City of Longview

1525 Broadway
Longview, WA 98632
www.ci.longview.wa.us

Agenda

Public Works SubCommittee

Monday, May 1, 2023 | **5:00 PM** | **Public Works Conference Room, 1st Floor, City Hall**

1. **CALL TO ORDER**
2. **ROLL CALL**
3. **APPROVAL OF MEETING NOTES**

   23-001109 Notes from April 3, 2023
4. **OLD BUSINESS**

   23-001113 Water System Continued
5. **NEW BUSINESS**
6. **PUBLIC COMMENT**
7. **ADJOURNMENT - Next meeting June 5th**

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Minutes

Public Works SubCommittee

Monday, April 3, 2023 | **5:00 PM** | **Public Works Conference Room, 1st Floor, City Hall**

1. CALL TO ORDER

The meeting was called to order at 5:08 pm.

2. ROLL CALL

Present: Councilmember Ruth Kendall; Councilmember Christopher Ortiz; *Public Works Director Ken Hash*
Not in attendance: Councilmember Hillary Strobel
Staff: Karl Enyeart, City Engineer; Chris Collins, PW Maintenance Manager; Brian Steveson, Utility Manager; Nancy Vandehey, Admin
Guest: Erik Halverson

3. MEETING NOTES

23-000995 Meeting notes from March 20, 2023

There were no changes.

4. OLD BUSINESS

5. NEW BUSINESS

23-000997 Water System

Karl Enyeart reviewed WAC 246-290, highlighting some sections of interest. He shared the Department of Health water webpage showing Water System Data for Longview. The group watched a video on the water system failures in Jackson, Mississippi. The inventory of water meters was explained and reviewed. There was a spreadsheet for costs of pipes for 100 year replacement, showing a 2% inflation increase. Assets replacement schedule versus the budget allowances as set today were shared. The preventive maintenance schedule spreadsheet shows the FTE shortfalls. A comparison chart of employees to Portland and Kelso was reviewed. Karl wrapped it up with a summary of where we go from here.

6. PUBLIC COMMENT

None

7. ADJOURNMENT - Next meeting May 1st

Meeting was adjourned at 6:35 pm.

PW COMMITTEE MEETING 5-1-23

Agenda Summary:

WAC 246-290

Video:

Water hammer

https://www.youtube.com/watch?v=xoLmVFAFjn4

water main breaks

https://www.youtube.com/watch?v=P9dnaq1Xj3w

https://www.youtube.com/watch?v=EgSnCUg-0D0 I like this one more than one above.

EPA Document

Deteriorating Buried Infrastructure Management Challenges and Strategies

HTML has links - PDF has Authentication

Complete Chapter HTML PDF

Including dispositions

Chapter 246-290 WAC | Show Dispositions

Last Update: 3/9/22

GROUP A PUBLIC WATER SUPPLIES

WAC Sections

PART 1.
GENERAL PROVISIONS

PART 2.
PLANNING AND ENGINEERING DOCUMENTS

PART 3.
DESIGN OF PUBLIC WATER SYSTEMS

PART 4.
WATER QUALITY

PART 5.
WATER SYSTEM OPERATIONS

PART 6.
SURFACE WATER TREATMENT
Subpart A - Introduction and General Requirements

