HOW TO REHAB A CULVERT WITHOUT A BACKHOE

Presenter: Robin Wolf

Have You Seen This Before?

What Are Your Options…

Small Equipment Footprint

Design Criteria for Liner Thicknes

- Load Requirements
- Cover
- Soil Types
- Condition of Pipe
- Hydrostatic Pressure

Design Life

The U.S. Army Corp of recommends a design life of 70-100 years for new precast concrete pipe, and there are countless examples of installations that surpass those numbers. This means the expectation for precast concrete's functional life is at least twice as long as lesser materials. The reasons for this go far beyond concrete's innate strength. Concrete also won't burn, rust, tear, buckle, deflect, and it's immune to the attack of most elements, whether the pipe is buried or exposed.

CentriPipe PL-8,000 as a repair material is designed to be stronger than the concrete used to manufacture new precast pipe. We would expect that PL-8,000 will offer the same level of design life as a new precast concrete pipe of 70-100 years.

Specifications

- ASTM A-979
- Standard Specification for Concrete Pavements and Linings in Corrugated Steel Structures in the Field

CASE STUDIES

MNDOT

- MNDOT- featured in Stormwater magazine

- “Our district is faced with thousands of deteriorated centerline roadway pipes,” says Ruth Betcher, P.E., hydraulics engineer for the Minnesota Department of Transportation’s (MNDOT) District 6, “and replacing all that pipe is cost prohibitive—and also, citizens don’t welcome detours!”

What Else Could Go Wrong?

Where is the Bottom of the Pipe?

Flowable Fill

First Lining Pass

Finished Product

MNDOT

Before

After

Warsaw, Indiana

- The City of Warsaw, Indiana, needed to de-combine their sewer system. They were going to keep their existing 48” brick sewer for storm water and build a new sanitary sewer parallel to the old
- Their existing sewer was over 4,000’ long and ran under their roads. Access was from 30” manholes

Warsaw, Indiana

Before

Warsaw, Indiana

After

Sanitary Sewer Rehabilitation

West Lake, Ohio

- **Article- UCT magazine**
- The City of Westlake, Ohio, got an interesting ‘wake up call’ in 2006, when a sanitary sewer interceptor line in nearby City of Lorain failed dramatically. “It forced the evacuation of several dozen homes for months,” says Westlake Director of Engineering Robert P. Kelly, PE, “and we realized we'd better take a closer look at our system.”

West Lake, Ohio

Before

After

Clay County Florida- SR16

- Article Published in Stormwater magazine

- When Tropical Storm Faye blew across Florida in 2008, stormwater rushed through one of the corrugated steel culvert pipes under State Road 16 in Clay County and began to suck the surrounding soil into the pipe.
- "It created a void along the side of the road about 10 feet deep and 20 feet across. You could have put a couple of minivans in this hole," says Spencer Townsend, project manager for the Clay and Nassau counties local sites for Transfield Services North America.

Clay County, Florida

Before

After

Atlantic Beach

- Article- Stormwater Solutions July/August 2011
- Atlantic Beach is a coastal community of 13,000 people in Duval County, Florida. As the name implies, it has a beach and the nearby ocean affects every aspect of life, including the infrastructure. Atlantic Beach's biggest subdivision, built in the early 1960s, didn't really take that into account.

