

PIPE LINING WITH CONCRETE

PNEUMATICALLY APPLIED CONCRETE

CULVERT PROGRAM

WHAT IS A CULVERT?

SPAN LENGTHS

FEDERAL BRIDGES	20' +
SMALL BRIDGES	10' TO 20'
CULVERTS	10' & UNDER

CULVERT & STORM DRAIN

MATERIALS

CONCRETE

STEEL

PLASTIC

TERRA COTTA

WROUGHT IRON

ALUMINUM

CULVERT PROGRAM

HARFORD COUNTY MAINTAINS
3080+ CULVERTS

BCCMP / CMP / SPPA	1064
RCCP	1823

STORM DRAIN PROGRAM

HARFORD COUNTY MAINTAINS
280+ MILES OF STORM DRAIN PIPE

CONCRETE PIPE	160 MILES
METAL PIPE	120 MILES

PROBLEMS ENCOUNTERED

- JOINT SEPARATIONS IN CONCRETE PIPE
- INVERTS IN METAL PIPES
- AREAS OF EXPOSED REINFORCING IN CONCRETE PIPES

CONCRETE PIPE FAILURES

JOINT FAILURE



EXPOSED REINFORCEMENT



METAL PIPE FAILURES

RUSTING AT INVERT



INVERT FAILURE



INTRODUCTION TO PNEUMATICALLY APPLIED CONCRETE

- WE LEARNED ABOUT PIPE REPAIRS WITH PNEUMATICALLY APPLIED CONCRETE ROUGHLY 15 YEARS AGO
- WE CONTACTED THE CONTRACTOR AND HAD THEM REPAIR A FEW CULVERTS PIGGY BACKING OFF OF A CONTRACT FROM MONTGOMERY COUNTY DPW

HARFORD COUNTY APPROACH

- THIS IS A TARGETED APPROACH TO MAKE FOR AN ECONOMICAL REPAIR
- WE ONLY REPAIR THE INVERTS IN METAL PIPES AND JOINTS IN THE CONCRETE PIPES, NOT THE WHOLE CIRCUMFERENCE OF THE PIPE

LIMITATIONS

- THERE ARE CERTAIN LIMITATIONS WE FACED WITH THIS TYPE OF REPAIR
- SINCE PEOPLE HAVE TO GO INSIDE THE PIPE AND APPLY THE CONCRETE THROUGH A NOZZLE, THE SIZE OF THE PIPE HAS TO BE MINIMUM OF 36" IN DIAMETER
- WE ALSO NEED TO MEET THE CONFINED SPACE REQUIREMENTS FOR LONGER STORM DRAIN SYSTEMS

BENEFITS

- FOR A TYPICAL 36" DIAMETER CULVERT, ROUGHLY 50 FEET LONG WITH 3 FEET OF COVER WOULD COST AROUND \$50,000 TO \$75,000 TO REPLACE DEPENDING UPON THE ACCESSIBILITY AND UTILITIES INVOLVED
- PIPE REPLACEMENT MAY INVOLVE CLOSING THE ROAD FOR CONSTRUCTION
- WE REPAIRED THESE CULVERTS FOR \$12,000 TO \$20,000 WITH THE PNEUMATICALLY APPLIED CONCRETE IN TWO DAYS WITHOUT CLOSING THE ROAD

CONCRETE PIPE JOINTS REPAIRED WITH PNEUMATICALLY APPLIED CONCRETE



METAL PIPE INVERT REPAIRED WITH CONCRETE



OTHER USES

- REPAIR ENDWALLS
- REPAIR WALLS/BOTTOMS OF STORM DRAIN INLETS/MANHOLES

HARFORD COUNTY REPAIR – JOHNSON MILL RD

- CONCRETE PIPE WITH JOINT SEPARATIONS
- EXPOSED REINFORCEMENT THROUGHOUT PIPE
- FAILING STONE ENDWALL

JOHNSON MILL ROAD BEFORE THE FACT



JOHNSON MILL ROAD DURING REPAIRS



JOHNSON MILL ROAD AFTER THE FACT



JOHNSON MILL ROAD AFTER THE FACT



RESULTS

- ONCE REPAIRED, WE ORIGINALLY ANTICIPATED AN ADDITIONAL 20 TO 25 YEARS OF LIFE TO THE EXISTING STRUCTURE
- WE DEVELOPED A REPAIR PROGRAM USING PNEUMATICALLY APPLIED CONCRETE AND DEVELOPED OUR OWN ON-CALL CONTRACT
- THE REPAIRS WE DID 15 YEARS AGO ARE STILL HOLDING UP WELL

