BASE PROTECTION LABORATORY

INFRASTRUCTURE SITE SURVEY REPORT

OF

THE PACIFIC MISSILE RANGE FACILITY

FOR

THE OFFICE ON NAVAL RESEARCH

PRESENTED BY:

SPACE AND NAVAL WARFARE SYSTEMS CENTER, SAN DIEGO
PACIFIC CR4ISR DEPARTMENT, CODE 5223
PEARL CITY, HAWAII

8 AUGUST 2008

EXECUTIVE SUMMARY

The Space and Naval Warfare Systems Center, San Diego, Pacific C4ISR Department in Pearl Harbor (SPAWAR Hawaii) conducted the site survey at the Pacific Missile Range Facility (PMRF) in June 2008 to identify infrastructure improvements which could support data collection during the upcoming Phase II of the Base Protection Laboratory (BPL) project.

Three areas were identified that would benefit the BPL; additional infrastructure to support Phase II sensors along Majors Bay; additional equipment in the PMRF Dispatch Office to accommodate sensors at Majors Bay and to exchange data with the BPL; and additional equipment at Port Allen to achieve 100% coverage and to leverage off of existing cameras.

Implementing these recommendations will have the following benefits:

- The Phase II contractor will be able to install new sensors quickly and easily.
- Realistic security data will be collected during Phase II.
- Existing Phase I sensors can be used operationally, permitting continuous data collection.
- Cooperation between the ONR BPL and PMRF Base Security personnel will improve security on the base.
- Transition of BPL systems to PMRF upon completion of the project will be simplified since they will be properly integrated into PMRF operations.
- High value use of FY08 funds.

The strategy to execute this work with FY08 funds involves PMRF NAVFAC using the existing PMRF BOS contract for the construction of the outside plant infrastructure such as sensor poles, AC power and buried fiber optics. SPAWAR Hawaii will design the equipment integration and will utilize existing contracts for procurement and installation.

The ability for PMRF NAVFAC to obligate FY08 funds and to execute the construction with these funds is the key to the success of this effort.

The ability for SPAWAR to obligate FY08 funds and to execute procurement and installation with those funds is also key to this effort.

The criteria for success of this project are that the infrastructure will be in place so that the Phase II contractor will be able to quickly and easily field additional sensors along Majors Bay; Phase I sensors will be available for PMRF operational use; and existing Port Allen sensors will be available for the Phase II contractor.

INTRODUCTION

This report presents the findings of a site survey conducted on the Pacific Missile Range Facility (PMRF) and Port Allen for additional infrastructure to support Phase II of the Base Protection Laboratory (BPL) project on Kauai, Hawaii (see fig. 1a and 1b). It provides recommendations for building that infrastructure and an acquisition strategy for using FY08 funds. Responsibilities, costs and schedule are also provided.

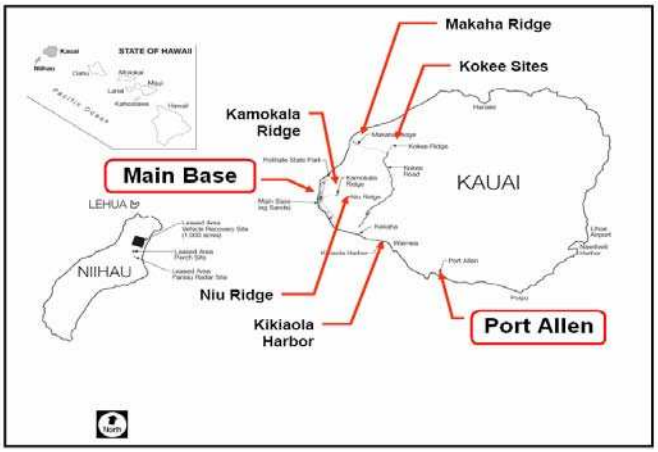

Figure 1a: PMRF Main Base and Port Allen

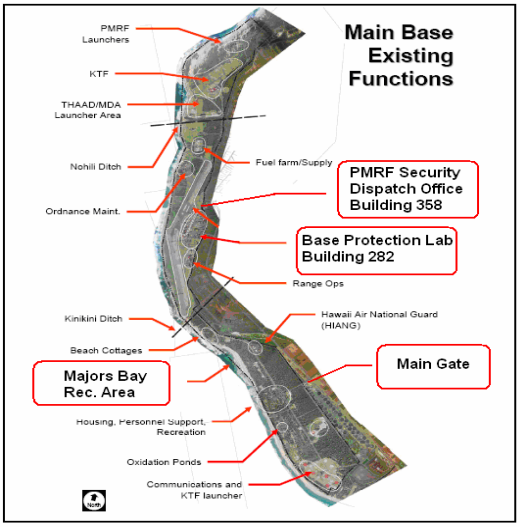

Figure 1b: PMRF, Majors Bay, Main Gate”

BACKGROUND

Phase I of the BPL project established the BPL in Building 282 on PMRF. The project installed various sensors (see fig. 2) at numerous sites on the base using wireless networks for communications and solar panels for power, and developed behavior analysis software such as the Blackboard. While the existing sensor sites were strategically sited, they lack the ability to collect real-life data in actual security situations. Also, since the data is only fed to the BPL, it is only collected during periods of active research. Furthermore, the bandwidth of the wireless communications limits video transmissions and the solar power panels are vulnerable to hurricanes, which is a recognized condition on PMRF.

Figure 2: A typical BPL Sensors on PMRF

Recent discussions with PMRF personnel have raised an opportunity for the BPL to partner with Base Security. Policy changes have increased public access to Majors Bay, a popular fishing and surfing beach on the base. While this improves relations with the off-base community, it also complicates the control of restricted access to nearby operational areas. Traditional security measures such as fences and lighting cannot be used due to environmental concerns for the local wildlife and for the pristine beaches. If the BPL project were to install security cameras or other sensors along Majors Bay, the Base Security Department could monitor the area and record data 24 hours a day, seven days a week. That data, representing real-life behavioral patterns in a real security situation, would be available to the BPL.

The base's security cameras and Intrusion Detection Systems (IDS) are monitored at the PMRF Security Dispatch Office in Building 358 (see fig. 3a). The office hosts systems such as digital video recorders, video motion detection processors, dispatch radios, video switches and video displays (see fig. 3b). In addition to monitoring the new sensors at Majors Bay, the Dispatch Office could also monitor the existing BPL sensors to track visitors en route from the main gate to the parking lot at the bay. This would allow for continuous collection from other BPL sensors as well.

Figure 3a: Dispatch Office

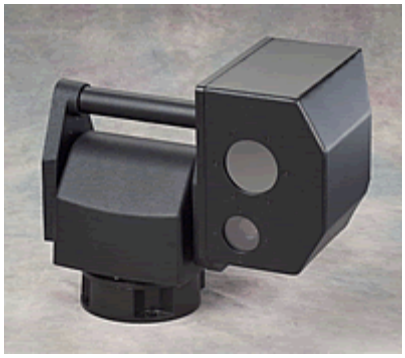

Figure 3b: Typical CCTV Cameras

Lastly, the Dispatch Office already monitors alarms and video from Port Allen, a State-owned small boat harbor 20 miles from PMRF (see fig. 4). Port Allen operates several recovery boats to retrieve drones and targets from the open ocean for the live firing range to the North and West of Kauai. The IDS and video systems at Port Allen monitor the pier for intruders and report alarms and video to the Dispatch Office over a leased T1 line.

Figure 4: Port Allen and Image of Pier

SITE SURVEY

SPAWAR Hawaii conducted the site survey at PMRF from 3 through 6 June 2008 with representatives from ONR MIDPAC, PMRF OPS, PMRF Base Communications, PMRF Base Security, and PMRF NAVFAC. Areas surveyed include Majors Bay and the surrounding parking lot and cottage areas, the PMRF Security Dispatch Office in Building 358, and the Port Allen pier.

SUMMARY OF FINDINGS

MAJORS BAY:

- There are two restricted areas of concern: the Boresight Tower near the parking lot and the runway at the north end of the bay. The parking lot, picnic area and beach cottages lay between the Boresight tower and the runway (see fig. 5a, b, and c).

- The areas that require surveillance are the parking lot and the beach from the parking lot to the runway. The beach at Majors Bay is partially viewed from the existing sensors in the parking lot.
- Three additional sensor locations would provide continuous coverage from the beach and parking lot to the runway.
- Existing power and signal infrastructure is nearby.
- PMRF NAVFAC has indicated that archeological and environmental (native birds) concerns are manageable.

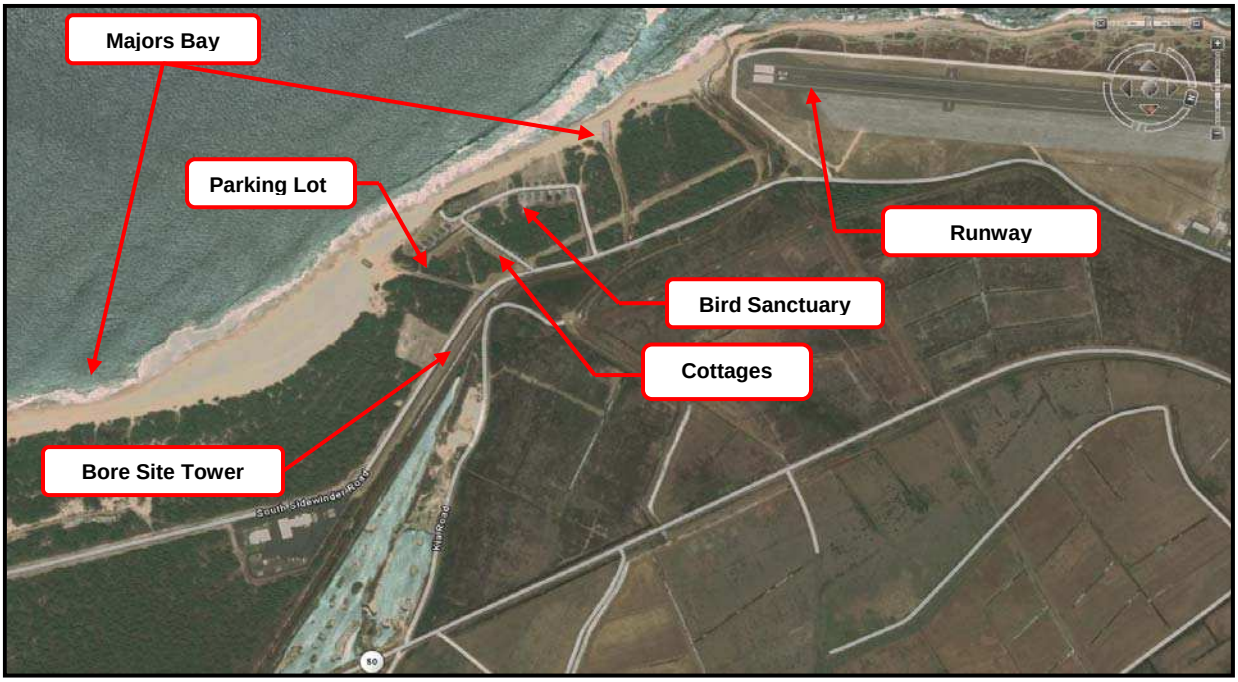

Figure 5a: Map of PMRF, BPL points of interest

Figure 5b: Majors Bay

Figure 5c: Majors Bay Parking Lot

DISPATCH OFFICE:

- The dispatch office hosts video processing, distribution, recording and display subsystems. The equipment is located in the operations room which is near

capacity. The systems are sized to support the current array of IDS alarms and video cameras.

- Video from existing PMRF cameras are recorded digitally and routed via the video switching matrix to the display subsystem. The video distribution system will need to be altered so that the signals are available to the BPL.
- Additional channels for video distribution, recording and detection are required to support the BPL.
- Video display system is at maximum capacity (see fig. 6). The BPL video will need to be integrated into the existing display subsystem.
- Additional space for equipment has been identified in a storage room adjacent to the operations room. Power and air conditioning are adequate (see fig. 7).

- In order to avoid network certifications and additional firewalls to isolate the BPL network from the PMRF networks, all video signals will be passed in video format. This configuration will ensure the highest quality video available to the BPL for processing.
- Other security sensors in PMRF are associated with local alarm panels and do not terminate directly in the Dispatch Office. These alarm panels report to the IDS server and are forwarded to the dispatcher's client workstation.

