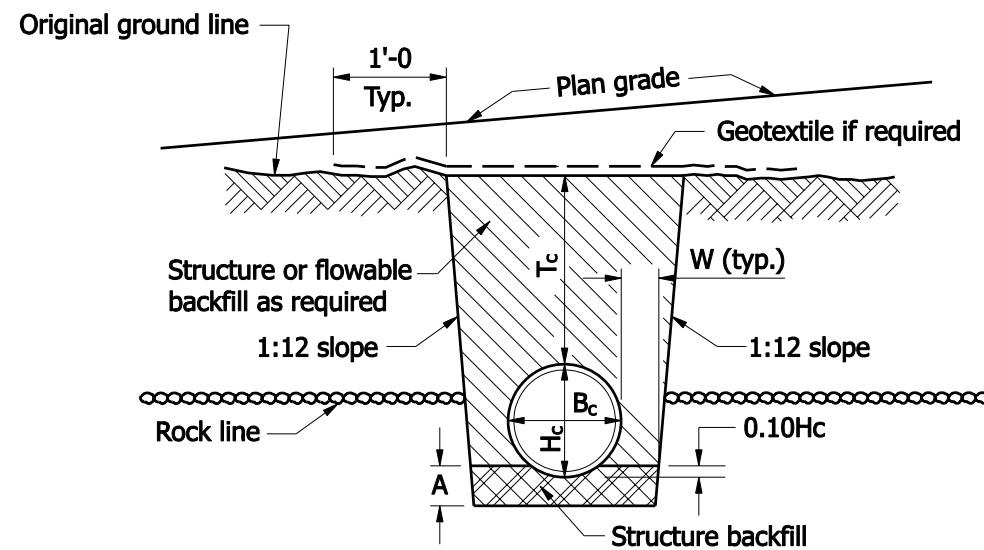


SECTION A-A



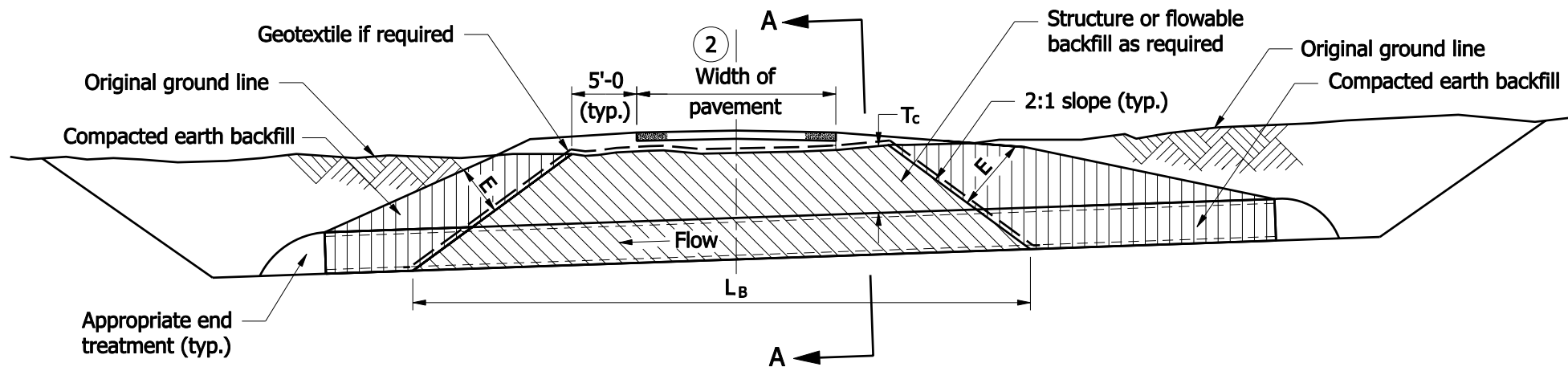
SECTION A-A  
ROCK FOUNDATION

**LEGEND**

- $H_c$  = Overall diameter or rise (typ.)
- $B_c$  = Overall diameter or span
- A = 8" min. for fill height less than 16'  
= 12" min. for fill height of 16' or more
- $T_c$  = Trench cover depth over pipe
- W =  $0.3 B_c$  or 9", whichever is greater
- E = Encasement
- $L_B$  = Backfill length measured from toe to toe of the 2:1 slopes.

**NOTES :**

1. Protective cover shall be constructed prior to running heavy equipment over installed pipes. The minimum covers are listed below:
  - a.) 1.5' for  $B_c \leq 18"$
  - b.) 3' for  $18" < B_c \leq 54"$
  - c.) 4' for  $B_c > 54"$
2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing E 715-BKFL-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.
3. Flowable or structure backfill shall be encased by compacted earth backfill. The minimum encasement shall be 2 ft. If necessary, the 2:1 slope between the flowable or structure backfill and the encasement shall be modified to maintain the minimum 2 ft encasement.



