Award Category Applied For:	**2003 AMSA National Environmental Achievement Awards Member Agency Achievement - Operations Award**
Project Name:	**Pipe Rating Program**
Date:	**December 16, 2002**

Summary Overview of MSD's "Pipe Rating Program"

1) What is "Pipe Rating"?

MSD's Pipe Rating Program is a new method of generating and prioritizing sewer rehabilitation projects. The typical approach of *reactive* planning is to define, develop and complete a rehabilitation project after problems occur - such as repeated overflows at a location, etc.

Pipe Rating is a more *proactive* planning tool which utilizes Closed Circuit Television (CCTV) information, a GIS database, and real-world maintenance history to view, rate, and score pipe segments based on a number of factors. These factors, for any given manhole-to-manhole segment, include maintenance work order history, both number and severity of defects, and history of overflows on that segment. These are all combined to yield a score which may then flag a particular line segment for further investigation.

Many municipalities have a system for scoring individual defects in sewer lines; however, Pipe Rating is new in that it combines several qualifiers together to generate a rehabilitation project. Another tangible benefit of this program is that it can quickly evaluate thousands of feet of sewer line from the database - flagging only those segments truly needing attention and maximizing the efficiency of rehabilitation dollars.

2) Time Frame

MSD is currently in the preliminary design phase of pipe rated projects. These projects will be implemented in FY03-04, with construction expected to begin in 2004. It is expected that this program will ramp up in future years and will serve as a deciding factor in how rehabilitation dollars are spent.

3) Goals and Objectives of Pipe Rating

The purpose of pipe rating is to provide for a more efficient long-range, system wide method to target "hot-spots" for rehabilitation. Traditional dig and replace projects will always exist; however, with an aged collection system over 900 miles long, a more efficient rehabilitation program is desired. Pipe Rating will help MSD identify the "worst of the worst" in an effort to focus rehabilitation dollars on those pipe segments that truly need fixing - while leaving those segments with lower defect scores in service.

4) Results of Pipe Rating

Early indications are promising. Development of the basic rating system, database, and protocols has already taken place. This process has been applied to 7 sub-basins within the District, and has yielded a total of 313 problem lines which require further investigation by engineering. Of these 313, 41 lines are scheduled for rehabilitation within the next two fiscal years as they have the highest (meaning worst) scores due to number and severity of defects combined with prior sewer overflows. The remainder are at varying levels of priority based upon their score.

Rehabilitation options will include trenchless lining, point repairs, or D&R - whichever provides for the most cost effective, long term fix. In addition to generating a list of prioritized repair projects, the database and inquiry features can also be used by maintenance crews to review previous repair history and pipe scoring data on pipe sections when they receive maintenance calls.

5) Level of Participation

To help the formation of this program be as efficient as possible, a special group was formed from all levels of staff which included GIS, System Services (maintenance) staff, engineering, and management. This "Vertical Team" helped to garner support from all levels within MSD, and of course obtained as diverse an input as possible from those involved in this process.

6) Ability to Replicate

Pipe rating would be relatively easy to replicate for any utility provided that it has a GIS, a database resource such as Microsoft Access which allows access to logged maintenance work-orders, CCTV information, and some form of pipe defect scoring system in place (there are several in use across the country). Once the process is established, ArcGIS and Access do the upfront processing in defining the score of each pipe segment. Those segments above a certain trigger score are flagged for further investigation by an engineer for both verification and to determine remediation options.

7) Environmental Education Benefits

This program was established to make our rehabilitation program more efficient, and to get the most "bang for the buck". It is not directly related to environmental education per se.

8) Was there a demonstrated need for the activity?

Yes. MSD ratepayers have funded tens of millions of dollars for rehabilitation projects in prior years. Seeking the most efficient methods of rehabilitating our system is incumbent upon MSD staff. This process will not only help to keep future rate increases as low as possible, but will also help us to more quickly rehabilitate troubled areas.

For example, some 75 year-old clay lines may have significant remaining service life (depending on a number of factors). It may be more efficient to leave good sections in place, replace other sections, and perform point repairs rather than replacing a significant length of a collector sewer.

9) In what way is the activity innovative?

The pipe rating program is innovative because it uses a multi-faceted approach to prioritize rehabilitation efforts. Using maintenance work order and overflow history, our extensive GIS, and database software - "hot-spot" line segments within a basin are flagged for rehabilitation based on a number of weighted factors.

Once flagged by the process, a line segment is reviewed by an engineer to determine the most efficient means of rehabilitating that segment (with an emphasis on lining and/or point repairs if possible). Segments will then be combined to form a project which will then be let to construction.

10) Additional information

Please see the attached pipe rating example, map, and documentation for a sample of the results of this program. Please note that this is intended to be as brief as possible, and is only a snapshot of the data generated by this process. The map and information shown after Page 1 is for Basin No. 65 (of 69 total sub-basins), and in this case is *not* prioritized based on severity - rather it is to show *all* of the 34 projects and point repairs flagged for further action in this small basin within the next ten years.

The map shows the *mean defect score* of each segment (sum of all defect scores divided by number of defects). There are also two other maps which show the *peak defect score* (regardless of pipe length or number of defects) and the *mean pipeline score* (sum of all defect scores divided by pipe length). All three of these components are added together for each line segment, and then another component is added for the number of SSO's which may have occurred on that segment. The highest scored pipes then receive priority to be rehabilitated. Please refer to Page 1 for an example of this process.

The highest priority pipes, for which data has been collected, are ready for review by engineering staff. An engineer will review the CCTV information on *each* flagged segment and recommend an economical method of rehabilitation.