

Chapter NR 320

BRIDGES AND CULVERTS IN OR OVER NAVIGABLE WATERWAYS

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Note: Chapter NR 320 was revised by emergency rule effective April 19, 2004; Chapter NR 320 was repealed and recreated by emergency rule effective August 24, 2004; Chapter NR 320 as it existed on April 30, 2005, was repealed and a new chapter NR 320 was created Register April 2005 No. 592, effective May 1, 2005.

NR 320.01 Purpose. The purpose of this chapter is to establish reasonable procedures and limitations for exempt activities, general permits and individual permits for placement of bridges and culverts in or over navigable waterways as regulated under s. 30.123, Stats., in order to protect the public rights and interest in the navigable, public waters of the state as defined in s. 30.10, Stats.

History: CR 04-084: cr. Register April 2005 No. 592, eff. 5-1-05.

NR 320.02 Applicability. (1) BRIDGES AND CULVERTS PLACEMENT. This chapter applies to construction, placement and maintenance of bridges and culverts in or over navigable waterways as regulated under s. 30.123, Stats. Any person that intends to construct, place or maintain a bridge or culvert in or over any navigable waterway shall comply with all applicable provisions of this chapter and any permit issued under this chapter.

Note: A permit that is granted under this chapter does not constitute review or authorization of floodplain effects. Where bridge or culvert activities occur in a mapped floodplain, permits will be required from the local municipality. The permittee shall assume all responsibility and liability for any direct or indirect damage caused or resulting from the presence of the bridge or culvert.

(2) MUNICIPAL HIGHWAY BRIDGES. (a) Municipalities are not required to obtain a permit or approval pursuant to s. 30.10, 30.12 or 31.23, Stats., prior to constructing a municipal highway bridge. However, municipal highway bridges cannot obstruct navigation. All municipal highway bridges shall be constructed or reconstructed in accordance with standards developed under s. 84.01, Stats.

Note: Municipal highway bridges must continue to meet local floodplain zoning requirements.

(3) STATE HIGHWAY BRIDGES. Intrastate and interstate bridges constructed pursuant to ss. 84.11 and 84.12, Stats., are subject to the control and supervision over the navigable waters of the state conferred by law upon the department. State highway bridges constructed pursuant to ss. 84.11 and 84.12, Stats., will be reviewed and approved by the department in accordance with interdepartmental liaison procedures established by the department and the department of transportation for the purpose of minimizing adverse environmental impacts under the procedures established in s. 30.2022, Stats.

History: CR 04-084: cr. Register April 2005 No. 592, eff. 5-1-05.

NR 320.03 Definitions. (1) "Area of special natural resource interest" has the meaning in s. 30.01 (1am), Stats., and as identified by the department in s. NR 1.05.

Note: "Area of special natural resource interest" means any of the following:

(a) A state natural area designated or dedicated under ss. 23.27 to 23.29, Stats.
 (b) A surface water identified as a trout stream by the department under s. NR 1.02(7).

(bm) A surface water identified as an outstanding or exceptional resource water under s. 281.15, Stats.

(c) An area that possesses significant scientific value, as identified by the department in s. NR 1.05.

Information and lists can be obtained by contacting the department, or found on the department's website at www.dnr.wi.gov, under the topic "Waterway and Wetland Permits".

(2) "Backwater" means the increase in the water surface elevation that results from a bridge and any associated road fills under average water flow conditions.

(3) "Bridge" means any private or public structure except municipal highway bridges constructed in or over a navigable waterway to provide a walkway or roadway for pedestrians, animals or vehicles, and includes pipe arches and culverts.

(4) "Channel" means a natural or artificial water course with defined bed and banks to confine and conduct the normal flow of water.

(5) "Clearance" means the vertical distance between the inside top of a culvert or the bottom of the lowest member of the bridge span and the ordinary high water mark of the waterway.

(6) "Clear span bridge" means a continuous span of which no portion of the bridge piling or other supporting structure may be located within the channel except for abutment protection.

(7) "Department" means the department of natural resources.

(8) "Highway" or "public highway" has the meaning in s. 340.01 (22), Stats.

