

Culvert Basics

31st Local Roads Conference
October 19, 2016 – Rapid City


Dale C. Heglund, PE/PLS, NDLTAP Director

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

North Dakota Local Technical Assistance Program

Culverts

Convey water from one side of the road to the other.




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Pipe Design Standards



Stream Crossings Statutes & Rules

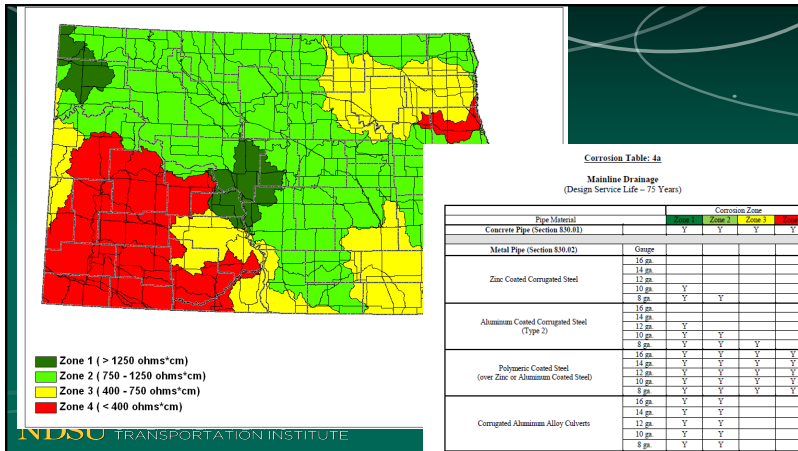
Office of the
North Dakota State Engineer
900 East Boulevard
Bismarck, North Dakota 58505

North Dakota Department of Transportation
608 East Boulevard
Bismarck, North Dakota 58505

January 1, 2015

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Prior to ALL Culvert Installations



**Know what's below.
Call before you dig.**

**NORTH DAKOTA
ONE-CALL
CALL 48 HOURS
BEFORE YOU
DIG - DRILL - BLAST**

Electric

Gas/Oil/Steam

Communications/CATV

Water

Reclaimed Water, Irrigation

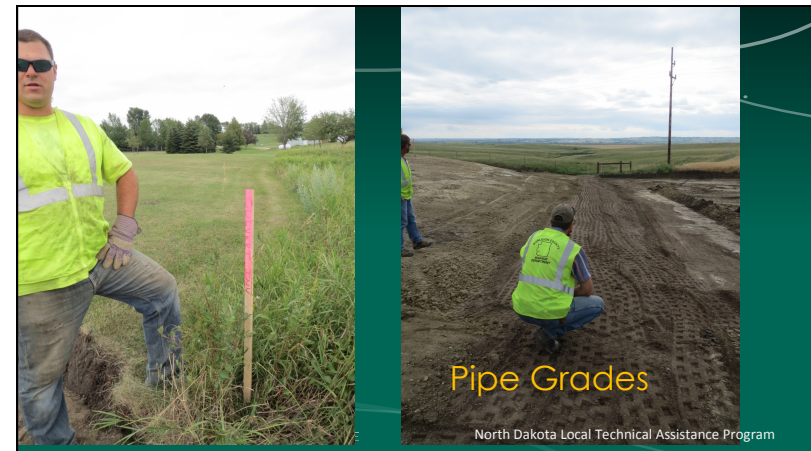
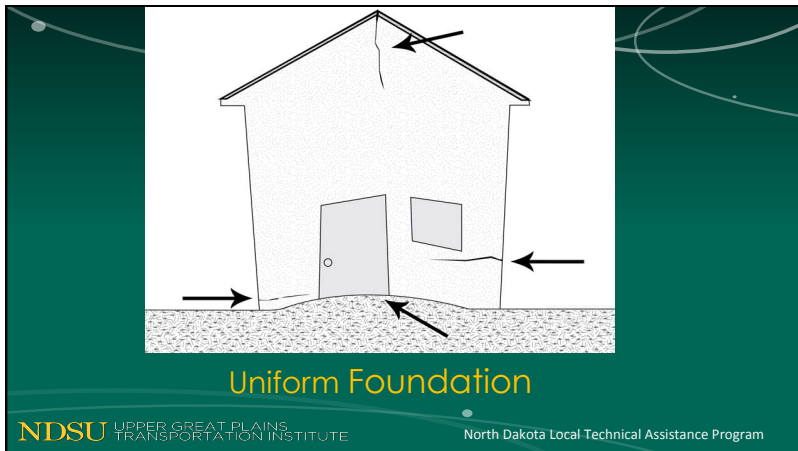
Sewer

