Bridgehead Pipeline Replacement Project Authorization

Board of Directors Meeting

September 9, 2020

Delta Diablo

Bridgehead Pipeline Failure
Event Summary

- 18-inch Bridgehead Pipeline failed on Wilbur Ave. bridge near Minaker Dr. (8/2 at ~2:00 pm)
  - SSO = ~127 gal with no water reaching surface waters
  - Immediate actions by District and City of Antioch staff to mitigate spill impacts
    - Secured spill area and began recovery and cleanup process
    - Coordinated with BNSF rail lines to allow for inspection and temporary repair
  - Staff completed temporary repairs to restore pipeline with reduced flow capacity by 7:15 pm
- Staff implemented immediate operational changes
  - Limited flow from the Bridgehead Pump Station (BHPS) to 2.5 MGD
  - Utilized BHPS storage capacity to equalize flows
  - Implemented operational strategy to manage daily flow variation

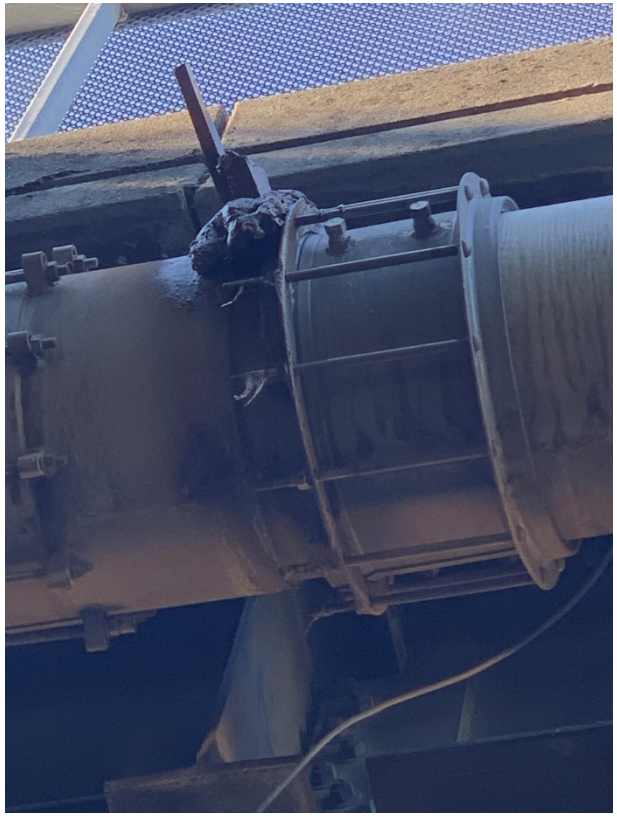
Bridgehead Pipeline Overview

18-inch pipeline suspended on north side of Wilber Ave. bridge (ductile iron pipe with polyethylene liner);
2.4 million gallons per day of flow

6-foot expansion coupling joint with cathodic protection jumper wire (unlined stainless steel)

Bridgehead Pipeline
Failure Location

Corrosion failure at flowline of expansion joint



Initial temporary repair at expansion joint

Bridgehead Pipeline
Inspection and Follow-up Repair

- Staff (with consultant) developed and implemented plan to inspect internal condition of 18-inch pipeline
  - Coordinated temporary shutdown of BHPS to allow for CCTV inspection using District equipment
  - Conducted CCTV inspection of the 18-inch pipeline (~600 feet in length) to assess pipe integrity and PE liner condition
  - Inspection findings—failure of PE liner at most pipe joints
    - Delamination of PE liner has resulted in direct exposure of ductile iron pipe material to accelerated corrosion conditions due to hydrogen sulfide gas
- Key Finding: Pipeline is significantly compromised and must be replaced to avoid an imminent failure

Bridgehead Pipeline
CCTV Inspection – Liner Condition

PE liner delamination at pipe joint (restricts flow capacity)

Ductile iron pipe corrosion at PE liner failure

Bridgehead Pipeline
Inspection and Follow-up Repair (cont'd)

- Staff developed a plan to improve the temporary repair and collect wall thickness measurements
  - Staff coordinated with BNSF to allow scaffolding installation to facilitate inspection and improved temporary repairs
  - Inspected expansion coupling corrosion and discovered a second hole on the opposite side of the pipe
  - Staff removed initial temporary repair and installed bolstered temporary repair using multiple layers of material to cover holes
    - Improved repair completed in one day and passed leak testing
    - BHPS returned to normal operation without flow restriction
  - Consultant measured wall thickness at pipeline joints
    - Bell and spigot joints hindered testing at PE liner failure locations
    - Wall thickness measurements showed limited material loss

