KS650.1280 Spring developments for seep area locations

(a) General

Springs and seep areas in rangeland areas may represent islands of unique wetland habitats. Development of these areas for livestock water will have differing effects on these habitats. Proper planning and layout of the spring development system can minimize the effects to the wetland system.

(b) Planning and investigation

Ordinarily, the user has already identified a potential spring development area. A soils investigation of the site will help to determine the potential volume and reliability of flow from a spring development in a seep area. The investigation along with selected elevation shots will determine the type of collection system that should be used. Elevation shots may also be used to determine possible locations of the spring box and watering facilities.

(c) Collection

The method of collection will be based on the seep area characteristics and their location on the landscape. The results of the soils investigation will assist in making these decisions.

The preferred method of collection would be to install a collection trench on the uphill side of the seep area. The trench should intercept the water-bearing layer and extend into, but not through, the impermeable layer. A slotted pipe should be placed in the trench and backfilled with clean, coarse gravel up to the level of the water-bearing layer. Figures KS12-1 and KS12-2 show a typical plan and cross section view of this type of installation.

Seep areas with minimal capacity may require a cutoff wall on the downhill side of the trench to provide adequate flow into the collector pipe. The length of the collector trench and pipe may encompass the entire seep area or be sized to provide the desired flow. The end of the collector pipe should be capped to prevent sediment and other obstructions from entering the pipe.

The collection trench may be located in the seep area, but this is less desirable due to the effect on the wetland habitat. This location may be required due to excessive trench depths in the uphill location. Collection trenches in the seep area should have a cutoff wall installed on the downhill side. The collection pipe should be installed and backfilled using the same methods, disregarding the location of the collection trench.

The collection system placed in the seep area may consist of just a perforated spring box backfilled with clean gravel if the area has adequate capacity.

(d) Spring box

Spring boxes may be part of the collection system as stated earlier and also be the storage system for the spring development. They provide a settling basin for sediment removal and facilitate maintenance of the system. They also provide a common collection point for multiple collection lines that feed into one supply line.

Figure KS12-1 Cross section of seep area collection location

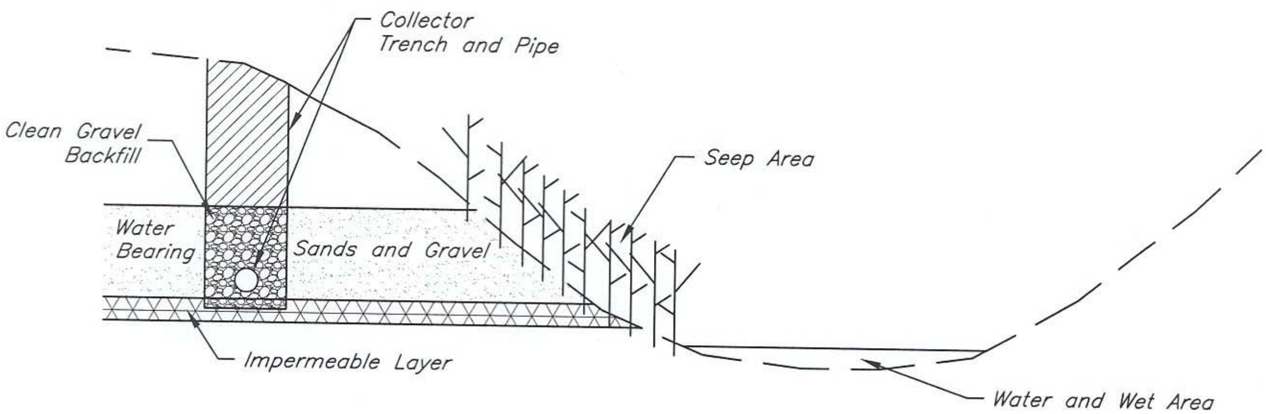
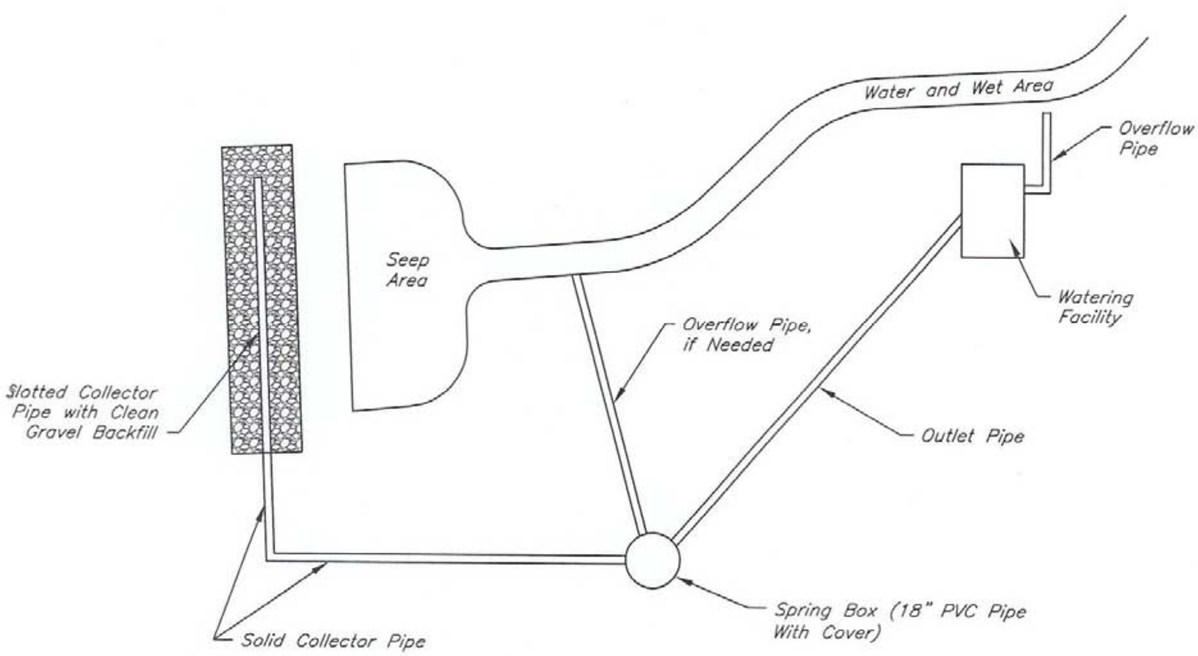


