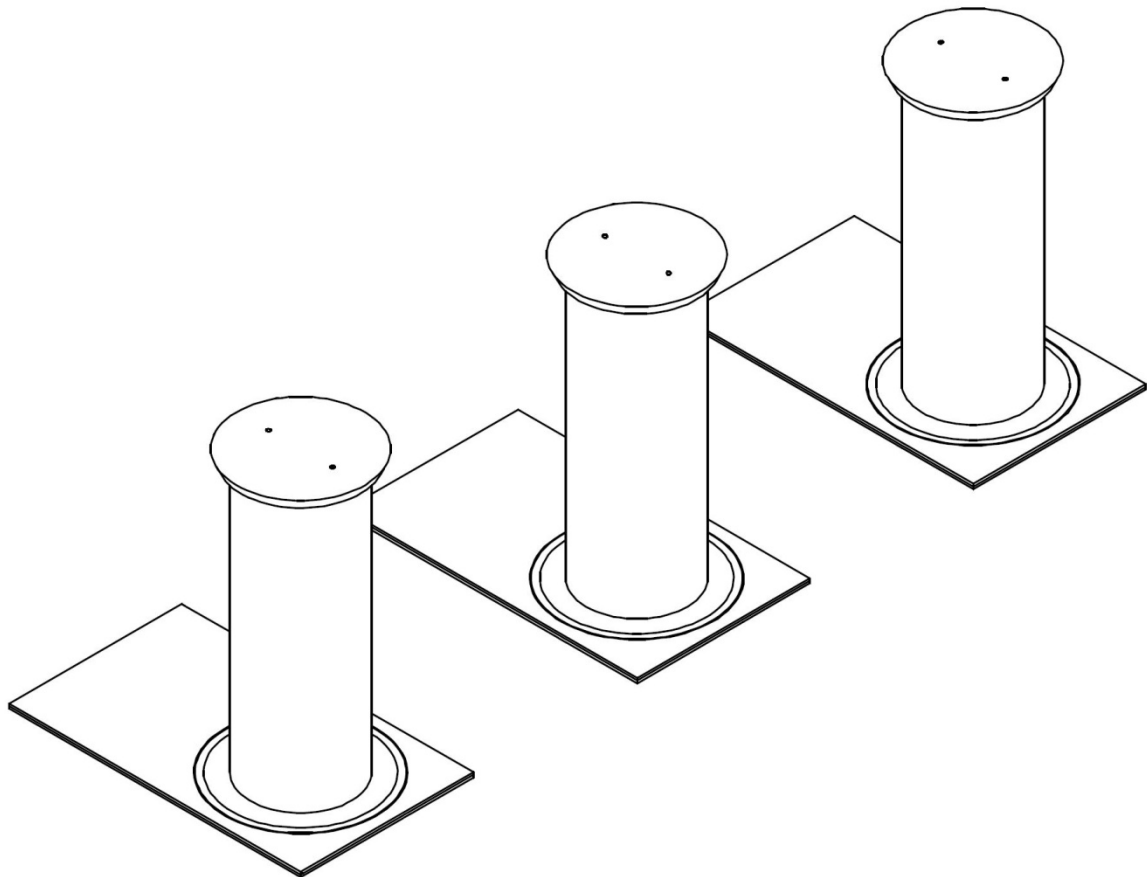


TITAN SERIES BOLLARDS

Installation Guidelines



Installation

Safety Precautions – in the Excavation of a Titan Bollard array take all necessary steps to make sure the pit is secured. Follow all OSHA requirements for digging a foundation of this depth and size. Make sure traffic control measures are in place and that caution tape be used around the whole foundation.