(9) "Maintain" means to repair, replace, own or possess all or a portion of a structure.

(10) "Municipal highway bridge" means any city, town, village or county owned structure built in or over a navigable waterway for public highway purposes.

(11) "Navigable waterway" means any body of water with a defined bed and bank, which is navigable under the laws of the state. In Wisconsin, a navigable body of water is capable of floating the lightest boat or skiff used for recreation or any other purpose on a regularly recurring basis.

Note: This incorporates the definition at s. 30.01(4m), Stats., and current case law, which requires a watercourse to have a bed and banks, *Hoyt v. City of Hudson*, 27 Wis. 656 (1871), and requires a navigable waterway to float on a regularly recurring basis the lightest boat or skiff, *DeGayer & Co., Inc. v. DNR*, 70 Wis. 2d 936 (1975); *Village of Menomonee Falls v. DNR*, 140 Wis.2d 579 (Ct. App. 1987).

(12) "Ordinary high water mark" or "OHWM" means the point on the bank or shore up to which the presence and action of water is so continuous as to leave a distinct mark either by erosion, destruction of terrestrial vegetation or other easily recognized characteristic.

(13) "Perched culvert" means a culvert where the inlet or outlet elevation is higher than the streambed elevation, thereby effectively reducing or eliminating fish migration and fish passage.

(14) "Professionally engineered" means designed by a person registered as a professional engineer under s. 443.04, Stats., and ch. A-E 4.

(15) "Replacement" means a degree of structural changes to a bridge or culvert by which some or all of the bridge or culvert is being removed or recreated.

(16) "Riprap" means a layer or layers of rock, including filter material, placed on the bed and bank of a navigable waterway to prevent erosion, scour or sloughing of the existing bank.

History: CR 04-084: cr. Register April 2005 No. 592, eff. 5-1-05.

NR 320.04 Bridge and culvert clearance over navigable waterway. (1) New bridges or culverts or replacements

of existing bridges and culverts spanning navigable waterways, shall, except as provided in this section, maintain a clearance of not less than 5 feet.

(2) The department may require clearance of more than 5 feet when the waterway has been or is likely to be navigated when it is above its ordinary high water mark elevation or if it is used by watercraft or snowmobiles requiring greater clearance.

(3) The department may allow less than 5 feet of navigation clearance when all of the following apply:

(a) The waterway is known to have little or no navigation or snowmobile use.

(b) The waterway is not anticipated to have navigational use by other than lightweight craft.

(c) The owner provides a portage over or around the bridge or culvert.

(d) The reduced clearance would not be detrimental to the public interest.

(4) The department may allow less than 5 feet of clearance for temporary bridges not meeting the criteria in sub. (3) (a) to (d) if the following apply:

(a) The owner of the bridge has entered into a written agreement with the department requiring installation and removal of the bridge.

(b) The stream is not appreciably used by snowmobiles during the period of time when the bridge will be in place.

(5) The conditions in the agreement under sub. (4) (a) shall be based on the navigational history and use of the stream. The department may modify the dates in the agreement or require removal if changed navigational uses so warrant. Repeated failure of the owner to comply with the installation or removal dates shall render the approval void.

History: CR 04-084; cr. Register April 2005 No. 592, eff. 5-1-05.

NR 320.05 Bridge enforcement for municipal highway bridges. Upon receipt of written complaint, the department shall investigate the construction or maintenance of any municipal highway bridge. In evaluating complaints, the department shall apply the principles in *Capt. Soma Boat Line, Inc. v. City of Wisconsin Dells* (56 Wis. 2d 838 (1973)) to determine what course of action it will follow in the case. The department shall apply the clearance standards in this chapter in determining whether a municipal highway bridge constitutes an obstruction to navigation.

History: CR 04-084; cr. Register April 2005 No. 592, eff. 5-1-05.

NR 320.06 Bridges and culverts. (1) EXEMPTIONS. (a) *Procedures.* Exemptions shall be processed according to the procedures in ch. NR 310.

(b) *Applicable activities.* A replacement of a culvert that meets all the standards in par. (c) shall be exempt under s. 30.123 (6) (e), Stats. A replacement of a previously permitted culvert that meets all the standards in par. (d) shall be exempt under s. 30.123 (6) (d), Stats.

