

Channel Island

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Santa Barbara Island



Santa Barbara Ranger Station Aerial View
Lat 33°28'49.70"N Long 119° 1'46.08"W

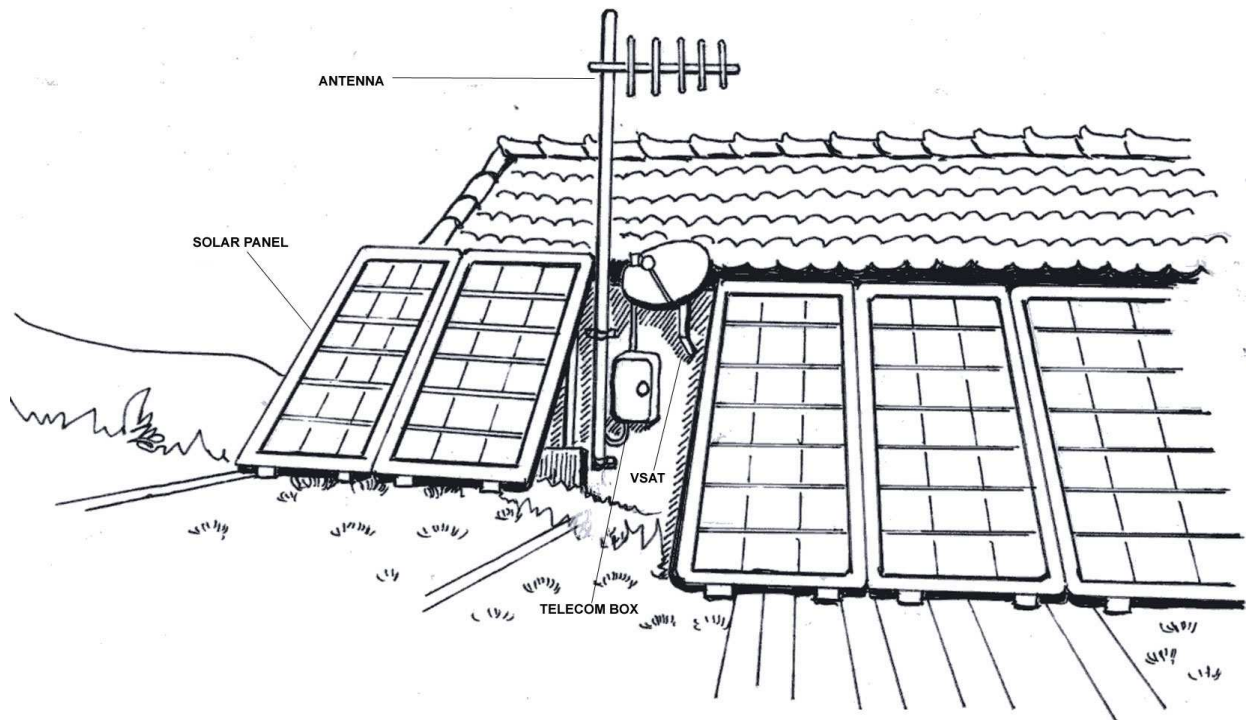


FIGURE 1 - SANTA BARBARA RANGER STATION

LAT 33°28'49.70"N

LONG 119° 1'46.08"W

Figure 1 – Santa Barbara Ranger Station with new equipment

New Equipment:

1. VSAT – upgrade to 1.8M dish (page 75)
2. Antenna – Yagi (page 86) /Omni directional (page 83)
3. Telecom box for Pico cell (page 78)
4. Solar panel – upgrade to a solar power system utilizing 176Watt panels (page 88)

Notes: This site has a ranger quarters/bunkhouse and solar house. There would be a potential for two government phone lines and a government internet connection. There would also likely be a demand from Non-NPS researchers for a non-government internet connection.

All new equipment will be attached to the existing infrastructure requiring a ladder, screws and brackets. The surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.

We also recommends the upgrade the existing Arco solar panel s (Arco 45Watts x 50 panels = 3600Watts) to a 176Watts system (Max 9000Watts). If we upgrade the solar panels then we will also need to upgrade the battery cells to support a 9000Watts system. The current solar power system currently powers – 2 refrigerators, lights, radio, TV, VSAT modem, computer, and printer.

Other potential equipment:

1. Weather station for Helicopter
2. A point-to-point link from Arch Point – 900Mhz link back to Ranger Station



Figure 1 A – Santa Barbara Ranger Station and existing Arco 45Watts solar panel
Lat 33°28'49.70"N Long 119° 1'46.08"W



Figure 2 – Santa Barbara Ranger Station existing battery bank (3600Watts)
Lat 33°28'49.70"N Long 119° 1'46.08"W

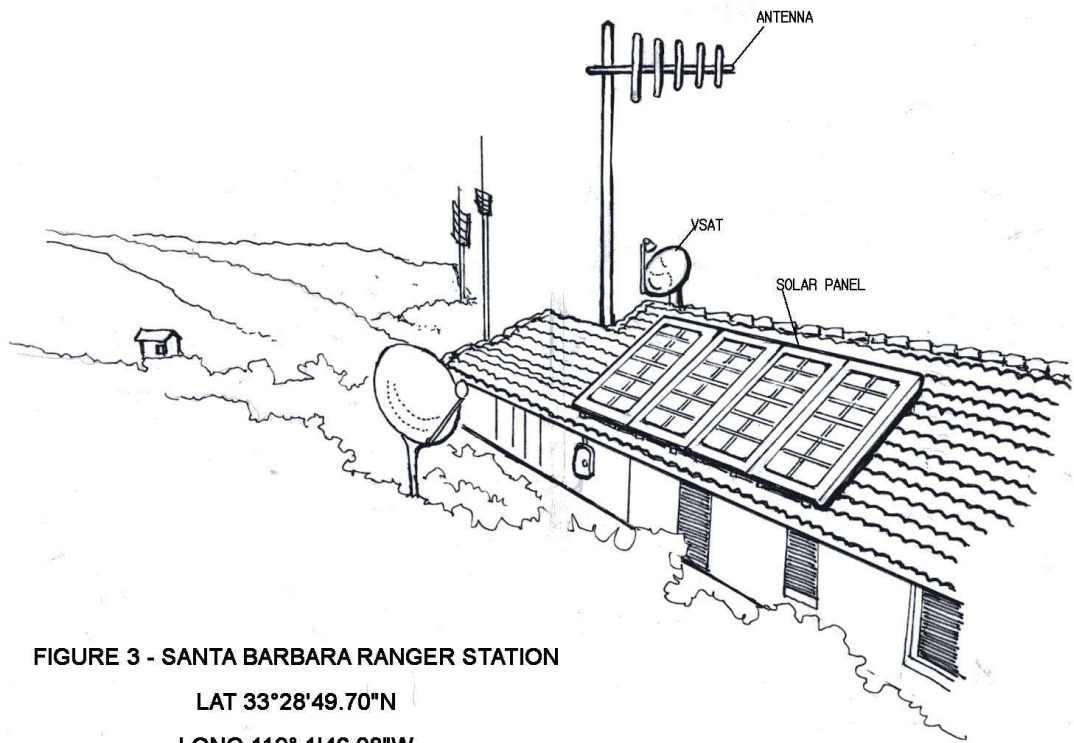


FIGURE 3 - SANTA BARBARA RANGER STATION

LAT 33°28'49.70"N

LONG 119° 1'46.08"W

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar panel – install a a solar power system utilizing 176Watt panels (see page 88)

Notes: If the existing solar power panels on Santa Barbara cannot be upgraded, then we recommend the new equipment will be installed on the roof of the Ranger bunkhouse. All new equipment will be attached to the existing infrastructure requiring a ladder, screws and brackets. The surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.



Figure 3 A – Santa Barbara Ranger Station with existing Internet access
Lat 33°28'49.70"N Long 119° 1'46.08"W



Figure 4 – another potential location for our telecom infrastructure
Lat 33°28'49.70"N Long 119° 1'46.08"W

Notes: The current antenna and flat panel structure is NOT being used and has clear LOS to Catalina Island

San Miguel Island



San Miguel Ranger Station Front View
Lat 34° 2'17.71"N Long 120°21'6.42"W



Figure 5 – San Miguel Ranger Station roof
Lat 34° 2'17.71"N Long 120°21'6.42"W

Notes: There plenty of room for us to add additional equipment and wiring for camera. We can also remove the solar heating system that is located on the roof to add our solar panels.

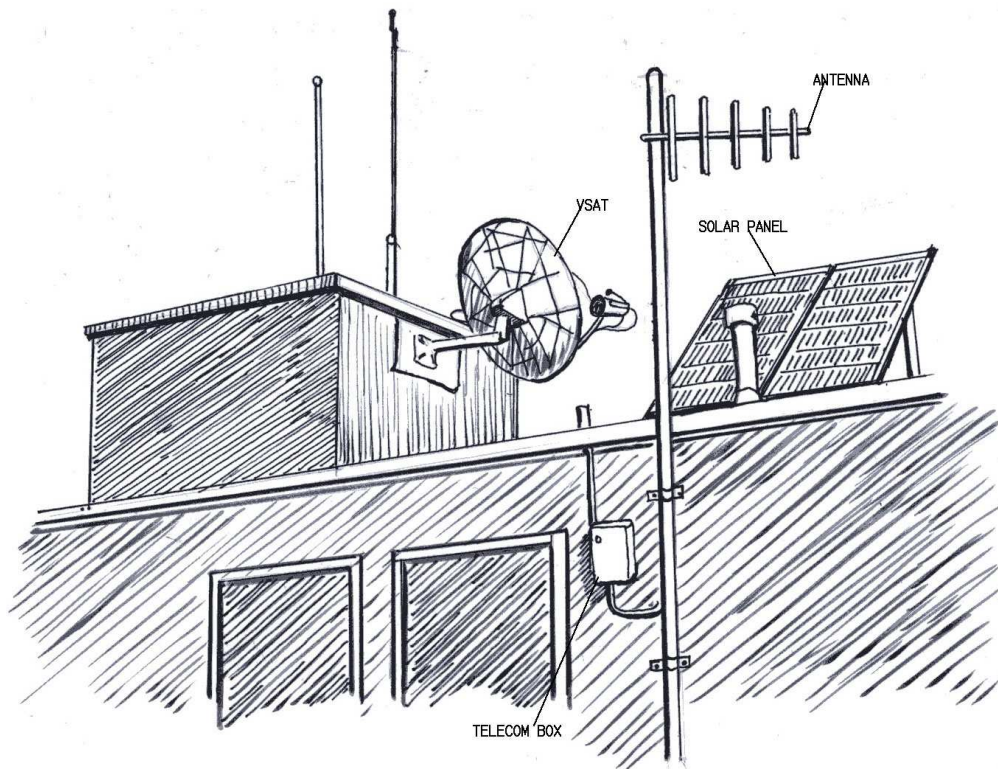


FIGURE 6 – EXISTING INTERNET ACCESS AT SAN MIGUEL
LAT 34° 2'17.71"N LONG 120°21'6.42"W

Figure 6 – San Miguel Ranger Station with new equipment

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar panel – add a a solar power system utilizing 176Watt panels and remove the old solar water heating system (see page 88)

Notes: This facility has Ranger/National Park Service (NPS) office space, island residences for a ranger and a biologist and a 4 person research bunkhouse. The site requires at least one government phone line and internet service. There is potential that an island resident would desire a personal phone line or internet connection. There is also a desire by visiting researchers to have an internet connection as they are not authorized to use the NPS network. That consideration holds true at most NPS sites in the park.

We recommend the removal of the solar heating system on the roof and installation of a 176 Watt solar power system. All new equipment will be attached to the existing infrastructure requiring a ladder, screws and brackets. The surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances. Other potential equipment is a camera with a view of Green Mountain. All new equipment will be attached to the existing infrastructure requiring a ladder, screws and brackets.