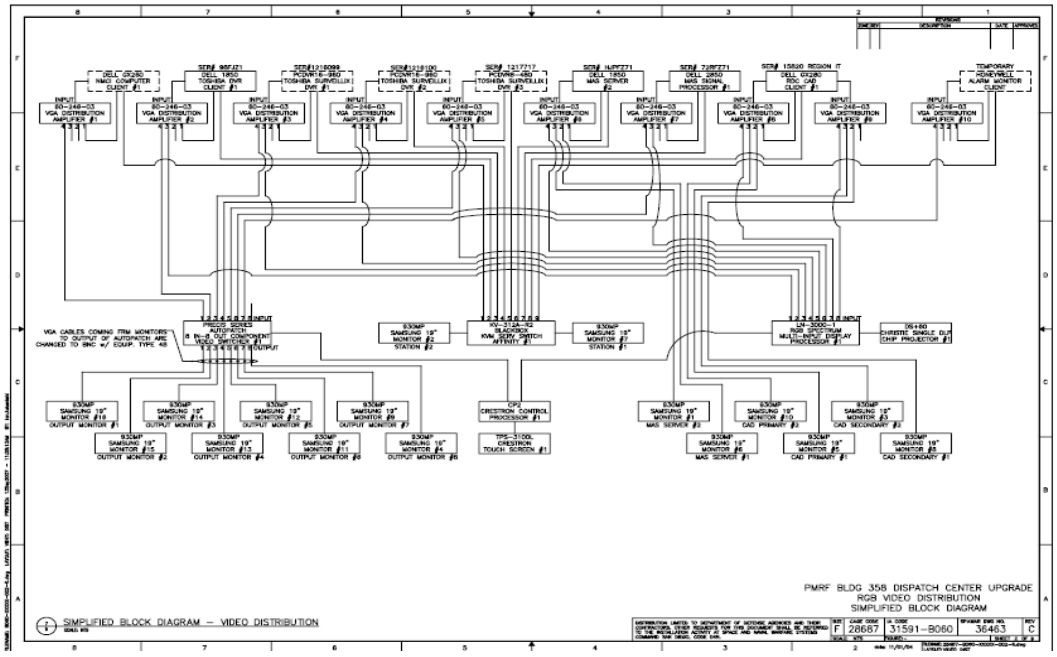

Figure 6: As-Built Video Distribution Diagram

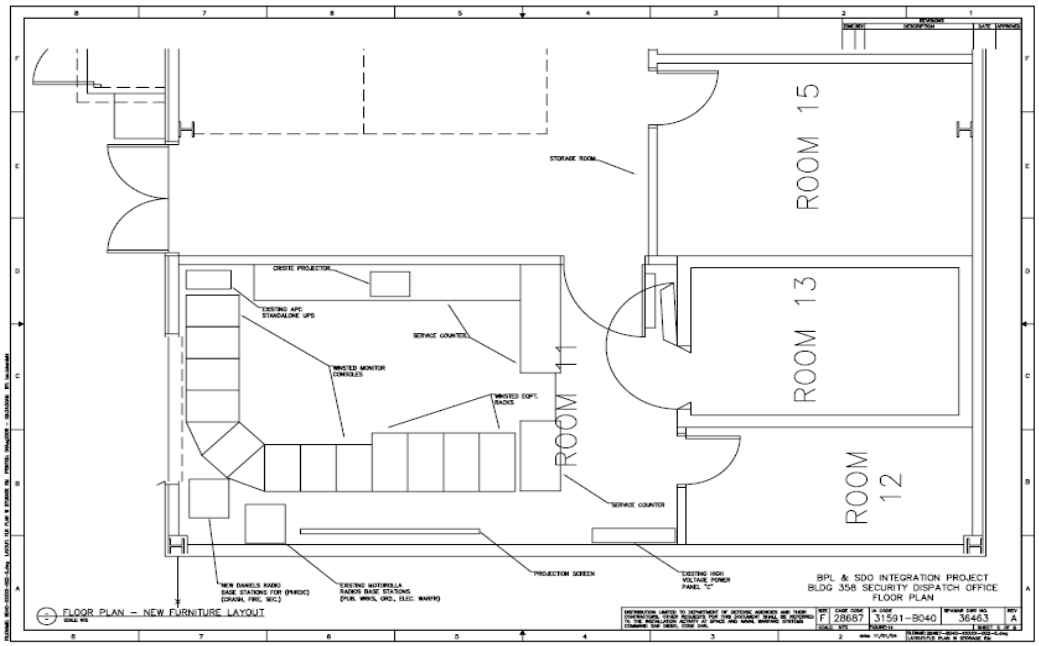

Figure 7: Dispatch Office and Storage Room floor plan

PORT ALLEN:

- The IDS for Port Allen uses Object Video processors with four existing fixed CCTV cameras. All processing and storage are done at the pier. Only the alarm signals and a composite view of the four cameras are passed back to the Dispatch Office on PMRF. The recorded video can be viewed from the Dispatch Office via a remote workstation.
- A walk-test of the pier demonstrated that the existing cameras cover approximately 98% of the pier (see fig. 8).
- The areas just outside the vehicle and pedestrian gates are not covered. The BPL requires one additional camera to cover these areas.
- The IDS, composite video and viewing workstation between Port Allen and the Dispatch Office are connected via a network link on leased T1 circuit. The circuit is fully loaded (see fig. 9).
- Sending video from Port Allen to the BPL will require minor equipment upgrades and additional leased bandwidth. Space, power and air conditioning are adequate.
- State of Hawaii approval for historical preservation is required to add one camera to view the pier gates. SPAWAR Hawaii has experience with this approval for the four existing cameras.

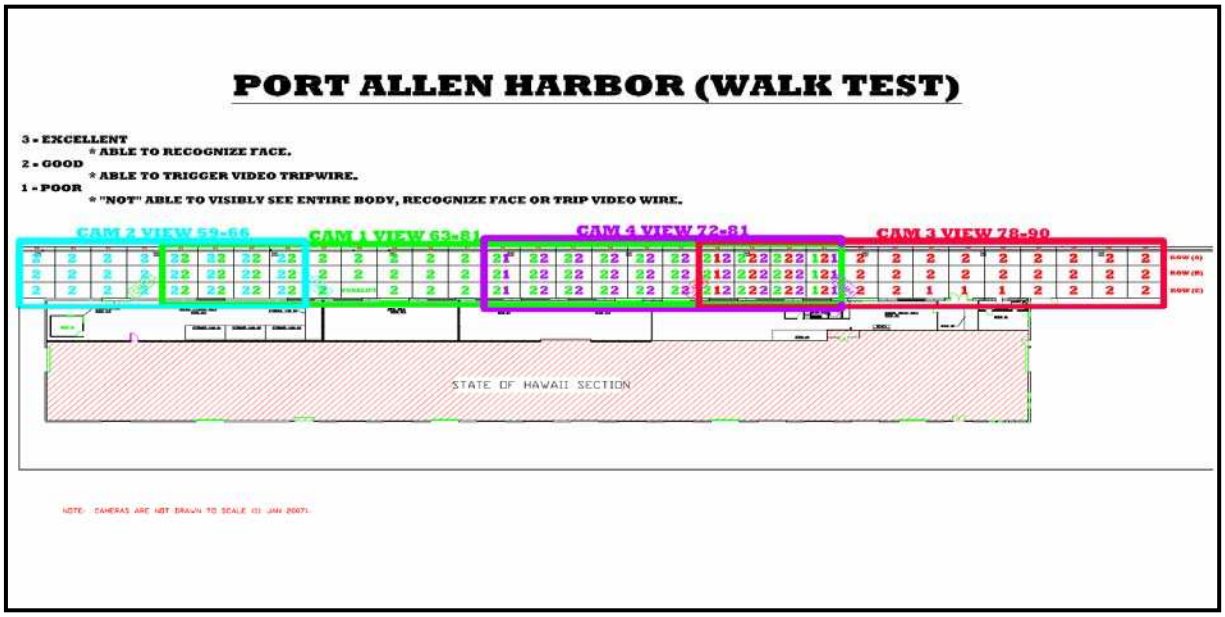

Figure 8: Port Allen Harbor Walk Test

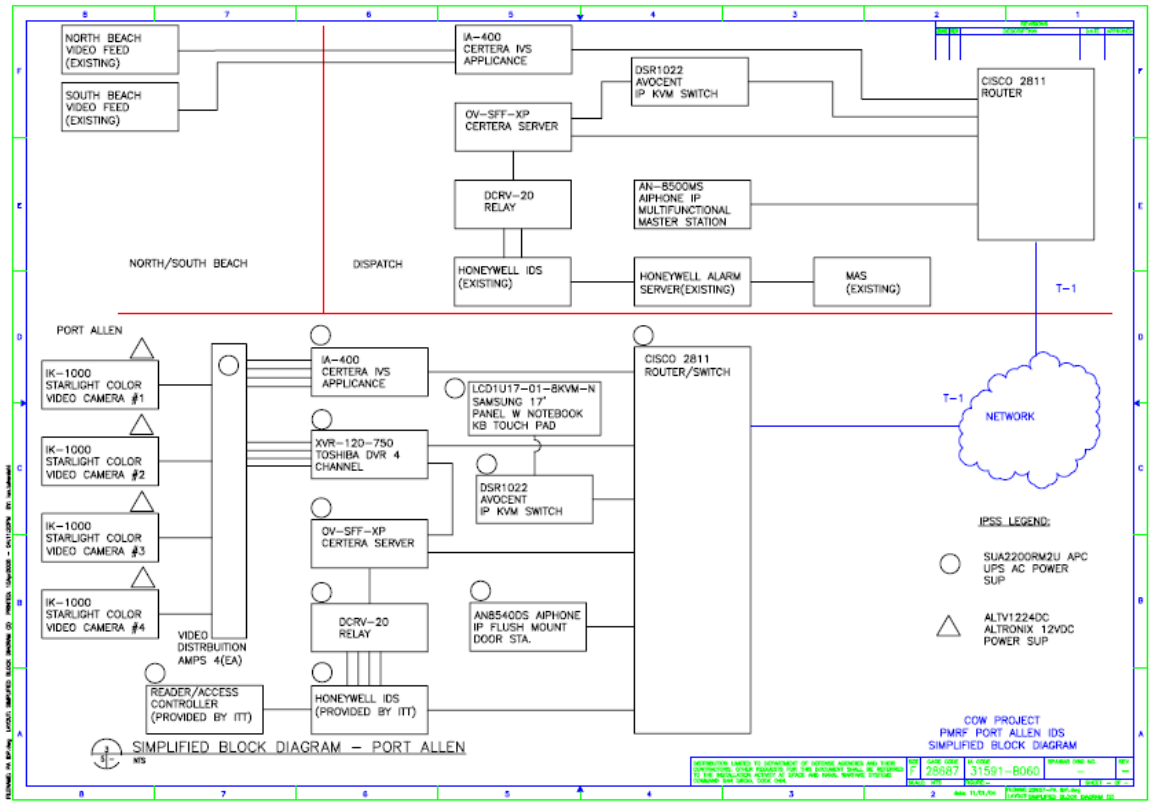

Figure 9: Port Allen As-Built Block Diagram

EXISTING BPL PHASE I:

- The existing sites have a variety of sensors including license plate cameras, RFID sensors, CCTV day and night cameras and seismic sensors.
- The communication paths from each sensor site are primarily 2.4GHz wireless links with 4.9 GHz wireless links for the backbone to the BPL.
- The existing sensor sites are powered by batteries charged by solar cells (see fig. 10).
- PMRF NAVFAC has indicated that the existing sensor sites listed below are too far from the existing infrastructure to consider for connection under this task (see fig. 11). The sites which were considered were:
  - Existing Site a - Main (Housing) Gate
  - Existing Site b - Majors Bay entrance road
  - Existing Site c - Majors Bay parking lot entrance
  - Existing Site d - Kinikini Ditch
- The BPL is not connected to Dispatch Office (see fig. 12).

Figure 10: Existing Phase I Sensors

Figure 11: Existing Sites a, b, c, & d

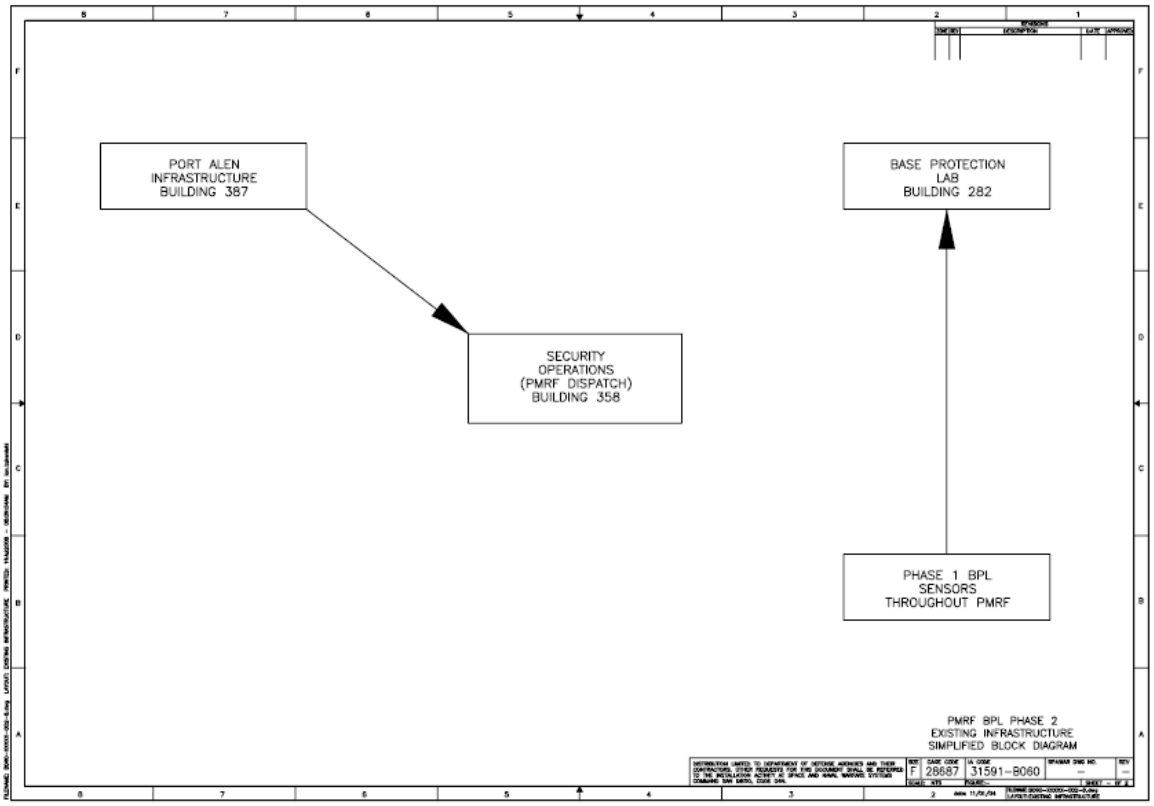

Figure 12: Current Infrastructure Configuration

RECOMMENDATIONS

MAJORS BAY:

BPL surveillance along Majors Bay would provide real-life data along a Navy beach with the added benefit of improving PMRF Base security. The video would be recorded and processed in the Dispatch Office and forwarded to the BPL. This would allow for continuous data collection and would transition to PMRF easily upon completion of the research project. Build the infrastructure for the Phase II contractor at three sensor sites for complete surveillance of the beach and parking lot to the runway.
Each site includes a permanent pole with AC power and fiber optic connection. The Phase II contractor will install cameras or other sensors.

1. Build infrastructure for at three sites along Majors Bay. See Appendices A and B for the scope of work for the construction and communications infrastructure.
   a. Locations are: (see fig. 13)
      New Site 1 - Majors Bay parking lot, South corner
      New Site 2 - Officer's cabin
      New Site 3 - Beach Cabins
   b. Provide a pole approximately 20 feet high to mount the future sensors (i.e., CCTV cameras) (see fig. 10).
   c. Provide 120VAC power to each pole with disconnect at the base of the pole. The anticipated current draw should not exceed 7 amps at each pole.
   d. Coordinate and acquire environmental approvals/monitoring as required.
2. Build communications infrastructure for the three additional sensor sites. The next BPL contractor will be able to quickly and easily install sensors at these locations along Majors bay.
3. Extend fiber optics from the existing PMRF fiber optic cable plant to the three new sites.

