NOTES:

1. Protective cover shall be constructed prior to running heavy equipment over backfilled pipes. The minimum covers are listed below:
   a. 0.5 ft for $B_p \leq 450$
   b. 0.75 ft for $450 < B_p \leq 1350$
   c. 1.2 ft for $B_p > 1350$

2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing 755-900FL-1 for pavement limits when curbs, paved shoulders, or sidewalks are present.

3. Flowable or structure backfill shall be compacted to 95% of their theoretical maximum density. The minimum embankment shall be 0.5 ft. If necessary, the 2:1 slopes between the flowable or structure backfill and the embankment shall be modified to maintain the minimum 0.5 ft embankment.

4. Geotextile required if coarse aggregate is used. Geotextile should extend 300 beyond each edge of the excavated trench or toe of the slope.

**SECTION A-A**

**ROCK FOUNDATION**

**SECTION E-A**

**ELEVATION**

**LEGEND**

- $H_p$: Overall diameter of pipe (ft)
- $B_p$: Overall diameter of span
- $A$: 250 min. for fill height less than 5.0 ft
- $T_e$: 300 min. for fill height of 5.0 ft or more
- $T_c$: Trench cover depth over pipe
- $W$: 0.3 $B_p$ or 3.0, whichever is greater
- $E$: Embankment
- $L_e$: Backfill length measured from toe to toe of the 2:1 slope.
NOTES:
1. Protective cover shall be constructed prior to running heavy equipment over buried pipes. The minimum covers are listed below:
   a) 0.5 m for \( R_e \leq 450 \)
   b) 0.8 m for \( 450 < R_e \leq 1350 \)
   c) 1.2 m for \( R_e > 1350 \)
2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing 7LS-100FL-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.
3. Flowsheet or structure backfill shall be extended by compacted earth backfill. The minimum extension shall be 0.5 m. If necessary, the 2:1 slope between the flowsheet or structure backfill and the embankment shall be modified to maintain the minimum 0.5 m extension.
4. Geotextile required if coarse aggregate is used. Geotextile should extend 300 beyond each edge of the extended trench of toe of slope.

LEGEND
- \( R_e \) = Overall diameter or rise (ft)
- \( R_i \) = Overall diameter or span
- \( A \) = 250 min. for fill height less than 5.0 m
- 300 min. for fill height of 5.0 m or more
- \( V_c \) = 300 for \( R_i \leq 450 \)
- 450 for \( R_i > 450 \)
- \( W \) = 0.3 \( R_e \) or 330, whichever is greater
- \( L_e \) = Backfill length measured from toe to toe of the 2:1 slopes.

SECTION R-8
ROCK FOUNDATION

All dimensions are in feet unless otherwise specified.

INDIANA DEPARTMENT OF TRANSPORTATION
PIPE BACKFILL METHOD 1
NEW ROADWAY, EMBANKMENT
HMA REPLACEMENT PAVEMENT

L = Pay limits of pavement removal and pavement replacement (m);
for cross pipe, measured along roadway centerline; for pipe parallel to
roadway centerline, measured perpendicular to pipe centerline.

Bc = Overall diameter or span (mm)
Hc = Overall diameter or rise (mm)
d = Vertical distance from flange to profile grade (m)

NOTES:
1. Existing subgrade and this subbase shall remain in place.
2. The minimum pavement sections shall be as follows:
   - HMA: 50 kg/m³ HMA Surfacing, Type A, B, C or D on
     variable HMA Intermediate, Type A, B, C or D
3. If underdrains are present, they shall be purged prior to
   the details shown on Standard Drawing 712-UNDER-01.
5. Geotextile required if coarse aggregate is used. Geotextile should extend
   300 beyond each edge of the excavated trench.

All dimensions are in mm unless otherwise specified.

INDIANA DEPARTMENT OF TRANSPORTATION
PIPE BACKFILL METHOD 1
EXISTING ROADWAY, TRENCH
NOTES:
1. Existing subgrade over this longitudinal distance shall remain in place.
2. The thickness of the replacement PCOP shall match that of the existing concrete pavement.
4. If underdrains are present, they shall be permitted in accordance with the details shown on Standard Drawing 718-UN06-01.
5. See Standard Drawing 718-BR01-01 for pipe backfill trench elevation view.
6. Geotextile required if coarse aggregate is used. Geotextile should extend 300 beyond each edge of the excavated trench.
7. New subbase type shall match the existing subbase type and thickness.

