CLAIM OF BENEFICIAL USE for Reservoir Permits by CWRE's (not self-certified)

Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem, Oregon 97301-1266
(503) 986-0900
www.wrd.state.or.us

A fee of $150 must accompany this form to be accepted for permits with a priority date of July 9, 1987, or later. (ORS 536.050(1))

A separate form shall be completed for each permit.

In cases where a permit has been amended through the permit amendment process, a separate claim for the permit amendment is not required. Incorporate the permit amendment into the claim for the permit.

This form is subject to revision. **Begin each new claim** by checking for a new version of this form at: http://www.wrd.state.or.us/OWRD/WR/cwre_info.shtml#.

The completion of this form is required by OAR 690-014-0100(1) and 690-014-0110(4).

Please type or print in dark ink. If this form is found to contain errors or omissions, it may be returned to you. **Every item must have a response.** If any requested information does not apply to the claim, insert "NA." **Do not delete or alter any section of this form unless directed by the form.** The Department may require the submittal of additional information from any water user or authorized agent.

If you have questions regarding the completion of this form, please call 503-986-0900 and ask for the Certificate Section.

The Department has a program that allows it to enter into a voluntary agreement with an applicant for expedited services. Under such an agreement, the applicant pays the cost to hire additional staff that would not otherwise be available. This program means a certificate may be issued in about a month. For more information on this program see http://www.wrd.state.or.us/OWRD/mgmt_reimbursement_authority.shtml.

SECTION 1

GENERAL INFORMATION

1. File Information

APPLICATION #	PERMIT # (IF APPLICABLE)	PERMIT AMENDMENT # (IF APPLICABLE)
R-	**R-**	

2. Property Owner (current owner information)

APPLICANT/BUSINESS NAME		PHONE NO.	ADDITIONAL CONTACT NO.
ADDRESS			
CITY	STATE	ZIP	E-MAIL

If the current property owner is not the permit holder of record, it is recommended that an assignment be filed with the Department. **The COBU must be signed by each permit holder of record.**

3. Permit holder of record (this may, or may not, be the current property owner)

PERMIT HOLDER OF RECORD		
ADDRESS		
CITY	STATE	ZIP

ADDITIONAL PERMIT HOLDER OF RECORD		
ADDRESS		
CITY	STATE	ZIP

4. Date of Site Inspection:

5. Person(s) interviewed and description of their association with the project:

NAME	DATE	ASSOCIATION WITH THE PROJECT

6. County:

7. If any property described in the place of use of the permit final order is excluded from this report, identify the owner of record for that property (ORS 537.230(4)):

**Mark "NA" if there are no owners of property not included in this claim

OWNER OF RECORD		
ADDRESS		
CITY	STATE	ZIP

ADDITIONAL OWNER OF RECORD		
ADDRESS		
CITY	STATE	ZIP

SECTION 2

SYSTEM DESCRIPTION

A. Reservoir(s)

1. Reservoir source and, if from surface water, the tributary:

RESERVOIR NAME OR NUMBER	SOURCE	TRIBUTARY

2. Developed use(s), period of use, and rate for each use:

RESERVOIR NAME OR NUMBER	USES	SEASON OR MONTHS WHEN WATER WAS STORED	VOLUME STORED (AF)
Total Quantity of Water Stored			

3. Provide a general narrative description of the distribution works. This description must trace the water system from **each** point of diversion to the reservoir:

SECTION 2

SYSTEM DESCRIPTION (B through F)

Are there multiple reservoirs? **YES** **NO**

If *"YES"* you will need to copy and complete Sections 2B through 2F for each reservoir.

Reservoir Name or Number this section describes (only needed if there is more than one):

B. Reservoir Location

1. Is the reservoir on-channel? **YES** **NO**

2. Provide dam outlet location and/or point of diversion(s).

TWP	RNG	MER	SEC	QQ	GLOT	DLC	MEASURED DISTANCES

Reminder: The map associated with this claim must identify Donation Land Claims (DLC), Government Lots (GLot), and Quarter-Quarters (QQ).

C. Diversion and Delivery System Information

Provide the following information concerning the diversion and delivery system. Information provided must describe the equipment used to transport the water from the point(s) of diversion to the reservoir.

