Site Survey Check List

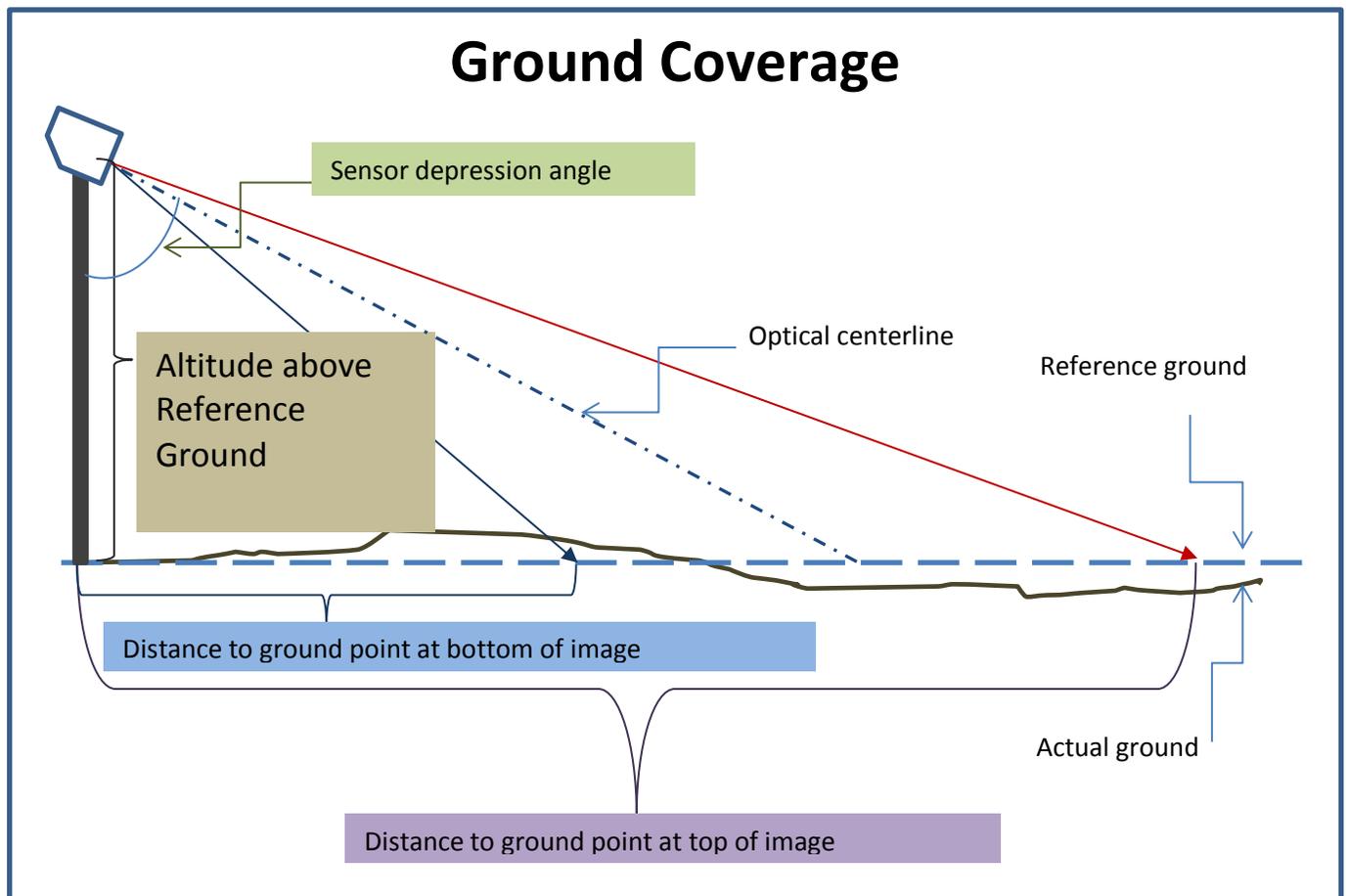*Install of LWIR, MWIR and VIS cameras on a non-penetrating roof mount.*

This check list is provided for your convenience and is not guaranteed to be comprehensive. When creating the Scope of Work for your WAVcam System, please perform a thorough survey of the physical site where the cameras will be mounted, where the servers will be mounted and where the video will be viewed.

Mounting height and camera tilt angle.

