Flowchart of HydInfra Report: Pipe Suggested Repair Method

Consider many additional factors before repairing a pipe:

1) If you reduce the hydraulic capacity of the repaired pipe you may cause problems – get a recommendation from Hydraulics/WRE before you line or replace a pipe.

2) Verify Pipe’s size, shape, material, length before doing a major repair.

3) Compare the Field Recommended Repair to the Flowchart Suggested Repair and critically review each suggestion against the condition problems (inspection flags and measures).

4) Soundness of road – can voids outside of the repaired pipe be adequately filled?

5) Structural integrity – will the pipe be structurally sound after repair?

6) Cost reduction by combining repairs – can several pipes be repaired together in a project?

7) Local costs of repair methods may suggest a different repair method.

8) Open trenching costs must include pavement cost except when part of a paving project.

9) The scope of the construction project (re-construction, overlay, maintenance) may suggest choosing replacement over repair, or vice versa

10) Traffic requirements – are lane closures required, or are they feasible?

11) Right-of-Way – is the highway-owned work area sufficient for the repair method?

12) Accessibility – Can equipment or materials needed for the repair method reach the pipe?

13) Presence of large rocks prevents jacking – consult Materials Office for soils information.

14) Other repair methods may be appropriate for any pipe, for example, “Joint Repair” may include internal bands, grouting, or other method.

15) Pipes with Roadway Types “Entrance”, “Township Road” or “City Road” might be open trenched, whereas Mainline, Centerline, Ramp/Loop, Collector/Distrib and County Roadway Types often may not be, due to traffic.

16) Permit requirements – work with hydraulics to determine if any permits are required or conditions that need to be met.

17) CIPP Liners cured with hot water may contain Styrene that has caused fish kills in streams. Capture all heated water used in resin-curing process and truck to a proper disposal site.

Assumptions used for Repair Options:

- Pipe repairs suggested are used for District or State-wide cost estimates and are not a final repair recommendation.
- Repair suggested is weighted by most common material failure mode.
- Permanent, low cost and simplicity of installation are primary considerations.
- Fixes done by MnDOT Maintenance are preferred to letting a contract.
- Maintenance is equipped to do some repairs (like joint repair, paved invert, slipline, and reset end sections) but not others (like CIPP or Jack).
- Contracts are required for Cured in Place Pipe Liner or Jacking.
- Reduction in diameter reduces hydraulic capacity. Sliplining reduces internal diameter more than cured in place liner or other methods, and limits its use.
- In pipes less than 36” diameter (2.90 meters) difficulty of human access will favor sliplining or cured-in-place pipe liner over other methods.
- Open trench replacement is least preferred for highways if traffic is disrupted and likely more expensive when repaving costs are included.
- Pipes under deep cover are more difficult and expensive to open trench.

Repair Methods:

1 = Reset (reset or replace end sections or apron)
2 = Grout Joint Repair
3 = Paved Invert
4 = Slipline
5 = CIPP (Cured In Place Pipe Liner)
6 = Trench
7 = Jack (or auger, ramming, drilling, bursting etc.)
8 = Review (needs repair, no suggestion given)
9 = NA (not applicable)

February 16, 2016
http://bridge/Hydraulics/HydInfraforMBMT.html
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Flowchart of HydInfra Report: Pipe Suggested Repair Method
Steel or Aluminum Pipes

1. Is Pipe Condition 3 or 4?
   - Yes: Reset apron or pipe section
   - No: NA (No repair suggested)

2. Does Activity = "Extension"?
   - Yes: Apron is Separated?
     - Yes: NA (No repair suggested)
     - No: Reset apron or pipe section
   - No: NA (No repair suggested)

3. Is Pipe Deformed?
   - Yes: NA (No repair suggested)
   - No: NA (No repair suggested)

4. Is Pipe round with span 6.1 ft or less?
   - Yes: NA (No repair suggested)
   - No: NA (No repair suggested)

5. Is pipe round with span 6.1 ft or less?
   - Yes: NA (No repair suggested)
   - No: NA (No repair suggested)

6. Is Span > 2.90'?
   - Yes: Cured In Place Pipe Liner (CIPL, Small)
   - No: NA (No repair suggested)

7. Is Repair Under Road?
   - Yes: Paved Invert
   - No: NA (No repair suggested)

8. Is Repair Under Road and Span > 2.90'?
   - Yes: Cured In Place Pipe Liner (CIPL, Small)
   - No: NA (No repair suggested)

9. Is Cover < 10 ft?
   - Yes: Jack or Bore Pipe Replacement
   - No: NA (No repair suggested)

Steel or Aluminum Pipes that are deformed and under shallow cover (<10') or too large to jack (>6.1' span) or not round, or Pipe has Extension of a second material or shape

Note: Misalignment is expected to be minor for pipes sorted by this process. (Pipes with major misalignment should have been reported immediately to Maintenance and addressed individually so not considered part of this group.)
Repair Methods from Suggested Repair Report

This page shows DRAFT idea for applying WIG Culvert Repair Cost to estimate repair costs for pipes in the HydInfra Suggested Repair Report

September 29, 2014

Roadway Type

Highway pipes (Centerline, Mainline, Ramp/Loop, Collector-Distributor, Median)
Assign estimated Maintenance repair costs
Add all estimated Maint repair costs to Suggested Repairs Report

County, City, Township pipes
Assign estimated Maintenance repair costs

Assign Maintenance Repair Costs

Roadway Type

Highway pipes (Centerline, Mainline, Ramp/Loop, Collector-Distributor, Median)
Assign estimated Construction repair costs

County, City, Township pipes
Assign estimated Construction repair costs

Assign Construction Repair Costs

Enter pipes (Entrance, Farm Entrance, Field Entrance)
Assign estimated Maintenance repair costs

Enter pipes (Entrance, Farm Entrance, Field Entrance)
Assign estimated Construction repair costs

Add all estimated Const repair costs to Suggested Repairs Report

Other Factors

Compare Maintenance vs Construction cost to repair or replace pipe

Compare to another Repair Method

Repair pipes