Note: Eligibility for an exemption or general permit does not automatically result in a federal permit or state water quality certification for fill in wetlands. Some projects involving minimal wetland fill may be eligible for authorization under a U.S. Army Corps of Engineers general permit which has already been granted state water quality certification [see non-reporting and 404 GP activities in the table at <http://www.mvp.usace.army.mil/docs/regulatory/WIMATRIX.htm>] or a general permit under s. 281.36 (8), Stats. (under development) All other projects affecting wetlands will require individual water quality certification including public notice as required by s. 401, Federal Clean Water Act, and s. 281.36 (2), Stats., and carried out under chs. NR 103 and 299. For further instructions, see the department's website at www.dnr.wi.gov under the topic "Waterway and Wetland Permits."

(c) *Standards to replace a culvert that does not exceed 24-inches in diameter.* 1. The culvert may not be located in an area of special natural resource interest, in a public rights feature as described in s. NR 1.06, or in navigable tributaries to surface waters identified as trout streams by the department in s. NR 1.02 (7).

2. The culvert may not exceed 24 inches in diameter, span or width.

3. For a culvert replacement to be considered exempt, the culvert must be in place or documented to have been in place in the past 3 years.

Note: The historical presence of a culvert that is no longer in place or was not in place in the past 3 years does not constitute a replacement.

4. The replacement culvert shall be an in-kind replacement of a single culvert of the same cross-sectional area and of equal or shorter length of culvert that is being replaced.

5. The required culvert area may not exceed 3 square feet as calculated in s. NR 320.07 (1), to ensure that a 24-inch culvert adequately passes stream flow and is not likely to create a ponded condition upstream.

6. Culvert replacement and installation shall mimic the natural streambed and gradient above and below the culvert channel. Perched culverts are not in compliance with this condition.

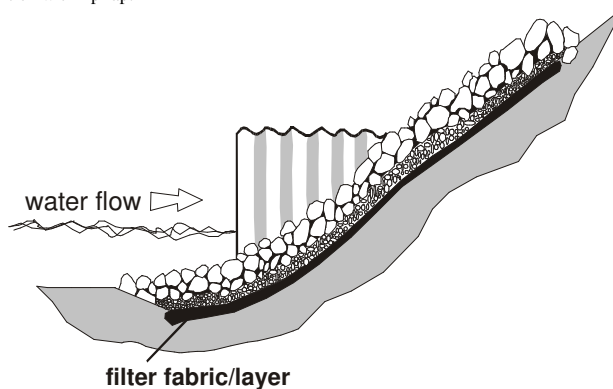
Note: A culvert which is part of a structure that functions as a dam requires an approval or permit under ch. 31, Stats.

7. Both ends of the culvert shall be installed so 4 to 6 inches lies below the bed of the waterway.

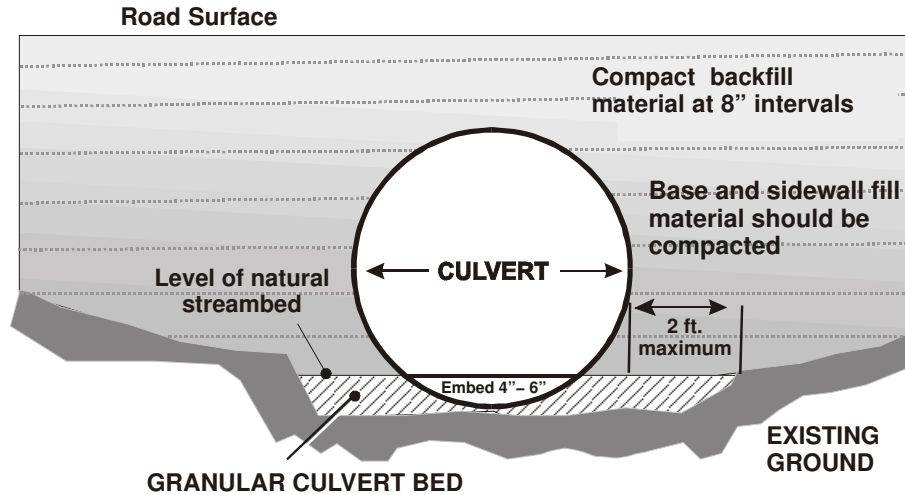
8. Culvert inlets may not be capped with screens, bars or any other means, with the exception of beaver control procedures, that prevents movement of fish or wildlife or collects debris. Culvert openings shall be inspected at least once a year for debris and any obstructions shall be removed.