BEAR CREEK RD 3 CELL CULVERT - 2006



BEAR CREEK RD 3 CELL CULVERT – 2019



BEAR CREEK RD 3 CELL CULVERT

2006



2019



BERNADETTE RD 2 CELL CULVERT - 2006



BERNADETTE RD 2 CELL CULVERT - 2019



BERNADETTE RD 2 CELL CULVERT

2006



2019



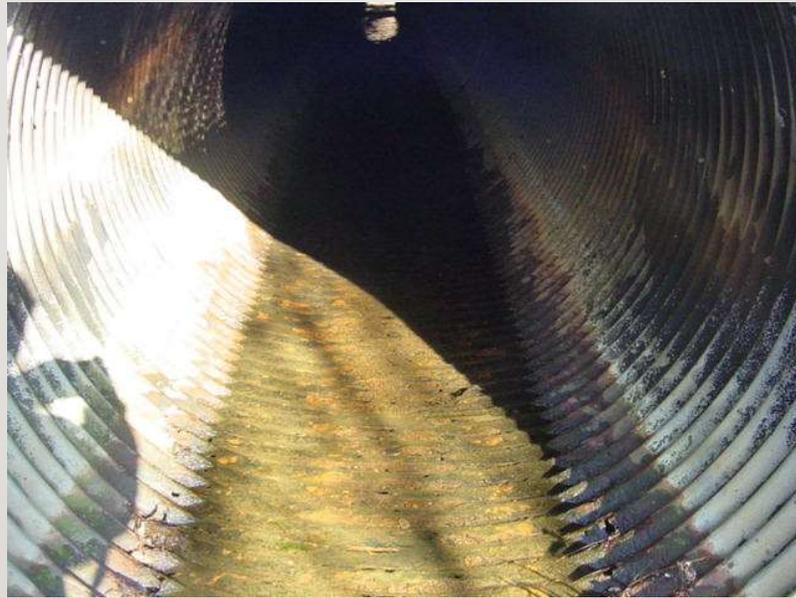
QUESTIONS & ANSWERS

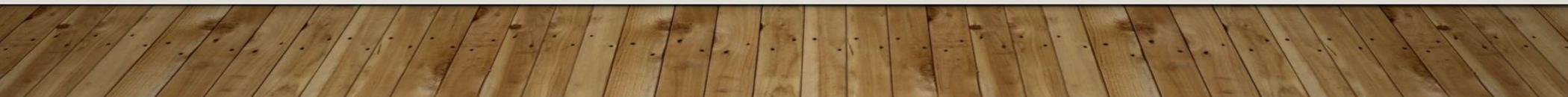


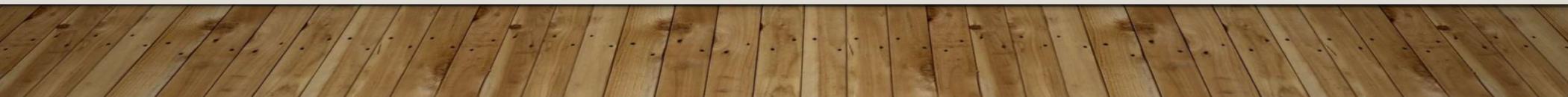


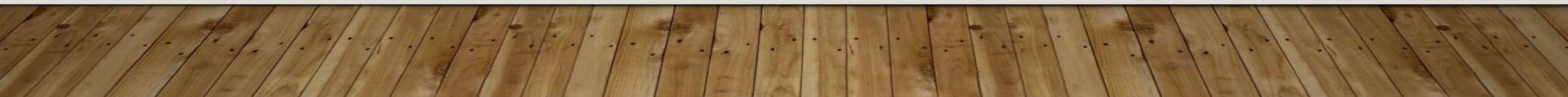
WIRE MESH BEFORE APPLYING THE PNEUMATICALLY APPLIED CONCRETE











THIS IS HOW CONCRETE PIPE CULVERT FAILS THROUGH JOINTS



THIS IS HOW METAL PIPE CULVERT INVERT FAIL



THIS REPAIR WAS DONE IN 2008





CONCRETE PIPES USUALLY FAIL AT THE JOINTS WHILE METAL PIPES FAIL AT INVERT AS IT RUSTS WHERE WATER IN CONSTANT CONTACT WITH THE METAL.

