Case Study:

MERRILL STREET COMBINED SEWER REHABILITATION

for the City of Indianapolis Department of Public Works

60 MGD bypass pumping operation (full image page 12)

ROLE OF WESSLER ENGINEERING

66" combined sewer, 25 feet below Merrill Street (full image page 8)

The City of Indianapolis operates an extensive sewer collection system to serve the metropolitan area. As sewers near the waste-water treatment plants, they grow larger in diameter and are more critical to operation. In the summer of 2007, Wessler Engineering was tasked with designing a solution for a portion of the Pogues Run Relief Interceptor (hereinafter known as the Merrill Street Sewer), which is a critical large diameter combined sewer in the heart of downtown Indianapolis. The City's concern for this particular sewer was twofold: first, it was approaching 60 years in age and had experienced a number of operational issues, and second, that it could limit capacity for the main campus of Eli Lilly & Company, the City's largest and most visible taxpayer. Wessler's job was to put a new sewer in place that would increase capacity and extend the service life, while limiting cost and construction disturbance.

Wessler began evaluating the sewer and its surroundings.

- *Closed circuit sewer televising was performed at night while the flow through the sewer was at its lowest.*
- *Manhole inspections were conducted to assess the structural integrity of access points.*
- *Existing flow monitoring data (provided by the City) was analyzed to establish flow patterns.*
- *Hydraulic modeling of the sewer was conducted to gauge its response to rain events.*
- *A topographic survey was completed to confirm sewer depths and define the project limits for the construction project ahead.*
- *Partnerships were established with businesses and landowners along the sewer route.*

Here are some quick findings regarding this portion of the Merrill Street Sewer.

» 2,900 linear feet between Alabama St. (Eli Lilly & Company) and Capitol Ave. (Lucas Oil Stadium)

» 60" – 66" diameter unlined reinforced concrete pipe (no corrosion protection)

» Depths ranging from 21 – 31 feet beneath active city streets

» Constructed in the 1950's

» A tangled web of existing utilities above and around the sewer

» Peak flow rates approaching 60 million gallons per day (MGD)

» Sewer televising revealed infiltration and structural damage warranting repair or replacement

Wessler worked with City staff to develop feasible solutions. Pipe replacement using open excavation methods was quickly ruled out due to the depth of the sewer and its proximity to utilities and major thoroughfares. It was agreed that a trenchless rehabilitation project would best serve the City. Shotcrete (gunite) was given brief consideration as a rehabilitation option, but was eliminated from consideration primarily due to the eight (8) inch diameter reduction in pipe size it represented. Two (2) trenchless rehabilitation options were carefully evaluated: sliplining and cured in place pipe (CIPP).

Hydraulic modeling to maximize sewer capacity
(full image page 13)

Sliplining, or "sliding" new sections of pipe into the existing Merrill Street Sewer, met all the project requirements and could be completed without a system for bypassing flows in the sewer. The major drawback to sliplining was the open excavations that would be required to accommodate bends in the sewer . CIPP, on the other hand, met all the project requirements but required a dry pipe, meaning a 60 MGD bypass pumping operation would need to be designed. Ultimately, Wessler and the City decided to rehabilitate the Merrill Street Sewer with 2,900 linear feet of 60" – 66" CIPP. Design calculations projected a capacity increase of 45% as a result of the CIPP liner. All thoroughfares were able to remain open to traffic as a result of the trenchless rehabilitation.

Wessler assisted the City in successfully bidding the project, and also provided construction administration services through the construction phase of the project. The Merrill Street Sewer is the largest CIPP project the City of Indianapolis has completed to date.

ROLE OF OTHER CONSULTANTS PARTICIPATING IN THE PROJECT

Wessler utilized the services of Keramida Environmental, Inc. for coordinating with high volume sewer customers and the City's Public Information Officer; Infrastructure Engineering, Inc. for assistance with design of the bypass pumping operation; and USI Consultants, Inc. for topographic survey.

Wessler also wishes to acknowledge the work of ms consultants, inc., who served as the resident project representative during construction.

