

METROPOLITAN SEWERAGE DISTRICT of Buncombe County, N.C.



PIPE RATING PROGRAM

Pipe Rating Program

- What is it?

A new, *proactive* program used to define and develop rehabilitation projects.

The usual *reactive* approach has been to rehabilitate an entire line after significant problems have occurred – such as line failures, SSO's, etc.

Pipe Rating is a *structural* asset rating tool which utilizes multiple components to rate pipe segments.

Pipe Rating Program

- Purpose: To get the Biggest (and Quickest) Bang for the Buck. This method is proving quicker and more efficient than our Basin Rehabilitation Projects.
- Focuses Rehabilitation Dollars where they are most needed – whether at a single point repair or a traditional D&R project.

Pipe Rating Program

Events Leading to Development

- Pipe Rating was developed as a progression of our Basin Rehabilitation, Preventative Maintenance, and GIS programs. Several years ago MSD completed its first basin-wide project (23,000 LF), and is 71% finished with the second basin-wide project (49,000 LF).
- Basin-Wide Rehabilitation, though comprehensive, is both time-and-capital intensive, taking 3-5 years to develop and complete a project. With sixty-nine sub-basins within the District, this approach is too slow.
- This led MSD to investigate more efficient methods.

Pipe Rating Program

- How was it started?

A special group was formulated which was comprised of several levels of staff including GIS, System Services, engineering, and management.

This “Vertical Team” helped to garner support from all levels within MSD and to gather as diverse an input as possible.

Pipe Rating Program

- Elements Used:

- 1) CCTV information
- 2) Defect Scoring System
- 3) GIS Database Software
- 4) Sanitary Sewer Overflow (SSO) history
- 5) Engineering analysis

These components are combined to generate specific projects for problem lines.

Pipe Rating Program

■ How Does the Process Work?

- 1) A line segment is first cleaned and CCTV' d, as a part of MSD' s Preventative Maintenance Program. MSD is required to clean 10% of our system each year, in accordance with our collection system permit.

*** MSD has CCTV' d 41 of 69 basins totaling 516 miles (57% of our total system) as of Nov. 2004. ***

- 2) Each *structural* defect noted in the video inspection is given a defect score, in accordance with MSD' s standardized scoring system. Defects are then embedded within the GIS database, with appropriate scores attached.

MSD Structural Defect Scores

	Code	Description	Score
■	CC	Circumferential Crack	20
■	CL	Longitudinal Crack	20
■	CM	Multiple Cracks	30
■	COH	Corrosion Heavy	50
■	COL	Corrosion Light	20
■	COM	Corrosion Medium	30
■	D	Deformed Sewer	65
■	FC	Circumferential Fracture	40
■	FL	Longitudinal Fracture	40
■	FM	Multiple Fractures	60
■	HL	Hole Large	50
■	HP	Hole Patched	5
■	HS	Hole Small	25
■	JDL	Joint Displaced Large	30
■	JDM	Joint Displaced Medium	5
■	OJL	Open Joint Large	30
■	OJM	Open Joint Medium	10
■	X	Collapsed Pipe	100

These scores are based on MSD's standardized Sewer Condition Classification Manual. Scores are weighted according to MSD priorities.

Pipe Rating Program

- How Does the Process Work? (cont' d)

3) Upon quantifying all *structural* defects within a pipe segment, three defect ratings are generated in our GIS:

I) Peak Defect Rating

II) Mean Defect Rating

III) Mean Pipeline Rating

Also, a fourth component is added for prior overflow history:

IV) SSO Rating

PIPE RATING PROGRAM

~ A simplified explanation of scoring and an example of Pipe Rating ~

NOTE: The defect scores come from the CCTV inspection of each line segment. Each defect found (an offset joint for example) is assigned a value, based on severity, from MSD's standard scoring system.

- Peak Defect** Highest score in any one foot section of pipe
- Mean Defect** The total sum of defects score divided by the number of defects
- Mean Pipeline** The total sum of defects score divided by the length of the pipe
- SSO's** The number of SSO's that have occurred on a pipe segment (MH to MH)

- RATING** The associated pipe rating value assigned to the defect score or SSO count

MAP COLOR CODE	PEAK DEFECT		RATING	MEAN DEFECT		RATING	MEAN PIPELINE		RATING	SSO's	RATING
Green	< 2.0000		1	< 2.00000		1	0.01063	0.50000	1	1	5
Light Orange	2.00001	15.00000	2	2.00001	6.00000	2	0.50001	0.90000	2	2	6
Orange	15.00001	30.00000	3	6.00001	11.00000	3	0.90001	1.70000	3	3	7
Red	30.00001	50.00000	4	11.00001	17.00000	4	1.70001	3.00000	4	4	8
Burnt	50.00001	100.00000	5	17.00001	100.00000	5	3.00001	9.26471	5	5	9

Example: A given segment of pipe has a number of defects resulting in scores within the above shaded ranges (as scored by the CCTV inspection). The pipe has also had one SSO per maintenance staff, therefore the *Pipe Rating* of this segment is : 3+5+1+5=14. This number is then applied against all other rated segments to help prioritize this individual line segment.