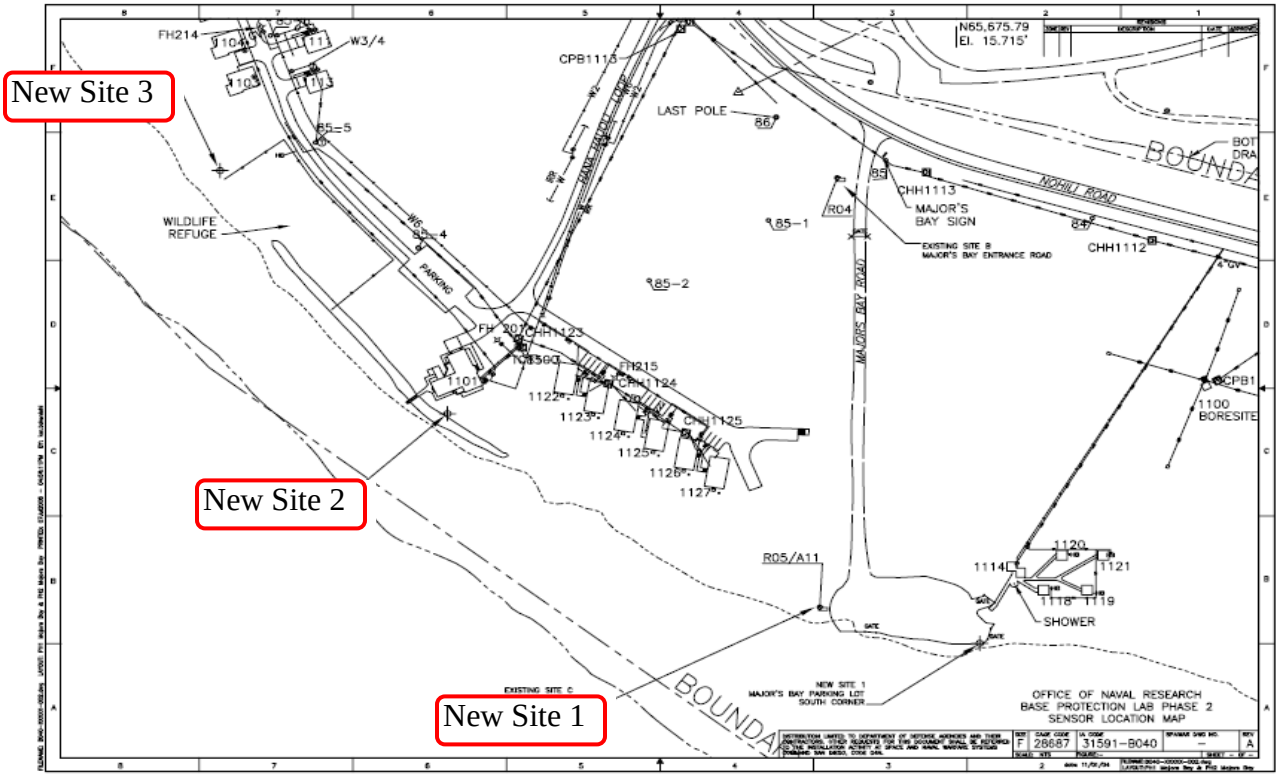

Figure 13: Majors Bay – New Sites 1, 2 & 3

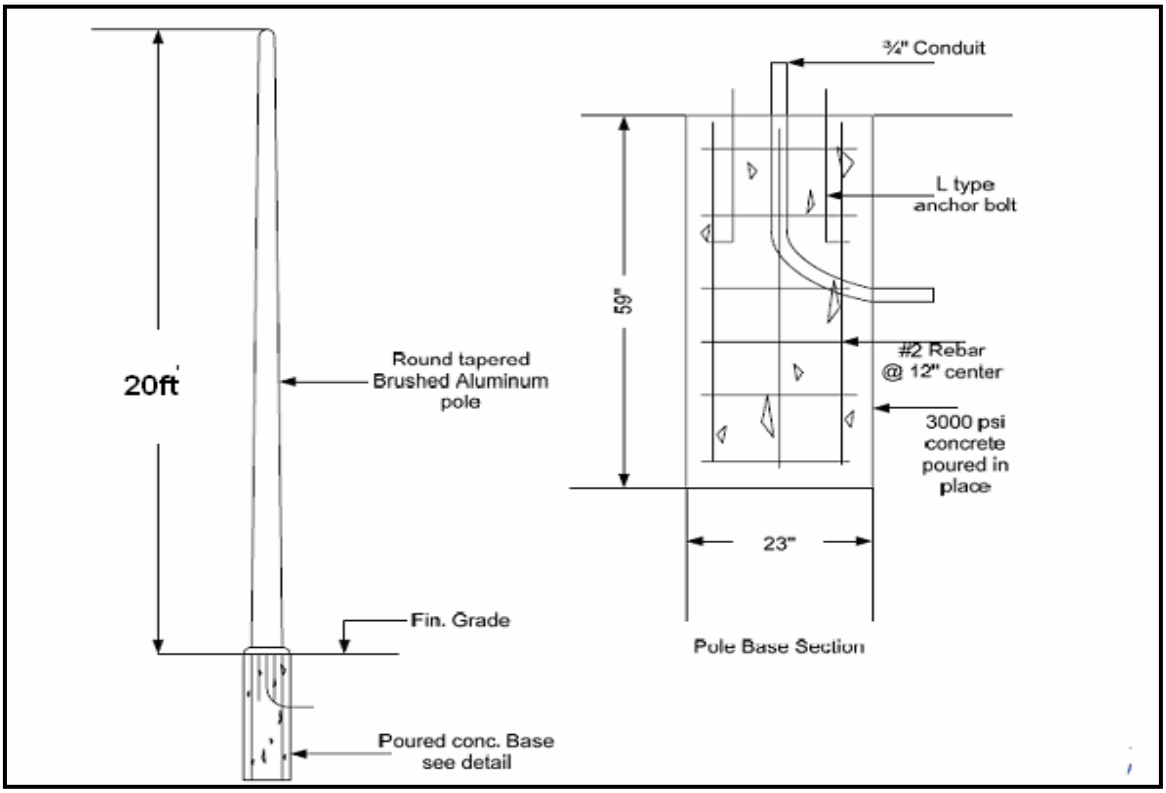

Figure 14: New 20ft Pole

DISPATCH OFFICE:

The PMRF Security Dispatch Office is the hub for PMRF's Base Security and ATFP video. These real-life video feeds from strategically placed cameras are continuously available and may be useful to the BPL. Examples of camera views include the main gate, North Beach boundary, South Beach boundary, the air traffic control tower and Port Allen. Cooperation between PMRF Base Security and the BPL will enhance base security and make more video available to the BPL (see fig. 15). It will also allow continuous data collection by the BPL if sensors are monitored by Base Security. The Dispatch Office should be outfitted to receive additional video signals from Majors Bay, from Port Allen and from existing Phase I cameras via video distribution subsystem at the BPL (see fig. 16). The Dispatch Office should also be outfitted to forward video signals to the BPL (see fig. 17). All of this can be accomplished with the addition of video recording, distribution and processing equipment (see fig. 18). The proposed enhancement at the Dispatch Center considers the capacities of the existing Extron video switching matrix, Crestron controller, video display bank, KVM switch, DVR channels, existing base fiber plant, and the bandwidth limitation to Port Allen.

1. Add fiber optic modems, DVRs and video processors to accommodate video signals from Majors Bay and from Port Allen.
2. Add fiber optic modems to pass video signals to and from the BPL.
3. Integrate new video signals into the video display subsystem.
4. Utilize space identified in the adjacent storage room as required.

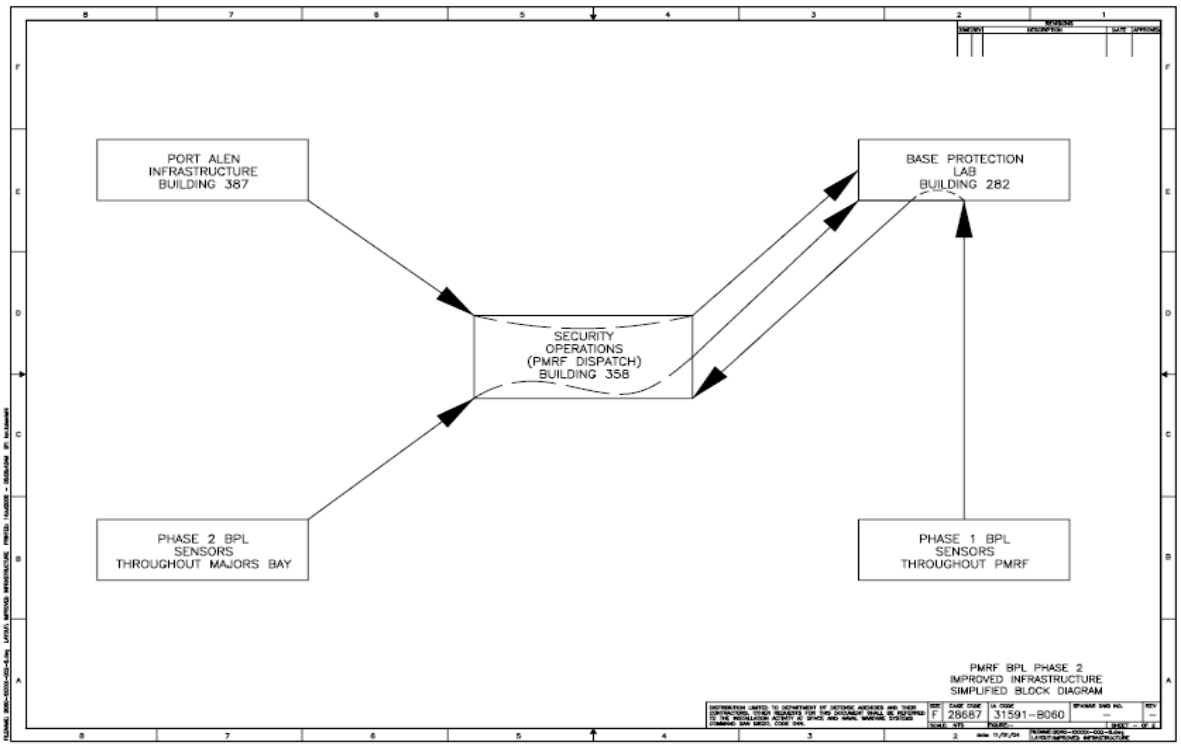

Figure 15:Proposed Infrastructure Configuration

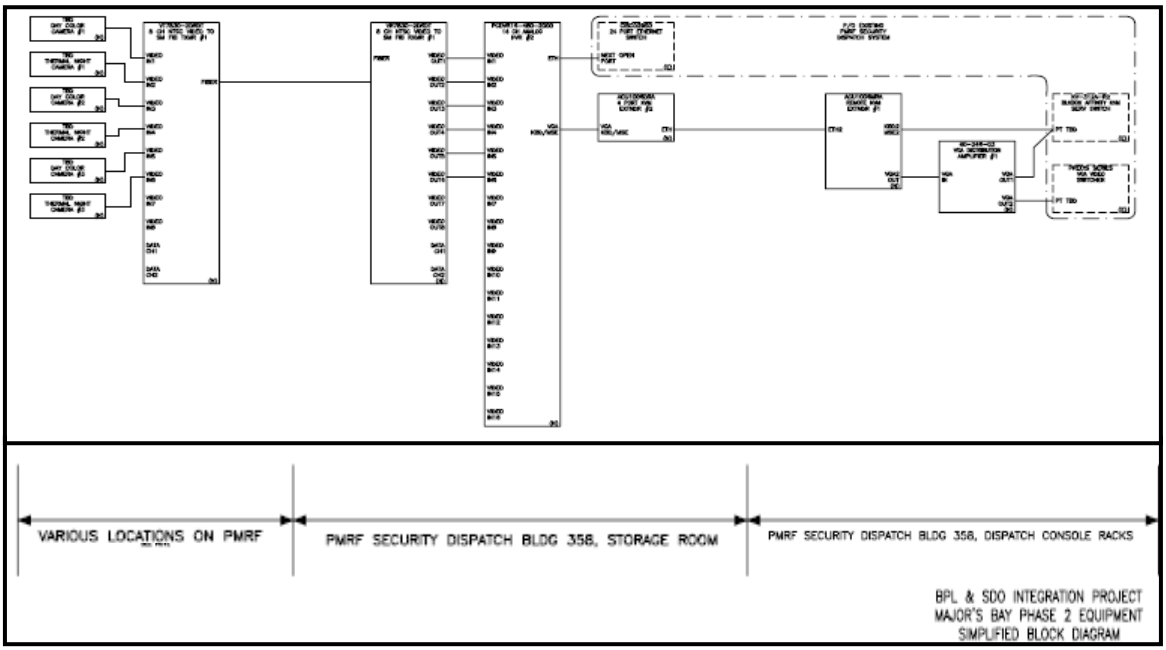

Figure 16: Block Diagram – Majors Bay/Dispatch Office Integration

ITEM	DESCRIPTION	FURN BY	QTY	U/M	NSN	MFGR. OR SUPPLIER	GOVT OR COMM DESIGNATION	REMARKS
1	8 CH NTSC VIDEO TO SM FIB TXMR	GFE	3	EA	-	INTERNATIONAL FIBER SYSTEMS	VT7830-2DRDT	
2	8 CH NTSC VIDEO TO SM FIB RXMR	GFE	3	EA	-	INTERNATIONAL FIBER SYSTEMS	VR7830-2DRDT	
3	16 CH NTSC DIGITAL VIDEO RECORDER WITH 2TB OF STORAGE	GFE	1	EA	-	TOSHIBA	DVR16-480-2000	
4	16 CH NTSC DIGITAL VIDEO RECORDER W/ IP UPGRADE & 2TB OF STORAGE	GFE	1	EA	-	TOSHIBA	NVR16-480-2000	
5	VGA DISTRIBUTION AMPLIFIER	GFE	2	EA	-	EXTRON	60-246-03	
6	6 PORT DUAL ACCESS KVM EXTENDER	GFE	1	EA	-	BLACKBOX	ACU1006DRA	
7	6 PORT KVM EXTENDER REMOTE UNITS	GFE	1	EA	-	BLACKBOX	ACU1006MRA	
8	24 PORT GB ETHERNET SWITCH	GFE	2	EA	-	CISCO	WS-C2960-24TCL	
9	GB SM FIBER MODULE	GFE	2	EA	-	CISCO	GLC-LH-SM	
10	NEMA 4X ENCLOSURES WITH SOLID STATE THERMOELECTRIC AIR CONDITIONERS	GFE	3	EA	-	EIC	CUSTOM	

Figure 17: Equipment Required for Proposed Configuration

PORT ALLEN

BPL surveillance at Port Allen would provide the capability to collect real-life data on a operating Navy pier. Leverage off of existing CCTV cameras which provide excellent coverage of the pier and add one fixed camera to view the gates (see fig. 19a, 19b, and 19c). Improve video distribution and network connections to send good quality video to the Dispatch Office where the BPL can access the data. The video is already recorded for security operations and would be available to the BPL for continuous data collection.