ORIGINAL OR INNOVATIVE APPLICATION OF NEW OR EXISTING TECHNIQUES

The Merrill Street Sewer is the largest CIPP project the City of Indianapolis has completed to date. Shotcrete has traditionally been used by the City to rehabilitate diameters this large. CIPP, on the other hand, is most often utilized for smaller diameters. By applying the CIPP technology to this project, however, the capacity in the sewer increased by 45% due to the "slick" inner surface of the liner. The useful service life of the Merrill Street Sewer was extended by at least 50 years as a result of the CIPP rehabilitation.

24" bypass piping snakes its way through downtown Indianapolis.
(full image page 6)

An innovative design was also created to handle the wastewater discharge from Eli Lilly & Company's corporate headquarters. All sewers on the campus converge at one point and drop into the Merrill Street Sewer. There was concern that construction operations could cause a backup at the discharge point, potentially flooding the facility basement where millions of dollars of pharmaceutical product was stored. Rather than rely on a pump, a temporary gravity bypass system was designed to capture 100% of Eli Lilly & Company flow and transfer it safely to a downstream portion of the sewer.

60 MGD bypass suction point (1 of 2)
(full image page 7)

FUTURE VALUE TO THE ENGINEERING PROFESSION & PERCEPTION BY THE PUBLIC

This project has been an educational tool for contractors, engineers, and vendors alike. Because of its uniqueness, the design has been the topic of trade show discussions. Professional organizations arranged field trips throughout construction to witness the 60 MGD bypass pumping operation in action and to see CIPP on a scale many had not seen before in their professional careers.

Project stakeholders, such as the City of Indianapolis and Eli Lilly & Company, had a very high perception of this project as it allowed them to continue their operations uninterrupted. The impact of this project on the general public was low by design. Trenchless rehabilitation allowed roads and sidewalks to remain open while sound attenuated pumps kept noise to a minimum.

SOCIAL, ECONOMIC + SUSTAINABLE DEVELOPMENT CONSIDERATIONS

The trenchless industry as a whole is on the cutting edge of sustainable design. In the case of this CIPP project, sustainability can be described by the ability to put a new pipe within a pipe 30 feet below a busy urban thoroughfare without stopping a single car or digging a massive trench.

COMPLEXITY

There were several factors that made this a complex design project. First, the City has one shot to rehabilitate the Merrill Street Sewer. The finished product needs to perform for decades. In order to ensure this, Wessler completed detailed calculations to determine safe CIPP liner thicknesses (based on ASTM F1216-07b) and then required the same as minimum thicknesses in the contract documents.

60" CIPP dry tube awaiting over-the-hole wetout
(full image page 9)

Working with the sewer customers, particularly Eli Lilly & Company, required a high level of coordination. While the public sewers passed beneath public streets, a good portion of this project took place on their campus, which meant that Eli Lilly & Company representatives were involved at all times to protect their assets.

Utility coordination was a challenge. The Merrill Street corridor includes every imaginable utility from fiberoptic to high pressure gas to water. Several meetings were held to share ideas. Field visits and test bores were completed to verify facilities and then include that information on the plans for the contractor's benefit.

Finally, the construction phase of the project was very complex in its own right. Contract documents were carefully prepared to establish firm project requirements while not limiting a contractor's creativity.

MEETING AND EXCEEDING OWNER'S/CLIENT'S NEEDS

The Design Project Manager for the City of Indianapolis had this to say about Wessler Engineering: "…once again, it was an enjoyable experience working with Wessler Engineering. You did an excellent job and helped me look out for our ratepayers and taxpayers - very much appreciated."

All of the project requirements were fulfilled by the final design. The life of the sewer was extended significantly, and its peak capacity was increased by 45%.

24” bypass piping snakes its way through downtown Indianapolis.