Pipe Rating Program

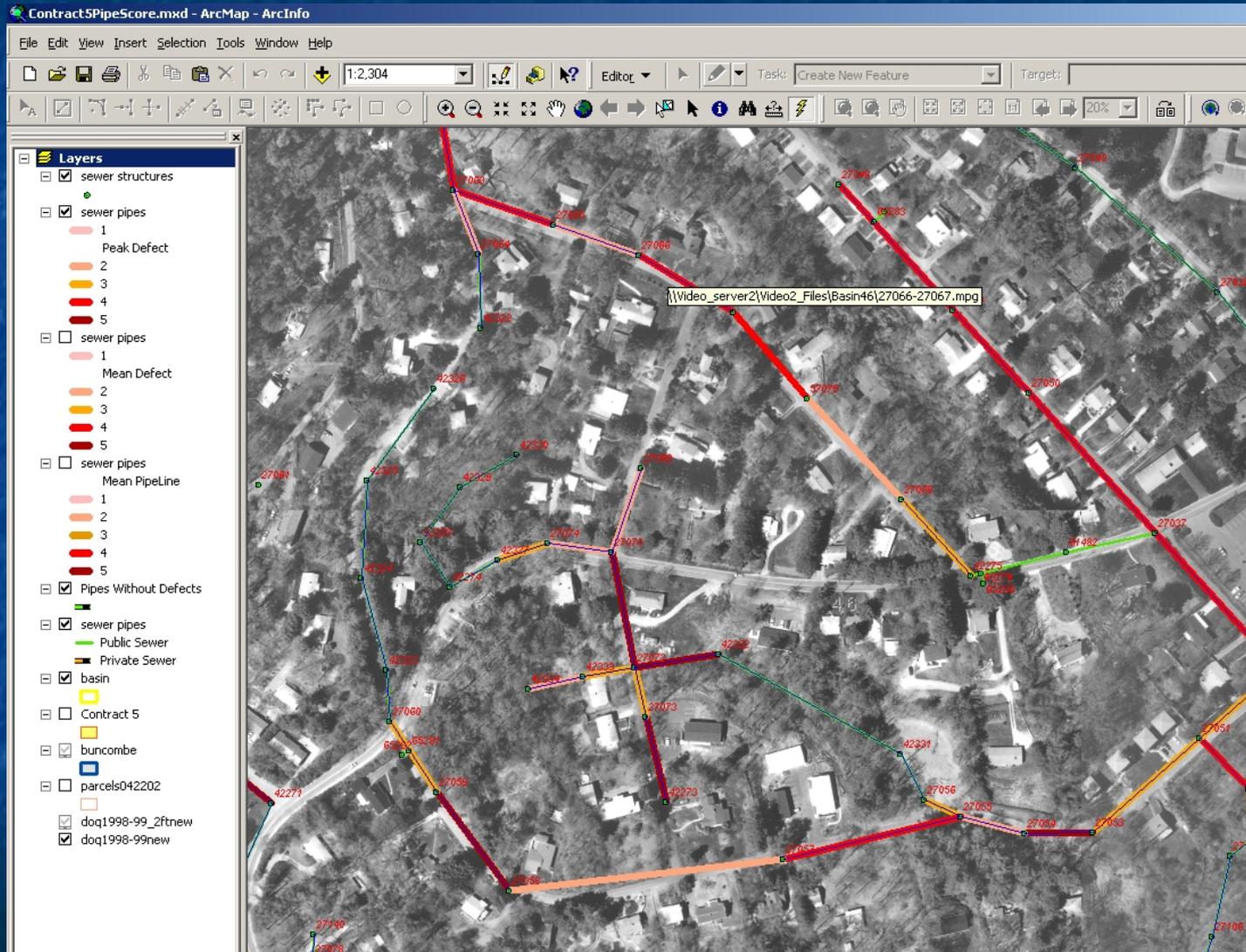
- Then What?

This pipe rating is then used to flag the “worst-of-the-worst” pipes within a rated basin, as lines are ranked against other problem segments.

