FILE UNDER STANDARD DRAWINGS

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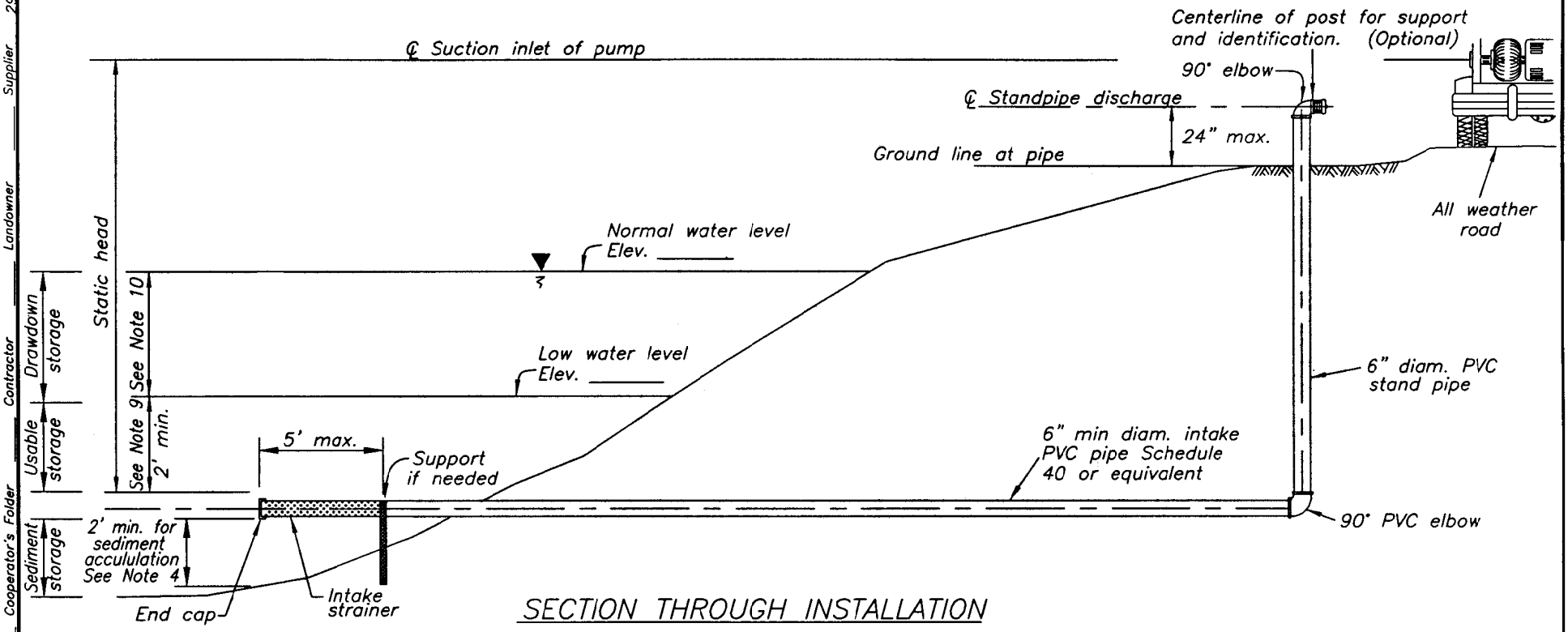


SECTION THROUGH INSTALLATION

BILL OF MATERIALS		
ITEM	NO.	UNIT
Hydrant head assembly 90°	1	each
6" diam. PVC pipe – standpipe		lf
6" diam. PVC 90° elbow	2	each
6" diam. PVC pipeline		lf
6" diam. PVC couplings		each
PVC intake strainer or well screen	1	each
'Quick setting' PVC glue		
Primer cleaner		
4" x 4"x 7' treated post (optional)	2	each
4" x 4" treated timber (optional)	1	each

All pipe material shall be PVC meeting ASTM _____. Pipeline, standpipe and strainer must be of the same material except strainer can be a manufactured well screen per Note 2 on Sheet 2.

