

## Polk Cemetery Savers Slotted Base Design

When we started to make new/replacement concrete slotted bases for tablets, we searched the internet for any details on construction. We didn't find too much that was useful. We looked at the slotted bases in the cemetery. In the cemeteries we have preserved, the original slotted bases are generally 5 or 6 inches wider at the front and back of the tablet and about 4 to 5 inches wider at the ends. The slot is normally 2.5 to 3 inches deep and about ¼ to ½ inch wider all around the tablet. The bases are generally 10 to 14 inches thick and made of sandstone. Based on the original slotted bases and the weight of the tablets that are set, we have determined the new slotted bases should be 2.5 to 3 times the weight of the tablet. This weight should allow the new base to adequately support the tablet when it is reset. We set the width and length so the thickness of the new slotted base is no more than a foot thick. We used the following calculations:

A cubic foot contains:  $(12 \times 12 \times 12) = 1728$  cubic inches.

The weight of the stone is about 175 pounds per cubic foot.

The weight of the stone per cubic inch would be:  $(175 / 1728) = .10$  pounds.

Concrete weighs about 4000 pounds per cubic yard.  $4000 / 27 = 148$  pounds per cubic foot

Therefore a cubic inch of concrete weighs:  $148 / 1728 = .086$  pounds per cubic inch.

As an example, consider a stone tablet that is 36 inches tall, 18 inches wide and 2.5 inches thick. The approximate volume of the tablet is:  $(36 \times 18 \times 2.5) = 1620$  cubic inches.

The weight of the stone tablet would be:  $(1620 \times .10) = 162$  pounds.

If you use 3 times the weight of stone for the weight of the new slotted base, you must calculate the size of the form for the new base. To do this, the following calculation should be performed:

$(3 \times 162) = 486$  pounds would be the weight of the new slotted base.

You can define the width (W) and length (L) of the new slotted base from the tablet dimensions. Then solve for the thickness (T) ie. The depth of concrete in the form. The formula for the calculation is:

$T = 486 / .086(L \times W)$  Weight of the base divided by the weight of concrete per cubic inch times the length and width of the new base.

$T = 486 / .086[(18 + 10) \times (2.5 + 13.5)]$  This includes 5 inches extra at each end (for a tablet that is 18 inches wide) and a 1 inch wider slot (for a tablet that is 2.5 inches thick) with 5 inches extra at the front and back of the tablet.

$T = 486 / .086(28 \times 16) > T = 486 / .086(448) > T = 486 / 38.5 > T = 12.6$  inches

The thickness of the new slotted base should be about 12.5 inches for 3 times the weight ratio.

Since we only have a 12 inch depth in this form, this slotted base will be just under the 3 times weight ratio.

As a check on the calculation:

$(28 \times 16 \times 12.5) \cdot 0.86 = 481$  pounds. > should equal to 2.5 to 3 times the weight of the stone.

You can choose to use different lengths and widths of the new base as well as the weight ratio of the base compared to the stone. The 2.5 to 3 times weight ratio is used by Polk Cemetery Savers and is not a standard. No matter what the ratio, this calculation will work.

**Note:**

**This calculation does not consider the loss of volume due to the size of the slot.**

To make the slotted base form, we had used pine most of the time. However it absorbs water and warps after a couple of uses. We have started using 3/8 or 1/2 inch plywood covered in vinyl sheeting in a frame. The vinyl keeps the water from seeping into the plywood so it is reusable more times. The vinyl can be replaced as needed. It does make the curing time of the concrete a little longer before you can remove the form. It also costs less when the slotted base is thicker than a foot. Wide lumber is quite expensive. For lighter tablets, we keep the width and length the same and vary the thickness of the slotted base.

The material used to make the slot varies. It can be wood, covered in vinyl, or any other material that can be removed before the concrete sets. The size of material for the slot depends on the tablet base, the width of the area between the base and the slot wall, and the depth of the slot.

For tablets that are short (less than 20 or so inches) and thick, (4 or 5 inches) we only make the slot about 1 inch deep. This seems to be similar to the tablets and original bases we see in the cemeteries that need resetting.

We have designed a slotted base form to allow us to use a form that will work for most tablets. The design maintains one width since the tablets are generally 2 to 2 1/2 inches thick. The thickness of the slotted base is generally less than 12 inches. Our form allows the full 12 inch depth or you can fill it with less concrete for less heavy tablets. The sliding section of the form allows us to vary the length of the form based on the width of the tablet. We can go as much as 28 inches wide. We have only seen a few tablets that are wider than 18 inches. For wider tablets a new form can be made or the distance at each end can be less than 5 inches. The top surface of the new concrete slotted base should be finished so it is fairly smooth. The edges should be finished similar to a sidewalk. Tools for finishing concrete are readily available from a hardware store.

Since there is 0.6 cubic feet in an 80 pound bag of redi-mix, you can calculate how many bags you will need for the base.  $(28 \times 16 \times 12.5) / 1728 = 3.24$  cubic feet >  $3.24 / .6 = 5.4$  bags of redi-mix.

Below are pictures of the form. The inside dimensions of this form are 16W X 12D x 28L inches. The vinyl covering inside allows us to use the form many times before recovering is necessary.

