



MISSOURI GAS ENERGY

PROPOSAL TO MODIFY THE MAINS REPLACEMENT PROGRAM

December 29, 1994

Late-filed Exhibit No. 1
Date 1-12-95 Case No. GO-91-277
Reporter bat

**MISSOURI GAS ENERGY
UNPROTECTED BARE STEEL
REPLACEMENT/PROTECTION PROGRAM**

DESCRIPTION	DOCKET REQUIREMENT			ACTUAL		
	92-93	94	Total	92-93	94	Total
Bare Steel Replacement						
Replace - P&P	2.00	1.00	3.00	0.40	1.31	1.71
Replace - Public Works Projects	2.00	1.00	3.00	1.40	1.42	2.82
Replace - FPI	11.90	10.00	21.90	4.49	15.16	19.65
Replace - System Improvement	2.00	1.00	3.00	0.12	0.66	0.78
TOTAL	17.90	13.00	30.90	6.41	18.55	24.96
Cathodic Protection						
Protect - P&P	17.00	13.00	30.00	8.00	0.05	8.05
Protect - SLRP	125.00	100.00	225.00	154.16	81.90	236.06
Protect - Independent	32.00	20.00	52.00	107.16	1.40	108.56
Total	174.00	133.00	307.00	269.32	83.35	352.67
GRAND TOTAL	191.90	146.00	337.90	275.73	101.90	377.63

MGE DARE STEEL REDUCTION PROGRAM

[REPLACEMENT]