NOTE:

Design and layout of Dry Fire Hydrants should be tailored to fit the site conditions. There are various installations that will function well. This drawing shows one of the most commonly used layouts.

Landowner:

DETAILS OF 6" DIAMETER
DRY FIRE HYDRANT
COUNTY, MISSOURI

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

	Date		Date
Designed		Approved by	
Drawn		Title	
Traced		Title	
Checked		Sheet No. of	Drawing No. 29-L-403A

Adapted from Indiana Standard Drawing IN-EDS-DH88

Sheet 1 of 3

Revised 03/00

FILE: Cooperator's Folder Contractor Landowner Supplier 29L403A

FILE: _____ Cooperator's Folder _____ Contractor _____ Landowner _____ Supplier _____ 29L403A

CALCULATING REQUIRED LIFT

Total Required Lift = Head Loss in Hydrant, Fittings & Intake Strainer + Head Loss in Intake Pipe (HL) + Static Head (H)

Using 750 Gallons/Min.
Total Required Lift = 13.3' + $\frac{L \times HL}{100}$ + H = 13.3' + ____ + ____ = ____

Using 500 Gallons/Min.
Total Required Lift = 7.6' + $\frac{L \times HL}{100}$ + H = 7.6' + ____ + ____ = ____

Using 250 Gallons/Min
Total Required Lift = 1.9' + $\frac{L \times HL}{100}$ + H = 1.9' + ____ + ____ = ____

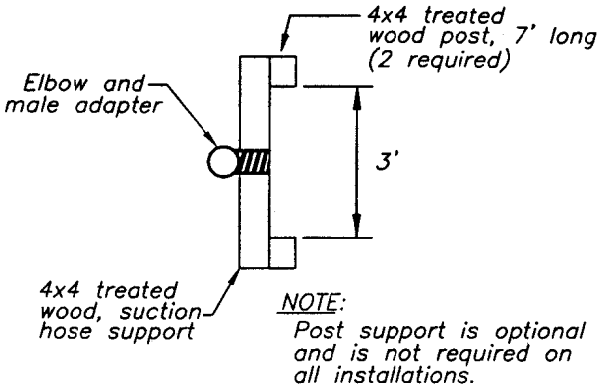
L = Length of pipe HL = Head Loss

ALTITUDE (Feet)	ALLOWABLE LIFT (Feet)
0	23.0
500	22.5
1,000	22.0
1,500	21.6

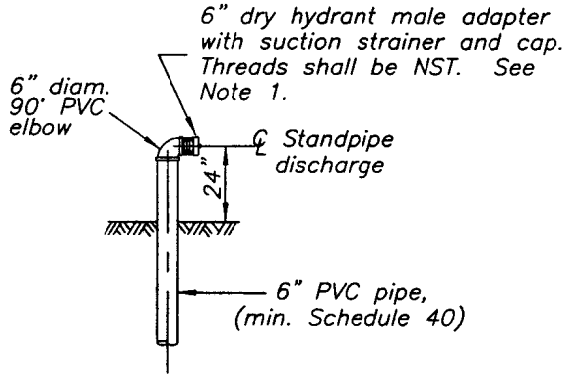
HEAD LOSS IN FEET (HL) PER 100 FEET OF 6" PIPE		
Gallons Per Minute	Plastic Pipe	Smooth Steel Pipe
750	3.4	7.1
500	1.6	3.3
250	0.5	0.9

NOTES:

1. Check with local fire department for approved type of connection. Each fire truck utilizing the dry fire hydrant should have an adapter or equivalent to fit the 6" dry hydrant male adapter.
2. Intake strainer shall have a minimum open area of 4 times the pipe cross section area or 113 square inches for 6 inch diameter pipe. Inlet holes shall be 3/8 inch diameter. Holes shall be cut in a manner so as not to significantly reduce strength of the pipe. Holes shall be clean cut and free of burrs. Holes shall be located in bottom 2/3 of pipe. A manufactured well screen may be used if it provides required open area.
3. The total required lift exceeding 20 feet is not desirable. This may vary depending on the capacity of local fire department pumps. The total required lift shall not exceed the value obtained from the table of allowable lifts. The static head shall not exceed 15 feet.
4. To allow for a minimum amount of sediment storage the intake shall be placed not less than 2 feet above the bottom of the pond. If sediment is a problem, this dimension shall be increased.
5. Install in a manner that normal water level in the pipe is protected from freezing. Some installations may require that compacted backfill be mounded around the pipe to accomplish this or by installing insulating sleeves.
6. PVC pipe equivalent in strength to ASTM D1785 Schedule 40 is adequate for up to 14' of earthfill cover over the pipe.
7. If a post support is required the treated lumber shall be pressure treated with 0.4 pounds per cubic foot of Copper Chromate Arsenate (CCA) or equivalent.
8. If the length of the pipe and strainer protruding into the water exceeds 5 feet, a support will be required.
9. The usable water below the low water level down to the top of the inlet pipe shall be of sufficient volume to provide the anticipated needs. This shall be a minimum of 2 feet deep.
10. The drop in water level from normal water level to low water level shall be computed by the dry fire hydrant design worksheet.
11. There shall not be more than 15 feet of pipeline above the low water level unless otherwise approved by local fire department.