1. Is a pump used? **YES** **NO**

If "NO" items 2 through item 5 may be deleted.

2. Pump Information

MANUFACTURER	MODEL	SERIAL NUMBER	TYPE (CENTRIFUGAL, TURBINE OR SUBMERSIBLE)

3. Theoretical Pump Capacity

HORSEPOWER	OPERATING PSI	LIFT FROM SOURCE TO PUMP *IF A WELL, THE WATER LEVEL DURING PUMPING	LIFT FROM PUMP TO PLACE OF USE	TOTAL PUMP OUTPUT (IN CFS)

4. Provide pump calculations:

5. Measured Pump Capacity (using meter if meter was present and system was operating)

INITIAL METER READING	ENDING METER READING	DURATION OF TIME OBSERVED	TOTAL PUMP OUTPUT (IN CFS)

Reminder: For pump calculations use the reference information at the end of this document.

6. Additional notes or comments related to the system:

D. Gravity Flow Pipe

(THE DEPARTMENT TYPICALLY USES THE HAZEN-WILLIAM'S FORMULA FOR A GRAVITY FLOW PIPE SYSTEM)

1. Does the system involve a gravity flow pipe? **YES** **NO**

If "NO", items 2 through 4 relating to this section may be deleted.

2. Complete the table:

PIPE SIZE	PIPE TYPE	"C" FACTOR	AMOUNT OF FALL	LENGTH OF PIPE	SLOPE	COMPUTED RATE OF WATER FLOW (IN CFS)

3. Provide calculations:

4. If an actual measurement was taken, provide the following:

DATE OF MEASUREMENT	WHO MADE THE MEASUREMENT	MEASUREMENT METHOD	MEASURED QUANTITY OF WATER (IN CFS)

Attach measurement notes.

E. Gravity Flow Canal or Ditch

(THE DEPARTMENT TYPICALLY USES MANNING'S FORMULA FOR CANALS AND DITCHES)

1. Is a gravity flow canal or ditch used to convey the water as part of the distribution system? **YES** **NO**

If "NO", items 2 through 4 relating to this section may be deleted.

2. Complete the table:

CANAL OR DITCH TYPE (MATERIAL)	TOP WIDTH OF CANAL OR DITCH	BOTTOM WIDTH OF CANAL OR DITCH	DEPTH	"N" FACTOR	AMOUNT OF FALL	LENGTH OF CANAL / DITCH	SLOPE	COMPUTED RATE (IN CFS)

3. Provide calculations:

4. If an actual measurement was taken, provide the following:

DATE OF MEASUREMENT	WHO MADE THE MEASUREMENT	MEASUREMENT METHOD	MEASURED QUANTITY OF WATER (IN CFS)

Attach measurement notes.

F. Reservoir

1. Does the reservoir require the submittal of as-built plans and specifications? **YES** **NO**

*If "**YES**", answer items 2; items 3 through 8 relating to this section may be deleted.*
*If "**NO**", skip items 2; answer items 3 through 8.*

2. Complete the table:

HAVE THE DOCUMENTS BEEN SUBMITTED? YES OR NO	WHEN WERE THE DOCUMENTS SUBMITTED?	HAVE THEY BEEN APPROVED BY THE DEPARTMENT?	NUMBER OF ACRE FEET STORED

3. If the reservoir stores less than 9.2 acre-feet of water or if the dam is less than 10 feet in height, and as-built plans and specifications are not required, complete the table and items 4 through 8.

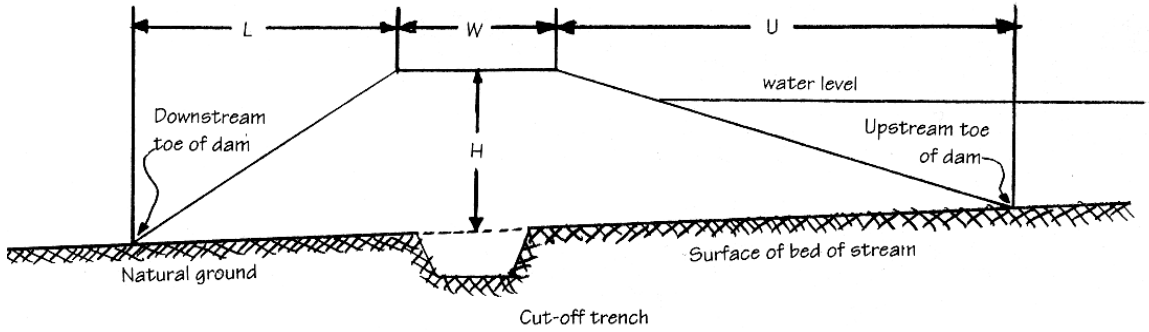
MAXIMUM DEPTH	AVERAGE DEPTH	SURFACE AREA (IN ACRES)	VOLUME (IN ACRE FEET)