Figure 6 A – San Miguel Ranger Station existing Internet VSAT system
Lat 34° 2'17.71"N Long 120°21'6.42"W



Figure 6 B – San Miguel Ranger Station (another view)
Lat 34° 2'17.71"N Long 120°21'6.42"W



Figure 7 – Battery Bank at San Miguel Ranger Station



Figure 7 A – Existing solar panel on the roof of San Miguel Ranger Station



Figure 8 - San Miguel Ranger Station this is a potential site for payphone
Lat 34° 2'17.71"N Long 120°21'6.42"W

Notes: The payphone will be located next to closet of battery bank near fire extinguisher. We can also deploy the solar payphone near the tool shed (see page 90). All new equipment will be attached to the existing infrastructure requiring a ladder, screws and brackets



Figure 9 – A typical weather station/auxiliary outdoor equipment cabinet powered by Solar on San Miguel Island

San Miguel Island – Marine Mammal Research Station – Point Bennett



San Miguel Island – Marine Mammal Research Station
Lat 34° 1'53.80"N Long 120°26'1.36"W

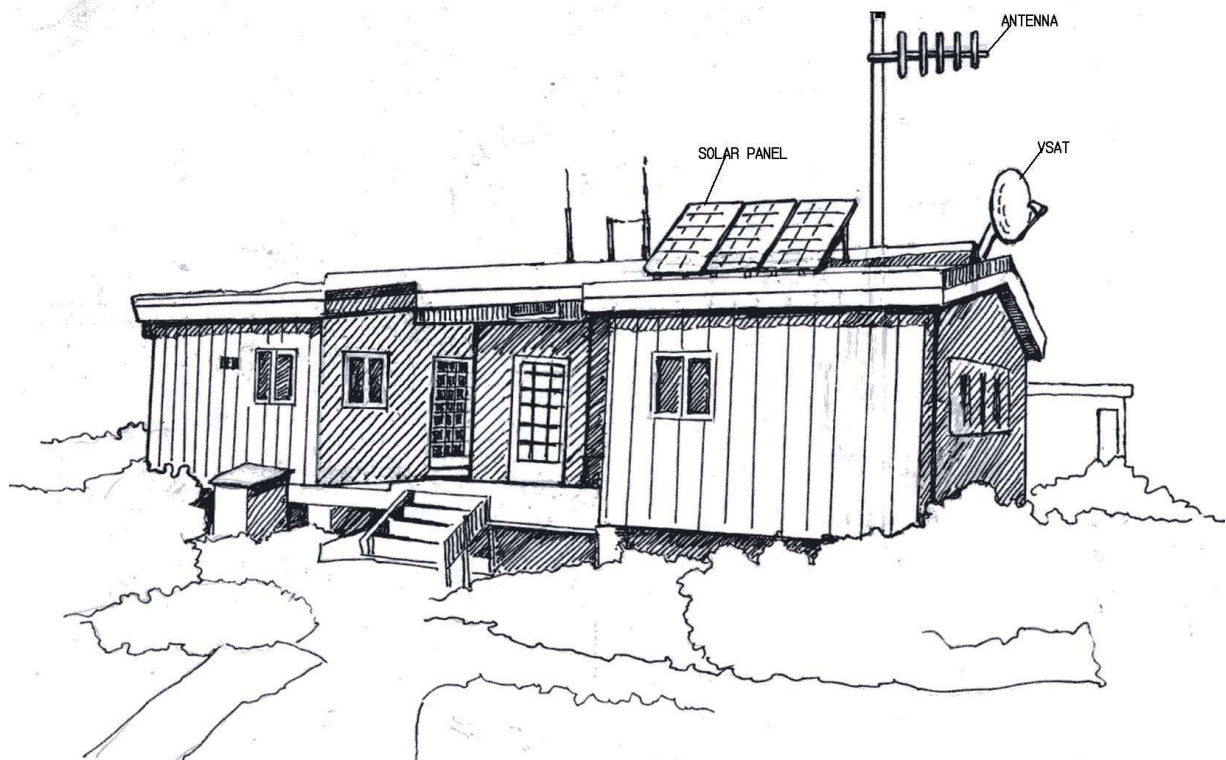


FIGURE 10 - SAN MIGUEL - MARINE MAMMAL RESEARCH FACILITY - POINT BENNETT
LAT 34° 1'53.80"N LONG 120°26'1.36"W

Figure 10 – San Miguel Marine Mammal Research Facility/Point Bennett with new equipment

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar panel – add a a solar power system utilizing 176Watt panels (see page 88)

Notes: This site is owned and operated by the National Marine Mammal Lab which is a part of NOAA. The station is occupied during the summer and intermittently throughout the year. This facility has Ranger/National Park Service (NPS) office space and a biologist research bunkhouse. The site requires at least one government phone line and internet service. There is potential that an island biologist would desire a personal phone line or internet connection as they are not authorized to use the NPS network. That consideration holds true at most NPS sites in the park.

We recommend the installation of a 176 Watt solar power system. All new equipment will be attached to the existing infrastructure requiring a ladder, screws and brackets. The surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances. Other potential equipment is a camera with a view of Green Mountain. All new equipment will be attached to the existing infrastructure requiring a ladder, screws and brackets.



Figure 10 A – San Miguel Marine Mammal Research Facility/Point Bennett
Lat 34° 1'53.80"N Long 120°26'1.36"W



Figure 10 B – San Miguel Point Bennett (back view)
Lat 34° 1'53.80"N Long 120°26'1.36"W

Notes: The three antennas are for a 800 MHz repeater for AT&T, telemetry and repeater fro NPS radio.

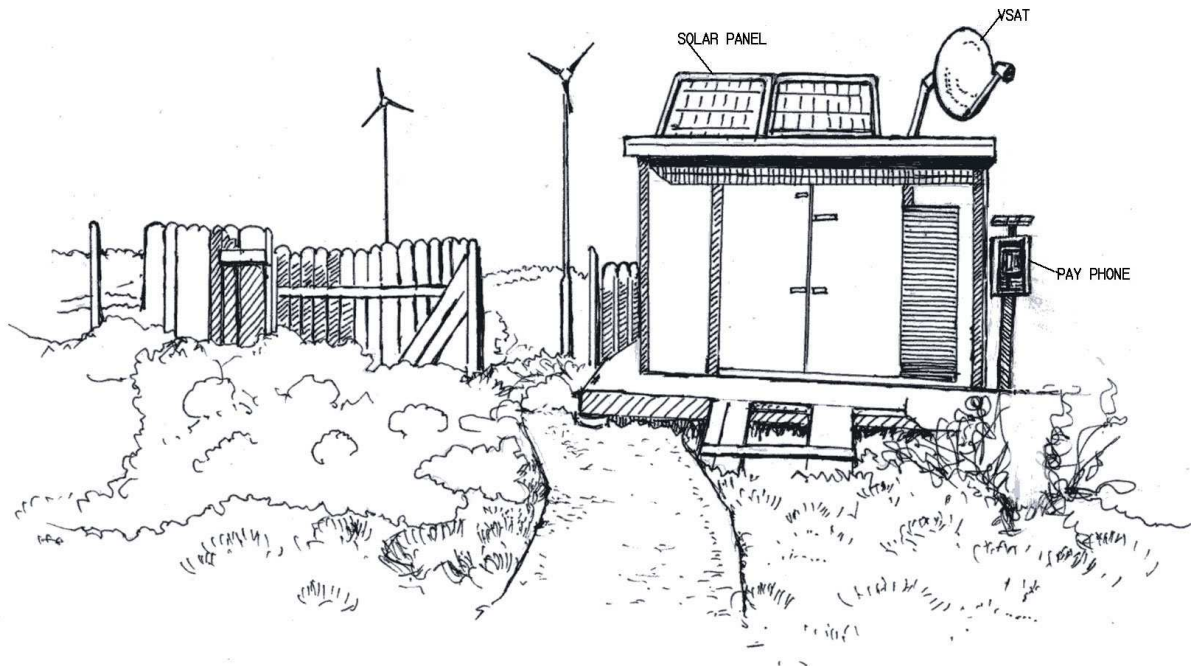


FIGURE 11 - TOOL SHED POINT ENNETT
LAT 34° 1'53.80"N LONG 120°26'1.36"W

Figure 11 – Typical tool shed with VSAT, telecom box, solar panel power system, payphone and antenna

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar panel – add a solar power system utilizing 176Watt panels (see page 88)
5. Solar powered payphone (see page 90)

Notes: This is a typical wood shed/structure that can be found on throughout Channel Islands. This drawing was made to show that all new equipment can be attached to any existing infrastructure requiring only a ladder, screws and brackets. The surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.



Figure 11 A – San Miguel Point Bennett
Lat 34° 1'53.80"N Long 120°26'1.36"W

Santa Rosa Island



Santa Rosa Island Main Ranch
Lat 34° 0'18.75"N Long 120° 3'6.38"W



Figure 12 – Santa Rosa housing and historic ranch area

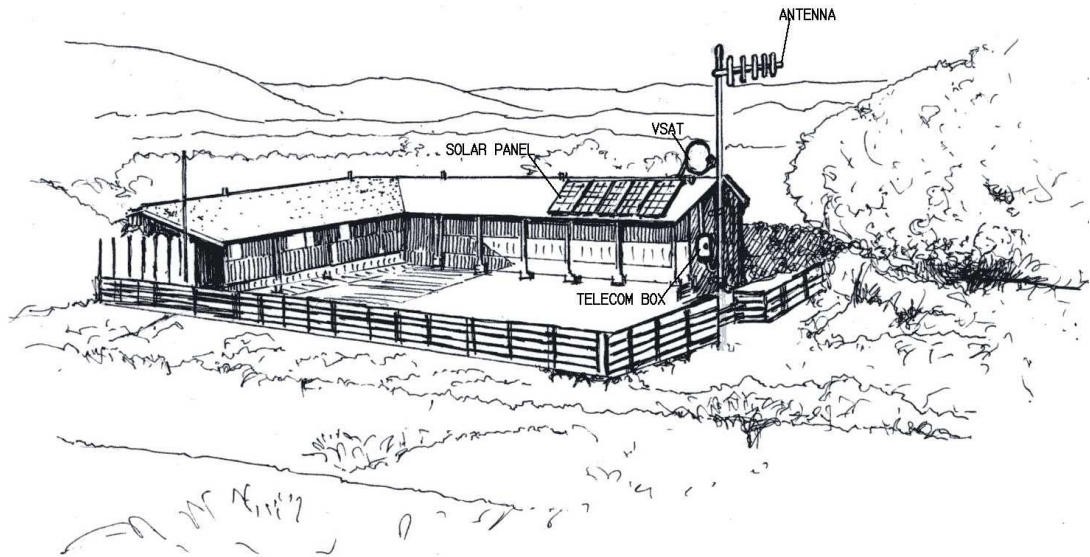


FIGURE 13 – CARETAKERS QUARTERS – DOWN IN VALLEY PICO CELL, NEAR OLD SHEEP MILL

Figure 13 – Santa Rosa Caretaker's Quarter with new equipment

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar panel – add a a solar power system utilizing 176Watt panels (see page 88)

Notes: The Island's former landowners have a use-an-occupancy lease through 2011. The facilities are used occasionally by the family and seasonally by a commercial hunting operation. There is also a resident caretaker. They could potentially desire phone service for three buildings known as The Big House, the Bunkhouse and the Caretaker's Quarters. When the lease runs out, these buildings will likely be adaptively used by the NPS and would require government phone lines.

This is a proposed site that will provide a public contact station in the vicinity of the Vail & Vickers Ranch complex. It would require a phone line and perhaps an internet connection.

We recommend the installation of a 176 Watt solar power system on the roof. All new equipment will be attached to the existing infrastructure requiring a ladder, screws and brackets. The Yagi/Omnidirectional antenna will be mounted to the existing pole to provide service and coverage to the historic area and Old Sheep Mill. The surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.

Optional equipment: Solar powered pay phone (see page 90). A solar payphone can all be attached to the wall of the building without disturbing the surrounding areas.



Figure 13 A – Santa Rosa Caretaker's Quarter – down in valley Pico Cell, Near Old Sheep Mill

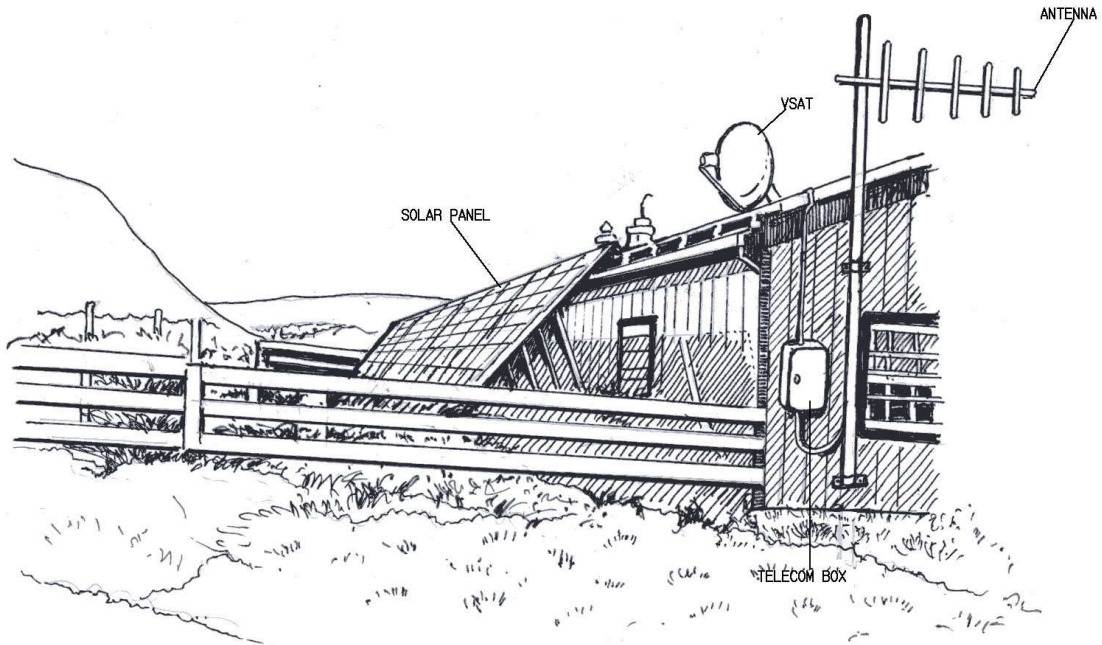


FIGURE 14 – POWER STATION (35KW), POTENTIAL CELL SITE BEHIND BUILDING

LAT 34° 0'11.21"N

LONG 120° 3'6.23"W

Figure 14 – Santa Rosa Power Station with new equipment

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)

Notes: To provide service and coverage from the Main ranch we propose the installation of the VSAT on the back roof, Omni or Yagi antenna pointed toward the Main Ranch. If additional power is needed we recommend the upgrade of the existing solar power system. All new equipment will be attached to the existing infrastructure requiring a ladder, screws and brackets. The surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.