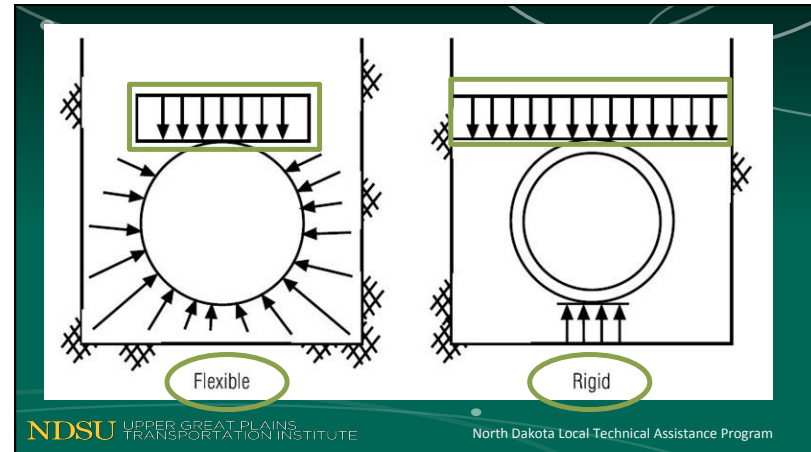
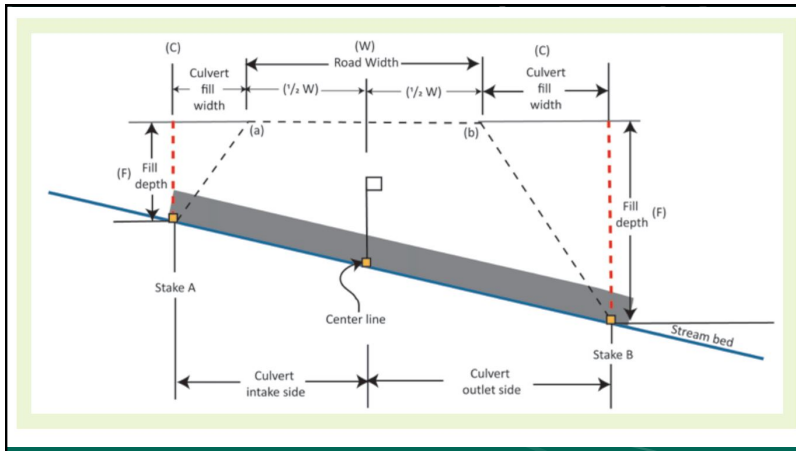
Temporary Survey Markings

