Lessons Learned:
Spray Applied Pipe Lining (SAPL)

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Spray Applied Pipe Lining involves the use of a fiber-reinforced mortar designed for structural rehabilitation of culverts.

No digging required

Cost effective

Frequently used for sinkhole projects to maintain drainage pipes

Can be hand-applied or spin cast

Design life of 75 years

Trenchless alternative to CIPP and Slip-lining
When to use SAPL

- Single Access Bridges
- Utility Conflicts
- Traffic/MOT
- Inadequate Detour
- Cost Factors
- Horizontal/Vertical Geometry Constraints
- Staging/LOC/ROW Restrictions
Highlighted Past Projects

BR 1-238 (StormSeal)

BR 1-657 (GeoSpray)

BR 1-227 (Centripipe)
Location: Elizabeth Court over Tributary to White Clay Creek, Newark
Pipe Size: (2) 6’-9” x 4’-11” CMP @ 110 ft LF each
Material: Cementitious – StormSeal (2” Liner)

Constraints:
• Cul-de-sac/Single access bridge (lack of access for residents/emergency personnel)
• Utility issues (utilities are located over the culvert on both ends)
• Replacement costs
• Limited room for staging
• No Detour
3 underground cable lines (crosses pipe twice)
1 underground electric line (crosses pipe twice)
1 underground sewer line
1 underground water line
BR 1-238 Before/After
Location: South Dupont Highway/Pulaski Highway (Rt. 13/40), New Castle
Pipe Size: (2) 48” x 72” CMP @ 250 LF each
Material: Cementitious Geopolymer – GeoSpray (2” Liner)
Included installation of Concrete Cloth for scour countermeasures

Constraints:
• Underground/aerial Utilities
• Possible realignment/raising of roadway necessary to conform to design standards
• High impact to businesses and homeowners
• Over 77,000 AADT
• Estimated Replacement Costs could exceed $10M
• Railroad involvement
• Extensive MOT (including Pedestrians)
Construction Photos
BR 1-657 Before/After
Location: Paper Mill Road over Middle Run, Newark
Pipe Size: (1) 120” x 85” Aluminum CMP @ 128 LF each
Material: Cementitious – Centripipe (2” Liner)

Constraints:
• Replacement Costs
• Over 12’ of cover on top of culvert
• ROW issues (Adjacent to County/State park)
• MOT
• Over 16,000 AADT
• Utility issues (DPL gas line directly underneath culvert)
BR 1-227 Elevation View

Approx. 12’ cover

BR 1-227

2” Spray Liner

BR 1-227 T

16” Gas Line
BR 1-227 Before/After
Specifications

SP #601501: Spray Applied Structural Liner for Pipes

- Updated unit of measure (SF)
- Detailed work plan
- Separate requirements for material types (Portland Cementitious, Geopolymer, Polyurethane)
- Added Figure 601501-1. Minimum Cover over Corrugations

Figure 601501-1.
Research

- SAPL Pooled Fund Study
  - In coordination with the University of Texas in Arlington
  - Includes ODOT, NYDOT, CTDOT, NCDOT, MNDOT, FDOT, PennDOT
  - Developing a structural design methodology
  - Performance based specification
- UD Research
- NTPEP Testing
Lessons Learned

- SAPL supplier must have approved plan
- SAPL supplier must seal/stamp design and have it reviewed by DelDOT Bridge Design
- Follow latest specifications
- Include Pre-lining meeting
- Include additional inspectors
- Oversee the mixing process
- Verify correct installation of liner
- Validate thickness indicators
- Collect testing samples each day lining is performed
- Coordinate material testing with DelDOT Lab

Final product to be approved by DelDOT Bridge Design for acceptance
Future SAPL

- Pipe Liner Bundle (BR 1-242, 1-362, 1-406)
- UD Research
- Polyurethane SAPL (SprayWall)
- UHPC SAPL (Ductal UHPC Liner)