



Montana Department of Transportation
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Memorandum

To: Distribution

From: Mark A. Goodman, P.E. *MAG*
Hydraulics Engineer

Thru: Paul Ferry, P.E. *[Signature]*
Highways Engineer

Date: **August 13, 2010**

Subject: Procedure Memorandum
New RCP Fill Height Tables

This memo is to address the new RCP Fill Height Tables that will replace the existing RCP Fill Height tables in Chapter 17: Drainage and Irrigation of the Road Design Manual.

Hydraulics has recently updated the current Fill Height Tables shown in figure 17.1A on page 17.1(4) of the Road Design Manual. Two new RCP Maximum Fill Height Tables have been created to replace the existing tables shown in Figure 17.1A. A new RCP Minimum Fill Height Table will be added to Figure 17.1A. These tables are attached. The supporting documentation has been placed on the Hydraulics website under Procedure Memorandums at the following link; RCP Fill Height Table Summary Report

The new fill height tables are to be used on all projects with a letting date after March 1st, 2011.

MAG: JRT:

copies: Distribution w/ attached
 Mark Goodman – Hydraulics Engineer
 Paul Ferry – Highways Engineer
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RCP MAXIMUM FILL HEIGHTS EMBANKMENT INSTALLATION								
PIPE	MAXIMUM FILL HEIGHT							
DIAMETER	PIPE CLASS							
(INCHES)	CLASS 2		CLASS 3		CLASS 4		CLASS 5	
	(ft)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)
12	*	*	15	4.6	22	6.7	33	10.1
18	*	*	15	4.6	22	6.7	33	10.1
24	*	*	15	4.6	22	6.7	33	10.1
30	11	3.4	15	4.6	22	6.7	33	10.1
36	11	3.4	15	4.6	22	6.7	33	10.1
42	11	3.4	15	4.6	22	6.7	33	10.1
48	11	3.4	15	4.6	22	6.7	33	10.1
54	11	3.4	14	4.3	22	6.7	33	10.1
60	10	3.0	14	4.3	21	6.4	33	10.1
66	10	3.0	14	4.3	21	6.4	32	9.8
72	10	3.0	14	4.3	21	6.4	32	9.8
78	10	3.0	14	4.3	21	6.4	32	9.8
84	10	3.0	14	4.3	21	6.4	32	9.8
90	10	3.0	14	4.3	21	6.4	32	9.8
96	10	3.0	14	4.3	21	6.4	32	9.8

* This class of pipe is not available in the sizes indicated.

Notes:

1. Embankment Installation based on MDT Detailed Drawing Nos. 603-18 and 603-19
2. This fill height table was developed using the indirect design method detailed in the ACPA Concrete Pipe Design Manual, version 19. This table applies only to pipes having "B" wall thickness.
3. Special Design is required when fill heights exceed Class 5 fill heights shown in table above.
4. For RCPA use maximum fill heights for equivalent RCP diameter listed above. RCPA is not available in Class 5.
5. Pipes should not extend into the surfacing section. Although not desirable, pipes may extend into the special borrow course.

**STRUCTURAL REQUIREMENTS FOR RCP
EMBANKMENT INSTALLATION**

Figure 17.1A

RCP MAXIMUM FILL HEIGHTS TRENCH INSTALLATION								
PIPE	MAXIMUM FILL HEIGHT (FT)							
DIAMETER	PIPE CLASS							
(FT)	CLASS 2		CLASS 3		CLASS 4		CLASS 5	
	(ft)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)
12	*	*	15	4.6	22	6.7	33	10.1
18	*	*	15	4.6	22	6.7	33	10.1
24	*	*	15	4.6	22	6.7	33	10.1
30	11	3.4	15	4.6	22	6.7	33	10.1
36	11	3.4	15	4.6	22	6.7	33	10.1
42	11	3.4	15	4.6	22	6.7	33	10.1
48	11	3.4	15	4.6	22	6.7	33	10.1
54	12	3.7	17	5.2	29	8.8	33	10.1
60	12	3.7	17	5.2	29	8.8	33	10.1
66	12	3.7	17	5.2	29	8.8	32	9.8
72	12	3.7	17	5.2	29	8.8	32	9.8
78	12	3.7	17	5.2	28	8.5	32	9.8
84	12	3.7	17	5.2	28	8.5	32	9.8
90	12	3.7	17	5.2	28	8.5	32	9.8
96	12	3.7	17	5.2	28	8.5	32	9.8

* This class of pipe is not available in the sizes indicated.

Notes:

1. Trench installation based on bedding material placed to springline of pipe and trench width equal to the outside pipe diameter, D_o plus 3 feet.
2. This fill height table was developed using the indirect design method detailed in the ACPA Concrete Pipe Design Manual, version 19. This table applies only to pipes having "B" wall thickness.
3. Special Design is required when fill heights exceed Class 5 fill heights shown in table above.
4. Class 5 fill heights are based on embankment conditions due to constructability.
5. For RCPA use maximum fill heights for equivalent RCP diameter listed above. RCPA is not available in Class 5.
6. Pipes should not extend into the surfacing section. Although not desirable, pipes may extend into the special borrow course.

**STRUCTURAL REQUIREMENTS FOR RCP
TRENCH INSTALLATION**

Figure 17.1A

RCP MINIMUM FILL HEIGHTS				
PIPE	MINIMUM FILL HEIGHT (INCHES)			
DIAMETER	PIPE CLASS			
(INCHES)	CLASS 2	CLASS 3	CLASS 4	CLASS 5
12	*	*	12	6
18	*	18	6	6
24	*	12	6	6
30	24	6	6	6
36	6	6	6	6
42	6	6	6	6
48	6	6	6	6
> 48	6	6	6	6

* This class of pipe should not be used for the size noted, for minimum cover designs.

Notes:

1. Contact Hydraulics for minimum cover requirements for RCPA.

MINIMUM COVER FOR CONCRETE PIPES

Figure 17.1A