



Traversable Grate Design for Box Culverts and Large Pipes

Prepared for
Bureau of Project Development

Prepared by
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WisDOT Research & Library Unit
July 23, 2009

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Request for Report

The 2006 Roadside Design Guide and recent studies have indicated the roadside safety benefit of using traversable grate covers on box culverts and large drainage pipes. The Bureau of Project Development is interested in learning about the design standards and maintenance experiences of agencies using traversable grates.

Summary

We distributed a survey to members of the AASHTO Research Advisory Committee for completion by appropriate staff at their agencies. The survey consisted of the following questions:

1. Does your agency have guidance or standard drawings for the use of traversable grates for large drainage structures? Please provide a link to your guidance.
2. How often are traversable grates installed on large drainage structures (excluding bridges and pipes of diameter 36" or less)?
 - a. Rarely—less than 25% of large drainage structures
 - b. Occasionally—25% to 50% of large drainage structures
 - c. Frequently—51% to 74% of large drainage structures
 - d. Majority—75% to 100% of large drainage structures
3. One of the concerns when it comes to using a traversable grate on a large drainage structure is that it will become clogged with debris. Has your agency had this problem? If so:
 - a. How significant a problem is maintenance, and how frequently has a large drainage structure with a traversable grate had to be maintained because of clogging?
 - i. Minor problem—Little or no maintenance
 - ii. Average problem—Maintenance staff has to go out once every year or two in order to fix traversable grates
 - iii. Major problem—Maintenance staff has to go out multiple times in one year to fix traversable grates
 - b. On average, how significant a problem is the clogging of a traversable grate?
 - i. Minor problem—One or two workers with hand tools can fix it in a couple of hours

- ii. Average problem—Two or more workers can fix it in a day or two by using hand tools, or in a day by using heavy equipment and one dump truck
- iii. Major problem—Requires the use of heavy equipment and multiple dump trucks for two or more days

Staff at 13 agencies responded to this survey. See **Survey Results** below for the full text of these survey responses.

Key findings from the survey follow. Percentages are based on the number of responses to each question.

- Almost half of respondents (42 percent) have guidance or standard drawings for the use of traversable grates for large drainage structures.
- Most (82 percent) rarely install traversable grates on large drainage structures (excluding bridges and pipes of diameter 36" or less), and none install them a majority of the time. One agency installs them occasionally, and one frequently.
- Almost half of respondents (40 percent) have had a problem with clogging. Of these four agencies:
 - All (100 percent) have had maintenance problems—50 percent minor, 50 percent average, and none major.
 - Three-fourths (75 percent) have an average clogging problem, 25 percent have a minor problem, and none have a major problem.

Survey Results

The full text of each survey response is provided below. For reference, we have included an abbreviated version of each question before the response; for the full question text, please see the Summary on page 1 of this report.

California

Contact: Glenn DeCou, Caltrans, glenn_s_decou@dot.ca.gov.

1. **Standard drawings?** No.
2. **How often installed?** Rarely—less than 25% of large drainage structures.
3. **Problem with debris?** No response.
 - a. **Level of maintenance problem?** N/A.
 - b. **Significance of clogging problem?** N/A.

Illinois

Contact: Scott Stitt, Illinois DOT, Scott.Stitt@illinois.gov.

1. **Standard drawings?** Yes: <http://www.dot.il.gov/desenv/demanuals.html>
2. **How often installed?** Frequently—51% to 74% of large drainage structures.
3. **Problem with debris?** Yes.
 - a. **Level of maintenance problem?** Average problem—Maintenance staff has to go out once every year or two in order to fix traversable grates.
 - b. **Significance of clogging problem?** Average problem—Two or more workers can fix it in a day or two by using hand tools, or in a day by using heavy equipment and one dump truck.

Indiana

Contact: Merrill Dougherty, Indiana DOT, mdougherty@indot.in.gov.

1. **Standard drawings?** Yes: <http://www.in.gov/dot/div/contracts/standards> (go to “Design Manual Information” and “Standard Drawings”).
2. **How often installed?** Occasionally—25% to 50% of large drainage structures.

3. **Problem with debris?** No.
 - a. **Level of maintenance problem?** N/A.
 - b. **Significance of clogging problem?** N/A.

Iowa

Contact: Deanna Maifield, Iowa DOT, Deanna.Maifield@dot.iowa.gov.