Foundation

A Titan Bollard array foundation size will vary based on the number of bollards purchased. Please refer to the chart below for excavation dimensions

*Note 11x17 drawings are available

	Dimension	A	B	C	D	E	F	G	H	J
3 Bollard	INCH	72.00	120.00	66.62	38.00	10.75	60.62	31.25	18.50	32.00
	MM	1829	3048	483	965	2438	2025	2613	305	914
4 Bollard	INCH	72.00	152.00	66.62	38.00	10.75	60.62	31.25	18.50	32.00
	MM	1829	3861	483	965	2438	2025	2613	305	914
5 Bollard	INCH	72.00	184.00	66.62	38.00	10.75	60.62	31.25	18.50	32.00
	MM	1829	4674	483	965	2438	2025	2613	305	914
6 Bollard	INCH	72.00	216.00	66.62	38.00	10.75	60.62	31.25	18.50	32.00
	MM	1829	5486	483	965	2438	2025	2613	305	914

Figure 1 - Foundation Dimension Table

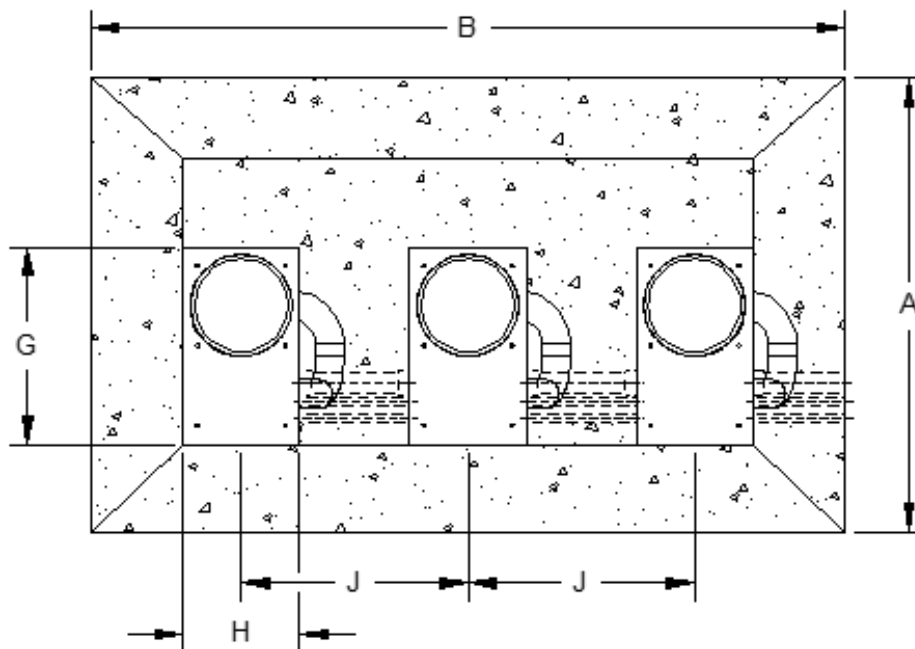


Figure 2 – Foundation Top View

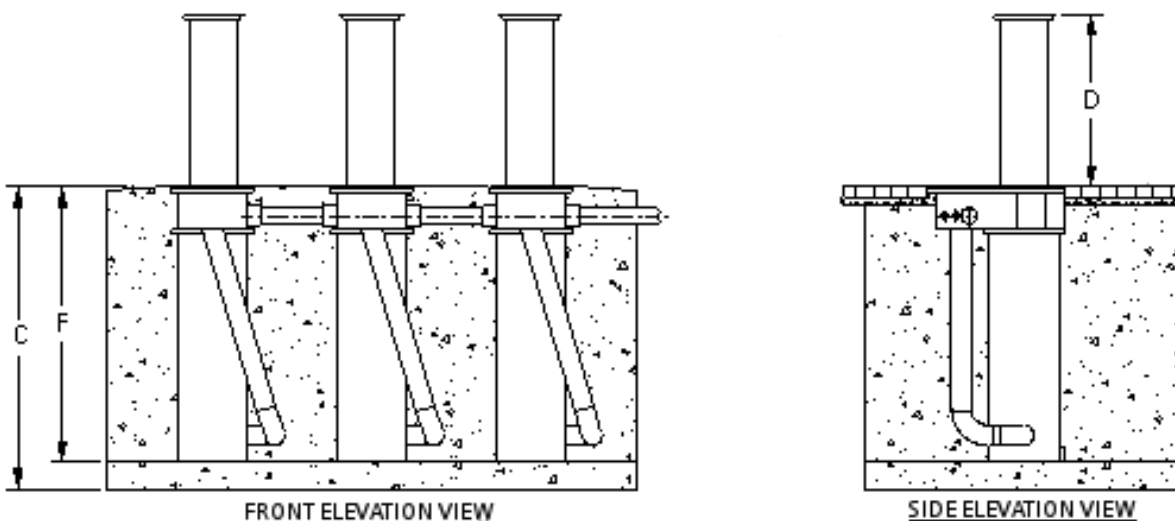


Figure 3 – Elevation Drawing

Installing the first layer of rebar

First layer of Rebar and Concrete forms.

- A. After you have the foundation excavated to the required depth and dimensions you install the first layer of rebar
- B. Form the pit for the first concrete pour (Barrier base pad), the form should be 120" long and 72" wide and 6" deep.

Pour 3000psi concrete 6" in depth in the formed Barrier base Pad.

Allow to cure for a minimum of 12 hours before proceeding to the next step.

Base Pad Pour

A Six Inch (6") concrete base pad is not required in a Titan Bollard installation, but is recommended

Verify all Forms are level and that you have 59.50" - 60" from the top of the forms to the final grade.

*Note Final Grade should be a minimum of ½" higher than finished roadway, to allow for water to fall away from the barrier.

Before concrete pour insure all rebar are vertically aligned and in line with each other so the second level of rebar fits properly.

*Refer to Figure 5 – First Rebar Cage / Base Pad form.

