City of Cupertino, Office of Emergency Services
Communications Van Requirements

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This document is a work in progress, and should not be considered final or approved. Solicitations from CARES, City Staff, and other parties of interest have been requested. It is presented here to support refining the requirements for the C-OES Emergency Communications Vehicle.

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Revision Tracking

Date	Comments
8 April 2011	First draft
20 April 2011	Feedback: Marsha, Ken, Skip
25 April 2011	Summary of team review
28 June 2011	Added use scenarios, Parts Ideas

1. Introduction

1.1. Purpose of this Document

This document describes the requirements for an Emergency Communications Vehicle (ECV) to be designed, built, and deployed in support of the City of Cupertino, Office of Emergency Services (C/OES), and the Cupertino Amateur Radio Emergency Service (CARES).

1.2. What this document is not

1. A description of the operational nature of its deployment or the procedures that will be performed by C/OES or CARES. This information will be captured elsewhere.

2. A complete design specification of the equipment or layout. Where necessary, recommendations and suggestions will be made to help clarify the requirement.

1.3. Purpose of the ECV

The primary purpose of the ECV is to support the City of Cupertino Emergency Operations Center with radio communications. The ECV will replace the fixed CARES Radio Room located at City Hall, lower level. The ECV will be parked within close proximity of the EOC for rapid activation.

The secondary purpose of the ECV is to support a mobile command post. Communications continues to be its primary mission, but the ECV will carry minimum equipment and supplies to establish covered space for outside operational use.

1.4. Introduction to Requirements

The ECV requirements are broken into the following categories.

1. Communications

2. Computing and Networking

3. Operating Environment

4. Access & Security

5. Power distribution

6. Maintenance

2. Operating Scenarios

2.1. EOC Support, City Hall

This scenario describes how CARES will use the Comm Van in support the Cupertino Emergency Operations Center (EOC) in the event of an emergency and subsequent activation.

2.1.1. Activation

1. CARES will activate the emergency net per our SOP. This initial response will occur where ever we are, and not necessarily at the EOC. A member qualified to drive a city vehicle will be deployed to the location where the van is stored and drive it to the City Hall Parking Lot.

2.1.2. Van System Startup

1. Once at City Hall, if commercial power is available, the van will be plugged into a "shore power" outlet to preserve generator fuel. If commercial power is not available, the on-board generator is started.

2. We will also plug in the van's phone line into a "shore telephone" outlet, and direct the line to be switched on in the EOC (ASSUMES City Services installs such a line).

3. Van lighting, computer, network, and communications systems will be activated.

4. Once confirmed operational, CARES will activate the following communications systems:

2.1.3. Team Supervision

1. The Shift Supervisor will assume control over the communications resources in the van and deployed to the field. The shift supervisor will monitor either the county command channel (440) or CARES TAC-3 for any relevant traffic on a dedicated dual-band radio from the supervisor's position.

2.1.4. CARES Message Net

1. The message net will be managed by a remote net control operator.

2. At the van, an operator will be assigned to the message net to receive messages from and originate messages to the field.

2.1.5. CARES Resource Net

1. The resource net will be staffed by a local operator at the van.

2.1.6. County Message Net

1. At the van, an operator will be assigned to the County message net to receive messages from and originate messages to the County EOC.

2.1.7. Packet Operations

1. The packet capability will increase in prominence as the ARK sites come on line with Packet. Initially, a non-ham packet operator may be assigned to handle packet traffic. This would include checking both the City's packet BBS as well as the county's packet BBS. In the situation where traffic is light, the County Message Net operator or Shift Supervisor can monitor packet activity.

2.1.8. EOC Network connectivity

1. To minimize the need for physical runners between the Van and the EOC, CARES will establish a wireless network connection to City Hall or to a remote CARES PC in the EOC. This PC link will provide the ability to Instant Message with the EOC as well as print packet messages directly in the EOC.

2. Outgoing messages from the EOC can be sent to the Packet PC in the Van via the program Ics213mm.

2.1.9. Operations

1. As voice messages arrive from the field, they are typed into a computer-based message form and printed remotely in the EOC.

2. The Shift Supervisor will communicate with the CARES EOC/PC operator on operational or logistical matters by VOIP, FRS or on TAC-3.