PLAN
ACTUAL

40

30

20

10

MILES

P&P

PUBLIC
WORKS

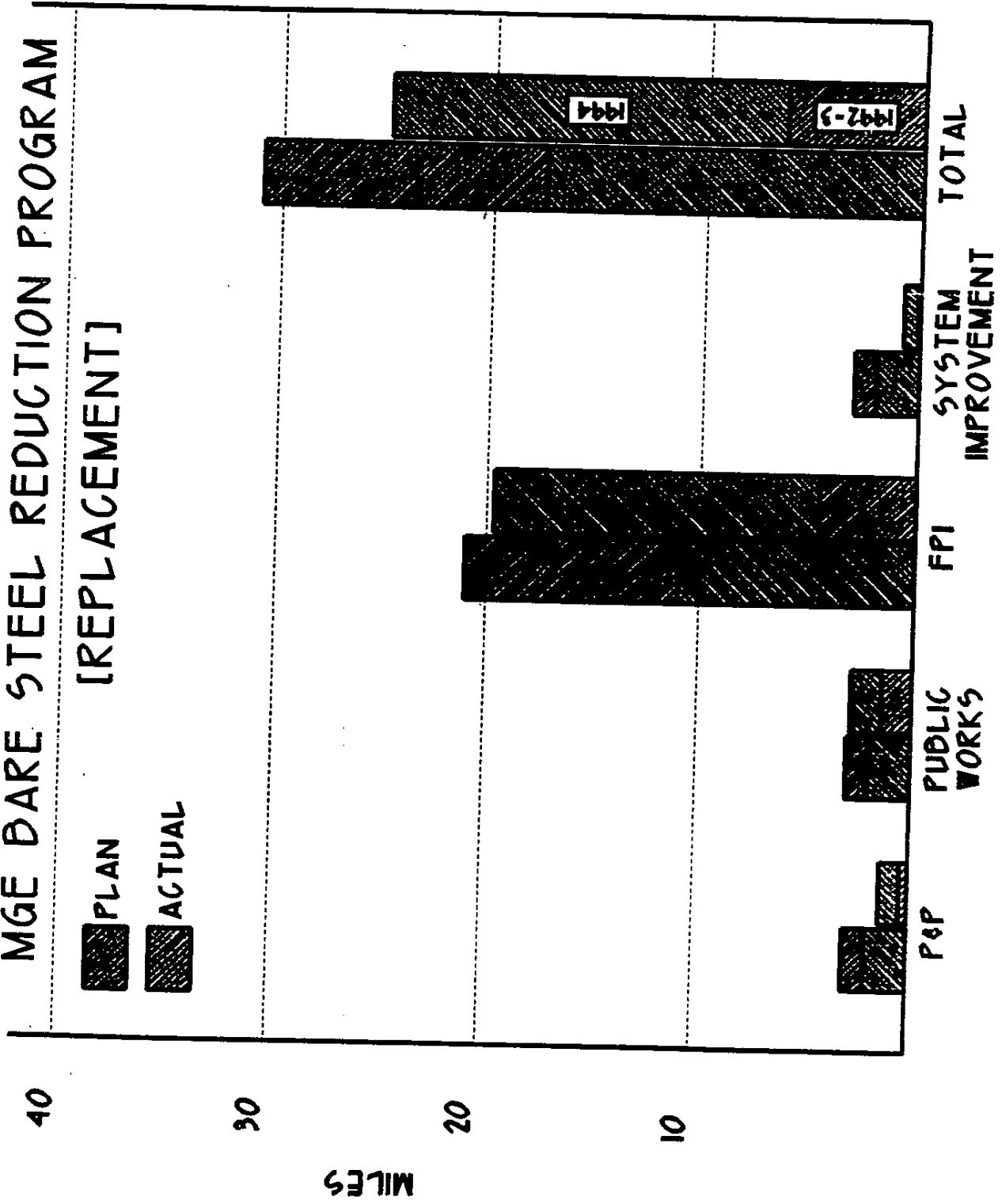
FPI

SYSTEM
IMPROVEMENT

TOTAL

1994

1992-3

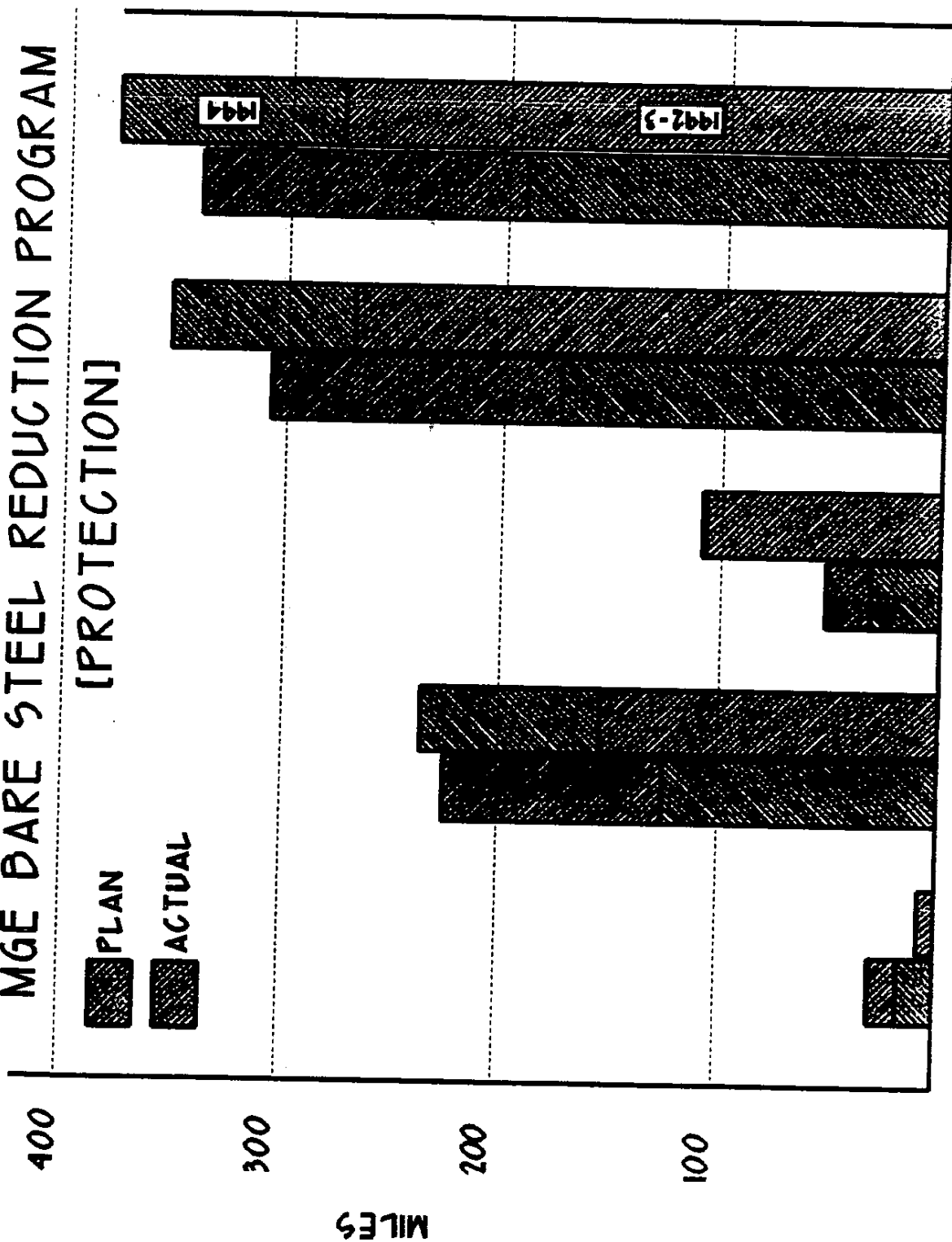


MGE DARE STEEL REDUCTION PROGRAM

