

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

SPRING DEVELOPMENT

(No.)

CODE 574

DEFINITION

Utilizing springs and seeps to provide water for a conservation need.

PURPOSES

This practice may be applied as part of a resource management system to support one or more of the following purposes:

- improve the distribution of water.
- increase the quantity and quality of water for livestock, wildlife, or other uses.
- obtain water for irrigation if water is available in a suitable quantity and quality.

CONDITIONS WHERE PRACTICE APPLIES

In areas where spring or seep development will provide a dependable supply of suitable water for the planned times of use, and where the intended purpose can be achieved by using this practice alone or combined with other conservation practices.

CRITERIA

General Criteria Applicable To All Purposes

Spring developments shall be planned, designed, and constructed in compliance with Federal, State and Local laws and regulations.

Impacts to existing wetland functions shall be assessed. USDA wetland conservation provisions apply. The practice must comply with NRCS wetland technical assistance policy contained in GM 190, Part 410.26.

An investigation of site conditions, including soil borings, shall be made. Water quality shall be determined to the extent required for the intended purpose. Water quantity shall be measured from existing flows, as practicable, to determine if the development will meet requirements.

Fracture and Tubular Springs This type of spring is associated with cavernous rock. If water issues from rock fractures, the individual openings shall be cleaned and enlarged, as needed, to improve flow. The water from these individual openings shall be collected by means of tile or perforated pipeline or by a gravel-filled ditch. The collection works shall be constructed an adequate distance below the elevation of the openings to permit free discharge.

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If water issues from a single opening, such as a solution channel in a soluble rock formation or a tunnel in lava, the opening shall be cleaned or enlarged as needed. A collection system usually is not required.

If a spring box or sump is used, it shall be installed at an elevation low enough that water yield is not restricted.

Perched or Contact Springs Perched or contact springs occur when an impermeable layer lies beneath a water-bearing permeable layer. Collection trenches shall be used to intercept and divert flows from the water-bearing formation.

Artesian Springs Artesian springs normally occur at a fissure or break in the impervious stratum with the water source being an under-lying pervious water-bearing layer so positioned that the water surface elevation (water table) is always above the outlet point of the spring. Remove obstructions, clean or enlarge joints or fractures, or lower the outlet elevation as needed to improve flow. Sumps or spring boxes shall be located as needed. Free outlet discharge or minimum restriction to the spring flow is required to protect and maintain yield.

Collection Systems If a collection trench is used, the trench shall be excavated so that it extends into the impervious layer. Minimum length of the trench shall be based on site conditions, preferably the entire length of the water-bearing outcrop.

A cutoff wall shall be constructed along the downstream side of the trench to ensure that the flow enters the collection system. The cutoff wall may be constructed of plastic sheeting, well-tamped clay, masonry, concrete, or other impervious materials.

The collection system shall consist of subsurface drainage tubing or perforated pipe not less than 4-inch diameter, wood box drain, or other suitable manufactured system. Surrounding the collector with geotextile fabric or a sand-gravel filter is recommended. Cleanouts are recommended for all collection systems.

Crushed rock or gravel backfill, not less than 1 foot thick, may be used as a collection system if site conditions warrant, in lieu of other materials.

Sand, gravel, and crushed rock shall be composed of clean, hard, durable particles.

Surface runoff will be diverted from the spring box to prevent entry into the water system. The top of the spring box should extend above the adjacent ground elevation to reduce the potential for surface runoff contamination.

Spring Boxes Spring boxes, if needed, shall be made of plastic, concrete, or other durable material, with a tight access cover and impervious floor. A “shoebox” type access cover or manhole attachment, with gasket, is recommended for tightness. The floor may be omitted when the underlying material is stable and impervious.

The boxes shall have a minimum cross-sectional area of 1½ ft², and the floor of the box shall be not less than 6 inches below the outlet of the collection system.

Spring box overflows, if needed, shall meet the requirements found in NRCS Conservation Practice Standard TROUGH OR TANK, Code 614.

When a spring box is not used in combination with the collection system, the pipe shall be extended to the trough, reservoir, or distribution system.

Spring box systems that can be contaminated by livestock shall be fenced, or the collection and conveyance system shall be covered with a permanent impervious membrane. The impervious membrane will be 4 mil. plastic minimum. Soil cover over the membrane shall be at least 12 inches.

