



PURPOSE

For subirrigation systems, field water tables must be accurately controlled to provide adequate capillary rise (upflux) into the root zone to meet crop evapotranspiration. The water table should be managed at a depth that prevents crop damage from excess water and ensures adequate moisture levels within the root depth.

The use of water table observation wells can improve irrigation and drainage management for agricultural production in high water table soils (within 5 feet of the surface). The water table observation well is an excellent tool to manage irrigation and drainage systems.

Because water movement in the soil pores occurs by capillary forces, it is important that the water table be accurately maintained just below the plant root zone to avoid plant water stress. For most Florida crops, the water table should be maintained within 18 to 24 inches below the soil surface. The actual design shall be based on the soil type and crop consumptive use.

The water table observation well allows growers to quickly and easily check field water table levels. Readings shall be taken in accordance with the irrigation water management plan.

To be effective, water table monitoring requires that:

1. water table observation wells be strategically located in the field,
2. water table observation wells be calibrated for depth from the soil surface to the water table,
3. water table observation wells be read continuously or at strategically selected times and recorded,
4. the data be analyzed and recorded in a useful form,
5. the resulting data be incorporated into scheduling and managing the irrigation or drainage system.
6. the data be used to start, to stop, or adjust the irrigation cycle.

MATERIAL

The water table observation well can be constructed of 3-inch diameter perforated pipe,

such as drain tile or sand point material. The depth of the water table observation well must be deep enough to allow measurement of the full range of water tables expected to occur that would affect crop or water management.

INSTALLATION

The water table observation well can be installed in the field using a manual post-hole digger. A simple water table observation well is shown in Figure 1.

When installing the water table observation well, it is important to firmly pack the soil around the pipe to provide a stable upright well casing. The top of the water table observation well should be $\frac{1}{2}$ to 1 inch above the ground to prevent entry of runoff water or sediments.

If the water table is high during installation, it may be necessary to use a 6-inch PVC pipe as a casing to keep the soil from caving in when installing the water table observation well. The casing is pushed into the soil while the soil is removed from inside the casing with a soil auger. When at the correct depth, the water table observation well is placed in the casing and the casing is removed.

LOCATION

The water table observation wells should be placed in an accessible location so as not to interfere with farming activities. In bedded groves, install the water table observation well in the top of the bed or in the tree row. In vegetables install the water table observation well in the row bed.

Locate water table observation wells near the edge of a field to allow reading by simply driving by the field site.

The water table observation well can be left in the field throughout the irrigation season.

CALIBRATION

After the water table observation well has been constructed, it must be calibrated so that field water table levels can be read by direct inspection of a scale drawn on the $\frac{1}{2}$ inch PVC pipe float (see Figure 1). An easy and accurate way to calibrate this instrument is:

1. Make a permanent mark on the outside of the 3-inch PVC water table observation well pipe to indicate the depth that the water table observation well should be inserted into the ground (ground level mark) when the water table observation well is installed. When installed, the water table observation well will be placed so that this mark is at the ground surface. This ground level mark should be near the upper end of the 3-inch PVC water table observation pipe and just below the PVC pipe cap. The actual location can be varied, depending on how far the water table observation well can be allowed to protrude above the ground. Normally, the mark is made about $\frac{1}{2}$ - 1 inch below the top of the water table observation well pipe, so that the water table observation well will present a low profile, and equipment clearance will not be a problem.
2. Fill a bucket or tub with several inches of water, and stand the water level indicator assembly upright in the bucket or tub. Use enough water so that the float assembly (float and $\frac{1}{2}$ -inch PVC pipe) float freely.
3. Using a measuring tape, measure the distance from the permanent ground level mark made on the 4-inch PVC water table observation well pipe to the water level in the bucket or tub. At the same time, make a permanent mark on the $\frac{1}{2}$ -inch PVC pipe where it protrudes through the hole in the 3-inch PVC pipe cap. For convenience, add or remove small amounts of water from the bucket or tub until the measured distance is a "round" number, such as a whole number of inches or centimeters, rather than a fraction of inches or centimeters.
4. Using a permanent marking pen, write the measured water table depth (from Step 3) directly onto the $\frac{1}{2}$ -inch PVC pipe where it was marked in Step 3. This is a direct reading of the water level in the water table observation well, and it will be used as a reference for the scale to be marked on the $\frac{1}{2}$ -inch PVC pipe.
5. Using a permanent marking pen and tape measure, make additional scale marks along the length of the $\frac{1}{2}$ -inch PVC pipe, beginning at the calibration point marked in Step 4. Marks should be made and labeled at each inch or centimeter. Label the 6-inch (15 cm marks). Notice that the numbers must get larger near the top of the $\frac{1}{2}$ -inch PVC pipe,

and smaller near the plastic float, since the scale will read distance from the ground surface down to the water table.