Figure KS12-2 Plan view of seep area spring development system



Spring boxes should be constructed of durable materials such as concrete, plastic, galvanized metal, or other suitable materials that are watertight and rot-resistant. The most commonly used materials are plastic or galvanized metal pipe. The size of the spring box shall be large enough to allow entry for maintenance, repair, or sediment removal. The spring box shall have an impervious floor and a tight-fitting cover to prevent trash and surface runoff from entering the box. It should be buried as needed for protection against freezing.

Spring boxes should be located to provide gravity flow from the collection pipe and away from the seep area if possible. The location should also provide gravity flow to the watering facility if possible. In a gravity flow system, the spring box will have an inlet pipe from the collection system, an outlet pipe to the watering facility, and may have an overflow pipe to carry excess flows back to the wetland system. The outlet pipe should be at least 6 inches above the floor of the spring box to allow for sediment storage. It should be lower than the inlet pipe to prevent reduced flows from the seep area.

An overflow pipe is needed when the flow from the collection pipe will exceed the use requirements. It should be slightly above the inlet pipe elevation to prevent reduced flows from the seep area. Size the overflow pipe to carry the maximum flows expected during the spring or wet weather periods. Direct the flow back into the wetland system to minimize the effects of the spring development system installation.

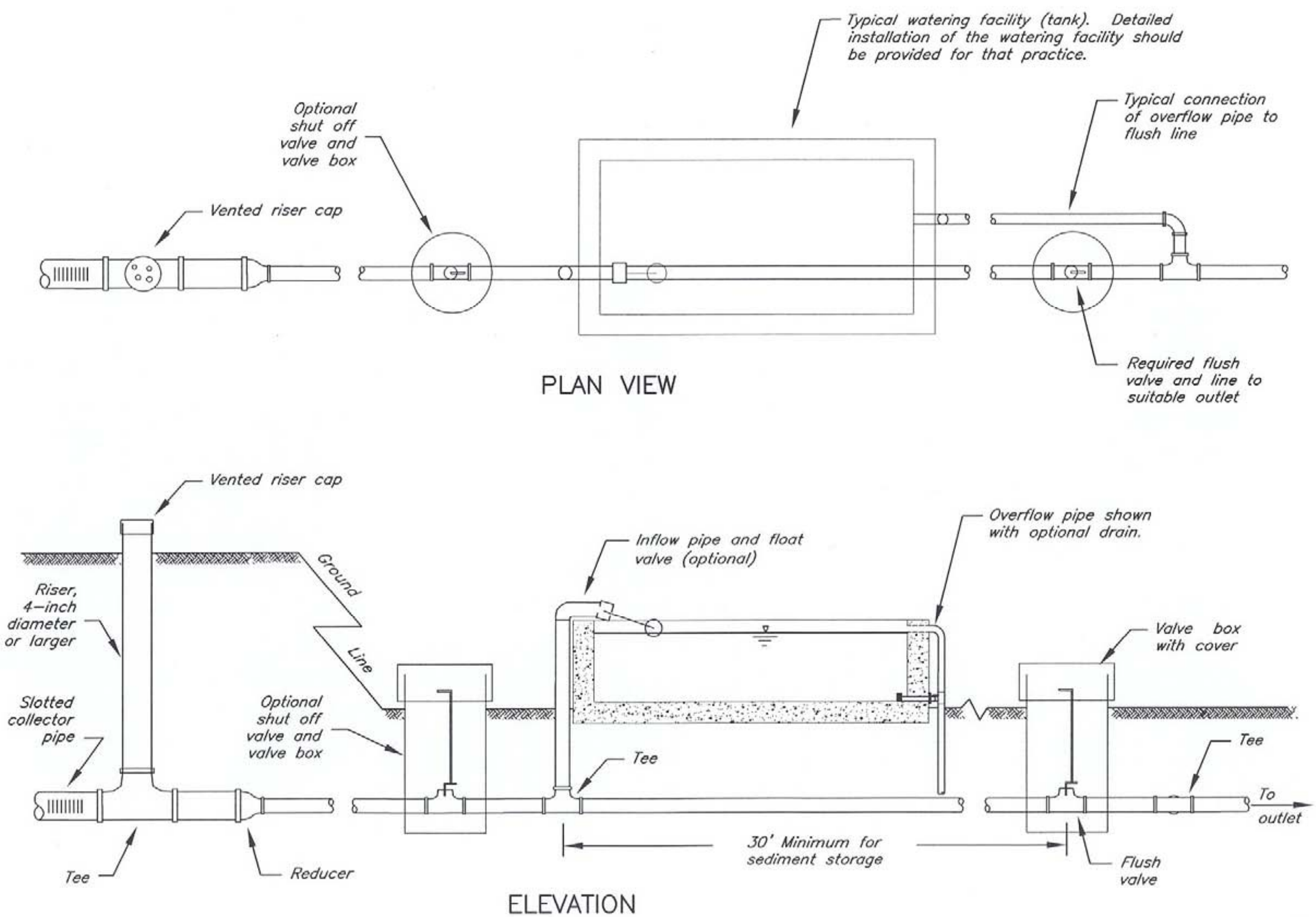
(e) Riser and flush valve system

Some locations may not allow the installation of a spring box due to the topography. An alternative installation is the use of a riser and flush valve system. This installation may be used where three or less collection lines are used.

A 4-inch diameter or larger riser is placed at the junction of the collection lines, instead of a spring box. The top of the riser should be at least 18 inches above ground level, be protected from damage, and be capped and vented. An outlet pipe shall extend from the riser and collection junction to the watering facility.

