NDT CORPORATION
Nondestructive & Geophysical Testing

Nondestructive Testing of a Trunk Sewer Line

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Nondestructive Testing of a Trunk Sewer Line

Constructed in the early 1900's with an unreinforced concrete top section and a vitrified brick base (below spring line), the B Street/New Jersey Trunk sewer is located in the center of Washington D.C. This sewer tunnel varies in size, shape and construction; transitioning from a 6' 6" circular brick tunnel upstream to a 17' X 16' concrete sewer with a brick bench downstream. This tunnel was inspected in 2004 with a closed circuit television (CCTV) examination and numerous defects were noted, but most were considered minor based on the age and construction of the sewer. However, experience shows that even though the interior of a tunnel has appearance of minor or no defects, tunnel sidewalls can be in poor condition resulting from deterioration that occurs at the exterior of the tunnel wall and progresses inward. The intent of this nondestructive testing investigation was to use sonic/ultrasonic and pipe penetrating radar (PPR) data to evaluate the full thickness condition of the tunnel at critical locations. Arcadis subcontracted NDT Corporation (NDT) to test specific locations identified by J.W. Marshall and Associates. J.F. White Construction Company's inspection team performed all in-tunnel operations, including the nondestructive testing. NDT's topside personnel monitored and evaluated the data acquisition and data quality with a real time video feed from the inspection team.

Pipe Penetrating Radar Team Assessing Concrete Liner.

The pipe penetrating radar (PPR) method uses a pulsed electromagnetic signal that:

- Assesses the thickness of the brick and concrete liner
- Evaluates for water infiltration into cracks or deteriorated concrete
- Identifies areas of reinforced concrete liner
- Identifies areas of potential behind the liner voiding

The sonic/ultrasonic data were acquired using a system developed by NDT Corporation specifically for testing concrete. This system (pictured below) uses a projectile impact energy source, an array of sensors, and a PC for onsite data display, quality control and data archiving. This data is used to determine the average strength of the liner concrete from measured average compressional and shear wave velocity values of the concrete. The transmission velocity values are principally controlled by the presence of cracking, voiding or deteriorated low-strength concrete. Impact echo data is acquired simultaneously with sonic/ultrasonic data, and is used to determine concrete thickness and to evaluate for back of lining deterioration and internal delamination and voiding. The results of the nondestructive testing determined the tunnel concrete wall thickness, locations of back of wall deterioration and average strength at critical locations. Structural engineers compare these results with as-built plans to evaluate the integrity of the tunnel walls and develop a management plan for this critical structure.

Sonic/Ultrasonic System Used to Determine Concrete Liner Mechanical Integrity.