PLAN OF POST SUPPORT



STANDPIPE DETAIL

Adapted from Indiana Standard Drawing IN-EDS-DH88

Sheet 2 of 3

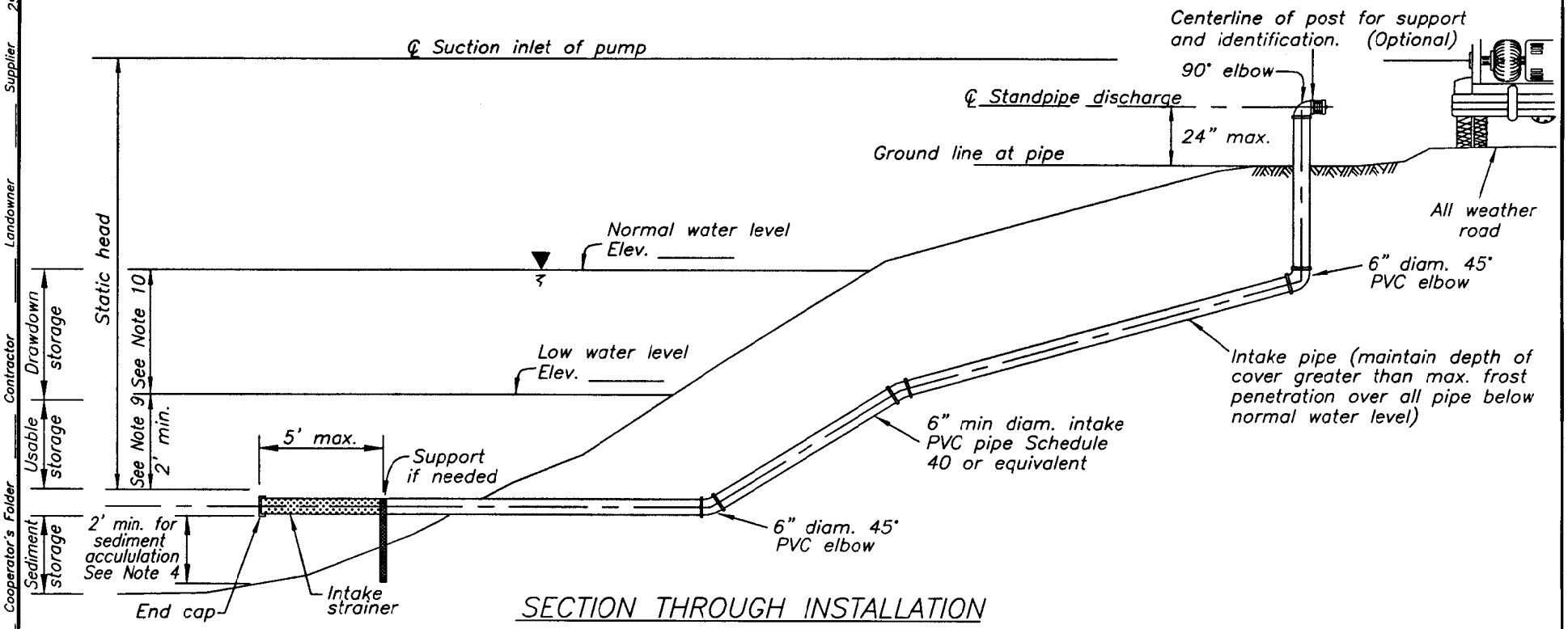
Revised 03/00

Landowner:

DETAILS OF 6" DIAMETER DRY FIRE HYDRANT COUNTY, MISSOURI

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

	Date		Date
Designed		Approved by	
Drawn		Title	
Traced		Title	
Checked		Sheet No. of	Drawing No. 29-L-403A



SECTION THROUGH INSTALLATION

BILL OF MATERIALS		
ITEM	NO.	UNIT
Hydrant head assembly 90°	1	each
6" diam. PVC pipe – standpipe		lf
6" diam. PVC 90° elbow	1	each
6" diam. PVC 45° elbow	3	each
6" diam. PVC pipeline		lf
6" diam. PVC couplings		each
PVC intake strainer or well screen	1	each
'Quick setting' PVC glue		
Primer cleaner		
4" x 4" x 7' treated post (optional)	2	each
4" x 4" treated timber (optional)	1	each

All pipe material shall be PVC meeting ASTM _____. Pipeline, standpipe and strainer must be of the same material except strainer can be a manufactured well screen per Note 2 on Sheet 2.

NOTE:

Design and layout of Dry Fire Hydrants should be tailored to fit the site conditions. There are various installations that will function well. This drawing shows one of the most commonly used layouts.

Landowner:

DETAILS OF 6" DIAMETER
DRY FIRE HYDRANT
COUNTY, MISSOURI

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

	Date		Date
Designed		Approved by	
Drawn		Title	
Traced		Title	
Checked		Sheet No. of	Drawing No. 29-L-403B

Adapted from Indiana Standard Drawing IN-EDS-DH88

Sheet 1 of 3

Revised 03/00

FILE: Cooperator's Folder Contractor Landowner Supplier 29L403B

FILE: ____ Cooperator's Folder ____ Contractor ____ Landowner ____ Supplier 29L403B

CALCULATING REQUIRED LIFT

Total Required Lift = Head Loss in Hydrant, Fittings & Intake Strainer + Head Loss in Intake Pipe (HL) + Static Head (H)

Using 750 Gallons/Min.
Total Required Lift = 13.3' + $\frac{L \times HL}{100}$ + H = 13.3' + ____ + ____ = ____

Using 500 Gallons/Min.
Total Required Lift = 7.6' + $\frac{L \times HL}{100}$ + H = 7.6' + ____ + ____ = ____

Using 250 Gallons/Min
Total Required Lift = 1.9' + $\frac{L \times HL}{100}$ + H = 1.9' + ____ + ____ = ____