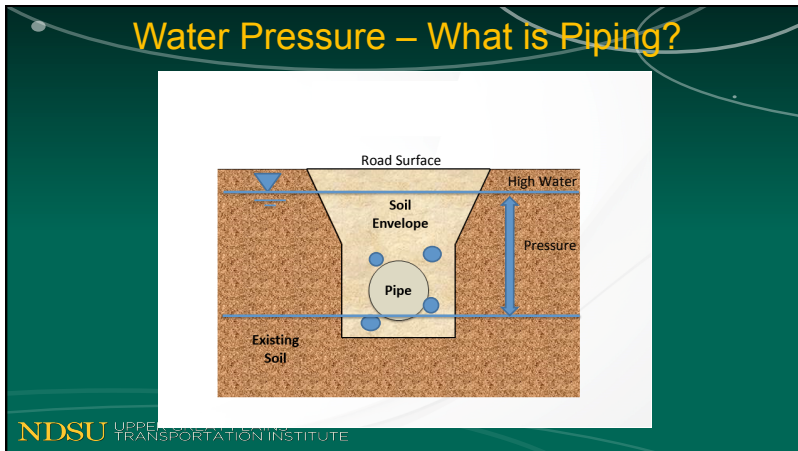
Proposed Excavation

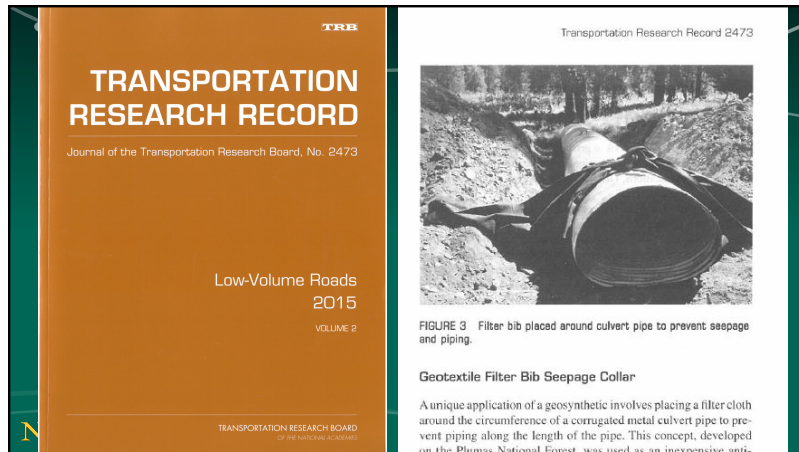
811 or 1-800-795-0555
www.ndonecall.com

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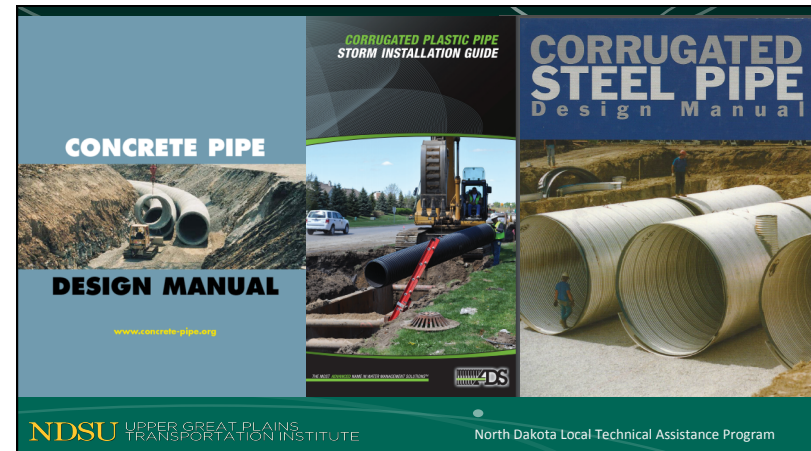
Transportation Research Record 2473

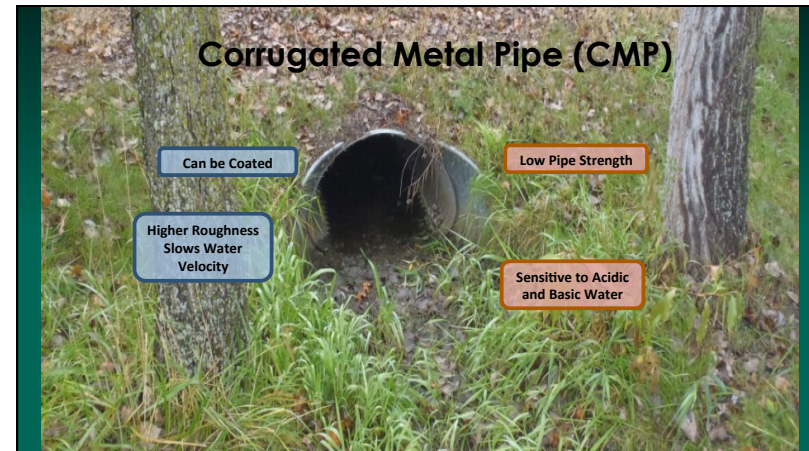
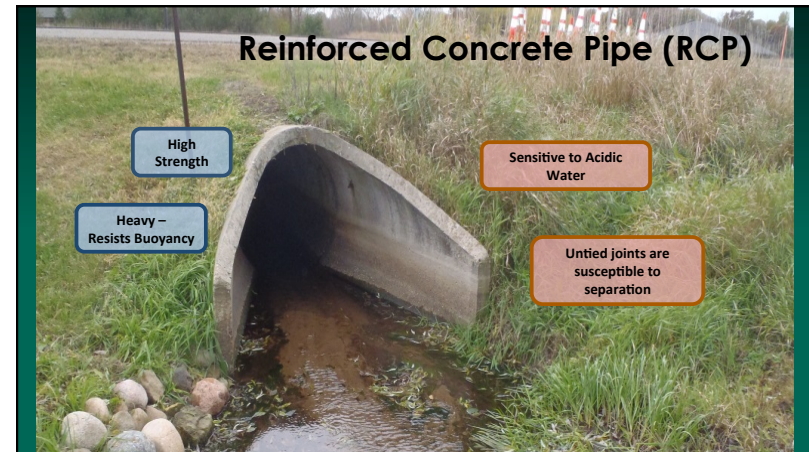