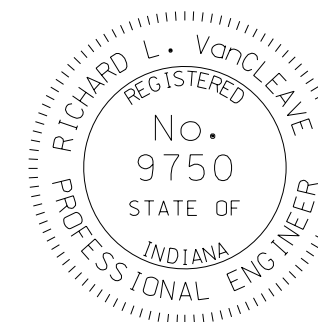
ELEVATION

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 1  
NEW ROADWAY, TRENCH

SEPTEMBER 2008

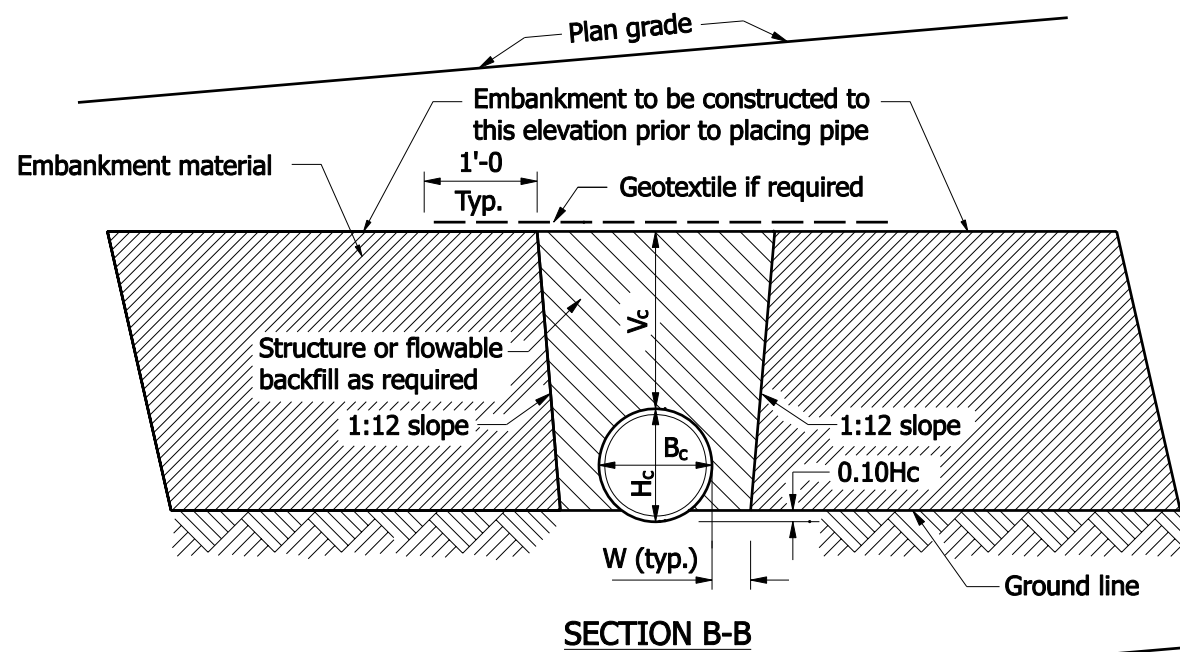
STANDARD DRAWING NO. E 715-BKFL-01



DESIGN STANDARDS ENGINEER

*/s/ Richard L. VanCleave* 09/02/08  
DESIGN STANDARDS ENGINEER DATE

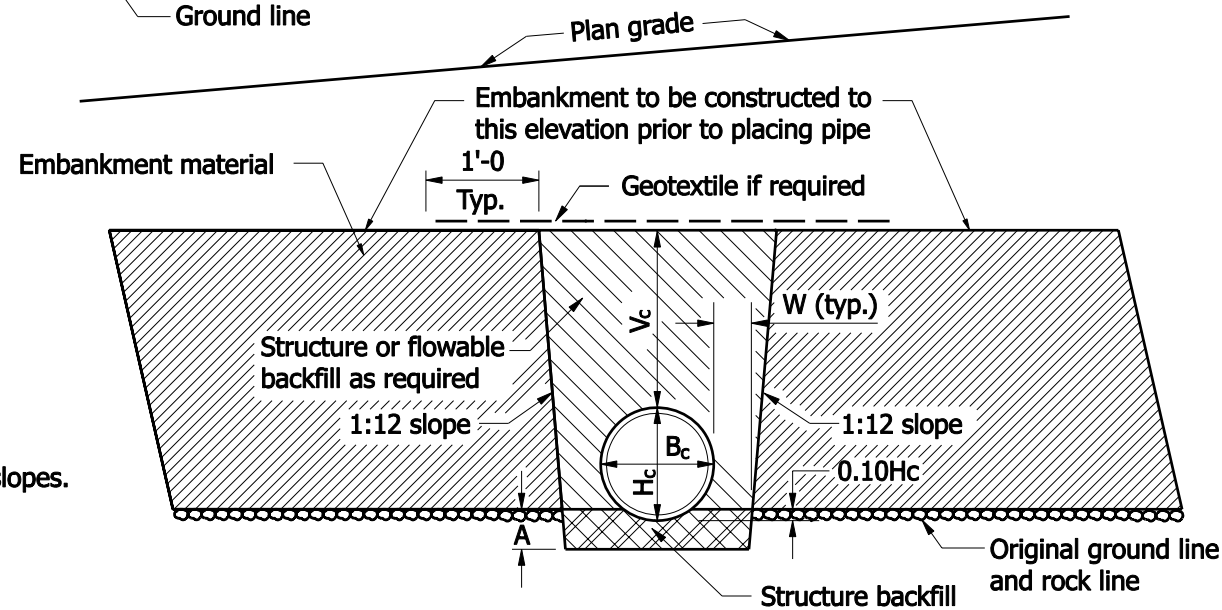
*/s/ Mark A. Miller* 09/02/08  
CHIEF HIGHWAY ENGINEER DATE



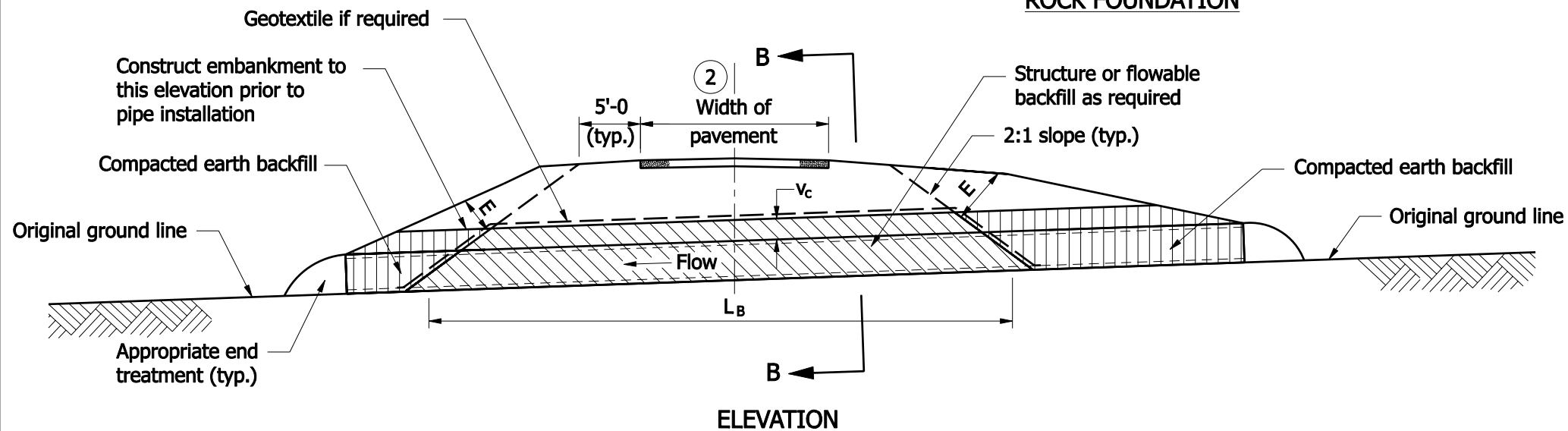
SECTION B-B

**LEGEND**

- $H_c$  = Overall diameter or rise (typ.)
- $B_c$  = Overall diameter or span
- $A$  = 8" min. for fill height less than 16'  
= 12" min. for fill height of 16' or more
- $V_c$  = 12" for  $B_c \leq 18"$   
18" for  $B_c > 18"$
- $W$  =  $0.3 B_c$  or 9", whichever is greater
- $L_B$  = Backfill length measured from toe to toe of the 2:1 slopes.



SECTION B-B  
ROCK FOUNDATION



ELEVATION

**NOTES :**

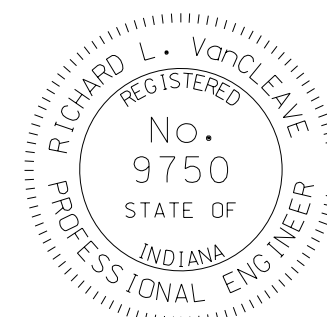
1. Protective cover shall be constructed prior to running heavy equipment over installed pipes. The minimum covers are listed below:
  - a.) 1.5' for  $B_c \leq 18"$
  - b.) 3' for  $18" < B_c \leq 54"$
  - c.) 4' for  $B_c > 54"$
2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing E 715-BKFL-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.
3. Flowable or structure backfill shall be encased by compacted earth backfill. The minimum encasement shall be 2 ft. If necessary, the 2:1 slope between the flowable or structure backfill and the encasement shall be modified to maintain the minimum 2 ft encasement.

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 1  
NEW ROADWAY, EMBANKMENT

SEPTEMBER 2008

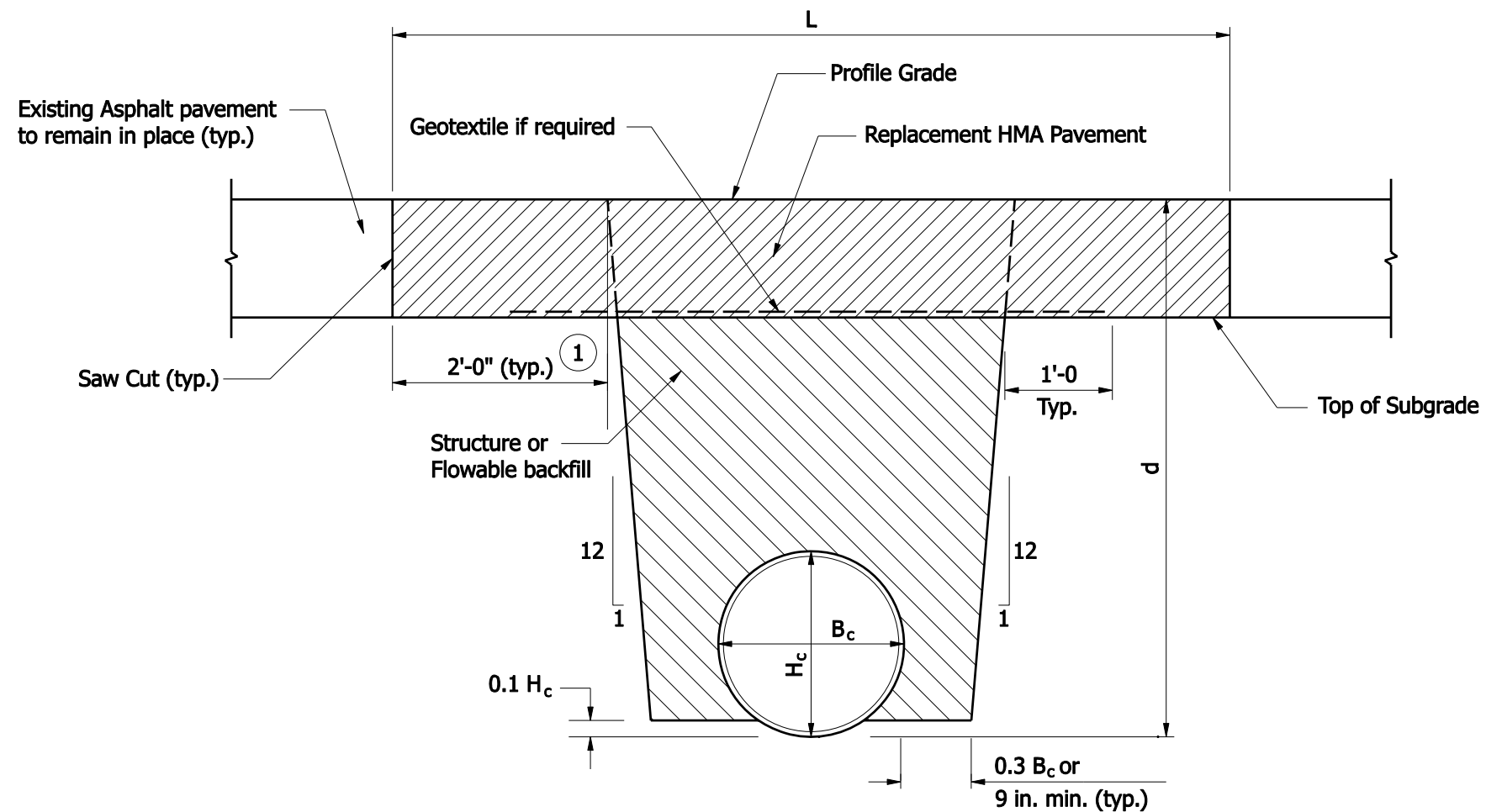
STANDARD DRAWING NO. E 715-BKFL-02



/s/ Richard L. VanCleave 09/02/08  
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/02/08  
CHIEF HIGHWAY ENGINEER DATE