The outlet pipe will be designed to collect and store sediments that may enter the system and provide a method to flush the sediments at regular intervals. This is typically accomplished at the watering facility location through the installation of additional pipe and a flush valve. The valve is placed 30 to 40 feet downstream of the riser inlet to the watering facility to allow for sediment storage. The overflow pipe from the watering facility is then connected back to the delivery pipe past the location of the flush valve. When the valve is in the closed position, flow is directed into the watering facility and out the overflow. When the valve is opened, flow bypasses the watering facility and flushes the accumulated sediments past the valve to a suitable outlet. The valve should be opened at least annually and may be left in the open position when the use of the watering facility is not required. Figure KS12-3 shows a typical installation of a riser and flush valve system.

Figure KS12-3 Typical installation of a riser and flush valve system



(f) Outlet pipe

Outlet pipes are the delivery pipes for gravity flow systems. They should be designed according to Conservation Practice Standard 516, Pipeline. The outlet pipe must have a positive grade away from the spring box unless a vent system is installed to prevent air locks. The minimum diameter of the outlet pipe will be 1¼ inches.
In lieu of site-specific spring flow and pipe vent calculations, the outlet pipe shall have a minimum size as follows (based on the grade line of the pipe):

- 1¼ inches diameter for line grades over 1 percent
- 1½ inches diameter for line grades of 0.5 to 1 percent
- 2 inches diameter for line grades from 0.2 to 0.5 percent

(g) Watering facilities

Follow Conservation Practice Standard 614, Watering Facility, to design facilities that provide access for livestock and wildlife to water from the developed spring. Watering facilities shall be located as required to provide adequate flow in gravity systems. They shall also be located to minimize the effects on the seep area system due to the installation of the spring development. They should be located at least 100 feet from the edge of the seep area and at least 50 feet from the edge of the wet, contiguous areas downstream from the seep area. Overflow discharge should be routed back to the wet, contiguous areas.