Optional equipment: Solar powered pay phone (see page 90). A solar payphone can all be attached to the wall of the building near the picnic table without disturbing the surrounding areas.



Figure 14 A – Santa Rosa Power Station (35KW), potential cell site behind building
Lat 34° 0'11.21"N Long 120° 3'6.23"W



Figure 14 B – Santa Rosa Power Station (another view)



Figure 15 – battery bank and controller inside power station building

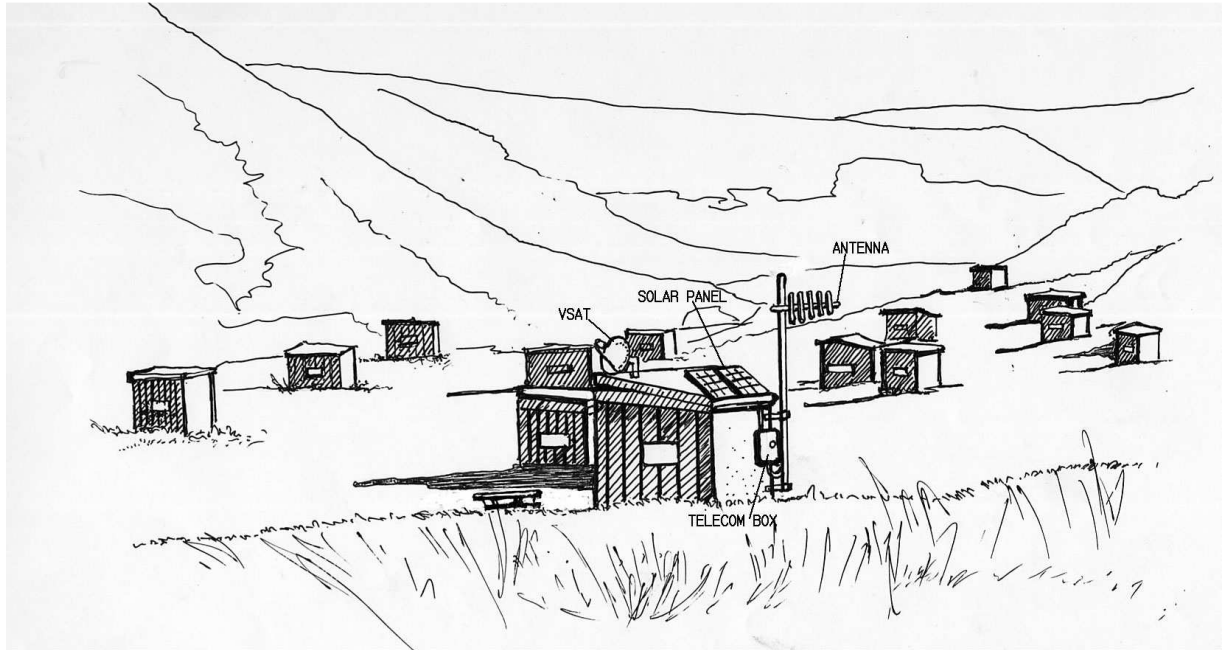


FIGURE 16 – SANTA ROSA CAMPGROUND - PICO CELL

LAT 33°59'28.68"N, LONG 120° 2'52.60"W

Figure 16 – Santa Rosa Campground with new equipment

New Equipment:

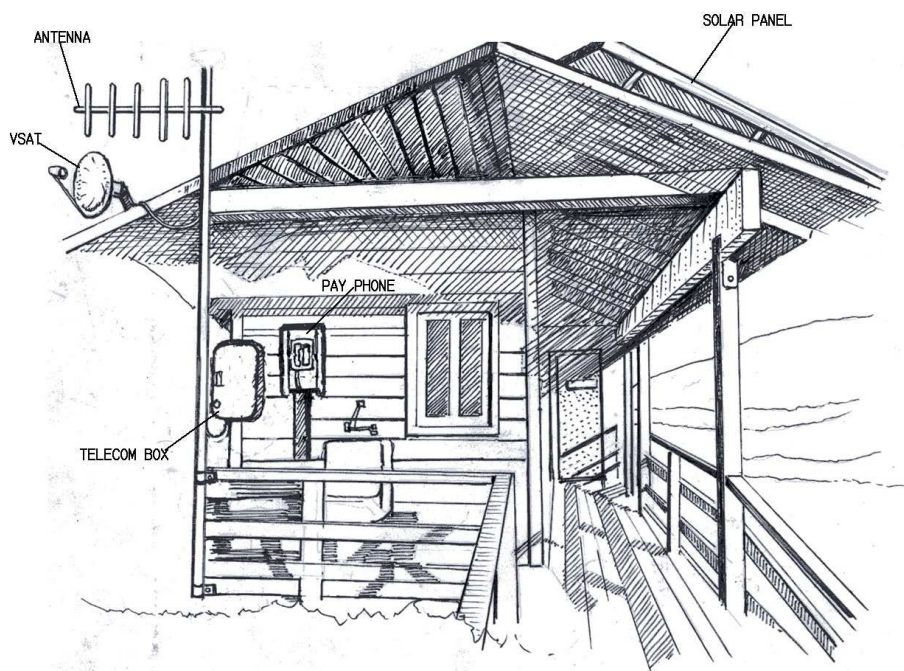
1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar panel – add a a solar power system utilizing 176Watt panels (see page 88)

Notes: To provide service and coverage to the campground, we propose the installation of a solar power system on the roof of the one of the campground shelter, the VSAT on the roof, telecom box on the back wall, Omni or Yagi antenna on the pole mounted to the back wall. All new equipment will be attached to the existing infrastructure requiring a ladder, screws and brackets. The surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.

Optional equipment: Solar powered pay phone (see page 90). A solar payphone can all be attached to the wall of the building near the picnic table without disturbing the surrounding areas.



Figure 16 A – Santa Rosa campground - Pico Cell
Lat 33°59'28.68"N Long 120° 2'52.60"W



**FIGURE 17 – PAYPHONE, CAMERA POWERED BY SOLAR PANEL
ON ROOF OF BUILDING AT CAMP GROUND
LAT 33°59'28.68"N, LONG 120° 2'52.60"W**

Figure 17 – Santa Rosa Campground Restroom with new equipment

New Equipment:

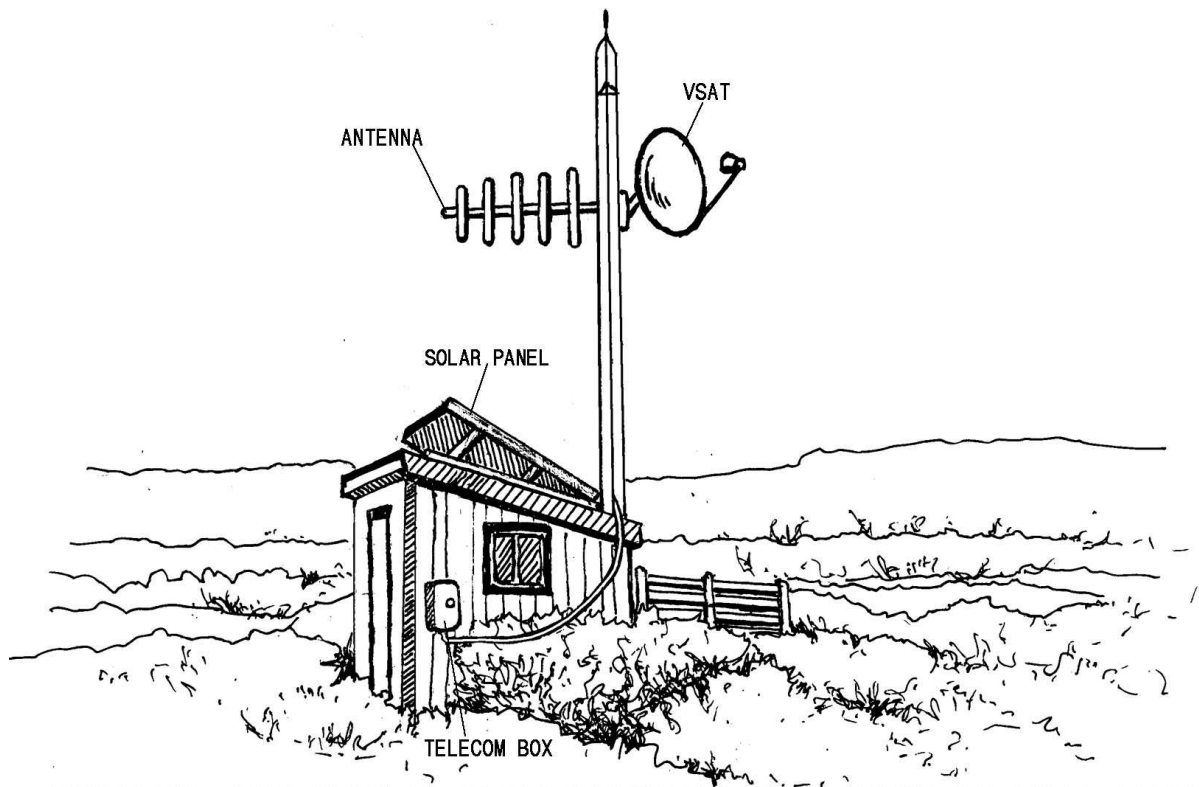
1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar panel – add a a solar power system utilizing 176Watt panels (see page 88)
5. Solar powered pay phone (see page 90)

Notes: As an alternate site to the campground shelter and to provide service and coverage to the campground, we propose the installation of a solar power system on the roof of the restroom shelter, the VSAT on the roof, telecom box on the back wall, Omni or Yagi antenna on the pole mounted to the back wall or decking. All new equipment will be attached to the existing infrastructure requiring a ladder, screws and brackets. The surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.

Optional equipment: A solar payphone can all be attached to the wall of the building near the sink without disturbing the surrounding areas.



Figure 17 A – Santa Rosa Campground Restroom
Lat 33°59'28.68"N Long 120° 2'52.60"W



**FIGURE 18 - CELL SITE - AIR QUALITY BUILDING DIRECT LINK TO POWER PLANT
LAT 34° 0'6.00"N, LONG 120° 2'53.46"W"**

Figure 18 – Santa Rosa Air Quality Building with new equipment

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar panel – add a solar power system utilizing 176Watt panels (see page 88)
5. Solar powered pay phone (see page 90)

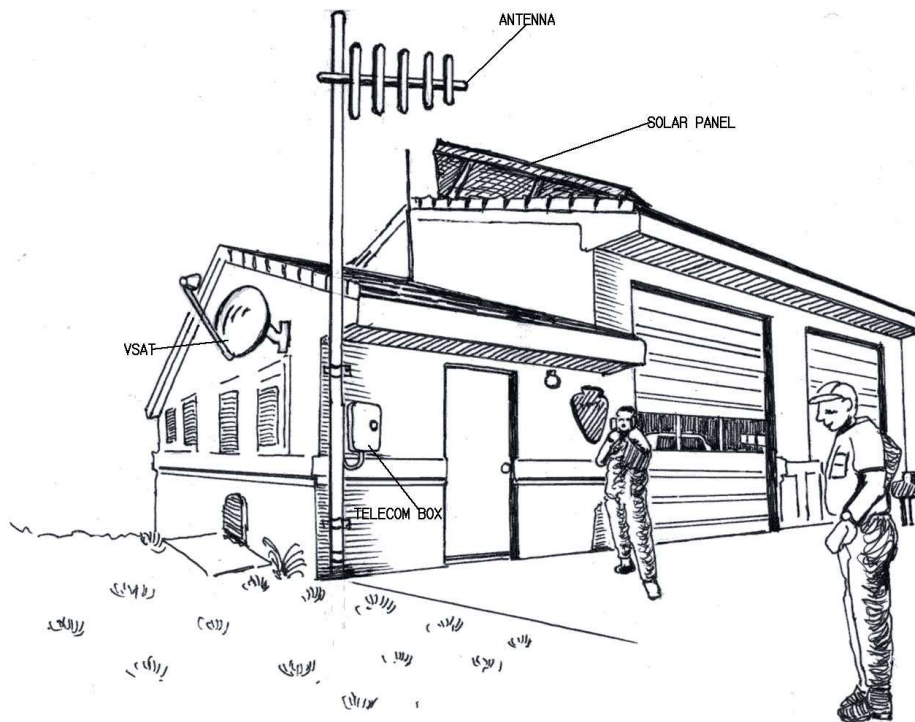
Notes: If a full six sectors (Distributed Antenna System – DAS) is needed or mini Satellite hub is need, then this is the ideal location because of the existing 30ft tower, direct link to power plant, clear LOS to Diablo – tallest peak (8 miles over water) as well as proximity to the Helicopter landing area and airport. This is also an idea location t store extra telecom gears because the building can be locked.