DESIGN STANDARDS ENGINEER



- L = Pay limits of pavement removal and pavement replacement (ft); for cross pipe, measured along roadway centerline; for pipe parallel to roadway centerline, measured perpendicular to pipe centerline.
- B<sub>c</sub> = Overall diameter or span (in.)
- H<sub>c</sub> = Overall diameter or rise (in.)
- d = Vertical distance from flowline to profile grade (ft)

**ASPHALT REPLACEMENT PAVEMENT**

**NOTES :**

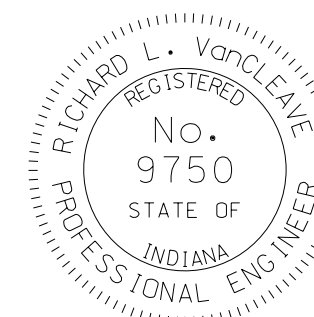
- ① Existing subgrade over this distance shall remain in place.
2. The minimum pavement sections shall be as follows:  
HMA: 165 #/syd HMA Surface, Type A,B,C or D on variable HMA Intermediate, Type A, B, C or D
3. If underdrains are present, they shall be perpetuated in accordance with the details shown on Standard Drawing E 718-UNDR-01.
4. See Standard Drawing E 715-BKFL-01 for pipe backfill trench elevation view.

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 1  
EXISTING ROADWAY, TRENCH

SEPTEMBER 2008

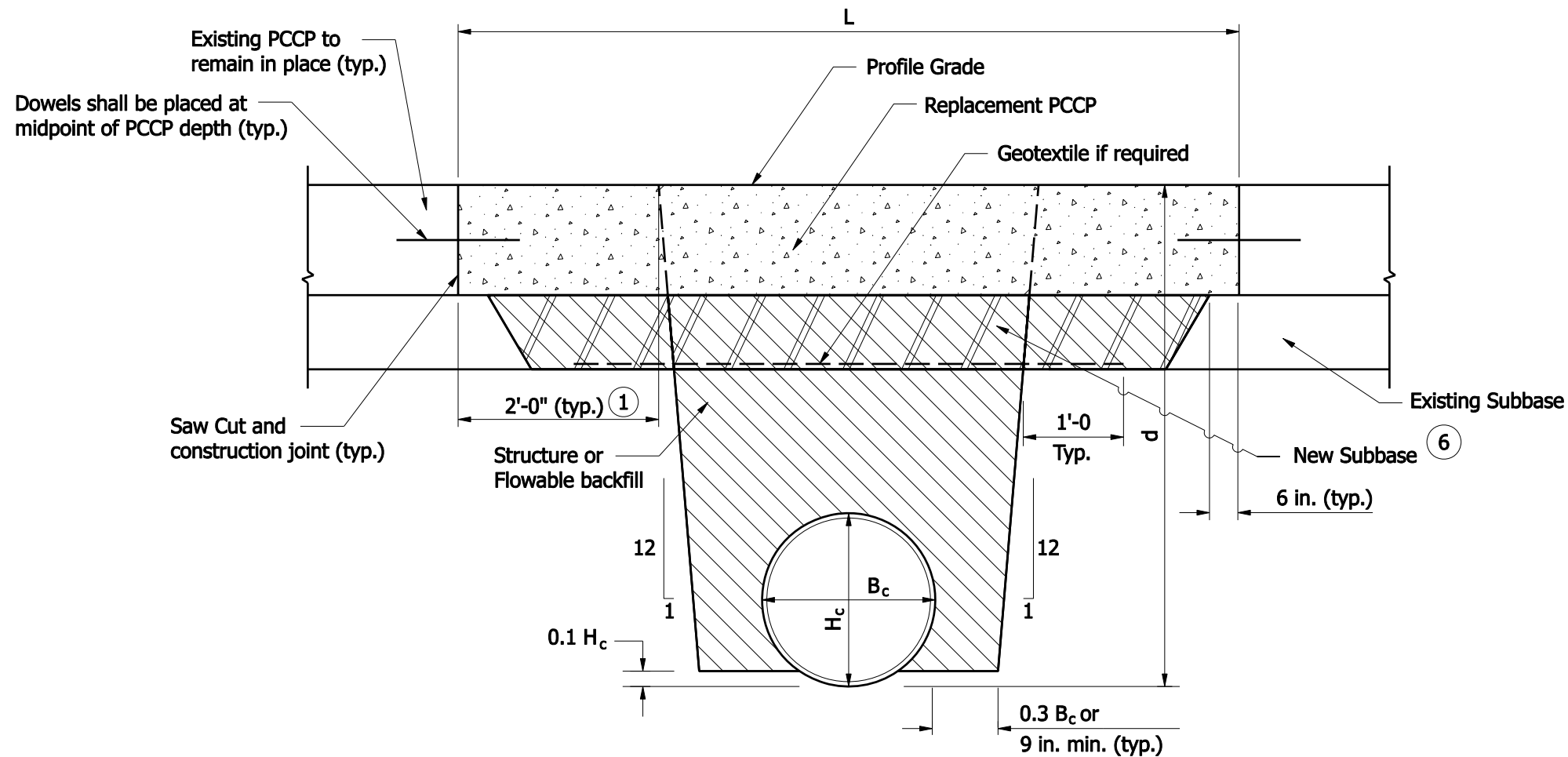
STANDARD DRAWING NO. E 715-BKFL-03



DESIGN STANDARDS ENGINEER

*/s/ Richard L. VanCleave* 09/02/08  
DESIGN STANDARDS ENGINEER DATE

*/s/ Mark A. Miller* 09/02/08  
CHIEF HIGHWAY ENGINEER DATE



- L = Pay limits of pavement removal and pavement replacement (ft);  
for cross pipe, measured along roadway centerline; for pipe parallel to  
roadway centerline, measured perpendicular to pipe centerline.
- $B_c$  = Overall diameter or span (in.)
- $H_c$  = Overall diameter or rise (in.)
- d = Vertical distance from flowline to profile grade (ft)

**PCCP REPLACEMENT PAVEMENT**

**NOTES :**

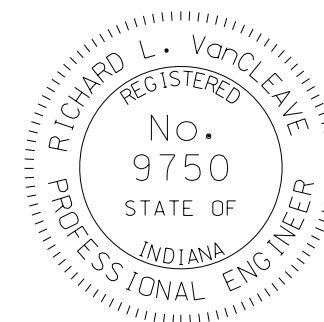
- ① Existing subgrade over this longitudinal distance shall remain in place.
2. The thickness of the replacement PCCP shall match that of the existing concrete pavement.
3. See Standard Drawing E 506-CCPP-01 for subbase, dowels, and construction joint details.
4. If underdrains are present, they shall be perpetuated in accordance with the details shown on Standard Drawing E 718-UNDR-01.
5. See Standard Drawing E 715-BKFL-01 for pipe backfill trench elevation view.
- ⑥ New subbase type shall match the existing subbase type and thickness.