*Note 11x17 drawings are available

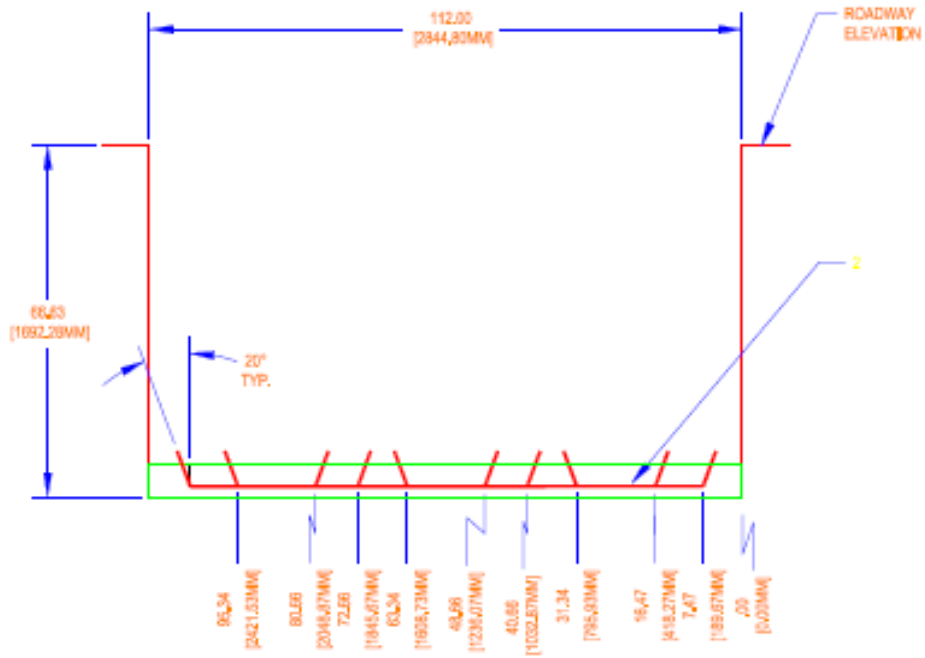


Figure 4 - First Rebar Cage / Base Pad Form

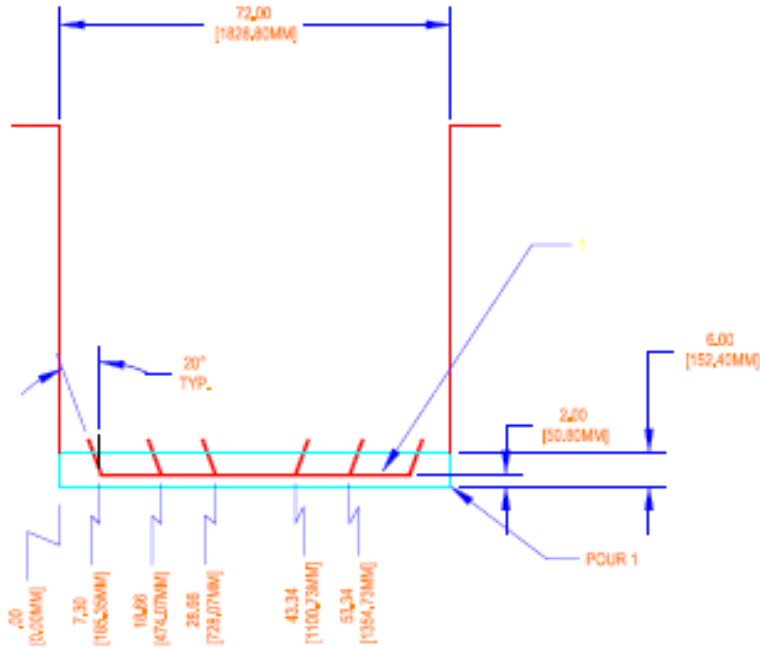


Figure 5 - Side View Bollard Base Pad

Setting Titan Bollards

After the Concrete has set (approximately 24 hours) – place the Bollards on the Barrier Base pad – Spacing of the bollards should be 32” in center.

Note Spacing up to 46” may be used, however all spacing wider than 32” is considered an engineered product.

At this time check for the check for the final grade of the barrier – should be .5 – 1 inch above final roadway grade.

Once the Bollards are in place and level install Drain lines connecting to the 2.5” female connector at the base of the bollard, run the drain outside of the foundation area.

Foundation drainage options

1. Route drainage from barrier to approved storm drain.
2. Install sump pit and sump pump to eject water runoff from barrier. Eject to storm drain or gutter.
3. Install “French drain” in barrier foundation. Use only in extremely dry climates.

Adequate drainage required!