L = Length of pipe HL = Head Loss

ALTITUDE (Feet)	ALLOWABLE LIFT (Feet)
0	23.0
500	22.5
1,000	22.0
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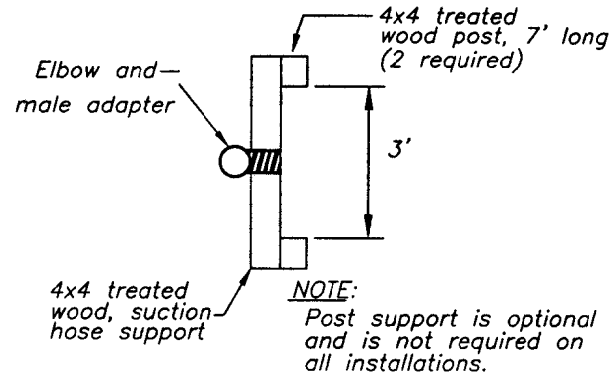
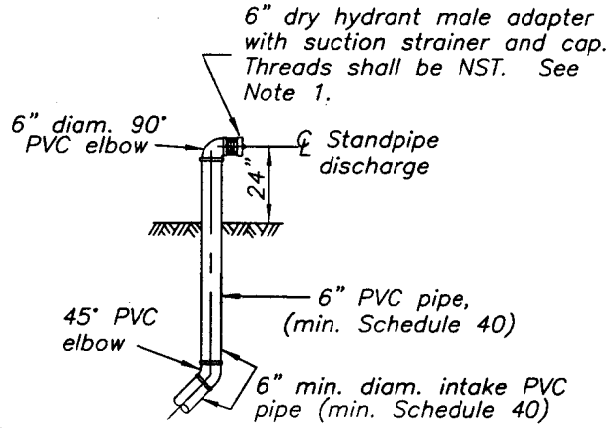
HEAD LOSS IN FEET (HL) PER 100 FEET OF 6" PIPE		
Gallons Per Minute	Plastic Pipe	Smooth Steel Pipe
750	3.4	7.1
500	1.6	3.3
250	0.5	0.9



PLAN OF POST SUPPORT



STANDPIPE DETAIL

NOTES:

1. Check with local fire department for approved type of connection. Each fire truck utilizing the dry fire hydrant should have an adapter or equivalent to fit the 6" dry hydrant male adapter.
2. Intake strainer shall have a minimum open area of 4 times the pipe cross section area or 113 square inches for 6 inch diameter pipe. Inlet holes shall be 3/8 inch diameter. Holes shall be cut in a manner so as not to significantly reduce strength of the pipe. Holes shall be clean cut and free of burrs. Holes shall be located in bottom 2/3 of pipe. A manufactured well screen may be used if it provides required open area.
3. The total required lift exceeding 20 feet is not desirable. This may vary depending on the capacity of local fire department pumps. The total required lift shall not exceed the value obtained from the table of allowable lifts. The static head shall not exceed 15 feet.
4. To allow for a minimum amount of sediment storage the intake shall be placed not less than 2 feet above the bottom of the pond. If sediment is a problem, this dimension shall be increased.
5. Install in a manner that normal water level in the pipe is protected from freezing. Some installations may require that compacted backfill be mounded around the pipe to accomplish this or by installing insulating sleeves.
6. PVC pipe equivalent in strength to ASTM D1785 Schedule 40 is adequate for up to 14' of earthfill cover over the pipe.
7. If a post support is required the treated lumber shall be pressure treated with 0.4 pounds per cubic foot of Copper Chromate Arsenate (CCA) or equivalent.
8. If the length of the pipe and strainer protruding into the water exceeds 5 feet, a support will be required.
9. The usable water below the low water level down to the top of the inlet pipe shall be of sufficient volume to provide the anticipated needs. This shall be a minimum of 2 feet deep.
10. The drop in water level from normal water level to low water level shall be computed by the dry fire hydrant design worksheet.
11. There shall not be more than 15 feet of pipeline above the low water level unless otherwise approved by local fire department.

Landowner:

DETAILS OF 6" DIAMETER DRY FIRE HYDRANT COUNTY, MISSOURI

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

	Date		Date
Designed		Approved by	
Drawn		Title	
Traced		Title	
Checked		Sheet No. of	Drawing No. 29-L-403B

Adapted from Indiana Standard Drawing IN-EDS-DH88

Revised 03/00

DRY FIRE HYDRANT DESIGN WORKSHEET FOR PONDS OR LAKES

By: _____ Date: _____ Checked: _____ Date: _____

Town: _____, _____ County, Missouri Township _____ Range _____ Section _____

Total Drainage Area _____ minus Controlled Drainage _____ = Effective Drainage Area _____

Normal Pool Surface Area = _____ acres Normal Pool Elevation = _____

Drought of record is computed for driest 4 month period (June, July, August and September) that has occured from 1930 to 1990.