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 1  
EXISTING ROADWAY, TRENCH

SEPTEMBER 2008

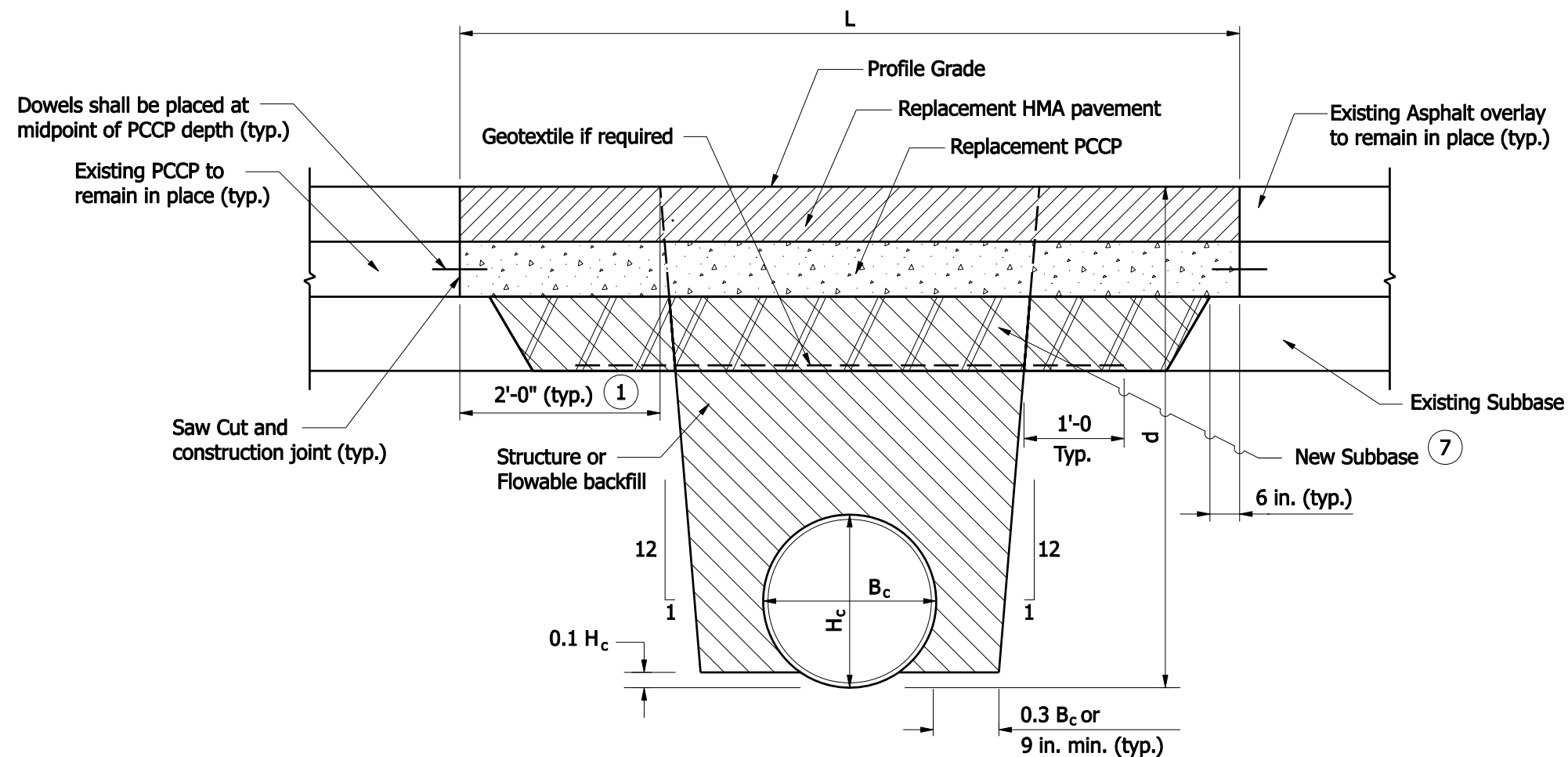
STANDARD DRAWING NO. E 715-BKFL-04



DESIGN STANDARDS ENGINEER

*/s/ Richard L. VanCleave* 09/02/08  
DESIGN STANDARDS ENGINEER DATE

*/s/ Mark A. Miller* 09/02/08  
CHIEF HIGHWAY ENGINEER DATE



- L = Pay limits of pavement removal and pavement replacement (ft);  
for cross pipe, measured along roadway centerline; for pipe parallel to  
roadway centerline, measured perpendicular to pipe centerline.
- $B_c$  = Overall diameter or span (in.)
- $H_c$  = Overall diameter or rise (in.)
- d = Vertical distance from flowline to profile grade (ft)

**COMPOSITE REPLACEMENT PAVEMENT**

**NOTES :**

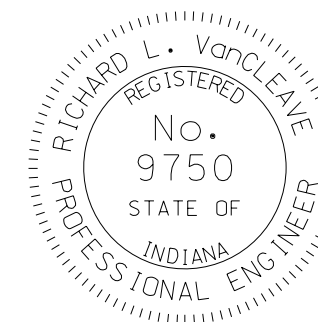
- ① Existing subgrade over this distance shall remain in place.
2. The thickness of the replacement PCCP shall match that of the existing concrete pavement.
3. The minimum pavement sections shall be as follows:  
HMA: 165 #/syd HMA Surface, Type A,B,C or D on  
variable HMA Intermediate, Type A, B, C or D
4. See Standard Drawing E 506-CCPP-01 for subbase, dowels, and construction joint details.
5. If underdrains are present, they shall be perpetuated in accordance with the details shown on Standard Drawing E 718-UNDR-01.
6. See Standard Drawing E 715-BKFL-01 for pipe backfill trench elevation view.
- ⑦ New subbase type shall match the existing subbase type and thickness.

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 1  
EXISTING ROADWAY, TRENCH

SEPTEMBER 2008

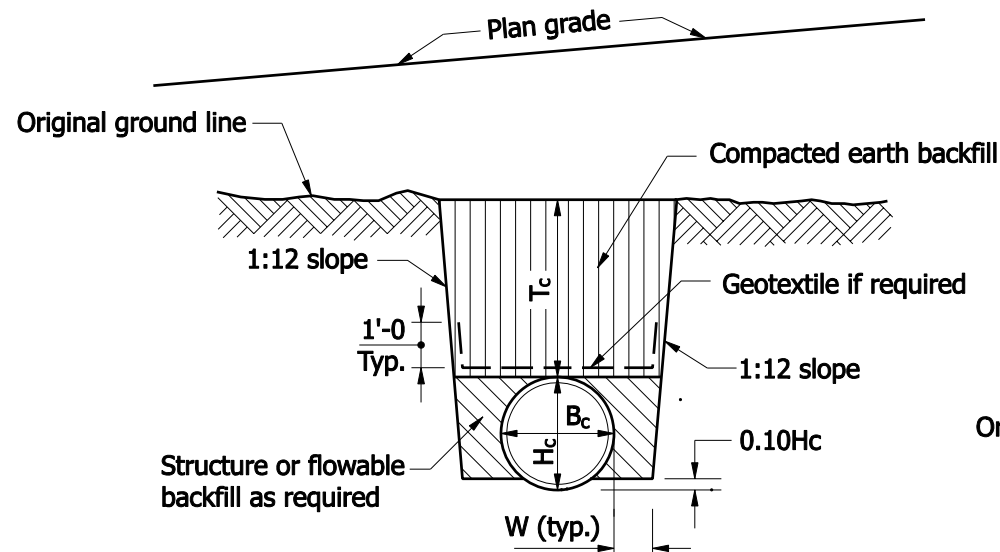
STANDARD DRAWING NO. E 715-BKFL-05



DESIGN STANDARDS ENGINEER

*/s/ Richard L. VanCleave* 09/02/08  
DESIGN STANDARDS ENGINEER DATE

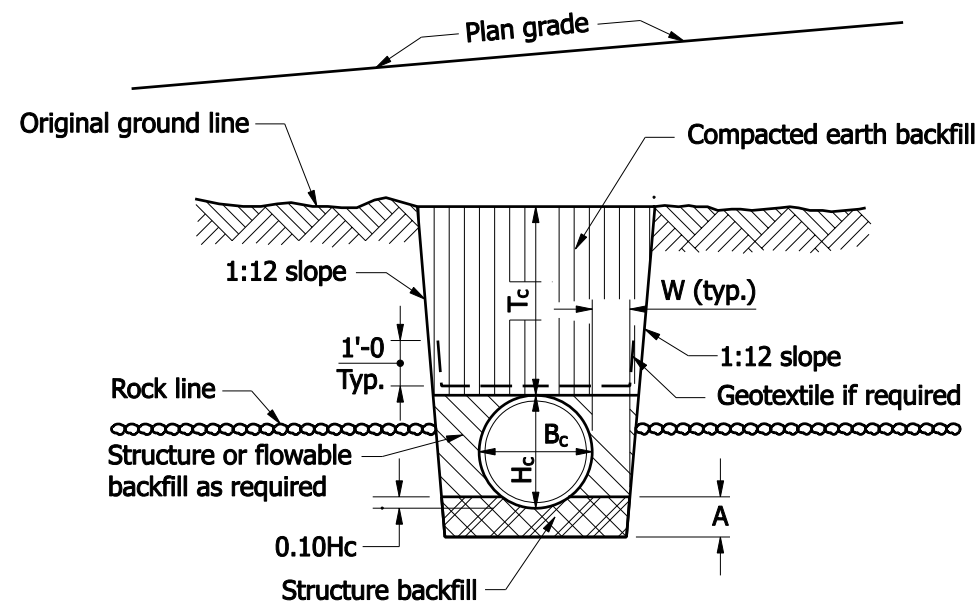
*/s/ Mark A. Miller* 09/02/08  
CHIEF HIGHWAY ENGINEER DATE