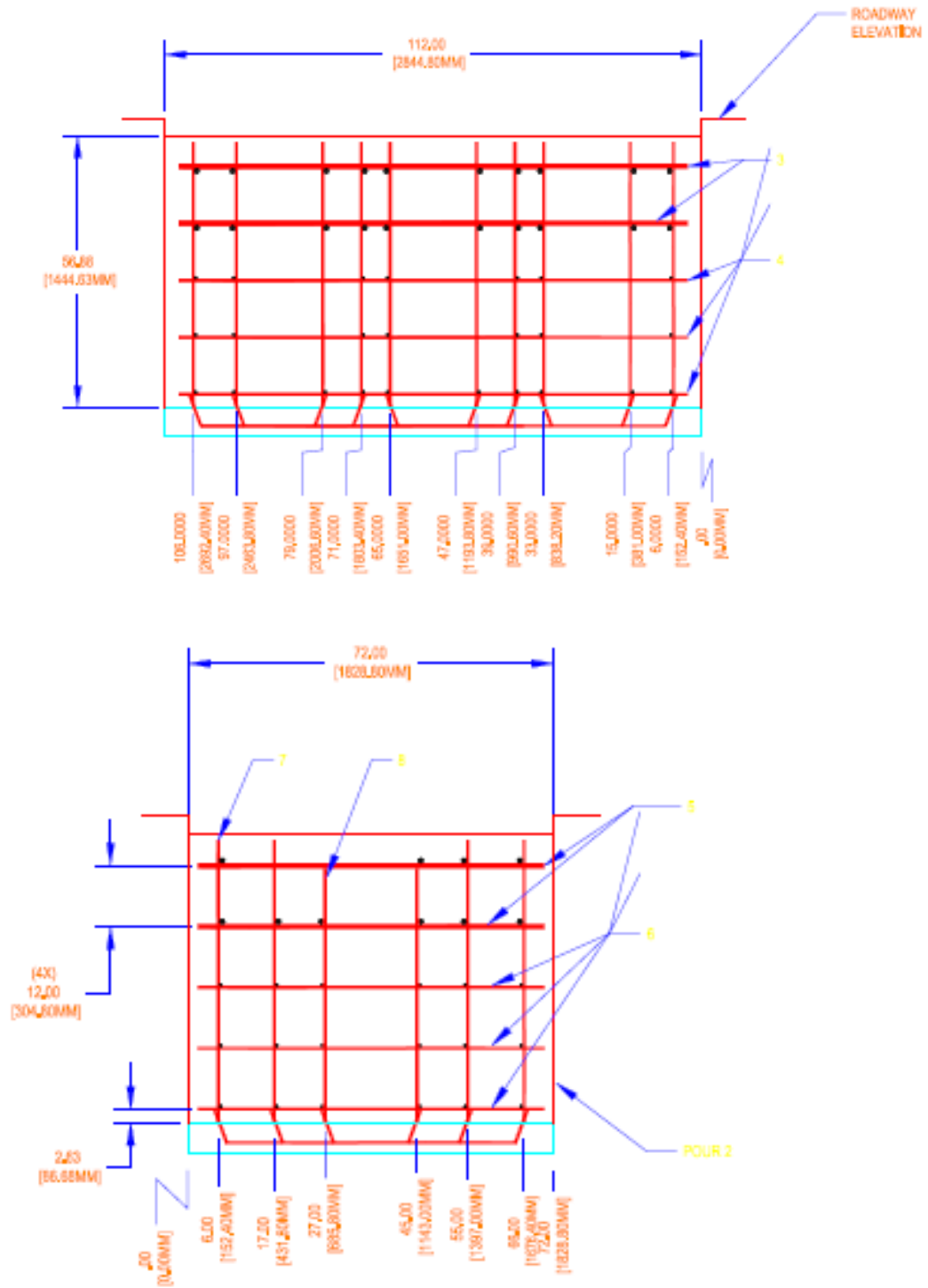
2” minimum drain line recommended. Local precipitation may require larger drainage capacity.

Consideration should be given to special drainage conditions during winter months.

Installing Second layer of Rebar

Pre-Assemble Reinforcing rebar as a unit before installing, as pre rebar drawings.

Once installed in the foundation tie the Reinforcement unit with the first layer of rebar



*Note 11x17 drawings are available

Installation of Conduits

Hydraulic line Conduit – install one 3" Schedule 40 PVT conduit from each of the Titan Bollards to the HPU, Interconnect each bollard together.