[PROTECTION]

PLAN

ACTUAL



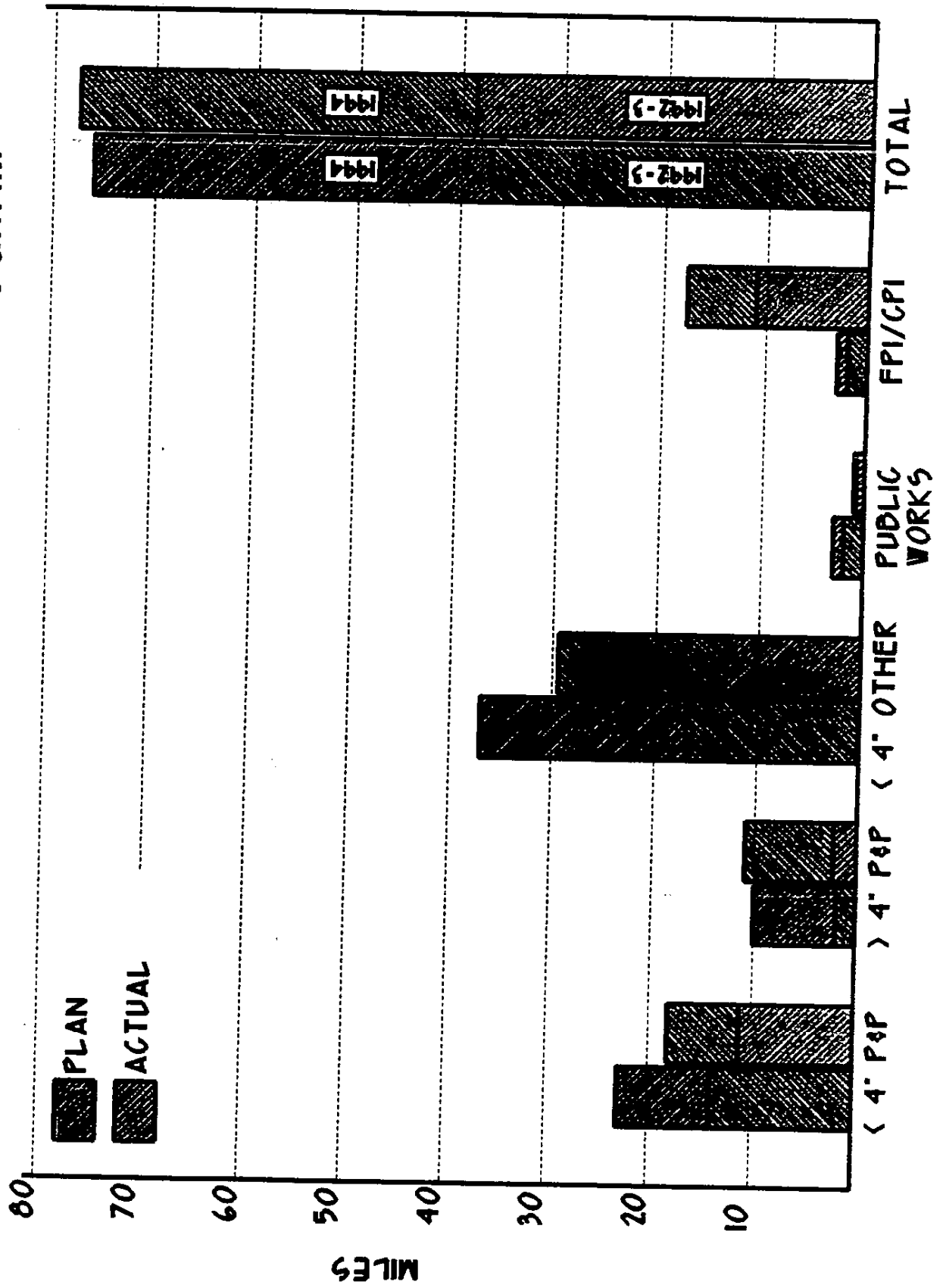
**MISSOURI GAS ENERGY
CAST IRON REPLACEMENT PROGRAM**

DESCRIPTION
4" & Smaller - P&P
Over 4" - P&P
4" & Smaller - Other
Public Works Projects
FPI/CPI
TOTAL