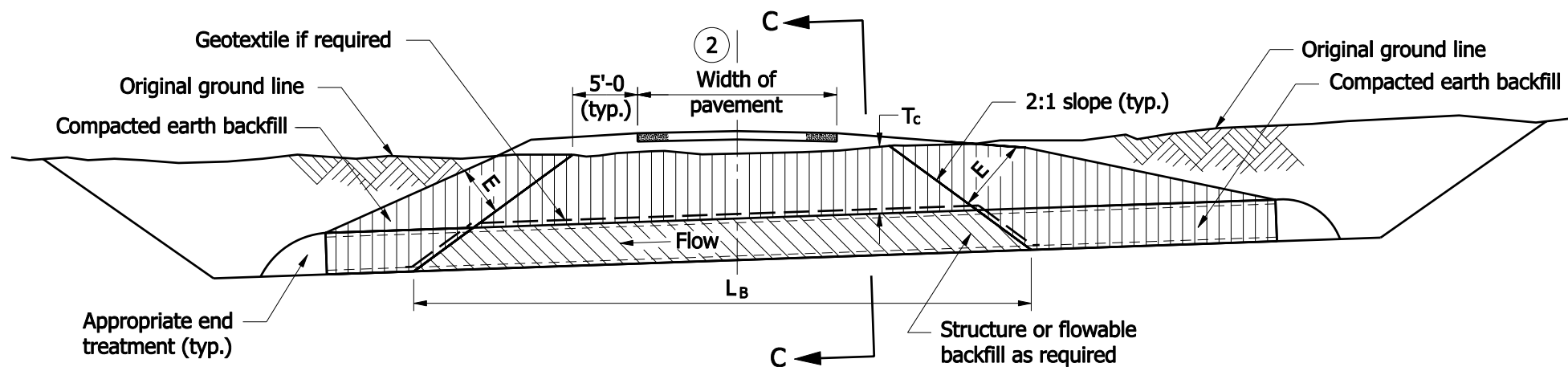
SECTION C-C

**LEGEND**

- $H_c$  = Overall diameter or rise (typ.)
- $B_c$  = Overall diameter or span
- A = 8" min. for fill height less than 16'  
= 12" min. for fill height of 16' or more
- $T_c$  = Trench cover depth over pipe
- W =  $0.3 B_c$  or 9", whichever is greater
- E = Encasement
- $L_B$  = Backfill length measured from toe to toe of the 2:1 slopes.



SECTION C-C  
ROCK FOUNDATION



ELEVATION

**NOTES :**

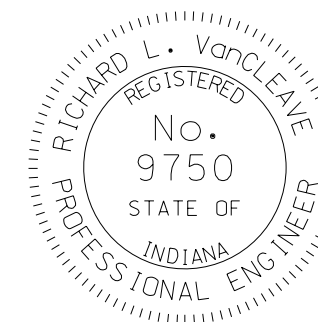
1. Protective cover shall be constructed prior to running heavy equipment over installed pipes. The minimum covers are listed below:
  - a.) 1.5' for  $B_c \leq 18"$
  - b.) 3' for  $18" < B_c \leq 54"$
  - c.) 4' for  $B_c > 54"$
2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing E 715-BKFL-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.
3. Flowable or structure backfill shall be encased by compacted earth backfill. The minimum encasement shall be 2 ft. If necessary, the 2:1 slope between the flowable or structure backfill and the encasement shall be modified to maintain the minimum 2 ft encasement.

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 2  
NEW OR EXISTING DRIVE

SEPTEMBER 2008

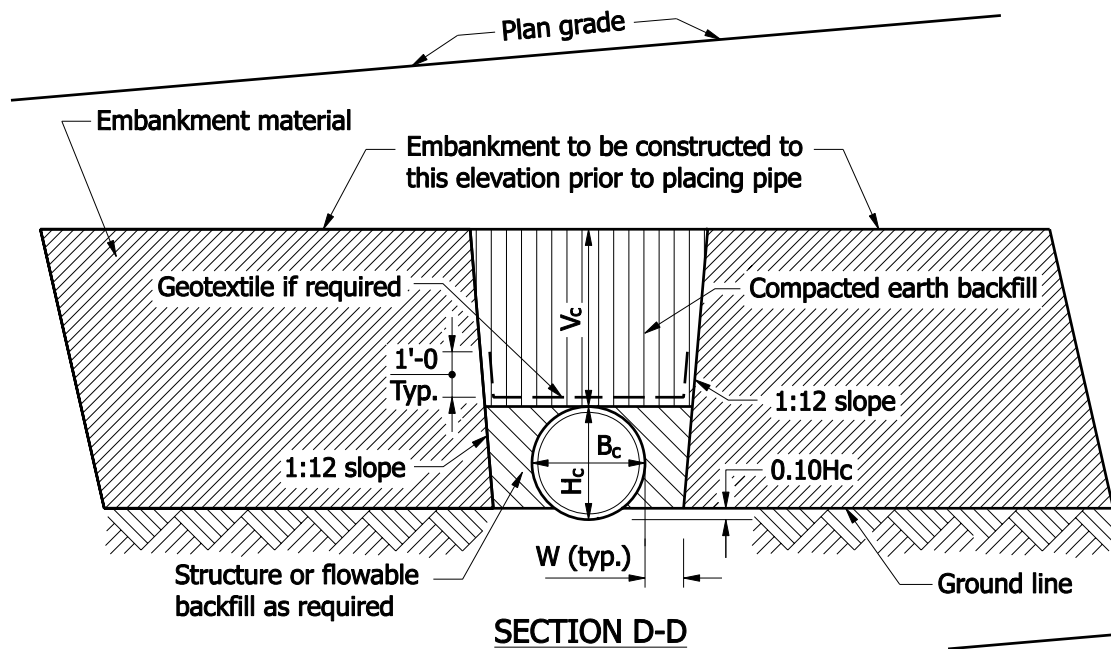
STANDARD DRAWING NO. E 715-BKFL-06



DESIGN STANDARDS ENGINEER

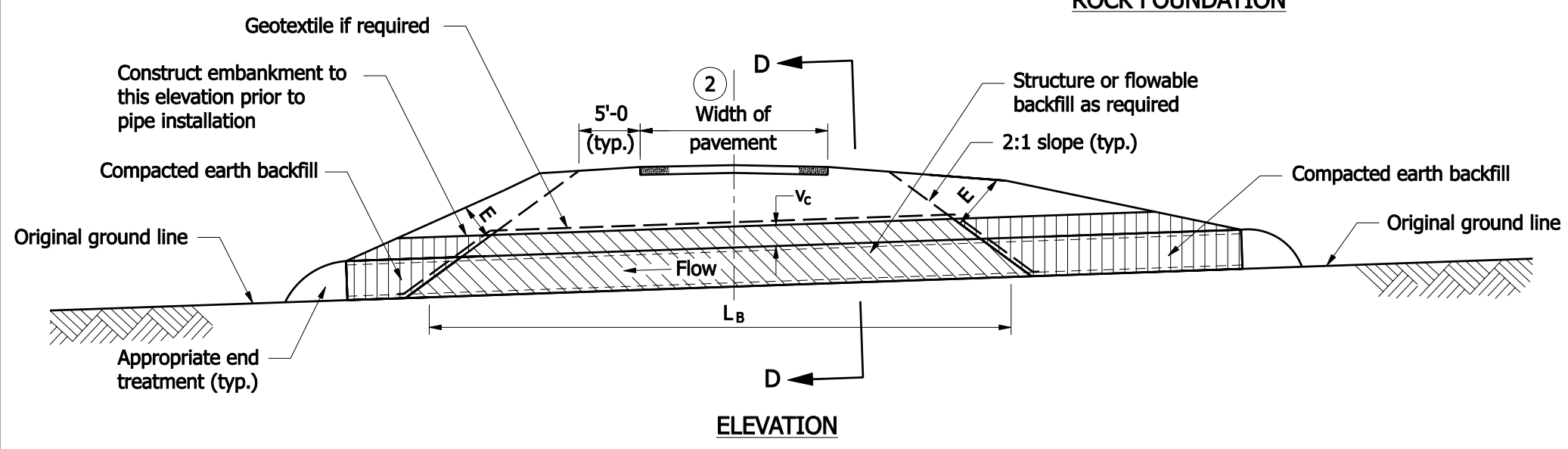
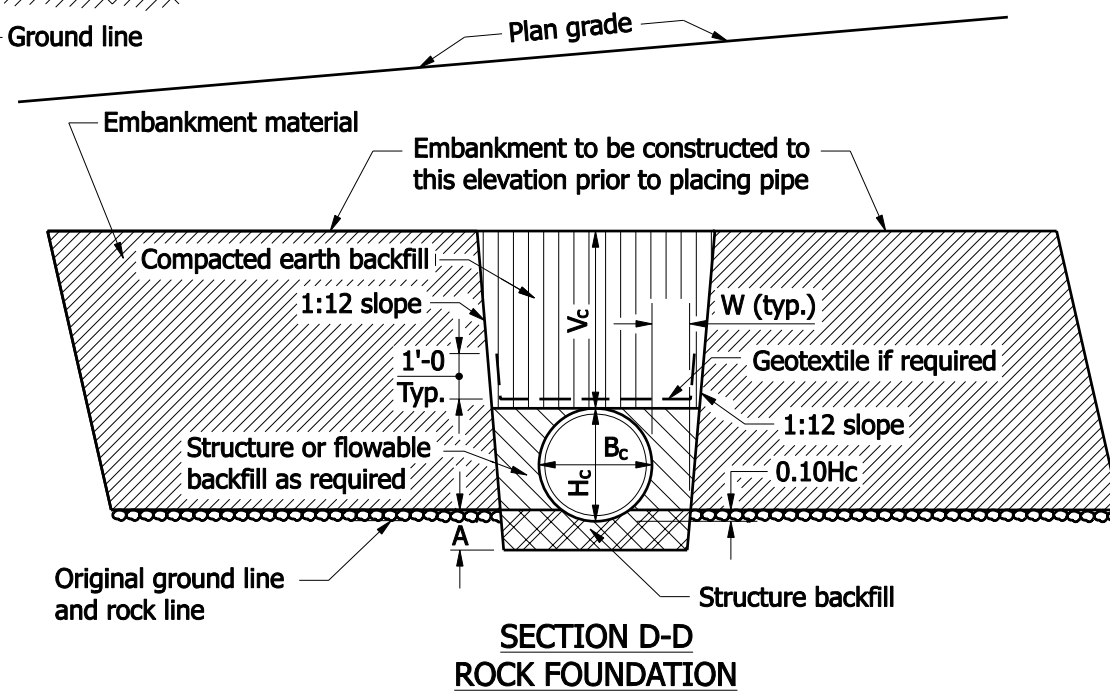
/s/ Richard L. VanCleave 09/02/08  
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/02/08  
CHIEF HIGHWAY ENGINEER DATE