OPERATION AND MAINTENANCE

An irrigation water management plan must be developed for the specific crop and soil type. The IWM plan shall indicate the proper water table depth during the growing season.

Reading the water table observation well prior to irrigating or draining is essential. Follow the guidelines in the irrigation water management plan for managing the water table depth.

Because the water table observation well is constructed of PVC pipe with only one moving part, it can be installed in the field for extended periods of time with little maintenance. The water table observation well is designed to provide a low profile for easy clearance by farm equipment. If necessary, the $\frac{1}{2}$ -inch PVC float and the 3-inch PVC pipe cap can be removed to provide additional equipment clearance.

Since the exterior of the instrument is relatively smooth PVC pipe, it can be removed from the field at the end of the season or before major tillage operations. First, remove the 3-inch PVC pipe cap and water level indicator, then grasp the edge of the 3-inch PVC well pipe and pull it upward. It is sometimes helpful to use vice grip pliers to grasp the edge of the PVC pipe in order to provide a better grip on the pipe.

With time, the scale and reference markings may fade and require marking again. If permanent marking pens are used, this maintenance need will probably not occur more often than each season.

With time, soil may begin to fill the water table observation well so that the float hits the bottom of the water table observation well. If this occurs, the water table observation well can be cleaned with a soil auger which can be inserted into the water table observation well. The water table observation well could also be moved a short distance and re-installed. Normally, water table observation wells would not be expected to fill up in less than one crop season unless the saturated soil is extremely unstable.

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Show on the sketch below (or attach or refer to appropriate plan map) location of water table observation wells.

Scale 1" = _____ ft. (NA indicates sketch not to scale: grid size = 1/2" by 1/2")

