City of Lincoln Park – Study Session
Water Infrastructure

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Water Infrastructure

- With much of the city being developed prior to 1960, the city's water infrastructure is old with an average age of approximately 80 years.
- Most of the city's water pipes are cast iron.
  - Cast-iron pipes have an expected life between 75 years (those installed in the 1950s) and 100 years (those installed in the 1920s).
- The water main system in the City of Lincoln Park is reaching the end of its useful life

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Water Infrastructure

- As cast-iron pipes age, they slowly corrode. Corroded pipes become brittle and are susceptible to breaking.

- Water mains can break for a few reasons, but most commonly:
  - Ground shifting during freeze/thaw conditions
  - Water hammers (hydraulic phenomenon)

- Water main breaks can be costly to repair

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Water Infrastructure

- Over the past few years, the city has experienced an acceleration in the number of water main breaks in the system

- 2020 – 80 main breaks
- 2021 – 120 main breaks
- 2022 (as of August) – 141 main breaks

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Financial Cost of Main Breaks

- Water main breaks are costly for the city for a few reasons. The following cost factors are attributable to water main breaks:
  - Labor to repair
  - Materials to repair
  - Costs of restorations (both landscaping and pavements)
  - Water loss

- According to estimates, each water main break costs the city approximately $4,480 in labor, material and restoration costs. This does not include the cost of water loss.

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Water Loss

- Water loss is water that is purchased (or produced) by a water system but is not billed to customers (or accounted for by other means).
- Water loss is extremely problematic for a water system and can be extremely costly.
- Among other things, water loss can be attributed to:
  - Unmetered water usage
  - Water leaks (main breaks)
  - Theft

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Water Loss

- Water loss represents a cost to the water system. For every 10% of water purchased but not billed, it costs the system approximately $251,000.
- As the city's system has aged, water loss has climbed to unacceptable numbers.

Fiscal Year	Water Loss (percent)
FY 2016	19.49%
FY 2017	14.75%
FY 2018	26.78%
FY 2019	28.51%
FY 2020	36.94%
FY 2021	35.59%

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Main Break Costs

- Considering the previously mentioned costs, the city is expending a great deal of funds to maintain and operate an aged system.
- With a yearly average of 114 main breaks the last three years, the city has expended an average of $510,720 annually on main breaks.
- With a water loss at approximately 35% the city losses approximately $878,000 annually. Though it is unreasonable to assume any system would have exactly zero water loss.
- Breaks and water loss combined represent over $1.4M annually.
  - This represents either an entire mile of water main replacement annually, 10 new DPS workers, or rate decreases.

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Main Break Costs

- Main breaks and water loss also carry a public safety risk.
- Significant drops in water pressure can allow bacteria to enter the system. This is what can cause boil water advisories.
- Drops in water pressure carry risk to fire suppression systems that require minimum pressure to operate effectively.
- The fire department also relies upon consistent water pressure to fight active fires using fire hydrants.

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Current Program

- While the city spent a great deal of time not replacing water main (the last major program was an $8M program between 1987 and 1990), as of recently, the city has been replacing approximately 1 mile of water main per year.
- At a pace of 1 mile per year, it would take the city about 130 years to replace all the water main in the city.
- With the current escalation of the deterioration of the system, this pace is unsustainable.

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Current Program

- The next two years, the city will be implementing a more aggressive program. This is being done through the use of ARPA funds.
- Over the next two years, approximately 5 miles of water main will be replaced, at an estimated cost of $5M.
- The sections of water main being replaced are those that have experienced the highest number of water main breaks over the past few years. This should help to reduce system maintenance costs.

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Current Program

- The following table shows the planned upgrades for the next two years:

Year	Street	Location
2023	Gregory	Dix to Fort St
2023	Buckingham	Dix to Fort St
2023	Pagel	Dix to Fort St
2024	London	Dix to Fort St
2024	Richmond	Dix to Fort St
2024	Merrell	Dix to Fort St
2024	Stewart	Dix to Fort St

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Moving Forward

- While the current two-year program is a small jump start, further upgrades are needed.
- It is estimated that if no serious action is taken, the city will continue to experience an estimated 28 additional water main breaks every year. This represents continued costs to the system.
- By the year 2029 the city can expect to have 307 water main breaks per year, representing $1.37M in labor, materials, and restoration costs.
- It is clear the only real option the city has is to increase the amount of water main upgrades performed each year.

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Aggressive Approach

- Due to the age of the system and previous inaction, the city needs to take an immediate, aggressive approach to upgrading the system.
- By replacing approximately six miles per year over five years the city could replace nearly a quarter of the system.
- This aggressive replacement would result in significant system savings from water loss and the cost of water main breaks.
- With these savings, the city could continue to upgrade at an acceptable pace that will continue to result in an improved system.

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Aggressive Approach

- Unfortunately, an aggressive approach would require a significant influx of cash into the system.
- There are only three main avenues for increasing the revenue for the system to pay for such a program:
  - Increasing rates (which results in a pay-as-you-go system)
    - Which would have to be increased to an unacceptable level
  - Locating various grants
    - While there are some coming through the federal government (and the city is pursuing them) this is not an avenue that can be solely relied upon.
  - Financing (which results in taking on debt over a longer period)

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Financing Improvements

- Financing the project would allow the city to spread out the cost of the upgrades over a determined number of years. This makes the annual cost lower and more affordable.

- The city has a few options when it comes to financing to pay for infrastructure upgrades.

- Revenue Bonds
  - Secured by a pledge of the water system revenues
  - Requires the city to raise rates to the point that they can cover annual system costs, annual debt costs, and fund a bond reserve account (approximately 1-year's worth of bond payments)

- Voter Authorized General Obligation Bonds
  - This allows the city to levy a special millage to cover the cost of the bonds on an annual basis.

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Financing Improvements

- Based on advice from the city's financial advisors, estimates have been created to look at the costs for bonding on three scenarios – 20-year, 25-year, and 30-year bonds.
- The following table shows estimated millage rates and an actual millage cost based on a home with a taxable value of $60,000).

Millage Needed	Twenty-Year (4.5%)	Twenty-Five-Year (4.75%)	Thirty-Year (5.0%)
First Year	1.344 ($80.64)	1.4187 ($85.12)	1.4934 ($89.60)
Peak Rate	2.8485 ($170.91)	2.4795 ($148.77)	2.2329 ($133.97)
Final Year	0.9136 ($54.82)	0.8061 ($48.37)	0.7107 ($42.64)
Average Rate	2.5182 ($151.09)	2.2494 ($134.96)	2.0187 ($121.12)