IRIS Procedure for

Excavation and Construction of Seismic Vaults

This document serves as a reference for the procedures to construct a TA station, and details the responsibilities of the Construction Supervisor onsite and the responsibilities of the Excavation Contractor.

General Description of Project

The IRIS consortium (www.iris.edu) is installing seismic stations to record earthquakes occurring locally and worldwide as part of a National Science Foundation award under the project name (EarthScope-USArray). The data is used to image the Earth's interior and produce new insights into the earthquake process. The project anticipates over 2000 sites across the country on both government and private land. For more detailed information regarding this project, please visit the following web location (www.earthscope.org or www.iris.edu/USArray).

Description of Work

Overview

A seismic vault consists of a plastic HDPE corrugated pipe 82" long, sealed on the bottom with a rubber membrane and then inserted vertically into an excavated hole so that the top end extends above grade about 1 corrugated ring. The bottom is embedded in concrete. The hole is backfilled, all soil and rock is mounded onsite. A cable conduit is trenched 20' to a 2" galvanized pole, embedded 3' into a concrete base. One or two additional poles are required at some sites to mount communication equipment-satellite dish and solar panel mounts.

A key aspect of the work is that the site locations are in remote areas, separated on average by 50 miles, with typical drive times of two hours to reach site. Materials to perform the work need to be coordinated for delivery and/or carried between sites. The work area is constantly shifting to new areas and will not generally be based from a single support location.

Proper respect for landowner property and courtesy in addressing landowner concerns are very important to the success of the project. We are guests on the property and can be asked to leave at any time for no reason, which is a great loss to the project.

The overall schedule is to construct 214 sites per year. A scheduled downtime is December 15 to January 15 each year. Scheduled maintenance breaks are negotiated with TACO Station Coordinator. The expected monthly schedule is 19 sites/month February through November and 12 sites/month December and January. Adding a second crew should schedule or favorable conditions warrant is sometimes necessary.

Safety

All OSHA safety regulations will be followed. The contractor will have the responsibility of determining if any underground utilities exist and shall utilize the local one-call (dig safe) service prior to ground disturbance. Rarely will the site be near any development. The machine operator will have final say on safety around the machinery and around the open hole. Excavations will not be left open for any length of time unattended without adequate safety fence. After installation, a lid will be placed and locked over the vault.

Site Locations

Actual locations are provided in a detailed reconnaissance report for each site. A summary table of locations and communication type (for additional pole plans) and fencing requirements are prepared before each deployment. Plan for 10% of the stations to be Solar VSAT, 40% AC VSAT, and 50% Cellular sites. Substitution of different sites can be made by the TA Manager or Station Coordinator depending on weather and site permit availability.

Work will be scheduled in a region according to the seasons. Northern states will be in done in summer, southern states in winter.

Work Conditions

An IRIS representative (Construction Supervisor) will be on-site for each installation and responsible for access to the sites and communications with the landowner. IRIS is responsible for obtaining permission to excavate on and have access to each location. In order for the construction contractor to receive credit for payment, the IRIS representative must sign off on each installation the day that construction work is accomplished as defined in the work description above.

Work will be organized regionally where 19 or more adjacent sites can be installed in one deployment. The average distance between adjacent sites is approximately 50 miles, but because of limitations in access roads, as much as 150 miles should be anticipated per site.

Mobilization of equipment will not be expected if fewer than 10 nearby stations are ready for installation. IRIS will provide mobilization clearance and ask for contractor response within 7 days. The work schedule for the next 19 or more constructions will be agreed upon by the IRIS representative before the start of contract work.

To the best of our ability, most of the sites will be located in areas where excavation can be performed with a backhoe without the need for a rock hammer. Nevertheless, hard rock sites will be encountered. For the purposes of this contract, plan on the use of a hammer for 5% of sites. At these hard rock sites, the 6.5’ deep hole requirement may be waived by the IRIS representative on site so that less than 1 hour of hammering will be required. Alternatively, a split vault may be constructed at the IRIS representative’s option. This involves cutting the 6’6” vault in two pieces, placing side-by-side, cementing in and connecting the two pieces with a short conduit coupler.

The contractor must be licensed by any State, Local, and Federal authorities for this type of work, be fully insured and have workers compensation for each employee working on this project.

As part of negotiations with the landowner for access, occasionally a small amount (<1hour) of backhoe work is requested by the landowner, usually tasks like clearing some brush or filling a small

ditch, or clearing a cattle guard. This incidental work is part of the contractor's job; we do our best to keep it reasonable. This work is coordinated by an IRIS representative.

Neither IRIS nor landowner is expected to provide toilet, water or food onsite. All waste must be removed from work site. IRIS prohibits smoking onsite due to fire hazard.