Subpart B - Requirements for Filtered Systems

DETERIORATING BURIED INFRASTRUCTURE MANAGEMENT CHALLENGES AND STRATEGIES

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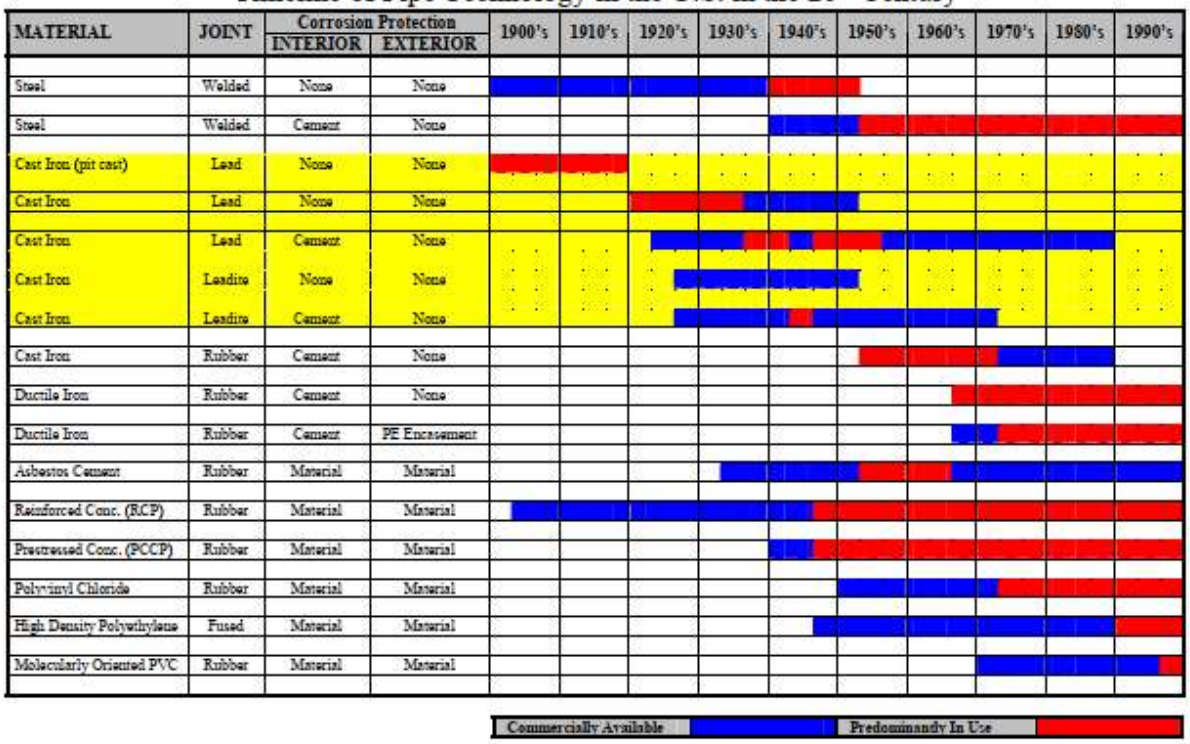
Exhibit No. 2

Timeline of Pipe Technology in the U.S. in the 20th Century



	DECADE INSTALLED									
Pipe Type	1920	1940	1950	1960	1970	1980	1990	2000	2010	TOTAL
AC	10,287		475	4,482	5,921	2,598	654			24,416
CI	176,169	2,699	24,922	126,322	239,953	72,363	41,685	15,362	2,748	702,223
DI	9,272	711	795	22,202	92,694	43,967	89,164	52,689	45,510	357,003
CONC	5,342				18					5,360
GALV	3,483			1,439	2,128	4,980	906	138	145	13,218
STEEL	2,134				1,891	1,011	234			5,271
OTHER	121				63			246	1,827	2,257
COPPER	72			548	108		8	1,095	100	1,932
PVC					2,248			280	248	2,777
TOTAL	206,881	3,410	26,191	154,993	345,024	124,919	132,650	69,810	50,579	**1,114,458**
	206,881	210,291	236,483	391,476	736,500	861,419	994,069	1,063,879	1,114,458	