Atlantic Beach, FL

Before

After

Sabine River Authority

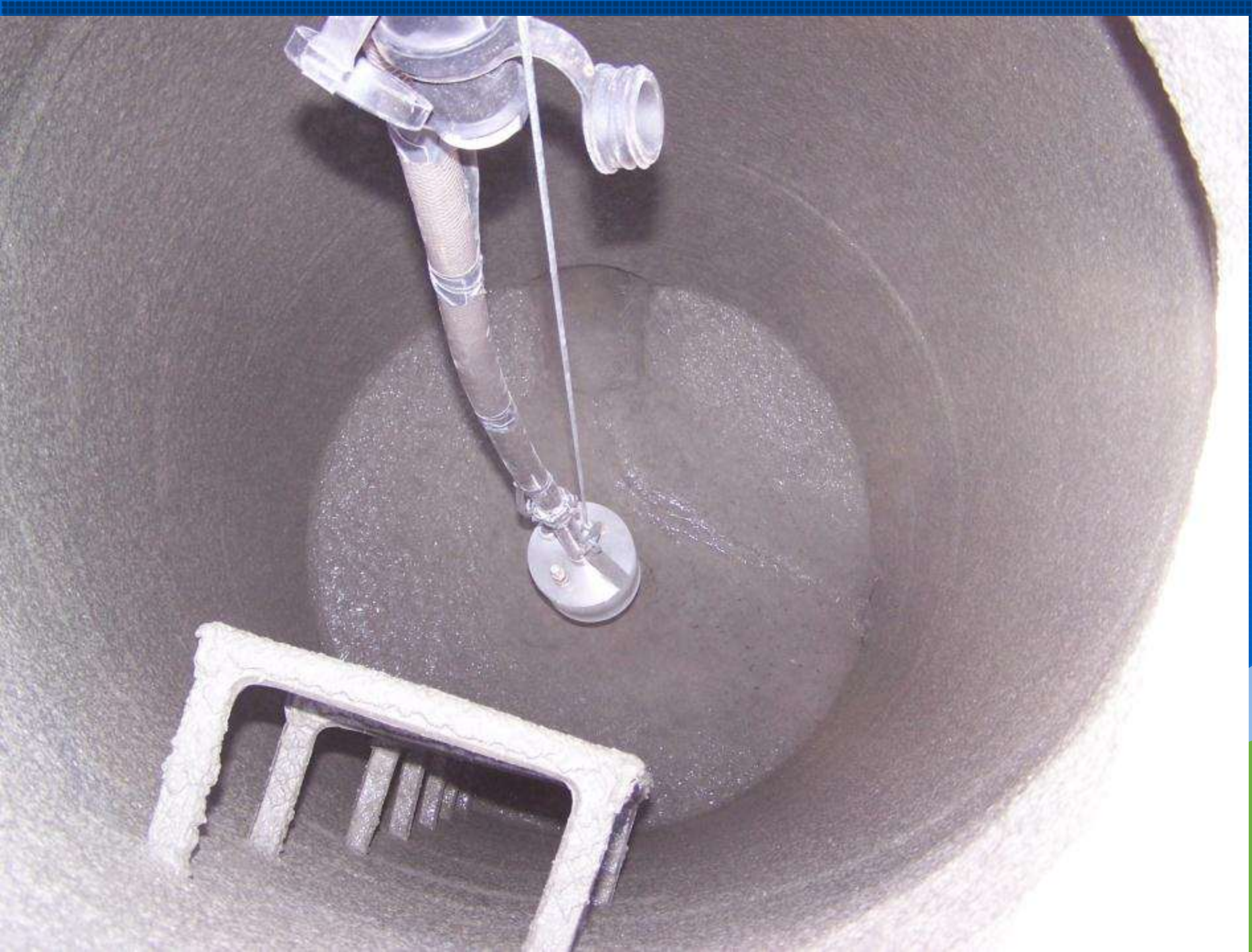
- Article- Stormwater magazine July/August 2011
- The Sabine River Authority (SRA) was created in 1949 to equitably distribute the waters of the Sabine River and its tributaries. As part of this distribution, “We provide surface water to eleven industrial customers, such as Conoco and Louisiana Pigment, for cooling and processing,” says SRA Facility Manager Mike Carr.