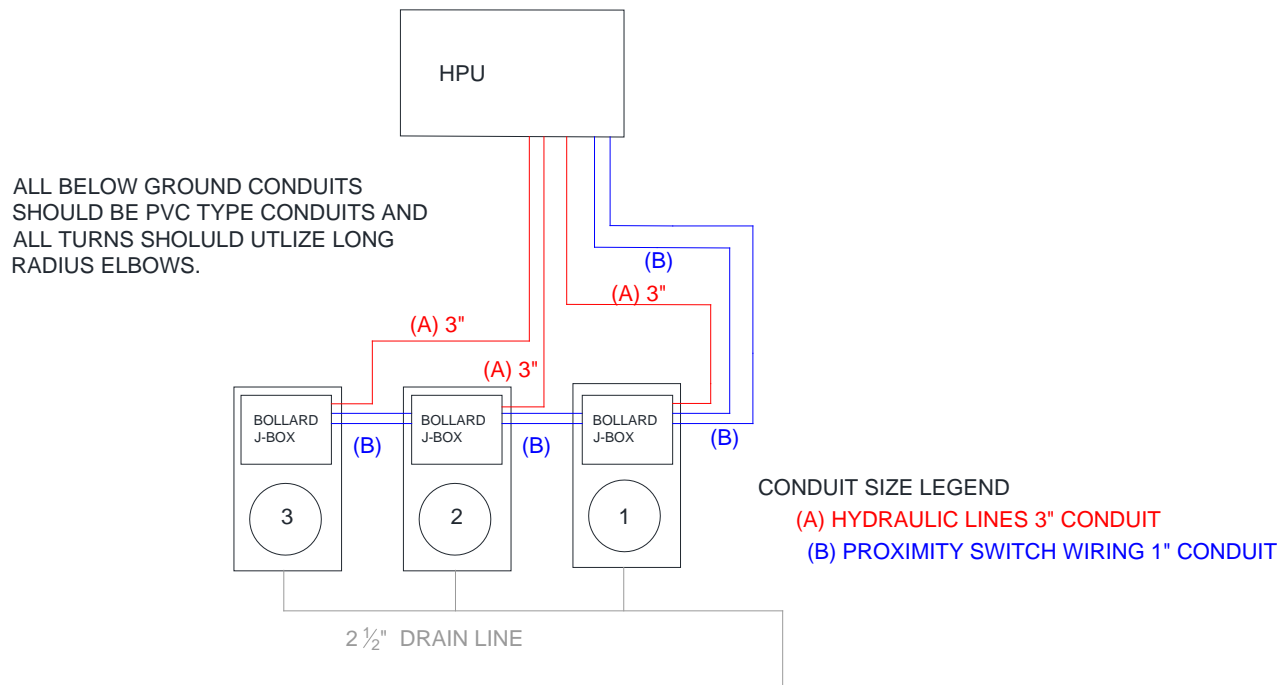
All conduit bends should avoid 90 degrees, if 90 degree bends are necessary only utilize a long sweep 90.

No more than 3 – 90 degree bends should be made for any Titan Bollard installation.

Make sure on the last bollard in the system you cap off the conduit opening not being utilized.

Electrical Conduits – install two (2) 1" schedule 40 PVC conduits to the side of the closest Titan Bollard to the HPU, Interconnect each bollard together.

Make sure on the last bollard in the system you cap off the conduit openings not being utilized.



*Note 11x17 drawings are available in Appendix A – Installation drawings

Final Concrete pour

The Titan Bollards requires 3000 psi concrete. Ameristar recommends utilizing a 4000psi or 5000psi mix for the final pour to achieve a 3000psi strength sooner.

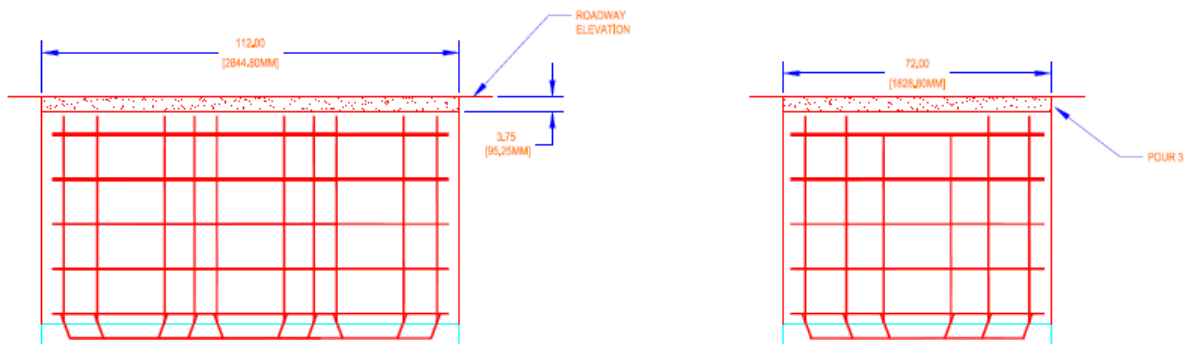
3000psi concrete will achieve 3000psi in strength in 28 days
 4000psi concrete will achieve 3000psi strength in approx. 5 – 7 days
 5000psi concrete will achieve 3000psi strength in approx. 3 – 5 days

Installation contractor should utilize a vibrator when pouring the final concrete pour to insure all air voids are removed from the slab.

When finishing the concrete make sure the concrete falls away from the bollards in all directions a minimum of .5 inches on the sides and 1 inch on the front and back.