The WAVcam HFOV is approximately 90˚ and the VFOV can be from 2.95˚ to 9.5˚ depending on the sensor and lens. When deciding on the location of the camera, it is important to take into consideration how the camera's proposed height and tilt angle will impact the field of view. The examples below are calculated for a Visible Light camera (200mm lens).   For coverage values specific to your mission, please provide us with:

1) the sensor you desire to use (VIS, MWIR, LWIR),
2) the proposed mounting height of the camera and
3) either the desired distance to the bottom of the image (X) or the distance to the top of the image (Y).

Alternatively, you can provide us with your desired minimum depth of view (X), your maximum distance to target (Y) and we will determine the best fit camera height, tilt angle and sensor type.

Ground Coverage

Sensor depression angle

Optical centerline

Reference ground

Altitude above Reference Ground

Distance to ground point at bottom of image

Actual ground

Distance to ground point at top of image

Sensor height	X feet	Y feet
30'	429	Horizon
100'	1,430	Horizon
200'	2,860	Horizon
300'	4,290	Horizon

Detection, Recognition and Identification (DRI)
Before deciding on a specific camera type or combination, it is important to identify the size of your target(s), the range from the camera and the viewing conditions. Once these parameters are determined, ISA utilize industry-standard models (NVTherm and SSCAM) to calculate the probability of detecting, recognizing and/or identifying a target. Some examples are listed in the chart below. Please contact us for calculations pertaining to your specific requirements.

P(det) = Probability of Detection - detecting that something is "out there"
P(rec) = Probability of Recognition - discriminating between classes of targets such as human, animal, vehicle, type of vehicle.
P(id) = Probability of Identification – the ability to identify as a "friend or foe". An example would be to discriminate between a person and a person carrying a weapon.

- Human = land-based with a surface area of 1.8m x .5m
- Vehicle = land-based with a surface area of 2.3m x 2.3m
- Vessel = marine environment with a surface area or 2m x 6m

- VIS = visible light sensor with a 200mm lens
- MWIR = cryogenically cooled thermal sensor with a 250mm lens
- LWIR = uncooled thermal sensor with a 66mm lens

Example – Looking at the last bar on the chart, "There is an 80% probability of detecting a 2m x 3m vessel at 9.5 miles with the VIS sensor."
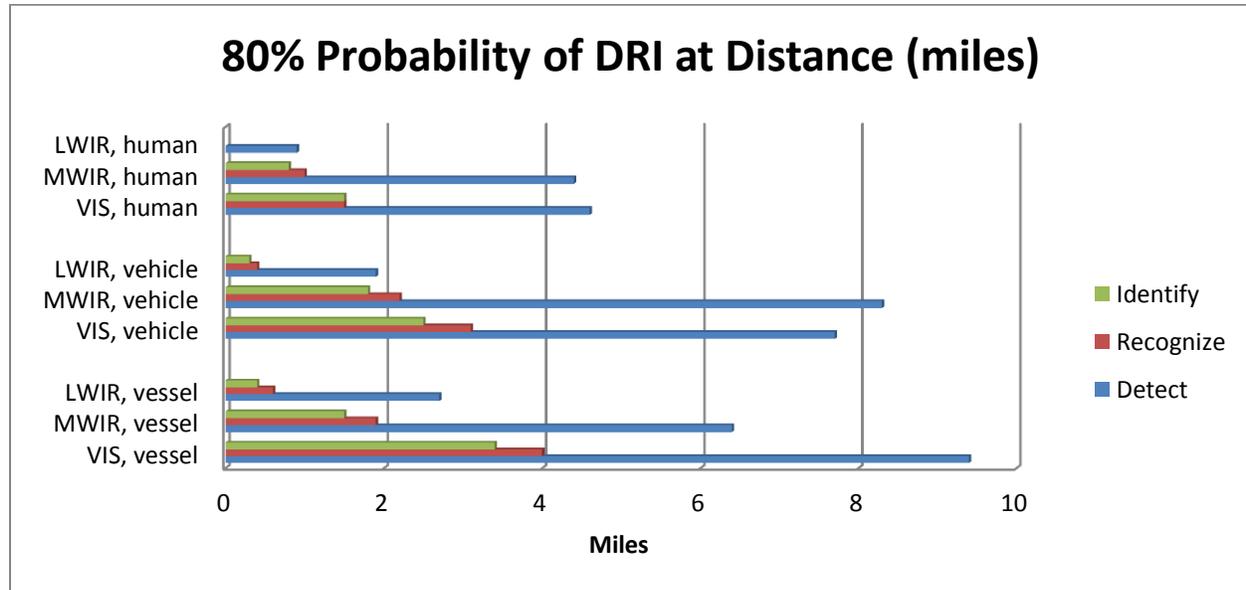
Network connectivity