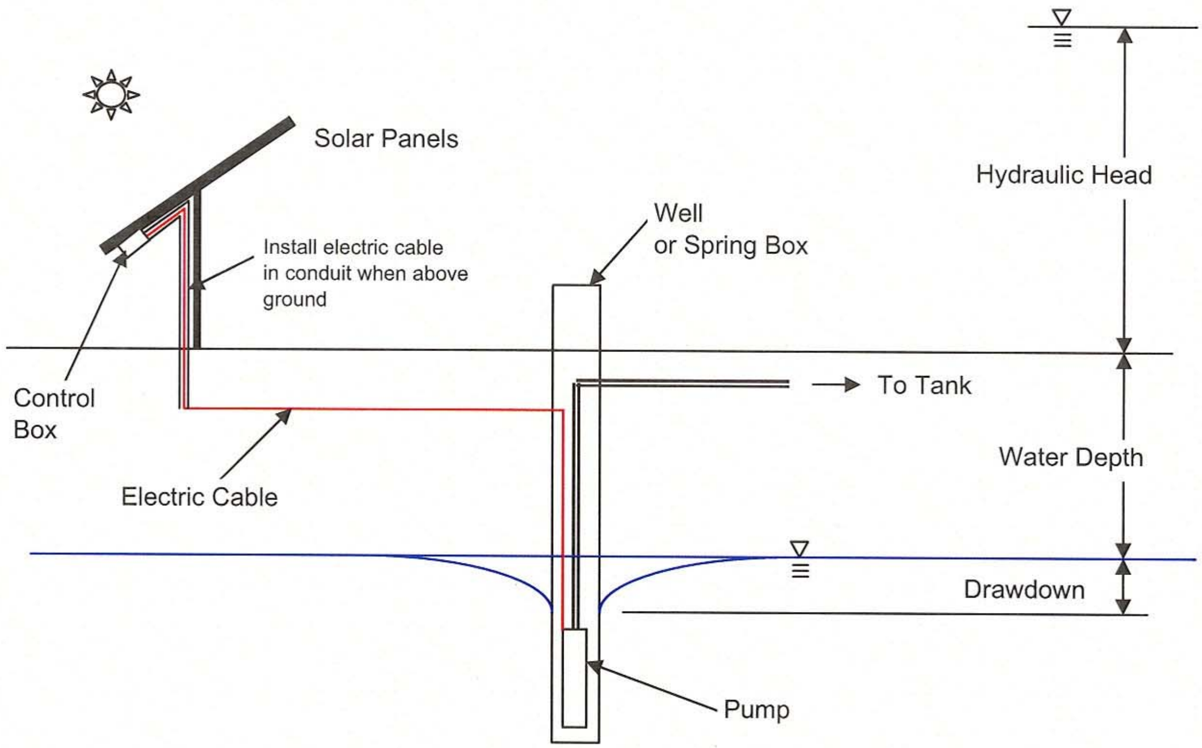
When the facility cannot be located away from at least one of these areas by the stated lengths due to elevation constraints, a float valve may be installed to minimize the effects of the spring development installation. The use of a float valve will minimize the water diverted away from the seep area. Livestock exclusion from the seep area may also be used to limit the effects of the installation.

(h) Alternate delivery systems

Suitable locations for watering facilities may not be available using gravity delivery systems. Spring developments may still be installed to provide a water supply, and a submersible pump can be placed in the spring box. Water can then be piped to suitable watering facility locations.

The pumps can be powered by an electric motor, internal combustion engine, hydraulic ram, or windmill. If the installation is in a remote area, a solar-powered pump is a recommended installation. Recent advances in photovoltaic arrays and electronics have increased the dependability of these types of systems. These systems are able to provide adequate volumes of water for livestock needs at total heads of greater than 100 feet. Follow Conservation Practice Standard 533, Pumping Plant, to design pumps and power supplies for alternate delivery systems. Figure KS12-4 shows a typical solar powered submersible pump installation for a spring development.

Figure KS12-4 Typical solar-powered submersible pump installation for a spring development



Installation Notes:

Pump installation shall be accordance with manufacturer recommendations. Pump shall be sized to provide the required head and flow as shown on the field sheet. Solar panels shall be protected from animal damage. Electrical cables shall be buried or encased in a pipe conduit when above ground.