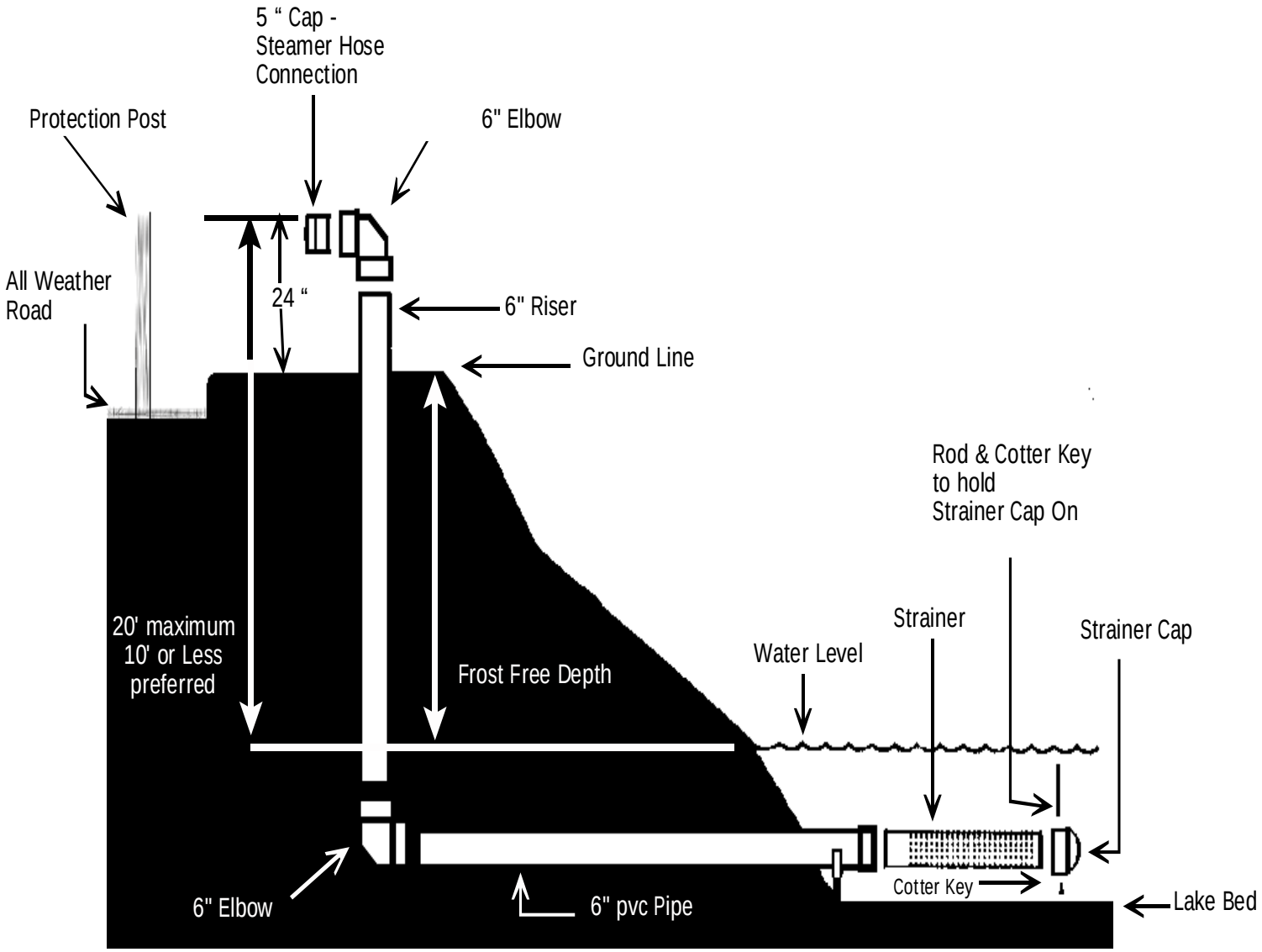


Dry Hydrant Construction

Minnesota Department of Natural Resources
Division of Forestry
402 SE 11th Street
Grand Rapids, MN 55744

WHAT ARE DRY HYDRANTS?

A dry hydrant is a "non-pressurized water delivery system" which when properly installed, will provide a ready source of water for fire departments to use. It is a pipe extending out into a suitable body of water, with elbows, an intake and a fitting on the end, which will match the local fire department suction hose. The hydrant itself is usually made of 6 inch schedule 40 PVC pipe with holes on the part that is in the lake, stream, or pond. To avoid, freezing, the pipe is usually installed with six to seven feet of water covering the intake. See Appendix A - Construction Notes.