The camera(s) must be directly connected to a private LAN that is also connected to the processing/storage servers via gigabit Ethernet. The distance between the camera(s) and the server(s) must not exceed the IEEE limit for this type of connection. The connection between the server(s) and the viewer(s) should be at least 10Mbps per concurrent viewer (20Mbps if wireless). A "System" sold by ISA includes a Cisco/Linksys SE2800 unmanaged Gigabit switch (the "Private Switch" referenced in the drawing below) into which are plugged the sensor(s) and server(s). The System connects to the Customer Network Device via one of the 4 Ethernet connections on the 30-day Storage server. The customer must supply ISA with at least one static IP address to be assigned to the System, an IP address for each device is preferred. The diagram below specifies the supplied IP address to be an Internet Public IP address which would be used to connect the WAVcam System when it is not resident on the customer's LAN. If the customer's LAN extends to the WAVcam System, then an outside internet public address is not required.
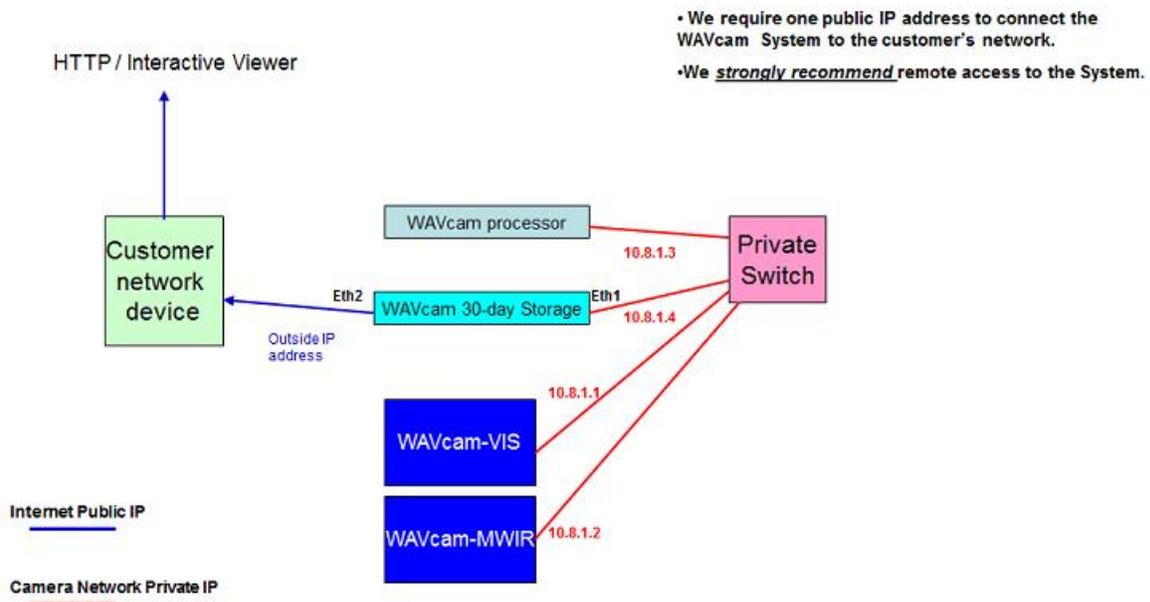
ISA strongly recommends remote access to the System via a VPN for maintenance purposes.

The Customer is responsible for all signal conditioning (lightning, surge, etc.).

The WAVcam system can be setup to integrate with many different network topologies. Since buyer site requirements often drive what is possible, ISA will provide some basic network configurations that can be tailored to meet specific buyer site requirements.

The power and copper Ethernet network connectors on the back of the cameras are weatherproof, twist lock style. A mating Ethernet connector is included. The installer is responsible for the Ethernet cable and termination thereof. In the event ISA is installing the system, the Ethernet cable will be quoted separately.