1. **Standard drawings?** No.
2. **How often installed?** Rarely—less than 25% of large drainage structures.
3. **Problem with debris?** Yes.
 - a. **Level of maintenance problem?** Minor problem—Little or no maintenance.
 - b. **Significance of clogging problem?** Average problem—Two or more workers can fix it in a day or two by using hand tools, or in a day by using heavy equipment and one dump truck.

Maine

Contact: Dale Peabody, MaineDOT, dale.peabody@maine.gov.

1. **Standard drawings?** No.
2. **How often installed?** No response.
3. **Problem with debris?** No response.
 - a. **Level of maintenance problem?** N/A.
 - b. **Significance of clogging problem?** N/A.

Maryland

Contact: Leonard Podell, Maryland State Highway Administration, lpodell@sha.state.md.us.

1. **Standard drawings?** No.
2. **How often installed?** No response.
3. **Problem with debris?** No response.
 - a. **Level of maintenance problem?** N/A.
 - b. **Significance of clogging problem?** N/A.

Minnesota

Contact: Andrea Hendrickson, Mn/DOT, andrea.hendrickson@dot.state.mn.us.

1. **Standard drawings?** Yes: <http://www.dot.state.mn.us/design/standard-plates/3000.html>
2. **How often installed?** Rarely—less than 25% of large drainage structures.
3. **Problem with debris?** Yes.
 - a. **Level of maintenance problem?** Minor problem—Little or no maintenance.
 - b. **Significance of clogging problem?** Minor problem—One or two workers with hand tools can fix it in a couple of hours.

Mississippi

Contact: Steven W. Reeves, Mississippi DOT, sreeves@mdot.state.ms.us.

1. **Standard drawings?** No.
2. **How often installed?** Rarely—less than 25% of large drainage structures.
3. **Problem with debris?** No.
 - a. **Level of maintenance problem?** N/A.
 - b. **Significance of clogging problem?** N/A.

Montana

Contact: Paul Ferry, Montana DOT, pferry@mt.gov.

1. **Standard drawings?** No response.
2. **How often installed?** Rarely—less than 25% of large drainage structures.
3. **Problem with debris?** No.
 - a. **Level of maintenance problem?** N/A.
 - b. **Significance of clogging problem?** N/A.

Nebraska

Contact: Kevin Donahoo, Nebraska Department of Roads, Roadway Design Division, Kevin.Donahoo@nebraska.gov.

1. **Standard drawings?** Yes. Page 5 of 46 at <http://www.nebraskatransportation.org/roadway-design/pdfs/stan-spec/special.pdf>.
2. **How often installed?** Rarely—less than 25% of large drainage structures.
3. **Problem with debris?** No.
 - a. **Level of maintenance problem?** N/A.
 - b. **Significance of clogging problem?** N/A.

Northwest Territories, Canada

Contact: Ann Lanteigne, Transportation - Government of the Northwest Territories, ann_lanteigne@gov.nt.ca.

1. **Standard drawings?** No.
2. **How often installed?** Rarely—less than 25% of large drainage structures.
3. **Problem with debris?** No.
 - a. **Level of maintenance problem?** N/A.
 - b. **Significance of clogging problem?** N/A.

Vermont

Contact: Nick Wark, Vermont Agency of Transportation, nick.wark@state.vt.us.

1. **Standard drawings?** No.
2. **How often installed?** Rarely—less than 25% of large drainage structures.
3. **Problem with debris?** No.
 - a. **Level of maintenance problem?** N/A.
 - b. **Significance of clogging problem?** N/A.

Washington

Contact: Jay Christianson, Washington State DOT, christj@wsdot.wa.gov.

1. **Standard drawings?** Yes. Standard Plans B-75.50, B-75.60, B-80.20 and B-80.40 at <http://www.wsdot.wa.gov/Design/Standards/Plans.htm#SectionB>.
2. **How often installed?** Rarely—less than 25% of large drainage structures.
3. **Problem with debris?** Yes.
 - a. **Level of maintenance problem?** Average problem—Maintenance staff has to go out once every year or two in order to fix traversable grates.
 - b. **Significance of clogging problem?** Average problem—Two or more workers can fix it in a day or two by using hand tools, or in a day by using heavy equipment and one dump truck.