IRIS Station Coordinator Responsibilities:

1. Routine communication regarding crew schedules with excavation contractor management, construction supervisors and TA management. Weekly schedules, daily changes
2. Responsible for alerting excavation contractor management of inappropriate or unsafe work practices of the field crew. Contact for excavation contract management to report same regarding IRIS personnel.
3. Participation in Recon conference call and awareness of permit status, special construction instructions for every site.
4. Participation in Field operations conference call including responsibility for construction, installation, shipping sections of weekly summary report. Will occasionally oversee entire report and/or chair conference call.
5. Issue management of any onsite landowner concerns.
6. Scheduling and delivery of materials delivery into field depots.
7. Work area planning, including second crew, to maintain safe and efficient work with regards to weather and driving distances.
8. Send Construction Information, to Construction Supervisor, Construction Supervisor to call Landowners one week in advance for permission to construct

IRIS Construction Supervisor Responsibilities:

1. IRIS Construction Supervisor (CS) is to maintain daily contact with the Station Coordinator in so far as possible. Preferably via phone in the morning and evening.
2. CS schedules day to day access with landowners, providing at least 24 hours notice where possible. This requires quite a bit of time and phone tag when a landowner is unavailable on the anticipated date.
3. CS is responsible for conversation with landowner to insure they understand the work to be done, and to address any and all questions landowner may pose regarding the project.
4. CS is responsible for determining the location to dig is the staked, reconned and permitted location, or has sought appropriate clearance with landowner in the event site must be relocated. If relocated, four cardinal photos must be taken and preferably the reasons for relocation discussed with recon supervisor or station coordinator. No ad hoc relocation on federal, state or corporate lands is allowed.
5. CS is responsible for deciding when access will be attempted or rescheduled due to road conditions and weather.
6. CS is responsible for inspecting the work performed, in particular the hole depth, tamping, concrete quality/mix. Certain photos are required for their report.
7. As available and not to interfere with above duties, CS is to help construction crew perform aspects of the construction tasks, especially if an additional hand adds a margin of safety or efficiency.

8. CS is authorized to purchase additional materials and/or to sign for materials supplied by the excavation contractor. In event the construction crew is unable to do so, the materials are to be supplied by IRIS

Excavation Contractor Responsibilities:

The contractor will be responsible for providing all the machinery, tools, dig permits, storage facilities, transport, labor and travel costs associated with the following tasks. See materials list in appendix.

Construction Task Detail

1. Cut to size from 20' lengths, 6'6" sections of 42" ADS HDPE corrugated plastic pipe. Also cut 36" HDPE plastic pipe according to drawings provided. Inspect accompanying lids for molding defects.

2. Transport cut HDPE plastic pipes and lids to job site. Waste and extra material to be disposed of by contractor.

3. Dig 6.5' deep hole approximately 4.5' wide. Hole must be wide enough at the bottom to fit a 42" ID HDPE plastic pipe vertically with enough space (4-6") around the outside so concrete is able to form a continuous seal. All soil and rock will be mounded on site; none is removed or brought in.

4. 45 mil EPDM rubber membrane in 8' square or circle is wrapped over the bottom of tube and 15' 2"wide nylon ratchet strap cinches the membrane into groove lined with adhesive sealant..

5. Mix and pour at least 0.4 yards of fine aggregate concrete into hole.
- Contractor to supply concrete, water, and mixer
- Quikrete mix #1101 or equivalent is used
- No rebar or other reinforcement is to be used.
- Concrete must not be poured when ambient temp is below 20F.

6. Set vault vertically into hole using 3/8" chain harness.
- Ensure no water or air trapped under membrane

7. Two 15' sections of 3/8 galvanized chain are to be connected around the vault approximately half-way down so that two open ends of the chain are exposed once vault is emplaced and connection links are buried once vault is backfilled. The two open ends of the chain will be used to lock the lid.

8. Add approximately 0.6 cubic yards concrete into inside of tube, on top of membrane liner to fill vault 14" deep. For transport and weight estimates, estimate 35 80# bags of concrete per site.

9. Pad formed inside the bottom radius of vault will be finished off smooth and level.

The floor should be level within 5 degrees for the installation of the sensor

10. Auger or excavate 12" diameter hole 4' deep no further than 23' away from edge of installed vault. An 8" deep trench (minimum) connecting the solar/antenna mast hole to the vault will also be dug to set 1.5" conduit from vault to mast.

11. Using a 12“diameter SonoTube cut to length, set 2” diameter, 10’ schedule 40 galvanized pipe in ground with cement. Depth of pipe in ground minimum 3’. Above ground end is threaded. End of steel pipe which is set into concrete will have holes drilled into it with either rods or wire mesh to add to the adhesion of pole to concrete. Contractor will supply concrete, forms, and steel pipe.