Exhibit No. 4

Main Breaks Since 1965

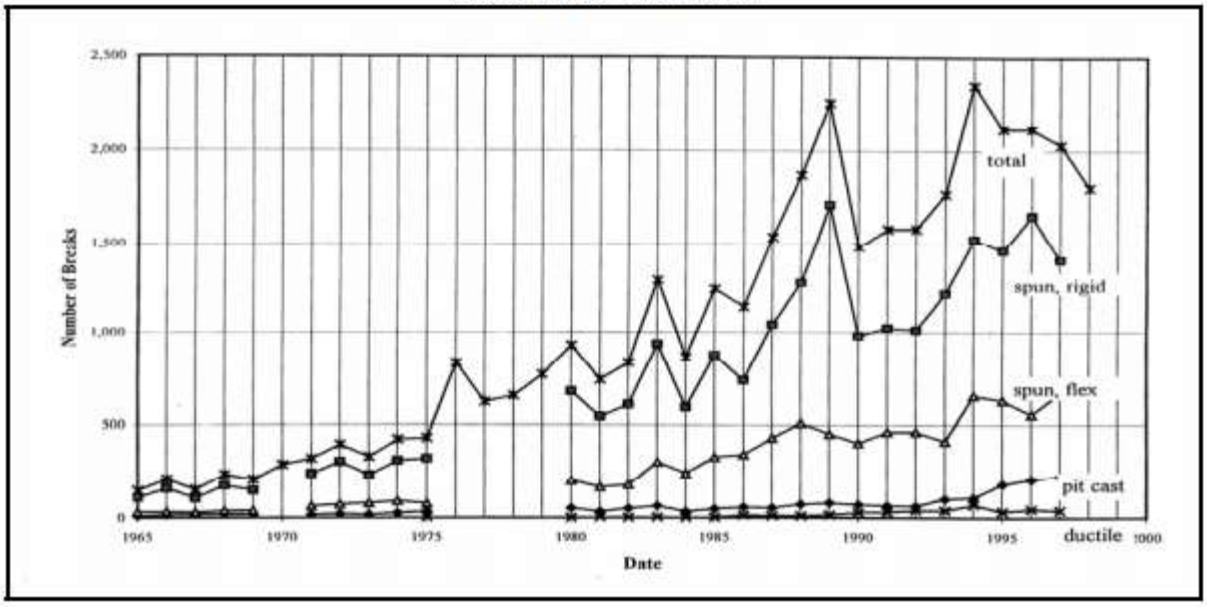
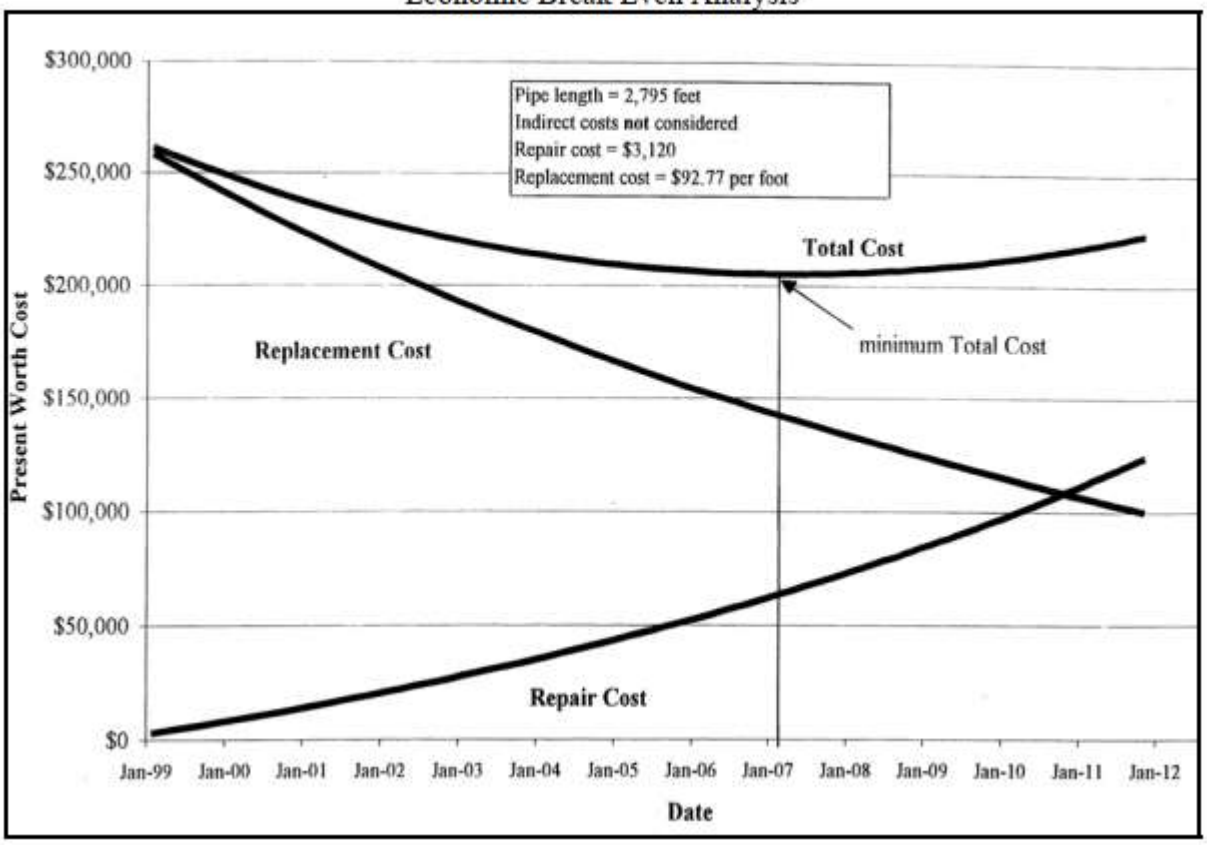