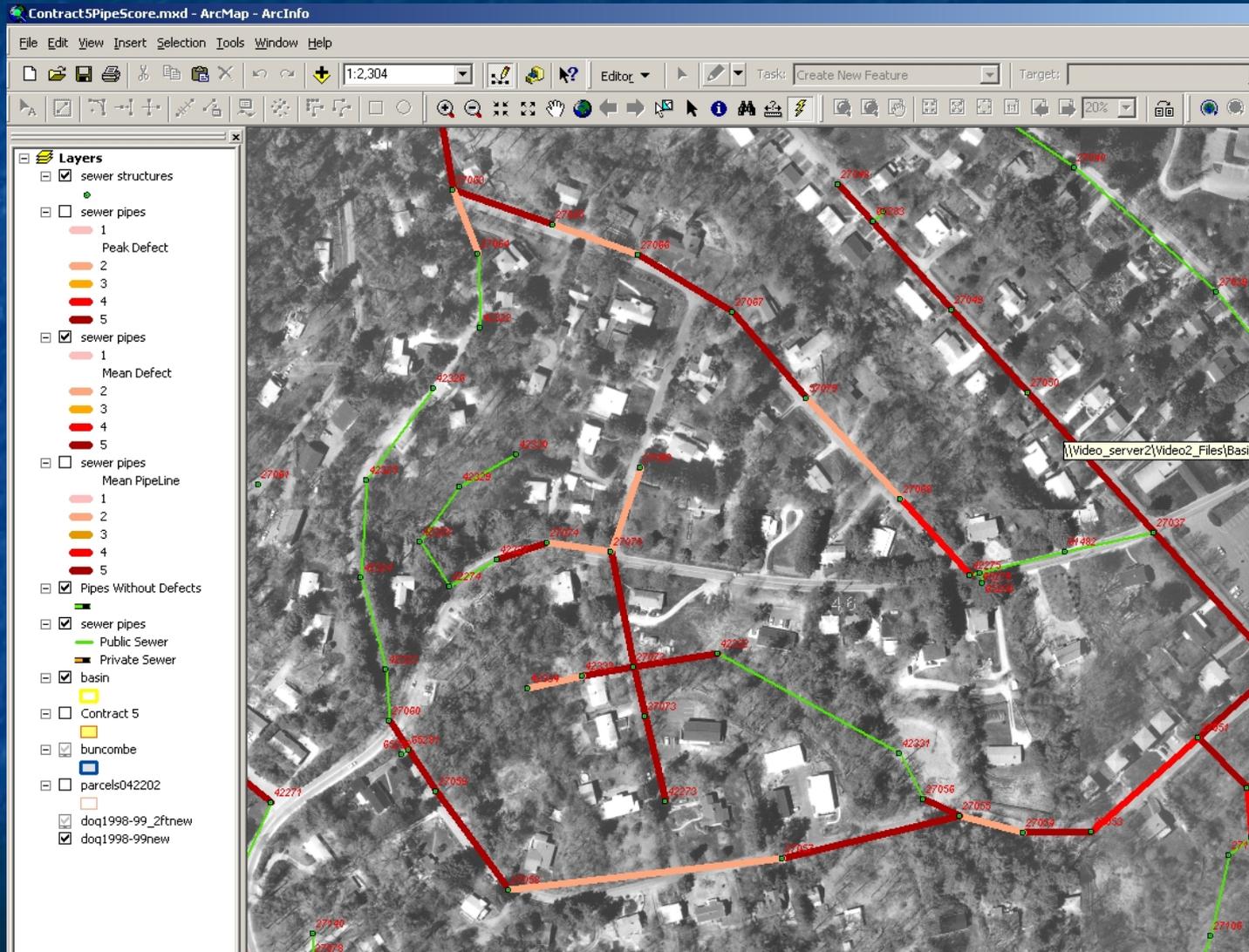
Once flagged, an engineer will further review CCTV footage of the segment, then evaluate rehabilitation options for the highest (meaning worst) rated pipes. This helps to make the engineer’s time more efficient as well, as they are guided to the “worst” pipes.

All CCTV information is stored digitally and can be quickly retrieved for further analysis. An additional benefit of this format is that maintenance personnel can also quickly review CCTV information as needed.