12. Install 10AWG copper ground wire between cable entry/junction box of seismic vault and mast, and install pump hose in vault sidewall, laying tubing along conduit run.

13. Backfill around outside of vault leaving approximately 2 yards of fill dirt which will be used for final coverage of lid at a later date. Fill dirt will be ramped up to edge of vault to create adequate drainage. An opening in the mounded fill dirt will be provided for drainage.

Care will be taken at this stage to keep vault level and dirt from inside of vault.

14. Install junction boxes, conduits and fittings from instrument vault to solar/antenna mast. IRIS will supply junction boxes and fittings, contractor will supply 1.5” diameter PVC conduit, glue and couplers.

15. Hang the inner ring and foam insulation within the vault

16. Install 8’ per side square fence around solar panel/antenna mast.
At the owners’ request, several fence types have been requested either;

- A heavy duty 8’ T-post with 48” welded wire mesh (included in fixed fee)
- Aluminum panel section fencing (supplied as cost plus fee)
- Chain link fencing at school sites (supplied as cost plus fee)

Line item for installation of complex fencing is allowed.

17. Site will be smoothed out as much as possible around vault. No excess concrete or deep ruts will be left at site. This will primarily consist of smoothing un-necessary piles of dirt and budgeting enough labor and equipment hours to maneuver to avoid impacting brush and trees that cannot be disturbed. No seeding, cover or boundary fence is required.

Special care must be taken in the installation to minimize the disturbance to plants or soil around the location thus minimizing the footprint to the property. Temporary work area is defined as 50ft x 50ft, with vehicles confined to this area.

Depending on the station communications, one or two additional masts are specified. We identify the sites as using AC VSAT or Solar VSAT.

- For AC VSAT a 2” mast embedded 4’ into ground and 6’ above ground in a 12” SonoTube filled with concrete is required. For the site, a total of two masts are installed.
- For a Solar VSAT, in addition to the mast for AC VSAT, a 4” schedule 40 pole embedded 4-5ft in a 18” diameter SonoTube is also required. For the site, a total of three masts are installed.

Materials Transport and deliveries

IRIS is obligated to make available at a central depot for the region (e.g. Salt Lake City, Denver, etc) the bulk items: HDPE lids and Construction Kits.

Transport of Pipe and materials forward to a sub regional depot (a 19 station work area) is provided by either IRIS or the Construction Contractor. The Construction Contractor is responsible for moving material to each site.

The Construction Contractor is requested to carry 10 extra bags of concrete and 50 gallons of water to avert onsite shortages.

Materials insufficient to carry out tasks. IRIS personnel are authorized to purchase materials in the event the contractor is unable to supply them. These costs plus 10% will be deducted from contractor invoice.

Construction of a basic site consists of two components connected by conduit and a ground wire in a ditch; the two components are a vault and a solar mast. The vault contains the sensor and associated electronics and may be split into two vaults as conditions on the grounds dictate. The solar mast holds the solar cells as well as the antennas for the cell modem and GPS gear. If there is no cell coverage then site requires a VSAT component. The VSAT requires more power than the basic solar mast can supply. Therefore the VSAT site will have access to AC power or additional Solar panels as required. Fencing may be required around any or all of the various components as requested by the landowner and conditions dictate.

This following will cover the site construction component by component starting with the basic vault.

SECTION 1
Excavation

1. Basic Vault
    a. Contact Landowner prior to site access if required

    b. Facing North take photo of vault location showing stake, label photo “Station-code_Before” example: C12A_Before

    c. Excavate vault location (depth of hole should allow vault to be 1 ring above finished grade and a 6” concrete pad below liner)

d. Level and Tamp bottom of hole with backhoe
e. Take photo of hole, label photo “Station-code_Hole” example: S23A_Hole

f. Dig ditch 18” wide x 18” deep x 20’ long from vault to mast location

i. Ditch should be deeper at the mast end than the vault end

g. Mast should be nominally 20' from side of vault.

h. Dig hole 4’ deep for mast SonoTube

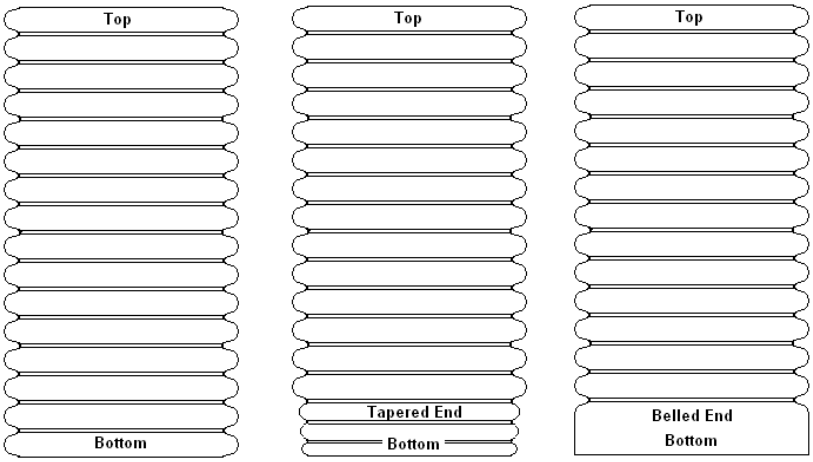
2. A Split Vault will be installed should conditions dictate

