NRCS Natural Resources Conservation Service

Instructions

Drip Watering Systems *NE-CPA-15A*

Instructions for use of NE-CPA-15A (formerly NB-Wood-1A)

A. Introduction

The NE-CPA-15A form is a companion form to be used along with NE-CPA-15. A sample problem to show proper design procedure and instructions on preparation of the form is included below.

In the example, assume that a NE-CPA-15 has been prepared for the planting and all data needed for the design of the drip watering system has been obtained (critical elevations, well or water source capacity, location and distance to the planting). This data is recorded on the attached sample Drip Watering Systems form.

B. Preparing the Form and Sample Problem:

1. Complete all blanks for NRD, field office, name, address, plan identification (EQIP, CRP, etc.), field number, and legal description. When this form is attached to a NE-CPA-15 form, entries in the heading need not be repeated on this copy. The cooperator's name should always be entered in case the two forms become separated.

2. A sketch of the drip watering system should include details needed for the design and installation of the system. The location of the water source, hydrant, layout of supply lines, headers and laterals, elevations of critical points, and dimensions of the planting should be shown. The sketch does not need to be drawn to scale and information on the NE-CPA-15 form does not need to be repeated.

3. Well capacity must be obtained and recorded. It is important that this be as accurate as possible, because it is the basis for the entire system and design. If water supply is inadequate, then system may need to be designed to water in segments

4. Remarks: This space should include any information that will be helpful in the design, installation, inspection, and operation of the system.

5. Show signature of the person or persons preparing the design, checking computations, approving the plan, and certifying installation. Enter appropriate dates.

6. Design:.

   (1) Enter row or segment number obtained from the sketch. Design only needs to be provided for the critical point in the system. The critical point in the point in the system where the difference in elevation between the ground and the hydraulic gradient is the least. On most systems, the critical point will be easily observable. On other systems several lines (sometimes all lines) must be designed to determine the critical point.

   (2) Enter total row length of the lateral that is being designed.

   (3) Enter the reach when design is being prepared for only a part of the lateral. This figure is the same as for column 2 when the design is for the entire lateral.

   (4) Enter the number of trees or emitters in the reach being designed. This can be obtained from NE-CPA-15.

   (5) Enter the gallons per hour that will be delivered by the lateral being designed. Multiply the number of emitters (col. 4) by the emitter rate (1 to 2 gallons per hour).

Instructions for use of NE-CPA-15A (cont.)

(6) Enter the size of the pipe being tried in the design of the lateral line. If the design proves that the size of pipe tried will not carry the required flow rate, then go to the next size larger and recomputed the design.

(7) Pipe length is the length of the row or reach plus the length required for snaking the line 1 percent to 5 percent.

8) Enter line friction loss. This figure is obtained from the applicable table for the gallons per hour in column 5. Multiply the friction loss from the table by 0.4 (multiple outlet factor) to allow for the reduction in water volume along the line as it is dispensed through the emitters. Example: 77 gal/hr = 1.39 from the table x 0.4 = .56 psi friction loss per 100 feet of line.

(9) Line friction loss is col. $\frac{8 \text{ X col. } 7}{100}$

Example: .56 X 309 ÷ 100 = -1.7. Line friction loss is always a minus.

(10) Enter the difference in elevation from the beginning of the line or reach to the end of the line or reach. An increase in elevation (uphill) results in a pressure (head) loss; therefore, it is given a minus (-) sign. A decrease in elevation (downhill) results in a pressure (head) gain; therefore, it is given a plus (+) sign..

(11) Line head difference is col. 10 x .43 psi/foot. (2.31 ft. = 1 psi or .43 psi/foot). Example: 0.4.4 foot increase in elevation = -4.4 x .43 psi/foot = -1.9 psi.

(12) Enter the sum of head difference which is the sum of the line friction loss (col.9) and the line head difference (col. 11). Example (-1.7 + (-1.9) = -3.6 psi. This is the pressure required to get water through the line or reach that you are designing. Note: The design for several lines or reaches may need to be computed to determine the critical point or the line requiring pressure or head difference. The line with the greatest head loss will be added to the header difference to determine the total pressure loss.

(13) Use Columns 1 through 11 as discussed above to determine the header difference. Header difference is Column 9 plus Column 11.

(14) Total pressure loss is the greatest pressure loss on the lateral lines plus the header difference. Example: Row 6A head difference = -5.0 Header diff. (-5.9) + (-5.0) = -10.9 psi pressure loss at the critical point.

15) Enter minimum emitter operating pressure obtained from the manufacturer or supplier of the emitters. Usually 10 psi for pressure compensating emitters.

(16) Minimum required operating pressure is the total pressure loss plus the minimum emitter operating pressure. Example: 10.9 psi + 10 psi = 20.9 psi or 21 psi. The maximum operating pressure is determined by operating characteristics of the emitters. Generally this will not exceed 50 psi – 60 psi.

7. Appurtenances: All required items must be listed on this part of the form. Listing of other items needed for installation such as tees, elbows, reducers, etc., is optional.

   Record the size or description and quantity planned. The actual quantity installed can be entered by the person who installs the system.

   List any remarks that will be helpful in obtaining the needed supplies or in the installation ot the system

C. Filing

This form will be filed with the NE-CPA-15 form in the applicable case file.