4. Provide reservoir volume calculations:

5. Provide the following information concerning the physical characteristics of the dam:

CREST WIDTH (W)	DAM HEIGHT AT CENTERLINE (H)	DISTANCE FROM DOWNSTREAM TOP OF DAM TO DOWNSTREAM TOE (L)	DISTANCE FROM UPSTREAM TOP OF DAM TO UPSTREAM TOE (U)	WATER LEVEL AT INSPECTION	DOWN-STREAM SLOPE	UP-STREAM SLOPE

Example Dam Profile *This box may be deleted from the form*

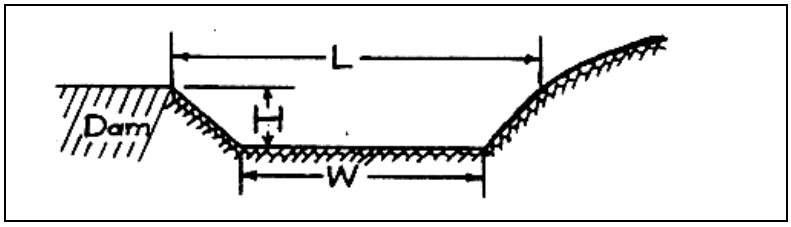


6. Provide a drawing showing the cross section of the dam at the maximum section indicating details and dimensions. The drawing should be drawn at a standard even scale.

7. Describe the outlet works (size and type of the outlet conduit and location):

8. Describe the emergency spillway (dimensions and location):

BOTTOM WIDTH (W)	TOP WIDTH (L)	SPILLWAY DEPTH (H)



SECTION 3

CONDITIONS

All conditions contained in the permit, permit amendment, or any extension final order shall be addressed. Reports that do not address all performance related conditions will be returned.

1. Time Limits:

Permits and any extension final orders contain any or all of the following dates; the date when the actual construction work was to begin, the date when the construction was to be completed, and the date when the complete application of water to the proposed was to be completed. These dates may be referred to as ABC dates. Describe how the water user has complied with each of the development timelines established in the permit or extension final order:

	DATE FROM PERMIT	DATE ACCOMPLISHED*	DESCRIPTION OF ACTIONS TAKEN BY WATER USER TO COMPLY WITH THE TIME LIMITS
ISSUANCE DATE			
BEGIN CONSTRUCTION (A)			
COMPLETE CONSTRUCTION (B)			
COMPLETE APPLICATION OF WATER (C)			

* MUST BE WITHIN PERIOD BETWEEN PERMIT OR ANY EXTENSION FINAL ORDER ISSUANCE AND THE DATE TO COMPLETELY APPLY WATER

2. Is there an extension final order(s)? **YES NO**

3. Measurement Conditions:

a. Does the permit, permit amendment, or any extension final order require the installation of a meter or approved measuring device? **YES NO**

If "NO", items 3b through 3f relating to this section may be deleted.

Reminder: If a meter or approved measuring device was required, the COBU map must indicate the location of the device in relation to the point of diversion or appropriation.

b. Has a meter been installed? **YES NO**

c. Meter Information

POD/POA NAME OR #	MANUFACTURER	SERIAL #	CONDITION (WORKING OR NOT)	CURRENT METER READING	DATE INSTALLED

If a meter has been installed, items 6d through 6g relating to this section may be deleted.

d. If a meter has not been installed, has a suitable measuring device been installed and approved by the Department? **YES NO**

e. If "YES", provide a copy of the letter approving the device, if available. If the letter is not available provide the name and title of the Water Resources Department employee approving the measuring device, and the approximate date of the approval:

NAME	TITLE	APPROXIMATE DATE

f. Measurement Device Description

DEVICE DESCRIPTION	CONDITION (WORKING OR NOT)	DATE INSTALLED

4. Recording and reporting conditions

a. Is the water user required to report the water use to the Department? **YES NO**

If "NO", item 4b relating to this section may be deleted.

b. Have the reports been submitted? **YES NO**

METHOD OF SUBMITTING REPORT (PAPER OR ELECTRONIC)	WATER USER REPORTING ID

If the reports have not been submitted, attach a copy of the reports if available.