All new equipment will be attached to the existing infrastructure requiring a ladder, screws and brackets. The surrounding environment will not be disturbed and there will be no new

ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.



Figure 18 A – Santa Rosa Air Quality Building
Lat 34° 0'6.00"N Long 120° 2'53.46"W



**FIGURE 19 - INTERNET AND PHONE SERVICE - MAINTENANCE,
VSAT MODEM ON BUILDING, PHONE, CAMERA**

Figure 19 – Santa Rosa Maintenance Office with new equipment

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar panel – add a a solar power system utilizing 176Watt panels (see page 88)

Notes: This area is the Maintenance facility for Santa Rosa and is separate from the housing area and consists of a maintenance facility and a garage for the island’s fire engine. It would require a phone line, internet access and remote monitoring cameras.

We propose the installation of a solar power system on the roof of the facility, the VSAT on side of the building, telecom box on the front wall, Omni or Yagi antenna on the pole mounted on any walls. All new equipment will be attached to the existing infrastructure requiring a ladder, screws and brackets. The surrounding environment will not be disturbed and there will

be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.



Figure 19 A – Santa Rosa Maintenance Office



Figure 19 B – Santa Rosa Maintenance Area



Figure 20 – ¾ inch conduit ingress/egress from power plant to maintenance area

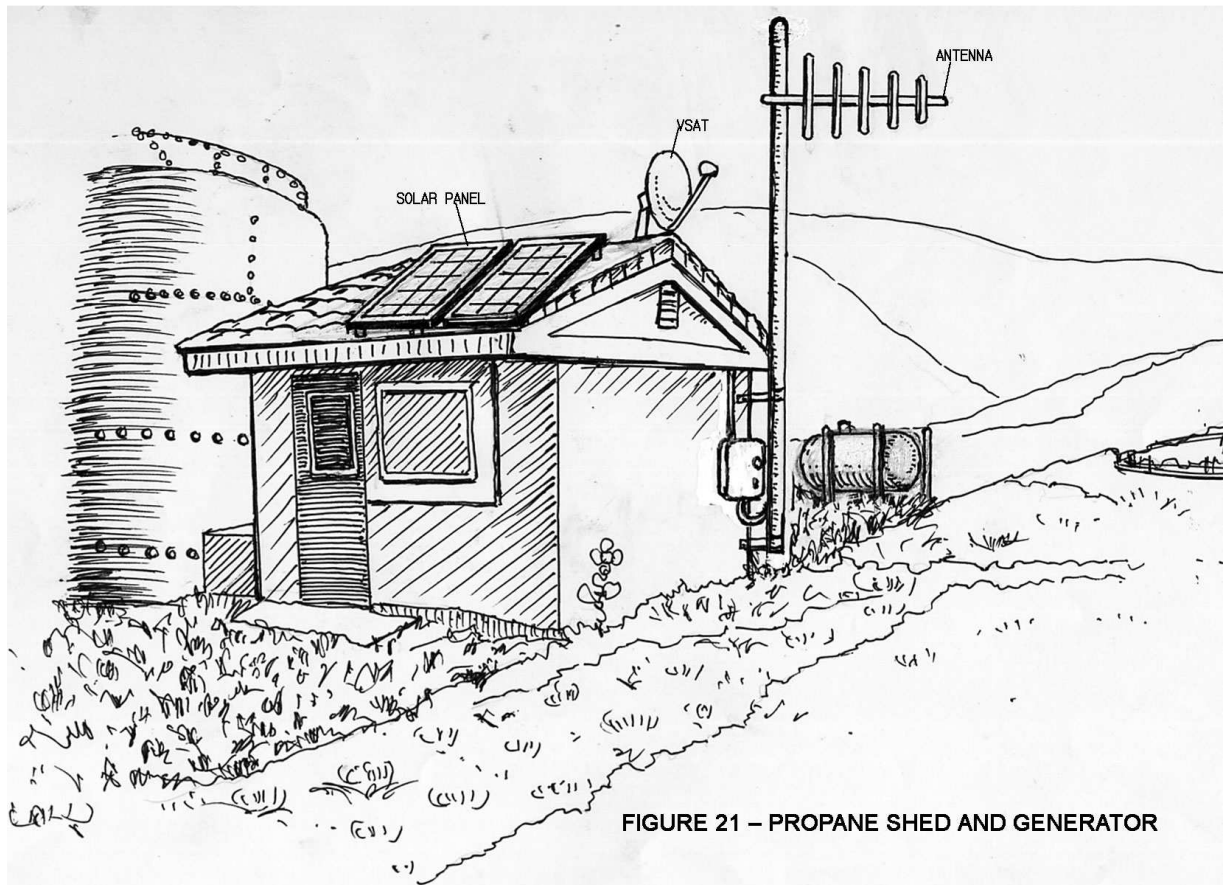


FIGURE 21 – PROPANE SHED AND GENERATOR

Figure 21 – Propane Shed – a typical non wood structure with new equipment

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar panel – a solar power system utilizing 176Watt panels (see page 88)

Notes: This is a typical non wood shed that are can also be found throughout the Channel Islands. This structure is located on Santa Rosa Maintenance facility.

This drawing was made to show that all new equipment can be attached to any existing infrastructure requiring only a ladder, screws and brackets. The surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.



Figure 21 A – propane shed and generator

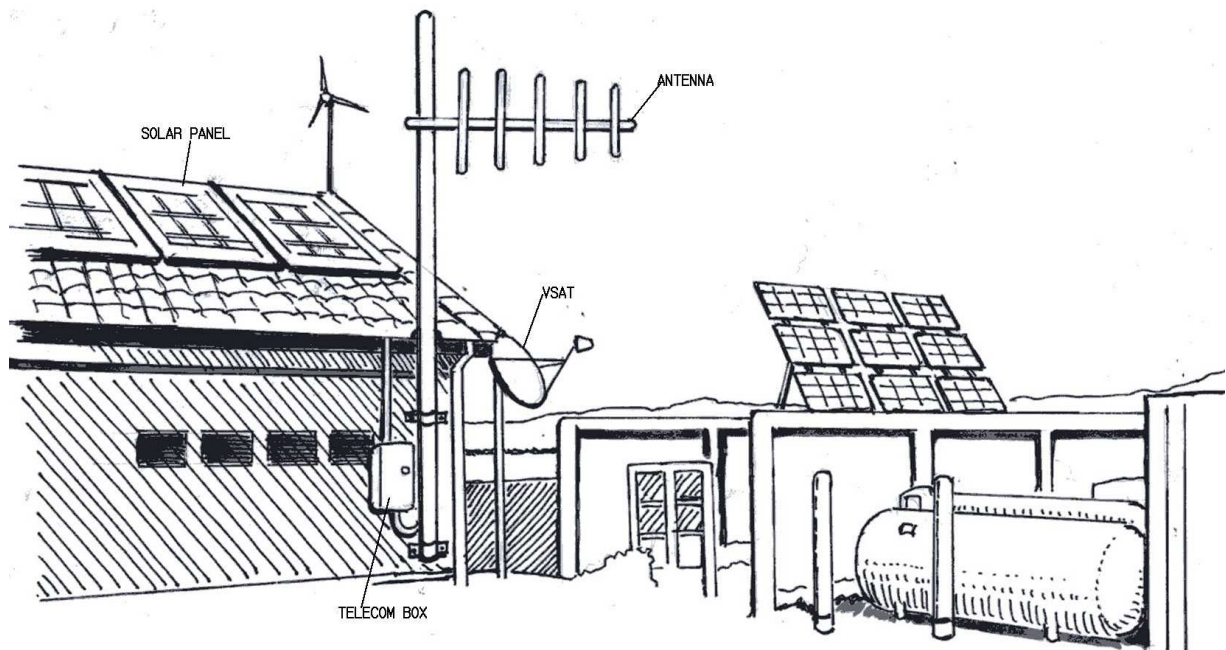


FIGURE 22 – STAFF HOUSING PROPANE, SOLAR, 4 DUPLEX HOUSES, PICO CELL, VSAT

Figure 22 – Santa Rosa staff housing with new equipment

New Equipment:

1. Antenna – Yagi (see page 86) /Omni directional (see page 83)
2. Telecom box for Pico cell is below solar panel (see page 78)

Notes: This site is occupied by permanent island staff along with various project crews and visiting researchers. The site would require three government phone lines (rangers, maintenance and resource management) and internet connection. There would also be potential that two other NPS residences would want personal phone lines. There would also be an interest among researchers and perhaps some NPS staff for a non-government internet connection

This drawing was made to show that all new equipment can be attached to any existing infrastructure requiring only a ladder, screws and brackets. Additionally our equipment will blend in with the existing equipments that can found throughout the Channel Islands. The surrounding environment will not be disturbed and there will be no new ground disturbances,

all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.



Figure 22 – Santa Rosa staff housing

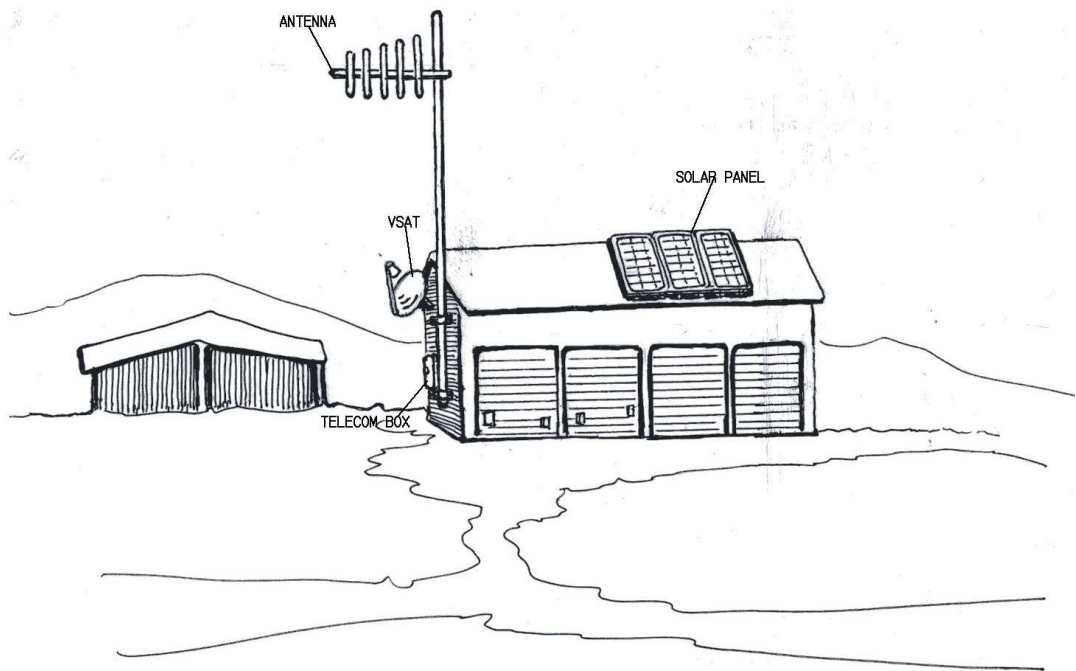


FIGURE 23 – JOHNSON'S LEE HOUSE, VSAT LOCATION

Figure 23 – Johnson's Lee House with new equipment

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar panel – a solar power system utilizing 176Watt panels (see page 88)

Notes: While we did not get a chance to land and visit the site, a drawing is made to show that all new equipment can be attached to any existing infrastructure requiring only a ladder, screws and brackets. The surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.