PCOP REPLACEMENT PAVEMENT

L = Key limit of pavement removal and pavement replacement (m); for cross pipe, measured along roadway centerline for pipe parallel to roadway centerline, measured perpendicular to pipe centerline.
Rc = Overall diameter or span (mm)
Hc = Overall diameter or rise (mm)
d = Vertical distance from flowline to profile grade (m)

INDIANA DEPARTMENT OF TRANSPORTATION
PIPE BACKFILL, METHOD 1
EXISTING ROADWAY, TRENCH

All Dimensions are in mm unless otherwise specified.
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: 90 kg/m² poly HMA Surfacing, Type A, B, C or D
   - Intermediate HMA: 90 kg/m² poly HMA Surfacing, Type A, B, C or D
5. If underground utilities are present, they shall be rerouted in accordance with the details shown on Standard Drawing 718-UNDER-01.
7. geocell required ifgravelaggregate is used. geocell shall extend 300 beyond each edge of the excavated trench.
8. New subbase type shall match the existing subbase type and thickness.

**COMPOSITE REPLACEMENT PAVEMENT**

- L = Full extent of pavement removal and replacement (ft)
- Bc = Overall diameter of pipe (in)
- Hc = Overall diameter or pipe elevation (mm)
- d = Vertical distance from subgrade to profile grade (m)

All dimensions in mm unless otherwise specified.
NOTES:
1. Protective cover shall be constructed prior to running heavy equipment over installed pipes. The minimum covers are listed below:
   a) 0.5 m for \( B_e \leq 450 \)
   b) 0.9 m for \( 450 < B_e \leq 1350 \)
   c) 1.2 m for \( B_e > 1350 \)

2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Design 713-889-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.

3. Permeable or structure backfill shall be allowed by compacted earth backfill.
   The minimum embankment shall be 0.5 m. If necessary, the 2:1 slope between the flexible or structure backfill and the embankment shall be modified to maintain the minimum 0.5 m embankment.

4. Geotextile required if coarse aggregate is used. Geotextile should extend 600 beyond each edge of the excavated trench or toe of slope.

LEGEND:
- \( H_e \) = Overall diameter or rise (typ)
- \( D_e \) = Overall diameter or span
- \( A \) = 20m min for fill height less than 5.0 m
   = 30m min for fill height of 5.0 m or more
- \( T_e \) = Trench cover depth over pipe
- \( W \) = 0.3 \( B_e \) or 20, whichever greater
- \( E \) = Embankment
- \( L_e \) = 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 pipe. The minimum covers are listed below:
   a. 0.5 m for $B_e < 450$
   b. 0.6 m for $150 < B_e < 450$
   c. 1.2 m for $B_e > 150$

2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing 71.5-9160-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.

3. Flexible or structure backfill shall be amended by compacted earth backfill. The minimum amendment shall be 0.6 m. If necessary, the 2:1 slope between the topsoil and structure backfill and the amendment shall be modified to maintain the minimum 0.6 m amendment.

4. Geasdale is required if coarse aggregate is used. Geasdale should extend 1.2 m beyond each edge of the controlled trench or toe of slope.
**NOTES:**

1. Protective cover shall be constructed prior to running heavy equipment over installed pipes. The minimum covers are listed below:
   a) 0.5 m for $B_s < 450$
   b) 0.8 m for $450 < B_s < 1250$
   c) 1.2 m for $B_s > 1250$

2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing 715-49041-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.

3. Geotextile required if coarse aggregate is used. Geotextile should extend 300 beyond each edge of the excavated trench or line of slope.

**LEGEND**

- $H_s$: Overall diameter or rise (typ.)
- $B_s$: Overall diameter or span
- $A$: 200 min. for fill height less than 5.0 m
- $B$: 300 min. for fill height of 5.0 m or more
- $V_e$: 300 for $B_s < 450$
- 400 for $B_s > 450$
- $T_s$: Trench cover depth over pipe
- $W$: 0.3 $B_s$ or 250, whichever is greater
- $L_s$: Backfill length measured from toe to toe of the 2:1 slope.

