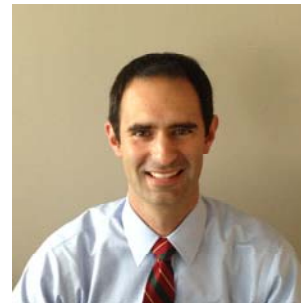


October 12, 2021  
ICRI 2021 Fall Convention



# Rehabilitation of 1920's Water Distribution Valve Vault in Minneapolis



**Michael J. Mitchell, PE, SE**  
*GCP Applied Technologies*



*The ideas expressed in this ICRI hosted webinar are those of the speakers and do not necessarily reflect the views and opinions of ICRI, its Board, committees, or sponsors.*

# Presentation Outline

1. Background Information
2. Inception of Project
3. Preliminary Assessment
4. Detailed Assessment
5. Design Challenges
6. Construction
7. Completion

# Minneapolis Water Vital Statistics

Established  
1867

Source water  
Mississippi River

Max capacity  
140-160 MGD

Average Day Production  
60 MGD

2017 total production  
19 billion gallons



# Distribution Area

1,000 miles of water mains bring water to 500,000 customers in the Minneapolis Metro area, including:

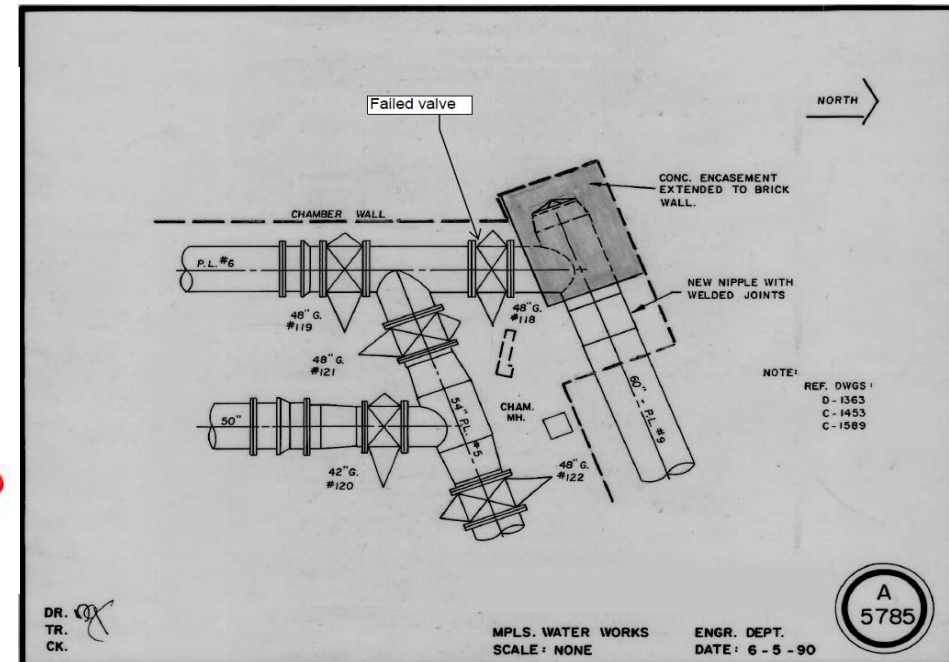
- New Hope
- Crystal
- Golden Valley
- Columbia Heights
- Hilltop
- Edina - Morningside neighborhood
- MSP airport
- Bloomington (partial)