3. In the event that additional workspace is required, CARES will deploy the awning on the drivers side of the vehicle, 1 or 2 on-board tables, and the necessary folding chairs.

4. Personal laptops may be brought by members. The plug in their laptops to power outlets for charging, as well as connect to the Van's LAN either by CAT-5E connections or wirelessly.

2.1.10. Shut-down / Recovery

1. At the end of the event, a list of replenishment supplies is developed and submitted to the EOC for refill. The Generator fuel is refilled. The van is returned to its storage location.

2.2. Remote Command Post

This scenario describes how CARES will use the Comm Van in support a remote field operation where a field-based command post needs to be set up.

2.2.1. Activation

1. CARES will activate the emergency net per our SOP. This initial response will occur where ever we are, and not necessarily at the EOC. A member qualified to drive a city vehicle will be deployed to the location where the van is stored and drive it to the City Hall Parking Lot.

2.2.2. Van System Startup

1. Once in site, the on-board generator is started.

2. Van lighting, computer, network, and communications systems will be activated.

3. Once confirmed operational, CARES will activate the communications systems as necessary to support the response. See sections **2.1.3** to **2.1.7** above.

2.2.3. EOC Network connectivity

1. CARES will establish a wireless network for local PC applications. Minimally, this will support the Packet Radio and its ability to initiate and receive remote messages within the range of the VAN/LAN.

2.2.4. Operations

1. In the event that additional workspace is required, CARES will deploy the awning on the drivers side of the vehicle, 1 or 2 on-board tables, and the necessary folding chairs.

2. Additionally, CARES will deploy 1 or 2 of its on-board pop-up tents, additional tables, and chairs.

3. Personal laptops may be brought by members. The plug in their laptops to power outlets for charging, as well as connect to the Van's LAN either by CAT-5E connections or wirelessly.

4. During night-time operations, sufficient inside and outside lighting is turned on (within the power budget) to support operations.

3. Requirements

3.1. Communications

Communications means the radio systems required to carry out the mission of CARES and C/OES.

3.1.1. Definitions

1. Operating Position: one of three (3) fixed positions where an operator is seated to staff and operate a radio.
2. Supervisor's position: the location where equipment is placed to support the Shift Supervisor. This is not a seated position.
3. Dashboard: Where the EVC driver operates. May be located on the passenger side of the vehicle.
4. Console: the location where equipment is placed to support general ECV operations. May be the same as the Supervisors position for equipment placement efficiency.

3.1.2. Radio Systems

The required communications capabilities in the ECV are as follows:

Application	Capability	Notes	Antenna	Priority
Radio Room Operator, CARES Message Net (TAC 1, 147.570)	2m/440, FM transceiver, 50 W	Operating position #1	Mast-mount	MUST
SCC Message Net	2m/440, FM transceiver, 50 W	Operating position #2	Roof-mount	MUST
Net Control, Resource Net (TAC 2, 146.460)	2m/440, FM transceiver, 50 W	Operating position #3	Mast-mount	MUST
Packet, includes TNC	2m or 220, FM transceiver, 50 W	Operating position #2	Roof-mount	MUST
Amateur TV	1.2Mhx TX /440 RX ATV	Console	NEED DECISION	MUST
CARES Command Net (TAC 3, 440.150)	2m/440, FM transceiver, 50 W	Supervisors position	Roof-mount	MUST
Navigation support	GPS	Dash Board	Roof-mount	Want
Includes APCO-25 receive capability	Scanner, public safety,	Console	Roof-mount	MUST
Community FRS/GMRS	GMRS	Dash Board	Roof-mount	Want
AM Radio 1670	Monitor			Want
Emergency Internet Link	SCEWN Antenna		TBD	Want
EOC to EOC	37Mhz public service	Supervisors position, or Dash Board	TBD	MUST
City Service Center	Trunk-radio, HT		HT	MUST

3.1.3. Other communications

The required communications capabilities in the ECV are as follows:

Application	Capability	Notes	Priority
Telephone		To be connected to a fixed phone jack	Want
P.A. System		General P.A., used with a radio patch for wide area announcements	Want

Additionally, the following is required:

1. All electrical wiring, control cables, and coax should be placed in accessible out-of-the-way wire-ways.
2. Each position will have a foot switch, boom mic, headphones, or a mic/headphone combination.
3. All equipment can be independently powered on and off.
4. External antenna connectors, or CARES antenna kit

3.1.4. Mast Subsystem

The best means of improving coverage of a transmitted and received radio signal is through antenna height, not radio power.