Before shipping to the customer, ISA requires the IP scheme and network diagram indicating how the WAVcam System will be connected to the customer's LAN. ISA will preprogram the IP addresses into the sensors and processors before shipment.

Power

The cameras and servers require 110VAC – 240VAC, 50Hz – 60Hz. The input power must be properly grounded and conditioned to protect the equipment from low voltage, fast transients and other anomalies that might harm the equipment. Each camera comes with an external power supply which must be mounted within 6' of the camera.

The AC supply side cable is 100' long. It is terminated on the supply end with a weather tight, twist lock style plug. It is terminated on the power end with a NEMA 5-15P connector. The cable may be cut to the desired length and the plug may be replaced with the appropriate plug for other approved input power systems. The DC camera side cable is 6' long. This cable is terminated on both ends using weather tight, twist lock style plugs.

We strongly recommend that all WAVcam Systems are installed using a UPS. The OR2200LCDRM2U Smart UPS has the capability of communicating with the WAVcam System (via USB) which allows the System to shut down gracefully upon sensing a critical battery state. This UPS may be rack or pedestal mounted. It requires a NEMA 5-20R receptacle.

Camera mount
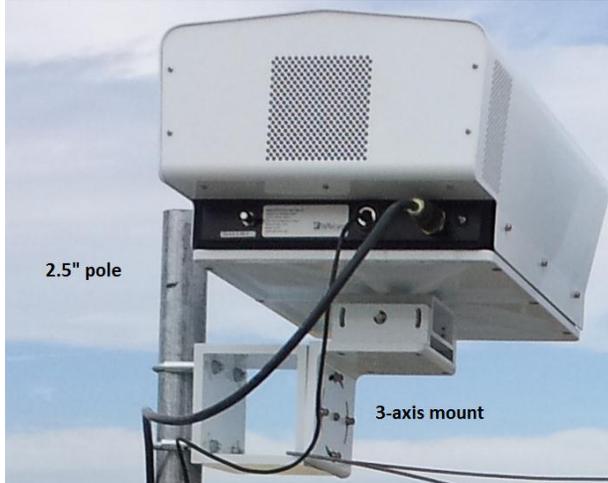
ISA offers a 3-axis physical mounting solution for WAVcam sensor equipment to simplify and improve the quality of the main product installation. The mount is designed to attach to a customer provided rigid, cylindrical pole of 2.5 or 4.5 inches (actual outer dimension) in diameter. At the buyers' request ISA can, at additional cost, provide the appropriate pole structure required for this mount.

A suitable non-penetrating pole mount would be:
a.   Mount: R-FRM238SP5
http://www.tessco.com/products/displayProductInfo.do?sku=313069&eventPage=1
b.   Mat: 102758
http://www.tessco.com/products/displayProductInfo.do?sku=472603&eventPage=1

If the buyer intends to procure another mount solution, he/she is responsible to ensure that the mount structure conforms to the WAVcam Sensor subassembly attachment interface, is rigid and affords an adequate range of adjustment in all three axes. The rigidity of the mounting solution can directly affect the stability of the WAV produced by the system if the dynamic motion exceeds the built in stabilization limit.

Most cameras are mounted 50' – 150' high. Each camera weighs approximately 60 pounds. The Customer is responsible for providing an adequate system to lift and install the cameras.

All cameras should be connected to an earth ground and lightning protection systems.

Viewer
Real time and archived WAVcam video may be viewed using the included WAVcam Viewer. Additionally, the video may be correlated with radar, AIS and other physical security information through one of our partner's user interfaces. Please contact ISA for a detailed discussion of the various interface functionality and connectivity requirements.

A recent release of JAVA is required on all computers viewing the WAVcam sensors.

Servers

VIS server, MWIR server and storage server

The WAVcam system makes use of COTS servers running WAVcam software. The servers provided are based upon the configuration of the WAVcam system. All servers require 120-240VAC 50-60Hz power connections. Each server will use approximately 350W of power (exact number depends on system configuration). For rack mounted configurations the buyer should ensure there is sufficient rack space available for the number of servers they are receiving.

The signal processing server(s) is a Dell R620. Consult with ISA for the number of servers required.
- 400 W
- Current is 400/input voltage. Valid inputs are 120V or 208V

The storage server is a Dell R720.
- 500W
- Current is 500/input voltage. Valid inputs are 120V or 208V