DOCKET REQUIREMENT		
92-93	94	Total
14.00	9.00	23.00
2.00	8.00	10.00
17.00	20.00	37.00
2.00	1.00	3.00
2.00	1.00	3.00
37.00	39.00	76.00

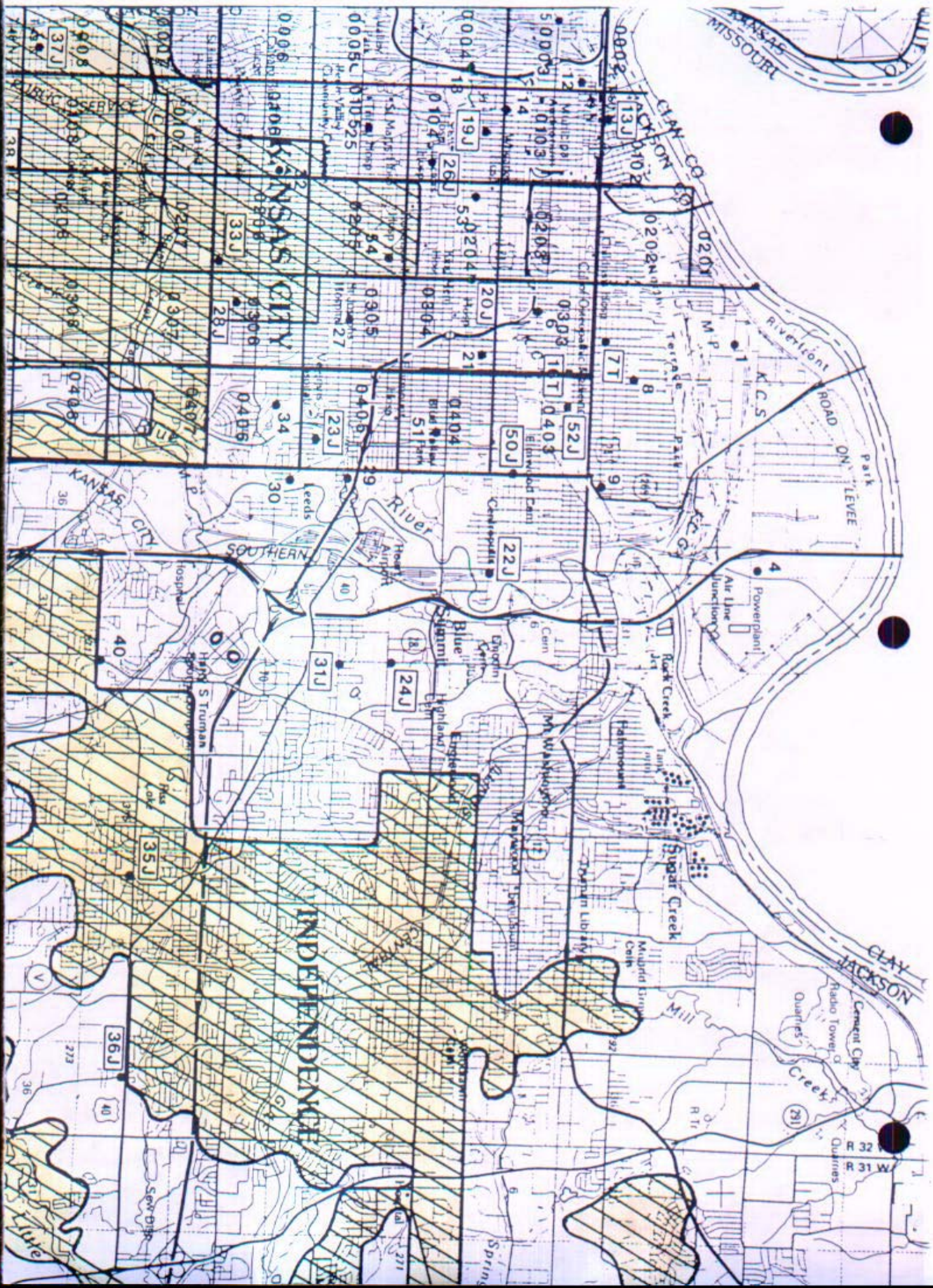
ACTUAL		
92-93	94	Total
11.19	7.02	18.21
2.33	8.61	10.94
13.23	16.19	29.42
0.82	0.30	1.12
11.02	6.72	17.74
38.59	38.84	77.43

