PLEDGE OF ALLEGIANCE
MEETING AGENDA

- Public Comment
- Approve Meeting #2 Summary
- Infrastructure Challenges
- Water Main Replacement Findings
- Water Main Replacement Costs
- Basic Financial Considerations
- Q&A
- Public Comment
- Preview of CAC Meeting 4 on February 5, 2019
- Meeting Take Away’s
PUBLIC COMMENT
APPROVE MEETING #2
SUMMARY –
AUGUST 28, 2018
WHERE WE ARE & WHERE WE ARE GOING
PROJECT OVERVIEW

2030 WATER MAIN REPLACEMENT PROJECT
PUBLIC ENGAGEMENT/CAC WORKSHOPS

2018
- Document Scanning
- Asset Invent./Polygon Dev.
- Demand Forecast

2019
- Water Main Assessment
- Cost Estimates
- Phasing Plan
- Funding Options
- Market Research
- Implementation Plan
- Final BOD Meeting

PUBLIC ENGAGEMENT
- Orientation 3/19/18
  - District Background
  - Brown Act Primer
  - Conflict of Interest
  - CAC Process and Logistics
- Workshop #1 5/28/18
  - Project 2030 Overview
  - Selection of CAC Chair and Vice Chair
- Workshop #2 8/28/18
  - Main Replacement Basics
  - Introduction to Utility Benchmarking
  - Asset Inventory Results
- Workshop #3 12/18
  - Main Replacement Findings and Costs
  - Funding Concepts Introduction
- Workshop #4 2/5/19
  - Up to 10 Options for Funding (5)
- Workshop #5 2/24/19
  - Market Research Primer
  - Review Protocols for Final Board Recommendation
- Workshop #6 3/19/19
  - Market Research Results
  - Review Final Board Recommendation
- Workshop #7 6/11/19
  - Implementation Plan
- Workshop #8 9/10/19
  - Field Inspection Plan
  - Documentation

TECHNICAL ELEMENTS

Documents
- 2030 Water Demand Forecast
- Infrastructure Challenges
- Financial Model for Alternatives
- Financial Model Updates
- Main Replacement Phasing
- Market Research Findings

* if needed
PROJECT 2030 SCOPE

- Asset Inventory
- Future Water Demand Projections
- Water Main Assessment & Costs
- Funding Strategy/Rate Analysis
- Water Main Replacement Phasing Plan
- Implementation Plan

Public Engagement
PROJECT 2030 BUILDING BLOCKS

- SPENDING OPTIONS
- WATER MAIN REPLACEMENT COSTS
- SPENDING & FUNDING ALTERNATIVES
- INFRASTRUCTURE CHALLENGES
- FUNDING OPTIONS
- WATER MAIN ASSESSMENT
- IMPLEMENTATION PLAN
- WATER DEMAND FORECAST
- ASSET INVENTORY
TECHNICAL MEMO #2 - INFRASTRUCTURE CHALLENGES
OVERVIEW OF TECH MEMO #2

- Infrastructure Challenges
  - What makes water main replacement challenging?
- Supply Challenges
- Regulatory Challenges
INFRASTRUCTURE CHALLENGES

• The American Water Works Association (AWWA) has identified aging infrastructure as a nationwide challenge

• Key Findings by AWWA
  • The Needs are Large
  • Household Water Bills Will Go Up
  • There are Important Regional Differences
  • There are Important Differences Based on System Size
  • The Costs Keep Coming
  • Postponing Investment Only Makes the Problem Worse
SUPPLY CHALLENGES

• **Availability** – Water Rights and Contracts
• **Reliability** – Infrastructure and Operations
• **Sustainability** – Planning for the Future
• The District must continue to manage and invest in supply availability, reliability and sustainability
REGULATORY CHALLENGES

• Compliance with current regulations is built into the District systems and operations

• Upcoming State mandated water conservation regulations may pose a challenge for the District and its customers

• Other factors CAC should consider:
  • Continue current water efficiency efforts
  • Additional water efficiency efforts as needed to achieve long-term State policy objectives
TECHNICAL MEMO #3 - MAIN REPLACEMENT RISK ANALYSIS FINDINGS
HOW WILL RISK-BASED APPROACH BE USED?