Broom or trowel finish is acceptable and if four (4) or more bollards are set together side by side a control joint is recommended to be place between the bollards.

Warning – Manufacturer Warranty void if the product is tested prior to reaching 3000psi



HPU Installation

Foundation

The HPU shall be installed no further than 100' from the furthest barrier connected to it.

If the HPU is further than 100' contact the manufacturer immediately for potential resizing of the, Hoses, Reservoir and Accumulators.

Dimensions of pad are 50" (L) x 42" (W) x 24" (D).

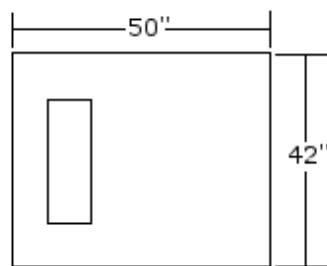


Figure 6 - HPU Slab Dimensions

Placed 18" below grade and 6" above grade.

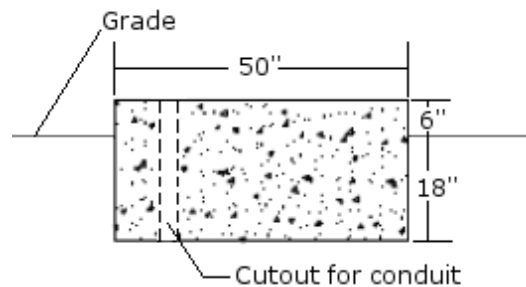


Figure 7 - HPU Slab Typical Depth

*note the depth of the foundation could vary based on geographical location.

The HPU Slab shall have a minimum cutout opening of 24"x8.5" for the system conduits. This cutout shall be place 11.25" X 25" on center from the 42" end of the slab or the 30" side of the HPU that will have the Controls access door.

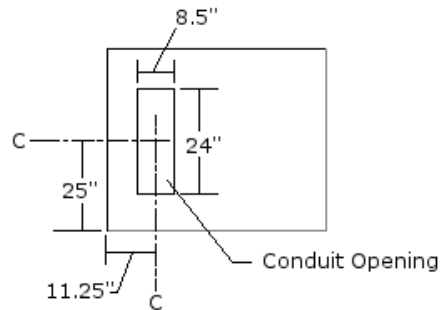


Figure 8 - HPU Conduit Opening

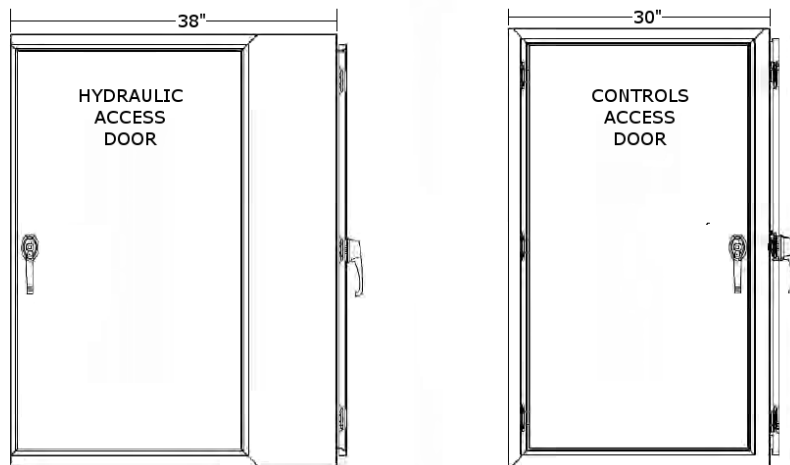


Figure 9 - HPU Access Doors

Setting the HPU

Allow a minimum of 12 - 24 hours to cure before setting the HPU in position

Allow the concrete 48 – 72 hours to cure, before fastening to concrete pad with min. 5/16" x 3-1/2" anchor bolt

