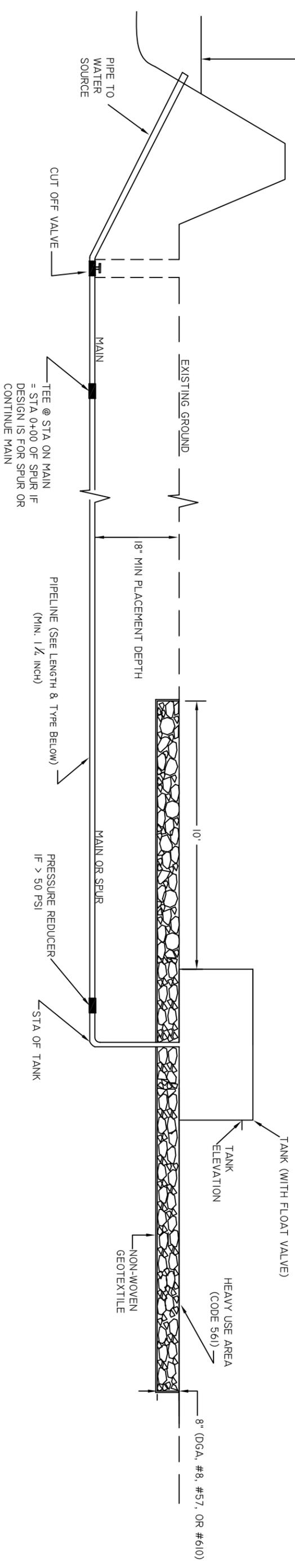


ELEVATION OF RELIABLE WATER LINE IN POND OR ELEVATION OF WATER IN SPRING BOX STA 0+00



TYPICAL SECTIONAL VIEW PIPELINE AND TANK

NOT TO SCALE

NOT TO SCALE

|                             | MAIN #1 | SPUR #2 | SPUR #3 | SPUR #4 |
|-----------------------------|---------|---------|---------|---------|
| PIPE DIAMETER (MIN. 1 1/2") |         |         |         |         |
| PIPE LENGTH                 |         |         |         |         |
| PRESSURE REDUCER Y OR N     |         |         |         |         |
| TANK ELEVATION              |         |         |         |         |
| TANK CAPACITY               |         |         |         |         |
| TANK STA                    |         |         |         |         |
| TEE @ STA ON MAIN           | XX      |         |         |         |

NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES.
2. THE TRENCH SHALL BE FREE OF ROCKS AND OTHER SHARP EDGED MATERIALS.
3. THE PIPE SHALL BE PLACED IN A "SNAKE LIKE" POSITION IN THE TRENCH.
4. TURN ON THE WATER AND CHECK FOR LEAKS PRIOR TO BACKFILLING THE TRENCH.

BILL OF MATERIALS

| QUANTITIES    | UNIT      | ITEM                   |
|---------------|-----------|------------------------|
|               | EACH      | ___ GAL TANK           |
|               | EACH      | ___ GAL TANK           |
|               | LIN. FEET | " PIPE                 |
|               | LIN. FEET | " PIPE                 |
|               | LIN. FEET | " PIPE                 |
|               | EACH      | " ELBOWS               |
|               | EACH      | " ELBOWS               |
|               | EACH      | ___ ELBOWS             |
|               | EACH      | PRESSURE REDUCER       |
| 70 (PER TANK) | SQ. YDS.  | NON WOVEN GEOTEXTILE   |
| 20 (PER TANK) | TONS      | ROCK (DGA.#8 #57 #610) |
| 1             | EACH      | PIPE CLEANER           |
| 1             | EACH      | GLUE                   |
|               | EACH      | CUT OFF VALVES         |
|               | EACH      | FLOAT VALVES           |

PLAN VIEW OF SYSTEM LAYOUT

(INCLUDE TANK AND LINE NUMBERS)

ENGINEERING JOB CLASS \_\_\_\_\_

DATE

DESIGNED \_\_\_\_\_  
 DRAWN \_\_\_\_\_  
 CHECKED \_\_\_\_\_  
 APPROVED \_\_\_\_\_

PIPELINE AND TANK  
 (PRACTICE CODE 516 AND 614)