SECTION 2

42” Diameter Vault Preparation

1. At storage area

   a. Cut standard 20' long x 42” diameter pipe into 3 sections each 82”
      i. Use sawzall
      ii. Starting at belled end count out the bell and 16 rings (82”)
      iii. Cut pipe in valley between rings
      iv. Go to tapered end and count out the taper and 16 rings (82”)
      v. Cut pipe in valley between rings
      vi. You now have 3 vaults



   b. Using Patch-n-Go seal all cracks, pinholes, or screw holes found on vault
2. At site
   a. Ensure all holes are sealed with Patch-n-Go

b. Record length of vault
c. Place vault in a vertical position with bottom end up

d. Apply sealant using caulk gun to the valley between 2nd and 3rd ring from the bottom or above the belled or tapered end
    i. If vault pipe has tapered end apply to tapered end just above taper
    ii. If vault pipe has belled end then apply to belled end just above bell

e. Stretch pond liner over bottom of pipe

i. Ensure there are no pin holes in liner

f. Secure pond liner to vault with ratchet strap
   i. Place strap over pond liner in the area where you applied the sealant
   ii. As you tighten ratchet pull slack out of pond liner so that it is tight
   iii. Trim excess liner to ring above strap using utility knife

g. Place vault on its side and attach chains using clevises.

h. Using clevises attach chains between the 7th and 8th rings from the top of vault

36” Diameter Insert Preparation

1. At storage area
   a. Cut 20’ x 36” into 4 ring sections using Sawzall

SECTION 3
Solar Mast

1. Basic Solar Mast

a. Place 12” diameter x 4’ long SonoTube in hole and back fill around SonoTube with dirt

b. Fill SonoTube with concrete
c. Cut 20’ length of 2” rigid pipe in half or use one 10’ pipe

i. If conditions dictate spray area with water to prevent fire

d. Use 2” x 10’ Schedule 40 rigid pipe, leave threaded end up

e. Install cap on threaded end

f. Drill 5/16” hole 18” from bottom of mast

g. Place 1/4” diameter x 8” steel rod in hole and using duct tape secure rod in place

h. Place bottom end of mast into center of SonoTube and ensure mast is vertical.

i. Cut 1.5” PVC conduit to length and add 90 degree sweep, Glue all PVC conduit joints

j. Glue 10' of 1.5” PVC conduit to sweep at mast end

k. Cut added 1.5” PVC to 4’ above grade

l. Glue 1.5” x 1.5” Tee to end of 1.5” conduit, Materials in Construction kit

m. Tee should face North

n. Attach #10 ground wire to mast using hose clamp

o. Pull power, GPS, and, Cell cables (from Step 1. (s)) from vault to Solar Mast

p. Pull 6’ of gray power cable thru Tee to exit North

q. Cut a piece of 1.5” PVC to run from Tee at 4’ to the top of the 2” rigid pipe

r. Attach 1.5” PVC conduit to Mast using hose clamps

s. Install 5’ liquid tight flex over 6’ gray power cable using reducer bushing and adapter as shown

t. Coil liquid tight flex cable and secure as shown

u. Glue second 1.5” x 1.5” Tee to top end of PVC, orient Tee as shown.

v. Pull Comm cable thru the North exit of Tee and install 1.5” street elbow (DO NOT Glue) orient as shown