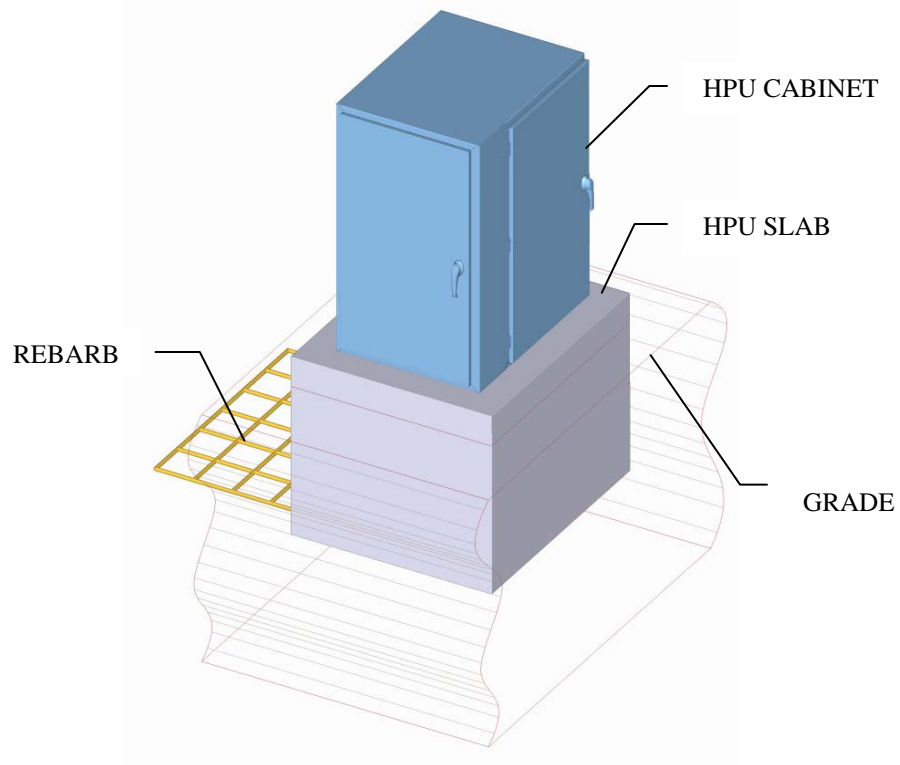


Figure 10 - HPU General Layout

Conduit connections

Hydraulic conduit connection

All below ground conduits should be PVC type conduits and all turns should utilize long radius elbows. 90 degree bends or greater should be avoided at all times. If you cannot avoid a 90 degree or greater bend a maximum of 3 long radius elbows should be used.

All Hydraulic Conduits should be installed below frost depth to ensure the fluid viscosity remains at an acceptable temperature. If conduit cannot be installed below frost line then Heat trace should be utilized to ensure fluid viscosity.

All Conduits after installation should be blown free of all debris or swept free of all debris before installation of Hydraulic hose. Sharp or jagged debris could damage the hose on installation.

Electric conduit connections

All below ground conduits should be PVC type conduits and all turns should utilize long radius elbows. 90 degree bends or greater should be avoided at all times. If you cannot avoid a 90 degree or greater bend a maximum of 3 long radius elbows should be used.

All Electrical Conduits should be installed below frost depth to ensure the integrity of the wires. After installation both ends of the conduit should be sealed to avoid water, debris and animals from entering the conduit and causing potential harm to the wiring.

All Conduits after installation should be blown free of all debris or swept free of all debris before installation of wire. Sharp or jagged debris could damage the wire on installation.

Control stations

Locate and install remote (slave) panel (if required) control panel. It is recommended that local control panel be installed within "line of sight" with the vehicle barrier.

All control panels should interconnect with the HPU. Normally, a 1" PVC conduit is adequate for control wiring.

Locate and install remote master panel. Usually installed inside main security room.

Vehicle Loop Detectors (Optional)

When used, the Loop Detection Module is installed inside the HPU.

Customer/End-user is responsible for the in-ground loops, conduit and wiring back to the HPU.

All loop wiring must be in PVC conduits. (Metallic conduits introduce higher than acceptable inductive noise levels to the loop detection modules).

See site specific drawings for loop size and placement.

End of guidelines.