9. The culvert shall be designed to prevent washout. Culverts shall be long enough so road fill does not extend beyond the ends of the culvert. The culvert shall be no longer than the sum of the width of the roadtop, the slide slopes, and additional one foot on each side as calculated in s. NR 320.07 (3). The culvert shall extend at least one foot beyond the fill. The channel shall be protected with 3 to 12 inch diameter variable sized riprap extending horizontally at least 2 times the culvert diameter from the end of the culvert. Riprap placement shall include an adequate filter layer or filter fabric.

Note: Prefabricated culvert end sections may be a viable alternative to stabilization with rip rap.



10. Clean fill material shall be firmly compacted around the culvert. The culvert shall be designed or protected to prevent crushing.



11. Dredging under s. 30.20 (1g) (b) 1., Stats., and deposition of sand, gravel or stone on the stream bed under s. 30.12 (1g) (a), Stats., may be associated with the replacement of a culvert provided dredging is limited to the volume necessary to bury the culvert as required in subd. 5. and the deposit is limited to the area immediately underneath or within 2 feet of the culvert.

12. Culvert replacement is prohibited from March 15 to June 1 annually to minimize adverse impacts on fish movement, fish spawning, egg incubation periods and high stream flows. Where emergency replacement is necessary to access an existing residence or agricultural lands, the culvert may be replaced during this time period if construction can be completed within 6 hours.

13. Erosion control measures shall meet or exceed the technical standards for erosion control approved by the department under subch. V of ch. NR 151. Any area where topsoil is exposed during construction shall be immediately seeded and mulched or ripped to stabilize disturbed areas and prevent soils from being eroded and washed into the waterway.

Note: These standards can be found at the following website: <http://dnr.wi.gov/org/water/wm/nps/stormwater/techstds.htm>

14. Unless part of a permanent stormwater management system, all temporary erosion and sediment control practices shall be removed upon final site stabilization. Areas disturbed during construction or installation shall be restored.

Note: Equipment shall be operated from the roadway or streambank only (see s. 30.29, Stats.).

Note: A permit is required under s. 30.19, Stats., and ch. NR 341 if land disturbance or excavation exceeds 10,000 square feet on the bank of the navigable waterway.

(d) *Standards to replace a previously permitted culvert.* 1. A culvert that is authorized by a permit issued under s. 30.12 or 30.123, Stats., may be replaced provided the construction, placement and maintenance will comply with the same conditions of the original permit.

Note: If changes to land use, flood flows, or navigational patterns have occurred since a culvert was originally permitted, the initial standards may no longer be appropriate and may need to be modified.

2. Both ends of the culvert shall be installed so a minimum of 4" with a maximum of 8" of a round culvert or 6" of a pipe arch culvert lies below the bed of the waterway.

Note: In most cases, the pipe arch culvert is the recommended culvert design because it is effective in low clearance installations, generally requires less fill, and the wider bottom allows for the better retention of natural substrates.

3. Erosion control measures shall meet or exceed the technical standards for erosion control approved by the department under subch. V of ch. NR 151. Any area where topsoil is exposed during construction shall be immediately seeded and mulched or ripped to stabilize disturbed areas and prevent soils from being eroded and washed into the waterway.

Note: These standards can be found at the following website: <http://dnr.wi.gov/org/water/wm/nps/stormwater/techstds.htm>

4. Unless part of a permanent stormwater management system, all temporary erosion and sediment control practices shall be removed upon final site stabilization. Areas disturbed during removal shall be restored.

5. A deposit of sand, gravel or stone under s. 30.12 (1g) (a), Stats., may be associated with the replacement of a culvert provided the deposit is limited to the area immediately underneath or within 2 feet of the culvert.