Exhibit No. 5
Economic Break Even Analysis



E. Regulations Affecting Buried Infrastructure

1. *Potential Health Effects*

In addition to this paper, other White Papers being prepared in response to the USEPA assessment of health risks and the need for distribution system regulation include:

a. Contamination of New or Repaired Mains
b. Permeation and Leaching
c. Intrusion into Pipes
d. Microbial Regrowth/Biofilms
e. Covered Storage Vessels
f. Decay of Water Quality in Pipe with Time
g. Cross Connections
h. Nitrification

2. *New Accounting Regulation*

The Governmental Accounting Standards Board (GASB) was formed in 1984 to develop and improve financial reporting rules for the 85,000 state and local governments in the United States. It operates under the auspices of the not-for-profit Financial Accounting Foundation, which oversees, funds, and appoints the members of the GASB, as well as the Financial Accounting Standards Board (FASB). GASB is not part of the government, federal or otherwise. Its rules are required in most states for financial reporting at the local and state level. GASB rules also are required to be followed when a state or local government's audit reports that it follows Generally Accepted Accounting Principles (GAAP). Bond covenants associated with government debt often require them to follow GAAP.

GASB Statement No. 34 (GASB 34) was modified in June 1999. It requires, for the first time, that governments begin including infrastructure assets on their balance sheets. After estimating the initial cost of each infrastructure asset and including that cost in the balance sheet, governments will be required to either depreciate those assets, or manage them using an asset management system. GASB 34 prefers that municipalities implement an asset management system referred to as the "modified approach" because it better models the way infrastructure should be treated. There are specific requirements for the implementation of the asset management system, and reporting that must be produced.

Whichever method is used, a fundamental requirement is a good inventory of assets. The inventory must include the actual or estimated historical cost of construction. The most straightforward method for valuing assets is depreciation, but this method ignores the extended life of the asset provided by continued maintenance. The modified approach incorporates the benefits, or value, of such maintenance activities. GASB 34 provides the following minimum guidelines as to what the modified approach should include:

a. The assessed physical condition of infrastructure assets (governments must perform such assessments at least every three years, and disclose the results of at least the three most recent condition assessments).
b. Descriptions of the criteria the government uses to measure and report asset condition.
c. The condition level at which the government intends to maintain the assets.
d. A comparison of the annual dollar amount estimated to be required to maintain and preserve the assets at the condition level established by the government with the actual expenses, for at least the last five years.

A. Recommendations for Extending Pipe Life

In order to minimize main failures and maximize the life of the assets, it is necessary to understand the failure mechanisms of pipe. These failure mechanisms, which are a result of either Operational/Physical or Chemical means, are identified in Exhibit No. 6.