• Using sophisticated risk assessment software
  • Evaluate multiple LOF and COF risk factors
  • Develop prioritized main replacement list

• Short-Term Planning (by CHWD staff)
  • Develop and update capital improvement plan (annually and 5-year intervals)
  • Revisit LOF and COF factors and weighting

• Long-Term Planning (by CHWD staff and CAC)
  • Understand key risk factors
  • Develop multi-decade spending and funding strategy
SUMMARY OF RISK ANALYSIS
FOR MAIN REPLACEMENTS

- Risk Analysis – Computer Software
  - Likelihood of Failure (LOF)
  - Consequence of Failure (COF)

- LOF and COF comprised of multiple factors

- Each LOF and COF factor also gets a weighting factor (% LOF or COF)

Total Risk Score =

\[(\%_{LOF1} \times LOF_1) + (\%_{LOF2} \times LOF_2) + \ldots\]

multiplied by

\[(\%_{COF1} \times COF_1) + (\%_{COF2} \times COF_2) + \ldots\]
# Risk Factors and Initial Relative Weighting

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<th>Consequence of Failure (COF)</th>
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<td>COF Total</td>
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LIKELIHOOD OF FAILURE (LOF) FACTORS
## Likelihood of Failure (LOF)

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<td>LOF Total</td>
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## Consequence of Failure (COF)

| COF #1: Pipe Diameter                  | 20% |
| COF #2: Pipe Flow                      | 20% |
| COF #3: Transmission Pipelines         | 25% |
| COF #4: Critical Facilities            | 10% |
| COF #5: Creek Crossing (Environmental Impact) | 10% |
| COF #6: High Traffic Areas             | 10% |
| COF #7: Difficult Access Areas (Backyard Mains) | 5% |
| COF Total                              | 100%|
LOF #1: PIPE AGE / SURVIVAL PROBABILITY (50% WEIGHTING FACTOR)

Pipeline Inventory
Decade of Installation

Legend
- Miles of Pipeline
- Percent of Pipeline

Year

Miles of Pipeline
Percent of Pipeline
LOF #1
DECADE OF INSTALLATION

PIPELINE
DECADE OF INSTALLATION
- 1950
- 1960
- 1970
- 1980
- 1990
- 2000
- 2010
- UNKNOWN

<1%
WHAT DOES “SURVIVAL PROBABILITY” MEAN?

- Likelihood that a pipe won’t experience a “failure”.
- “Failures” can be repaired and returned to service.
- Everyday examples: car repairs/replacement
  1. *How do you decide when to replace with new?*
LOF #1: WATER MAIN SURVIVAL PROBABILITY 2030-2065

2030

Survival Probability Benchmarks
- <15%
- <25%
- <50%
- >50%

5%

2065

70%*

* Assumes CHWD continues at current rate of replacement.
## LOF #2: PIPE MATERIAL (25% WEIGHTING FACTOR)

### Pipeline Inventory

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<th>Miles</th>
<th>Percent</th>
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### Legend

- **ACP**: Asbestos Cement Pipe
- **PVC**: Polyvinyl Chloride
- **DIP**: Ductile Iron Pipe
- **CML**: Cement Mortar Lined (Steel)
- **STL**: Steel (Type Unknown)
- **CMLC**: Cement Mortar Lined & Coated (Steel)
- **DW**: Tar Dipped & Wrapped (Steel)
LOF #2
INSTALLATION BY MATERIAL
**LOF #2**

**LIFE EXPECTANCY FOR VARIOUS PIPE MATERIALS**

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<th>Pipe Material</th>
<th>Life Expectancy (Years)*</th>
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<td>Asbestos Cement Pipe (ACP)</td>
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<td>Steel</td>
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<tr>
<td>Polyvinyl Chloride (PVC)</td>
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*Buried No Longer. Confronting America’s Water Infrastructure Challenge, AWWA, 2012*

Life Expectancy is **NOT** the same as Survival Probability!
LOF #3: PIPELINE VULNERABILITY (15% WEIGHTING FACTOR)

• 17 creek crossings (8 free standing, 9 bridge supported)
• Vulnerable to flood stage creek flows and debris, pipes are exposed.
LOF #4: HISTORICAL WATER MAIN BREAKS
(10% WEIGHTING FACTOR)

- Break/repairs from 2004-2018
- Predictor of future trouble spots
CONSEQUENCE OF FAILURE (COF) FACTORS
## CONSEQUENCE OF FAILURE (COF) FACTORS