6. Dredging under s. 30.20 (1g) (b) 1., Stats., is allowed for the replacement of a culvert provided it is limited to the volume necessary to bury the culvert as required in subd. 2.

(e) *Permit required.* 1. Activities that do not meet the standards in par. (c) or (d) or are otherwise determined ineligible for an exemption by the department require a general permit or individual permit.

2. The department has the authority under s. 30.123 (6m), Stats., to require a permit in lieu of exemption.

(2) **GENERAL PERMITS.** (a) *Procedures.* 1. General permits shall be processed according to the procedures in ch. NR 310.

2. If the department determines that a proposal submitted under this section has the potential to impact an endangered or threatened species in accordance with s. 29.604, Stats., the application shall be deemed incomplete. The department may not consider the application complete or issue a general permit until the applicant submits documentation to demonstrate one of the following:

a. The project avoids impacts to the endangered or threatened species in accordance with s. 29.604, Stats.

b. The project has received an incidental take authorization under s. 29.604, Stats.

3. If the applicant modifies the project plans to meet the requirements of subd. 2., the modified plans shall be submitted before the department may consider the application complete or issue a general permit.

(b) *Applicable activities.* A clear span bridge that meets all the standards in s. NR 320.04 and pars. (c) and (d) shall be eligible for a general permit under ss. 30.123 (7) (a) 1. and (b) and 30.206, Stats. A culvert placement that meets all the standards in par. (c) and either par. (e) or (f) shall be eligible for a general permit under ss. 30.123 (7) (a) 1. and (b) and 30.206, Stats.

Note: Eligibility for an exemption or general permit does not automatically result in a federal permit or state water quality certification for fill in wetlands. Some projects involving minimal wetland fill may be eligible for authorization under a U.S. Army Corps of Engineers general permit which has already been granted state water quality certification [see non-reporting and 404 GP activities in the table at <http://www.mvp.usace.army.mil/docs/regulatory/WIMATRIX.htm>] or a general permit under s. 281.36 (8), Stats. (under development) All other projects affecting wetlands will require individual water quality certification including public notice as required by s. 401, Federal Clean Water Act, and s. 281.36 (2), Stats., and carried out

under chs. NR 103 and 299. For further instructions, see the department's website at www.dnr.wi.gov under the topic "Waterway and Wetland Permits."

(c) *General standards.* 1. Erosion control measures shall meet or exceed the technical standards for erosion control approved by the department under subch. V of ch. NR 151. Any area where topsoil is exposed during construction shall be immediately seeded and mulched or riprapped to stabilize disturbed areas and prevent soils from being eroded and washed into the waterway.

Note: These standards can be found at the following website: <http://dnr.wi.gov/org/water/wm/nps/stormwater/techstds.htm>

2. Unless part of a permanent stormwater management system, all temporary erosion and sediment control practices shall be removed upon final site stabilization. Areas disturbed during removal shall be restored.

(d) *Standards for placement of clear span bridges over navigable waters.* 1. To minimize adverse impacts on fish movement, fish spawning, egg incubation periods and high stream flows, instream work associated with clear span bridge placement, except for abutment protection, may not occur during the following time periods:

a. For trout streams identified under s. NR 1.02 (7) and navigable tributaries to those trout streams, September 15 through May 15.

b. For all waters not identified in this subd. 1. a. and located south of state highway 29, March 15 through May 15.

c. For all waters not identified in this subd. 1. a. and located north of state highway 29, April 1 through June 1.

d. The applicant may request that the requirement in this subd. 1. a., b. or c. be waived by the department on a case-by-case basis, by submitting a written statement signed by the local department fisheries biologist, documenting consultation about the proposed project, and that the local department fisheries biologist has determined that the requirements of this paragraph are not necessary to protect fish spawning for the proposed project.

2. The clear span bridge may only span a navigable waterway that is less than 35 feet wide, measured from ordinary high water mark to ordinary high water mark.

3. The clear span bridge may not be located on a wild river designated under ch. NR 302, or where similar federal, state or local regulations prohibit the construction.