1. Add one fixed CCTV camera to view the vehicle gate and pedestrian gate (see fig. 19a).
2. Acquire State of Hawaii historical preservation approval to mount the camera.
3. Add video distribution and increase network capacity to pass video to PMRF Dispatch Office.
4. Add two leased T1 circuits between Port Allen and the PMRF Dispatch Office.

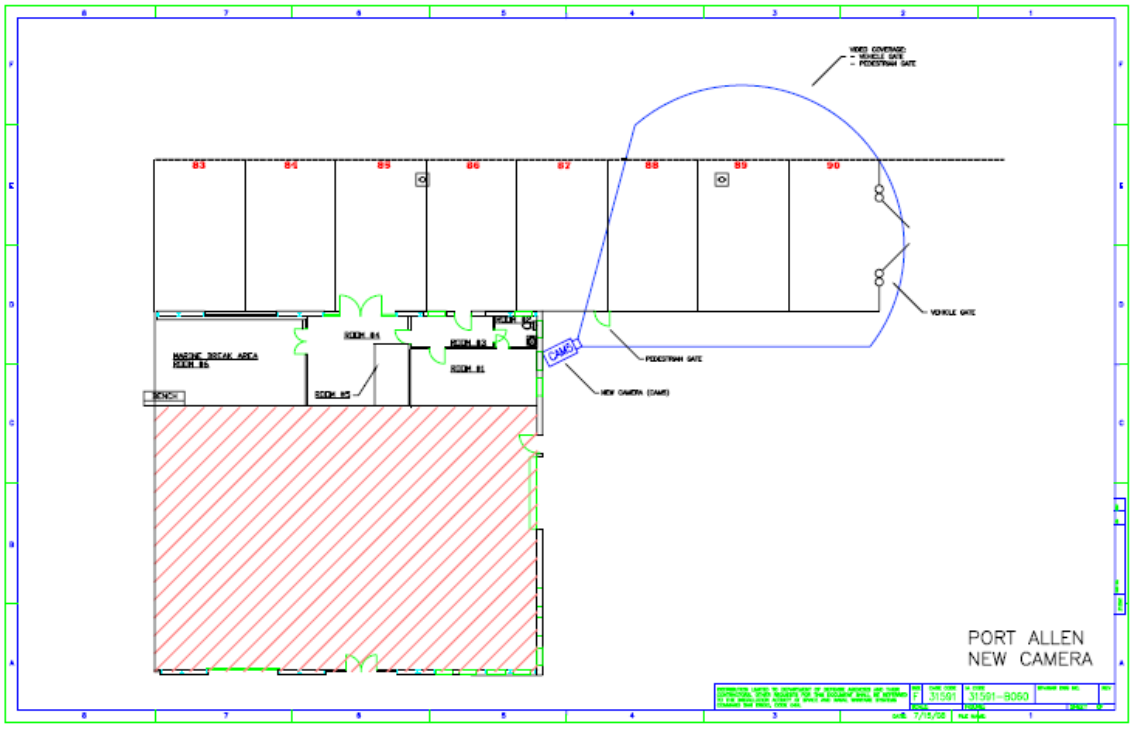

Figure 18a: New Camera on Port Allen Pier

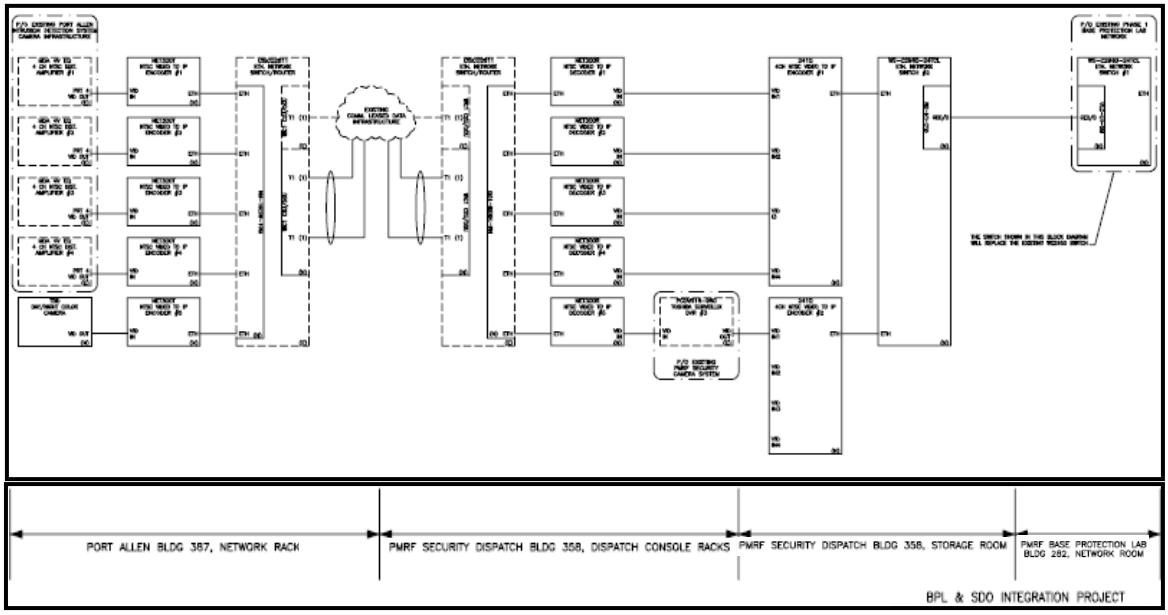

Figure 18b: Block Diagram – Proposed Port Allen

ITEM	DESCRIPTION	FURN BY	QTY	U/M	NSN	MFGR. OR SUPPLIER	GOVT OR COMM DESIGNATION	REMARKS
1	NTSC TO IP ENCODER	GFE	5	EA	-	PELCO	NET300T	
2	NTSC TO IP DECODER	GFE	5	EA	-	PELCO	NET300R	
3	4 CH NTSC TO IP ENCODER	GFE	2	EA	-	AXIS	0209-011	
4	2 PORT T-1 WAN INTERFACE CARD WITH VIOCE	GFE	2	EA	-	CISCO	VWIC-2MFT-T1	
5	16 PORT ETHERNET SWITCH NETWORK MODULE	GFE	2	EA	-	CISCO	NM-16ESW-1GIG	

Figure 18c: Port Allen Equipment List

EXISTING BPL PHASE I:

BPL Phase I sensors can be routed to the Dispatch Office via the BPL in Building 282. For example, video signals can be transmitted via existing fiber optics between the two buildings. The Blackboard terminal can also be duplicated in the Dispatch Office over existing fiber optics. The distances from the BPL existing sensor sites to the existing infrastructure are too great to connect permanent power and fiber optics within the given timeframe for FY08 funds. For now, the BPL will need to work with the bandwidth limitations and susceptibility to high winds.

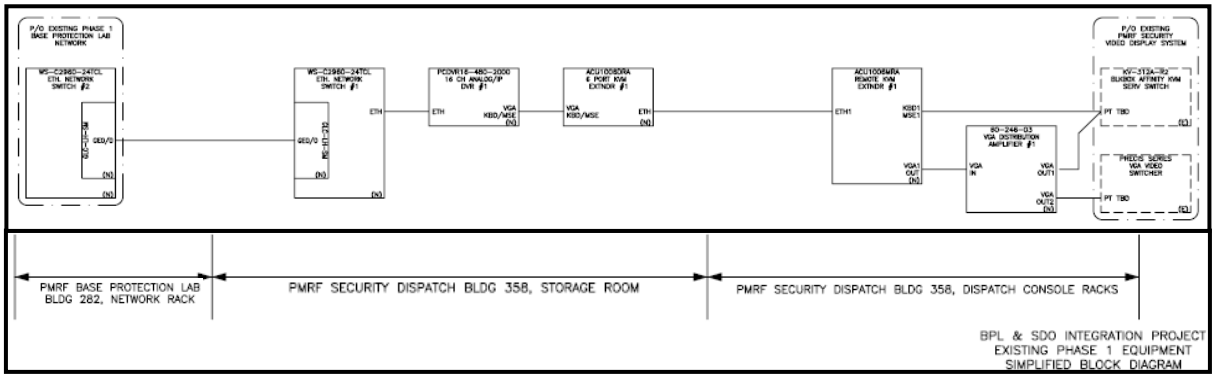

Figure 19: Block Diagram– BPL Phase 1 Integration

SPECIAL CONSIDERATIONS:

- A Memorandum of Agreement between ONR and PMRF will establish mutual sharing of security sensor data and base infrastructure. It will establish Majors Bay and Port Allen as additional data acquisition sites. It will also address O&M, training and spares for the additions to the Dispatch Office and to Port Allen.
- Environmental considerations along Majors Bay include Shearwater nesting areas and ancient burial sites.
- Historical preservation approval at Port Allen.
- Uninterrupted security operations when the BPL is deactivated.
- Data passed between the BPL and the Security Dispatch Office will be in video format to maintain separation of the BPL and PMRF security networks.
- Security operations will take precedence over BPL research when resources are shared.

ACQUISITION STRATEGY

The strategy to accomplish the objectives is driven by the availability of funds and the need to obligate those funds in FY08. Additional funds in FY09 will be required for PMRF NAVFAC and for SPAWAR to continue contract oversight in FY09.

CONSTRUCTION:
PMRF NAVFAC will plan and design the facilities infrastructure and will execute with the existing PMRF BOS contract with in-house environmental support. The effort will be a design-build contract. An optional approach for construction contracting is for PMRF NAVFAC to use an existing Multiple Award Contract (MAC) to obligate funds in FY08 then execute in FY09. The construction costs are to be determined along with the schedule for funding, obligation and execution at a later time.

ELECTRONICS:
SPAWAR Hawaii will plan and design the electronics infrastructure in-house and will execute with support from existing IT contracts for equipment procurement and installation. The electronics costs for engineering, equipment and installation on Majors Bay and the Dispatch Office is $215,000; the electronics costs for Port Allen is $110K. The total is $325,000 with the schedules shown below for funding, obligation and execution.

Dispatch Office /Majors Bay Schedule	
Money Accepted By:	Aug 30 2008
Design Start Date:	Sept 1 2008
Design Completed By:	Oct 17 2008
Procurement Start Date:	Oct 1 2008
Procurement Completed By:	Feb-09
Installation Start By:	Feb-09
Installation Completed By:	Apr-09

Dispatch Office/Majors Bay Schedule

Port Allen Schedule	
Money Accepted By:	Aug 30 2008
Design Start Date:	Oct 18 2008
Design Completed By:	Oct 31 2008
Procurement Start Date:	Oct 1 2008
Procurement Completed By:	Feb-09
Installation Start Date:	Feb-09
Installation Completed By:	Apr-09

Port Allen Schedule

RESPONSIBILITIES

Office of Naval Research
Fund the infrastructure project.

PMRF Program Manager/Range Ops
Provide on-site coordination and oversight with Base Communications for fiber optic connectivity on PMRF and for leased circuits to Port Allen.
Provide base drawings.

ONR MIDPAC, Technical Advisor Allen Couture
Provide technical guidance, coordination and oversight.
Draft the MOA between ONR and PMRF.

PMRF Security
Provide guidance on the Dispatch Office operations and video recording/viewing requirements.
Coordinate for equipment space in the Storage Room in Building 358.
Coordinate video downtimes and acceptability of the MOA.

PMRF NAVFAC
Accept the funds.
Execute the design-build tasks by contract.
Ensure environmental clearances are acquired.
Coordinate for an on-site archeologist during execution if necessary.
Oversee the execution.

SPAWAR Hawaii
Accept the funds. Plan and design the electronics additions.
Contract the procurement and installation.
Oversee the installation.
Develop an interface plan for the BPL Phase II contractor.