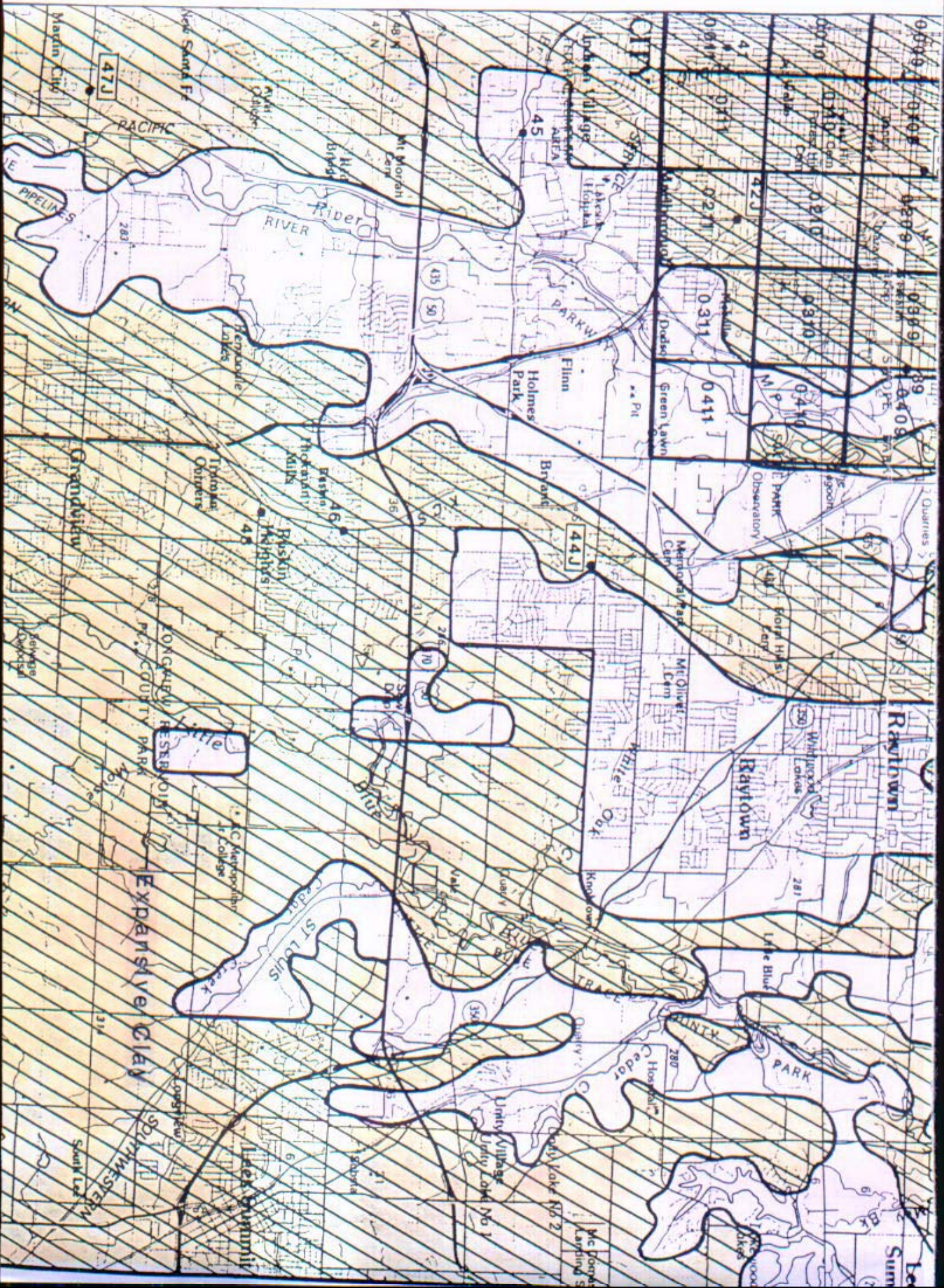
MGE CAST IRON REPLACEMENT PROGRAM



The following sketch provides a graphic presentation of the location of expansive clay soils in the Kansas City, Missouri area.