**LEGEND**

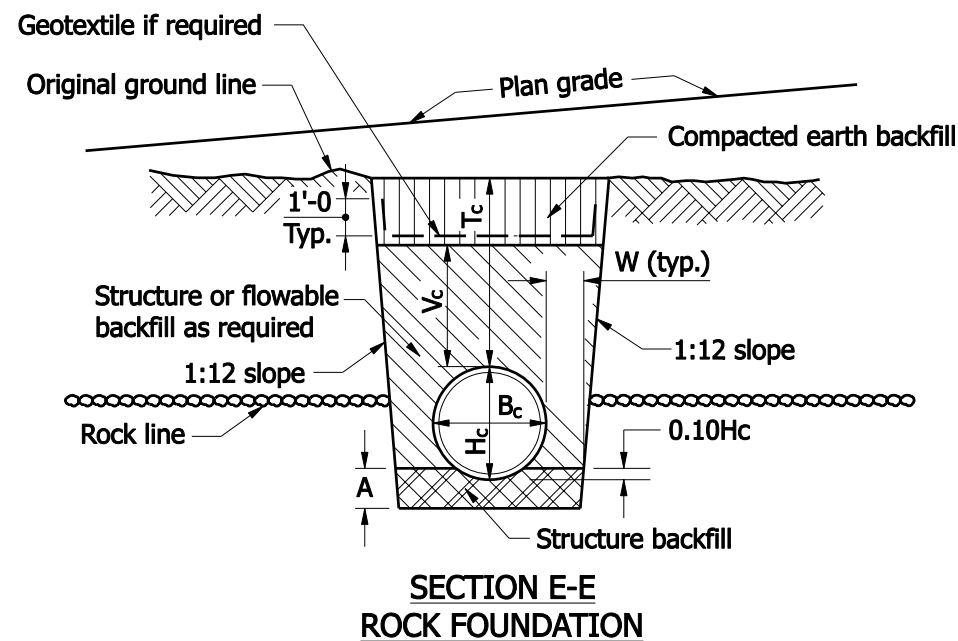
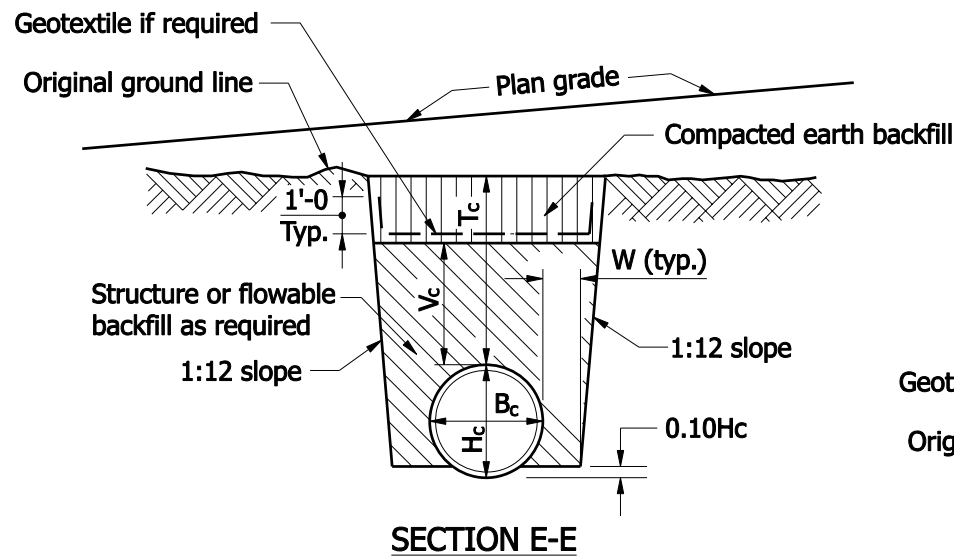
- $H_c$  = Overall diameter or rise (typ.)
- $B_c$  = Overall diameter or span
- $A$  = 8" min. for fill height less than 16'  
= 12" min. for fill height of 16' or more
- $V_c$  = 12" for  $B_c \leq 18"$   
18" for  $B_c > 18"$
- $W$  =  $0.3 B_c$  or 9", whichever is greater
- $E$  = Encasement
- $L_B$  = Backfill length measured from toe to toe of the 2:1 slopes.



**NOTES :**

1. Protective cover shall be constructed prior to running heavy equipment over installed pipes. The minimum covers are listed below:
  - a.) 1.5' for  $B_c \leq 18"$
  - b.) 3' for  $18" < B_c \leq 54"$
  - c.) 4' for  $B_c > 54"$
2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing E 715-BKFL-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.
3. Flowable or structure backfill shall be encased by compacted earth backfill. The minimum encasement shall be 2 ft. If necessary, the 2:1 slope between the flowable or structure backfill and the encasement shall be modified to maintain the minimum 2 ft encasement.

<b>INDIANA DEPARTMENT OF TRANSPORTATION</b>									
<b>PIPE BACKFILL METHOD 2 NEW OR EXISTING DRIVE</b>									
<b>SEPTEMBER 2008</b>									
<b>STANDARD DRAWING NO. E 715-BKFL-07</b>									
	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border-bottom: 1px solid black; width: 80%;"><i>/s/ Richard L. VanCleave</i></td> <td style="border-bottom: 1px solid black; width: 20%; text-align: right;"><i>09/02/08</i></td> </tr> <tr> <td style="font-size: small;">DESIGN STANDARDS ENGINEER</td> <td style="text-align: right; font-size: small;">DATE</td> </tr> <tr> <td style="border-bottom: 1px solid black;"><i>/s/ Mark A. Miller</i></td> <td style="border-bottom: 1px solid black; text-align: right;"><i>09/02/08</i></td> </tr> <tr> <td style="font-size: small;">CHIEF HIGHWAY ENGINEER</td> <td style="text-align: right; font-size: small;">DATE</td> </tr> </table>	<i>/s/ Richard L. VanCleave</i>	<i>09/02/08</i>	DESIGN STANDARDS ENGINEER	DATE	<i>/s/ Mark A. Miller</i>	<i>09/02/08</i>	CHIEF HIGHWAY ENGINEER	DATE
<i>/s/ Richard L. VanCleave</i>	<i>09/02/08</i>								
DESIGN STANDARDS ENGINEER	DATE								
<i>/s/ Mark A. Miller</i>	<i>09/02/08</i>								
CHIEF HIGHWAY ENGINEER	DATE								
DESIGN STANDARDS ENGINEER									