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</table>
COF #1: PIPE DIAMETER
(20% WEIGHTING FACTOR)

Miles and Risk Score of Pipes by Size

Total amount of all pipes = 250 miles
COF #2: PIPE FLOW
(20% WEIGHTING FACTOR)

Miles and Risk Score of Pipes by Flow

Flow (gallons per minute)

- <25
- 25-100
- 100-150
- 150-250
- 250-500
- 500-10,000

Miles

Risk Score
COF #3: TRANSMISSION PIPELINES (25% WEIGHTING FACTOR)

- **Distribution Mains (<= 12 inch Diameter)**
  - Deliver water to customers and businesses
  - Mostly 6-8 inch diameter
  - Also provide neighborhood fire protection

- **Transmission Mains (> 12 inch Diameter)**
  - Bring water from supply origin (e.g. San Juan Water)
  - Ensure water flows quickly and efficiently throughout service area
  - Larger diameter / higher flow capacities
COF #3
MAP OF TRANSMISSION PIPELINES
COF #3
COMPARISON OF SURVIVAL PROBABILITY FOR ALL MAINS AND TRANSMISSION MAINS ONLY

Distribution and Transmission Mains (250 miles)
Transmission Mains Only (15 miles)
COF #4: CRITICAL FACILITIES (10% WEIGHTING FACTOR)

- Assisted Living
- Commercial
- Dental Offices
- Medical Offices
- Public Services
- Schools
COF #5: CREEK CROSSINGS (ENVIRONMENTAL IMPACT) (10% WEIGHTING FACTOR)

- Potential release of chlorinated water to creeks due to pipe failure
- Releases subject to fines by state agencies
COF #6: HIGH TRAFFIC AREAS
(10% WEIGHTING FACTOR)

- Terminal Routes (Red)
  - Madison Ave
  - Greenback Lane
  - Sunrise Blvd
  - Hazel Ave

- Local Arterials (Green)
  - Old Auburn Rd
  - Oak Ave
  - San Juan / Sylvan
  - Antelope Rd
COF #7: DIFFICULT ACCESS
“BACKYARD” WATER MAINS
(5% WEIGHTING FACTOR)

• More difficult to access
• Would likely take longer to repair
• Potential damage to private property
NUMBER CRUNCHING
### EXAMPLE OF MODEL OUTPUT

![Image of model output]

**COF** \(\times\) **LOF** = **TOTAL RISK**

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<th>COF5 (Inter.)</th>
<th>COF10 (Diameter)</th>
<th>COF2 (Inter.)</th>
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<th>LOF1</th>
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<th>Likelihood of Failure</th>
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TECHNICAL MEMO #3 - REPLACEMENT COST ESTIMATES
• Planning Level Cost Estimates include:
  • Construction Costs
  • Other Project Costs (Soft Costs)

• Future Cost Considerations
  • Project Specific conditions
  • Pipe Rehabilitation Options
  • Alternative Pipe Replacement Techniques
  • Performed on a project-specific basis
• Construction Costs:
  • Materials
  • Labor
  • Traffic Control
  • Pavement Replacement
  • Flushing and Testing
  • Environmental
Other Project Costs:
- Project Management
- Construction Management
- Engineering
- Permitting
- Inspections
- Contingencies
To estimate Unit Costs the BNi Costbook used

These unit costs are adjusted to our area using a Geographic Multiplier

Recent District construction cost data was also used to confirm unit costs
## TOTAL PIPELINE REPLACEMENT COSTS

<table>
<thead>
<tr>
<th>Pipe Classification</th>
<th>Total Miles</th>
<th>Cost (million)</th>
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</thead>
<tbody>
<tr>
<td>Distribution Mains (&lt;=12 inch diameter)</td>
<td>235</td>
<td>$317</td>
</tr>
<tr>
<td>Transmission Mains (&gt;12 inch diameter)</td>
<td>15</td>
<td>$54*</td>
</tr>
<tr>
<td>Appurtenances (e.g. fire hydrants, customer service connections)</td>
<td>n/a</td>
<td>$61</td>
</tr>
<tr>
<td>Total Construction Cost</td>
<td>n/a</td>
<td>$432</td>
</tr>
<tr>
<td>Engineering, Management and Permitting</td>
<td>n/a</td>
<td>$108</td>
</tr>
<tr>
<td>Total</td>
<td>250</td>
<td>$540</td>
</tr>
</tbody>
</table>

