

## Dry Hydrant (No.) 432

### DEFINITION

A non-pressurized permanent pipe assembly system installed into a 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

Dry hydrants shall be planned, designed, and installed to meet all federal, state, local and tribal laws and regulations.

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.

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 other appropriate techniques.

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.

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 and hydrant head with standard fire truck

hose adapters acceptable to the local fire department, for quick connect/release.

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 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 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 acceptable to the local fire department, for quick connect/release.

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. Give careful attention to silt, debris, or other interference that may limit the full operation of the hydrant.

**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 NRCS Conservation Practice Standard, Critical Area Planting (342).

Use vegetation adapted to the site that will accomplish the desired purpose. Preference shall be given to native species in order to reduce the introduction of invasive plant species; provide management of existing invasive species; and minimize the economic, ecological, and human health impacts that invasive species may cause. If native plant materials are not adaptable or proven effective for the planned use, then non-native species may be used. Refer to the Field Office Technical Guide, Section II, Invasive Plant Species for plant materials identified as invasive species.

## CONSIDERATIONS

Consider the potential effects of installation and operation of dry hydrants on the cultural, archaeological, historic and economic resources.

Where the dry hydrant will be located adjacent to a drain, consider drain maintenance in the design.

Where the dry hydrant will be located adjacent to a county drain, consider drain right-of-way in the design. Consult the county drain commissioner.

Consider avoiding locations where frequent road flooding will limit access to the dry hydrant.

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.

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

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 NRCS State 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.

Consider visibility and sight distances when locating access roads and pull-off areas. When local road traffic may be involved, the access road must be completely separated from any public road for the safety of emergency service personnel and the public.

### PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended use.

Support data documentation requirements are as follows:

- Inventory and evaluation records
  - Conservation Assistance notes or special report
- Survey notes, where applicable
  - Design survey
  - Construction layout survey
  - Construction check survey
- Design records
  - Physical data, functional requirements and site constraints, where applicable

- Soils/subsurface investigation report, where applicable
- Design and quantity calculations
- Construction drawings/specifications with:
  - Location map
  - “Designed by” and “Checked by” names or initials
  - Approval signature
  - Job class designation
  - Initials from preconstruction conference
  - As-built notes
- Construction inspection records
  - Conservation Assistance notes or separate inspection records
  - Construction approval signature
- Record of any variances approved, where applicable
- Record of approvals of in-field changes affecting function and/or job class, where applicable

### OPERATION AND MAINTENANCE

An Operation and Maintenance (O&M) plan shall be developed for this practice. The O&M plan shall be consistent with the purposes of the practice, its intended life, safety requirements, and the criteria for the design.

### REFERENCES

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