

# **Innovative Pipe/Culvert Repair Project: Valley City District**

**PRESENTERS: DAN VIAU-PROJECT ENGINEER**

**JIM BELANGER – LEAD INSPECTOR**

**FEBRUARY 29, 2016**

# Culvert Repair Project

DESIGN DATA				<b>JOB # 10</b> <b>NORTH DAKOTA</b> <b>DEPARTMENT OF TRANSPORTATION</b>  <b>NH-2-001(071)041</b> Lakota and Barnes County Jct ND-27 North to South of Jct I-84 Various Locations Centerline RCB & RCP Repair and Sealing	STATE	PROJECT NO.	FON	SECTION NO.	SHEET NO.	
Traffic Control 2014	Average Daily	Trucks 182	Total 639		ND	NH-2-001(071)041	20096	1	1	
Preventative Maintenance				<b>GOVERNING SPECIFICATIONS:</b> 2014 Standard Specifications adopted by the North Dakota Department of Transportation and the Supplemental Specifications effective on the date the project is advertised.						
				<b>PROJECT NUMBER &amp; DESCRIPTION</b> NH-2-001(071)041 <b>NET MILES</b> 21.577 Miles <b>SINCS MILES</b> 21.577 Miles						
<b>DESIGNERS</b> Adam McMahon AS				<b>STATE COUNTY MAP</b> 			I hereby certify that the attached plans were prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the State of ND. APPROVED DATE: 8/7/2015 Daniel R. Visu AS ND0007 Valley City District		This document was originally issued and sealed by Daniel R. Visu, Registration Number PE- 6329, on 05/07/2015 and the original document is stored at the North Dakota Department of Transportation.	

# Culvert Repair Project

ND Highway 1-Valley City District

- This project is one of the **FIRST** of it's kind for NDDOT

# Culvert Repair Project

- Repaired 4 reinforced concrete box culverts and 1 reinforced concrete pipe
- Conducted during the winter months to minimize impact to the environment and no running water in culverts

# The Repair Process

- Flaps installed at each end to keep heat in pipe



*Flaps help keep heat inside of pipe*

# The Repair Process

- Conducted during winter months to minimize impact to the environment and no running water in culverts



*Machine pumps warm air to thaw culvert floor*



*Warm air melts ice to help dry out work area*

# The Repair Process

- Dewater the pipe-pump into existing draining system.
  - Eco friendly-as not to transfer sediment from existing pipe into environment



*Workers pump water out of culvert to help dry it out*

# The Repair Process

- Vacuuming the culvert to clean sediment from the existing pipe



*Clearing sediment from culvert*



*Cleaning culvert to prepare for repair*

# The Repair Process

- Seal joints-Four step process



*Contractor works to prepare crack for repair*



*Huge crack in culvert wall in need of repair*

# The Repair Process

- Step #1 -Install Hydrophilic Polyurethane (Mountain Grout –Gel-Foam II) saturated Oakum Rope into joint to seal front end



*Applying Joint Seal*

# The Repair Process

- Step #2 – Inject Hydrophilic Polyurethane Resin (Mountain Grout–Ultra) behind the Oakum Rope into the rear of the joint.



*Injecting joint seal into crack*

# The Repair Process

- Step #3 – Inject two component hydrophilic polyurethane (mountain grout-u4.0 to fill voids)



*Holes drilled to prepare for fill*



*Holes filled with grout to fix voids*

# The Repair Process

- Step #4 – UV Protection – Apply flexible multipurpose epoxy gel adhesive (Prime Resins – Gel 2200 Flexible)



*Applying UV protection to the repair*



*Letting resin dry*

# THE REPAIR PROCESS

- Strategically drill injection holes (3/8")
- Pump polyurethane system into holes to seal joints and voids

# THE REPAIR PROCESS

## Trimmed Joint



## Completed Box Culvert



# Reinforced Concrete Pipe Repair



*Completed section*



*End Section Strap*

# REINFORCED CONCRETE PIPE REPAIR



*Existing end section joint*



*Growth through joint*



*Joint tie bar*

# Challenges

- Hard to estimate size of void
  - Cannot predict how much material it will take to repair



# Benefits of this Process

- Major cost savings
  - Project Cost this project = \$174,000
  - Estimated Cost to Replace the RBCs and RCP could be \$2,000,000 in round numbers
- Time savings
  - Do not have to dig up roadway

# Benefits of this Process

- No road closures/keeps traffic moving
- Provides a long term repair

**Questions?**