Figure 23 A – Johnson’s Lee house, VSAT location

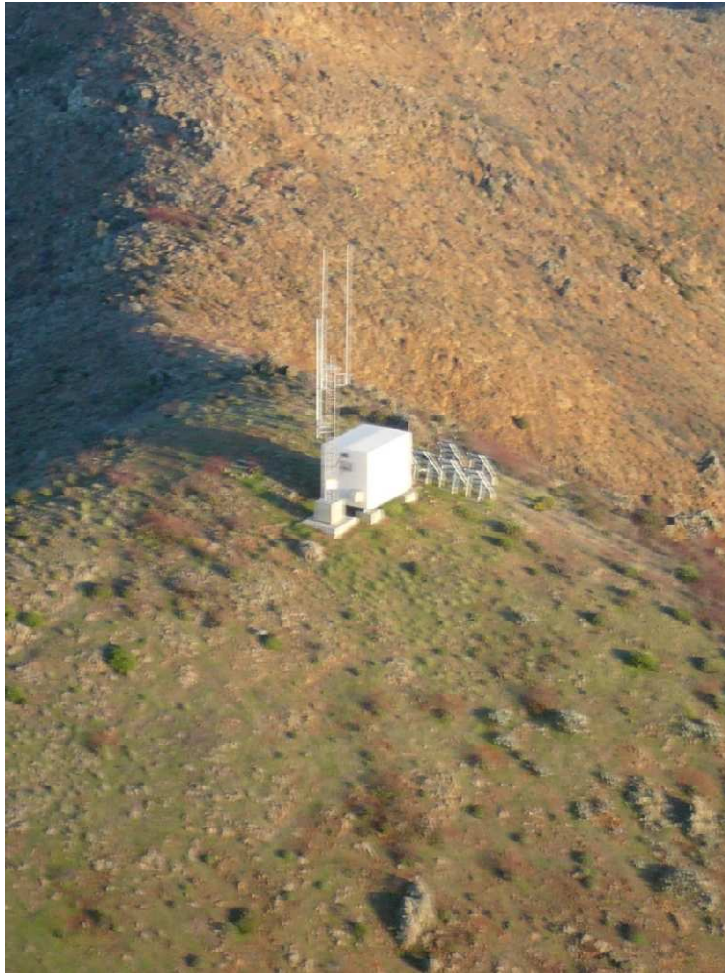


Figure 24 – Black Mountain
Coordinates: 33.9777778,-120.0777778

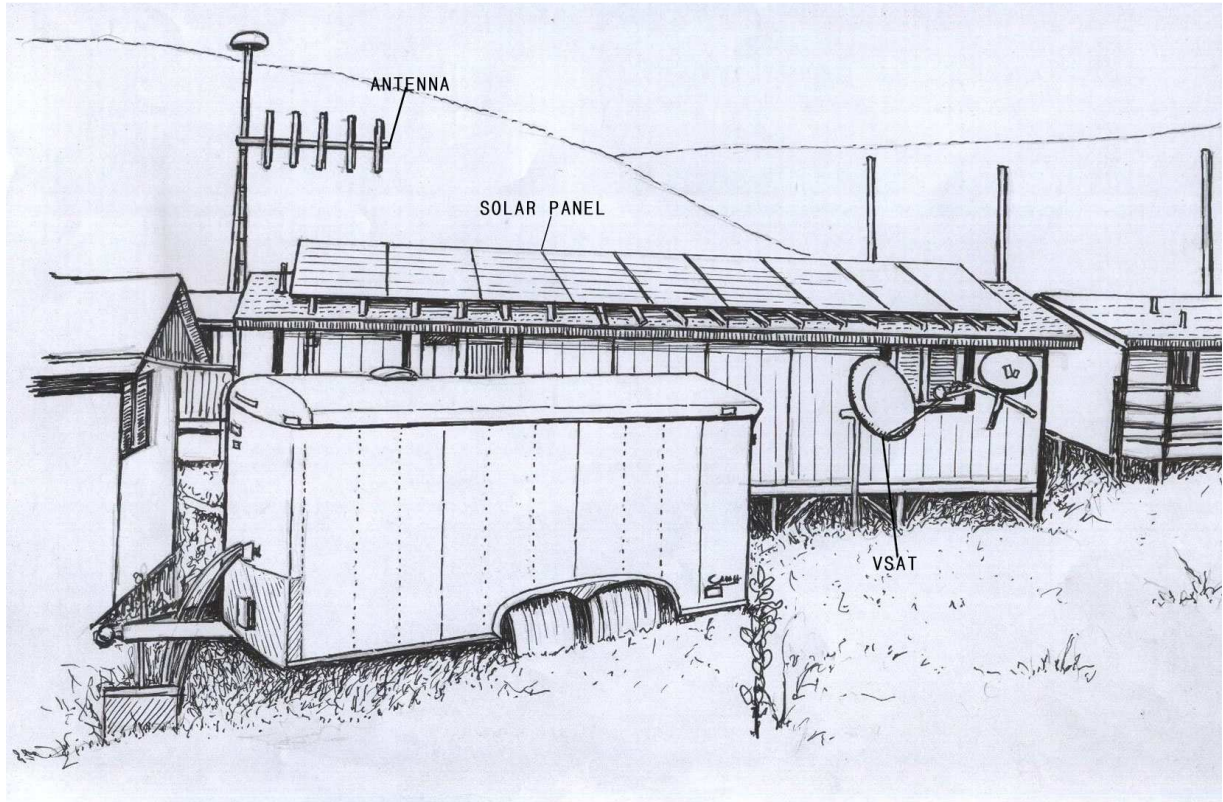
Notes: This picture shows a typical telcom structure that is presently located on Santa Rosa. This high site presently has a remote weather station. It has a commanding view and may have potential as a link site for microwave signals. The site is road accessible and we did not get the opportunity to visit the site.

We do NOT have any plans to install any new equipment at this site.

Santa Cruz Islands



Notes: This is the main NPS facility on east Santa Cruz. The site would need a government phone line and internet connection. There would also be a potential for a non-government internet connection and potentially two personal phone lines. No cell phone service works from the housing site or nearby campground. Having a system that would augment cellular coverage in the Scorpion Valley would be a huge asset.



**FIGURE 25 - SANTA CRUZ SCORPION HOUSING
LAT 34° 3'1.07"N, LONG 119° 33'42.15"W**

Figure 25 – Santa Cruz Scorpion housing

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar panel – an upgrade is potential needed to accommodate the new telecom equipment.

Notes: The Scorpion NPS housing area current gets power by solar, internet and connectivity to the mainland is provided by the VSAT and directional Yagi are used to propagate signals beyond the immediate area.

This drawing was made to show that all of the equipment that we propose is currently deployed on Channel Islands in one variation or another. The battery bank is inside the trailer that can be towed to a new location with minimal disturbance to the area. The Scorpion NPS housing area illustrates all of the equipment that we propose can be mounted to existing

structure. All new equipment can be attached to any existing infrastructure requiring only a ladder, screws and brackets. The surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.



Figure 25 A – Santa Cruz Scorpion housing
Lat 34° 3'1.07"N Long 119°33'42.15"W



Figure 25 B – Santa Cruz Scorpion housing (another view)
Lat 34° 3'1.07"N Long 119°33'42.15"W

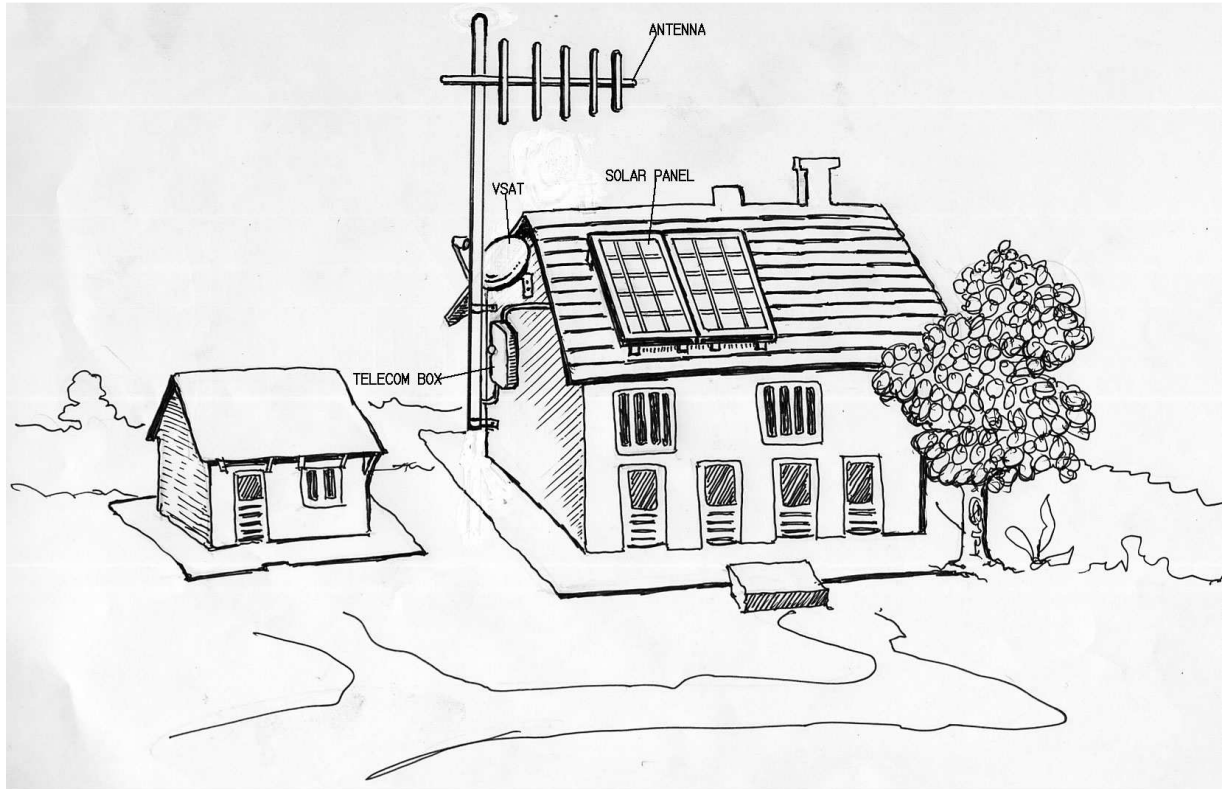


FIGURE 26 – SMUGGLERS ABODE (OLIVE), VSAT
LAT 34° 1'23.14"N, LONG 119°32'41.84"W

Figure 26 – Santa Cruz Smugglers Adobe with new equipment

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar panel – a solar power system utilizing 176Watt panels (see page 88)

Notes: This site is occasionally used as a spike camp for projects in the area. It is not regularly staffed. Boaters come ashore here and sometimes have problems landing in the surf. Having a pay phone or emergency phone at the adobe or down near the beach and outhouse facility would be an asset for visitor safety.

While we did not get a chance to land and visit the site, a drawing is made to show that all new equipment can be attached to any existing infrastructure requiring only a ladder, screws and brackets. We can deploy the equipment to the main structure or to the smaller structure on the left. We chose to this deploy all of the equipment on the larger picture for clarity

because we were not able to land and get details of the small structure. The surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.



Figure 26 A – Smugglers Adobe (olive), VSAT
Lat 34° 1'23.14"N Long 119°32'41.84"W



Figure 26 B – Smugglers Adobe (olive), VSAT
Lat 34° 1'23.14"N Long 119°32'41.84"W



Figure 27 – Scorpion Adobe
Lat 34° 2'55.95"N Long 119°33'30.00"W

The upstairs portion of this historic structure is being adapted for ranger office space, and the downstairs will become a contact station.