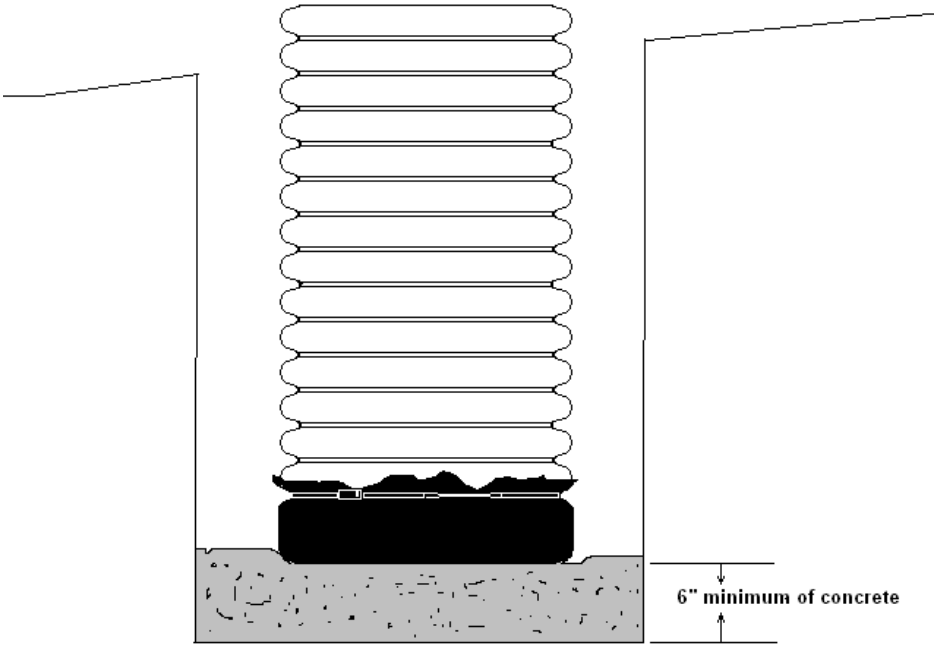
w. Push foam plug into street elbow as shown

x. Install GPS antenna using reducer bushing and nipple

y. Coil 10’ of Comm cable to top end of mast

SECTION 4
Install Vault

1. Basic Vault
   (a) Ensure photo of hole has been taken, label photo “Station-code_Hole” example: S23A_Hole



   (b) Place a minimum of 6” concrete in bottom of hole

(c) Using a concrete vibrator level 6” concrete pad

(d) Vault is now ready to be placed in excavation.

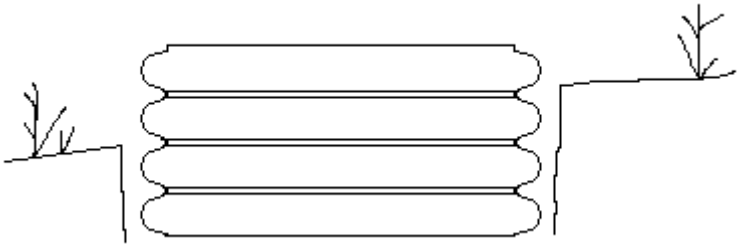
(e) Attach chains to backhoe bucket and place vault in excavation.
   i. Wrap chains around outboard teeth of backhoe bucket and tie ends in a knot
   ii. Leave enough slack in chain so that the vault will hang freely from bucket.
   iii. Vault should be centered in hole to allow even backfill

   iv. Chains should be oriented to the sides of the vault as seen while standing in the ditch

v. Lower vault into hole. Leave 3” gap between membrane and concrete in hole

vi. Pour 10-20 gallons of concrete into vault

vii. Slowly lower vault onto concrete in hole allowing concrete in vault to displace any air/water trapped under membrane



viii. Vault should be deep enough to expose only **one** ring above grade

ix. Using 4’ level ensure vault is level and plumb

x. Backfill around vault ensuring there are no voids around vault and the vault remains level and plumb

xi. Place a minimum of 14 " of concrete into vault

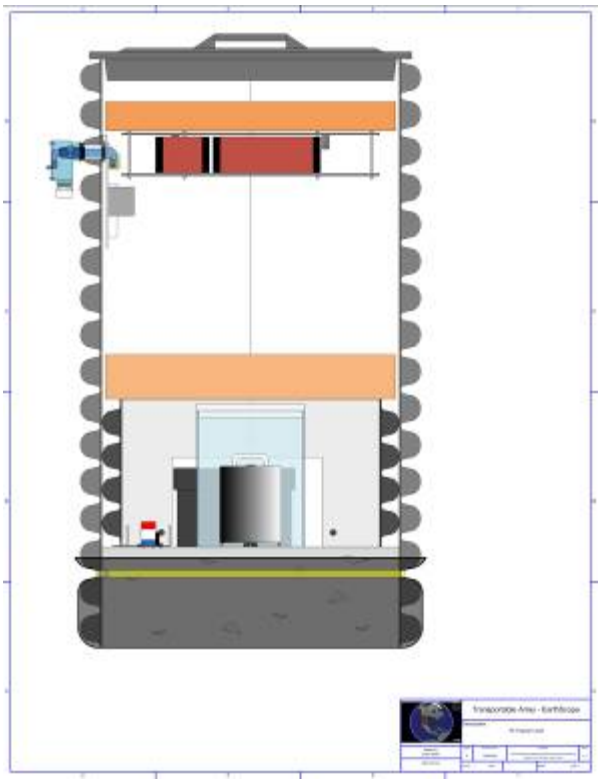
xii. Record size and number of sacks of concrete used to fill vault

xiii. Using round end float, level and finish concrete

xiv. Clean splattered concrete from sides of vault using clean water

xv. Record depth of finished concrete from top of vault

2. Less than full length single tube vault
    a. A standard length vault should be about 15 to 16 rings in length or about 78” to 84” in length