Exhibit No. 6
Pipe Failure Mechanisms

Operational/Physical	Applies to	Options	Chemical	Applies to	Options
Manufacturing defects	M,P,C	No	Internal corrosion	M,C	Yes
Improper design/installation	M,P,C	No	External corrosion - soil	M,C	Yes
Geologic instability	M,P,C	No	External corrosion - other	M,C	Yes
Higher operating pressures	M,P,C	Yes	Leadite corrosion	M	Yes
Hydraulic transients	M,P,C	Yes	Leadite expansion	M	Yes
Change in water temperature	M	Yes	Material incompatibilities	M	Yes
Excessive external loads	M,P,C	No	Gasket deterioration	M,P,C	Yes
Damage from digging	M,P,C	No	Material fatigue	P	No

M = Metallic (ductile iron and/or cast iron)
P = Plastic (PVC or HDPE)
C = Concrete (RCP or PCCP)

Exhibit No. 7
Operational Strategies for Reducing or Eliminating Pipe Failures

Failure Mechanism	Strategy	Potential
Higher operating pressures	Redistribution of pressure zones	Low
Hydraulic transients	Surge control and operator training	Medium/High
Change in water temperature	Blending with ground water sources, where possible	Low
Internal corrosion	Cleaning and lining	High
External corrosion - soil	Cathodic protection	Medium
External corrosion - other	Cathodic protection	Medium
Leadite corrosion	Replace the joint only	Low
Leadite expansion	Replace the joint only	Low
Material incompatibilities	Install dielectrics at corporation stops	Medium
Gasket deterioration	Replace the joint only	High

4. Cost Considerations

a. The exact nature of the problem(s) to be solved.
b. The hydraulic and operating pressure requirements for the rehabilitated main.
c. The materials, dimensions, and geometry of the water main.
d. The types and locations of valves, fittings, and service connections.
e. The length of time in which the main can be taken out of service.
f. Site-specific factors.

