

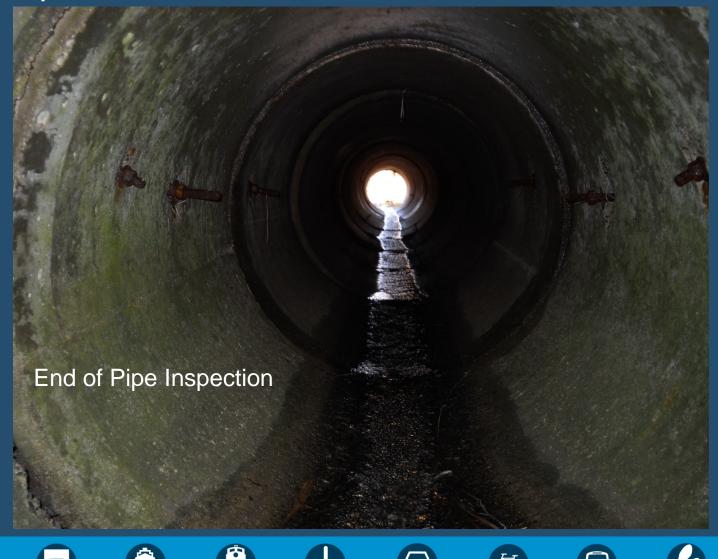
# Hydraulics Inspection Vehicle Explorer (HIVE)

Rob Coughlin & Kristoffer Langlie, PE Minnesota Department of Transportation



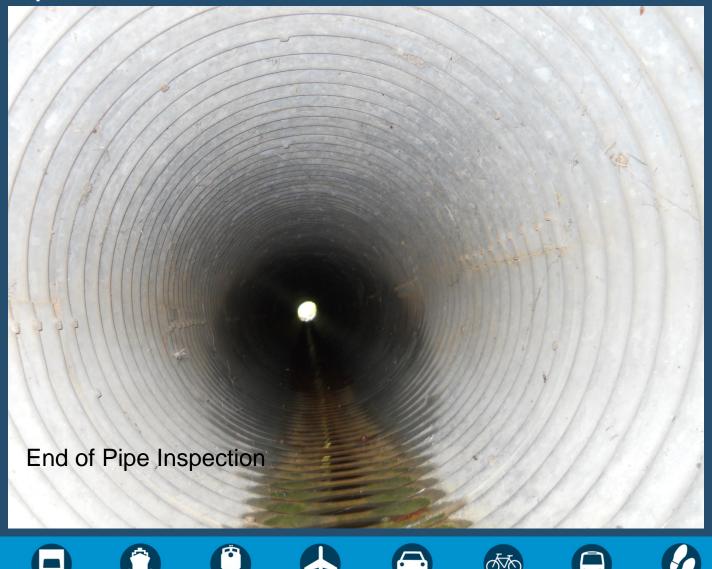


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# Right Tool for the Job?

### Commercially Available Inspection Unit

- \$80,000 to \$100,000 Capital Cost + Transport Van
- Two Operators Required
- Extensive Range in Small Storm Sewer Applications

#### Normal Field Inspection Needs

- 50 to 100ft Range
- One Person Operation
- Small to Transport
- Durable and Low Cost



















# Right Tool for the Job?

### Ineffective Solutions for Culverts

- Cable Camera
- Pole Camera
- End of Pipe Inspection

#### Development

- Idea and Field Experience
- Wi-Fi Connectivity in Cameras
- Remote Control Car Hobbyist

















#### HIVE – Hydraulics Vehicle Inspection Explorer

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- Waterproof; Wi-Fi transmission; 4x4 drive
- \$1200 vehicle/camera + \$300 tablet
- Transported in 11"x17" Box















#### I-90 Dakota HIVE Video – 24" CMP

#### End of Pipe Inspection

#### HIVE Video – 55ft from Pipe End







#### MN26 Maintenance Repair Case Study – 24" CMP

#### End of Pipe Inspection

#### HIVE Video – Rest of Pipe "Good"





#### Repair: Replacement (\$45k)

















#### US52 Maneuverability/Waterproof HIVE Video – 24" RCP



8 Culverts Changed from No Work Needed to Repair Needed
Large joint separations or broken flanges with exposed soil visible

















#### MN44 Hokah HIVE Video – 15" CMP Storm Sewer at 60ft

















## **DEMONSTRATION AND QUESTIONS**



#### HIVE – Hyd Insp Vehc Explr

- Waterproof; 4x4 Drive
- Wi-Fi transmission
- \$1200 vehicle/camera + \$300 tablet
- Transported in 11"x17" Box
- 1/32" SS Recovery Cable

#### Observed Range

- 24" Diameter = ~250ft
- 18" Diameter = ~150ft
- 12" Diameter = ~50ft