Hydraulics Inspection Vehicle Explorer (HIVE)

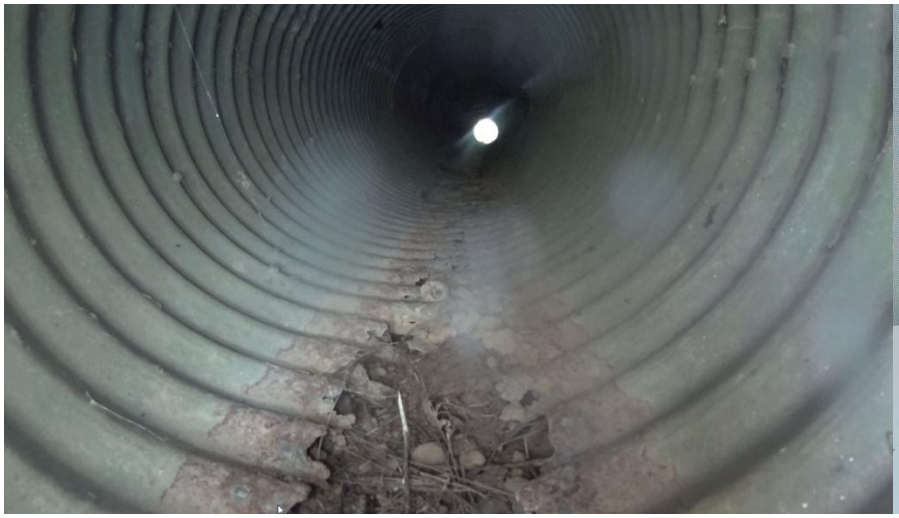
Other WIG-Supporting Activity: District 6

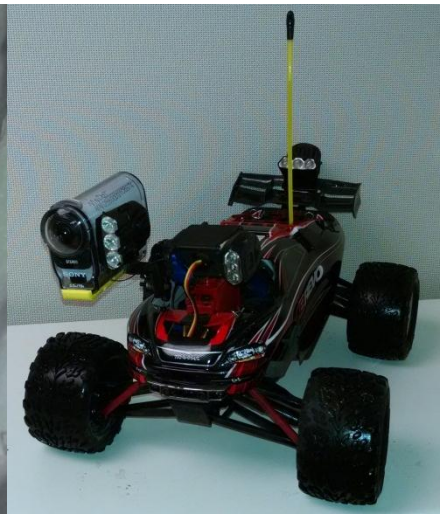
Goal

To provide more accurate hydraulic recommendations, a remote control vehicle was constructed allowing visual inspection of concrete joints and metal surfaces of culverts that cannot be physically entered (less than 3 feet diameter).

Equipment

The inspection vehicle is a waterproof 4-wheel drive remote-controlled truck capable of fitting in a 12-inch diameter culvert. A separate remote control pivot is mounted on the truck body to hold a waterproof camera and LED lighting. This pivot allows for full movement of the camera. The camera sends video to a Wi-Fi enabled device.
Cost: $1,000 vehicle/camera, $300 Wi-Fi device. (Purchasing a proprietary inspection unit costs $80,000+.)





A. Image captured by HIVE on a 24" culvert under TH26 near Brownsville *B. HIVE Vehicle*

Results

I) Image A above shows a 24-inch diameter metal culvert with a missing invert (bottom). The HIVE video revealed that the deteriorated culvert invert was only present in the last 12 feet of the culvert and could be repaired partially (cost less than $1,000). Without this information, inspectors would have assumed this was deteriorated for the majority of the culvert length, and therefore the recommended repair would have been CIPP lining (cost ~$15,000) or full replacement (cost ~$45,000).

II) A 24-inch diameter concrete culvert on TH52, which appeared in good condition from visual inspection at the apron, was inspected with the HIVE. The video revealed areas of exposed rebar, deformation and infiltration. These conditions require replacement. Had the HIVE not been used, the culvert would not have been replaced with the upcoming mill and overlay. Instead, infiltration would have likely continued until a sinkhole developed in the new pavement, requiring emergency repair with maintenance or an emergency contract.

III) The HIVE is also used to assist maintenance in identifying severity and location of culvert failure under road damage.

For More Information

Visit: http://ihub.dot.state.mn.us/efe/
Contact: Rob Coughlin or Kristoffer Langlie, D6 Hydraulics or Chade Trupe, D6 Inventory