1. The ECV requires specific antennas (marked as Mast Mount above) to be elevated to a height of 30 to 50 feet above ground level (50 ft preferred).
2. The mast system should be strong enough to support the set of antennas and their associated cables.
3. The mast should be field-deployable to achieve the required height requirement.
4. The mast must be able to be lowered and secured for vehicle travel.
5. Mast-mounted antennas should be stored when not in use and the mast is down, and easily attached upon reaching an operational position.
6. Storage of mast-mounted antennas should be implemented to ensure they are secure and not accessible or damaged by unauthorized persons (vandalism).
7. Raising or lowering of the mast can be by either manual or electro-mechanical means.
8. The mast antenna system should be capable of being assembled and raised by no more than 2 persons.

3.1.5. Questions

1. External Coax connectors for roof-mount antennas?

3.2. Computing and networking

3.2.1. Computing

The following PCs are required for ECV operations:

Application	Capability	Notes	Priority
Amateur Radio Packet	PC, Laptop, Windows	ECV Desktop position #2	MUST
EOC, CARES position	PC, Laptop, Windows	EOC, This PC could be used for EOC-based packet, for Instant messaging between the EOC and the ECV, and/or other to be defined purposes.	MUST
Supervisor support	PC, Laptop, Windows	ECV Supervisors console	Want

3.2.2. Other Devices: Printer and Scanners

The following additional devices are required for ECV operations:

Application	Capability	Notes	Priority
Amateur Radio Packet	Printer, networked	ECV Desktop position #2, or vicinity	MUST
EOC, CARES position	Printer, direct connect or networks	EOC, This printer could be used for EOC-based packet, incoming messages from the ECV, and/or other to be defined purposes.	MUST
ECV operations	Scanner	Printer/Scanner combinations are common devices in the market. A separate scanner should not be purchased.	Want

3.2.3. ECV Local Area Network

The following requirements are all considered MUST requirements.

1. A LAN should be established between all PCs and Printers in the ECV.
2. The LAN should support both direct connected devices and wireless devices (primary).
3. The LAN should be able to operate stand-alone as its own independent subnet without any support or connectivity with any other internet provider.
4. Connectivity to the EOC, either the City secured LAN, the City's public LAN, or a C/OES-hosted LAN is required.

3.3. Operating Environment

Operating environment refers to the things that are in place that affect the operations of the ECV staff.

3.3.1. Internal Operations

Application	Notes	Priority
Operating Positions	Three (3) seated operating position must be established. The positions should have sufficient space for transcribing messages, paperwork, keyboarding, etc., posting messages/notes (corkboard, hanging clipboards, etc.)	MUST
Supervisors Position	This is a standing position. An operating surface provides a place to take notes, update logs, or originate messages for transmission. This position should be located close to the rear door or passenger position to avoid unnecessary traffic through the van. Items required to support the Supervisor: • T-CARD holder • White-board • Fold down seat (or folding 3 legged stools?)	MUST

Passenger Seat Position	This is an ad-hoc seated operating position that supports a temporarily available work surface that can be used on an as-needed basis.	Want
Map Board	This is a flat surface where plates of the City and/or County maps can be placed.	MUST
Lighting	All of the above positions should have sufficient local lighting that eliminates the immediate work space. Overhead lights should be available to ensure the interior is sufficiently eliminated. Operating position lighting should support a "night time red" light to avoid delayed recovery of night vision when leaving the van.	MUST
Sound dampening	All walls and ceiling areas not used as white-boards will have sound dampening cloth applied.	MUST
Vertical Writing surfaces	Cabinet doors will be covered with material that allows them to be used as "white board" surfaces.	Want