5. Fish Screening

a. Are any points of diversion required to be screened to prevent fish from entering the point of diversion? **YES NO**

If "NO", items 5b through 5e relating to this section may be deleted.

Reminder: If fish screening devices were required, the COBU map must indicate their location in relation to the point of diversion.

b. Has the fish screening been installed? **YES NO**

c. When was the fish screening installed?

DATE	BY WHOM

Reminder: If the permit or transfer final order was issued <u>on or after February 1, 2011</u>, the fish screen is required to be approved by the Oregon Department of Fish and Wildlife regardless of the rate of diversion.

d. If the diversion **involves a pump** *<u>and</u>* the **total** diversion rate of all rights at the point of diversion is less than 225 gpm (0.5 cfs):

- Has the self-certification form previously been submitted to the Department? **NA YES NO**
- If not, go to http://www.wrd.state.or.us/OWRD/PUBS/forms.shtml, complete and attach a copy of the self-certification form to this claim, and send a copy of it to the Oregon Department of Fish and Wildlife (ODFW).

Reminder: Failure to submit evidence of a timely installed fish screen may result in an unfavorable determination. The ODFW self certification form needs to have been previously submitted or be attached to this form.

e. If the diversion does **not involve a pump** *or* the **total** diversion rate of all rights at the point of diversion is 225 gpm (0.5 cfs) or greater:

- Has the ODFW approval been previously submitted? **NA YES NO**
- If not, contact and work with ODFW to ensure compliance. To demonstrate compliance, provide signed documentation from ODFW. A form is available at http://www.wrd.state.or.us/OWRD/PUBS/forms.shtml

Reminder: Failure to submit evidence of a timely installed fish screen may result in an unfavorable determination. In order to receive a favorable approval, the ODFW/WRD "Fish Screen Inspection" form needs to have been previously submitted or be attached to this form.

6. By-pass Devices

a. Are any points of diversion required to have a by-pass device to prevent fish from entering the point of diversion? **YES NO**

If "NO", items 6b and 6c relating to this section may be deleted.

Reminder: If by-pass devices were required, the COBU map must indicate their location in relation to the point of diversion.

b. Have by-pass device been installed? **YES NO**

c. Describe the diversion works as related to whether a by-pass device is installed or unnecessary:

(Provide a letter from ODFW indicating the device is approved or is unnecessary. If there is no letter from ODFW, explain whether or not a by-pass device is necessary.)

DESCRIPTION (I.E. "ODFW HAS APPROVED THE BY-PASS DEVICE" OR "NO BY-PASS DEVICE IS NECESSARY BECAUSE THERE IS A DIRECT DIVERSION FROM THE STREAM VIA A PUMP ON RIVER LEFT STREAM BANK WITH FOOT VALVE DESCENDING DIRECTLY INTO NATURAL POOL.") IN ADDITION, YOU MAY ATTACH PHOTOS TO THIS CLAIM.	IF INSTALLED (DATE)	IF INSTALLED, BY WHOM

7. Other conditions required by permit, permit amendment final order, or extension final order

a. Was the water user required to restore the riparian area if it was disturbed? **YES NO**

b. Was a fishway required? **YES NO**

c. Was submittal of a letter from an engineer required prior to storage of water? **YES NO**

d. Was submittal of a water management and conservation plan required? **YES NO**

e. Other conditions? **YES NO**

If "YES" to any of the above, identify the condition and describe the water user's actions to comply with the condition(s):

SECTION 4

VARIATIONS

Include a description of variations from the permit, permit amendment final order, or extension final order. (i.e. *"The permit allowed three reservoirs. The water user only developed one of the reservoirs."* or *"The permit allowed for the storage of 40.0 AF. The water user only stored 10.0 AF.")*