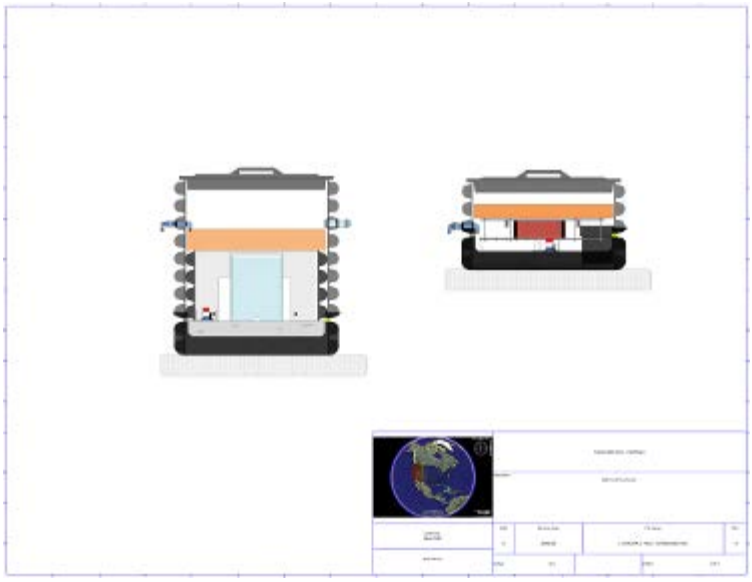


    b. If ground conditions warrant the vault can be shortened by removing one ring at a time.
    c. The minimum length single tube vault is 11 rings

i. The floor is 10 inches thick

d. If ground conditions do not allow for a single tube vault a split vault must be constructed

3. Split Vault



a. Should ground conditions warrant a split vault can be constructed
   i. Sensor vault should be as deep as possible
   ii. Sensor vault should be placed 3’ from electronics vault
   iii. Concrete pad under membrane 4 inch minimum
   iv. Connect vaults using supplied split vault kit
   v. Sensor vault floor is 10” thick
   vi. Electronics vault floor is 2” thick

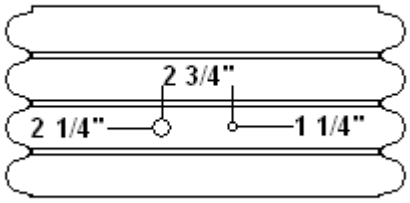
SECTION 5
Completion of Vault

4. Basic Vault
    a. Open Construction Kit and assemble LB and Pump hose feed thru assemblies

    i. LB feed thru and pump feed thru assemblies (typical contents may vary)

    b. Standing in the ditch use a hole saw to cut 2 ¼" hole in vault 3 rings from top of vault for LB feed thru. Use hole saw guide.

c. Cut a 1 ¼” hole 2 ¾” from the right edge of the LB hole to the center of the Pump hose feed thru hole



d. Install LB and Pump hose feed thru assemblies

e. Install 1.5” PVC conduit sweep and run to mast

i. Use sealant around feed thru fittings

f. Connect LB to Solar Mast using 1.5” conduit and 90 degree sweeps
    i. Glue all PVC joints
g. Prep power, GPS, and, Cell cables and pull from vault to Solar Mast. Tape cable ends to keep them free of dirt etc.
h. Pull cables thru LB to mast

i. Run cables thru LB into vault
j. Run Marine tubing from bulkhead assembly to ditch
k. Place marine tubing inside 10' length of 3” drain tile (perforate PVC tube)(scrap 2” PVC conduit may be used to protect marine tubing)
l. Install 8' of Marine tubing on inside of vault

m. Attach #10 solid copper ground wire to LB threaded stud fasten with nut

n. Liberally coat LB and feed thru with silicone sealant
o. Label Vault inside and out with Site_code ex. T33A-1
p. Take photo of LB, label photo “Site-code_LB” ex R23A_LB

q. Backfill around LB by hand to protect marine tubing and ground wire from damage

r. Cut 36” diameter pipe to shape (see appendix for specs)

s. Lower 36” diameter insert into vault

t. Tie 36” insert to LB bushing using cord

u. Install foam pieces in vault on top of 36”inner ring

v. Coil comm., GPS, power, and ground cables inside vault

w. Install lid with chain and locks (set locks to standard TA combination)

x. Backfill around vault and mound excess dirt around vault.

y. Level out area around vault and mast
z. Ensure backfill does not cover lid
aa. Take photo of Lid, label photo “Site-code_Lid” ex R23A_Lid