3.3.2. External Operations

Application	Notes	Priority
Work Positions	It is probable that the ECV will become the center of activity during a field deployment for ICS or ad-hoc conference space. Therefore, sufficient folding table space is required to support such operations. The requirement is: 2-4 pop-up tents 2-4 folding tables 4-8 folding chairs.	MUST
Towing	Removable trailer hitch to tow CERT or other trailer	Want
Weather Protection	Roll down RV-type awning on drivers side (avoids the generator on the passenger side)	Want
Lighting	External lights/flood lights are mounted on roof, both sides for exterior wide-area night time operations. Outlets for plugging in task lighting at outside operating positions.	MUST

3.3.3. Storage

Application	Notes	Priority
Operating Positions Supervisors Position	Each operating position requires closed space (cabinets or drawers) for manuals, documentation, supplies, forms, paper, and personal effects. Closed implies that the contents will not be dumped out when the vehicle is in transit.	MUST
External Operations	Space for the tents, folding tables, and folding chairs must be available and situated for easy access. They should take up the least amount of space as possible without sacrificing inside operating spaces. When not in use, these items are stored in a manner that allows them to be easily accessible as well as out of the way for internal operations.	MUST
Other	General storage is required for other items needed to support the ECV's mission. Items for storage should be organized in bins or tubs for easy organization, access, and management. Multiple size flip top containers on shelves might be more flexible? The list of items could include, but is not limited to, the following: Documentation: procedures, instructions, etc.	Various

	• Administrative supplies: forms, pens, pencils, clip boards, etc. • Communications supplies: fuses, replacement bulbs, replacement antennas, other infrequently used radios, etc. • Safety equipment: vests, yellow caution tape, traffic cones, goggles, gloves, etc. • Tools: general purpose tools, duct tape, gaffers tape, bucket, plastic garbage bags, etc. • General purpose supplies: tarp, rope, paper towels, cleaner • Personal supplies: Water, porta-potty, toilet paper, paper, Kleenex etc. • First Aid Kit • We have a spare microwave oven - 120VAC or generator? • Coffee Pot • Tool Kit	

3.4. Access and Security

Access refers to the ability of CARES members to get to and deploy the ECV.

Security refers to the means for protecting the ECV when it is not activated.

3.4.1. Access
1. The ECV must be accessible by CARES members to support a City-wide activation or drill.
2. CARES members must meet certain criteria to be qualified as an SCV chauffeur. These criteria will be established by Cupertino OES.

3.4.2. Security
1. The city should take whatever measures it feels are appropriate to ensure the security of the ECV while meeting the requirements for Accessibility.

3.5. Power Systems

3.5.1. In General
1. IF THE GENERATOR CAN BE AUTOMATICALLY STARTED. In the event of a loss of shore power, an automatic transfer switch engages and immediately initiates the generator start sequence.
2. IF THE GENERATOR CAN NOT BE AUTOMATICALLY STARTED. In the event of a loss of shore power, a manual transfer switch is engaged and the generator is manually started.
3. During the power transfer switch process, all 12 VDC loads will be maintained by the on-board backup batteries.
4. Electrical wiring will be installed behind the wall surface or in surface-mount flat conduit. Interior power outlets will be located throughout the interior and in specific locations in the exterior.
5. Power Management is critical with this system. The available generator is rated at 120VAC, 23A, with an inverter rated at 12VDC, 20A.
   NOTE: This is the key limitation to what we can actually field in terms of powered equipment.
6. In the event of the loss of generator power, backup batteries supply a reduced current capacity until either generator or shore power can be restored. At least 200 Ah of battery capacity is required (MUST VERIFY)

3.5.2. Loads
1. The power system must support the following loads:

120 VAC Loads	12 VDC Loads
1. Battery Charging 2. Air Conditioning 3. Internal Fluorescent lighting 4. PCs, Printers, Network equipment 5. Exterior, Interior outlets	1. 12 VDC internal lighting, LEDs 2. 12 VDC external "porch" lighting by awning, or external flood Lamps 3. Radio Power supplies

3.5.3. AC Power System

1. The Van will use a built-in generator for operational needs
2. A "shore power" connection will allow the Van to be plugged into an outlet as an alternate source of power.
3. 110VAC outlets will be available for internal and external use.
4. A breaker panel must be used to isolate different circuits and provide GFI.