SECTION 5

ATTACHMENTS

Provide a list of any additional documents you are attaching to this report:

ATTACHMENT NAME	DESCRIPTION

SECTION 6

CLAIM SUMMARY

RESERVOIR NAME OR #	MAXIMUM STORAGE AUTHORIZED BY PERMIT (AF)	MAXIMUM STORAGE DEVELOPED (AF)

SECTION 7

CLAIM OF BENEFICIAL USE MAP

The Claim of Beneficial Use Map must be submitted with this claim. Claims submitted without the Claim of Beneficial Use map will be returned. The map shall be submitted on poly film at a scale of 1" = 1320 feet, 1" = 400 feet, or the original full-size scale of the county assessor map for the location.

Provide a general description of the survey method used to prepare the map. Examples of possible methods include, but are not limited to, a traverse survey, GPS, or the use of aerial photos. If the basis of the survey is an aerial photo, provide the source, date, series and the aerial photo identification number.

Map Checklist

Please be sure that the map you submit includes ALL the items listed below.
(Reminder: Incomplete maps and/or claims may be returned.)

- ☐ Map on polyester film.
- ☐ Appropriate scale (1” = 400 feet, 1” = 1320 feet, or the original full-size scale of the county assessor map)
- ☐ Township, Range, Section, Donation Land Claims, and Government Lots
- ☐ If irrigation, number of acres irrigated within each projected Donation Land Claims, Government Lots, Quarter-Quarters
- ☐ Locations of fish screens and/or fish by-pass devices in relationship to point of diversion
- ☐ Locations of meters and/or measuring devices in relationship to point of diversion
- ☐ Conveyance structures illustrated (pumps, reservoirs, pipelines, ditches, etc.)
- ☐ Point(s) of diversion or appropriation (illustrated and coordinates)
- ☐ Tax lot boundaries and numbers
- ☐ Source illustrated if surface water
- ☐ Disclaimer (“This map is not intended to provide legal dimensions or locations of property ownership lines”)
- ☐ Application and permit number or transfer number
- ☐ North arrow
- ☐ Legend
- ☐ CWRE stamp and signature

SECTION 8
SIGNATURES

CWRE Statement, Seal and Signature

The facts contained in this Claim of Beneficial Use are true and correct to the best of my knowledge.

Seal and Signature

CWRE NAME		PHONE NO.	ADDITIONAL CONTACT NO.
ADDRESS			
CITY	STATE	ZIP	E-MAIL

Permit Holder's of Record Signature or Acknowledgement

This Claim of Beneficial Use must be signed by each permit or transfer holder of record.

The facts contained in this Claim of Beneficial Use are true and correct to the best of my knowledge. I request that the Department issue a water right certificate.

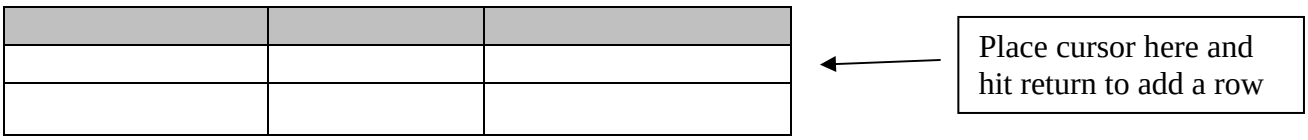
SIGNATURE	PRINT OR TYPE NAME	DATE

SECTION 9
REFERENCE INFORMATION FOR CWRE USE
(Please DO NOT submit these pages.)

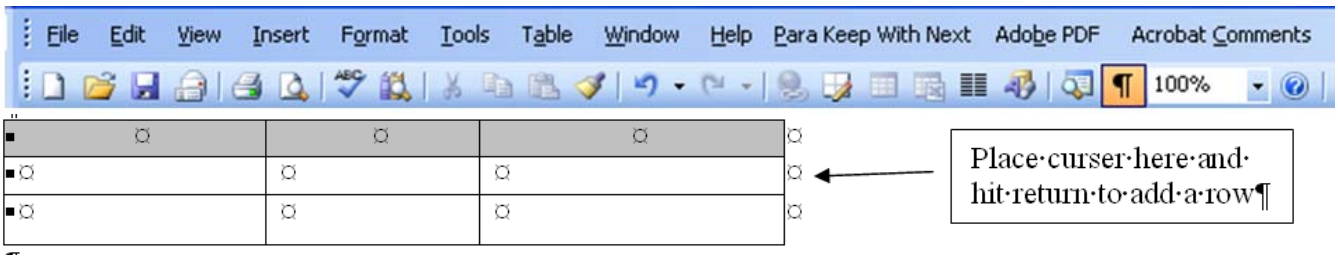
Additional information is available at: http://www.wrd.state.or.us/OWRD/WR/cwre_info.shtml