POINTS OF CONTACT

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APPENDICES

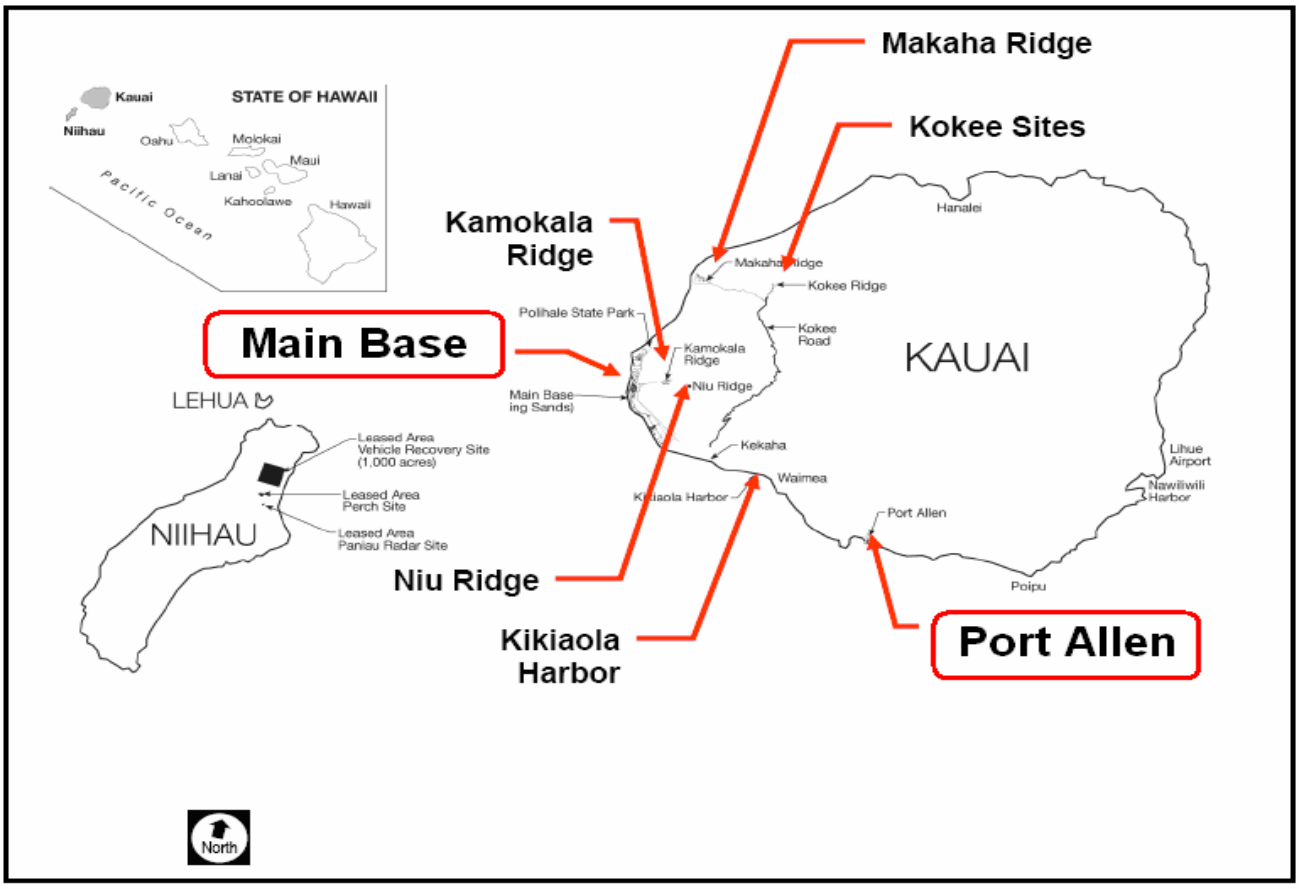

Figure 1a: PMRF Main Base and Port Allen

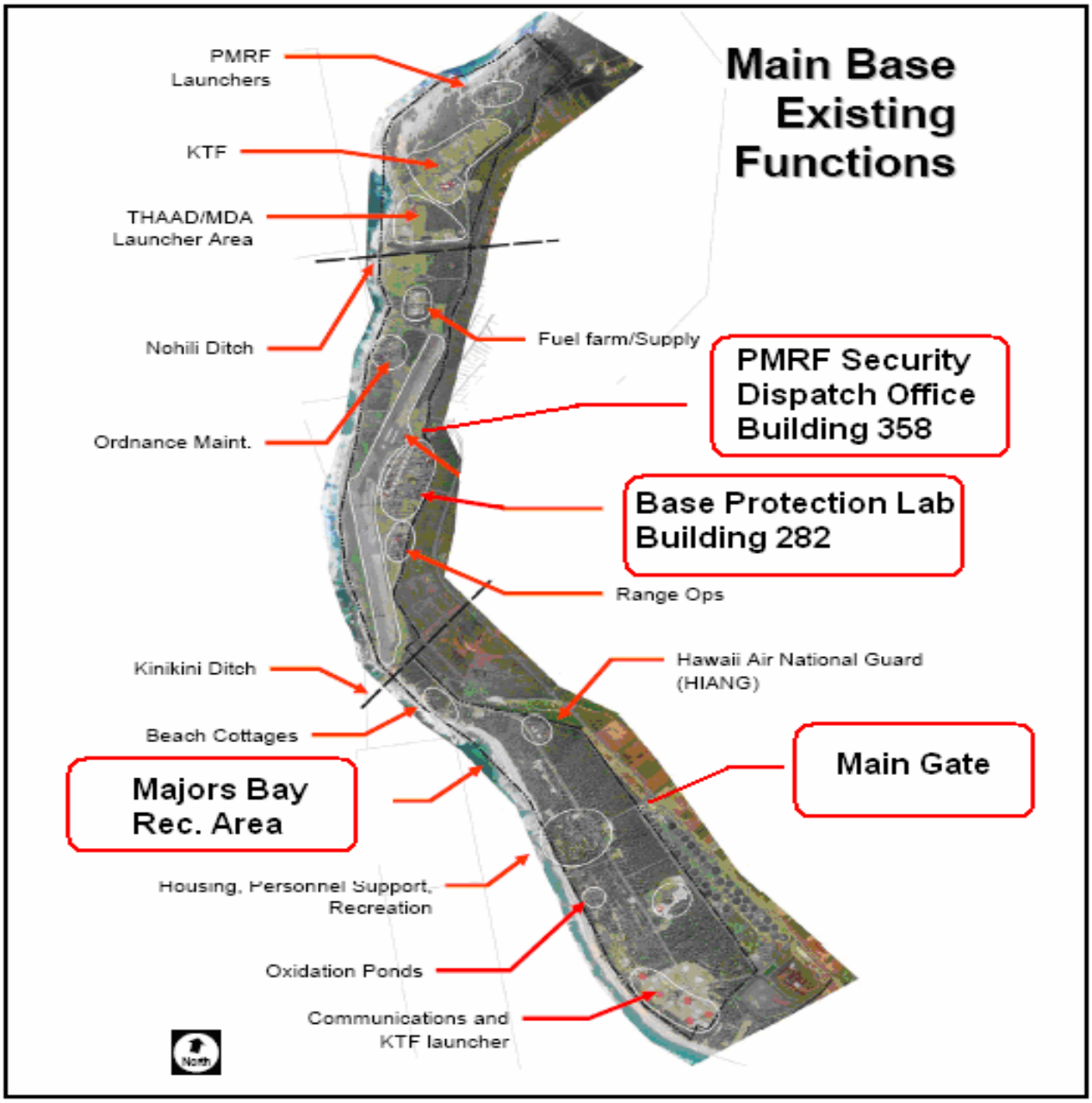

Figure 1b: PMRF, Majors Bay, Main Gate”

Figure 2: A typical BPL Sensors on PMRF

Figure 3a: Dispatch Office

Figure 3b: Typical PMRF ATFP CCTV Camera

Figure 4: Port Allen Pier

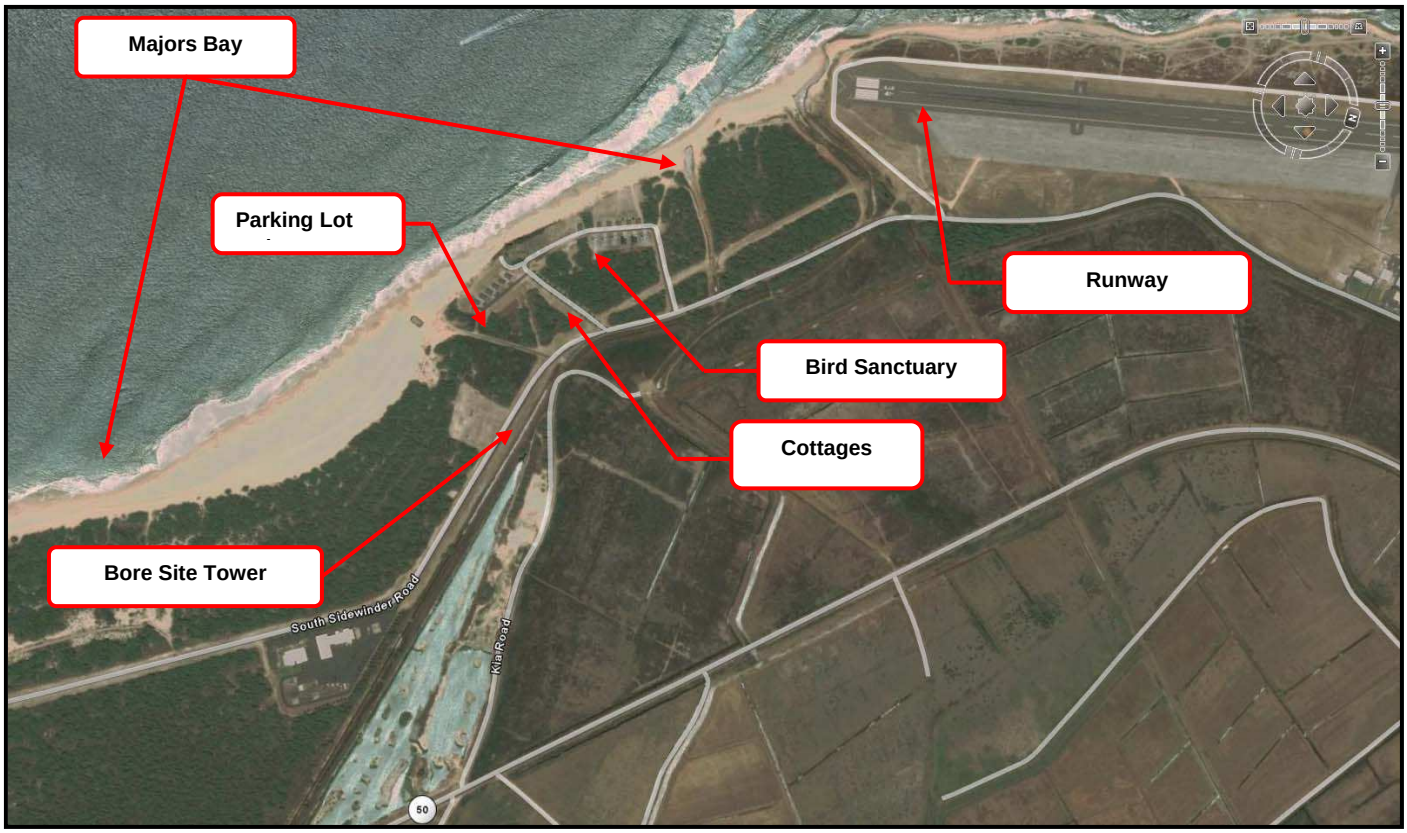

Figure 5a: Map of PMRF, BPL points of interest

Figure 5b: Majors Bay

Figure 5c: Majors Bay Parking Lot
(Note the Boresight Tower in the background)

