Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

DRY HYDRANT

CODE 432

(no)

DEFINITION

A nonpressurized permanent pipe assembly installed to permit withdrawal of water by suction from a water source.

PURPOSE

Use this practice to accomplish one or more of the following purposes:

- Provide water for fire suppression
- Provide water for livestock
- Provide water for small acreage irrigation
- Provide water for wetland management

CONDITIONS WHERE PRACTICE APPLIES

This standard applies where an adequate volume of water with acceptable quality is available for the intended purpose; the user is equipped with a suction pump, proper connections, and a transport vehicle, if necessary; and where transport vehicles can access the site in all weather.

CRITERIA

General Criteria Applicable to All Purposes

Plan, design, and construct the dry hydrant to comply with all Federal, State, and local laws and regulations. Notify landowner and contractor of their responsibility to locate all buried utilities, drainage tile, and other below-grade structures in the project area. The landowner is required to obtain all necessary permits for project installation prior to construction.

Site accessibility

Prior to design and installation of the dry hydrant, review access, topography, elevations, and location with the landowner and any other entities, such as fire department personnel, with approved access to the dry hydrant site.

Provide a well-drained all-weather surface access road to facilitate movement to and around the hydrant site if the site currently lacks adequate access. Use NRCS Conservation Practice Standard (CPS) Access Road (Code 560).

Take into account visibility and sight distances when locating access roads and pull-off areas adjacent to public roads. Locate the suction pump connection within 10 feet of the edge of the access road or pull-off area.

Clearly mark the hydrant location using permanent features such as posts painted with reflective paint.

If the dry hydrant is located in a constructed impoundment, locate the access road and suction pump connection at a higher elevation than the auxiliary spillway.

Water requirement
Ensure the quantity and quality of the water supply is adequate for the intended purpose.

For water-impounding structures, use a water balance approach such as the procedures described in NRCS National Engineering Handbook (NEH) (Title 210), Part 630, Chapter 20, “Watershed Yield.”

For streamflow sources, use a regional analysis of stream gauge data or other appropriate techniques to determine if the flow is adequate.

Pump lift
Design suction pipes to prevent cavitation. Account for suction, lift, net positive suction head, pipe diameter and length, minor losses, temperature, and altitude. Base the size of the suction pipes on hydraulic analysis and compatibility with other system components.

Pipe intake
Install the top of the pipe intake at least 2 feet below the expected lowest water surface elevation and at least 2 feet below the frost-free depth for the area, whichever is deeper. For low-profile stream screen intakes, the depth of water cover below the design low-flow water level may be less than 1 foot depending upon the manufacturer’s recommendations.

Install the dry hydrant intake pipe on a slope toward the water source to avoid accumulation of sediment in the pipe and joints. Support and secure the intake screen or strainer at least 2 feet above the pool bottom and at least 4 feet beyond the earth slope in pits or impoundments.

Freeze protection
When the high-water level is anticipated to be at or above the average frost-free depth, use one of the following methods to prevent the water in the standpipe from freezing:

- Mound soil around the stand pipe to an additional height and perimeter to attain adequate thermal protection, or
- Add commercial pipe insulation around the pipe per National Fire Protection Association 1142, “Standard on Water Supplies for Suburban and Rural Fire Fighting.” This option involves a minimum 2-inch thick styrofoam collar surrounding the riser, encased in a PVC pipe at least 4 inches larger in diameter than the riser pipe, with a cap at the top of the insulation assembly to protect the insulation material.

Strainer
Fabricate a strainer of material compatible with the pipe or use corrosion-resistant manufactured well screens. Use noncorrosive materials for all components, including pins. Screens and strainers must have a minimum open area of 4 times the pipe cross-sectional area with individual inlet holes no greater than 3/8-inch diameter.

If the intake pipe is greater than 3 feet above the bottom of the water source and siltation is not anticipated, a trash rack may be used in lieu of a strainer.

If the strainer does not have an end cap, install a perforated end cap that is easily removed without special tools to allow cleanout by backwashing.

Dry hydrant
Construct the standpipe (hydrant) for connection to the suction pump from durable materials similar to those used for the intake pipe. Do not use conventional dry barrel hydrants, such as those found in public water supply systems.

Install a brace 2 to 4 feet in front of the hydrant to bear the weight of the hard-suction between the suction pump and the hydrant head.

A recessed (or flush-mount) hydrant (below ground-level connection) may be used in areas with special needs, such as high vandalism areas, or for low-profile and aesthetic needs. This type of dry hydrant does not require the 24-inch riser. It may be used with the 45-degree or straight dry hydrant head assembly.

Install a dry hydrant head on the standpipe. Ensure that the selected hydrant head is compatible with the planned use of the hydrant and the hose and suction pump connection.

Include a snap-on/snap-off cap that is removable without special tools and joined permanently to the dry hydrant head with a steel cable or chain.

Testing
Allow pipe joint sealants to cure before testing. Test the installation to ensure it provides adequate flow and otherwise operates properly. Give careful attention to silt, debris, or other interference that may limit the full operation of the hydrant.