Exhibit No. 8

Rehabilitation Decision Tree

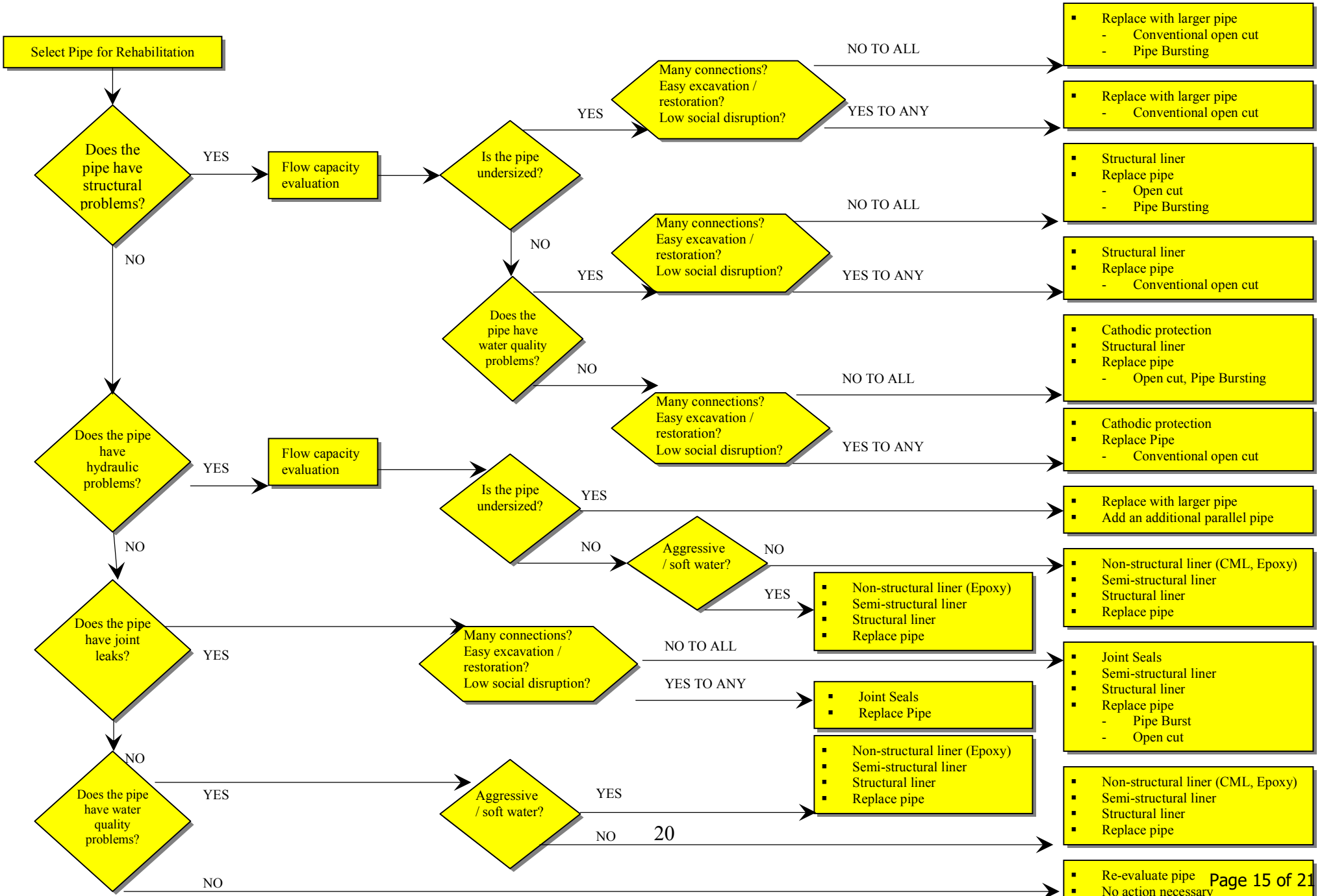


Exhibit No. 9

Summary of Applicable Technology and Recommended Use

Technology	Recommended Application
Cement Mortar Lining	• Prevent scale formation, internal corrosion and reduce pipe roughness (improve Hazen Williams C-value). • Considered with hydraulic and wq problems when there are no structural and joint leaks and original pipe material is cast iron, ductile iron or steel. • Should not be considered when soft or acidic water is conveyed due to possible deterioration of CML.
Epoxy Resin Lining	• Protects original pipe against corrosion and provides an increased Hazen-Williams C-value. • Considered with hydraulic and water quality (WQ) problems when there are no structural and joint leak problems.
Conventional Slip Lining	• Effective diameter of pipe is reduced, with a new pipe have a smooth interior surface. • Excavations are required for service connections, entrance pits and exit pits. • Various pipe materials (DI, PVC, HDPE and steel) may be used as new pipe. No strength is added to the host pipe in conventional slip lining.
Close-Fit Slip-lining	• Classified as structural or semi-structural lining depending on the thickness of the liner. The inserted pipe add strength, prevents further internal corrosion and improves Hazen-Williams C-value. • Considered for hydraulic, joint leak and water quality problems with no structural problems are involved.
Cured in Place Pipe	• Compared to close-fit lining, the thickness of CIPP liner is typically less than a close-fit liner. • As with the close-fit liner, the loss of diameter is compensated for by an improved Hazen-William C-value. • As opposed to epoxy lining, CIPP also provides a certain measure of leakage protection. • Considered a semi-structural liner and is applicable for hydraulic, joint leak and water quality problems when no structural problems are involved.
Pipe Bursting	• Pipe bursting is a structural lining technique and is considered suitable for CI, PVC, AC and thin wall steel pipes. • Pipe Bursting recommended for deep mains with sufficient cover to avoid heaving. • Host pipe should not have offset pipe joints or clamps with bolts. • Applicable for replacing pipes of the same diameter or larger. • Excavations are required for service connections, entrance pits and exit pits.

C. Preventative Technologies

Cathodic Protection is a technology for reducing corrosion of a metal water main by turning the entire main into the cathode of a galvanic or electrolytic corrosion cell. Normally, sacrificial anodes are used as the galvanic cell to minimize the effects of external corrosion on existing metal water mains, thus reducing water main breaks and extending the useful life of the mains. A sacrificial anode system does not stop the process of corrosion but rather redirects the corrosion from the water main to the anode. Exhibit No. 10 shows a typical installation of a galvanic anode. Sacrificial anode protection may be used in selective "hot spot" (highly corrosive soils) areas that have been located by soil-survey procedures. In corrosive soils, sacrificial anodes should be installed during the repair of water mains. Typically this would only increase the total cost of the repair by approximately $200 - $300 per break.