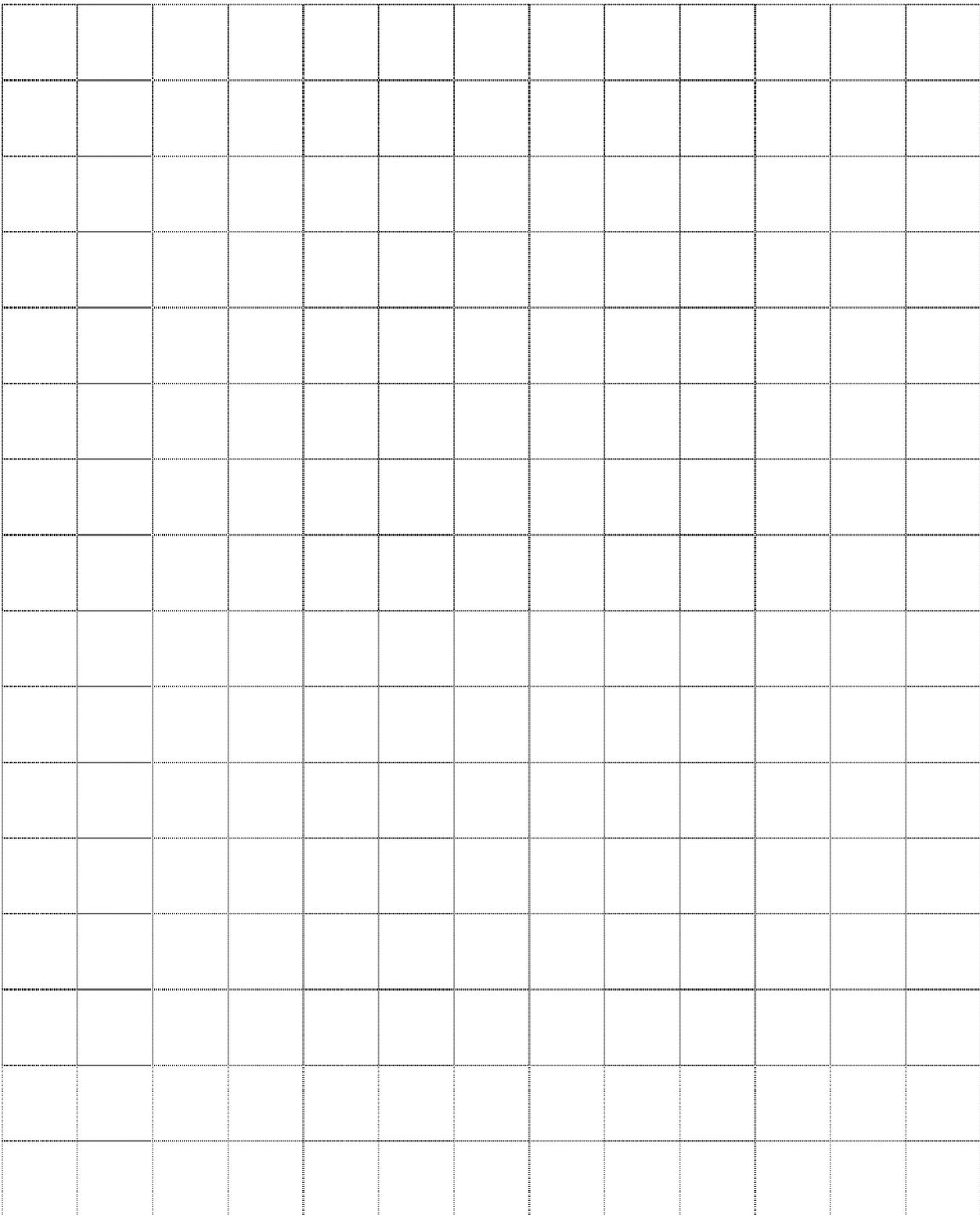
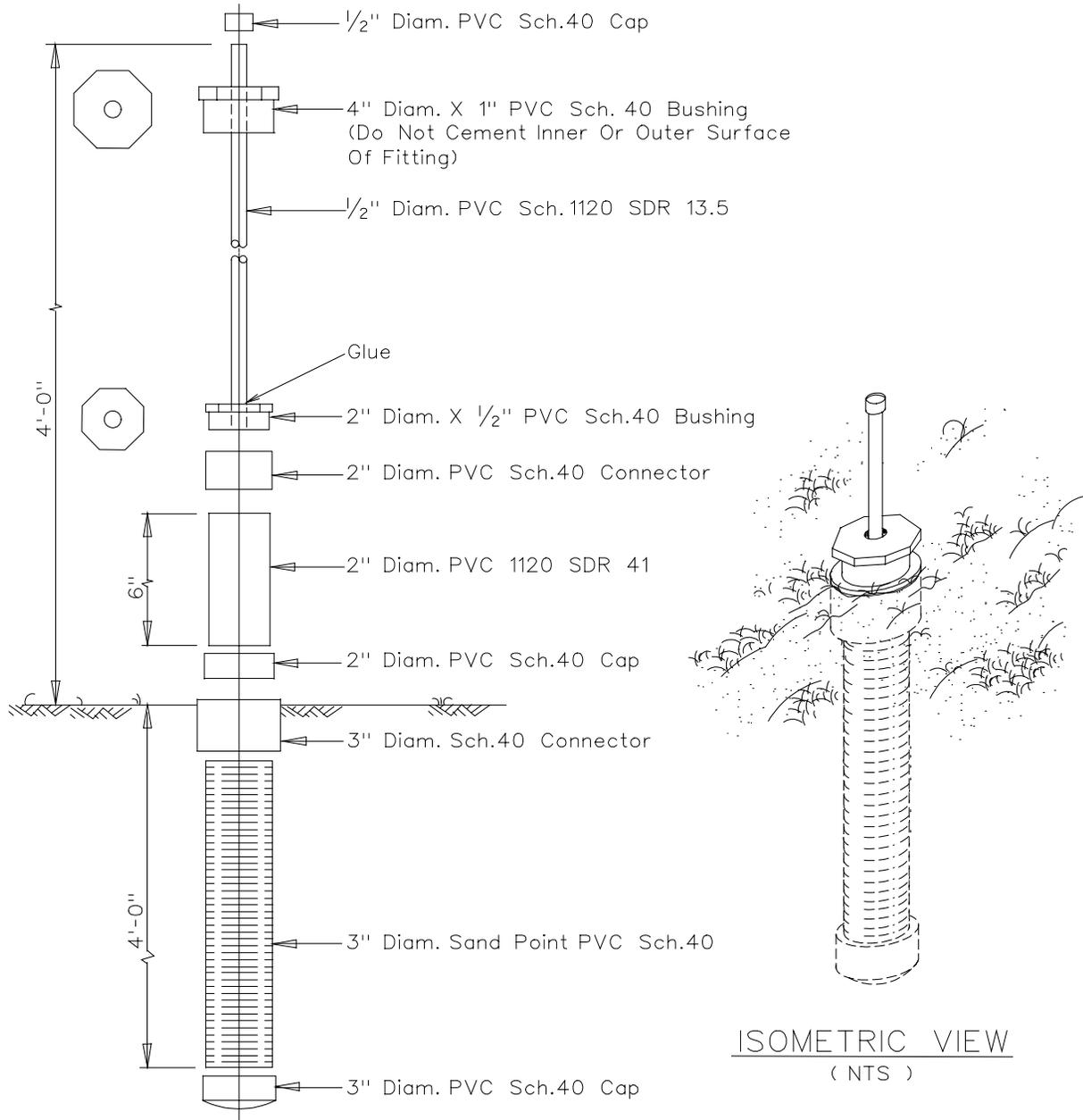


Figure 1 – Typical Water Table Observation Well

WATER TABLE OBSERVATION WELL



PARTS DETAIL
(NTS)

ISOMETRIC VIEW
(NTS)