Expansive clay soils have an affinity for moisture. The resulting earthen movement can increase the risk of cast iron breaks.





NEW TOOLS

The Engineering team works closely with Field Operations to:

- Evaluate and prioritize construction projects
- Design system replacements
- Provide information, modeling, mapping and database support
- Provide rectifier design and installation supervision

A TEAM EFFORT

Since late 1991, the following new tools have been developed by Engineering and Field Operations to assist the Company in evaluating, prioritizing, and managing the replacement programs.

Analyses of Cast Iron Coupons - Cast iron samples are collected and analyzed to determine the level of graphitization. Mains are replaced in those areas where high graphitization exist.

Cast Iron Break Database - A database of cast iron break history since 1991 identified by sector and used to determine breaks per mile and to prioritize sectors for cast iron replacement.

Leak Database (LDS) - All leaks found are entered by classification, location (facility), main, or service. When repaired, the leak is closed out along with information on the size, material, the reason for the leak, etc. This database is used for evaluation and benchmarking.

5-5-3 Program - This computer program produces a quarterly report listing candidates for replacement identified by five leaks in 500 feet over the last three years.

FPI - An algorithm developed by ZEI that predicts the order of which unprotected bare steel will fail due to corrosion. This program is used to identify areas for analysis using the CPI benchmark rating system.

Construction Priority Index (CPI) - A standard rating system to evaluate replacement candidates using various criteria to prioritize the replacements.

Soil Analysis - Studies were completed by Midwest Research and ZEI to develop soil types, expansive clays, and corrosive soils. The boundaries of these areas were defined and mapped to overlay our distribution system.

Premise Data System (PDS) - A database of all service lines and yard lines includes pipe materials and meter location and provides a tracking system for the service line replacement program.

Corrosion Control Maintenance System (CCMS) - Essentially, a database of cathodically protected steel mains, test stations, and a history of the protected levels of the piping system to assist in monitoring the protection and forecasting system maintenance.

Mains Data System (MDS) - A database of mains consisting of 49 fields of information. This database is a backbone of our mapping system and provides valuable data of facilities by sector.

Computerized Mapping - Development of accurate landbases and the digitizing of facilities to produce custom maps such as pressure, cathodic protection, valving and system feed, leak survey, and many other operating functions using the mains database.

Stoner Models - Computer models of the gas mains and distribution system. These models are used to study the flow capacity of the network and to enhance the design of new and replaced piping systems. The digital mapping system is linked to the Stoner Modeling system.

Drawings of the Stoner Computer model
of the Kansas City 30" W.C. system.

- A. The red line depicts the 8" and
larger CI grid system.
- B. Red line indicates 6" CI
Blue line indicates 4" and smaller CI
Black is all other piping sizes and
materials.

MISSOURI GAS ENERGY ---**--- INTEGRATED 30" WC SYSTEM ---**---
 8" AND LARGER CI - RED ALL ELSE BLACK



NETWORK:CS00104	REPORT:GASNETSUMMARY	GAUGE	COUNT	COORDINATES
NODES:0000	MIN =0.0001	BELOW	0.0050 2075	LLX:4127003
ELEMENTS:0023	MAX =0.190	7.50	50.00 2153	LLY:1010070
UNBALANCED	NODE ANNOFF	50.00	60.00 0	MAX:530075
	ELEM ANNOFF	60.00	70.00 0	MIN:1070000
		ABOVE	70.00 0	