MS Word Hints

To add rows to a table, click outside the table on the far right and hit enter.



If you are having difficulty placing the curser outside the table, click on the Show/Hide (Paragraph) icon ¶. This is found on the Standard toolbar (View =>Toolbars=>Standard) of some versions of Word.



To resolve page numbering issues, go to print preview. Page through the entire document (while in print preview), then print from print preview.

Common Calculations

The Department typically uses the following calculations to determine system capacities; many of which are available to download from the Department's Web Site:

Pumps:

$$\textbf{Q Pump} = \frac{\text{(horsepower)(pump efficiency)}}{\text{(total head in feet)}} = \text{Q in cfs}$$

Efficiency factors:

NOTE: Pump efficiency factor for centrifugal pump (75%) = 6.61
Pump efficiency factor for turbine pump (80%) = 7.04

Centrifugal Pump, 75% eff. $\frac{\text{(550 ft lb/sec/Hp)(.75)}}{\text{(62.4 lb/cu ft)}} = 6.61\ ft^4/sec/Hp$

Turbine & Submersible Pumps, 80% eff. $\frac{\text{(550 ft lb/sec/Hp)(.80)}}{\text{(62.4 lb/cu ft)}} = 7.04\ ft^4/sec/Hp$

Total head is the sum of suction lift, pressure head, and discharge lift.

If the operating pressure is not measured, varying the assumed operational pressure in the above formulas until the calculated outputs are equal, or nearly so, will generally give the most correct theoretical capacity of the system.

Efficiencies have been assumed to be 75% for centrifugal pump installations and 80% for turbine or submersible pumps. See the list below of converted psi's to feet of head. These figures account for minor friction losses. If the system involves unusually long pipelines friction losses should be accounted for by using standard charts and formulas.

Refer to the conversion table below to compute PSI to head for pump pressure in feet.

[(psi/.433)(1.1) = head (in feet/psi) = 2.54 feet head/psi]

PSI	HEAD	PSI	HEAD
25	63.5	55	139.7
30	76.2	60	152.4
35	88.9	65	165.1
40	101.6	70	177.8
45	114.3	75	190.5
50	127.0	80	203.2

Ditches/Canals:

Manning's Formula:

$$v = \frac{1.486}{n} r^{2/3} s^{1/2}$$

v = mean velocity of flow in feet per second
r = hydraulic radius in feet
s = slope of the energy gradient
n = coefficient of roughness

Type of Conduit and Description	Coefficient of Roughness	
Pipe	**Minimum**	**Maximum**
Cast Iron, Coated	0.01	0.014
Cast Iron, Uncoated	0.011	0.015
Wrought Iron, Galvanized	0.013	0.017
Wrought Iron, Black	0.012	0.015
Steel, Riveted and Spiral	0.013	0.017
Corrugated	0.021	0.0255
Wood Stave	0.01	0.014
Neat Cement Surface	0.01	0.013
Concrete	0.01	0.017
Vitrified Sewer Pipe	0.01	0.017
Clay, Common Drainage Tile	0.011	0.017
Lined Channels		
Metal, Smooth Semicircular	0.011	0.015
Metal, Corrugated	0.0228	0.0244
Wood, Planed	0.01	0.015
Wood, Unplaned	0.011	0.015
Neat Cement-Lined	0.01	0.013
Concrete	0.012	0.018
Cement Rubble	0.017	0.03
Vegetated, Small Channels, Shallow Depths		
Bermuda Grass; Long - 13", Green	0.042	
Bermuda Grass; Long - 13", Dormant	0.035	
Bermuda Grass; Short - 3", Green	0.034	
Bermuda Grass; Short - 3", Dormant	0.034	
Unlined Channels		
Earth; Straight and Uniform	0.017	0.025
Dredged	0.025	0.033
Winding and Sluggish	0.0225	0.03
Stoney Bed, Weeds on Bank	0.025	0.04
Earth Bottom, Rubble Sides	0.028	0.035
Rock Cuts; Smooth and Uniform	0.025	0.035
Rock Cuts; Jagged and Irregular	0.035	0.045