Cities that get Minneapolis tap water



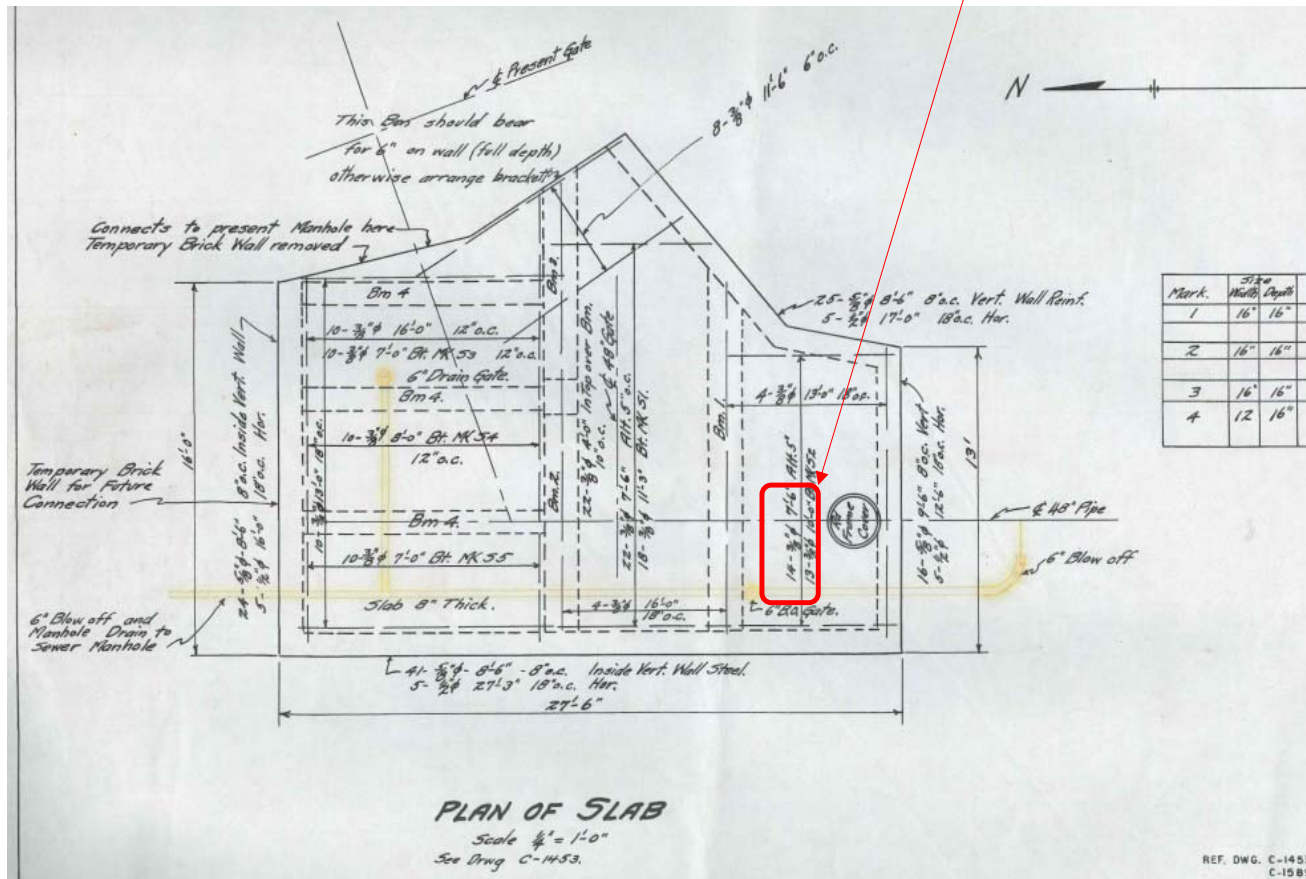
# Project Inception

- Pipelines installed between 1927 and 1931.
- The mains interconnect in order to provide system redundancy and flexibility.
- The interconnection is isolated with 5 large gate valves housed in a 1,100 square foot vault.
- **Valve 118 broken in closed position. Need to replace.**



# Project Inception

"We'd like to cut a hole in the slab here..."