PERMITS

Before installing a dry hydrant, contact the MN Department of Natural Resources, Division of Waters for necessary permits and special provisions. Depending on your location, contact one of the following offices:

Regional Hydrologists

Region I	Bemidji	(218) 755-3973
Region II	Grand Rapids	(218) 327-4417
Region III	Metro	(651) 296-4800
Region IV	New Ulm	(507) 359-6050

In some instances, permits may be needed from the US Army Corps of Engineers. Their St. Paul office phone number is (651) 290-5861.

Check with state, county or township governments for specific requirements concerning signs on right-of-ways, snow plowing, and other necessary road maintenance.

PLANNING AND DESIGN CONSIDERATIONS

1. Located and map potential sites. Consider population and property loss potential. Site selection and design assistance may be available through DNR Forestry offices and Soil and Water Conservation Districts.

2. Check the depth of the water at the site during the lowest water levels of the year. A minimum of 4 to 5 feet of water over the intake screen during low water is needed. This will prevent freeze-out of the screen, obstructions to navigation, and reduce the chance of water swirl while drafting. Depth of water can be checked by boat with a depth line or stick.

   If it is not possible to install a dry hydrant so it will not freeze, use air pressure to evacuate the water from the hydrant. See Appendix B.

3. Check the composition bottom of the lake, stream, or pond. Sand, gravel, or rock bottom work best. Muck and vegetative matter may clog up the suction screen. A mat to retard vegetative matter may be laid down under the suction screen.

4. Check the ease of digging. Can a large backhoe get close enough to the water to dig down at least 5 feet below the surface of the water?

5. Determine the landowner at the site location. You need **written permission** to do work on their property.
   - Establish a long-term easement with private landowners, private business, and railroads. See sample "Land Use Agreement" - Appendix C.
   - Get approvals from state, county or townships.

6. Consider how the hydrant connection will be protected from damage or burial by snow:
   - Is a crash barrier needed?
   - How is the hydrant marked to avoid being hit by a snow plow?
   - Who is responsible to keep the hydrant location open in the winter?

7. Check for any utilities (gas lines, telephone, electric services, etc). Call the **Gopher State One Call** - **1-800-252-1166** at least 48 hours before excavation will start. It's your responsibility to have all utility owners notified before you start excavation.

DRY HYDRANT DESIGN

A typical dry hydrant drawing is shown on the front cover page. This can be used to determine how much water will be available from your dry hydrant. As a practical matter, dry hydrants probably should not be more than 15 feet vertical. The department risks losing suction due to leaks from pump seals and or hydrant fittings.

Maximum Vertical Lift for 6" PVC Dry Hydrant at Various Horizontal Distances

Horizontal Distance ≡	0'	60'	100'	160'	200'	260'
750 GPM	*9'*	*7.2'*	*6'*	-	-	-
500 GPM	*16'*	*15.2'*	*14.6'*	*13.6'*	*13'*	*12.2'*
250 GPM	*20'*	*20'*	*20'*	*19.8'*	*19.6'*	*19.3'*

Table shows the maximum vertical lift for various pump flow ratings and different vertical distances. For example, a 500 GPM rated pump drafting from a dry hydrant with 100 feet vertical distance is 14.6' maximum vertical lift.

MAINTENANCE

Dry hydrants require periodic checking, testing, and maintenance. Test the hydrants annually with a pumper. After back flushing, test the maximum designed flow rate to verify proper condition and to see if the line and strainer are clear of silt and aquatic growth. Steams and ponds may need frequent removal of debris, dredging or excavation of silt and protection from erosion. A record of inspection should be maintained for each hydrant. See Appendix D for example.

APPENDIX A

Construction Notes:

1. Obtain necessary permits.

2. The excavator must notify utilities 48 hours prior to excavation by calling "GOPHER STATE ONE-CALL at (800) 252-1166.

3. PVC material shall have a cell classification of 12454-B according to ASTM D-1784.

4. PVC pipe shall be Schedule 40 according to ASTM D-1785.

5. PVC pipe fittings shall be according to ASTM D-2466.

6. Solvents for solvent cemented joints on PVC pipe shall conform to ASTM D-2564.

7. The intake strainer can be a well screen with minimum area of 113 square inches of opening or 1026 3/8 inch diameter holes drilled into a 3 – 4 foot length of PVC pipe.