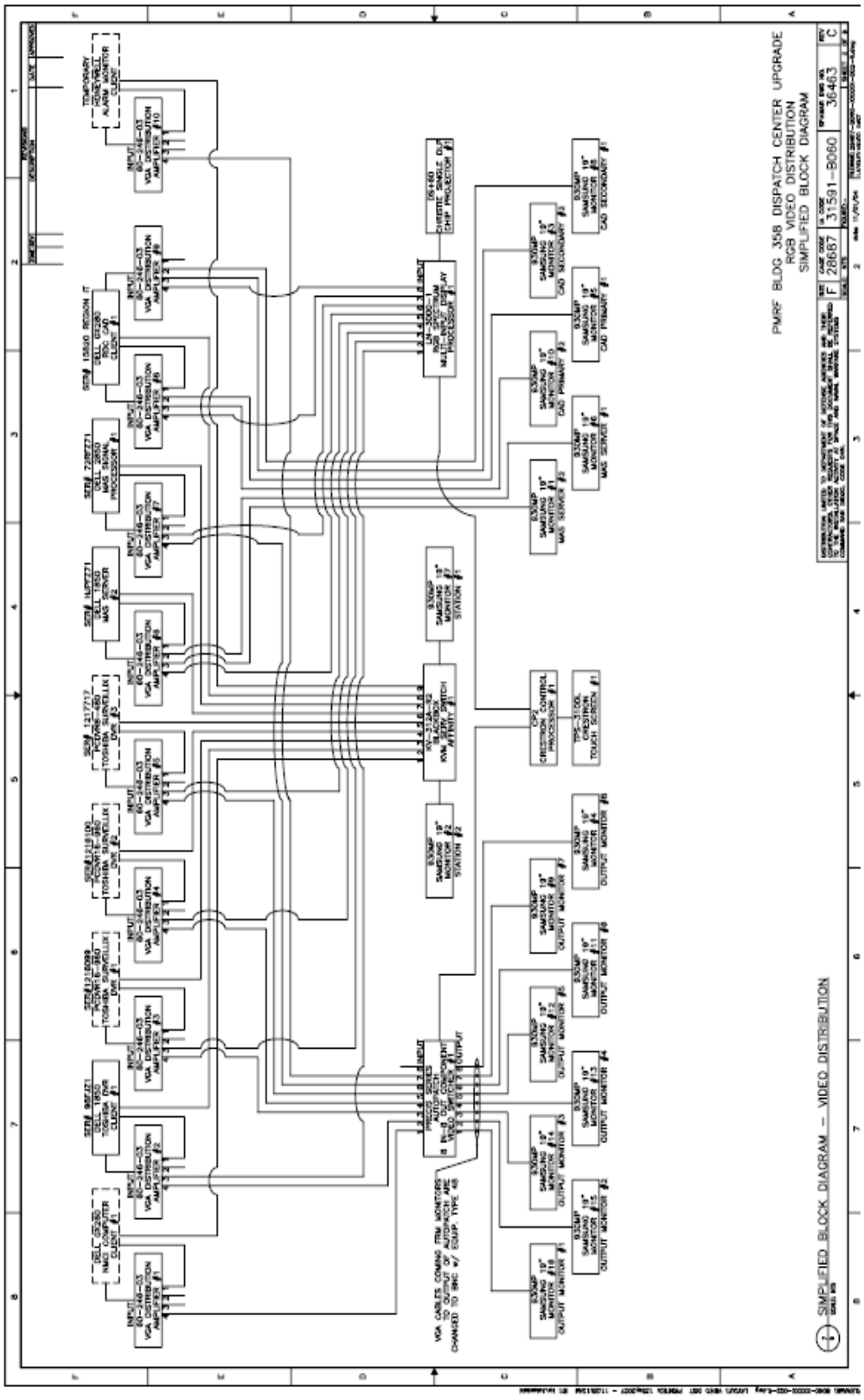

Figure 6: As-Built Video Distribution Diagram

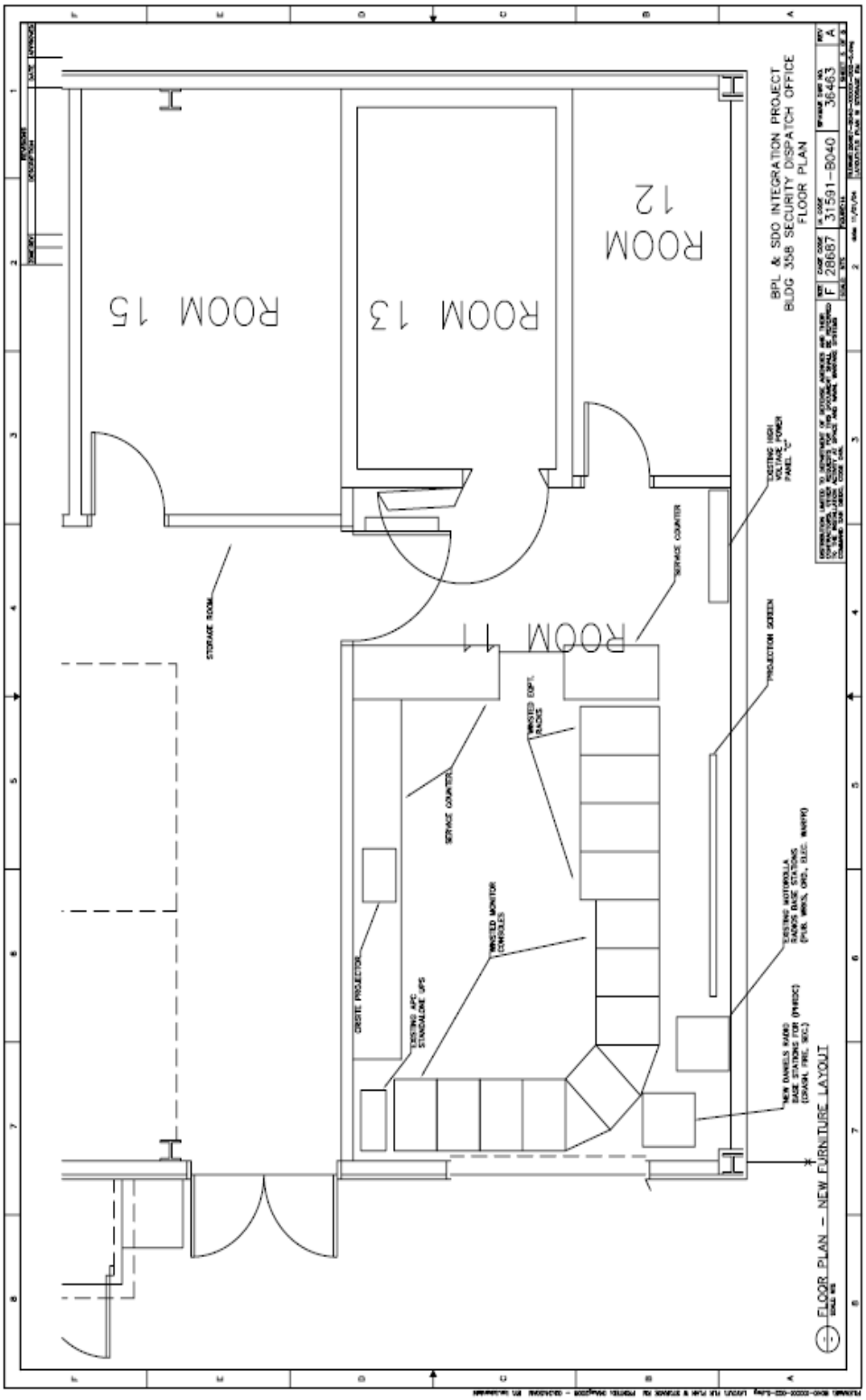

Figure 7: Dispatch Office and Storage Room floor plan

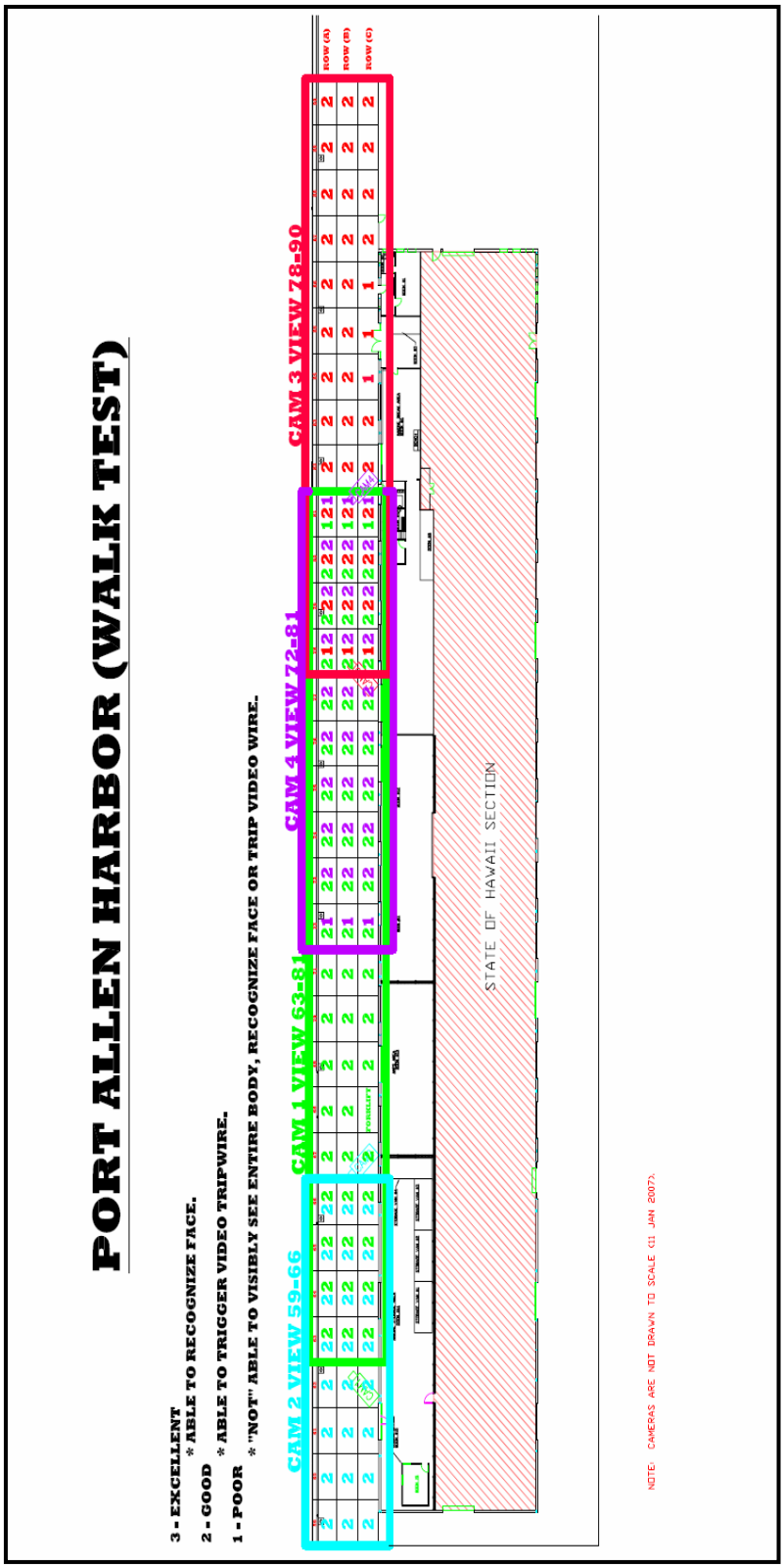

Figure 8: Port Allen Harbor Walk Test

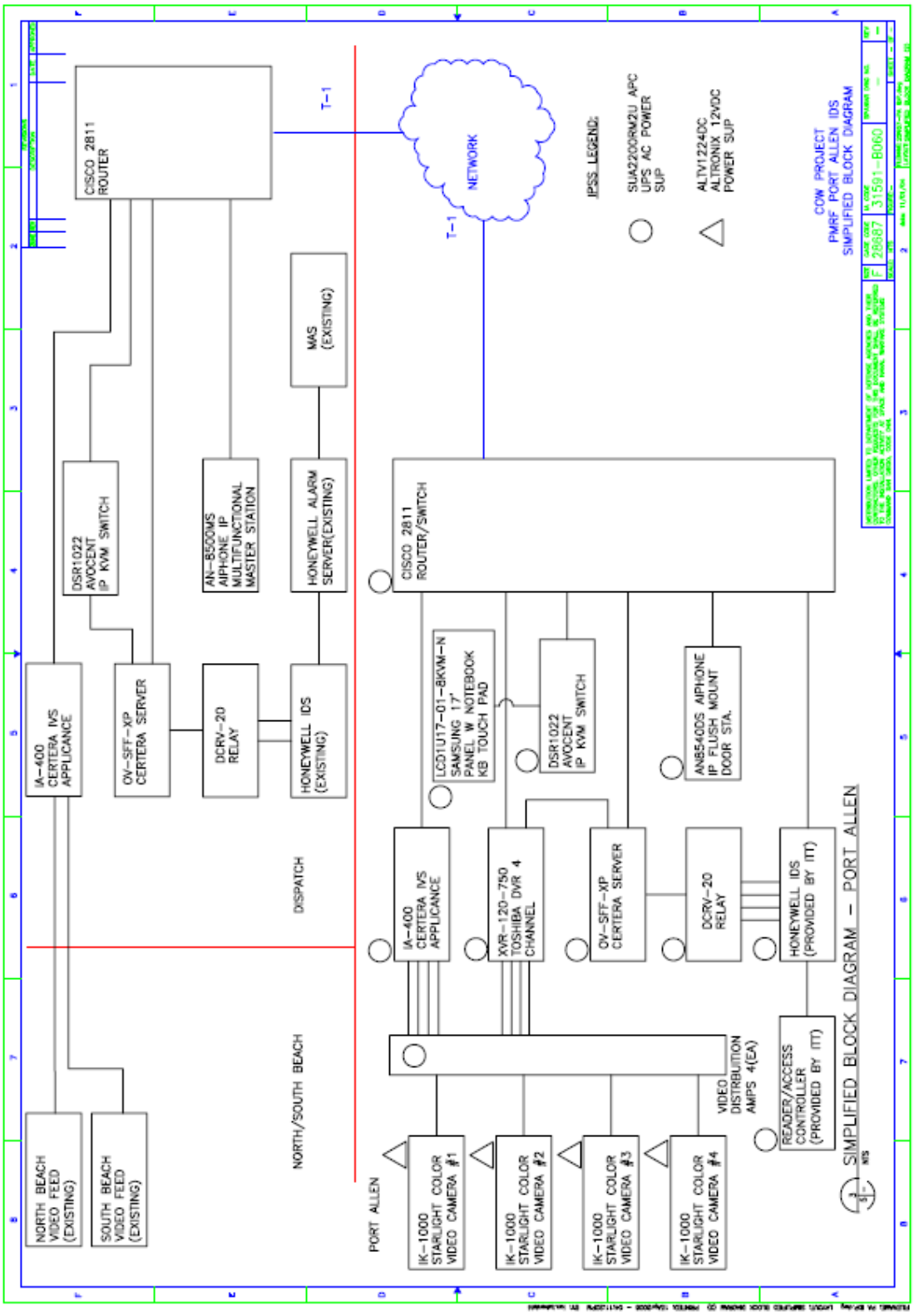

Figure 9: Port Allen As-Built Block Diagram

Figure 10: Existing Phase I Sensors

Figure 11: Existing Sites a, b, c, & d

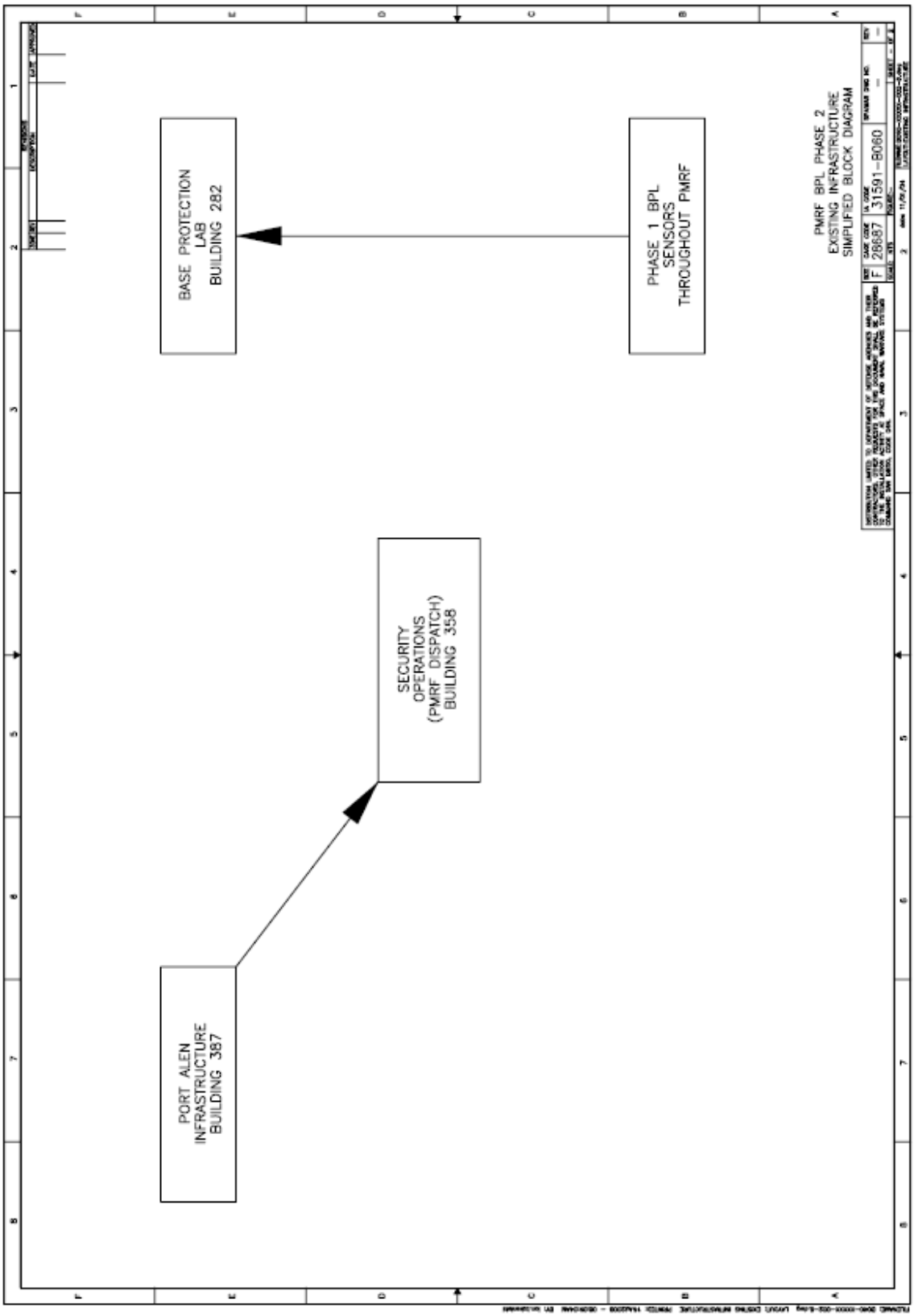

Figure 12: Current Infrastructure Configuration

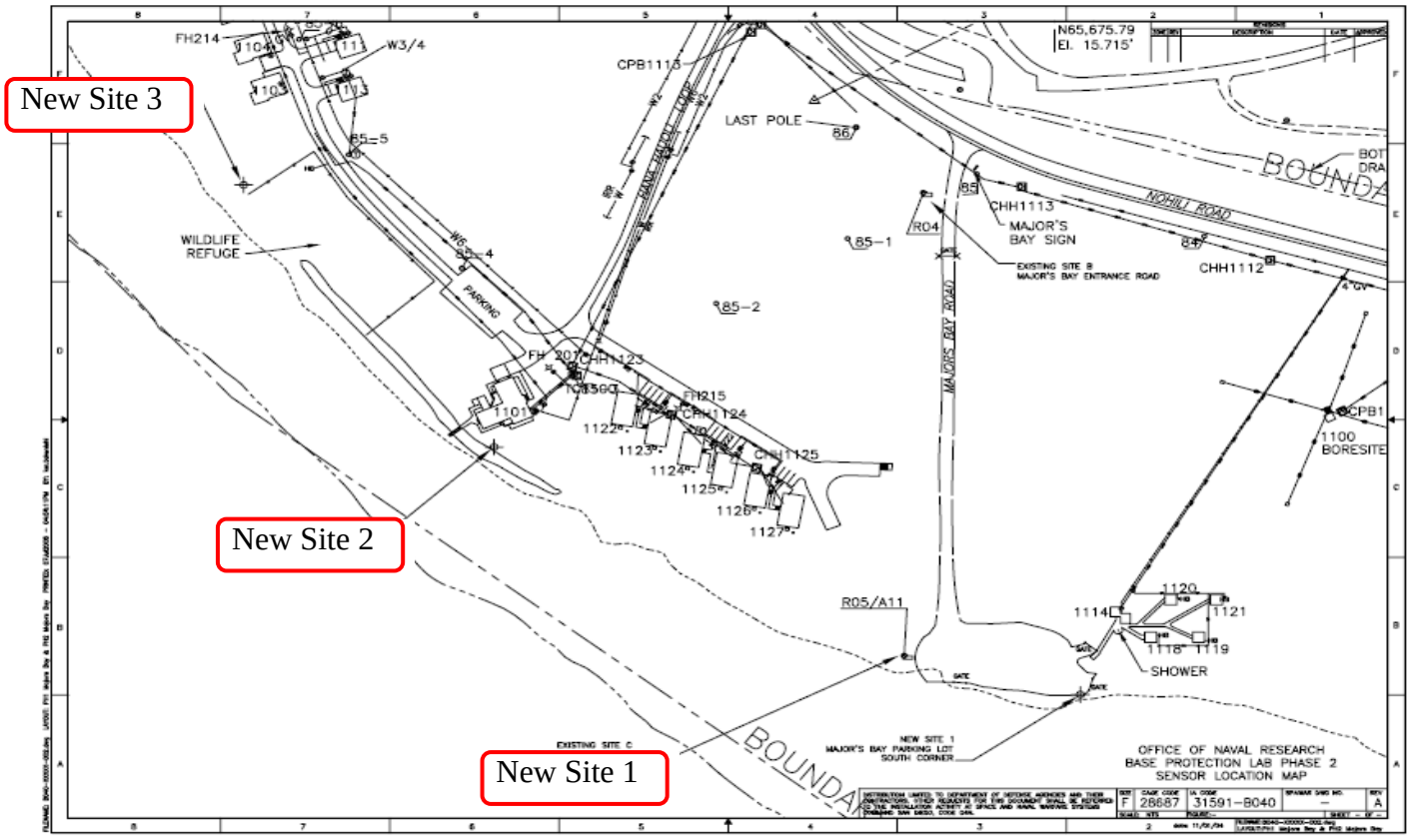

Figure 13: Majors Bay – New Sites 1, 2 & 3

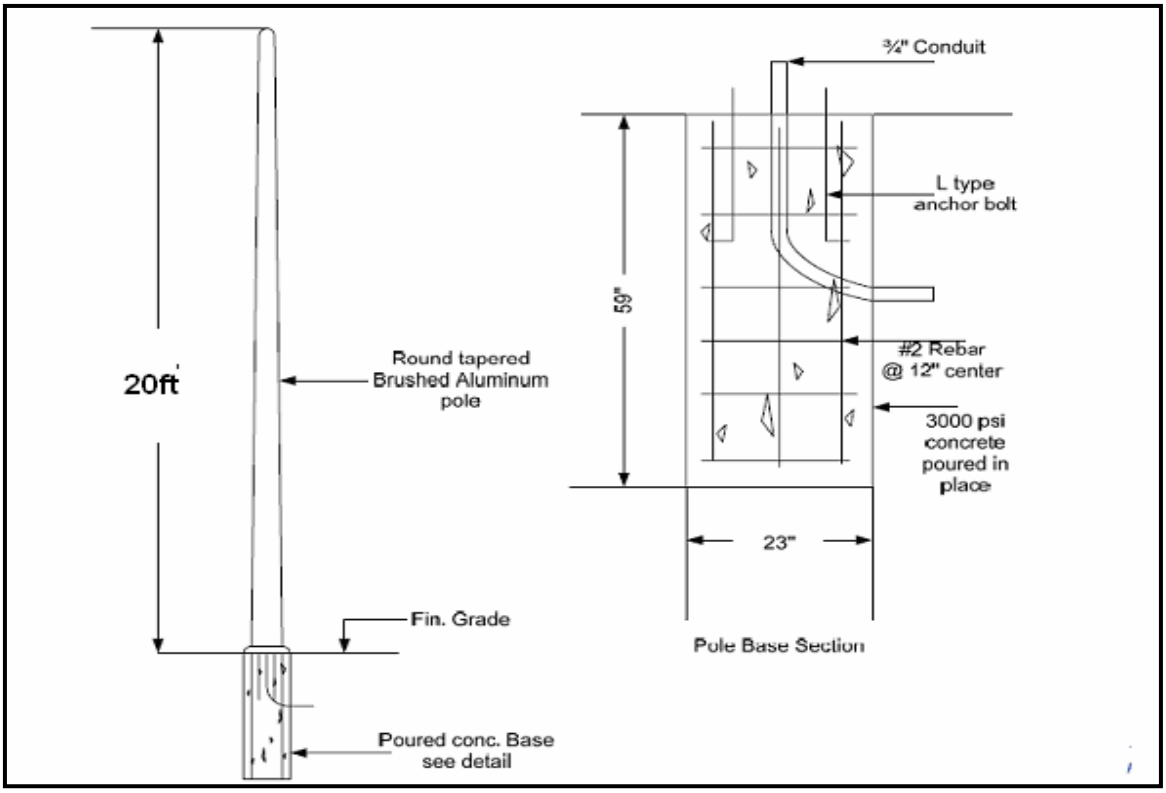

Figure 14: New 20ft Pole

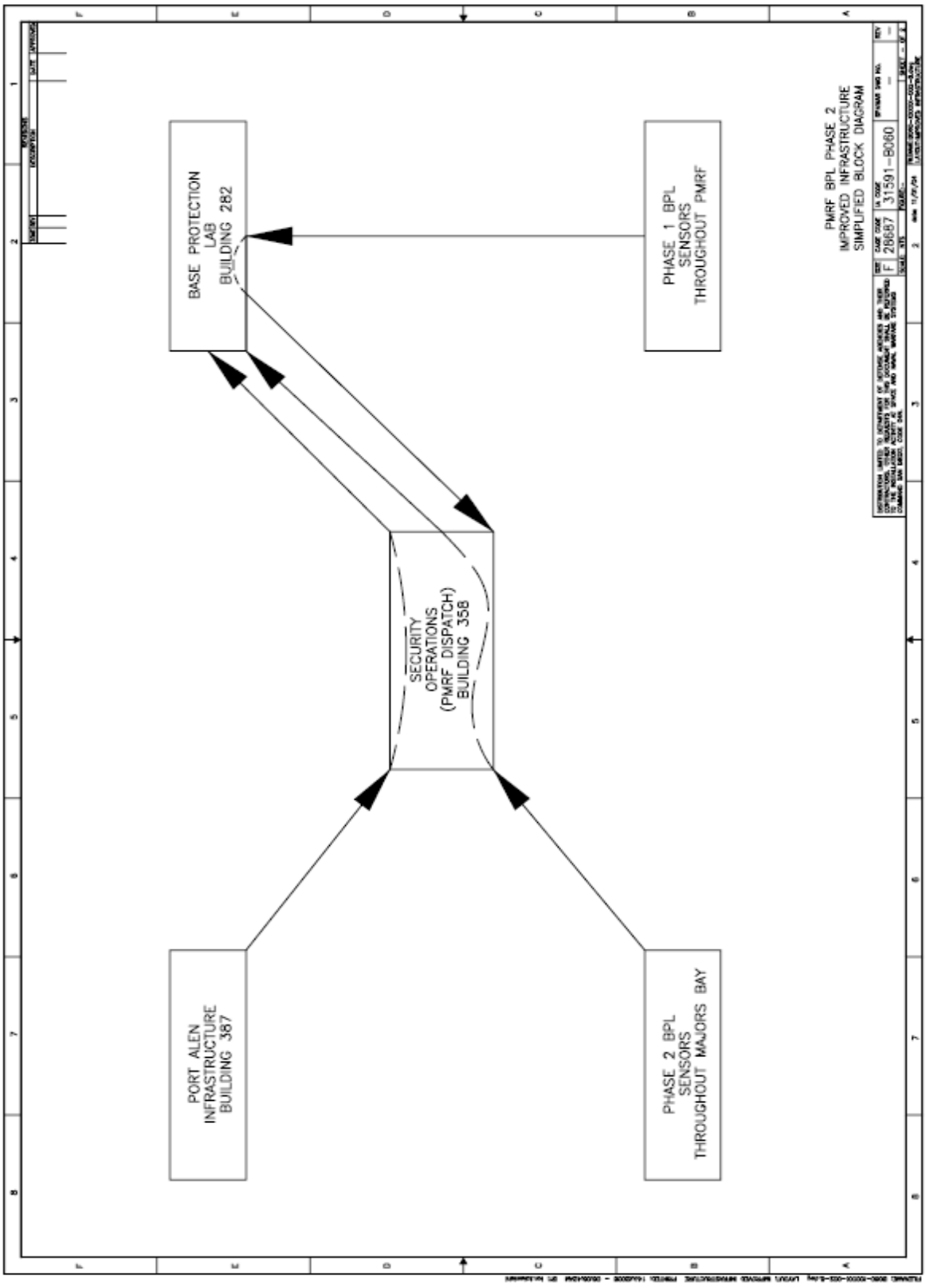

Figure 15:Proposed Infrastructure Configuration

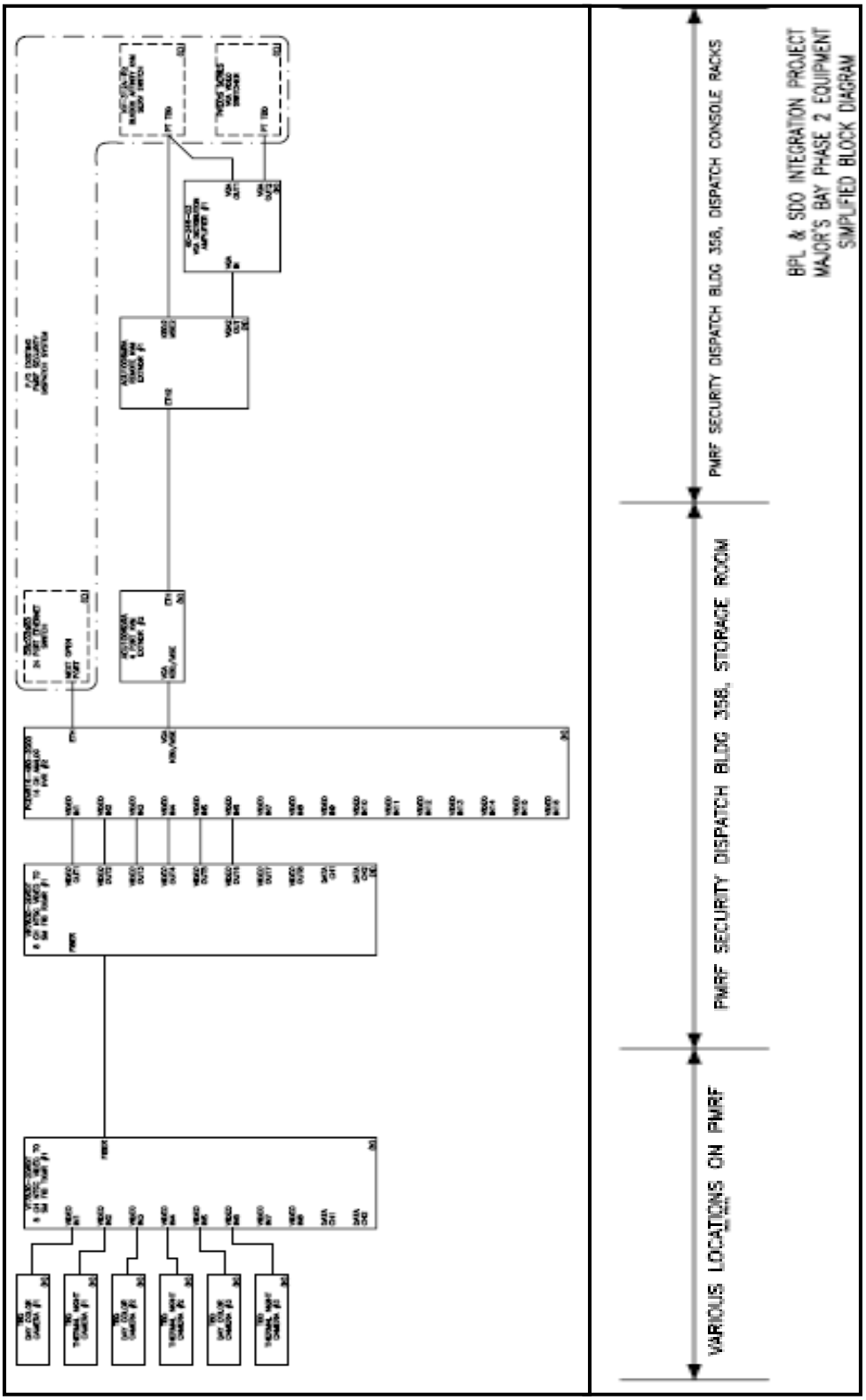

Figure 16: Block Diagram – Majors Bay/Dispatch Office Integration