* Factors affecting higher transmission main replacement unit cost:
  - Larger diameter
  - Creek crossings
  - Difficult access (backyard mains / private easements)
SPENDING OVER VARIOUS PHASING TIME PERIODS

2030’s | 2040’s | 2050’s | 2060’s | 2070’s
---|---|---|---|---
$108 M | $108 M | $108 M | $108 M | $108 M
$130 M | $130 M | $130 M | $130 M |
$180 M | $180 M | $180 M |

Increased Likelihood of Failure
(Survival Probability Decreases Over Time)
GATHER QUESTIONS
BREAK
BASIC FINANCIAL CONSIDERATIONS
TOPICS

01 Capital Costs
02 Spending Options
03 Funding 101
04 Debt Financing Overview
05 Spending and Funding Metrics
• Current capital spending averages around $4M
  • ~$2M related to Water Main Replacement

• Water Main costs may exceed $500M over 50 years
  • Average annual spending is dependent on time
  • Peak spending would also be considered

• Significant revenue needs when compared to today
HOW SPENDING AND FUNDING OPTIONS BECOME ALTERNATIVES

Spending Options

- S1
- S2
- S3
- S4
- S5
- S6
- S7
- S8
- S9
- S10

Funding Options

- F1
- F2
- F3
- F4
- F5
- F6
- F7
- F8
- F9
- F10

Spending & Funding Alternatives

- S1 OR S2
  - F1
  - F2
  - F3
CAPITAL FINANCIAL PLAN

• Capital Improvement Plan (CIP) is a primary driver of Financial Plan
  • A detailed capital plan generates a strong financial plan
  • Financial plans should extend at least through the life of CIP

• Catalog capital based on prioritizing needs
  • Critical Assets
  • Ongoing Repair & Replacement

• Identify construction timing and useful life of improvement
  • Determine short-term vs long-term needs
    • Typically threshold is > 5 years
Develop Funding Strategy for Water Main Replacement:

1. Financial sufficiency
   - Generates adequate revenues for Labor, Operations & Maintenance (O&M), and planned capital costs
   - Operating costs will also increase over time

2. Evaluate benefits and impacts with debt-financing
   - Level of capital funding
   - Impacts to reserves
   - Net income for debt coverage
   - Affect to end customers’ bills

3. Funding strategy should compliment District’s Mission
   - Responsible management of capital assets
FINANCIAL PLAN DEVELOPMENT

**Revenue**
- Operating
- Non-Operating

**Expenses**
- O&M
- Planned Capital

**Financial Policies**
- Water Main Funding
- Debt vs PAYGO
- Operating Reserve

**Revenue Adjustment Schedule**
Multi-year Funding Strategy
CAPITAL FUNDING AND RESERVES

CIP & Funding Sources
- Orange bar – Planned Capital
- Green bar – Additional funding Water Mains
- Black line – Funding Goal (CIP + Mainlines)

Reserve Balances
- Blue bar – projected ending balances
- Green line – Min Reserve target
- Red line – Ideal Reserve target
**DEBT FUNDING OF CAPITAL**

**Capital Projects Expenditures**

- **FY 2018**:
  - Debt: $5.0
  - Planned CIP: $6.6
  - Additional Mainline Funding: $0
- **FY 2019**:
  - Debt: $5.4
  - Planned CIP: $6.6
  - Additional Mainline Funding: $0
- **FY 2020**:
  - Debt: $6.6
  - Planned CIP: $7.5
  - Additional Mainline Funding: $0
- **FY 2021**:
  - Debt: $7.5
  - Planned CIP: $8.6
  - Additional Mainline Funding: $0
- **FY 2022**:
  - Debt: $8.6
  - Planned CIP: $9.7
  - Additional Mainline Funding: $0

**All Reserves**

- **FYE 2018**:
  - Total Reserves: $7.0
  - Minimum Reserve: $4.0
  - Target Reserve: $6.0
- **FYE 2019**:
  - Total Reserves: $8.0
  - Minimum Reserve: $5.0
  - Target Reserve: $7.0
- **FYE 2020**:
  - Total Reserves: $9.0
  - Minimum Reserve: $6.0
  - Target Reserve: $8.0
- **FYE 2021**:
  - Total Reserves: $10.0
  - Minimum Reserve: $7.0
  - Target Reserve: $9.0
- **FYE 2022**:
  - Total Reserves: $11.0
  - Minimum Reserve: $8.0
  - Target Reserve: $10.0

