

TECH TIPS

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TECH TIPS BY NASSCO IS A BI-MONTHLY ARTICLE ON TRENDS, BEST PRACTICES AND INDUSTRY ADVICE FROM NASSCO'S TRENCHLESS TECHNOLOGY MEMBERSHIP PROFESSIONALS.

USING GIS TO MAP PACP DATA

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Figure 1: Structural Pipe Ratings (Green=Good, Yellow=Re-inspect, Orange=Repair if budget allows, Red=Emergency Repair)

For years, Municipalities have used Geographic Information Systems (GIS) to map infrastructure inventories and apply basic attribute information such as material, size and construction date. Most are using GIS to map PACP condition grades in order to plan maintenance and rehabilitation activities, develop capital plans, and apply condition data as the Likelihood of Failure to asset risk management analysis. Thinking outside the box allows GIS professionals to map other PACP data that is useful for Municipal planning.

Mapping Overall Pipe Ratings

Municipal staff and consultants must be properly trained in PACP to accurately interpret inspection results and understand the pipe ratings provided in reports. There are up to 9 pipe ratings provided in most PACP reports. Choosing the most appropriate condition rating to map within GIS is important to flag sewer sections requiring rehabilitation or maintenance activities.

The result of thematically mapping pipe ratings requires further analysis by reviewing the data or watching the inspection video to determine why a sewer section was assigned a specific rating. In addition, CCTV inspection pictures and videos, GIS or an above ground sketch should be reviewed in order to assign the appropriate rehabilitation method(s). Inspections represented in a sophisticated GIS data model with links to the most recent CCTV inspection report and video make the review process much more efficient.

Mapping Individual Defects Observed Along the Pipe

PACP-certified GIS staff will have the knowledge to represent data accurately. To create an appropriate data model, the application must consider the following:

- Not all PACP codes are considered defects, and separate layers are useful such as:
 - » Structural defect codes that typically use the same rehabilitation methods and capital budgets for repair.
 - » Operational and maintenance defects that are typically managed through jetting, cutting and reaming, and usually funded from the operations budget.
 - » Non-defective construction features and miscellaneous codes that give useful information in terms of lateral locations, pipe material and size changes. It should not be

necessary to map the typical first line of code in PACP surveys (Access Point) as manholes should already be represented within the GIS. Unnecessary data can be filtered.

- Thematically mapping defects by type and/or severity (condition grade).
- Using a linear referencing model, point defects are represented as points along a sewer line and continuous defects are represented as lines. Many software incorrectly represent continuous defects as two points; start and end of the defect.
- Codes observed in reversal surveys are correctly referenced in the opposite direction from the original survey.
- QA/QC checks which include:
 - » Upstream and downstream manholes in inspection data exist within the GIS. This helps identify typos in manhole IDs, duplication of IDs, or incorrect mapping.
 - » The surveyed length is within acceptable thresholds of the sewer length represented in the GIS. This helps flag issues such as incomplete surveys, unidentified manholes, and improper mapping.

Mapping each line of PACP code observed allows for more efficient and effective interpretations and decision making. It is visually and spatially understood instantly why a sewer segment has been assigned a particular overall rating, lines requiring maintenance versus rehabilitation, lines that require spot repairs versus complete rehabilitation or replacement, in addition to identifying maintenance and repair programs by location.

Mapping Other PACP Data

Thinking outside the box to represent useful PACP information within a GIS allows for better asset management practices. Representation of condition over time can determine sewers failing at faster rates than others. On limited inspection budgets, it may be useful to inspect sewer lines in poor condition more frequently than those that are new. Thematically mapping the Inspection Status field can help to identify manholes that are buried, locked, or inaccessible due to location or snow covered during winter months and can help build a more efficient inspection program. Identifying sewers that repeatedly display Miscellaneous Survey Abandoned code can flag potential problems with the sewer line for more frequent maintenance or a required repair that has been dismissed in urgency but inhibits proper inspections in the future.