ITEM	DESCRIPTION	FURN BY	QTY	U/M	NSN	MFGR. OR SUPPLIER	GOVT OR COMM DESIGNATION	REMARKS
1	8 CH NTSC VIDEO TO SM FIB TXMR	GFE	3	EA	-	INTERNATIONAL FIBER SYSTEMS	VT7830-2DRDT	
2	8 CH NTSC VIDEO TO SM FIB RXMR	GFE	3	EA	-	INTERNATIONAL FIBER SYSTEMS	VR7830-2DRDT	
3	16 CH NTSC DIGITAL VIDEO RECORDER WITH 2TB OF STORAGE	GFE	1	EA	-	TOSHIBA	DVR16-480-2000	
4	16 CH NTSC DIGITAL VIDEO RECORDER W/IP UPGRADE & 2TB OF STORAGE	GFE	1	EA	-	TOSHIBA	NVR16-480-2000	
5	VGA DISTRIBUTION AMPLIFIER	GFE	2	EA	-	EXTRON	60-246-03	
6	6 PORT DUAL ACCESS KVM EXTENDER	GFE	1	EA	-	BLACKBOX	ACU1006DRA	
7	6 PORT KVM EXTENDER REMOTE UNITS	GFE	1	EA	-	BLACKBOX	ACU1006MRA	
8	24 PORT GB ETHERNET SWITCH	GFE	2	EA	-	CISCO	WS-C2960-24TCL	
9	GB SM FIBER MODULE	GFE	2	EA	-	CISCO	GLC-LH-SM	
10	NEMA 4X ENCLOSURES WITH SOLID STATE THERMOELECTRIC AIR CONDITIONERS	GFE	3	EA	-	EIC	CUSTOM	