**CIP & Funding Sources**

- Grey bar – Debt proceeds introduced

**Reserve Balances**

- Debt proceeds fund capital while rate revenues build up reserves
<table>
<thead>
<tr>
<th>Debt Considerations</th>
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<tbody>
<tr>
<td>• Capital facilities are critical and needed right away</td>
</tr>
<tr>
<td>• Liquid cash is not sufficient on its own to fund capital</td>
</tr>
<tr>
<td>• Reliable future revenues are available to secure debt</td>
</tr>
<tr>
<td>• Strong credit rating to obtain low interest rate</td>
</tr>
<tr>
<td>• Capital has a long useful life</td>
</tr>
<tr>
<td>• Inter-generational equity</td>
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</table>
## PAYGO
### ADVANTAGES & DISADVANTAGES

<table>
<thead>
<tr>
<th><strong>Advantages</strong></th>
<th><strong>Disadvantage</strong></th>
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</thead>
<tbody>
<tr>
<td><em>Save on interest charges</em></td>
<td><em>If capital costs spike - rates spike</em></td>
</tr>
<tr>
<td><em>Eliminate cost of issuance (COI) + debt reserve</em></td>
<td><em>Capital may need to be deferred due to liquidity</em></td>
</tr>
<tr>
<td><em>No bond covenants to satisfy - Maintain local control</em></td>
<td><em>Existing customers are absorbing entire burden</em></td>
</tr>
<tr>
<td><em>Projects only funded when cash is available</em></td>
<td><em>Inequity between existing / future customers</em></td>
</tr>
<tr>
<td><em>Additional admin. costs are avoided</em></td>
<td><em>Other needs not addressed due to CIP costs</em></td>
</tr>
</tbody>
</table>
## DEBT ADVANTAGES & DISADVANTAGES

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Favorable low interest rates</td>
<td>• Total project cost increases due to interest and COI</td>
</tr>
<tr>
<td>• Critical capital projects may move forward</td>
<td>• Bond coverage requires additional revenue collection</td>
</tr>
<tr>
<td>• Achieve intergenerational equity</td>
<td>• Incurring debt may not be an option - politically</td>
</tr>
<tr>
<td>• Mitigate rate spikes in specific years</td>
<td>• Debt payments must be made while revenue is variable</td>
</tr>
<tr>
<td>• Smooth out revenue adjustments</td>
<td></td>
</tr>
</tbody>
</table>
CAPITAL SPENDING METRICS

- Total costs of Water Main Replacement
- Annual spending
- Peak annual spending
- Timeframe for completion
- Amount of spending when compared to today
- Relative system risk
FUNDING METRICS

• Pre-funding (ramp up before 2030)
• Debt Financing
  • Percent of total CIP
  • Percent of operating costs
• Peak Revenue Need
• Total Revenue Increase
  • Shown as % compared to today and/or total $$$
FUNDING DASHBOARD

SPENDING METRICS

Total Cost
Annual Spending
Years to Complete

FUNDING METRICS

% Debt Funded
$ Pre-Funded
$ Peak Rev Need

System Risk

High
Low

Capital Spending
Current Revenue
Pre-Funded
Debt
PAYGO
NEXT STEPS

• Develop multiple main replacement phasing/spending options.
• Develop multiple funding options.
• Combine phasing and funding options into discreet project alternatives.
• Derive total revenue increase required.
CAC Q&A ACTIVITY
PUBLIC COMMENT
PREVIEW OF CAC MEETING 4
Next Meeting: Tuesday, February 5th, 2019

**Time:** 6:30 pm – 9:15 pm

**Location:** Citrus Heights Community Center, Hall A
VISIT THE CAC WEBPAGE
chwd.org/customer-advisory-committee/
PARTICIPANT TAKEAWAY’S
SUMMARY OF MEETING 3

• Main Replacement Findings and Costs
  • Transmission mains are more vulnerable and failure consequences are significant
  • The pace of main replacement will increase from current practice
  • Trade-off between pace of main replacement and risk of increasing pipe failures

• Basic Financial Considerations
  • Various options are available to fund project
  • Revenue increases are dependent on pace of main replacement
  • Ultimate goal is to provide multiple viable options
CLOSING