**INFORMATION**

- 715-49040-10
- Indiana Department of Transportation

**PIPE BACKFILL METHOD 3**

**MEDIAN INSTALLATION, TRENCH**

**ELEVATION THRU MEDIAN STRIP**
NOTES:

1. Protection cover shall be constructed prior to running heavy equipment over trench pipe. The minimum covers are listed below:
   a) 1.5 ft for $R_e < 18^\circ$
   b) $3\text{ ft}$ for $18^\circ < R_e < 54^\circ$
   c) $6\text{ ft}$ for $R_e > 54^\circ$

2. For backfill purposes, paved shoulders, curbs, and shoulders are considered pavement. See Standard Drawing E-715-961-10 for pavement limits when curbs, paved shoulders, or shoulders are present.

3. Flowable or structure backfill shall be excavated by compacted earth backfill. The minimum backfill shall be 2 ft. If necessary, the 1:1 slope between the flowable or structure backfill and the excavation shall be modified to maintain the minimum 2 ft. excavation.

4. Geotextile required if coarse aggregate is used. Geotextile should extend 1 foot beyond each edge of the excavated trench or toe of slope.

LEGEND

- $H_e = \text{Overall diameter or fill (fps)}$
- $B_e = \text{Overall diameter or span}$
- $A = \text{12\text{ ft}}$ min. for fill height less than 15\text{ ft}$
- $B = \text{12\text{ ft}}$ min. for fill height of 15\text{ ft} or more
- $T_e = \text{Excavation depth over pipe}$
- $W = 0.5 \times B_e$ or $5\text{ ft}$, whichever is greater
- $E = \text{Excavation}$
- $L_e = \text{Backfill length measured from toe to toe of the 2:1 slope}$

INDIANA DEPARTMENT OF TRANSPORTATION
PIPE BACKFILL METHOD 1
NEW ROADWAY, TRENCH
NOTES:

1. Protective cover shall be constructed prior to running heavy equipment over backfilled pipe. The minimum covers are listed below:
   a) 1' 0" for $R_0 \leq 18''$
   b) 3' 0" for 18'' < $R_0 \leq 54''$
   c) 4' 0" for $R_0 > 54''$

2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing E715-9801 for pavement limits when curbs, paved shoulders, or sidewalks are present.

3. Fluvialite or structure backfill shall be constructed by compacted earth backfill.
   The minimum embankment shall be 2' 0". If necessary, the 2' 0" slope between the fluvialite or structure backfill and the embankment shall be modified to maintain the minimum 2' 0" embankment.

4. Geotextile required if coarse aggregate is used. Geotextile should extend 1 foot beyond each edge of the excavated trench or toe of slope.

LEGEND:

- $H_0$: Overall diameter of pipe (ft)
- $R_0$: Overall diameter of span
- $A$: 9" min. for fill height less than 16'
- $V_0$: 12" min. for fill height of 16' or rain
- $U_0$: 12" for $R_0 \leq 18''$
- 18" for $R_0 > 18$
- $W$: 0.5 $R_0$ or 3', whichever is greater
- $L_0$: Backfill length measured from toe to toe of the 2:1 slopes.

SECTION A-B

ROCK FOUNDATION

ELEVATION

INDIANA DEPARTMENT OF TRANSPORTATION
PIPE BACKFILL METHOD 1
NEW ROADWAY, EMBANKMENT
NOTES:

1. Existing subgrade over this distance shall remain in place.
2. The minimum pavement sections shall be as follows:
   - HMA: 185 ft. by 5 ft. HMA Surface, Type A, B, C, or D
   - Variable HMA Intermediate, Types A, B, C, or D
3. If underdrains are present, they shall be purged and cleaned in accordance with the details shown on Standard Drawing E 718-UNDER-01.
5. Geotextile required if coarse aggregate is used. Geotextile should extend 1 foot beyond each edge of the excavated trench.

HMA REPLACEMENT PAVEMENT

L = Pay limits of pavement removal and pavement replacement (ft);
   for corps pipe, measured along roadway centerline; for pipe parallel to
elevation centerline, measured perpendicular to pipe centerline.

