

NATURAL RESOURCES CONSERVATION SERVICE
VIRGINIA CONSERVATION PRACTICE STANDARD

DRY HYDRANT

(Each)

CODE 432

DEFINITION

A non-pressurized permanent pipe assembly system installed into water source that permits the withdrawal of water by suction.

PURPOSE

This practice may be applied to provide all weather access to an available water source for fire suppression.

CONDITIONS WHERE PRACTICE APPLIES

This standard applies where an adequate volume of water is available, where transport vehicles can access the site, and where a source of water is needed for fire suppression.

CRITERIA

Site Accessibility. Prior to construction obtain a letter of approval to use the site from the landowner. Prior to installation of the dry hydrant, review access, topography, elevations, and dry hydrant location with fire department personnel. Locate or develop fire truck and pumper unit vehicle accessibility to the dry hydrant in conjunction with local fire officials.

Provide a well drained all-weather surface access road a minimum of 12 feet wide to facilitate movement by personnel and equipment during an emergency. The access road shall be in conformance with Virginia NRCS Conservation Practice Standard *Access Road (Code 560)*. The road surface and the surface at the dry hydrant shall provide adequate support for heavy vehicles at all times of the year. Adequate space for vehicle turn around shall be provided where feasible.

Access must be acceptable to the local fire department.

When local road traffic may be involved, an all-weather road surface adjacent to the dry hydrant and completely off the public road is recommended for safety of the emergency personnel and the public. Take visibility and sight distances into account when locating access roads and pull-off areas.

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

In order to limit the length of suction lines, locate the fire truck and pumper connection within 10 feet of the edge of the access.

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

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.

Water Requirement. The minimum quantity of water available to a dry hydrant is the amount obtainable at not over 15 feet total static lift during a drought. An adequate volume of water is defined as a minimum of 30,000 gallons (1.1 acre-inches) of pumpable impounded water or a minimum pump flow rate of 250 gallons per minute (gpm) without interruption for 2 hours.

Determine the adequacy of the water supply in accordance with appropriate local criteria. Determine the volume of water supply in water impounding structures using RESOP or other similar computer programs or models. Determine the adequacy of streamflow sources using regional analysis of stream gage data or

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

other appropriate techniques.

Placement of dry hydrants in streams is not recommended due to the potential for problems with sediment, debris, and water fluctuations. Use stream intakes only after full evaluation of other alternative sites. Special care and maintenance will be required when debris and fine soil particles are part of the stream bed.

Pump Lift. Install the hydrant so that the top of the fire truck pumping connection or the centerline of pump (whichever is higher) is no more than 15 feet in elevation above the centerline of the dry hydrant pipe intake.

Coordinate with the local fire department to determine the proper height of the 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. The total lift (pumping head) must not exceed 20 feet when all losses are totaled. Pumping head losses include head loss from the strainer, elbows, line friction, elevation (static head), and the suction hose connecting the dry hydrant to the fire truck.

Pipe. The pipe material may be flexible conduit such as plastic pipe, steel pipe, aluminum pipe, or ductile iron pipe that meets material specifications in the appropriate ASTM Standard.

Design the pipe, using NRCS National Engineering Handbook (NEH) Part 636, Structural Engineering, Chapter 52, Structural Design of Flexible Conduits, to withstand pumping pressures at design flow to meet water requirement criteria.

Use pipe with a nominal diameter of 6 inches or larger. Use no more than two 90-degree elbows in the entire pipe system. Fit the pipe with an intake strainer.

Protect plastic pipe from ultraviolet rays.

Pipe Intake. Install the top of the pipe intake 2 feet below the low water surface elevation and at least 2 feet below the frost-free depth for the area, whichever is deeper.

Install the dry hydrant intake pipe on a slope toward the water source in order to avoid accumulation of sediment in the joint. Support and secure the intake screen or strainer at least two feet above the pool bottom and at

least four feet beyond the earth slope in pits or impoundments.

Strainer. Fabricate a strainer of material compatible with the pipe or use corrosion resistant manufactured well screens. Use non-corrosive 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 in diameter.

A strainer may be formed by drilling 1/4-inch to 3/8-inch diameter holes with a minimum of one hole diameter between the holes in PVC pipe. Debur drill holes and clean the pipe before putting the strainer into service.

End Cap. Cap the inlet end of the intake pipe with a perforated end cap that is easily removed without special tools. Perforations improve flow conditions into the strainer and allow jetting action for silt cleanout.

Dry Hydrant. Do not use conventional dry barrel hydrants, such as those found in public water supply systems. It is necessary that dry barrel hydrants be absolutely airtight and as a result, excess suction loss may occur if used for a dry hydrant installation.

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

Dry Hydrant Head. Use a bronze, brass, aluminum alloy, or other durable, non-corrosive metal hydrant sleeve permanently affixed inside the head. It must have a quick connect/release fitting acceptable to the local fire department.

The hydrant head must accept a 6-inch NST (National Standard Thread), also known as NH (National Hose thread), connection to provide maximum supply.