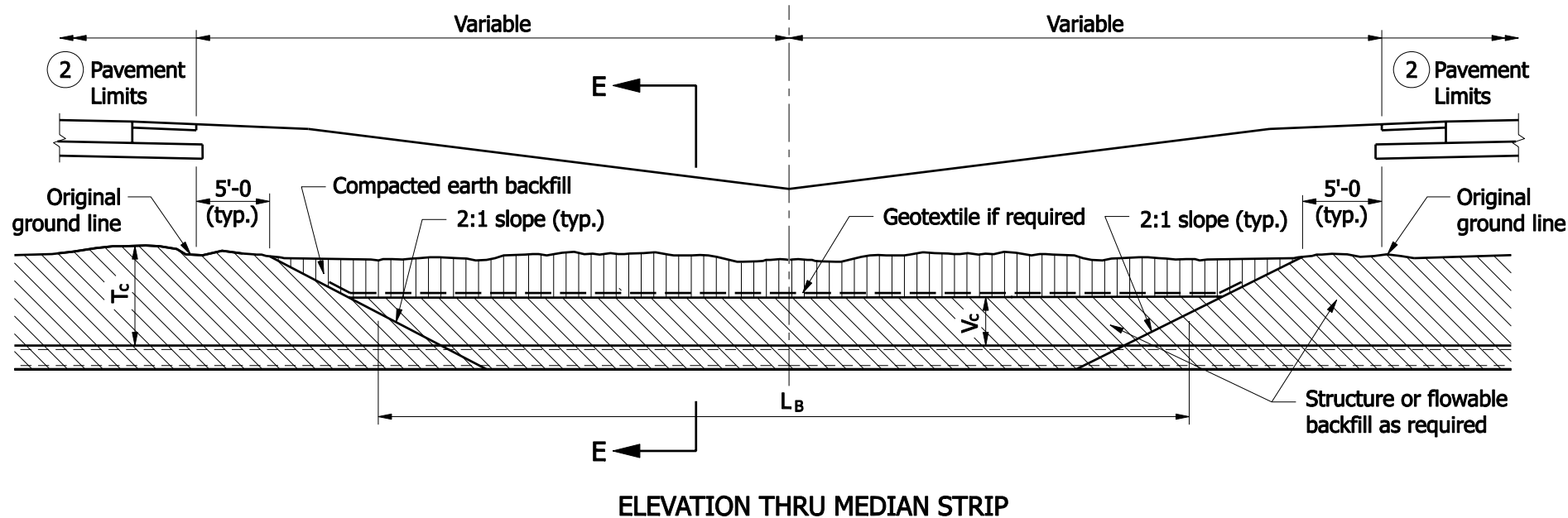


**LEGEND**

- $H_c$  = Overall diameter or rise (typ.)
- $B_c$  = Overall diameter or span
- A = 8" min. for fill height less than 16'  
= 12" min. for fill height of 16' or more
- $V_c$  = 12" for  $B_c \leq 18"$   
18" for  $B_c > 18"$
- $T_c$  = Trench cover depth over pipe
- W = 0.3  $B_c$  or 9", whichever is greater
- $L_B$  = Backfill length measured from toe to toe of the 2:1 slopes.

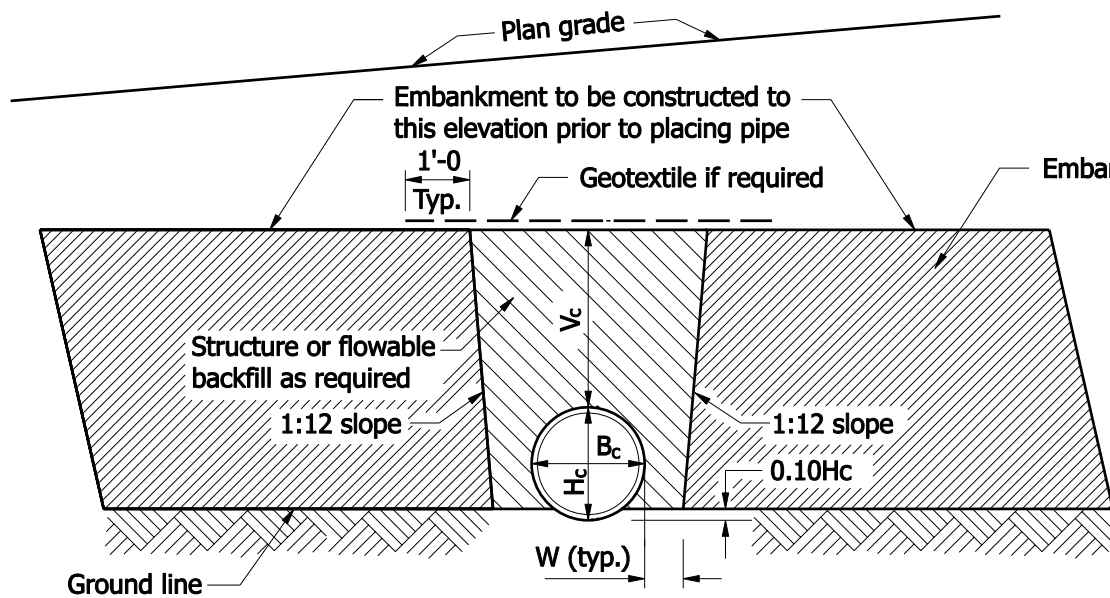
**NOTES :**

1. Protective cover shall be constructed prior to running heavy equipment over installed pipes. The minimum covers are listed below:
  - a.) 1.5' for  $B_c \leq 18"$
  - b.) 3' for  $18" < B_c \leq 54"$
  - c.) 4' for  $B_c > 54"$
2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing E 715-BKFL-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.

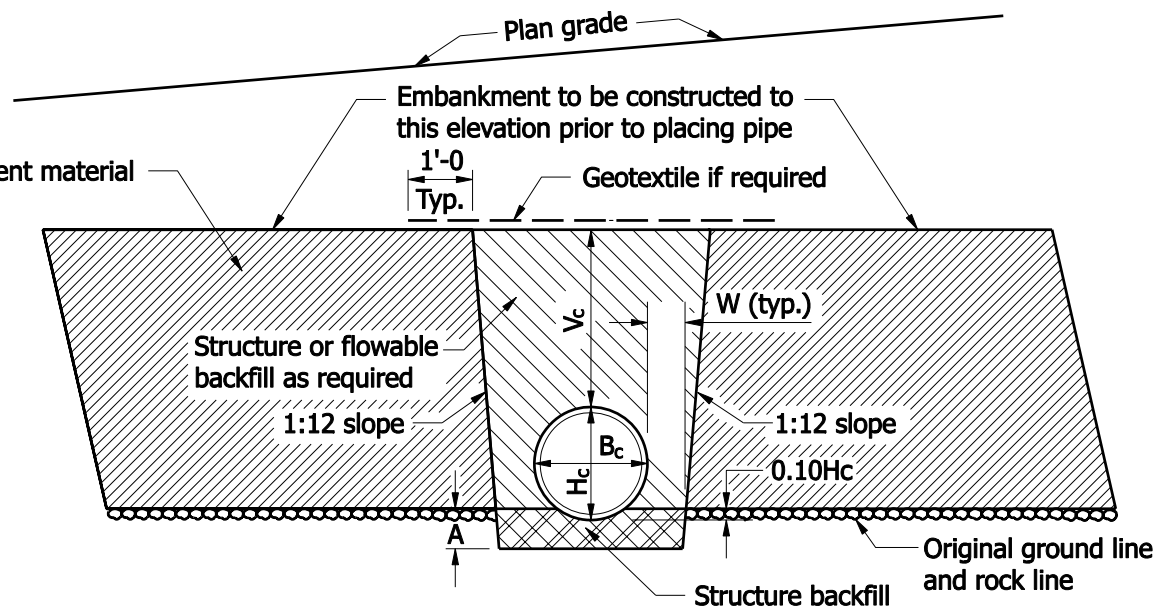


<b>INDIANA DEPARTMENT OF TRANSPORTATION</b>	
<b>PIPE BACKFILL METHOD 3 MEDIAN INSTALLATION, TRENCH</b>	
<b>SEPTEMBER 2008</b>	
<b>STANDARD DRAWING NO. E 715-BKFL-08</b>	
	<p><i>/s/ Richard L. VanCleave</i>      09/02/08 DESIGN STANDARDS ENGINEER      DATE</p> <p><i>/s/ Mark A. Miller</i>      09/02/08 CHIEF HIGHWAY ENGINEER      DATE</p>
<b>DESIGN STANDARDS ENGINEER</b>	