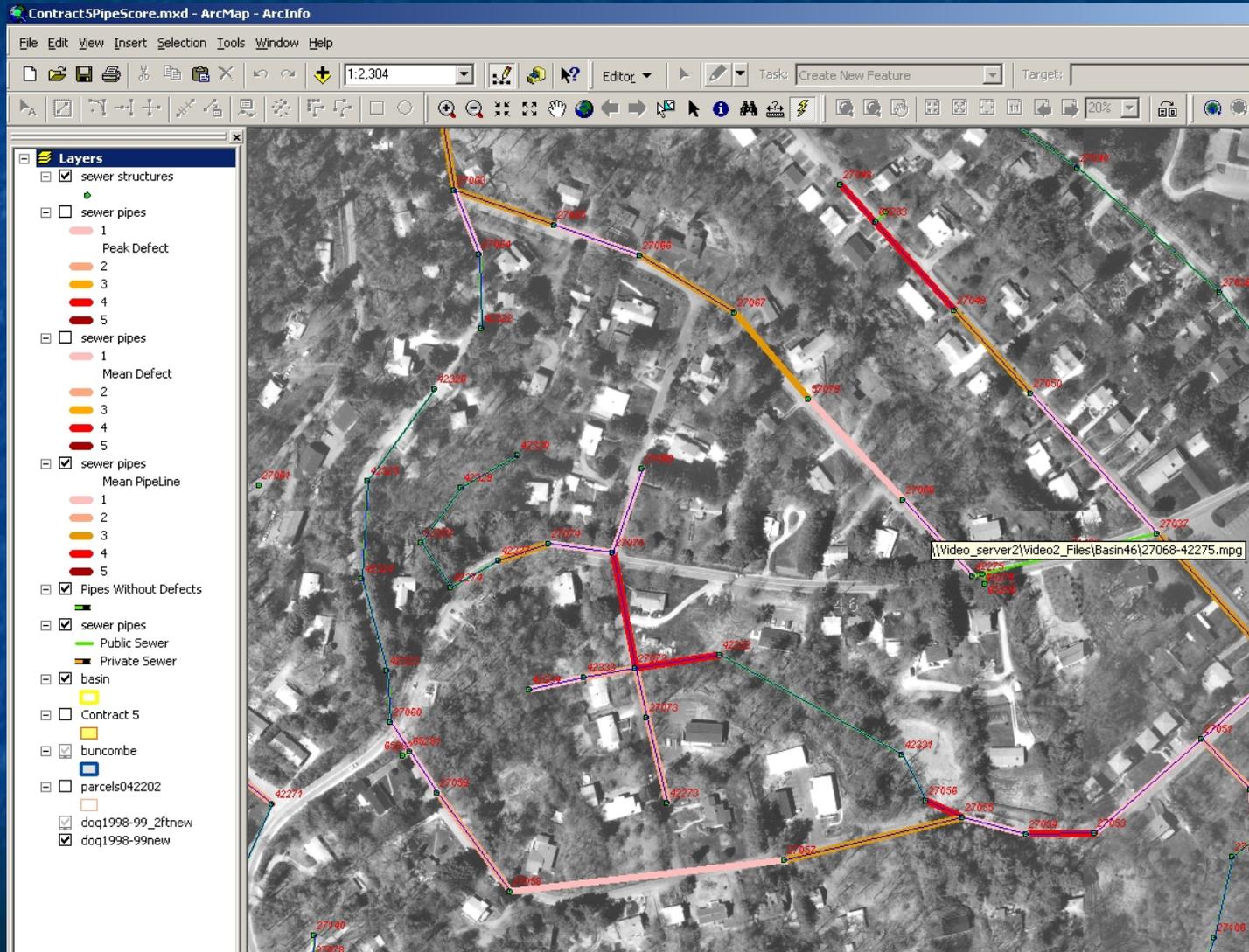
Map Showing *Peak Defect Rating*



Map Showing *Mean Defect Rating*



Map Showing Mean Pipeline Rating



So – have we actually used this?

- MSD's first and second round of PR projects (@ approx. 6,839 LF) are both complete. These were both lining.
- Pipe Rating Contract III will be advertised July '05 (5000 ft. lining)
- In- house crews will be using Pipe Rating as a project source. (5000 ft. D&R)
- This program is organic and will re-prioritize over time as new data is received and other pipes are rated. There has been a good correlation between pipes with high ratings and real-time maintenance problems.
- To date, over 1,381,500 LF (262 miles) of sewer have been rated by this program. Approx. 412,500 LF (or 30%) have been flagged as significant for further review.

