Overview & Housekeeping

- Presentation Outline
- I-75/M-221 Cured In Place Pipe Project (CIPP)
  - Project Location
  - Cost/Schedule
  - Pay Items in Project
  - Special Provision for CIPP
  - Proposal for UV-GRP/Animation
  - Installation of the UV-GRP on M-221 in Brimley
- Environmental Issues - Thermal vs UV Cured
- Material Properties/Life Expectancy
- Fun Facts!
- Questions?
I-75 & M-221 Cured-In-Place Culvert Lining Project

Chippewa County, Michigan
Contract ID
17033-M11675

Project Location
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Project Location
Let in August of 2016

Upper Peninsula Rubber Co had low bid of $414,957.50

Contract Awarded September 19, 2016

Construction began July 11, 2017

All Work Completed August 9, 2017
Contract ID 17033-M11675

Pay Items in Project

- **Bid Items:**
  - I-75 in Chippewa County
    - Cured-In-Place Pipe Lining, 15 in...718 Ft
    - Cured-In-Place Pipe Lining, 18 in...282 Ft
  - M-221 in Chippewa County
    - Cured-In-Place Pipe Lining, 57 by 38 in...340 Ft
MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
CURED-IN-PLACE PIPE FOR CULVERTS AND STORM SEwers FOR JOB
NUMBER M11675

CFS:DMG

APP: SJU: DBP: 07-12-16

1 of 2

a. Description. This work consists of providing all labor, equipment and materials necessary for the design and installation of the cured-in-place resin impregnated felt liner into an existing culvert or storm sewer by hydrostatic inversion or by the direct pulled-in-place method at the locations specified on the plans. Cure the liner in place so that the finished installation is continuous, provides structural support and is tight fitting to the existing pipe. The manufacturer of the liner system must provide the design, installation and inspection of the liner and must have an authorized representative on site during installation.

Provide video inspection of the culverts and sewers before (after cleaning) and after lining. All culvert and sewer cleaning, maintaining flow, bypass pumping, and site preparation is included in this work.

b. Materials. Use tube and resin material that meets the requirements of ASTM F 1216 and ASTM F 1743, as applicable.

Design the liner for HS-20 live loading. Design the required cured-in-place liner wall thickness in accordance with appendix X1 of ASTM F 1216. Use the formulas assuming a fully deteriorated pipe condition and the water table at the ground surface.

Provide documentation to the Engineer indicating the proposed design liner thickness for each run of pipe, all component materials and that the liner meets the minimum chemical resistance requirements listed in appendix X2 of ASTM F 1216 prior to installation.

Provide a tube consisting of one or more layers of flexible needled felt or equivalent woven or nonwoven material capable of carrying resin and withstand installation pressures and curing temperatures. Ensure the tube is compatible with the resin system used. Ensure the tube
Contract ID
17033-M11675

Alpha Liner Animation

Curtesy of:
Mike Burkhard,
RELINE AMERICA
Contract ID 17033-M11675

Delivery: 57 by 38” liner
Contract ID
17033-M11675

Delivery: 57 by 38” liner
Contract ID
17033-M11675
Before
Contract ID
17033-M11675

The Light Train
Contract ID
17033-M11675

Packer (End Seal)

Slip Sheet
Contract ID 17033-M11675

After
Contract ID
17033-M11675

After
FINAL REPORT
February 2017
Prepared for
California Department of Transportation

WATER QUALITY OF FLOW THROUGH CURED-IN-PLACE PIPE (CIPP)
The Caltrans Report Regarding UV Environmental Conclusions:

Executive Summary

To conservatively measure the water quality impacts of CIPP methods, a small volume of water was introduced immediately after CIPP installations of 11 pipes. Minimizing the volume of water used to flush the pipes theoretically results in higher concentrations of chemical residuals from the CIPP installation materials. Water quality analysis for volatile organic compounds in samples taken from the induced flows demonstrated that adherence to the Caltrans specification for CIPP installation is sufficient to avoid fish kills. Some measured concentrations were above the no observable effect concentration (NOEC) for algae within 4 days; however, all concentrations were below all other known toxicity thresholds for other test species (e.g., trout). The most protective CIPP curing method was UV, where the concentrations of volatile organic compounds in all samples analyzed were below all known environmental thresholds. Potential specification improvements may be helpful to further reduce the risk to sensitive species such as algae.
Initial styrene jobsite testing:

2 sites cumulative reading over 6 hours each
1.2ppm and 1.7 ppm
UV Liners:

Structural, Life Expectancy, Corrosion Resistance, Hydraulic Characteristics
Structural Characteristics:

Short Term Flexural Modulus: 1,000,000psi to over 3,000,000psi

Long Term Flexural Modulus: 600,000psi to 2,600,000psi

Long Term Loss over 50 years: 15% to 40%
Life Expectancy:

With the Decreased Long Term Expectations the Life Expectancy is Considered Longer. City of Hamburg, Germany awarded 80 year expectancy after long term evaluations.
• First Use by MDOT

• Currently largest diameter UV liner in Michigan

• Approaching the Practical Limit in Size

• New MDOT SP Currently Being Developed

• Cost Comparison UV Cured /Steam & Hot Water Cured
Fun Facts!

- Currently 8 UV Manufacturers Worldwide
- 7 Currently Selling Liners in North America
- 4 of Those Actually Manufacture Liners in NA
- 1 Makes Equipment & Liners as a Set In NA
- Worldwide 3 of the 8 Manufacture Equipment & Liners as a Set
Questions?

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