Exhibit No. 10
Anode Installation

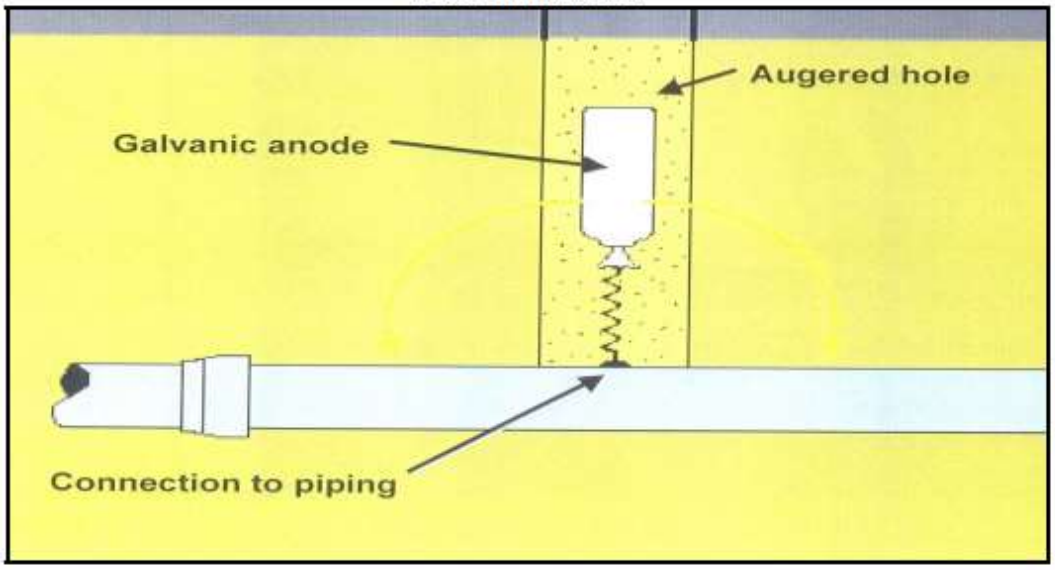


Exhibit No. 11a

Comparison of Distribution Size Pipe Materials - Material Properties

Material Property	DI	PVC	HDPE
Tensile strength	60,000 psi	7,000 psi	3,200 psi
Compressive strength	48,000 psi	9,000 psi	1,600 psi
Yield strength	42,000 psi	14,500 psi	5,000 psi
Ring bending stress	48,000 psi	none specified	none specified
Impact strength	17.5 ft-lbs/in	0.75 ft-lbs/in	3.5 ft-lbs/in
Density	441 lbs/ft^3	88.6 lbs/ft^3	59.6 lbs/ft^3
Modulus of elasticity	24,000,000 psi	400,000 psi	110,000 psi
Temperature range	< 150° F	< 140° F	-50 to 140° F under press.
Thermal expansion	0.07" per 10° F per 100'	0.33" per 10° F per 100'	1" per 10° F per 100'
Corrosion resistance (int)	Good - w/cement lining	Excellent	Excellent
Corrosion resistance (ext)	Good - w/polywrap	Excellent	Excellent
UV resistance	Excellent	Gradual strength decline	Yes - w/carbon black
Abrasion resistance	Excellent	Good	Good
Cyclic resistance	Excellent	Fair	Good
Permeation resistance	Yes	No - solvents & petroleum	No - solvents & petroleum
Scale & growth resistance	Good	Excellent	Excellent

Exhibit No. 11b

Comparison of Distribution Size Pipe Materials - Pipe Properties

Pipe Property	DI	PVC	HDPE
Trade organization	DIPRA	Uni-Bell	PPI
AWWA designation	C151	C900 and C905	C906
Diameter range	3" - 64"	4" - 12" (C900) 14" - 48" (C905)	4" - 63"
Pressure range	350 psi	100 psi - 200 psi	50 psi - 255 psi
ID range (8")	8.425"	7.76" - 8.33"	6.918" - 8.136"
Wall thickness range (8")	0.25"	0.362" - 0.646"	0.265" - 1.182"
Weight range (8")	21.1 lbs/ft	6.6 lbs/ft - 11.4 lbs/ft	5.1 lbs/ft - 11.06 lbs/ft
OD nominal (8")	9.05"	9.05"	9.05"
Buoyant (8" 100 psi)	No	Yes	Yes
Surge allowance	100 psi	125 - 200% of press. rating None for 14" - 48" (C905)	50 - 100% of press. rating
Surge potential (8" 100 psi)	53.6 psi per 1 ft/sec <V	17.6 psi per 1 ft/sec <V	9.8 psi per 1 ft/sec <V
Integrity under vacuum	Excellent	Good	Poor
C-factor	140	150	150
Standard pipe lengths (8")	18 ft or 20 ft	20 ft	40 ft or 50 ft
Type of joints	Push-on or mechanical	Push-on or mechanical	Heat fused
Max joint deflection (8")	5°	3°	Radius = 20 - 50 times OD
Compatible w/DI fittings	Yes	Yes	Yes - in DI sizes