3.5.4. DC Power System

1. All 12VDC equipment will be powered from a redundant high amperage power supply system with battery backup.
2. Some emergency power lighting will be available within the Van in the event of loss of AC lighting.
3. LED lighting – internal and external – must be controlled from separate switches.
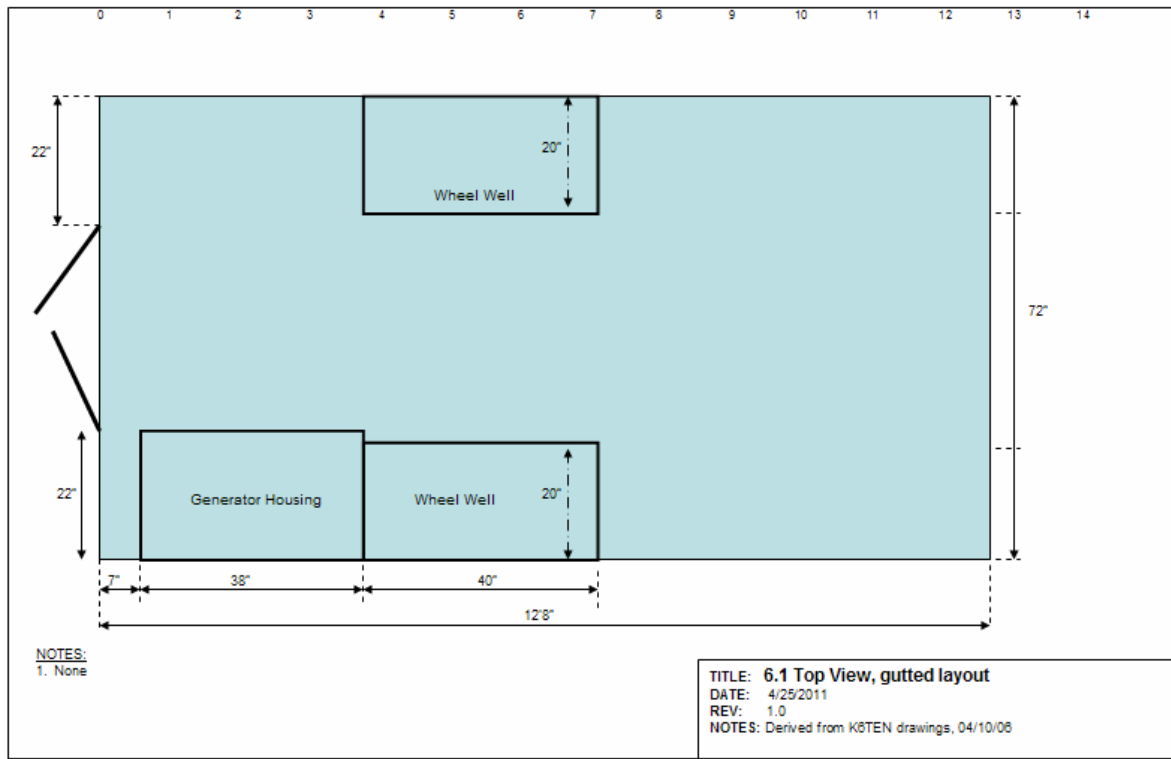
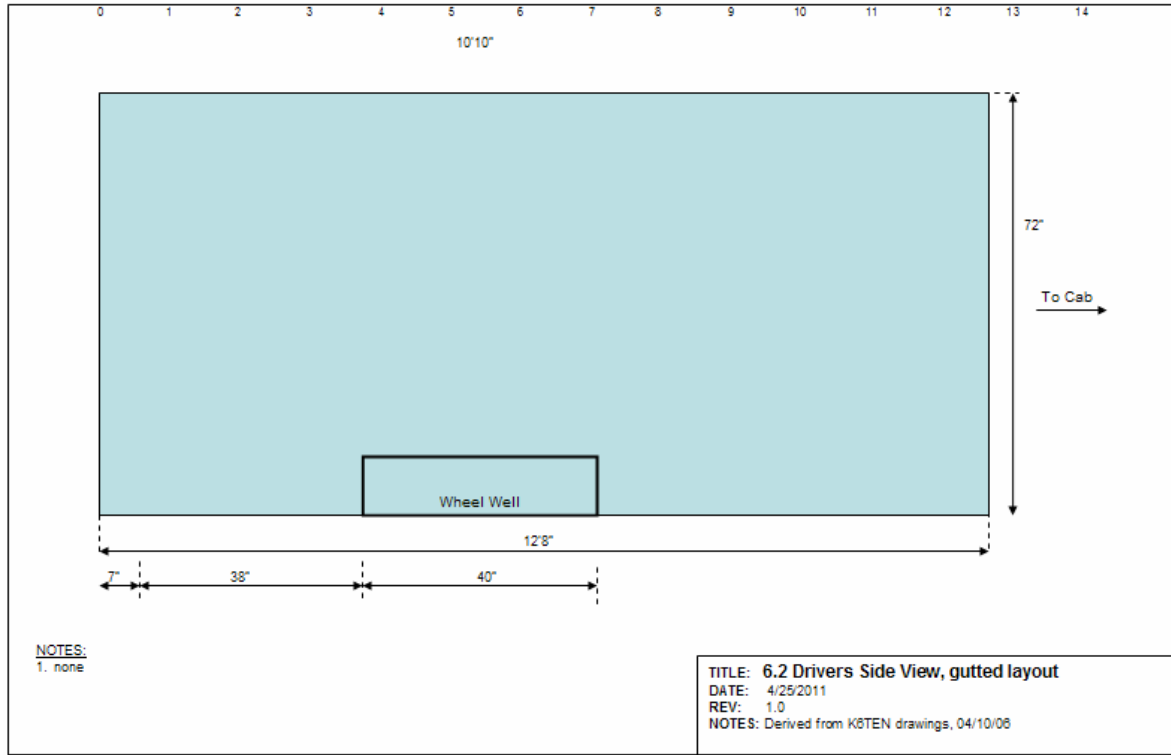### 3.5.5. Refueling