Outlets The outlet pipe from a spring box shall be placed not less than 6 inches above the floor, to provide a sediment trap. The spring outlet pipe should be at the same elevation or lower than the collector pipe outlet to prevent reduced spring flow. The intake to the outlet pipe shall be screened as necessary, and installed to the box with a watertight connection.

The outlet pipe must have positive grade away from the spring box or collection system unless vent pipe(s) are added to prevent air locks

The outlet pipe shall have minimum 1¼ inch (3 cm) diameter. In lieu of site-specific spring flow and pipe vent calculations, the outlet pipe shall have the following minimum size based on line grades:

1. 1¼ inches inside diameter for line grades greater than 1.0 percent.
2. 1½ inches inside diameter for line grades greater than or equal to 0.5 percent but less than or equal to 1.0 percent.
3. 2 inches inside diameter for lines grades less than 0.5 percent.

Minimum outlet pipe material and strength requirements shall equal those found in NRCS Conservation Practice Standard PIPELINES, Code 516.

Appurtenance Protection Measures shall be included to protect appurtenances from damage by freezing, flooding, sedimentation, contamination, vehicular traffic, and livestock.

Wildlife Habitat Protection Spring developments with potential to jeopardize wetlands, bogs, fens, or other unique ecological sites shall be designed with measures required to maintain the existing habitat, unless acceptable mitigation is provided. A functional assessment will be made at potential spring development areas to determine existing ecological functions and/or potential losses.

Operation and maintenance plans for ecologically sensitive sites shall include specific valve installation and operation requirements to protect existing site habitat values.

Vegetative Establishment Establishing vegetation on disturbed areas shall be in accordance with NRCS Conservation Practice Standard Critical Area Planting, Code 342.

CONSIDERATIONS

Considerations when determining the suitability of a site for development shall include the need and feasibility of protection from contaminants, and potential damage to cultural resource areas, wetlands, woody cover, and existing wildlife habitat.

A shutoff valve and vent system on the spring outlet pipe should be considered for winter shutdown, flow control, and maintenance.

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Native vegetation adapted to wet conditions may be used as an alternative to introduced grasses on some wet sites.

PLANS AND SPECIFICATIONS

Plans and specifications for installing spring developments shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

The operation and maintenance plan shall include such items as winter freeze and flooding protection, overflow and valve operations, spring box sediment removal, rodent damage repair, maintaining vegetative cover and stable outlet, and other site specific items as needed.

REFERENCE

National Engineering Handbook - Part 650 - Engineering Field Handbook, Chapter 12, Springs and Wells.

**NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION**

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All loose rock, sediment, logs, and vegetation than can obstruct the free discharge of the spring shall be removed and disposed of so that it will not endanger the spring development.

Collection trenches, drain tiles, perforated pipe lines, sumps, and spring boxes shall be constructed to the elevations and grades shown on the plans.

Crushed rock or gravel for collection systems and sand-gravel material for filters shall be composed of clean, hand particles. O.D.O. T. Aggregate Specifications for size 67, 68, and 78 meet the requirements for a well-graded filter material.

Concrete used in construction of cutoff walls, spring box bases covers and caps shall be ready-mixed commercially available concrete mix, or hand-mixed on site. Cement will be Type I or Type IA, meeting requirements of ASTM C150, and aggregates will meet the requirements ASTM C33. Coarse aggregate will be size 57 or 67 for ready-mix and hand-mixed concrete. Hand-mixed concrete shall be mixed at a ratio of 1 part cement, 2 parts sand, and 3 parts coarse aggregate. Pre-bagged concrete mix will be mixed according to the manufacturers' recommendations. Mixing water will be clean and free of substances that would effect the strength or durability of the concrete. Concrete will be mixed to a consistency that will allow proper consolidation in the forms, but not so wet that aggregates will separate from the mortar (approximately 3"-6" slump).

Concrete will be mixed and placed in the forms in a timely manner so that it does not begin to set prior to placement, or cold joints are not formed between successive layers. Forms shall be mortar-tight and unyielding as concrete is placed.

All materials used will be in good condition and meet requirements of the applicable ASTM specifications, commercial standards, or Conservation Practice Standard as shown on the drawings.

Upon completion of construction, all disturbed areas will be graded smooth and blend with the surrounding ground. Vegetation will be established by applying seeding and mulching materials as described on the drawings.

Construction operations shall be carried out in such a manner that erosion and soil and water pollution are minimized and held within legal limits.