Bridgehead Pipeline
Scaffolding and Improved Repairs

Scaffolding to access pipeline and allow train movement

Improved temporary repairs

Bridgehead Pipeline
Temporary Pipeline Installation

- Staff recommendation is to immediately install a parallel temporary pipeline under emergency conditions, while the permanent line replacement project is planned, designed, bid, and constructed
- Installation of ~1,400 feet of below and above grade HDPE plastic pipeline, control valve, new manhole, air release valve, K-rail barriers, and other appurtenances
- Construction of temporary pipeline and other related activities ($1.5 million) requires funds to be transferred from eight active capital projects to establish budget
  - Two projects designated for unanticipated projects
  - Two projects to be deferred to next fiscal year
  - Four projects with partial scope deferral to next fiscal year

Bridgehead Pipeline
Temporary Pipeline Installation (cont'd)

- Installation is in progress and will be placed into immediate service to restore operational reliability (with redundancy) prior to start of wet weather season
  - Consequence of another failure on critical line is high due to access limitations and lack of existing redundancy
- Designed to convey existing wet weather flows
- Estimated to be in service for ~12 months, while permanent solution is designed and constructed under public bidding conditions
  - Note: Installation of a temporary pipeline would be required for permanent line replacement even under planned conditions
  - Pipe and barriers are being rented and will be removed by the contractor after the new permanent pipeline is installed

Bridgehead Pipeline
Permanent Pipeline Installation

- Design and construct a permanent replacement of the existing 18-inch pipeline
  - Consultant engaged to prepare construction documents
  - Design to extend the force main to western side of Wilbur Ave. bridge
    - Consistent with planned project in FY23/24 and FY24/25 to improve operational control and flexibility
    - Need to determine if new pipeline can be installed on bridge or if BNSF will require alternative alignment (e.g., buried)
  - Planned Schedule
    - Design: September – November 2020
    - Bidding: December 2020 – February 2021
    - Construction: Beginning in March 2021 (duration TBD)
  - Staff will recommend additional project funding allocation as design and construction activities progress in FY20/21

Driving Organizational Improvement
Proactive vs. Reactive Asset Management

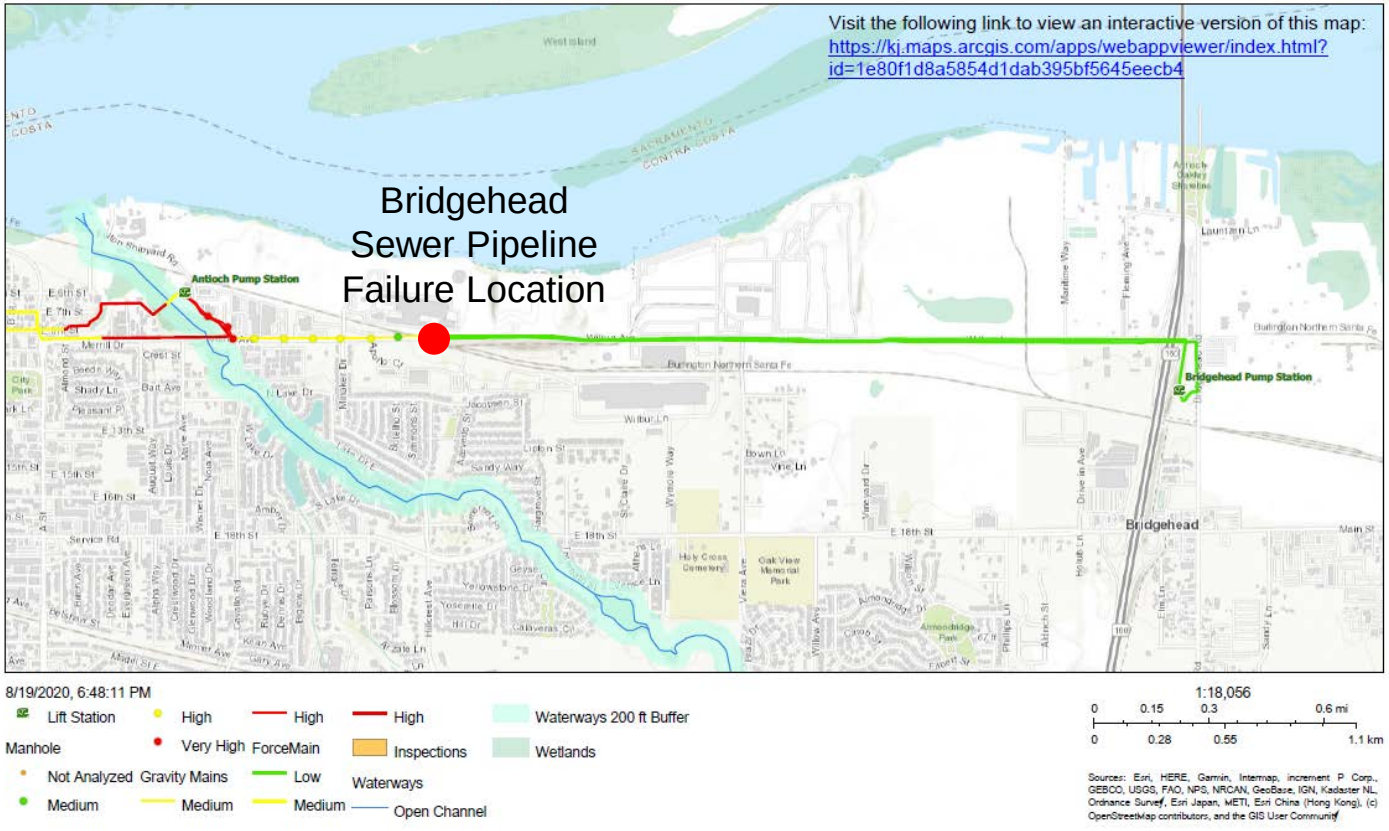
- Key Question: How does the District identify and address key infrastructure vulnerabilities before they occur?
- Organizational focus on development of Asset Management Program, but multiple years to develop
  - Goal to determine conveyance system assets with high risk and consequence of failure
- Facility Condition Assessment of District's linear assets did not identify Bridgehead line vulnerability