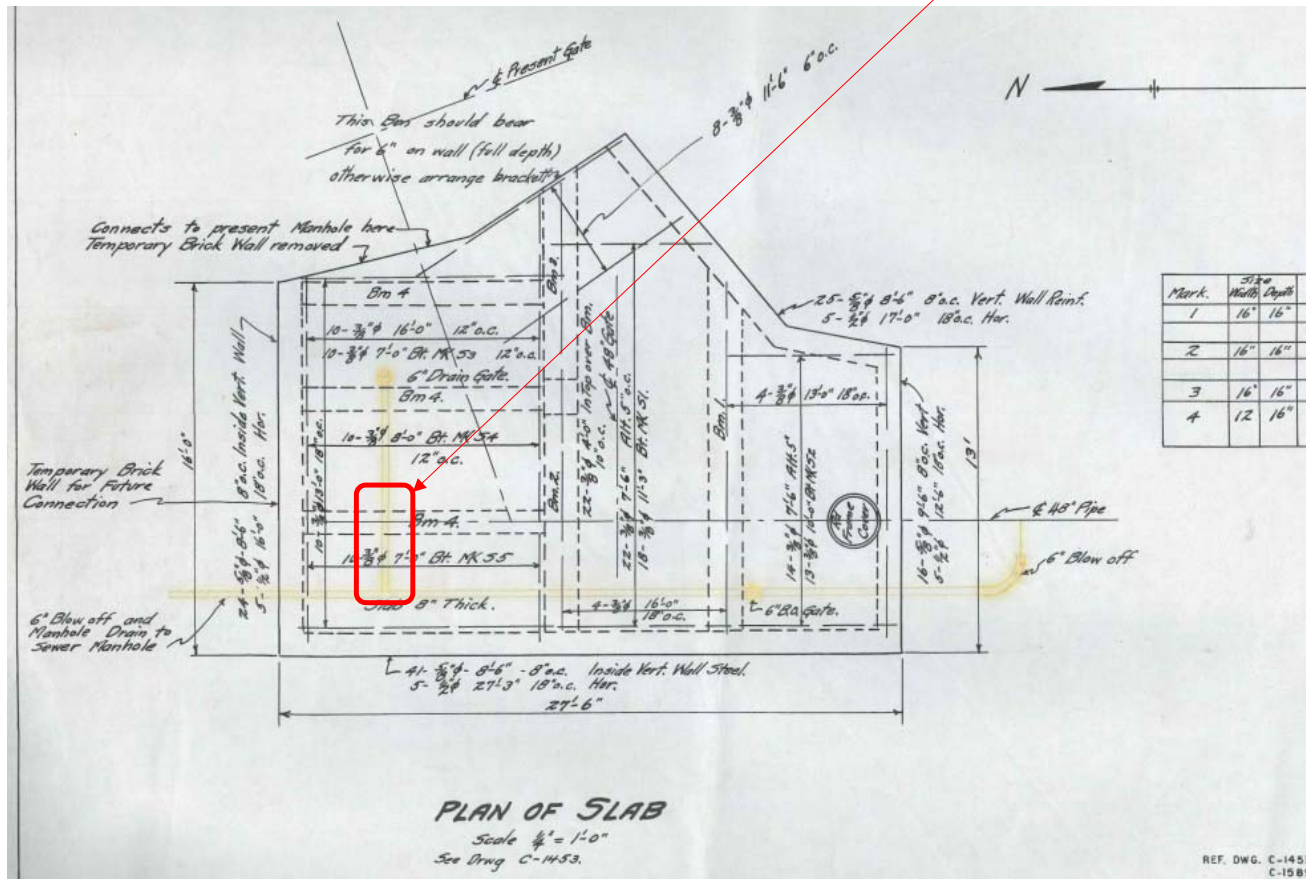


# Preliminary Evaluation



# Preliminary Evaluation

"Oops! The valve we need to remove is actually over *here!*"