SECTION 6
Completion of Site

1. Fencing
    a. If cattle panel is required use a minimum of 8 tee posts per installation (see appendix)

        i. 1 post on each corner
        ii. 1 post located midway between corner posts
        iii. Use steel tie wire to fasten fencing to posts

    b. Typical finished fence
2. Final Site Prep
    a. Ensure site is left in good condition

i. Remove all scrap and litter
ii. Smooth out all vehicle tracks

b. Take photo of finished Solar Mast location and vault location, label photo “Site-code_After” ex R23A_After

Appendix

Overview of TA Station

Changes in Construction Operating Procedures

January 2008:

1. Fencing of solar mast is 4 sides, 8 ft side with the mast pole located on the north side of fence equal distance from the E, W poles (4 ft) and 2 feet from the fence itself towards the south side. 8 posts to be use to secure fencing t
2. Solar VSAT 4 inch pole is 5 feet above ground. This is to accommodate the different type of enclosures (height) used for the VSAT electronics

January 2009

1. Use concrete vibrator to level concrete and remove trapped water or air from under membrane

Mast Requirements:

Types of masts	*Total Pole length*	*Height Above ground level*	*Pole depth*	*Fence size if required*
Std Vault Mast, 2" sched 40, threaded on top	10'	7'	3'	8'x 8'
VSAT Dish Mast, 2" sched 40	10'	6'	4'	8'x 8'
Solar VSAT mast, 4" sched 40	10'	6'	4'	8'x 16'

Site Mast:	2" Galvanized		Pole length
Standard Height	6' above grade	4' below grade	10 ft
VSAT Mast:	2" Galvanized		
Standard Height	6' above grade	4' below grade	10 ft
Solar Power Mast:	4" Galvanized Schedule 40		
Standard Height	6' above grade	4' below grade	10 ft

628A, Solar VSAT installation at Desert height

C11, Solar VSAT snow area installation

Z13

Z13

On solar VSAT the fencing should be 16’ X 8’
With the VSAT pole 6’ (4”pipe) from the 8’ side and VSAT Dish pole is then 6’ (2” pipe) from solar pole. Desert pole would be 5’ above ground level; standard site would be 6’ above ground.

Mast Requirements:
Site Mast: 2” Galvanized

Standard Height 6’ above grade 4’ below grade
Desert Height **NONE**
When required, fencing of 8’x 8’ square, with pole location middle of north fence line (4’ from each end) and 2’ from the north side towards the south

VSAT Mast: 2” Galvanized

Standard Height 6’ above grade 4’ below grade

When required, fencing of 8’x 8’ square, with pole location in middle of area fenced

Solar Power Mast: 4” Galvanized Schedule 40

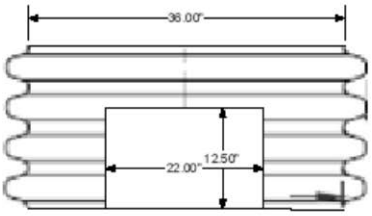
Standard Height 6’ above grade 4’ below grade
When required, Fencing of 8’x 16’ square, with 4” solar pole minimum of 5’, Maximum of 6’ from 8’side and VSAT dish pole 6’ (what the spec is now) from solar pole. Poles would be 4’ from north and south sides

Construction Check List

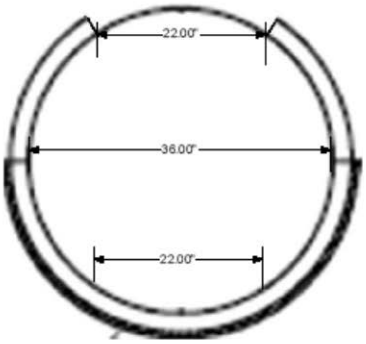
Photos to be sent with the construction report:
_____Site before construction, labeled StationCode_Before
_____Bottom of vault hole prior to putting in concrete, labeled StationCode_Hole
_____LB connection box with silicone seal applied, labeled StationCode_LB
_____Lid of vault after all backfill is completed, labeled StationCode_Lid
_____Finished site after all work has been done, including mast and fencing if required, labeled StationCode_After