Stabilization
During construction of the dry hydrant, take appropriate measures to limit erosion and sedimentation from construction activities. After installation, grade the site to provide surface drainage and vegetate or otherwise protect from erosion. Use NRCS CPS Critical Area Planting (Code 342) or Heavy Use Area Protection (Code 561).

Additional Criteria for Fire Suppression
Prior to construction, obtain a letter of approval from the landowner to use the site for fire protection. Prior to installation of the dry hydrant, review access, topography, elevations, and dry hydrant location with the landowner and fire department personnel. Locate or develop fire truck and pumper unit vehicle accessibility to the dry hydrant in conjunction with local fire officials. For floating hydrants, verify locations with appropriate fire department personnel.

Clearly mark the dry hydrant in a manner acceptable to the fire department.

When local road traffic may be involved, separate the access road completely from any public road for the safety of emergency service personnel and the public.

Upon completion of construction, provide a copy of the location map showing the exact site of the hydrant and vehicle access to the local fire department and to the landowner.

For fire suppression, an adequate volume of water is defined as a minimum of 30,000 gallons (1.1 acre-inches) of pumpable water or a minimum flow rate of 250 gallons per minute without interruption for 2 hours. Base calculations on not over 15 feet of total static lift during low water (drought) conditions.

Coordinate with the local fire department to determine the height of the hydrant fire truck pumper connection. Typically, this height is approximately 24 inches above the ground surface, but must never be higher than the intake of the fire truck drawing from the dry hydrant.

Fit the pipe with an intake strainer and hydrant head with standard fire truck hose adapters acceptable to the local fire department for quick connect and release.

Use a bronze, brass, aluminum alloy, or other durable, noncorrosive metal hydrant sleeve permanently affixed inside the head acceptable to the local fire department for quick connect and release. The hydrant head must accept a 6-inch National Standard Thread (NST), also known as National Hose (NH) thread, connection to provide maximum supply.

Install a snap-on/snap-off cap that is removable without special tools and joined permanently to the dry hydrant head with a steel cable or chain. Use a cap made of hard plastic or of the same metal as the NST connection for maximum corrosion resistance.

The local fire department is responsible for performing an initial pump test at the design capacity after installation to confirm satisfactory operation.

CONSIDERATIONS

Dry hydrant use may result in dewatering of the water source and adversely impact aquatic organisms and other wildlife that depend upon the water source. If the operation of the dry hydrant will dewater the water source, include mitigation measures in the design to address these issues.

A spill mitigation plan is advisable in order to mitigate the possible effects on surface and ground water of spilled fuels and lubricants by vehicles accessing the dry hydrant.

The hydrant standpipe and head are vulnerable to vehicle damage. Consider installing protective bollards, (recommended 3-inch diameter or larger steel posts or concrete) adjacent to and on both sides of the head, allowing for adequate personnel access. Physical barriers may be needed to protect any aboveground piping. Use reflective paint on signs and on the connection cap to improve visibility during emergencies.

Consider signage for hydrants not intended for fire suppression to indicate the hydrant is not situated on an adequate water source for fire suppression.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for dry hydrants that describe the requirements for applying the practice according to this standard. Obtain required permits prior to initiating any work. As a minimum, include the following items in the plans and specifications:

- Dry hydrant location and site map
- Plan view of the installation
- Profile of the pipe line
- Access road requirements, including plan, profile, and cross sections
- Details of pipe intake
- Details of standpipe, including hydrant head and protective measures
- Site stabilization requirements
- Materials list

OPERATION AND MAINTENANCE

Develop an operation and maintenance plan and provide it to the owner and operator of the dry hydrant. As a minimum, include—

- Keeping the site clear of obstruction and mowing the dry hydrant access area regularly to maintain ready access to the hydrant. When feasible, schedule mowing to take place outside of the primary nesting season for grass-nesting birds.
- Pumper testing the dry hydrant a minimum of annually at the maximum designed flow rate to verify site usability for fire suppression installations. Back flush the system before testing.
- Inspecting the hydrant each spring and fall and back flush if necessary to remove silt or sediment debris that may have accumulated on the screen.
- Regularly clearing the intake screen of excess aquatic growth that may limit full operation of the dry hydrant.

- Regularly inspecting signage and other protective measures, including annual (or as needed) painting for damage repairs.

REFERENCES

National Fire Protection Association (NFPA). 2017. NFPA Standard 1142, Standard on Water Supplies for Suburban and Rural Fire Fighting. Quincy, MA.

USDA Forest Service. 1993. Dry Hydrant Manual, A Guide for Developing Alternative Water Sources and Delivery Systems for Rural Fire Protection, Technical Publication R8-TP 19. Washington, D.C.

USDA NRCS. 2009. National Engineering Handbook (Title 210), Part 630, Chapter 20, Watershed Yield. Washington, D.C. https://directives.sc.egov.usda.gov/.

USDA NRCS. 2005. National Engineering Handbook (Title 210), Part 636, Chapter 52, Structural Design of Flexible Conduits. Washington, D.C. https://directives.sc.egov.usda.gov/.