Annual evaporation = _____ inches (Reference attached MO-2-25, Engineering Field Handbook)

Method 1 for Sites with low seepage and no other water uses.

$\frac{\text{Drainage Area}}{\text{Pool Size}}$ = _____ = _____ From Sheet 3b of 3 Drawdown = _____ feet x 1.05 = _____ feet

Method 2 for Sites with moderate seepage or other losses

Seepage rate = Seepage _____ gpm + livestock use _____ gpm = _____ gpm

Moderate Seepage = _____ gpm x $\frac{1}{7.5\ \text{gal/ft}^3}$ 60 min/hr x 24 hr/day x $\frac{1}{43{,}560\ \text{ft/ac. ft.}^3}$ x 120 days = _____ acre feet

Seepage drawdown in feet = $\frac{\text{acre feet x 1.05}}{\text{Surface area at normal pool}}$ = _____ feet

Total drawdown in feet = Method 1 drawdown + Seepage drawdown = _____ + _____ = _____ feet

NOTES:

1. Equivalent methods of computing available water as approved by the local Fire Protection Districts is permissible.
2. 1 acre foot = 43,560 cubic feet
   1 cubic foot = 7.5 gallons
3. Inspect site and estimate seepage rate in gallons per minute. Seepage rate for moderate seepage should vary from 3 to 10 gpm depending on site conditions. For dry toe of dam use 0 gpm seepage. For wet toe use 5 gpm. For wet toe with flowing water just visible, use 10 gpm. High seepage rates will require measuring as reccomending by NRCS Engineers. Losses for livestock watering should also be considered. One (1) gpm and a large watering tank will water about 60 head of mature cattle.

Storage Computation

Surface area at low water level can be obtained from survey data or can be estimated from the following equation for a pool shape somewhere between a circle and a square.

$$W_1 = \left(\frac{\text{Normal Pool Surface Area in acres X 43,560}}{0.85}\right)^{1/2} - 10' = _____$$

$$\text{Surface Area at low water level} = \frac{0.85\ W_1^2}{43{,}560} = _____ \text{ acres}$$

Surface Area at top of intake inlet can be obtained from survey data or can be estimated from the following equation for a pool shape somewhere between a circle and a square.

$$W_2 = \left(\frac{\text{Low water level surface area X 43,560}}{0.85}\right)^{1/2} - 12' = _____$$

$$\text{Surface area at top of intake inlet} = \frac{0.85\ W_2^2}{43{,}560} = _____ \text{ acres}$$

$$\text{Available water} = \frac{(\text{Surf. Area at low water level + Surf. Area at top of intake inlet}) \text{ X Vert. Interval X 43,560 X 7.5}}{2} =$$

$$\frac{(_____ \text{ acre} + _____ \text{ acre}) \text{ X } _____ \text{ feet X 43,560 X 7.5}}{2} =$$