4. Any grading, excavation and land disturbance shall be confined to the minimum area necessary for the construction and may not exceed 10,000 square feet.

5. All equipment used for the project shall be designed and properly sized to minimize the amount of sediment that can escape into the water.

6. Construction or placement of the clear span bridge shall minimize the removal of trees, shrubs and other shoreline vegetation above the ordinary high water mark.

Note: Local zoning ordinances may place restrictions on activities located in mapped floodplains or in shoreland zones. The riparian is responsible for ensuring that their project is in compliance with any local zoning requirements as well as the provisions of this chapter.

7. Approach fill shall be a maximum of one foot at the bank and 0 feet at 15 feet landward of the bank. If an approach fill of greater than one foot is required or must be located in a wetland, it shall be of open ramp style that does not impede flow.

8. Accumulated brush or debris shall be regularly removed from underneath the bridge.

9. At least one end of the bridge structure shall be firmly anchored in a manner that the bridge will not be transported downstream during flood conditions.

10. The bridge shall completely span the navigable waterway from top of channel to top of channel with no support pilings in the waterway.

11. The permittee shall submit a photograph of the completed project to the department within 10 days of project completion.

(e) *Standards for culvert placement on navigable streams without a professionally engineered culvert design.* 1. To minimize adverse impacts on fish movement, fish spawning, egg incubation periods and high stream flows, culvert placement may not occur during the following time periods:

a. For trout streams identified under s. NR 1.02 (7) and navigable tributaries to those trout streams, September 15 through May 15.

b. For all waters not identified in this subd. 1. a. and located south of state highway 29, March 15 through May 15.

c. For all waters not identified in this subd. 1. a. and located north of state highway 29, April 1 through June 1.

d. The applicant may request that the requirement in this subd. 1. a., b. or c. be waived by the department on a case-by-case basis, by submitting a written statement signed by the local department fisheries biologist, documenting consultation about the proposed project, and that the local department fisheries biologist has determined that the requirements of this paragraph are not necessary to protect fish spawning for the proposed project.

2. Culvert placement may not occur in a public rights feature as described in s. NR 1.06.

3. The required culvert area may not exceed 20 square feet as calculated in s. NR 320.07 (1).

4. Culvert placement and installation shall mimic the natural streambed and gradient above and below the culvert channel. Perched culverts are not in compliance with this condition.

5. If flow conditions require the use of a multiple culvert arrangement, culverts shall be placed at varying elevations, one in the bed and the other at 4" to 8" higher, to facilitate base and low flows as well as larger rain or snowmelt events.

6. Both ends of the culvert shall be installed so a minimum of 4" and a maximum of 8" for a round culvert and 6" for a pipe arch culvert lies below the bed of the waterway.

7. Culvert inlets may not be capped with screens, bars or any other means, with the exception of beaver control procedures, which prevent movement of fish or wildlife or collect debris. Culvert openings shall be inspected at least once a year for debris and any obstructions shall be removed.

8. Culverts shall be designed to prevent washout. Culverts shall be long enough so road fill does not extend beyond the ends of the culvert. The culvert shall extend at least one foot beyond the fill. The channel shall be protected with variable-sized riprap extending horizontally at least 2 times the culvert diameter or height of arch culvert from the end of the culvert. Riprap placement shall include an adequate filter layer or filter fabric as illustrated in sub. (1) (c) 9.

9. Clean fill material shall be firmly compacted around the culvert as illustrated in sub. (1) (c) 10. Multiple culvert crossings shall have a minimum of 2 feet clearance between adjacent culverts to allow adequate compaction of fill material. The culvert shall be designed or protected to prevent crushing.

10. Dredging and deposition of sand, gravel or stone on the streambed may be associated with the placement of a culvert provided dredging is limited to the volume necessary to bury the culvert as required in this section and the deposit is limited to the area immediately underneath or within 2 feet of the culvert.

11. Approach fill shall be a maximum of one foot at the bank and 0 feet at 15 feet landward of the bank.

12. Issuance of a general permit under this paragraph constitutes a waiver of the vertical clearance standards under s. NR 320.04.

13. The activity is not located in a lake system.

Note: Equipment shall be operated from the streambank only (see s. 30.29, Stats).