District Conveyance and Collection System Assets	District Asset (miles)	Desktop Assessment		Physical Assessment	
		Length (miles)	Pipe Diameters	Length (miles)	Pipe Diameters
Force Mains	18.5	16.5	4" to 28"	<1	
Interceptors	14	9.7	12" to 48"	4.0	12" to 36"
Baypoint Collection	43			10.1	6" to 30"
Total	75.5	26.2		14.1	

Bridgehead Pipeline
Facility Condition Assessment Findings

- District drawings did not clearly describe the stainless steel expansion joint and cathodic protection system issue (i.e., desktop assessment was not predictive of failure)

Bridgehead Force Mains and Interceptor



Driving Organizational Improvement Asset Management (cont'd)

- Staff will conduct comprehensive review of District conveyance system infrastructure elements
  - Apply lessons learned from Bridgehead pipeline and two failures on Antioch Force Main 102
  - Identify locations with similar potential for severe corrosion, vulnerable pipe materials, and enhanced cathodic protection
  - Understand key vulnerabilities due to consequence of failure, accessibility issues, O&M issues, and lack of redundancy
  - Update GIS mapping and review prior condition assessment info
  - Augment identification and prioritization of future inspection, physical condition assessment, and repair activities
- High priority project to assess Bay Point collection system infrastructure was included in 5-year CIP (FY20/21, $0.7 million)

Recommended Actions

1. Adopt resolution declaring that public interest and necessity demand immediate expenditure of public money to repair the unanticipated structural failure of the Bridgehead sewer pipeline, which includes a 24-inch pressurized force main section and an 18-inch gravity sewer section, to safeguard life, health, and property, without submitting the expenditure to bid
2. Authorize General Manager to establish a new FY20/21 project within the WW CAR Fund, entitled “Bridgehead Pipeline Replacement Project” and to transfer monies to this project from other budgeted Wastewater CAR Fund projects, in the amount of $1,500,000, for a total project budget of $1,500,000

Recommended Actions (cont'd)

3. Authorize General Manager to negotiate and execute Materials Procurement, Construction, and other related Services Contracts in a total combined amount not to exceed $1,400,000 to complete emergency repair of the Bridgehead sewer pipeline
4. Determine that the emergency repair of the Bridgehead sewer pipeline is exempt from environmental review under CEQA, and direct General Manager, or his designee, to file a CEQA Notice of Exemption (NOE) with the County Clerk-Recorder