Figure 28 A – solar panel and housing at Scorpion Adobe



Figure 28 B – solar panel and housing at Scorpion Adobe

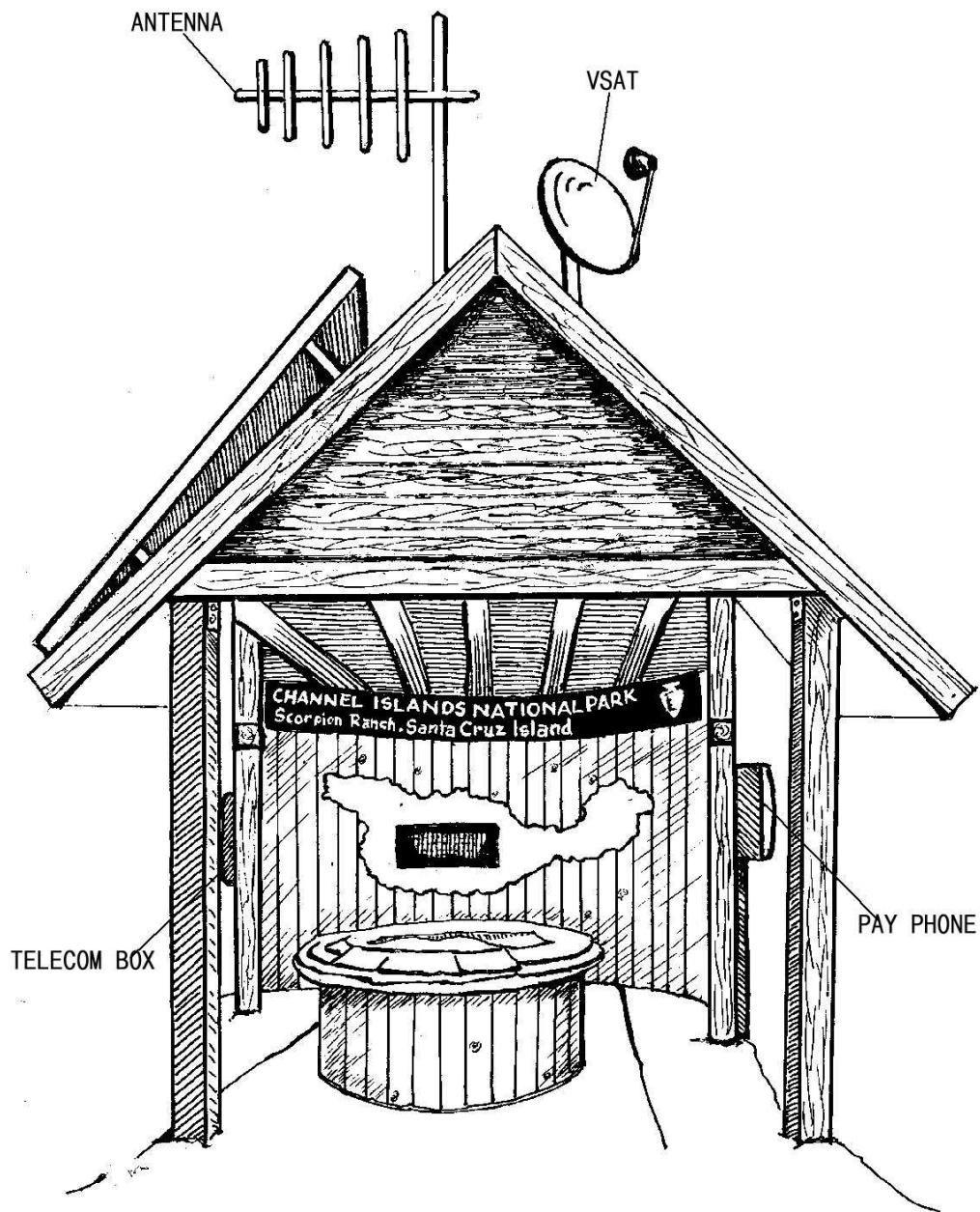


FIGURE 29 – POTENTIAL LOCATION FOR VSAT LOCATION
(PAYPHONE)

Figure 29 – potential location for VSAT location (payphone), solar panel on roof with

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar payphone (see page 90)
5. Solar panel – we can upgrade the existing solar power system of Figure 28 A/B or install a new a solar power system utilizing 176Watt panels (see page 88)

Notes: There is a need for a government phone line and internet connection. The Scorpion Valley is the most heavily visited area in the park and would benefit from a pay phone or emergency phone.

This drawing is made to show that all new equipment can be attached to any existing infrastructure requiring only a ladder, screws and brackets. The solar power system can be installed on the roof. The VSAT and antennas can also be mounted on the roof. The payphone can be installed on the side wall of the structure. The surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.



Figure 29 A – potential location for VSAT location (payphone), solar panel on roof



Figure 30 – Scorpion telecom relay as seen from the air – Pico Cell
Lat 34° 2'43.53"N Long 119°33'45.61"W

Notes: Since we were not able to visit this site and it was viewed only from the air, we anticipate that the structure located at this may look like the typical weather station/auxiliary outdoor equipment cabinet powered by Solar on San Miguel Island (see Figure 9). This picture is to show an example of a telecom structure that is currently on Santa Cruz.

We do NOT plan to install any equipment at this location.



Figure 31 – Navy site
Coordinates: 33.9943333,-119.6345

Notes: This is a large development with a lot of Navy infrastructure, but only occasional Navy staff. The NPS and IWS use the facility as an operational base and housing area. The Navy provides some phone lines, but they are limited in number. Additional phone lines might be desired at this site by NPS, IWS or the Navy. Internet connections for both the government and non-NPS researchers would be required here.

This picture is to show an example of a telecom structure that is currently on Santa Cruz.

We do NOT plans to install any equipment at this location.

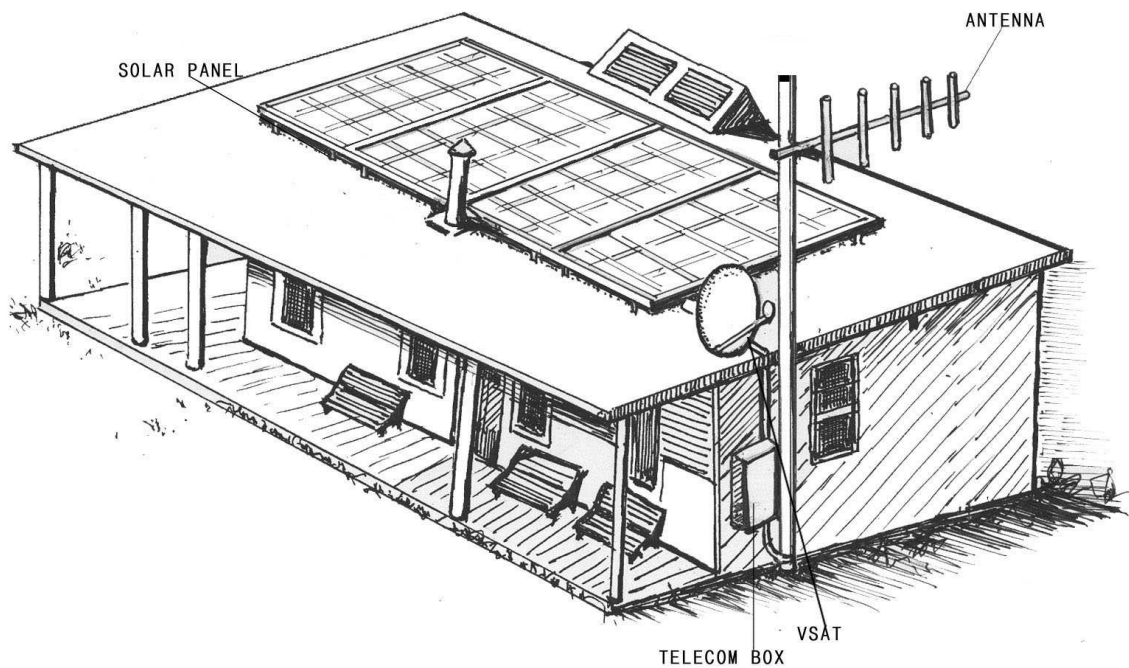


FIGURE 32 – DEL NORTE, VSAT LOCATION, SOLAR ON ROOF
LAT 34° 0'30.30"N LONG 119°39'20.67"W

Figure 32 – Santa Cruz Del Norte with new equipment

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar panel – we can install a new a solar power system utilizing 176Watt panels (see page 88)

Notes: This site provides occasional housing for NPS staff and researchers conducting work on Santa Cruz. A small backcountry camp is nearby. The cabin would potentially use one phone line.

This drawing is made to show that all new equipment can be attached to any existing infrastructure requiring only a ladder, screws and brackets. The solar power system can be installed on the roof. The VSAT and antennas can also be mounted on the side of the building. The surrounding environment will not be disturbed and there will be no new ground

disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.



Figure 32 A – Santa Cruz Del Norte, VSAT location, solar on roof



Figure 32 B – Santa Cruz Del Norte another view



Figure 33 – Nature Conservancy Main Ranch

Notes: This is the headquarters for The Nature Conservancy on Santa Cruz Island. This facility would require one or more phone lines as well as internet connectivity. TNC and Univ. of California field operations take place throughout the Central Valley, so anything that could enhance cell phone coverage throughout the valley would be ideal.

We do NOT plans to install any equipment at this location.

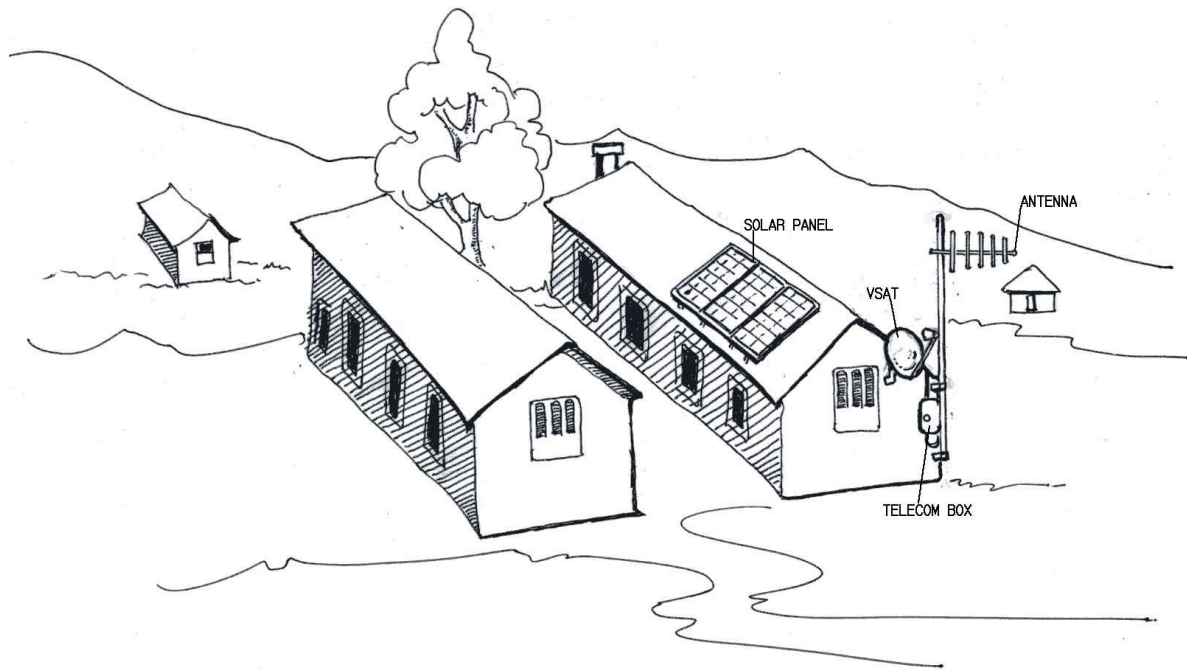


FIGURE 34 – UC FIELD STATION
LAT 33°59'57.05"N LONG 119°44'3.87"W

Figure 34 – University of California Field Station with new equipment

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar payphone (see page 90)
5. Solar panel – we can upgrade the existing solar power system of Figure 28 A/B or install a new a solar power system utilizing 176Watt panels (see page 88)

Notes: This site is occupied by one permanent researcher and is visited by various scientists and students throughout the year. The site presently has its own microwave link to the mainland. The site may still desire at least one phone line and internet connection.

We were not able to land and visit the site so the drawing is made to show that all new equipment can be attached to any existing infrastructure requiring only a ladder, screws and brackets. The solar power system can be installed on the roof. The VSAT, telecom box and

antennas can also be mounted on the side of the building. The surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.



Figure 34 – UC Field Station
Coordinates: 33.997086, -119.726184

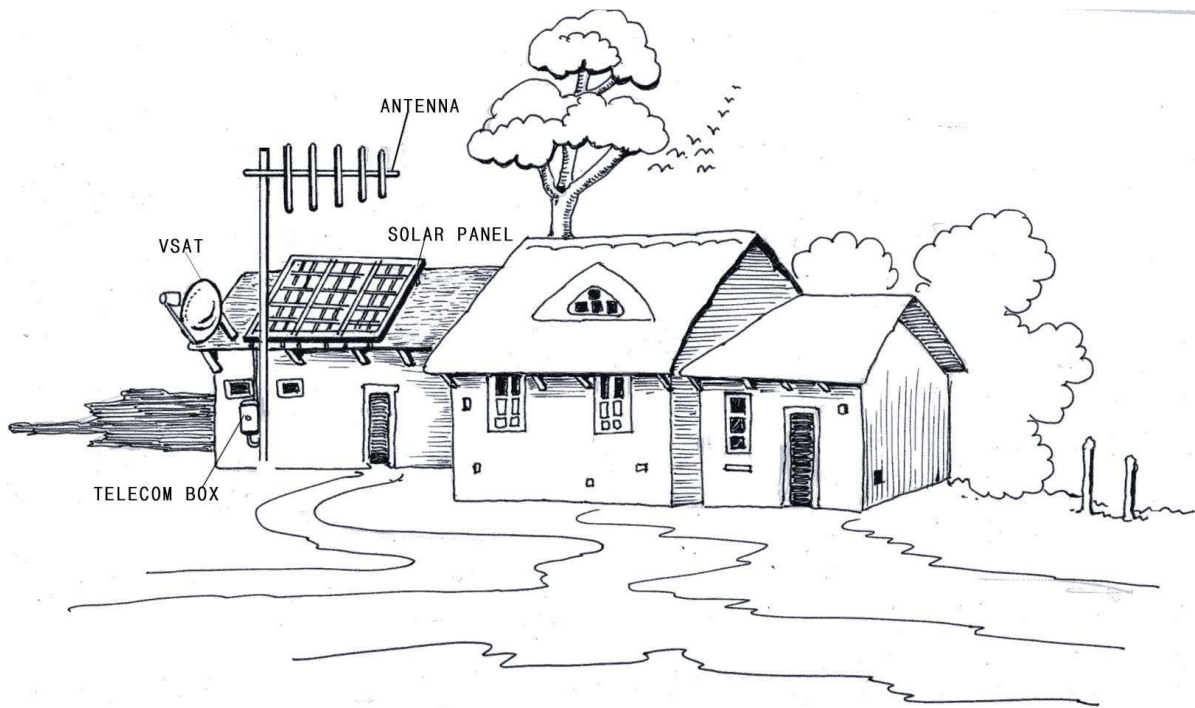


FIGURE 35 - CHRISTIE'S RANCH

LAT 34° 1'22.71"N LONG 119°52'10.74"W

Figure 35 – Christie's Ranch

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar panel – we can upgrade the existing solar power system of Figure 28 A/B or install a new a solar power system utilizing 176Watt panels (see page 88)

Notes: This is a remote, historic ranch site at the west end of Santa Cruz Island. It has been used over the years as an ecotourism camp and as a spike camp for fieldwork. There would probably be a desire for one phone line.