\( R_e \) = Overall diameter or span (ft)

\( H_e \) = Overall diameter or rise (ft)

\( d \) = Vertical distance from finished to profile grade (ft)

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 1
EXISTING ROADWAY, TRENCH
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.
4. If underdrains are present, they shall be perforated in accordance with the details shown on Standard Drawing E 715-UNDER-01.
6. Geotextile required if crush aggregate is used. Geotextile should extend 1 foot beyond each edge of the excavated trench.
7. New subbase type shall match the existing subbase type and thickness.

PCCP REPLACEMENT PAVEMENT

L = Key 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 = Overall diameter or span (ft)

H = Overall diameter or rise (ft)

d = Vertical distance from florline to profile grade (ft)

INDIANA DEPARTMENT OF TRANSPORTATION
PIPE BACKFILL, METHOD 1
EXISTING ROADWAY, TRENCH
NOTES:

1. Excavated subgrade over the distance shall remain in place.
2. The thickness of the replacement PPCP shall match that of the existing concrete pavement.
3. The minimum pavement thickness shall be as follows:
   - HMA: 1 1/2" @ 94°F HMA Surface, Type A, B, C or D on variable HMA Intermediate, Type A, B, C or D.
5. If underdrains are present, they shall be continued in accordance with the details shown on Standard Drawing E 715-UNINS-01.
7. Geotextile required if coarse aggregate is used. Geotextile should extend 1 foot beyond each edge of the excavated trench.
8. New subbase type shall match the existing subbase type and thickness.

**COMPOSITE REPLACEMENT PAVEMENT**

- 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 (ft.)
- $h_C$ = Overall diameter or rise (ft.)
- d = Vertical distance from baseline to profile grade (ft.)

**INDIANA DEPARTMENT OF TRANSPORTATION**

**PIPE BACKFILL METHOD 1**

**EXISTING ROADWAY, TRENCH**
The document contains diagrams and text related to pipe backfill methods, specifically for Class II, IV, V, and VI drives. The text includes instructions for the construction and backfill of pipelines, with specific notes on grading, structural design, and backfill materials. The diagrams illustrate the cross-sections and elevations of the pipelines with annotations for various dimensions and requirements. The notes section contains detailed specifications for the backfill materials and construction procedures.
3 Geotextile

Original ground line
Compacted earth backfill

Structure of flexible backfill as required
1:12 slope

Plan grade
W (typ.)
0.10%e

SECTION E-E

LEGEND

H = Overall diameter of hub (typ.)
B = Overall diameter of span
A = 8\" min. for fill height less than 16\"
B = 12\" min. for fill height of 16\" or more
V = 15\" for B < 16\"
V = 18\" for B > 16\"
T = Trench cover depth over pipe
W = 0.3 B, or 5\", whichever is greater
L4 = Backfill length measured from toe to toe of the 2:1 slope.

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 < 16\"
   b) 3\" for 16\" < B < 36\"
   c) 6\" for B > 36\"

2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing E-715-005-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.

3. Geotextile required if coarse aggregate is used. Geotextile should extend 1 foot beyond each edge of the excavated trench or toe of slope.

SECTION E-E
ROCK FOUNDATION

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 3

MEDIAN INSTALLATION, TRENCH

ELEVATION THRU MEDIAN STRIP
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 \( d_b \leq 15" 
   b) 3" for \( 15" < d_b \leq 34" 
   c) 4" for \( d_b > 34" 

2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing E715-55F-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.

3. Geotextile required if coarse aggregate is used. Geotextile should extend 1 foot beyond each edge of the excavated trench or toe of slope.

LEGEND:
- \( d_b \) = Overall diameter or rise (typ.)
- \( R_b \) = Overall diameter or span
- \( A \) = 18" min. for fill height less than 18"; 24" min. for fill height of 18" or more
- \( V_b \) = 12" for \( d_b \leq 18" 
   18" for \( d_b > 18" 
- \( W \) = 0.3 \( d_b \) or 9", whichever is greater
- \( L_b \) = Backfill length measured from toe to toe of the 2:1 slopes.

INDIANA DEPARTMENT OF TRANSPORTATION
PIPE BACKFILL METHOD 1
MEDIAN INSTALLATION, EMBANKMENT