Dry Hydrant Cap. 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 same metal as NST connection for maximum corrosion resistance.

Testing. Allow pipe joint sealants to cure before testing the piping system. The local fire department is responsible for performing an initial pump test at the design capacity after installation to confirm satisfactory operation. Remove silt, debris, or other interference that may limit the full operation of the hydrant. After the initial test, perform tests on a regular basis in conformance with local fire protection policy and the Operation and Maintenance plan.

Protection. After the dry hydrant is installed, grade the site to provide surface drainage and vegetate or otherwise protected from erosion. Vegetate in accordance with the criteria in Virginia NRCS Conservation Practice Standard *Critical Area Planting (Code 342)*.

Erosion and Sediment Control. Appropriate erosion and sediment control measures are required during and immediately following construction.

CONSIDERATIONS

Dry hydrant use may result in dewatering of the water source and adversely impact aquatic organisms and other wildlife that may depend upon the water source. If the operation of the dry hydrant will dewater the water sources, 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 fire trucks using the dry hydrant.

This practice has the potential to negatively affect National Register listed or eligible (significant) cultural resources (archaeological, historical or traditional cultural properties); it also has the potential to protect listed or eligible historic structures. Consider these factors during planning and also follow the Virginia NRCS policy during construction and maintenance.

The hydrant head is vulnerable to vehicle damage. Consider installing a steel post (recommend 3" diameter or larger) adjacent to and on both sides of the head, allowing for adequate personnel access. Physical barriers may be needed to protect any above ground piping. Use reflective paint on signs and on the connection cap to improve visibility during emergencies.

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.

Record all required information in an engineer field book, on a plan sheet or design computation sheet, or in another appropriate location.

DESIGN DATA

1. Completed Environmental Evaluation and subsequent requirements.
2. Soils investigation. Collect information pertinent to estimating water seepage losses for use in evaluating the adequacy of the source. Note soils where pipe will be placed and any adverse conditions affecting installation. Note soils and adequacy of drainage in access area.
3. Survey and plot data: A profile of the pipeline is required; provide cross-sections and topography, as needed.
4. Design computations, including purpose of practice and references used.
 - a. Water surface elevation corresponding to drought conditions or as determined by local fire protection policy.
 - b. Computations (such as a stage-storage curve) documenting the adequacy of the water supply in accordance with this standard and local fire protection criteria.
 - c. Document that static lift (elevation head) is no more than 15 feet.
 - d. Document that total lift (pumping head) is no more than 20 feet. Include head loss from screen or strainer, elbows, line friction, elevation (static head), and hard rubber or flexible suction hose to the fire truck.
5. Details of dry hydrant assembly including pipe intake, stand pipe, and hydrant head.
6. Plan view of site with existing and planned features, such as the access road. Include dimensions, distances, etc.

7. Dry hydrant location map.
8. Standard Cover Sheet (VA-SO-100A).
9. Materials and quantities needed. Identify borrow material and/or spoil area, as needed.
10. Site stabilization, vegetation and/or ground cover requirements.
11. Identification of needed Erosion & Sediment Control measures.
12. Supplemental practices required, including access road requirements.
13. Virginia Conservation Practice Specifications (700 Series).
14. Operation and Maintenance Plan.
15. Site markings

CHECK DATA

1. As-built survey.
2. As-built plans including dimensions, types and quantities of materials installed, and variations from design. Include justification for variations.
3. Locations of appurtenant practices.
4. Adequacy of vegetation and/or ground cover.
5. Complete as-built section of Cover Sheet.

OPERATION AND MAINTENANCE

Develop and provide an operation and maintenance plan to the owner and operator of the dry hydrant. The minimum requirements to be address in the operation and maintenance plan are:

1. Keep the site clear of obstructions and mow the dry hydrant access area regularly

to maintain ready access to the hydrant for emergency use. When feasible, schedule mowing to take place outside of the primary nesting season for grass-nesting birds.

2. To verify site usability, pumper test the dry hydrant semi-annually (spring and fall) or as directed by local fire protection policy. Back flush the system before testing. Test the dry hydrant annually at the maximum designed flow rate.
3. Regularly clear the intake screen of silt, debris, aquatic growth, or other interference excess aquatic growth that may limit full operation of the dry hydrant.

REFERENCES

USDA-NRCS, National Engineering Handbook, Part 636, Structural Engineering, Chapter 52, Structural Design of Flexible Conduits.

USDA-Natural Resources Conservation Service. Electronic Field Office Technical Guide (eFOTG), [Online]. Available at <http://www.nrcs.usda.gov/technical/eFOTG>

USDA-Natural Resources Conservation Service. Virginia 700 Series Construction Specifications. [On-line]. Available at <http://www.nrcs.usda.gov/technical/eFOTG>.

ASTM D2466 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

National Fire Protection Association (NFPA) Standard 1231, "Water Supplies for Suburban and Rural Fire Fighting."

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.

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