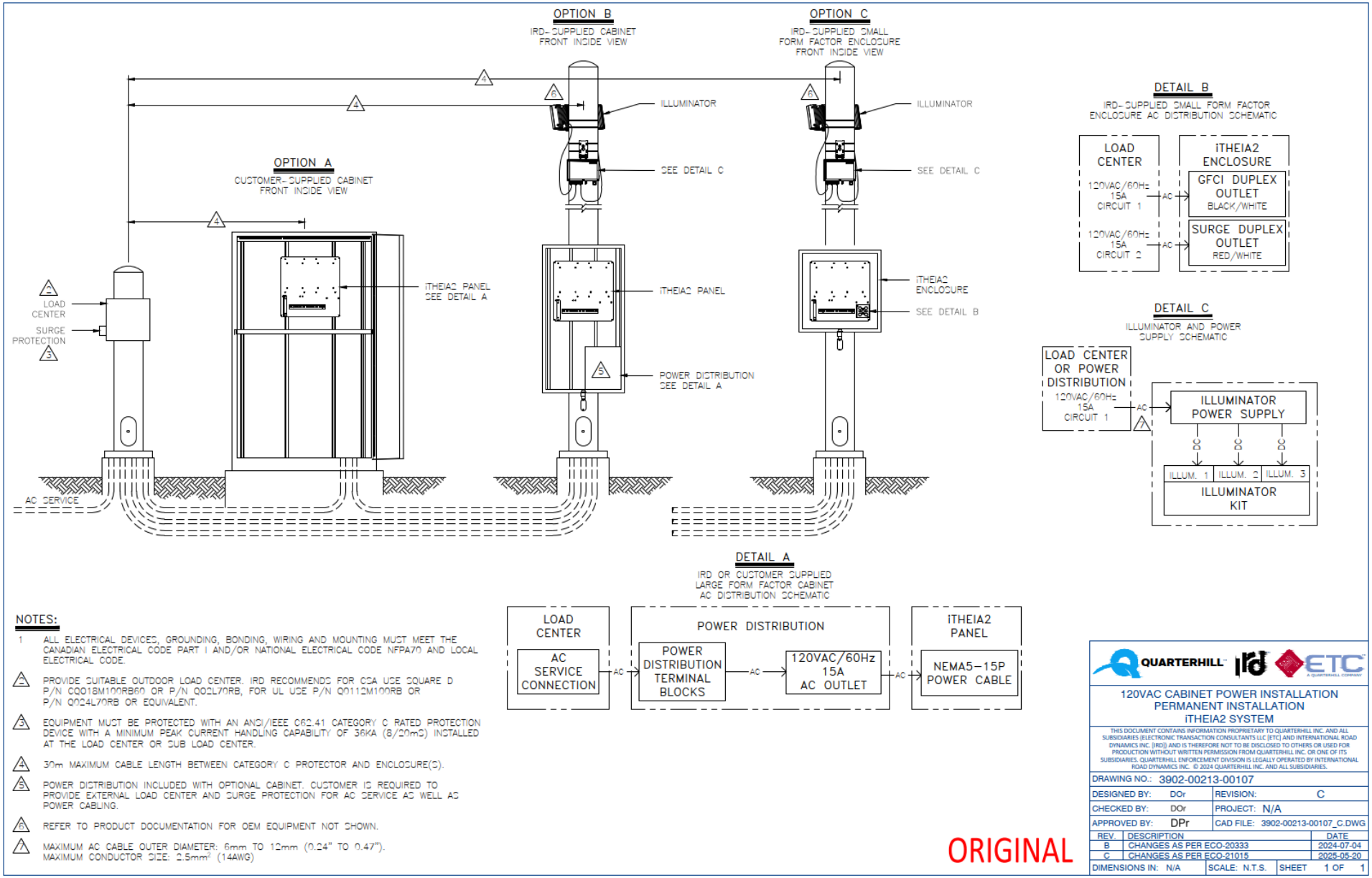
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DIMENSIONS IN: FT [m] | SCALE: N.T.S. | SHEET 5 OF 5

Appendix C 120VAC CABINET POWER DETAIL - PERMANENT INSTALLATION



NOTES:

1. ALL ELECTRICAL DEVICES, GROUNDING, BONDING, WIRING AND MOUNTING MUST MEET THE CANADIAN ELECTRICAL CODE PART I AND/OR NATIONAL ELECTRICAL CODE NFPA70 AND LOCAL ELECTRICAL CODE.
2. PROVIDE SUITABLE OUTDOOR LOAD CENTER. IRD RECOMMENDS FOR CSA USE SQUARE D P/N QO018M100RB60 OR P/N QOL70RB, FOR UL USE P/N QO112M100RB OR P/N QO24L70RB OR EQUIVALENT.
3. EQUIPMENT MUST BE PROTECTED WITH AN ANSI/IEEE C62.41 CATEGORY C RATED PROTECTION DEVICE WITH A MINIMUM PEAK CURRENT HANDLING CAPABILITY OF 36KA (8/20mS) INSTALLED AT THE LOAD CENTER OR SUB LOAD CENTER.
4. 30m MAXIMUM CABLE LENGTH BETWEEN CATEGORY C PROTECTOR AND ENCLOSURE(S).
5. POWER DISTRIBUTION INCLUDED WITH OPTIONAL CABINET. CUSTOMER IS REQUIRED TO PROVIDE EXTERNAL LOAD CENTER AND SURGE PROTECTION FOR AC SERVICE AS WELL AS POWER CABLING.
6. REFER TO PRODUCT DOCUMENTATION FOR OEM EQUIPMENT NOT SHOWN.
7. MAXIMUM AC CABLE OUTER DIAMETER: 6mm TO 12mm (0.24" TO 0.47"). MAXIMUM CONDUCTOR SIZE: 2.5mm² (14AWG)

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120VAC CABINET POWER INSTALLATION
PERMANENT INSTALLATION
iTHEIA2 SYSTEM

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REV.	DESCRIPTION	DATE
B	CHANGES AS PER ECO-20333	2024-07-04
C	CHANGES AS PER ECO-21015	2025-05-20

DIMENSIONS IN:	N/A	SCALE: N.T.S.	SHEET 1 OF 1