Note: A permit is required under s. 30.19, Stats., and ch. NR 341 if land disturbance or excavation exceeds 10,000 square feet on the bank of the navigable waterway.

(f) *Standards for culvert placement on navigable streams with a professionally engineered culvert design.* 1. The culvert placement shall meet all the standards in s. NR 320.04.

2. The activity shall meet all the standards in par. (e) with the following exception: The required culvert area may not exceed 40 square feet as calculated in s. NR 320.07 (1).

(g) *Individual permit required.* 1. Activities that do not meet the standards in par. (c) and either par. (d), (e) or (f), or a general permit issued by the department shall require an individual permit.

2. The department has authority under s. 30.206 (3r), Stats., to require an individual permit in lieu of a general permit.

(3) **INDIVIDUAL PERMITS.** (a) *Procedures.* 1. Individual permits shall be processed according to the procedures in ch. NR 310.

2. If the department determines that a proposal submitted under this section has the potential to impact an endangered or threatened species in accordance with s. 29.604, Stats., the application shall be deemed incomplete. The department may not consider the application complete or issue an individual permit until the applicant submits documentation to demonstrate one of the following:

a. The project avoids impacts to the endangered or threatened species in accordance with s. 29.604, Stats.

b. The project has received an incidental take authorization under s. 29.604, Stats.

3. If the applicant modifies the project plans to meet the requirements of subd. 2., the modified plans shall be submitted before the department may consider the application complete or issue an individual permit.

(b) *Applicable activities.* Any bridge or culvert which is not exempt under sub. (1) and is not authorized by a general permit under sub. (2) requires authorization by an individual permit under s. 30.123 (8), Stats. Individual permits will be required for streams with required culvert areas in excess of 40 square feet.

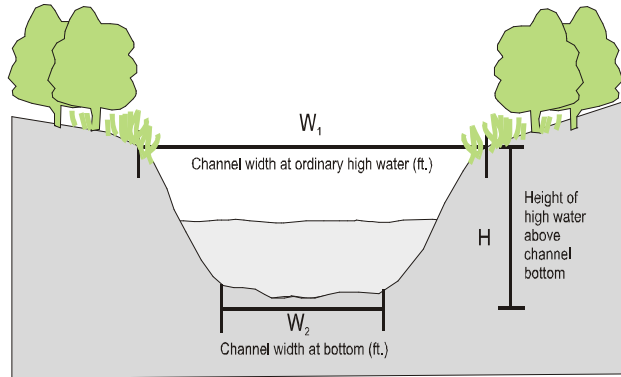
(c) *Standards.* Construction, placement or maintenance of a bridge or culvert that meets the standards in s. 30.123 (8) (c), Stats., may be authorized under an individual permit.

History: CR 04-084: cr. Register April 2005 No. 592, eff. 5-1-05.

NR 320.07 Culvert area calculation, culvert sizing, and culvert length determination. Applicants shall use the following calculation and assessment methods:

(1) **CALCULATION OF REQUIRED CULVERT AREA.** To determine the required culvert area, 3 measurements shall be made: channel width of the stream in feet at the ordinary high water mark (W_1), channel width of the stream in feet at the stream bottom (W_2), and the height in feet of the high water above the stream bottom (H) (see diagram). These 3 measurements shall be made at each of 3 locations or transects along the stream: the location of the proposed crossing, 100 feet upstream from the crossing, and 100 feet downstream from the crossing. The individual measurements of W_1 , W_2 and H shall be averaged to derive the final W_1 , W_2 and H values. The required culvert area is then calculated with the following equation:

$$\text{Required Culvert area (square feet)} = H \times (W_1 + W_2)$$



(2) **CULVERT SIZING.** Once the required culvert area has been determined, the applicant can identify the proper culvert size by reviewing the following tables. The minimum size culvert needed to pass flows must have an area that is as much or more than the required culvert area. For example, the recommended culvert size for a culvert area calculation of 8.50 square feet would be 42".

Table 1. Round culvert diameters and corresponding culvert area.