1. City to address.

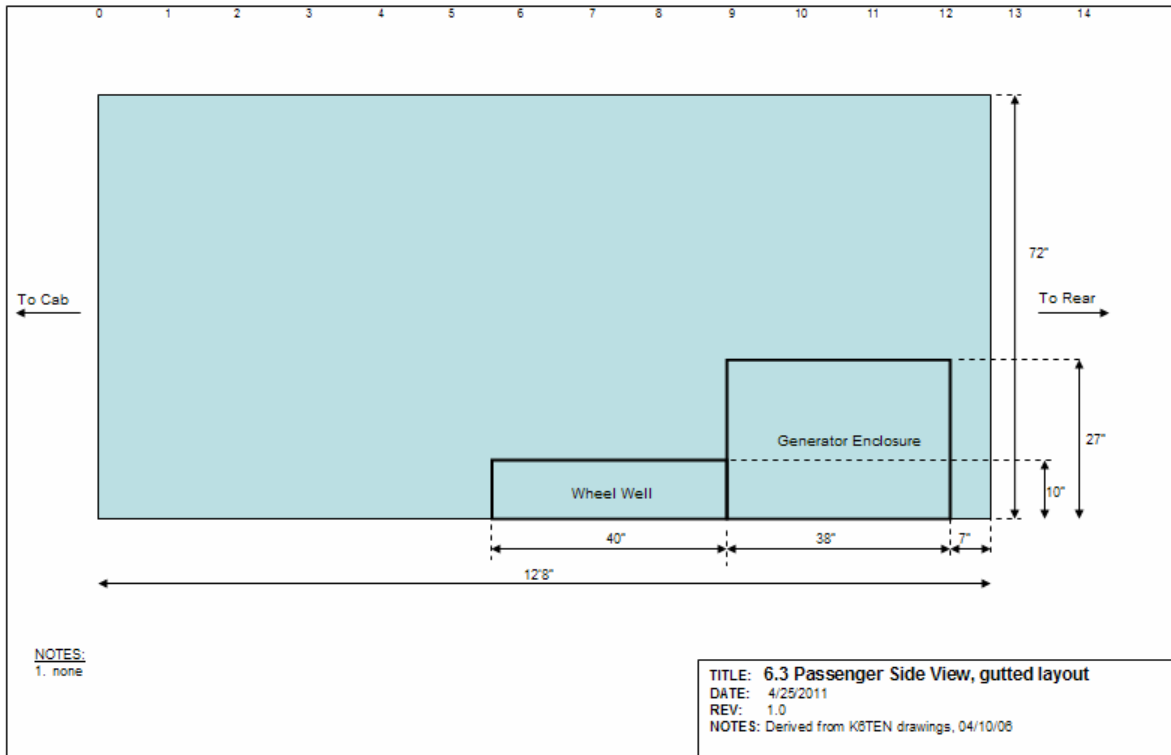## 3.6. Maintenance

To be completed later

4. Drawings

Top view

Drivers Side view

10'10"