Project Data Sheet

Pipe Rating Project Report													
Proposed Pipe Rating Const Date			FY		to								
Pipe Rating Project Data													
Project Name													
Pipe Rating Project No:			19001				Type of Project (Point Repair or Multiple Sections)			SSOProject			
MSD Project No:			Basin No.		19		GIS Map No.						
Project Justification			SSO's:			Comments							
			Struct. Defect:										
			Comb. SSO/Def.										
			Other:										
Line Segment Data													
Begin MH#:	End MH#:	Line Segment #	Peak Defect	Mean Defect	Mean Pipe Defect	SSO	Pipe Rating Score	Length (LF)	Type Pipe	Pipe Dia. (Inch)	Pipe Slope	Pipe Flow Cap (CFS)	
27869	27866	26012	0	0	0	6	6	488	VCP	8	0.0145	4.17144	
27872	27871	26014						139	VCP	6	0.0280	4.781250	
27873	27872	26015	0	0	0	5	5	188	VCP	6			
27866	27865	78401	0	0	0	5	5	276	VCP				
27871	53381	78404						287	VCP				
53381	27869	78405						242	VCP				
								Total Length of Project:		1620		Linear Feet	
Project Description and Limits: (List manhole segments if different from those listed above)													
Video Server No.:			Comments:										
Preliminary Engineering Recommendation													
Type of Construction recommended (Lining, Pipe Bursting, Open Cut, Other)													
Project Description and Limits: (List manhole segments if different from those listed above)													
Project Location			Inside Street RAW			Outside Street RAW			Combination		Other		
RAW Aquisition Required			Yes/No		Number of Parcels Anticipated to be needed:								
Recommended Schedule													
Recommended Design Schedule				Recommended RAW Acq. Schedule				Recommended Construction Schedule					
Months (2 Mo. Min)			Months (6 Mo. Min)			Months (2 Mo Bid/Adv Min)							
Begin Date			Begin Date			Begin Date							
Complete Date			Complete Date			Complete Date							
Project to be done as individual project or combine with other similar projects for bidding													
Recommended Pipe Rating Project Construction Date:						FY							
Video Comments:													
Video Review By:									Date:				

Plans for the Future

Root Component

MSD is planning to add a root-component to the rating process.

The addition of this parameter should prove as an additional indicator of lines which either need chemical treatment for roots or could be lined as a more permanent solution to a given root problem.

Tracking of Completed Projects

What to do about the *existing* CCTV footage/Pipe Rating data which are both stored within the database. Easiest option will be to simply flag segments as opposed to new CCTV work.

Asset Management/GASB34 Requirements

When the entire system has been rated (est. 2008), Pipe Rating will help to serve as a condition assessment tool for the *Modified Approach* under GASB34.



In May of 2003, MSD received an AMSA National Environmental Achievement Award for the Pipe Rating Program. *This program was developed solely with MSD in-house staff and off-the-shelf software.*

MSD and Los Angeles were the only two utilities in the nation to receive this award.

For More Information....

The screenshot shows a Microsoft Internet Explorer browser window displaying the website for the Metropolitan Sewerage District of Buncombe County, NC. The address bar shows the URL <http://www.msdbc.org/>. The page features a navigation menu on the left with links to various sections, a main content area with a large aerial photograph of the wastewater treatment plant, and a section for advertisements for bids.

Metropolitan Sewerage District of Buncombe County
"We are the caretakers of our water. We must protect and preserve this beautiful and immensely important resource for ourselves and for future generations."

[Click here for a tour of the facility](#)

ADVERTISEMENTS FOR BIDS
Fiscal Year 2003-2004 Budget
Audited Financial Statements, June 30, 2002 (Adobe Acrobat format)

ASHEVILLE
A CITY OF DISTINCTION

- [MSD Board Information](#)
- [Budgets for 2004](#)
- [Grease and Oil Info](#)
- [Sewer Rate Information](#)
- [Notice of Non-Discharge Permits](#)
- [MSD Sewer Use Ordinance](#)
- [Sewer Connection and Permit Application Forms](#)
- [System Performance Annual Report \(Fiscal Year 2003\)](#)
- [Sewer Extension Manuals](#)
- [Web Mapping Services \(GIS\)](#)
- [Environmental Policy Statement](#)

start | Inboxes - Microsof... | 2 Reminders | F:\EdB\Powerpo... | Microsoft Excel -... | Metropolitan Se... | Microsoft Power... | 8:46 AM

Please visit our web site www.msdbc.org

MSD Pipe Rating Program



Questions?

Next - Eric Mann, GIS Coordinator

AMSA Award for Pipe Rating Project



- In May of 2003, MSD received an AMSA National Environmental Achievement Award for the Pipe Rating Program
- Developed in-house with a vertical team using off-the-shelf software