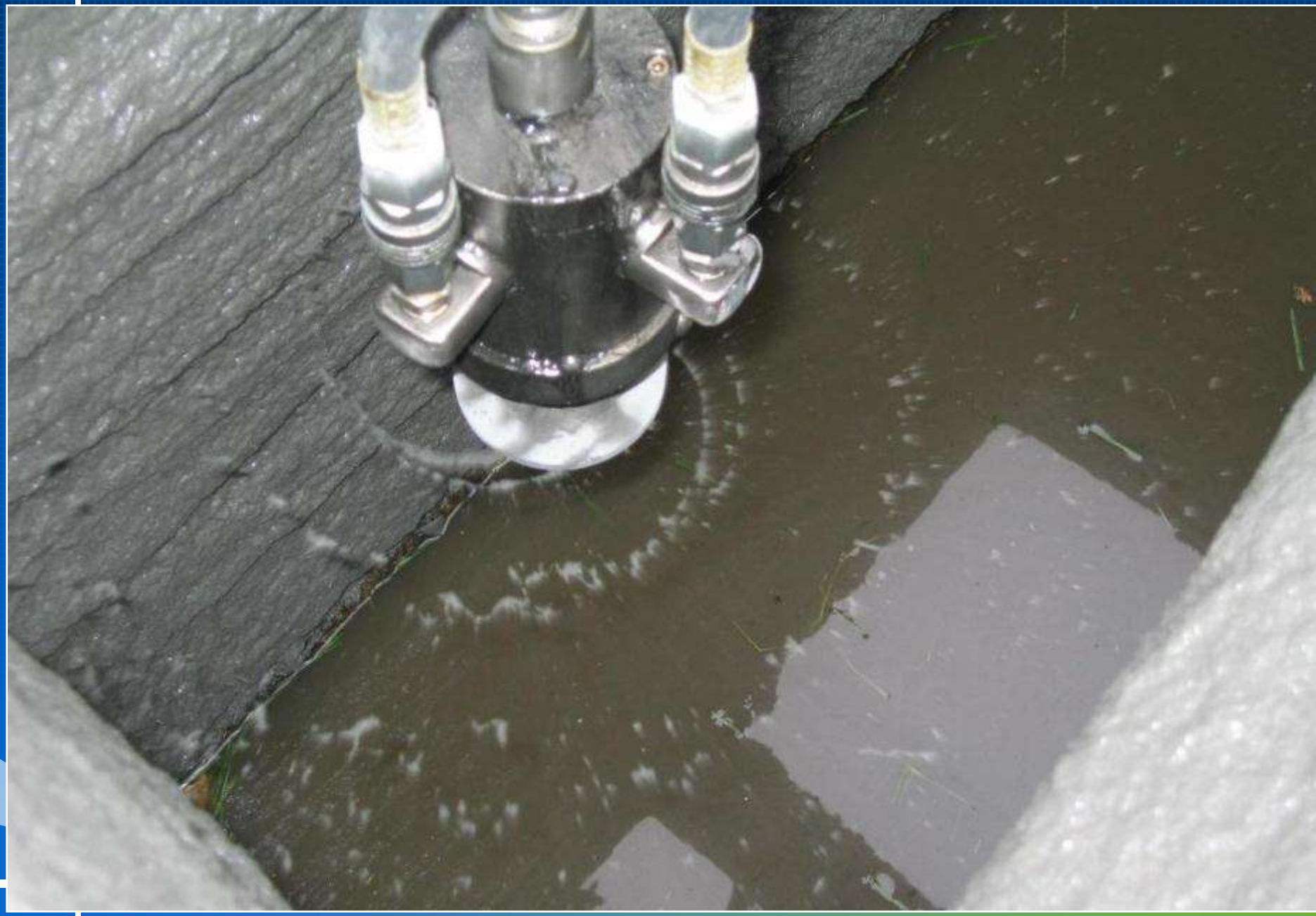
Sabine River Authority

Before

After

WARNER ROBBINS, GEORGIA





Designation: F 2551 – 09

Standard Practice for Installing a Protective Cementitious Liner System in Sanitary Sewer Manholes[1]

This standard is issued under the fixed designation F 2551; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

A sanitary sewer manhole may be repaired or rehabilitated by applying a prepackaged cementitious liner to the interior surface after it has been properly prepared and cleaned. Sanitary sewer manholes can be damaged by dynamic loading, abrasion, erosion, and corrosion.

1. Scope

1.1 This specification describes all the work required to structurally reinforce, seal, and protect sanitary sewer manholes. Applications include applying a prepackaged cementitious liner that can function as a full depth restoration or a partial depth repair. A uniform high-strength, fiber-reinforced cementitious mortar should be manually sprayed and hand troweled or centrifugally cast in a uniform, prescribed thickness to all cleaned, interior surfaces from the bottom of the frame to the bench. The cementitious liner may be applied to manholes constructed of brick, concrete, block, and various other materials.

1.2 A manufacturer's approved applicator shall furnish the complete application of the protective, prepackaged cementitious liner material. All of the cleaning, preparation, and application procedures shall be in accordance with the manufacturer's recommendations.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Manholes are permit required confined spaces in accordance with OSHA definition and should be treated as such, requiring confined space entry permits, appropriate monitoring equipment, and the associated personal protective equipment.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C 39/C 39M Test Method for Compressive Strength of Cylindrical Concrete Specimens

C 109/C 109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)

C 309 Specification for Liquid Membrane-Forming Compounds for Curing Concrete

C 494/C 494M Specification for Chemical Admixtures for Concrete

C 969 Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines

C 1140 Practice for Preparing and Testing Specimens from Shotcrete Test Panels

C 1244 Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill

C 1315 Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete

F 2414 Practice for Sealing Sewer Manholes Using Chemical Grouting

2.2 *ACI Standards:*[3]

ACI 301-05 Specifications for Structural Concrete

ACI 305R-99 Hot Weather Concreting

ACI 306R-88 Cold Weather Concreting

ACI 308R Practice for Curing Concrete

ACI 506R Guide to Shotcrete

[1] This practice is under the jurisdiction of ASTM Committee F36 on Technology and Underground Utilities and is the direct responsibility of Subcommittee F36.20 on Inspection and Renewal of Water and Wastewater Infrastructure.

Current edition approved May 1, 2009. Published June 2009.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American Concrete Institute (ACI), P.O. Box 9094, Farmington Hills, MI 48333-9094, http://www.concrete.org.

Before

After

THANK YOU !