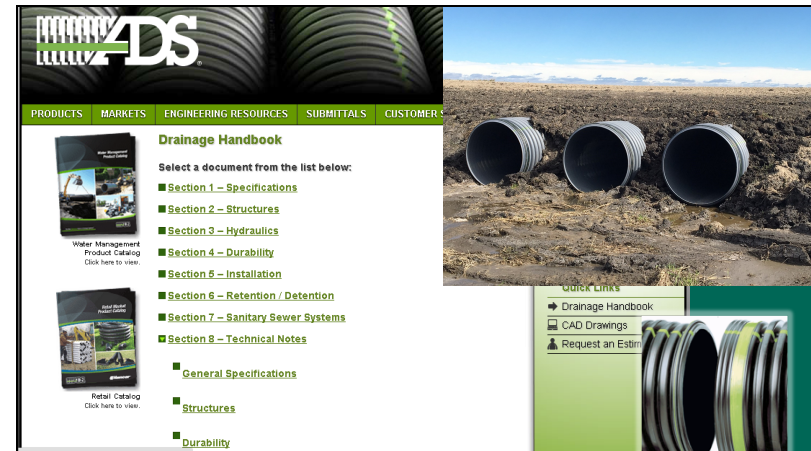
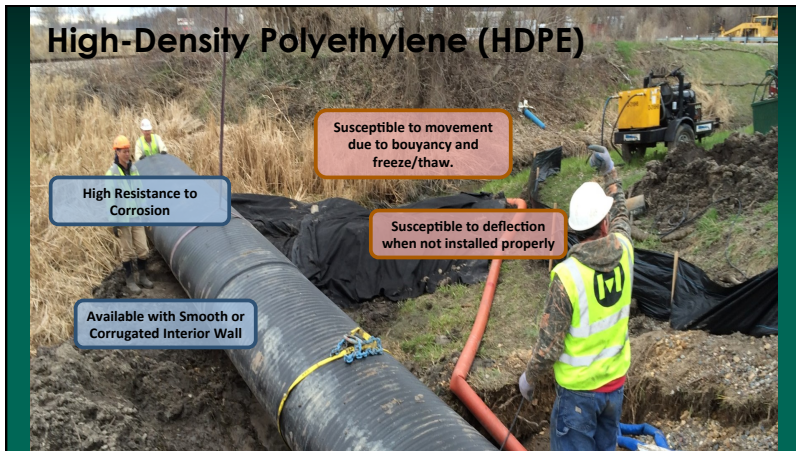
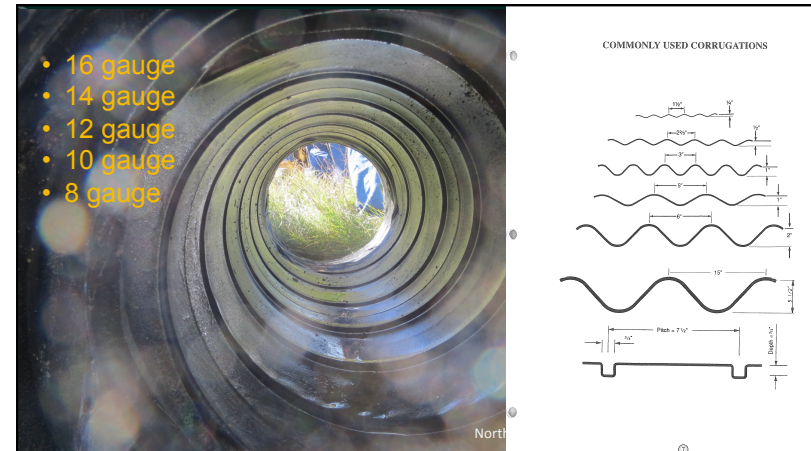
FIGURE 3 Filter bib placed around culvert pipe to prevent seepage and piping.