Guidelines for construction:
_____Construction should be planned with minimal disturbance to surrounding land.
_____The vault tube and membrane should be checked for pin holes and repaired when needed.
_____When possible, the vault should be at a higher elevation than the mast to avoid leakage problems.
_____Vault hole should be clear of loose dirt and tamped. The tamping can be done by the backhoe in most cases.
_____With vault in place chain for lid should be oriented perpendicular to ditch
_____In placing the SonoTube, (mast Pole) the initial backfill should be by hand with the base thoroughly tamped by foot.
_____Mast pole located in open clearing, exposed to sun from east to west
_____PVC conduit should be on the North side of mast.
_____Pump hose installed in trench per specifications
_____LB Box – Vault junction cleaned with solvent and covered with a silicone sealant.
_____Ground wire connected at mast pole and LB box
_____Initial backfill on the conduit should be by hand to ensure that the conduit is stable and will not move or be damaged when backfilling by machine.
_____The lid should be completely clear of any dirt on it to eliminate any unnecessary work by the installation crew.
_____On completion inner ring, upper/lower foam and pump hose left inside vault
_____Security locks set to 5380
_____Completed site should have final grading 360 degrees, sufficient backfill dirt should be placed around the vault. Backfill dirt should be free of large rocks and trees/shrubs roots.
_____ Crew to make a sweep of site area to remove any waste left on the ground and site is clean
_____Site area and vehicle tracks smoothed when leaving site.
_____ Any extra work performed in area
_____Record GPS location of Site
_____Record number and weight of Quikrete sacks used to fill vault
_____Record length of vault and depth to finished floor

36 inch Insert cut requirements

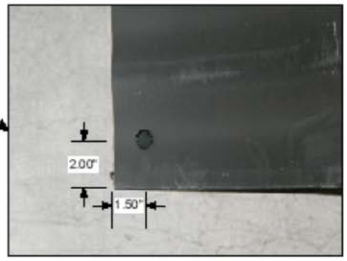


Side View



Top View

On each corner of the battery cut outs
Use 7/8" wood boring drill bit.
4 holes total



IRIS / PASSCAL	
Date: 23 Sept. 2005	Description: TA Inner Ring Layout Rev: 1.1
Scale: None	
Remarks: None	
File Name: TA Inner Ring Layout	Derry H. Webb

MATERIAL LIST (PER SITE)

Materials Supplied by Contractor

- 36 80lbs bags of concrete
- 32 lf fencing (welded wire mesh) with 4 each T-posts w/steel fence ties
- 40 lf 1.5” electrical PVC conduit
- 1 each 12” X 24” sonotube
- 1 each 2” X 10’ Galvanized Schedule 40 pipe with threaded cap
- 1 tube 3M 4200 caulking
- PVC glue
- 30 lf 3/8” chain
- 42” diameter HDPE corrugated pipe, length 6’ 6”
- 36” diameter HDPE corrugated pipe, length 20”, see diagram.
- 2 each 3/8 shackles
- ½ PVC liquid tight flex conduit 5 feet in length

when specified for AC VSAT (estimated 40% of total, or 89 sites)

- 1 each 2” X 10’ Galvanized Schedule 40 pipe
- 1 each 12” X 24” sonotube
- 4 each 80lbs bags of concrete

when specified for Solar VSAT (estimated 10% of total, or 38 sites)

- 1 each 2” X 10’ Galvanized Schedule 40 pipe
- 1 each 12” X 48” sonotube
- 1 each 4” X 10’ Galvanized Schedule 40 pipe
- 1 each 24” x 48” sonotube

Materials Supplied by IRIS

- ADS lid for 42” pipe, Foamed
- 40’ solar panel cable
- 40’ LMR400 RF cable
- 75’ GPS antenna cable
- Misc PVC fittings to terminate conduit both ends (Construction Kit)
- LB box Sealing fittings for vault side
- EPDM membrane 40mil, 8’ diameter circle
- Top foam disk
- Bottom foam halves
- Pump well template, pump tubing and fittings

The following Construction report with attached/labeled photos to be emailed each day upon completion of Site.

Recipients: Katrin Hafner, Bob Busby, Steve Welch, Don Lippert, Sandi Azevedo, Denise Elvrum

Subject line: Construction Report - Station Code

US Array Construction Report: Station Code
Form: V1.1

Date: YEAR MO DA

Site: XXXA-1

Station Code: XXXA

Tube Length = "
Distance from rim to concrete = "
Distance from rim to mast = '
Rim above grade ~: 1
Tamped hole: YES
Number of sacks of concrete to complete vault floor =
Size of concrete sack = lbs

Fencing Installed: Cattle Panel around mast/None

Elevation = M
GPS: LAT LON

Comms:

VSAT: AC/DC
Elevation = M
GPS: LAT LON

Construction crew: IRIS Construction Engineer
Coastal Tech: (Trent Hooten, Mack Maclauchlan, others)

Comments: Any notable actions or circumstances

The following Daily Construction Summary is to be emailed each day upon completion of Site.

Recipients: Katrin Hafner, Steve Welch, Don Lippert, Rick Stout, Anthony Gonzales

Subject line: Daily Construction Summary YRMO DA

Daily Construction Summary

Date: YRMODA

Time started: 24hr format Central

Site(s) constructed:

Site(s) plan for tomorrow:

Site(s) completed this deployment:

Location of crew:

Time reported: 24hr format Mountain

Comments: Any notable actions or circumstances