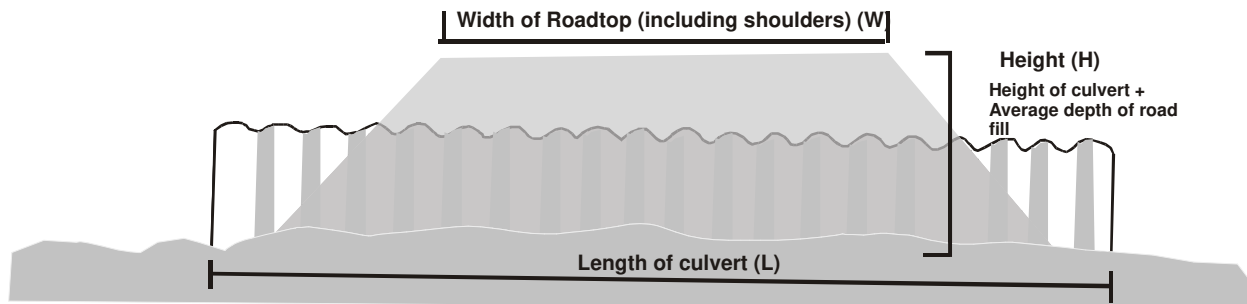
Culvert diameter (in.)	Culvert area (sq. ft.)
18	1.80
24	3.10
30	4.90
36	7.10
42	9.60
48	12.60
54	15.90
60	19.60
66	23.80

Note: To find the area of any round culvert, use the following equation:
 Culvert diameter (in.) divided by 2 = _____ divided by 12 = _____ (radius in ft.)
 Radius x Radius x 3.14 = _____ (area of culvert in sq. ft.)

Table 2. Pipe arch dimensions and corresponding culvert area.

Pipe width or span (in.)	Pipe height or rise (in.)	Culvert area (sq. ft.)
43	27	6.4
50	31	8.7
58	36	11.4
65	40	14.3
72	44	17.6
73	55	22.0
85	54	25.3
81	59	26
87	63	31
95	67	35
103	71	40

(3) **CULVERT LENGTH DETERMINATION.** The proper culvert length is determined by the following calculation:



Determining the length of a culvert:

- ! $L = W + 4H + 2$
- ! $L =$ Length of Culvert
- ! $W =$ Width of Road Top
- ! 4 (Constant) Angle of Side Slopes (2 x 2:1)
- ! $H =$ Height of Culvert + Average Depth of Road Fill
- ! 2 (Constant) One Foot Pipe Extension Beyond Fill

Example: Length of culvert needed for a 10' road top, 24" (2') diameter pipe, 1' average road fill, 2:1 slopes, 1' pipe extension beyond fill:

$$L = 10' \text{ road top} + 4(2' \text{ culvert} + 1' \text{ fill}) + 2' \text{ extension}$$

$$L = 10 + 4(2 + 1) + 2$$

$$L = 10 + (4 \times 2 + 4 \times 1) + 2$$

$$L = 10 + 8 + 4 + 2$$

culvert length = 24 feet

History: CR 04-084: cr. Register April 2005 No. 592, eff. 5-1-05.

NR 320.08 Enforcement. (1) Noncompliance with the provisions of ss. 30.12, 30.123, 30.20 and 30.206, Stats., this chapter, or any conditions of an exemption, general permit or individual permit issued by the department, constitutes a violation and may result in a forfeiture. The department may seek abatement under s. 30.294, Stats., for any activity in violation of ss. 30.12, 30.123, 30.20 and 30.206, Stats.

(2) If the activity may be authorized by a general permit under s. 30.206, Stats., failure of an applicant to follow the procedural requirements may not, by itself, result in abatement of the activity.

(3) When an after-the-fact permit application has been filed with the department, the department shall follow the procedures in ch. NR 301 for violations.

(4) Any violation of these rules shall be treated as a violation of the statutes they interpret or are promulgated under.

(5) No person may place a bridge or culvert in or over a navigable waterway if the activity is not eligible for an exemption, authorized by a general permit or individual permit issued under this chapter, or otherwise authorized under this chapter.

History: CR 04-084: cr. Register April 2005 No. 592, eff. 5-1-05.