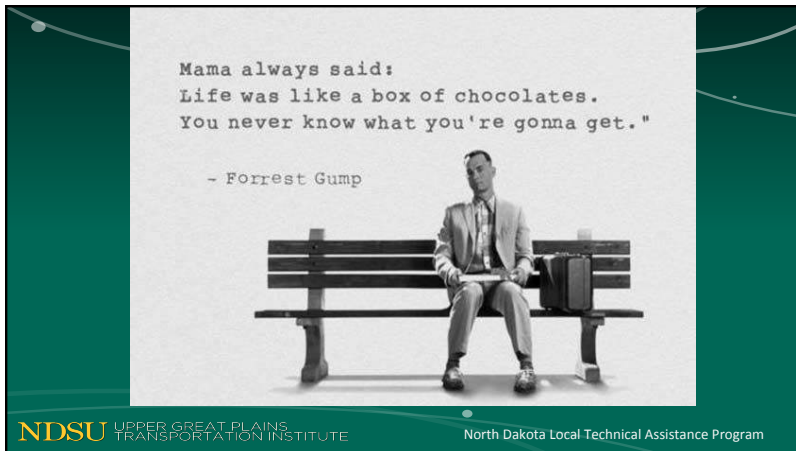
Geotextile Filter Bib Seepage Collar

A unique application of a geosynthetic involves placing a filter cloth around the circumference of a corrugated metal culvert pipe to prevent piping along the length of the pipe. This concept, developed on the Plumas National Forest, was used as an inexpensive anti-









How Long Will It Last? It Depends

ESTIMATED MATERIAL SERVICE LIFE FOR CSP			
ESTIMATED SERVICE LIFE	SITE ENVIRONMENTAL CONDITIONS	MAXIMUM FHWA ABRASION LEVEL	MATERIAL
Minimum 100 Years	$5.0 \leq \text{pH} \leq 9.0$ $r > 1500 \text{ ohm-cm}$	Level 3	Polymer Coated
		Level 2	Aluminized Type 2*
Minimum 75 Years	$4.0 \leq \text{pH} \leq 9.0$ $r \geq 750 \text{ ohm-cm}$	Level 3	Polymer Coated
		Level 2	Aluminized Type 2
Minimum 50 Years	$3.0 \leq \text{pH} \leq 12.0$ $r \geq 250 \text{ ohm-cm}$	Level 3	Polymer Coated
Average 50 Years	$6.0 \leq \text{pH} \leq 10.0$ $2000 \leq r \leq 10,000 \text{ ohm-cm}$ $> 50 \text{ ppm CaCO}_3$	Level 2	Galvanized

Weight Comparison in pounds per foot of pipe

Size (in.)	HDPE	RCP ¹	CMP ^{2,3}
12	3.3	120	12
15	4.6	155	15
18	6.4	175	19
24	11	290	29
30	15.4	410	36
36	19.8	480	43
42	26.4	745	65
48	46.6	920	75
60	67.3	1340	92