8. Connection height of the dry hydrant needs to be lower than the pump intake. Suction hose should slant slightly towards the dry hydrant when drafting.

9. To prevent frost damage mound the upland in-take pipe area to maintain a minimum of 5 feet of soil cover.

10. To prevent fire damage, install a 4 foot diameter gravel base at the upland pipe intake.

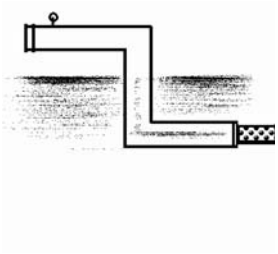
11. All excavated material shall be deposited in an upland location and seeded to prevent sediment going back into the wetland, lake or river.

12. Contact the nearest Soil and Water Conservation District for a seeding plan and additional information.

APPENDIX B
"SLACK WATER" — Above Frost Line — Dry Hydrant Installation

Principle: When a dry hydrant must be installed in slack water or above the frost line this system will ensure that the dry hydrant will not freeze, by evacuation of the water from the dry hydrant with low -pressure air.

Hydrant head, air chuck, gauge



Water level, ice line

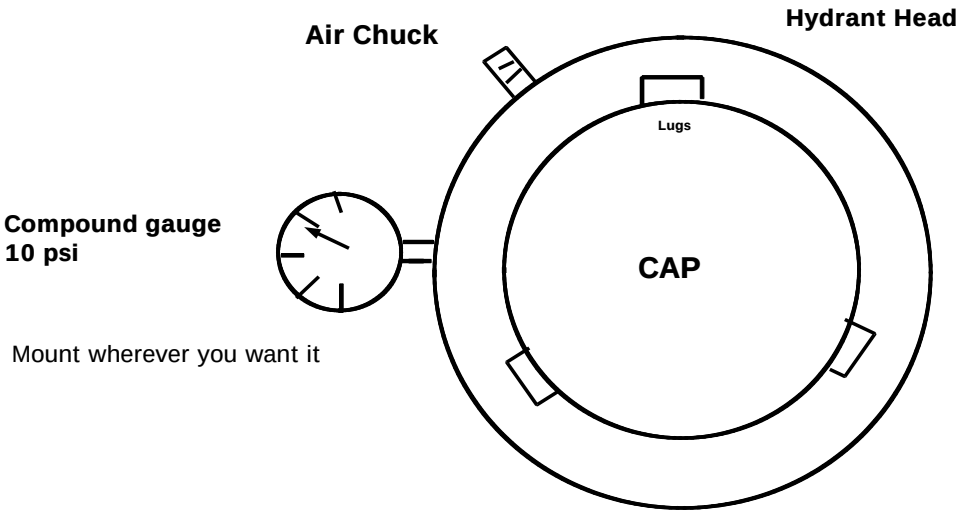
Apply 5 to 10 psi air to dry hydrant to evacuate water. Will hold through the winter.

Materials:

Threaded compounded gauge
Threaded air chuck
Teflon tape

Installation:

1. Use portable drill, to drill appropriate hole in the hydrant head.
2. Use tap of appropriate size, and thread to thread the holes.
3. Teflon tape the air chuck and compound gauge and screw on to the hydrant head.
4. Use portable compressor or air tank to charge the dry hydrant with air. Charge until air bubbles are out of the strainer. Only 5 to 10 psi is needed.
5. Check the compound gauge whenever you drive by. They will hold through the winter.
6. The compound gauge has the added advantage of showing you the vacuum that you are drawing when drafting from the hydrant and detect air leaks.



Obviously:

1. There can be no air leaks in the system or the air will leak out.
2. The cap must be on **tight.**
3. Caution everyone to release the cap slowly to let the air out when setting up to draft (although 5 to 10 psi should not be dangerous).

APPENDIX C

This is an example of a Land Use Agreement that may be used for dry hydrants installed on private land. It can be used as is or modified to meet your local needs. It was reviewed by one county attorney, but is not guaranteed to hold up in court. Although the landowner can cancel the agreement with 60 days notice, the agreement is intended to get the landowner to remain committed to providing access to the dry hydrant. It also gives the landowner some protection and a voice in how the dry hydrant is installed and used.

It may not be possible for a fire department to be guaranteed that a landowner will not change his or her mind about having a dry hydrant located on their property unless the department is willing to pay an easement. If possible, it is best to locate dry hydrants on public land. The intent of the agreement is to make sure both parties understand each other's needs and thoroughly discuss the project before construction begins.