_____ gallons

Sheet 3a of 3 Revised 05/00

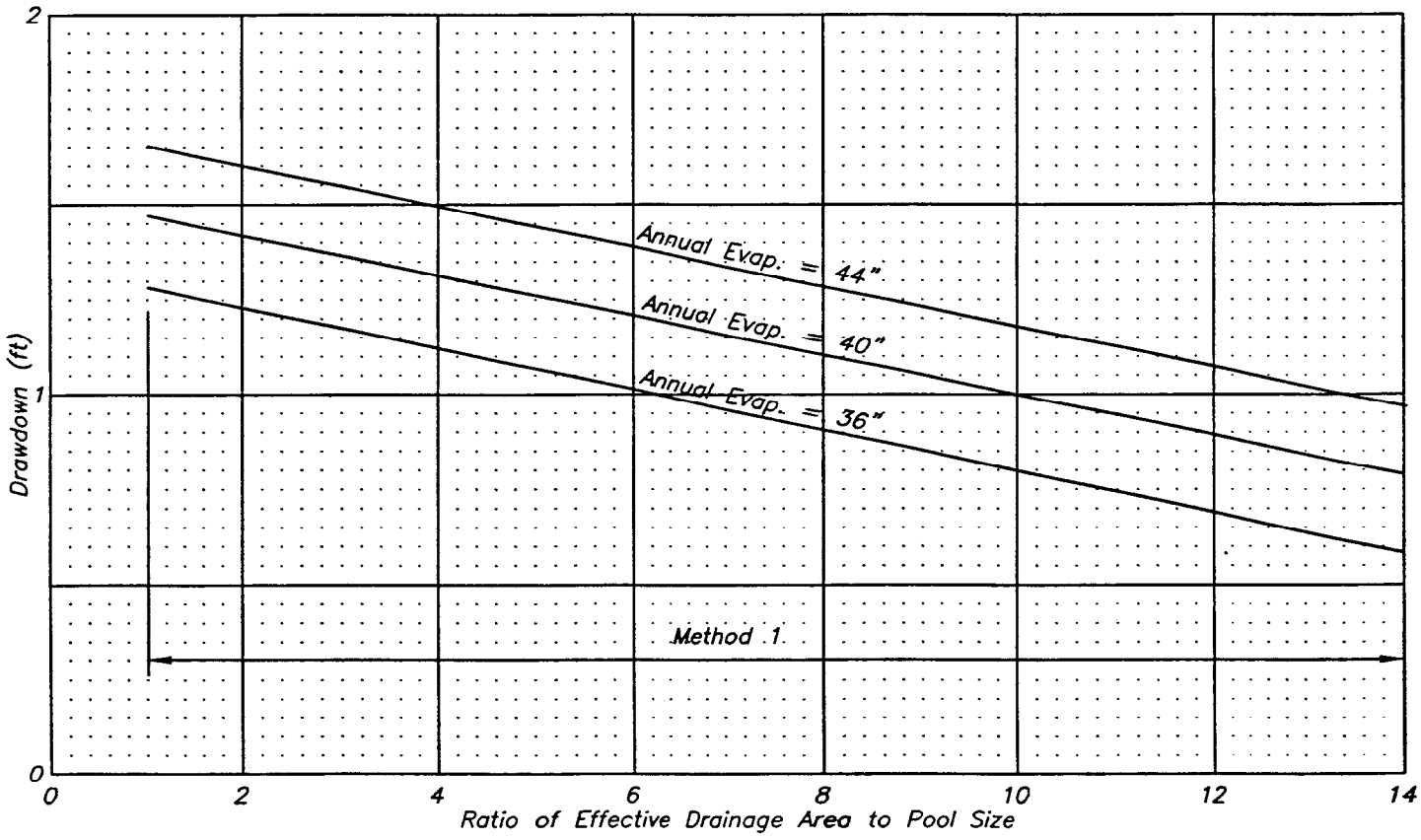
Landowner:

DRY FIRE HYDRANT
DESIGN WORKSHEET
COUNTY, MISSOURI

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

	Date		Date
Designed		Approved by	
Drawn		Title	
Traced		Title	
Checked		Sheet No. of	Drawing No. 29-L-403

FILE: Cooperator's Folder Contractor Landowner Supplier 291403

Note:

1. 55% of yearly evaporation will occur during the 4 month period of June thru September.
2. Annual Lake Evaporation may be taken from Missouri Supplement MO-2-25 to Engineering Field Handbook (EFH).
3. Interpolate below data to obtain drawdown for actual annual evaporation.
4. Drawdown is for four month period (June thru September) that occurs during a drought of record that accumulated from 1930 to 1990.
5. This is a very simple procedure. The only information needed is the ratio of effective drainage area to pool size and annual evaporation. The drawdown shown represents a 60 year period and is assumed to be equivalent to the 50 year drought. The 1.05 factor shown on page 3a represents the reduction in surface area as water level drops. For total drawdown complete page 3a.
6. If upstream ponds or lakes control more than 10% of total drainage area the controlled drainage area should be deducted from the total drainage area.