Exhibit No. 11c

Comparison of Distribution Size Pipe Materials - Operational Considerations

Operational Consideration	DI	PVC	HDPE
Ease of installation	Subjective	Subjective	Subjective
Can be direct tapped	Yes	Yes	No
Need for special installation equipment	No	No	Yes
Need for special bedding for typical installations	No	Yes	No
Need for joint restraint	Yes	Yes	No
Ability to locate underground	Excellent	Poor - needs tracer wire	Poor - needs tracer wire
Applicable for above ground installations	Yes	With opaque material for UV resistance	Yes - w/proper support
Applicable for aqueous installations	Yes	Yes	Yes - but potential for flattening is high
Anticipated service life	100 years	50 - 100 years	50 years

Exhibit No. 15

Data Requirements for a Detailed Management Plan

Physical	Exist	New	Performance	Exist	New	Commercial/Service	Exist	New
Year of Installation	Y	Y	Complaint Frequency	A	Y	Critical Customer	Y	Y
Diameter	Y	Y	Type of Complaint	A	Y	Affect on Community	Y	Y
Material	Y	Y	Break Frequency	A	Y	No. of People Served	A	A
Length	Y	Y	Type of Break	A	Y	Length of Shutdown	A	A
Location	Y	Y	Reason for Break	A	Y	Coordination w/Others	A	A
Interior Lining	A	Y	Service (hydraulic) Adequacy	Y	Y			
Exterior Protection	A	Y	Fire Flow Adequacy	Y	Y			
Joint	A	Y						
Wall Thickness	A	Y						
Soil conditions	A	A						
Internal Condition	A							
External Condition	A							

Y = yes, in all cases

A = as needed, or as available

C. Data Management

There are three options to consider for maintaining the data that is recommended for a detailed management plan. The first option would be to utilize a simple personal computer spreadsheet or database. Although this would be the least costly solution, it would also be the most labor intensive. An important factor when implementing a computerized program is to assure, where possible, that the required data is entered in the course of doing daily business (a self populating database) thus minimizing duplication of data entry. A personal computer spreadsheet or database would likely not meet this criteria.

The other two software options would utilize either an infrastructure management software package or a computerized maintenance management system (CMMS). The two are similar, and vary mainly in that infrastructure management software is typically less flexible and more specifically geared to the municipal market, whereas CMMS software is more powerful and more customizable (and ultimately more costly). Again, the key with either is that they integrate with other software currently utilized by the utility and that they meet the needs of other operations, customer service, and maintenance tasks in addition to buried infrastructure management. For example, if a new main is being installed, and information is being entered into a utility's asset management system, this information needs to populate the database selected for use in managing buried infrastructure. A customer complaint that is recorded in a Customer Information System would be another example of information that needs to link with the buried infrastructure software. The other advantage that these types of software packages have over simple spreadsheets or databases is that they allow integration with Geographical Information System (GIS) software. The value of GIS is that it provides the necessary geographical information which should factor into decisions regarding pipe replacement. For example, if main replacement is warranted in a particular geographical area, it might be appropriate to replace other mains in the area to avoid future disruption to the customers and the community. Without GIS, it would be difficult to perform the same type of evaluation except possibly in very small systems.

V. Implementation

a. *Data Collection & Buried Asset Inventory*: The data necessary for a performance based management plan (see Exhibit No. 15) can be found in a variety of places that would include:

- Distribution drawings
- Work orders
- Asset records
- Customer Information Systems