LAND USE AGREEMENT

TO WHOM IT MAY CONCERN:
This agreement, made this _____day of _____ 20____ , by and between _____(Owner) of _____ (County), Minnesota, and Fire Department (Permit-tee) of _____, (County), Minnesota, to enter upon and use the following described area located at _____(name of area) in _____, (County) Minnesota , (legal description as follows):

For the purpose of installation and use of a dry hydrant for drafting water. In order to accomplish this purpose, the Permit-tee intends to place or construct the following items on the above described land: 6 inch or 8 inch PVC pipe and guards with the pipe terminating in a fire department connection. The agreement allows _____ Fire Department, DNR Forestry, and other fire suppression agencies access to use of the dry hydrant for fire suppression and training. This agreement shall be effective, commencing the day of _____, 20_____. The Permit-tee will pay the Owner one dollar ($1.00) for consideration of this agreement. Additionally, the Owner receives fire protection benefits from having a readily available source of water located on his/her property and may be eligible for lower insurance rates.

It is understood, by the Owner and the Permit-tee that this agreement, is subject to the following conditions:

1. The Owner may terminate this agreement with 60 days written notice if the continued use of this land by the Permit-tee will interfere with present or future management objectives of the Owner for the above described area, or the Permit-tee breaches any terms or conditions in this agreement.

2. Neither this agreement nor any right or duty in whole or in part by the Permit-tee under this agreement may be assigned, delegated or subcontracted without written consent of the Owner.

3. All items placed on the property of the Owner by the Permit-tee shall remain the property of the Permit-tee. If this agreement is terminated, the Owner shall allow the Permit-tee 60 days, while the ground is frost free, to remove said property and return the land to its natural state. The Owner may bill the Permit-tee, for reasonable actual cost, of removal if not completed as stated above.

4. Stumps, slash waste materials, and other debris shall be disposed of by the Permit-tee as directed by the Owner.

5. The Permit-tee shall be responsible for obtaining any and all permits required for constructing items placed on the lands of the Owner.

6. No cutting or trimming of trees shall be done unless approved, in writing, by the Owner.

7. All signs postings and other markers shall conform to all codes and local ordinances and shall be approved by the Permit-tee. The Permit-tee retains ownership of all signs and postings.

8. The Permit-tee shall maintain the area under this agreement in a safe condition at all times.

9. The Permit-tee agrees to save, keep harmless, defend and indemnify the Owner and all its officers, employees and agents, against any and all liability claims, cost of whatever kind and nature, for injury or death of any person or persons, and for loss or damage to any property occurring in connection with or in any incident to or arising out of the occupancy, use service, operation or performance of work in connection with this Agreement or omissions of Permit-tee employees, agents or representatives.

10. This agreement does not give the Permit-tee, its members or agents, any rights to hunting, fishing or trapping. The Owner grants right to the Permit-tee to enter the lands under agreement only for the express purpose as stated by this Agreement.

11. The Owner shall give the Permit-tee advanced notice of intent to sell the above property and the new Owners name and address upon sale.

12. Additional conditions specifically pertaining to this agreed land use will be valid if enumerated in the space provided between this condition and closing signature. Every such addition will be initialed by the Permit-tee and the Owner.

Permit-tee:	**Owner:**
_____	_____
Fire Department – Permit-tee	Owner
By:_____	By: _____
Name	Name
_____	_____
Title	Title
_____	_____
Signature	Signature
Date:_____	Date: _____

Witness: I have witnessed the signing of this agreement by the above parties:

Date:_____ Signature: _____

APPENDIX D

Record of Inspection

Keep an up-to-date record of conditions associated with each dry hydrant. Accomplish as part of fire department's standard operating procedure.

1. Depth of water —approximate level from surface to strainer.

2. Back flush

3. Gallons per minute flow

4. Weed control

5. Identification sign

6. Protection guards

7. Paint: Is the exposed portion of the dry hydrant painted?

8. Road access condition

9. Remarks — general comments

    - Check end cap condition.
    - Identify equipment used for inspection.
    - Show the time required to prime and begin draft.
    - Identify the type and thread of suction hose used to connect with dry hydrant.
    - Identify provisions for the protection of the underwater portion and the exposed portion of the dry hydrant.
    - Record the condition of the water – muddy, scum, debris, etc.
    - State whether erosion is occurring.