72"

To Cab →

Wheel Well

12'8"

7" 38" 40"

NOTES:
1. none

TITLE: **6.2 Drivers Side View, gutted layout**
DATE: 4/25/2011
REV: 1.0
NOTES: Derived from K6TEN drawings, 04/10/06

Passengers Side view

72"

← To Cab

To Rear →

Generator Enclosure

27"

Wheel Well

10"

40" 38" 7"

12'8"

NOTES:
1. none

TITLE: **6.3 Passenger Side View, gutted layout**
DATE: 4/25/2011
REV: 1.0
NOTES: Derived from K6TEN drawings, 04/10/06

5. Parts Notes

5.1. Mast Subsystems

Mast subsystems exist on the market for a variety of purposes. While the following is not an endorsement of the companies listed, it is intended to provide a sense of what the Mast Subsystem could looks like:

1. www.floatograph.com
2. http://www.willburt.com/
3. http://www.clarkmasts.com/

Examples of field deployable antenna masts

Distribution

http://www.dan-marcrvparts.com/eldipa.html

Breaker Panel	
	Blue Sea 3023 DC 8 Position Breaker Panel Blue Sea 3082 DC 10 Position Toggle Branch Circuit Breaker Panel
	http://www.dan-marcrvparts.com/20235.html http://www.dan-marcrvparts.com/20250.html

5.2. 120 VAC Power System

Distribution Panel: http://rvpowerpartsplus.net/

AC/DC distribution	Sample Description: 50 AMP Main AC Breaker is provided, with locations for 12 additional AC Branches. Locations for 15 DC Circuits.
	AC/DC 50 AMP FUSE PANEL W/O Door
	http://www.dan-marcrvparts.com/ac50ampfupaw.html

Transfer Switch	Sample Description. Automatically switch power from shoreline to generator with a simple flick of the generator switch. No unplugging from shoreline receptacle and re-plugging into generator needed.
	120 volt, 30 amp automatic generator / shoreline transfer switch
	http://store.dan-marcrvparts.com/30ampparvaut.html

Breakers

120 VDC	Blue Sea 3029 AC Main +1 Position Breaker Panel (Black Switches) http://www.dan-marcrvparts.com/20238.html
	Blue Sea 3027 AC Main +6 Positions Breaker Panel (Black Switches) http://www.dan-marcrvparts.com/20237.html

Blue Sea 3074 AC Main +8 Positions Toggle Circuit Breaker Panel (Black Switches)
http://www.dan-marcrvparts.com/20245.html

5.3. Lighting, Interior

Interior lighting falls into the following categories:

1. Task Lighting. This is lighting that eliminate the operating positions. The lighting is recommended to be 12 VDC Fluorescents with the capability for switching either white light for day-time use, or red for night-time use (prevents light shock when coming in from the dark).

2. SCV Interior lighting. This lighting eliminates the broader surrounding areas within the ECV. 120VDC Fluorescents are recommended, and would be higher output than the Task lights. Additionally, secondary 12 VDC LED Lighting will be installed as an emergency light source in the event the generator is not running.

3. Other work surface lighting. Additional task lighting is required to eliminate other operating areas as they are defined.

All lighting will be fused at the appropriate 12VDC/120VAC breaker panel. Local on/off control will remain at the point of the light fixture.

Florescent, work surface	Fluorescent 12v Interior Light, Twin 8-watt Bulbs #S-8033P http://www.easternmarine.com/Fluorescent-12v-Interior-Light-Twin-8-watt-Bulbs-S-8033P-0/

	Surface Mount LED Reading Light w/Switch #50023860 http://www.easternmarine.com/Surface-Mount-LED-Reading-Light-w-Switch-50023860-0/
Florescent, cabin	