Hydraulics Inspection
Vehicle Explorer (HIVE)

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End of Pipe Inspection
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End of Pipe Inspection
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

- 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)

Repair: 12ft of Paved Invert ($1k)
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
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