NDSU





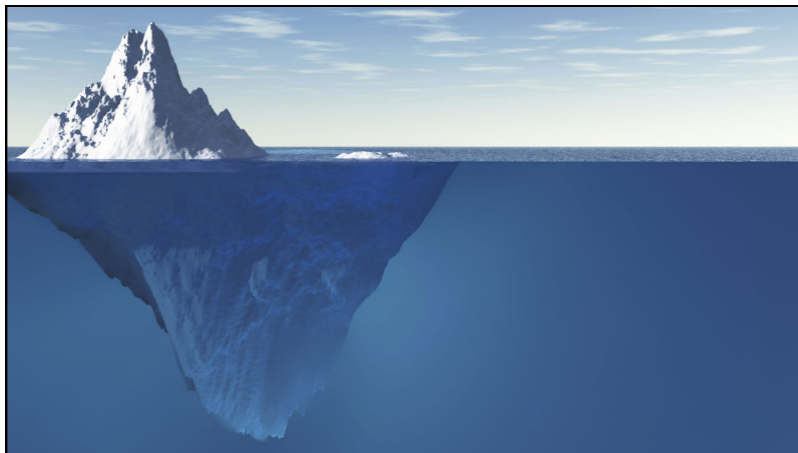
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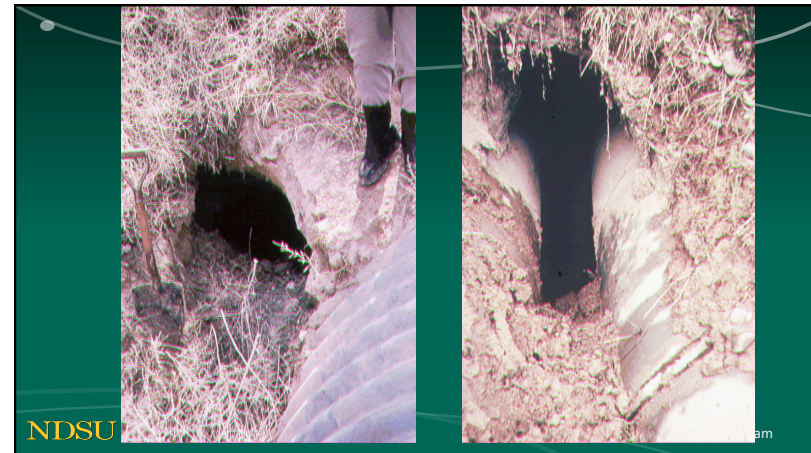
The following slides depict graphic infrastructure scenes.
Viewer discretion is advised.

NDSU Upper Great Plains Transportation Institute North Dakota Local Technical Assistance Program













MOUNTAIN-PLAINS CONSORTIUM

PROJECT BRIEF | December 2015

Developing A Methodology to Inspect and Assess Conditions of Short Span Structures on County Roads in Wyoming

the ISSUE

Even though the FHWA's National Bridge Inspection Standards are a very comprehensive tool for bridge inspection, they only apply to structures with spans of more than 20 feet. WYDOT inspects these larger bridges on regular intervals, but there is currently no formal inspection procedure for assessing the condition of short-span structures, especially culverts.

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Distance Program

Local Roads Corrugated Metal Pipe (CMP) Workshop

Presenter Info - Keith Fraase, True North Steel & Dale Heglund, NDLTAP

September 20th, 2016 - Morton County, 8 AM - 3 PM CT
September 21st, 2016 - Ramsey County, 8 AM - 3 PM CT

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Dakota Local Technical Assistance Program

NDLTAP & TrueNorth Steel

DAKOTA BRIEFS

B2 | FRIDAY, SEPTEMBER 30, 2016

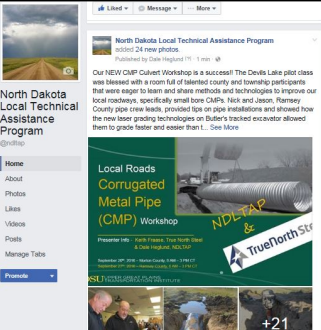
Culvert work will close part of Rifle Range Drive through 1st week of Nov.

Rifle Range Drive from between Yegen Road and Cavalry Drive will be closed through the first week of November for culvert work being performed by JMAC Resources.

No detours will be in place. Motorists are asked to use another route, said Daniel Schriock, senior assistant county engineer.

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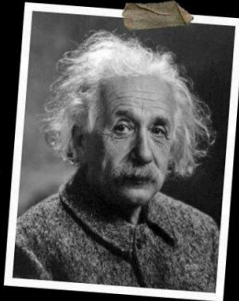
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"Education is not
the learning of
facts, but the
training of the mind
to think."
-Albert Einstein



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Dip is occurring here

Settlement Over Culverts

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Concrete Pipe Installation Procedures



Concrete Pipe Installation Procedures briefly outline some important steps in concrete pipe installation. They are not intended only as a guide and do not replace or supersede project specifications or contract documents.

Unloading

Do Use proper technique

Don't Drag pipe

Excavation & Foundation Preparation

Do Trench Top Wide and Shallow

Don't Sub-grade

Alignment Line & Grade

Do check line and grade as each section is installed.

Don't remove pipe section

Pipe Bedding

Do 12 inches

Don't Excess

Do Even Fill

Don't Voids

Stockpiling

Do Support on barrels

Don't Support on bells

Warning

Do Use proper technique

Don't operate heavy construction equipment over the pipe until adequate backfill is in place.

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