We were not able to land and visit the site so the drawing is made to show that all new equipment can be attached to any existing infrastructure requiring only a ladder, screws and brackets. The solar power system can be installed on the roof. The VSAT can also be mounted on the roof. The antenna and telecom box can be mounted on the side of the building. The

surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.



Figure 35 - Christies Ranch
Coordinates: 34.022806, -119.869756



Figure 36 – Diablo Peak
Coordinates: 34.0288,-119.7848

Notes: This peak is the highest point on Santa Cruz, and is the island's main telecom site. The existing tower and infrastructure make it an ideal place to add phone equipment. On the other hand, the site is only accessible by helicopter which makes installation and service expensive. Most of the equipment at the site is part of various radio systems, but the site also has the Verizon phone link for the central valley. That phone system has a courtesy phone that serves the equipment building. The Institute for Wildlife Studies tapped into that phone

to run a remote telemetry station. That linkage may no longer be working, and it is possible that the IWS may desire a phone line up there again for telemetry purposes.

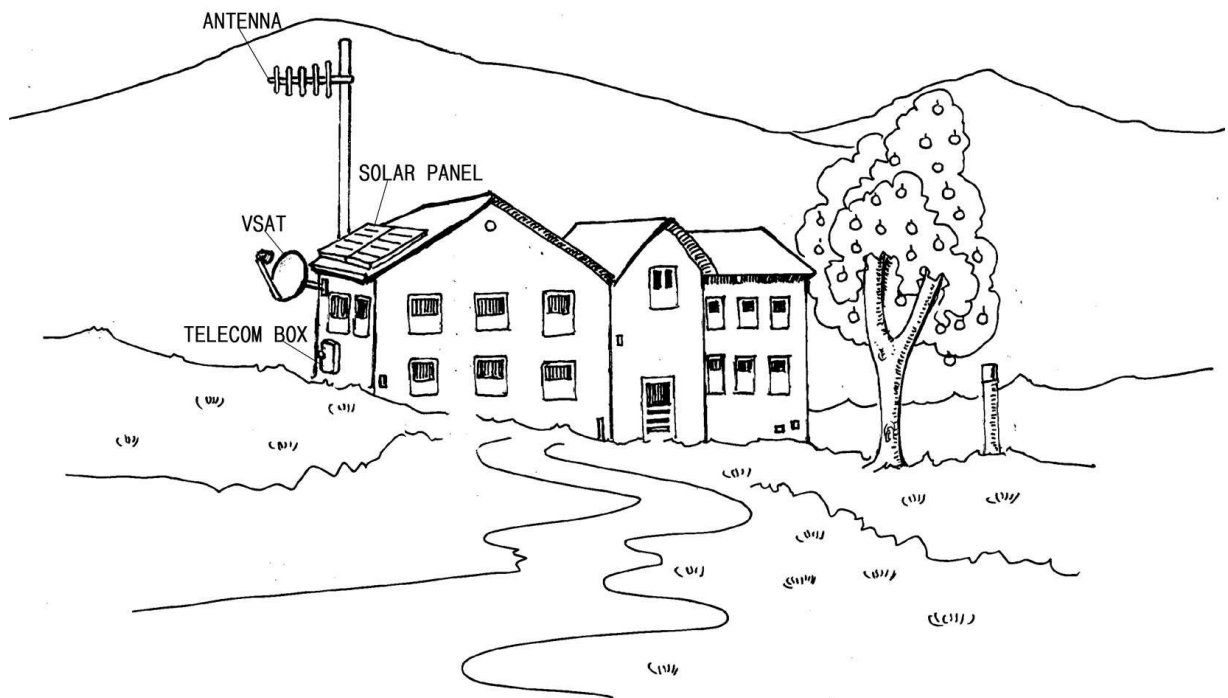
This picture is to show an example of a telecom structure that is currently on Santa Cruz.

We do NOT plans to install any equipment at this location.

Anacapa Island



Coordinates: 34.015705,-119.362556



ANACAPA ISLAND

New Equipment:

1. VSAT – 1.8M dish (see page 75)
2. Antenna – Yagi (see page 86) /Omni directional (see page 83)
3. Telecom box for Pico cell is below solar panel (see page 78)
4. Solar panel – we can upgrade the existing solar power system of Figure 28 A/B or install a new a solar power system utilizing 176Watt panels (see page 88)

Notes: Facilities at east Anacapa include the ranger quarters, maintenance quarters and bunkhouse. Each of these could use phone lines as well as internet connectivity. These services may soon be provided by the microwave link that will support the underwater video program, but an additional link for redundant support may be valuable.

We were not able to land and visit the site so the drawing is made to show that all new equipment can be attached to any existing infrastructure requiring only a ladder, screws and brackets. The solar power system can be installed on the roof. The VSAT can also be mounted on the roof. The antenna and telecom box can be mounted on the side of the building. The surrounding environment will not be disturbed and there will be no new ground disturbances, all equipment staging will be made on existing infrastructure with minimal or no environmental disturbances.

The house/building is the furthest and largest structure in the photograph.

Satellite Coverage

Potential Global iDirect Sites

No.	Potential Site Name	Lat	Long	Existing Tower	Phase	Satellite Name
1	Santa Barbara Ranger station	33°28'49.70"N	119° 1'46.08"W	N	1	G16 / AMC-21 Satellite
2	Anacapa Ranger Station	34° 0'56.60"N	119°21'47.79"W	N	1	G16 / AMC-21 Satellite
3	San Miguel Ranger station	34° 2'17.71"N	120°21'6.42"W	N	1	G16 / AMC-21 Satellite
4	Scorpion Housing area	34° 3'1.07"N	119°33'42.15"W	N	1	G16 / AMC-21 Satellite
5	Christie Ranch	34° 1'22.71"N	119°52'10.74"W	N	1	G16 / AMC-21 Satellite
6	Santa Cruz Main ranch	33°59'45.42"N	119°43'1.07"W	N	1	G16 / AMC-21 Satellite
7	Scorpion abode	34° 2'55.95"N	119°33'30.00"W	N	1	G16 / AMC-21 Satellite
8	Scorpion telecom relay site	34° 2'43.53"N	119°33'45.61"W	N	1	G16 / AMC-21 Satellite
9	UC Field station	33°59'57.05"N	119°44'3.87"W	N	1	G16 / AMC-21 Satellite
10	Prisoners harbor day use area	34° 1'9.31"N	119°41'2.75"W	N	1	G16 / AMC-21 Satellite
11	Santa Rosa Island ranch	34° 0'18.75"N	120° 3'6.38"W	N	1	G16 / AMC-21 Satellite
12	Santa Rosa campground	33°59'28.68"N	120° 2'52.60"W	N	1	G16 / AMC-21 Satellite
13	Air Quality shed - Macro site?	34° 0'6.00"N	120° 2'53.46"W	Y	1	G16 / AMC-21 Satellite
14	Del Norte ranch	34° 0'30.30"N	119°39'20.67"W	N	1	G16 / AMC-21 Satellite
15	Santa Rosa housing	33°59'56.80"N	120° 3'55.10"W	N	1	G16 / AMC-21 Satellite
16	Power station	34° 0'11.21"N	120° 3'6.23"W	N	1	G16 / AMC-21 Satellite
17	Smugglers Abode (olive tree)	34° 1'23.14"N	119°32'41.84"W	N	1	G16 / AMC-21 Satellite
18	Second airfield San Miguel	34° 2'36.54"N	120°24'45.15"W	N	1	G16 / AMC-21 Satellite
19	San Miguel Research Facility	34° 1'53.80"N	120°26'1.36"W	N	1	G16 / AMC-21 Satellite

Notes: all sites are cleared – ONLY physical obstruction will prevent VSAT from seeing the Satellite.

Satellite Equipment



1.8Meter Standard Antenna¹

¹ Please see P65208_-_Part_3_VSAT_Hardware.pdf and 1.8TxRx.pdf

Ku-band 2W BUC [Block Upconverter]



Ku-band 2W BUC [Block Upconverter] MODEL NO. NJT5016 / 16F²

Output Interface	Waveguide, WR-75
Output Power	@ P1 dB +33 dBm minimum over temperature
Conversion Gain	53 dB nom.
Phase Noise (SSB)	-60 dBc/Hz max. @ 100 Hz -70 dBc/Hz max. @ 1 kHz -80 dBc/Hz max. @ 10 kHz -90 dBc/Hz max. @ 100 kHz
Required External Reference	
Signal Frequency :	10 MHz
Input Power :	-5 to +5 dBm
Phase Noise :	-125 dBc/Hz max. @ 100 Hz -135 dBc/Hz max. @ 1 kHz -140 dBc/Hz max. @ 10 kHz
Input Interface	N-type, female (50 ohm) [Model No. NJT5016] F-type, female (75 ohm) [Model No. NJT5016F]
Input / Output V.S.W.R.	2.0:1 max. @ Input 2.0:1 max. @ Output
Mute	Shut off the HPA in case of LO unlocked
Power Requirement	+15 to +24 V dc
Power Consumption	37.5 W max.
Operating Temperature	-40 to +55 degrees C
Storage Temperature	-40 to +75 degrees C
Size & Weight	245.4 mm (L) x 127 mm (W) x 55 mm (H), 2.3 kg max.

² JRC_2_Watt_BUC.pdf

iDirect 3000 VSAT Modem ³



Network Configuration

Network Topology	Star (TDM/MF-TDMA)	
Modulation	Downstream: BPSK, QPSK, 8PSK Upstream: BPSK, QPSK	
Maximum Rates Supported	Max Rate	Downstream (TDM) Upstream (D-TDMA)
	Symbol rate	Up to 11 Msps (QPSK, .793 FEC) Up to 5 Msps (QPSK, .793 FEC, unlimited NMS)
	Info rate	Up to 18 Mbps (QPSK, .793 FEC) Up to 8 Mbps (QPSK, .793 FEC, unlimited NMS)
	IP data rate	Up to 17.5 Mbps (QPSK, .793 FEC) Up to 5 Mbps* (QPSK, .793 FEC, unlimited NMS)
	For more Information on maximum data rates please refer to the Release Notes of IDS 8.0.1	
FEC	For full list please refer to the latest iDirect Link Budget Analysis Guide	
E_b/N₀	For full list please refer to the latest iDirect Link Budget Analysis Guide	

Interfaces

SatCom Interfaces	TxIF: Type-F, 950–1700 MHz, Composite Power +7dBm / -35dBm RxIF: Type-F, 950–1700 MHz, Composite Power -5dBm / -65dBm TVRO: Type-F, 950–1700 MHz
Available BUC Power (IFL)	+24V (supports BUCs up to 4W Ku-band or 5W C-band)
Available LNB Power (IFL)	+19.5V (Nominal)
10 MHz Reference	Software controllable on Tx and Rx IF ports
Data Interfaces	LAN: Single 10/100 Ethernet, 802.1q VLAN RS-232: RJ45 (for GPS or Console Connection or Antenna Pointing)
Protocols Supported	TCP, UDP, ACL, ICMP, IGMP, RIP Ver2, BGP*, Static Routes, NAT, DHCP, DHCP Helper, Local DNS Caching, cRTP and GRE
Traffic Engineering	Group QoS, QoS (Priority Queuing and CBWFQ), Strict Priority Queuing, Application Based QoS, Minimum CIR (Static and Dynamic), Rate Limiting
Other Features	Built-in Automatic Uplink Power, Frequency and Timing Control, Authentication, Antenna Control Interface (OpenAMIP)