MISSOURI GAS ENERGY ---**--- INTEGRATED 30" WC SYSTEM ---**---
 2"-4" CI - RED 6" CI - GREEN ALL ELSE BLACK

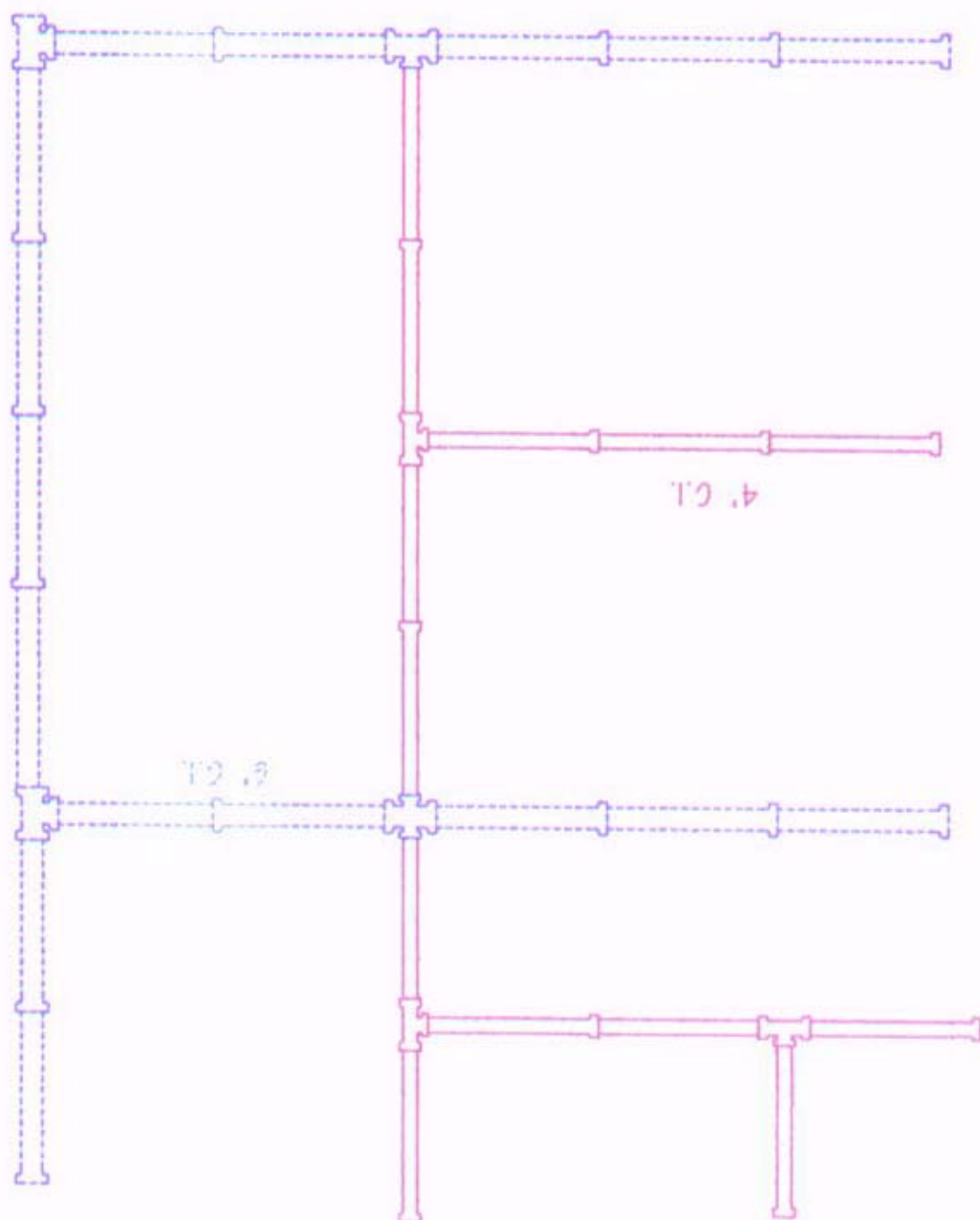


NETWORK:KCM00194	PERFORM:QRM(2000000000)	RANGE	COUNT	COORDINATES
NODES:8809	MIN =0.0000	BELOW	0.0100 8672	LLX:627803
ELEMENTS:8820	MAX =0.0100	6.5	6.5 3641	LLY:1018570
UNBALANCED	NODE AMB-OFF	6.5	50.0 2153	URL:530575
	ELEM AMB-OFF	50.0	100.0 0	URY:1078805
		ABOVE	100.0 0	

The following are examples of the complexed networks of various sizes of pipe and materials that must be considered in the replacement programs.

- A. Drawing depicting how the 4" CI is typically tied into 6" CI headers.
- B. Digital map of a sector in St. Joe, Missouri indicating those pipes replaced.