LANDOWNER: \_\_\_\_\_ COUNTY: \_\_\_\_\_



| DATE  | REVISIONS       | TITLE |
|-------|-----------------|-------|
| 09/05 | APPROVED<br>DLC | CE    |
|       |                 |       |
|       |                 |       |

FILE NO. \_\_\_\_\_  
 DRAWING NO. KY ENG 516C  
 SHEET OF \_\_\_\_\_

## GRAVITY PIPELINE AND TANK DESIGN

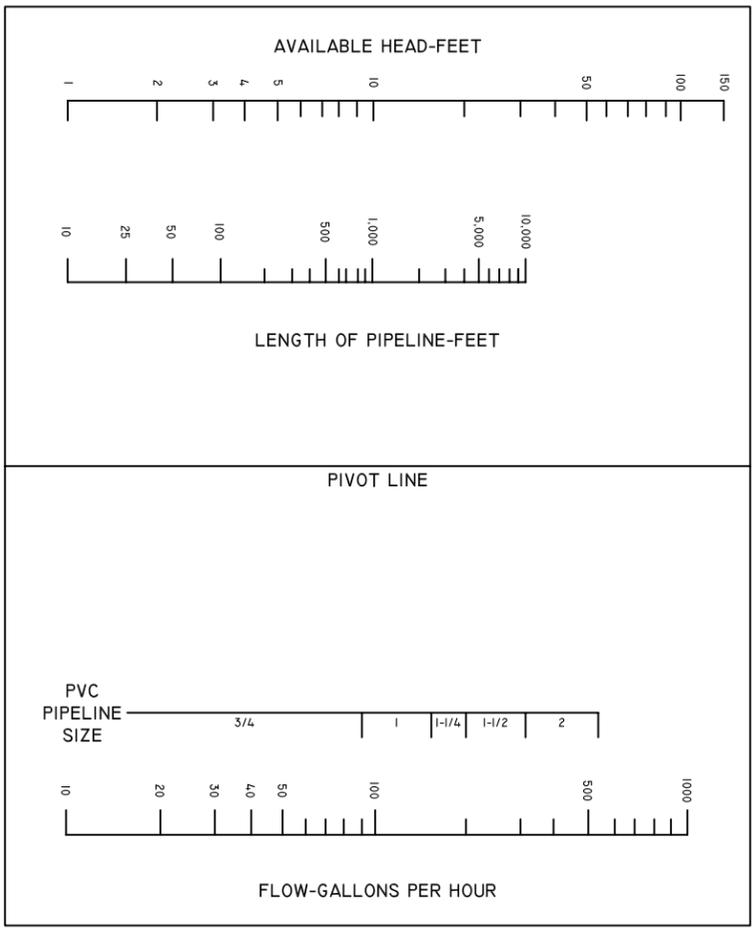
## DESIGN PROCEDURE

- |  |   |         |         |         |         |
|--|---|---------|---------|---------|---------|
| 1) Pipe and Tank                         |   | Main #1 | Spur #2 | Spur #3 | Spur #4 |
| 2) Number of Cows or Horses (hd)         |   | 15      | 15      | 15      | 15      |
| 3) Daily Consumption <u>1/</u> (g/hd/h)  | x | 15      | 15      | 15      | 15      |
| 4) Water Needs (g/h)                     | = | _____   | _____   | _____   | _____   |
| 5) Tank Capacity (g)                     | = | _____   | _____   | _____   | _____   |
| 6) Flow Rate in Pipeline <u>2/</u> (g/h) |   | _____   | _____   | _____   | _____   |
- Check the Replenishment Rate (Line 4 x 0.5) – Line 5 then divide by 3

- 7) Replenishment Rate (g/h) \_\_\_\_\_
- For the Design Flow Rate in the Pipeline (Line 12) use the greater of Line 6 or Line 7
- 8) Elev. of the Water Source \_\_\_\_\_
- 9) Elevation of the Tank \_\_\_\_\_
- 10) Total Available Head (ft.) \_\_\_\_\_
- (min. 4 ft., if > 115 ft. add pressure reducer)
- 11) Length of Pipe Along Ground Line (ft.) \_\_\_\_\_
- (for design purposes this distance is from the source, down the main, and out the spur)
- 12) Design Flow Rate in Pipeline (g/h) \_\_\_\_\_
- 13) Length of Pipe to Install (ft.) \_\_\_\_\_
- 14) PVC Pipe Diameter (in.) \_\_\_\_\_

### PIPELINE DESIGN CHART FOR LIVESTOCK WATER FACILITIES

(plot lines on this chart, see KYFOTG IV for instructions)



1/ From Table 1 FOTG for beef, dairy, and horses use 15 gal/hd/hr.  
2/ From Table 2 FOTG  
 Design note: The main shall be designed from the source to the farthest tank in the system. The spurs may be a smaller size than the main.