60 MGD bypass suction point (1 of 2)

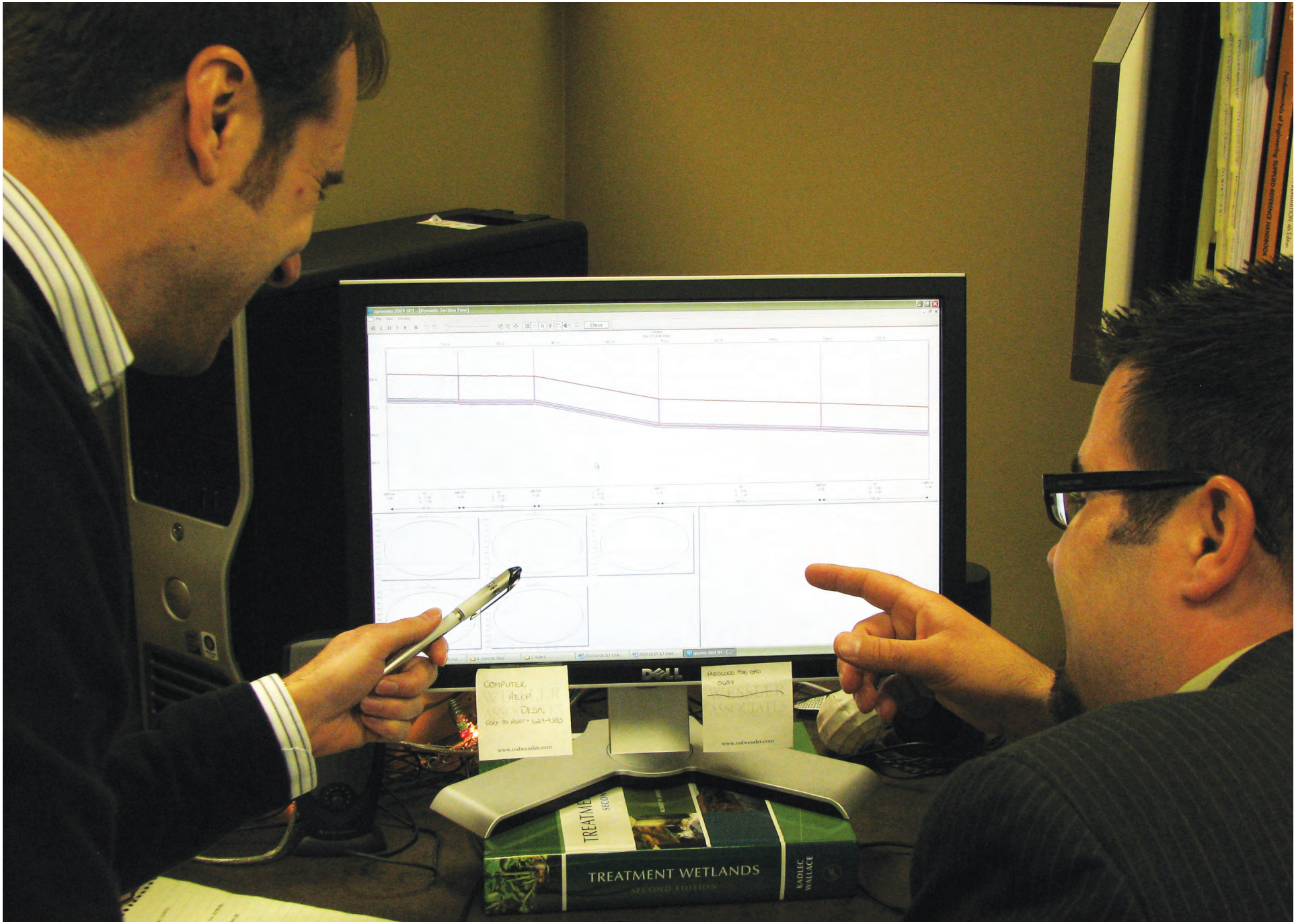
66” combined sewer, 25 feet below Merrill Street

60” CIPP dry tube awaiting over-the-hole wetout

“Over-the-Hole” wetout of 60”-66” CIPP

Piping and valves at the bypass pumping pit

60 MGD bypass pumping operation



Hydraulic modeling to maximize sewer capacity

Project location plan

WESSLER
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More Than a Project™

We can help.

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Wessler Engineering is a civil and environmental engineering firm, specializing in wastewater, drinking water, and stormwater projects, providing services ranging from master planning and design to construction administration and process energy audits. Founded in 1975 and based in Indianapolis, Indiana, we have branch offices in Evansville, West Lafayette, and Fort Wayne, and in Bluffton, Ohio.