

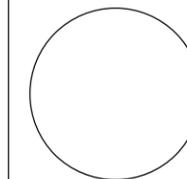
Typical Roadway Section - Center Crown

Note:

Normal sections shown may be appropriately modified for areas specifically designated by the Engineer.

STATION	TO STATION	LOCATION	WIDTH
0+00	46+39	LAKE/CAMPGROUND	12'
100+00	115+06	HEADING WEST	12'
200+00	213+62	WEST LOOP	12'
300+00	304+80	CAMPGROUND	12'
400+00	411+77	SOUTH LOOP	12'
500+00	571+02	MAIN ROAD	18'

CONSULTANT:



IOWA DEPARTMENT OF NATURAL RESOURCES

ENGINEERING SERVICES - WALLACE BUILDING
502 E. 9TH ST., DES MOINES, IA 50319-0034



TYPICAL CROSS SECTIONS AND DETAILS

ROAD MAINTENANCE FOR:

STEPHENS STATE FOREST - LUCAS UNIT

LUCAS COUNTY

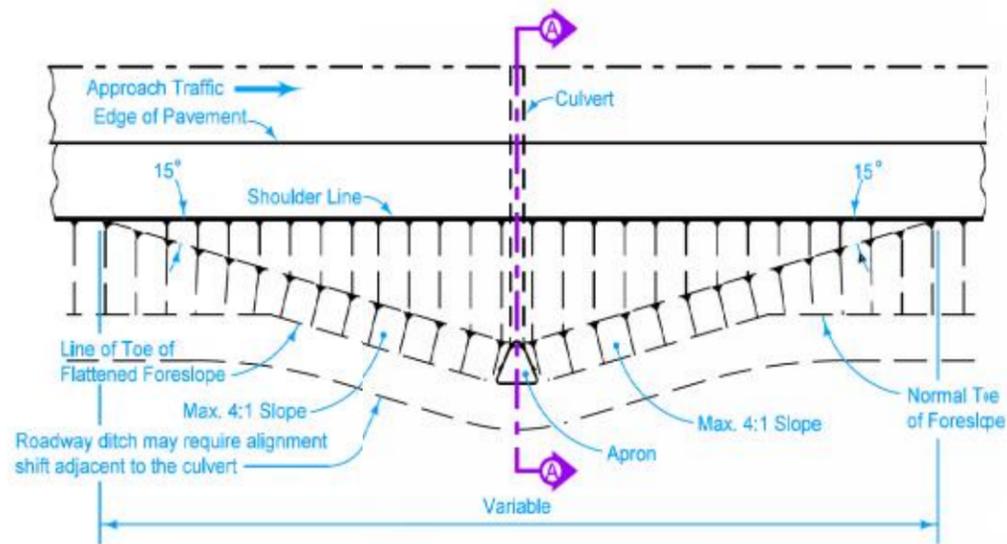
NO. BY DATE REVISION

DRAWN BY: PROJECT NUMBER:
BLF 21-05-59-01

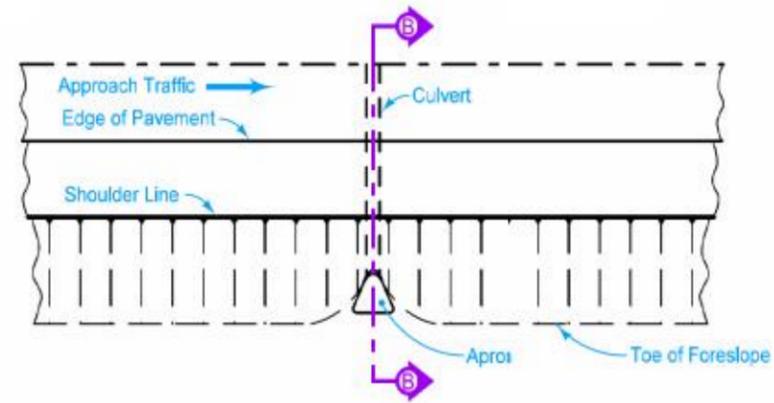
CHK'D BY: DATE:
OCT 2020

SHEET No:

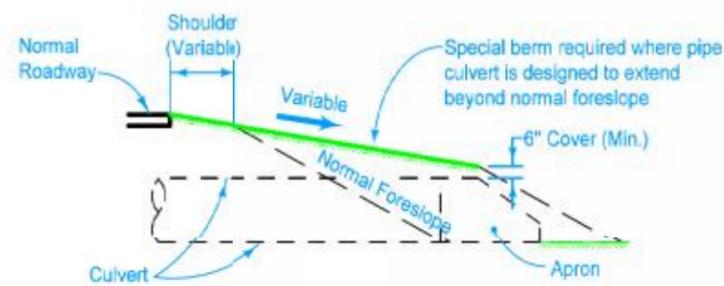
B.01



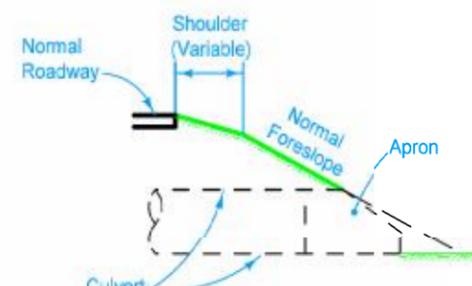
TYPICAL INSTALLATION PLAN
WHERE SPECIAL BERM IS REQUIRED



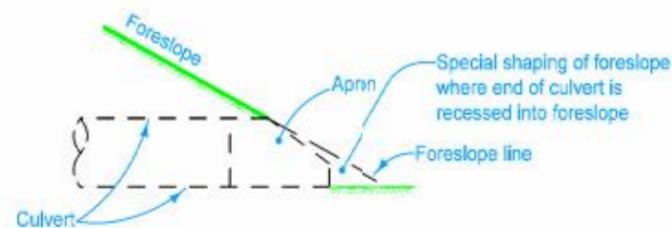
TYPICAL INSTALLATION PLAN
WHERE CULVERT MATCHES NORMAL FORESLOPE



SECTION A-A



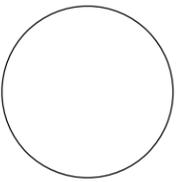
SECTION B-B



DETAIL OF SHAPING EARTH FORESLOPE
AT CULVERT END

	REVISION
	New 04-21-15
STANDARD ROAD PLAN	DR-103
	SHEET 1 of 1
REVISIONS: New, Replaces RF-30C.	
APPROVED BY DESIGN METHODS ENGINEER	
PIPE CULVERT (INSTALLATION DETAILS)	

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B.05

CONCRETE CULVERT PIPE CLASS "B" BEDDING				
DIAMETER OF PIPE 'D' Inches	(H) MAXIMUM ALLOWABLE COVER IN FEET			
	1500D (Class II)	2000D (Class III)	3000D (Class IV)	3750D (Class V)
18	11	13	20	25
24	12	14	21	26
36	13	16	23	28
48	14	16	24	29
60	14	17	24	29
72	14	17	24	30
84	15	17	25	30
96	15	18	25	31
108	15	18	26	32

CONCRETE CULVERT PIPE CLASS "C" BEDDING				
DIAMETER OF PIPE 'D' Inches	(H) MAXIMUM ALLOWABLE COVER IN FEET			
	1500D (Class II)	2000D (Class III)	3000D (Class IV)	3750D (Class V)
18	9	12	18	22
24	10	13	19	23
36	11	14	20	24
48	11	15	21	25
60	12	15	21	26
72	12	16	22	26
84	13	16	22	27
96	13	16	23	27
108	13	17	23	28

DESIGN CRITERIA FOR CONCRETE PIPE

The height of cover tables have been prepared from data in the "Concrete Pipe Design Manual" published by the American Concrete Pipe Association using the values listed below.

FOR EMBANKMENT CONDITIONS

- Fill Material Density = $w = 120$ lbs. per cu. ft.
- Settlement Ratio = $rsd = +0.5$
- * = $ku = 0.13$
- Projection Ratio = $p = 0.9$ (Class "C" bedding)
- = $p = 0.7$ (Class "B" bedding)
- Factor of Safety = $F.S. = 1.33$ on Ultimate Strength

* Using a ratio of lateral to vertical earth pressure (k) of 0.37 (saturated yellow clay) and a coefficient of internal friction (u) of 0.34.

The values shown for concrete pipe were calculated for concrete pipe placed under embankment conditions. These values do not apply to design and installation of sanitary sewer except where sanitary sewer would be placed under embankment conditions.

When unclassified pipe is specified, furnish and install a class of pipe meeting the requirements on the chart.

For Steel Round Pipe, the Contractor may choose the type of corrugated pipe and installation to furnish as long as the selection conforms to the limits indicated for the type specified.

When furnishing Steel Arch Pipe, furnish pipe with corrugations as specified in plans.

Minimum allowable cover for concrete and metal pipe is 2 feet for roadway culverts and 1 foot for entrance culverts.

Maximum cover for all sizes and installations of concrete arch pipe is 12 feet.

For all sizes and installations of polyethylene pipe:
 minimum cover = 2 feet
 maximum cover = 24 feet for 12 to 24 inch pipes
 20 feet for 30 to 48 inch pipes

Where a pipe size not listed in the table is required, the 'H' indicated for the next smaller size will apply.

Special installations may be designed to exceed indicated maximum allowable cover by specific modification of one or more of the following conditions:

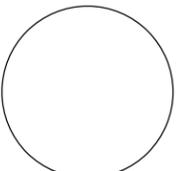
1. Bedding Class
2. Pipe Strength (including special design pipe)
3. Type of backfill or cover material
4. Compaction requirements for backfill or cover material
5. Controlled trench width

Where site conditions favor such modifications, significant economy may result from special design installations and these should be considered. Special designs will specify particular modification of construction requirements or design criteria as applicable. Necessary modifications of normal requirements will not ordinarily be paid for separately but will be included in the price bid for culvert pipe.

CONCRETE CULVERT PIPE

 STANDARD ROAD PLAN	REVISION	
	1	04-19-16
DR-104		SHEET 1 of 3
REVISIONS: Added general note regarding maximum cover on concrete arch pipes.		
<i>Brian Smith</i> APPROVED BY DESIGN METHODS ENGINEER		
DEPTH OF COVER TABLES FOR CONCRETE AND CORRUGATED PIPE		

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TYPICAL CROSS SECTIONS AND DETAILS

ROAD MAINTENANCE FOR:

STEPHENS STATE FOREST - LUCAS UNIT

LUCAS COUNTY

NO.	BY	REVISION

DRAWN BY: BLF PROJECT NUMBER: 21-05-59-01

CHK'D BY: DATE: OCT 2020

SHEET NO:

B.06