- 1) This design is for a gravity system using tanks with float valves on all tanks with a pond or spring as a water source.
- 2) The design survey shall have the elevation of the reliable water line in the pond or the elevation of the water in the spring box and the elevation of each watering facility to be installed. A GPS is not accurate enough for this and it cannot be taken from a topographic map. You will also need to tape along the ground line of the proposed pipeline to determine how much pipe to design for. This can be done with a GPS with a backpack antenna. If you use a GPS, be sure to get shots close enough together to depict the ground line not the horizontal distance. Note in the taped survey or GPS survey where the spurs will be coming off the main line. The main line will usually be the one to the watering facility that is the farthest distance from the water source. However, due to more head loss in one of the spur lines, the spur with a shorter distance may actually require a larger pipe. In this case, the larger pipe would be used for the spur and from the spur out the main to the source. Be sure to draw a plan view of the layout to accompany your survey.
- 3) Determine from the landowner the number of cattle or horses that will be using each tank and the volume of each tank.
- 4) Begin by designing the main. Fill in the blanks on the Pipeline and Tank Design chart. For the main, the length of pipe along the ground line and the length of pipe to install will be the same. Using the total available head (line 10), length of pipe along the ground (line 11), and flow rate in pipe (line 12), determine the pipe size of the main.
- 5) To design the size of a spur line, use the same process except the length along the ground line (line 11) will be the length of the spur plus the length from the meter to the spur. The length of pipe to install (line 13) will be the length of the spur. The diameter of the spur line should be smaller or equal to the size of the main. If not, adjust the size of the main out to the source as described in 2) above. Continue this process until all of the spurs have been designed.
- 6) It is best to tee off a short distance to install a tank that is on the main line so that if necessary a pressure reducer can be installed on the spur rather than on the main line. The pipes can withstand most pressures we encounter and you may need the pressure on down the line. The tanks are what is sensitive to pressure.
- 7) Schedule 40 PVC pipe is most commonly used for these facilities. But in the event that another type of pipe (that meets the standards) is to be used, list the length and type pipe used in the Bill of Materials on the drawing.
- 8) Any time the gained head produces a total available head (line 10) greater than 115 feet (50 psi), a pressure reducer should be installed at the watering facility.
- 9) If the water source is a spring then the over flow from the spring box shall be capable of passing the entire expected over flow. See the Spring Development (Code 574) standard to determine the minimum pipe size from the source to the first tank.
- 10) The engineering job class will be based on the pressure, which is the total available head divided by 2.31, and the length of pipe to the farthest watering facility (usually the main). Do not use the total length of the spurs too. Give a copy of the *front sheet only* to the land owner or contractor.

### CONSTRUCTION CHECK

|                                | Main #1 | Spur #2 | Spur #3 | Spur #4 |
|--------------------------------|---------|---------|---------|---------|
| Length of Pipe (ft.)(measured) | _____   | _____   | _____   | _____   |
| Diameter of Pipe (in.)         | _____   | _____   | _____   | _____   |
| Description of Pipe            | _____   | _____   | _____   | _____   |
| Min. Cover                     | _____   | _____   | _____   | _____   |
|                                | #1      | #2      | #3      | #4      |
| Description of Tank (Gals.)    | _____   | _____   | _____   | _____   |
| Elev. of Tank                  | _____   | _____   | _____   | _____   |
| Min. Projection of HUA         | _____   | _____   | _____   | _____   |

To the best of my professional knowledge, judgment, and belief the installed practice meets NRCS standards.

Name \_\_\_\_\_ Title \_\_\_\_\_ Date \_\_\_\_\_