Mechanical/Environmental

Size	W 11.5 In x D9.5 In x H2 In. (W 29.2 cm x D24.1 cm x H5.1 cm)
Operating Temperature	0° to +50°C (32° to +122°F) at Sea Level with temperature gradient of 5°C per 10mins 0° to +45°C (32° to +113°F) at 10000 feet (3048m) with temperature gradient of 5°C per 10mins
Humidity	Max 90% non-condensing humidity
Input Voltage	100–240 VAC Single Phase, 50–60 Hz, 2A max at 90 VAC, 1A max at 240 VAC
Radio Standards	EN 301-428 v1.3.1 — Ku-Band System Level Specifications EN 301-443 v1.3.1 — C-band System Level Specifications
Safety Standards	Complies with IEC 60950, EN 60950-1, UL 60950-1, CSA C22.2 No.60950-1-03
Emission Standard	Complies with EN 55022 Class B, FCC Part 15 Class B, CISPR 22 Class B, EN 61000-3-2, EN 61000-3-3
EMC/Immunity Standard	Complies with EN 55024, EN 301-489-1, EN 301-489-12, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-11
Certification	FCC, CE and RoHS compliant * Model 3100-NB is limited to 200 kbps ** Future release

Indoor/Outdoor Pico Cell⁴

Close-up: Pico Cell



Outdoor Enclosure

Note:

Includes Ku band satellite modem

Pico Cell Features:

- Entire base station on single board
- One GSM transceiver (TRX)
 - Can be paired with another for dual capacity
- Dual band 1800/1900MHz
- Abis over IP (Ethernet)
- Supports:
 - GPRS EDGE Packet data
 - Prioritization of important users



⁴ CCG_Presentation_90206.ppt



Frequency band

GSM 1800, GSM 1900

Number of transceivers

1–2

Transmission interface

Ethernet

Dimension (WxDxH) / Weight

RBS 2409: 336x58x278 mm / 2 kg

PSU: 46x155x40 mm / 0.55 kg

EBB-11: 100x45x140 mm / 0.6 kg

Output Power

23 dBm (GMSK and 8-PSK)

Receiver sensitivity

–100 dBm

(faded channel TI 5, 15°C–30°C)

Power Supply

100–240 V AC

Power Consumption

40 W (100–250 V AC)

Normal operating temperature

+5°C to 40°C

Battery backup time (EBB-11)

>5 min

The RBS 2409 is an entire radio base station on one circuit board, designed to be easily mounted on a wall or ceiling for zero footprint applications. The base station supports all of the relevant BSS features and provides 23 dBm in output power. Weighing slightly more than 2kg, the RBS 2409 is very easy to install by attaching it to a wall/ceiling mount and plugging in the power and Ethernet connections. Its silent operation and full set of BSS functionality through Abis over IP make the RBS 2409 a perfect option for indoor coverage.⁵

⁵ It uses Abis over IP to significantly reduce the cost of backhaul transmission. The RBS 2409 can be used as either a stand-alone, single transceiver (1 TRX) base station or be paired with another RBS 2409 for a dual transceiver solution (2 TRX). The unit has its own, omni-coverage internal antenna, but also has an external antenna option, allowing it to feed a small Distributed Antenna System (DAS) covering a small office instead of a non-capacity-enhancing RF repeater solution. The RBS 2409 connects to the operator's BSC like any other RBS and supports all GSM/BSS features developed in the past 15 years that can be used with a Pico solution based on IP transport. The RBS is designed for use with most AC power supply voltages and consumes only 40 W of power. The capabilities of the RBS 2409 include Abis optimization, efficient data handling and prioritization of important users. It controls traffic through hierarchical cell structures, cell load sharing and assignments to other cells. The RBS 2409 reduces interference through dynamic BTS power control, dynamic MS power control and DTX Uplink and Downlink.

Please see [Ericsson_GSM_2409_Pico_cell_datasheet.pdf](#)

Outdoor Pico Cell

Pole mounting of three SuperPico Cellular Radios Showing antenna cabling at top, cabling to BSS Controller at bottom



SuperPico GSM Cellular Radio

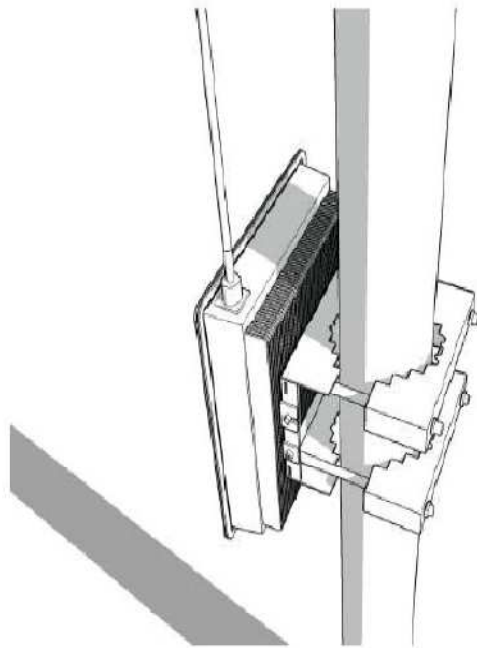
GSM850/1900 Options Availability in Q2/Q3'09⁶

Antenna port power:	+30.5dBm/TRX (1W)
Antenna Connector:	Type N
Receiver Sensitivity:	-104 dBm (voice)
Digital I/O:	100/1000 Mbps Ethernet, RJ-45
DC Power:	24 VDC
Power Consumption:	Avg. 20W, Peak 25W
Weight:	3.5 kg
Mounting Bracket Options:	Wall Mount, Pole Mount
Enclosure:	IP-67 rated

Radios typically mounted < 1 meter below antennas

⁶ 3 weeks lead – Miles Lu and Victoria @ UT Starcom (conversation 02/10/09 – vendor is STM and Ip Access)

Pole Mounting Details for both SuperPico Cellular Radios and BSS Controller EX3



SuperPico GSM BSS Controller EX3

Supports up to 3 Cellular Radios (each 1TRX)
5 voice – 1 controller

Digital I/O to Radios:	100/1000 MBps Ethernet, RJ-45
Terrestrial Backhaul:	100/1000 Mbps Ethernet, RJ-45
Power In:	2-pin, circular, 16 AWG, 24 VDC
Power Consumption:	Single TRX = 13W Avg, 15W peak 3TRX = 42W Avg, 50W peak
Mounting Bracket Options:	Wall Mount, Pole Mount
Enclosure:	IP-67 rated

All Band Cellular Omnidirectional Antenna



Specifications:

Product Code: OMNI-A0069 N-type female connector⁷

Electrical: Environmental:

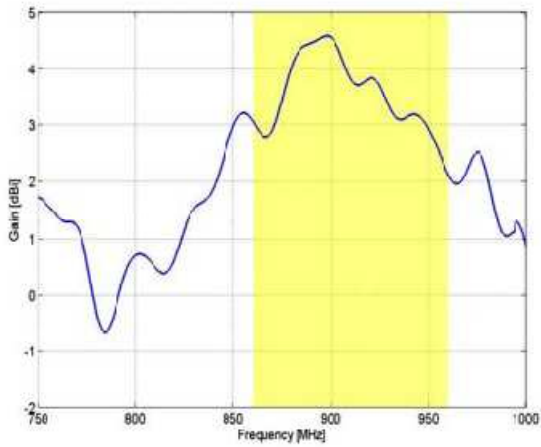
Gain (max):	4.6 dBi in 800MHz band 6.3 dBi in 1.8GHz band
Wind Loading:	160 km/h
Gain (min over the band):	2.1 dBi in 800MHz band 5.5 dBi in 1.8GHz band
Temperature Range:	- 20° C to +70° C
Frequency:	860-960 MHz 1710-2170 MHz
Shock:	40G at 10 msec
VSWR:	< 2.5:1
Thermal Shock:	- 20° C to +70° C : 10 cycles
Feed power handling:	10 W
Water Ingress Rating:	IP65 (NEMA 4X)
E-plane 3 dB beamwidth:	25° (± 5°)
H-plane 3 dB beamwidth:	360°

⁷ all band cellular omni.pdf

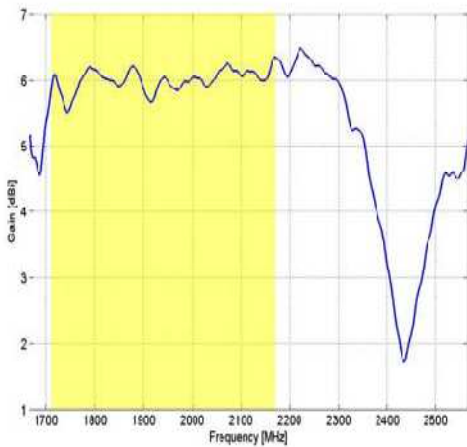
Mechanical:

Front to back (F/B ratio)	N/A
Dimensions (l x w x d):	500 mm x 50 mm x 50 mm
Nominal input impedance:	50 Ohm
Weight:	930 g (including bracket)
Polarization:	Linear
Mounting	Stainless steel brackets for up to 50 mm poles

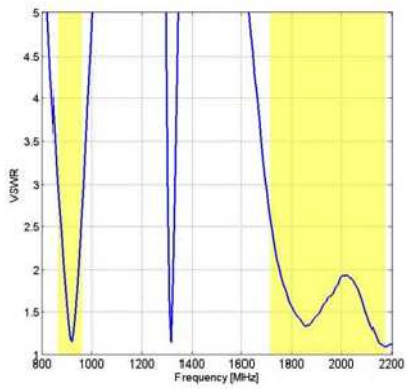
Gain:



800MHz Band



1800MHz Band



VSWR

Dual Band Yagi



Features:

- Covers Cellular/PCS (US and worldwide) and WiFi frequencies
- Consistent 9dBi gain across all frequencies
- Pole or wall mountable
- Light gray attractive UV protected housing
- Vertical or horizontal polarization
- DC grounded for lightning protection

Applications:

- Cellular, PCS or WiFi repeaters
- Indoor Cellular, PCS or WiFi extenders
- WISP equipment
- Non-line of sight

Requires:

- Cable: This antenna includes no cable
- Phone Adapter Cable if connecting directly to an EVDO device or cellular phone (see adapter notes below)

Cable:

We suggest using one of these Ultra Low Loss LMR-400 Cables we have available. The dual band yagi antenna will connect directly to one of the "N Male" ends of the cable. On the other end of cable, you will need an N Female to FME Female Adapters AS WELL AS an adapter cable for your specific EVDO device or cell phone.

Specifications

Part Number MB825

Frequency Range:

806MHz-960MHz

1710MHz-2500MHz

Impedance:

50 Ohms

Antenna Gain:

9dBi

Beam Width:

H 90 Degrees (Low band)

H 75 Degrees (High band)

Maximum Power:

50 Watts

Radiation:

Directional

Connector:

N Female

Height :

10.5"

Length:

15.5"

Width:

2.75"

Weight:

1.5lbs

Mount Pole:

(1.7" Max) with included pole mount hardware

Sharp ND-176U1Y 176 Watt Solar Panel (29.28 Volts) ND176U1Y



Sharp ND-176U1Y 176 watt solar panel ⁸

High-efficiency photovoltaic module using Poly-crystalline cells.

Performance

Rated Power (Pmax): 176 watts

Power tolerance: +10 / -5%

Nominal Voltage: 29.28 volts

Limited Warranties: 25 years

Electrical Characteristics

Maximum Power: 176 Watts

Voltage at Pmax: 23.42V

Current at Pmax: 7.52A

Short-circuit current: 8.22A

⁸ Doc_ND-176U1Y_20080519173645.pdf

Open-circuit voltage: 29.28V

Maximum series fuse rating: 15A

Maximum system voltage: 600V

Mechanical Characteristics

Black frame module, and associated racking with hidden hardware and tapered covers. Tempered glass, EVA lamination and weatherproof backskin provide long-life and enhanced cell performance. Advanced surface texturing process to increase light absorption and improve efficiency.

UL Listed

Fire Rating: Class C

Weight: 36.4 pounds (16.5 kg)

Dimensions (LxW): 39.1" x 52.3" x 2.3" (994 x 1328 x 57.5 mm)

Output: 43.3"/1100 mm cable, Lead wire with MC Connector

Solar Payphone



The Sungia solar payphone⁹: the payphone can be deployed as a standalone unit or integrated into an off grid solar system. The payphone can generate 15Watt to 35Watt depending on its geographical position. The panel is used for recharging a 12V battery, and it can charge, on average, 4Ah per day to a 12V battery for a standard fixed line payphone or a wireless GSM payphone power consumption about 3Ah per day. The Sungia Solar Panel module/panel is assembled by lamination. The four holes on the metal frame make mounting easy and provide a strong fixing of the modules to the supporting structure. The modules can withstand winds over 200 km/h.

⁹ solar_ap_w07 instal directions.pdf