TYPICAL SYSTEM MIX OF 4" & 6" CAST IRON





DISCOUNTS WE DO
NOT OFFER

***** KUTTING BACK WITH MY

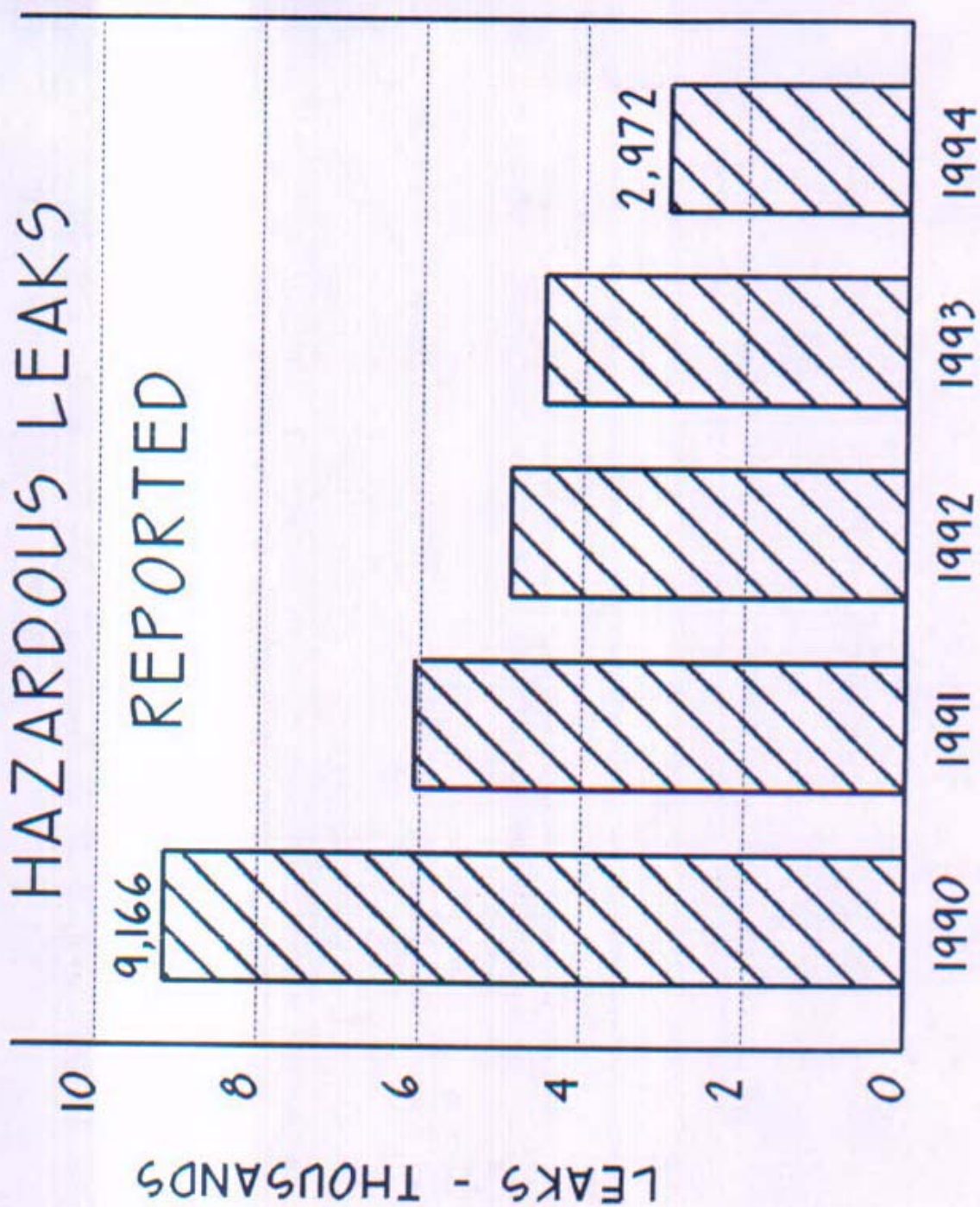
EXISTING CAST IRON PIPE
EXISTING PAVEMENT
BASE STR. PIPE
EXISTING PROTECTED
CONCRETE STR. PIPE

- 2-WAY TOR
- TR
- TRANSITION FITTING
- IN CLIMB
- POINTER & COMPASS

- Cap
- Phase front
- Interface
- Wavelet
- Wave packet

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LEAK SUMMARY

