

# **PIPE REHABILITATION**

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Have you ever wondered what happens to waste after it has been flushed down the sink or commode? This is where the city's job comes in. In Houston, Texas, the city (City of Houston) takes a major responsibility in making sure that when locals flush a commode, the waste flows through the sewer lines to the nearest and most convenient water plant located throughout each residential community as smooth as possible. The branch responsible for this function is called the *Wastewater Operations* (WWO). WWO is one of the several branches that make up the Public Works and Engineering Department of the City of Houston. One of my jobs as a student intern is a *field analyst*. This job implies going out to the different residents throughout the city and other selected bordering communities to locate and analyze their sewer lines. This job will be further explained later on through the research paper. The main focus of this research is to give you a better understanding, to the best of my knowledge, about the responsibilities and procedures that my coworkers and I are held accountable for.

A *field analyst* is important for two main functions. One being for the City of Houston is currently in the middle of a process of rehabilitating 2.5 million linear sewer lines for the next ten years. The other reason being

for customer service which is whenever a local citizen has sewer problems. For these two main functions, the job is divided into two rehabilitation processes; scheduled pipe renewal and unscheduled pipe renewal.

The purpose of the scheduled pipe renewal rehabilitation procedures is to "follow the *Compliance Agreement*" (CA) between the City of Houston (COH) and the *Texas Commission on Environmental Quality* (TCEQ). The two created what is called the *Administrative Order* (AO) Plan, which is to rehabilitate old pipe (URC, RCP, VCP, ABS, CIP, and DIP). This renewal process will help to prevent sewer problems caused by "pipe deterioration, meet goals established in the AO and CA, and reduce the occurrence of Sanitary Sewer Overflows (SSOs)". The first step to this procedure is the Data Collection which consists of numerous different ways to collect information such as:

- o Condition & Complaint Map
- o Current AO basic prioritization list
- o Geographic Information Management System (GIMS) Map
- o Easement Data
- o Maintenance History
- o Point Repair Work Orders
- o TV inspection Reports
- o P-MAP Tracking Spreadsheet

- o T-MAP Tracking Spreadsheet
- o Rehab Status Report
- o Turnaround Reports

The **Condition & Complaint Map** is a 24x36in printed grid map displaying street blocks, houses, and non-updated sewer lines. This map gives the analyst a general understanding of the problems and the performance of the collection system in a particular basin.

The Current **AO basic prioritization list** is a schedule of the rehabilitated sewer lines the City of Houston agrees to keep up. The **GIMS Map** lists sewer sizes and slopes as well as construction plan information. This map is not always accurate, as I being an investigator found out the hard way.

The **Easement Data** grants access to private property. "It is required to gain access to sewers located behind houses, also called back lot lines." **Maintenance History** is simply documentation of what maintenance has been done to a particular pipeline.

**TV Inspection Reports** are stored into the Infrastructure Management System (IMS) database. The Inspection reports contain observations made by the tape reviewer. They indicate where service laterals "enter the sewer, where defects such as cracks, sags, ovalaties,

missing pipe, etc. are located and identify changes in pipe type observed while viewing the tape”.

**P-MAP/T-MAP Tracking Spreadsheets** contain all of the rehabilitation work orders issued by the *Collection System Operation* (CSO). Both spreadsheets should be “checked for every basing in order to locate completed or proposed work generated by CSOs outside of the Scheduled Pipe Renewal process”. If the work has been scheduled under the AO plan, the segments are listed in the T-MAP Tracking spreadsheet.

A **Rehabilitation Status Report** is generated from the Intelligent Query Management System (IQMS) database. It provides a summary of the work orders performed for each segment from 1990 through June 1999.

**Turnaround Reports** “provide a list of work orders performed under the Greater Houston Wastewater Program” (GHWP). The takeoff quantity is used to determine whether or not the work was actually completed. If the takeoff quantity is the same as the actual quantity, then the work was performed. The next procedure is the field investigation. This is where field analyst comes into play. “When all of the required information is gathered, the investigator goes out to analyze the area and determines the best approach to restoring the given area.”

The investigator's field responsibilities are manhole inspections, checking for constructability Assessment, land usage and field safety.

**Manhole Inspections** are done to observe flow volume, pipe type, manhole type and condition, debris accumulation, invert-status, services directly connected to manhole, grease buildup, and surcharge evidence. Two digital photos should be taken of all manholes opened and any other items that might add to the analysis. Photos provide visual confirmation of the observation recorded in the field notebooks. While the investigator is visiting the location, areas where construction may be difficult due to encroachments on utility easement by houses, garages, swimming pools, etc. should be noted.

The investigator should also note the **land usage** such as restaurants, apartment complexes, garages, swimming pools, etc. The staff should also practice **Field Safety**. The staff is responsible to comply with the COH's Health and Safety procedures, field and traffic control practices and guidelines.

After or even during the field investigation, the investigator creates what is called a **Recommendation Map**. This map is used to suggest what needs to be executed in the given basin such as which sewers will be selected for

cleaning and televising, point repair, or rehabilitation. This map is given to the Contract Support Engineer for implementation. After all of the research and recommendations are completed, the Scheduled Pipe Renewal Manager transmits the completed work packages into a work order and the rehabilitation begins.

The Unscheduled Pipe Renewal procedure is done similarly, but there are some different approaches. Under the AO Plan, "the City of Houston commits to clean 20 million linear sewer lines" for the next ten years. The Unscheduled Pipe Renewal Task's main objective is to "support the City of Houston to identify *Repeat Excursions* or floods and recommend appropriate corrective actions to eliminate the probable root cause of the problem identified". The first procedure is the Data Collection. This procedure includes:

- o AO list of basins to determine whether the basin is scheduled for rehabilitation under the AO Plan.
- o Condition & Complaint Map
- o Geographic Information Management System (GIMS) Map
- o Easement Information
- o Maintenance History

The Graduate Engineer must verify whether the meter basin has been scheduled for rehabilitation under the AO

Plan. If so, the Graduate Engineer has the option of recommending rehabilitation in the Initial Repeat Excursion analysis phase. If not, the engineer should skip the CTV phase and recommend RTV or rehabilitation depending on most recent TV Reports available for the line segments. The next procedure would be the Field Investigation. The Field Investigation is done a little different as well. It consists of manhole inspections, constructability assessment, land usage, documentation of field observations, COH field safety measures, report stoppages and excursions observed, proper customer contact, and dye-flood testing and sewer probing.

**Dye-Flood Testing** is when dye is placed into a pipeline followed up with plenty of water. This is performed to confirm cave-ins on sanitary/storm sewers, find the connection point of sewer laterals, and confirm storm-sanitary sewer cross connection.

**Probing** is performed to find the location and the flow direction of shallow sewers under dirt. After the Graduate Engineer gathers all of the data for the given basin, the data is then evaluated to determine the best rehabilitation strategy. After the Graduate Engineer meets up, discusses the rehabilitation strategy with the Supervising Engineer, and is approved, he/she then takes the approved

recommendations and implements a work order to begin the rehabilitation.

As you can see, the Pipe Rehabilitation Procedures are very well organized for safety and to ensure locals that their collection system is safe. I hope that this research has been a helpful and educational tool. As an intern, this experience has been a great one. The work environment was not as intimidating as I originally imagined. All employees were friendly, professional, down to earth, and did not mind helping me with any of the work issues that I came across. I will definitely keep the City of Houston in mind, after graduation, for the chance of a great career.

**WORKS CITED**

Iken, Jason. "Contract Procedure Manual". 4545 Groveway  
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