Figure 17: Equipment Required for Proposed Configuration

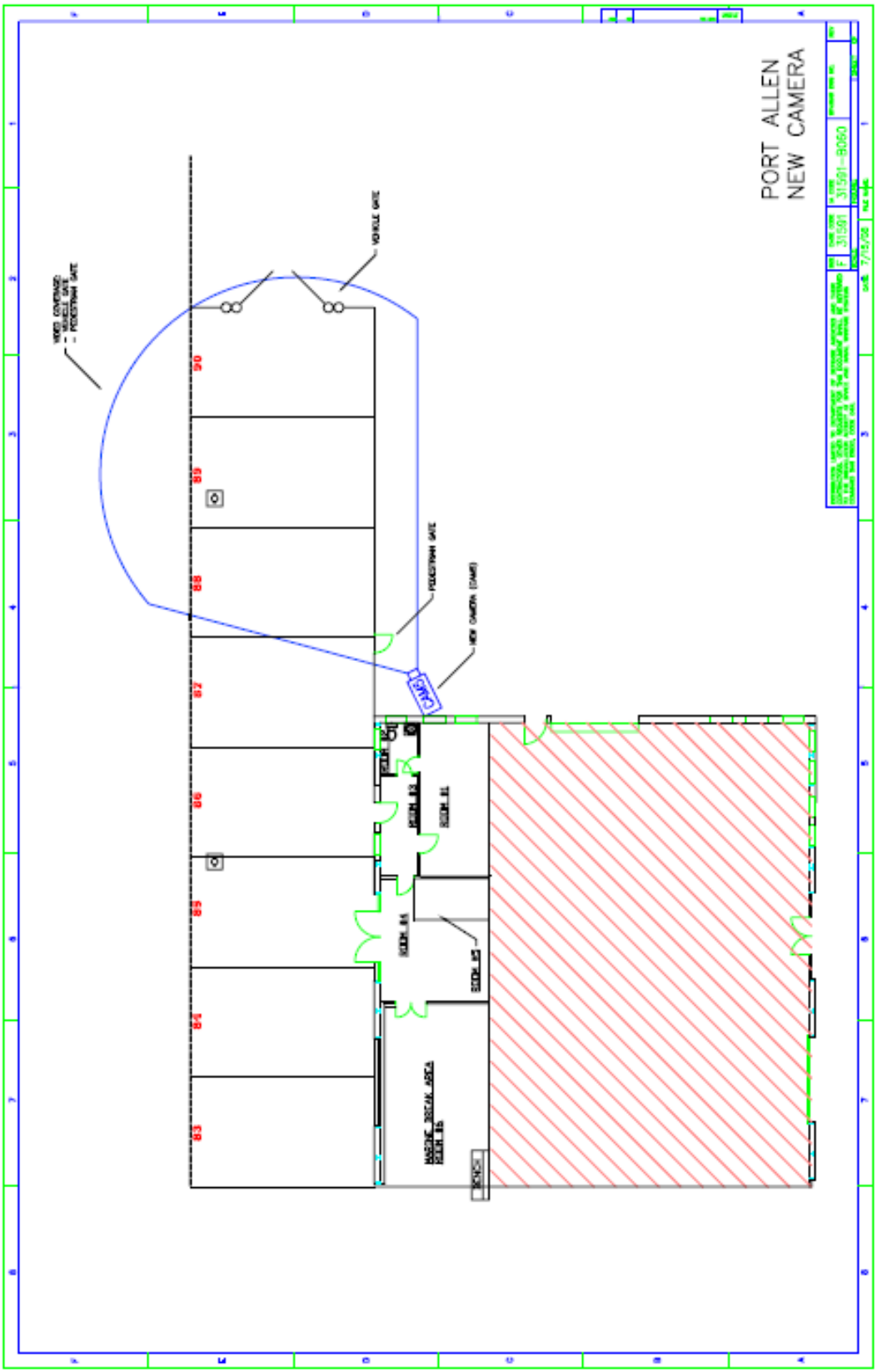

Figure 18a: New Camera on Port Allen Pier

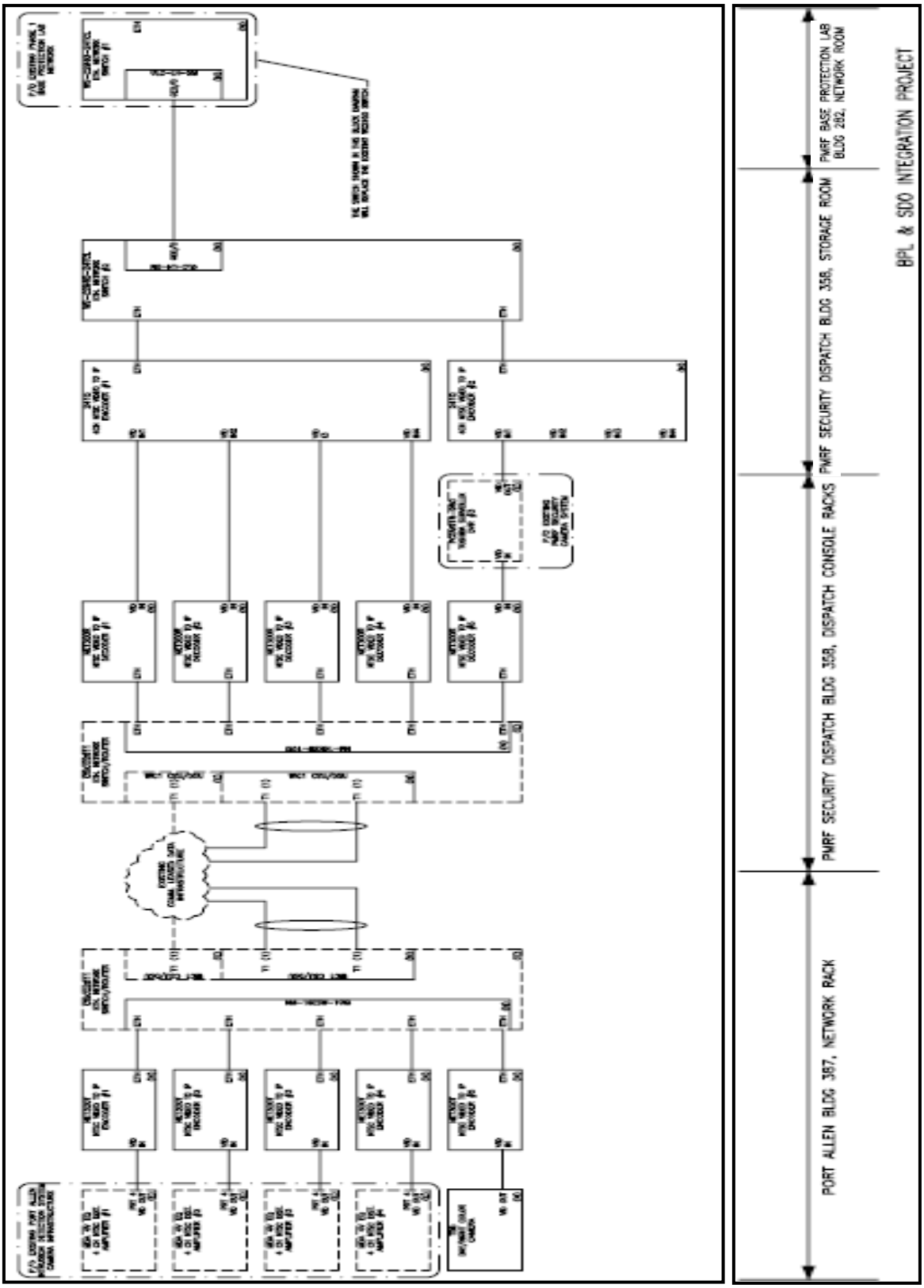

Figure 18b: Block Diagram – Proposed Port Allen

ITEM	DESCRIPTION	FURN BY	QTY	U/M	NSN	MFGR. OR SUPPLIER	GOVT OR COMM DESIGNATION	REMARKS
1	NTSC TO IP ENCODER	GFE	5	EA	-	PELCO	NET300T	
2	NTSC TO IP DECODER	GFE	5	EA	-	PELCO	NET300R	
3	4 CH NTSC TO IP ENCODER	GFE	2	EA	-	AXIS	0209-011	
4	2 PORT T-1 WAN INTERFACE CARD WITH VIOCE	GFE	2	EA	-	CISCO	VWIC-2MFT-T1	
5	16 PORT ETHERNET SWITCH NETWORK MODULE	GFE	2	EA	-	CISCO	NM-16ESW-1GIG	

Figure 18c: Port Allen Equipment List

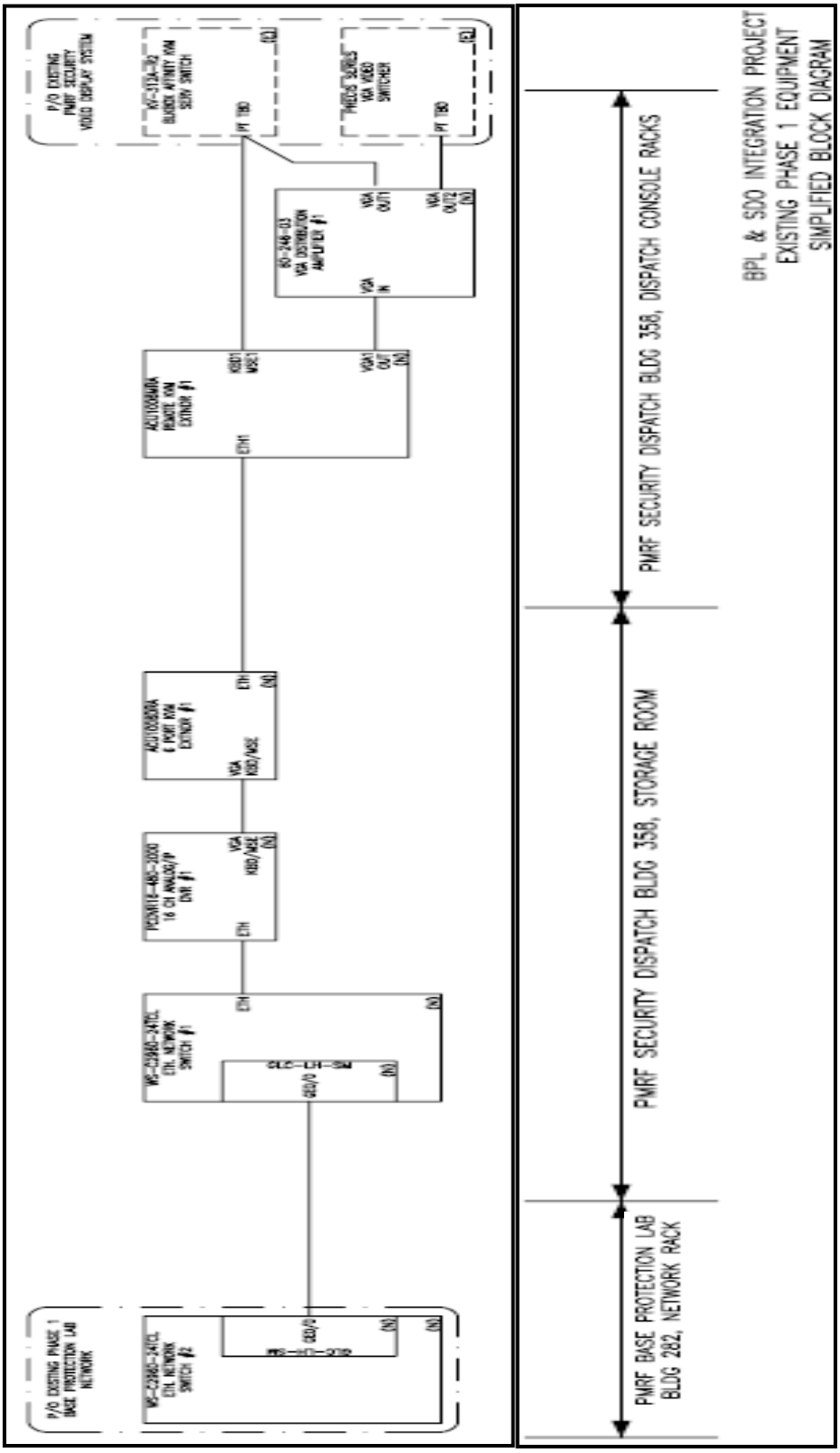

Figure 19: Block Diagram– BPL Phase 1 Integration