Gravity flow pipe systems

Hazen-William's Formula:

$$v = 1.31(c)(r^{0.63})(s^{0.54})$$

v = mean velocity of flow in feet per second
c = coefficient of roughness
r = hydraulic radius in feet
s = slope of energy gradient

Material	Coefficient of Roughness
Asbestos Cement	140
Brass	135
Brick sewer	100
Cast-Iron - new unlined (CIP)	130
Cast-Iron 10 years old	110
Cast-Iron 20 years old	95
Cast-Iron 30 years old	82
Cast-Iron 40 years old	74
Concrete	130
Copper	135
Ductile Iron Pipe (DIP)	140
Galvanized iron	120
Glass	140
Lead	135
Plastic	145
PVC, CPVC	150
Smooth Pipes	140
Steel new unlined	145
Steel	130
Steel riveted	110
Tin	130
Wood Stave	120

SPRINKLER CAPACITIES BY NOZZLE SIZE IN GALLONS PER MINUTE

This chart is comprised of information gathered from a number of sources and may differ slightly from the manufacturer's specifications.

Q Sprinklers = (number of heads)(rate in gallons per minute) = Q in cfs
(448.8 gpm per cfs)

		P.S.I. ("*" designates computed capacity)																	
		5	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**
NOZZLE SIZE	**3/32**				1.1	1.3	1.4	1.5	1.6	1.7	1.8								
	7/64				1.5	1.7	1.9	2	2.2										
	1/8				1.9	2.2	2.4	2.7	2.9	3	3.2								
	9/64				2.3	2.6	2.9	3.1	3.4	3.7	4								
	5/32				3	3.4	3.8	4.1	4.4	4.7	5								
	11/64	1.9	2.7	3.3	3.7	4.2	4.6	5	5.4	5.7	6	6.3	6.6						
	3/16	2.2	3.2	3.9	4.3	5	5.5	6	6.4	6.8	7.2	7.5	7.8						
	13/64	2.9	3.6	4.5	5.1	5.9	6.5	7.1	7.6	8.1	8.5	8.9	9.2						
	7/32		4.1	5.1	5.8	6.8	7.6	8.3	8.9	9.4	9.9	10.3	10.6						
	15/64							8.8		10		11.2		12.4					
	1/4		5.2	6.4	7.4	8.9	9.8	10.6	11.4	12.1	12.8	13.4	13.9	14.8*	15.3*	15.9*	16.4*	16.9*	17.4*
	17/64								12.5		14		15.6		17.1				
	9/32					11.2	12.3	13.3	14.3	15.2	16	16.8	17.5	18.1	18.9	19.7	20.7*	21.4*	22*
	19/64									16.6		18.3		19.9		21.4			
	5/16					13.1	15.2	16.5	17.7	18.9	20	21	22	23	23.9	24.8	25.7	26.4*	27.1*
	21/64										20.8		22.7		24.6		26.4		
	11/32					16.5	18	19.7	21.1	22.5	23.8	25	26.2	27.4	28.5	29.6	30.6	31.9*	32.8*
	23/64										24.5		26.8		29.1		31.4		
	3/8					19	21	22.8	24.4	26	27.5	29.1	30.6	32	33.2	34.5	35.7	38*	39*
	13/32								29*	30.9*	32.7*	34.5*	36.2*	37.4*	38.9*	40.4*	41.9*	43.3*	44.7*
	7/16								33.5*	35.6*	37.7*	39.7*	41.7*	43.6*	45.3*	46.9*	48.4*	50.1*	51.6*
	1/2								42.5*	45.2*	47.7*	50.2*	52.5*	54.7*	56.8*	58.6*	60.6*	63.6*	66.7*

NOTE: Use the maximum number heads operating at any one time.
Rate per head in gpm comes from either manufacturer's specifications using orifice size and operating pressure or from OWRD chart.