SECTION F-F



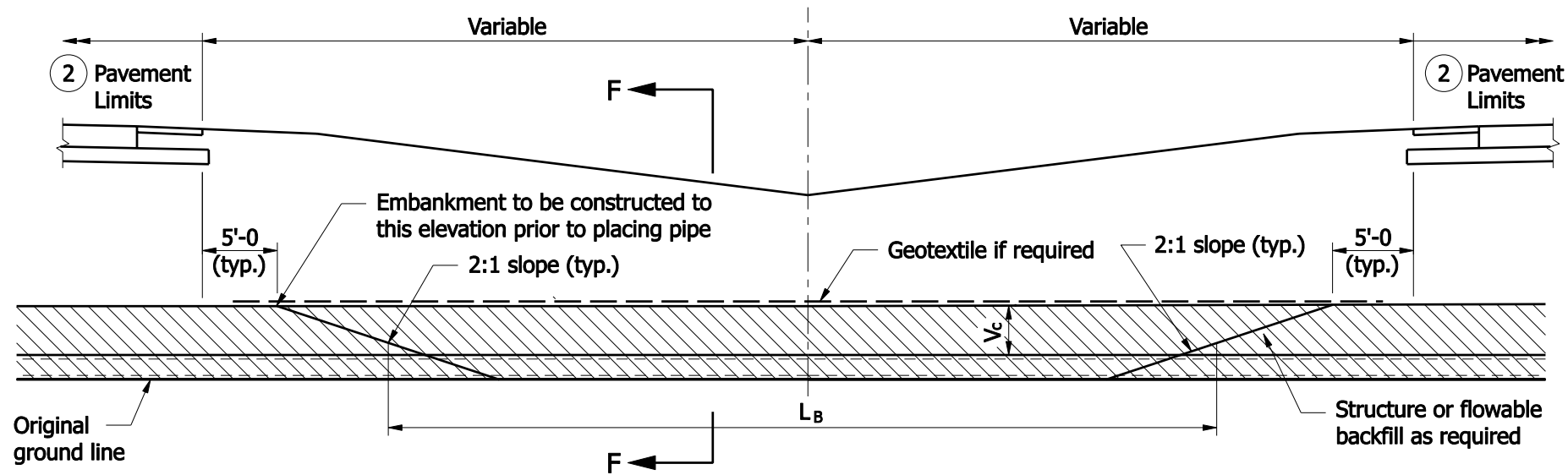
SECTION F-F  
ROCK FOUNDATION

**NOTES :**

1. Protective cover shall be constructed prior to running heavy equipment over installed pipes. The minimum covers are listed below:
  - a.) 1.5' for  $B_c \leq 18"$
  - b.) 3' for  $18" < B_c \leq 54"$
  - c.) 4' for  $B_c > 54"$
2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing E 715-BKFL-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.

**LEGEND**

- $H_c$  = Overall diameter or rise (typ.)  
 $B_c$  = Overall diameter or span  
 A = 8" min. for fill height less than 16'  
       = 12" min. for fill height of 16' or more  
 $V_c$  = 12" for  $B_c \leq 18"$   
       = 18" for  $B_c > 18"$   
 W =  $0.3 B_c$  or 9", whichever is greater  
 $L_B$  = Backfill length measured from toe to toe of the 2:1 slopes.



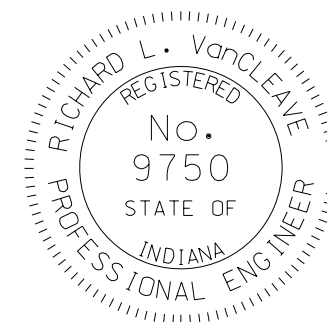
ELEVATION THRU MEDIAN STRIP

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 1  
MEDIAN INSTALLATION, EMBANKMENT

SEPTEMBER 2008

STANDARD DRAWING NO. E 715-BKFL-09



DESIGN STANDARDS ENGINEER

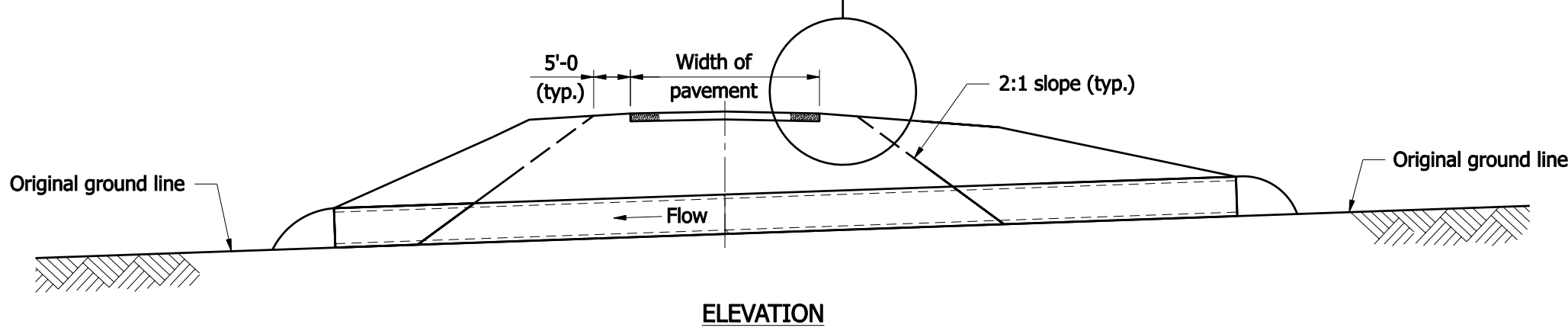
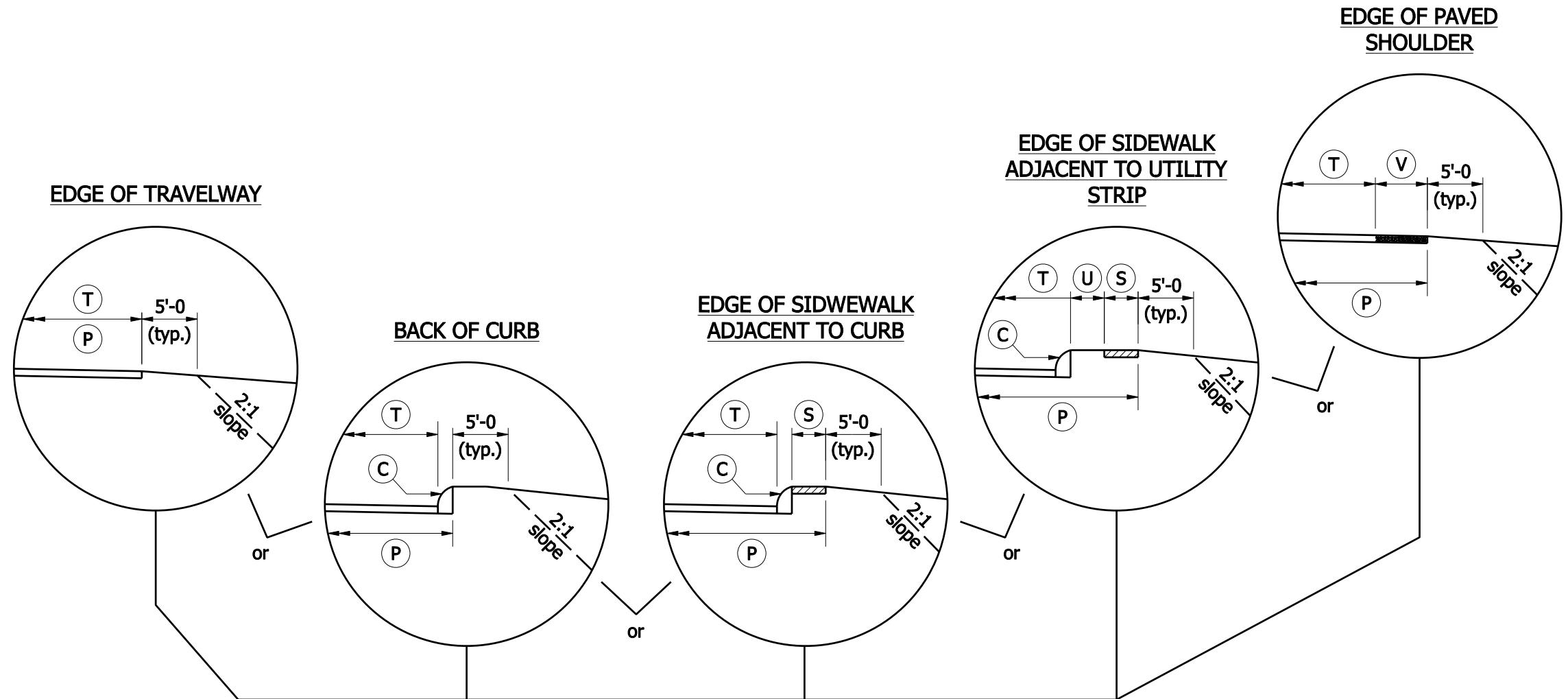
/s/ Richard L. VanCleave 09/02/08  
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/02/08  
CHIEF HIGHWAY ENGINEER DATE

**LEGEND**

- (C) Curb
- (P) Pavement Limits \*
- (S) Sidewalk
- (T) Travel Lane
- (U) Utility Strip
- (V) Paved Shoulder

\* For backfill placement and computation



INDIANA DEPARTMENT OF TRANSPORTATION	
PIPE BACKFILL LIMIT DETERMINATION	
SEPTEMBER 2007	
STANDARD DRAWING NO. E 715-BKFL-10	
	/s/ <i>Richard L. VanCleave</i> 09/04/07 DESIGN STANDARDS ENGINEER      DATE
DESIGN STANDARDS ENGINEER	/s/ <i>Mark A. Miller</i> 09/04/07 CHIEF HIGHWAY ENGINEER      DATE