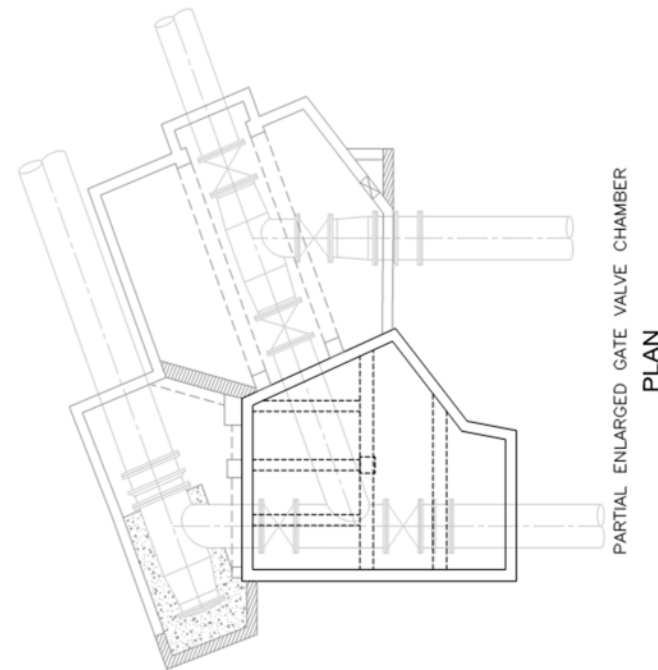
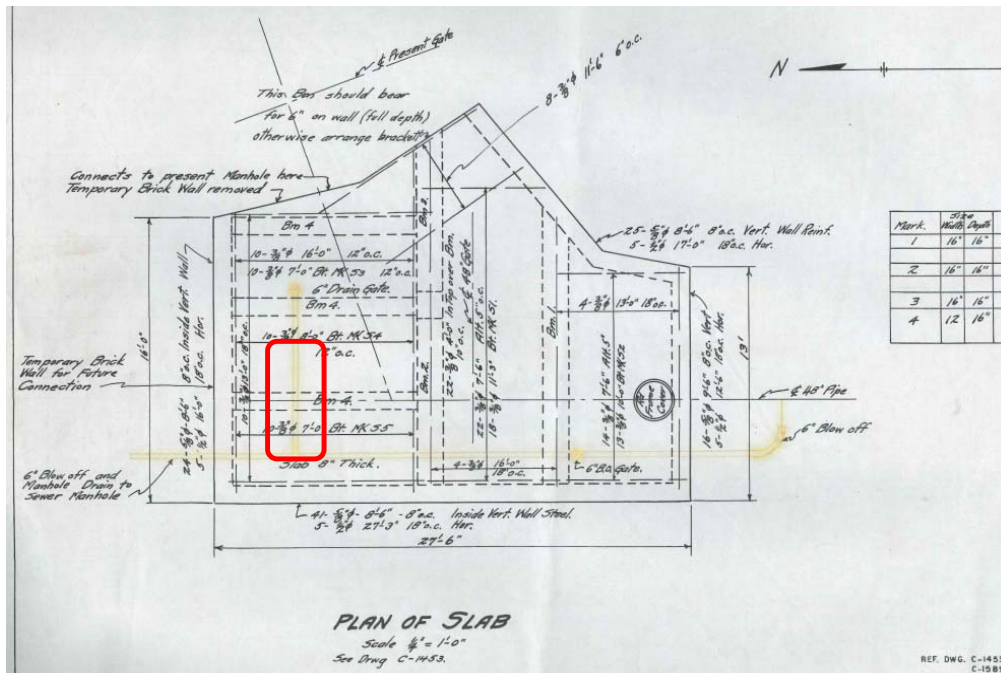
# Preliminary Evaluation



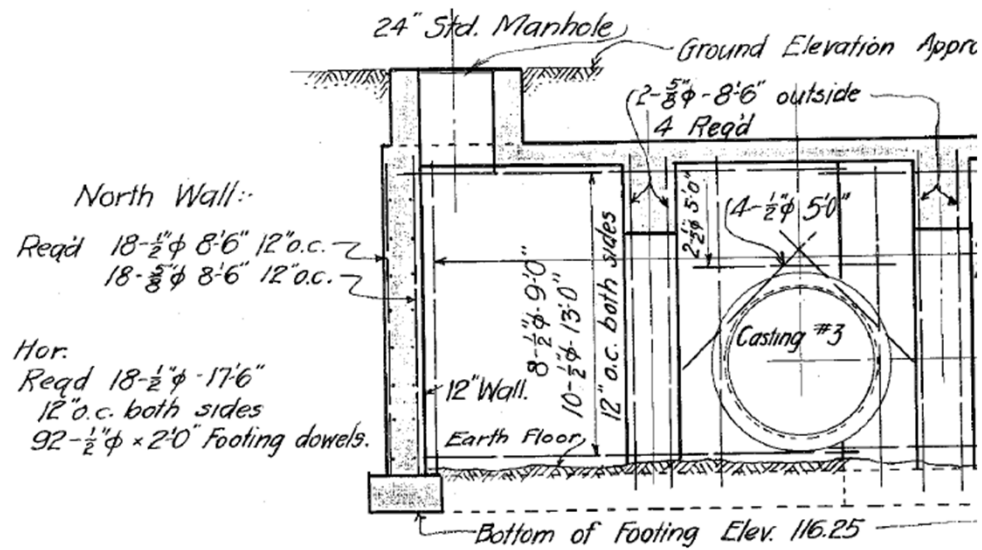
# Preliminary Evaluation



# Record Drawings vs As-Built



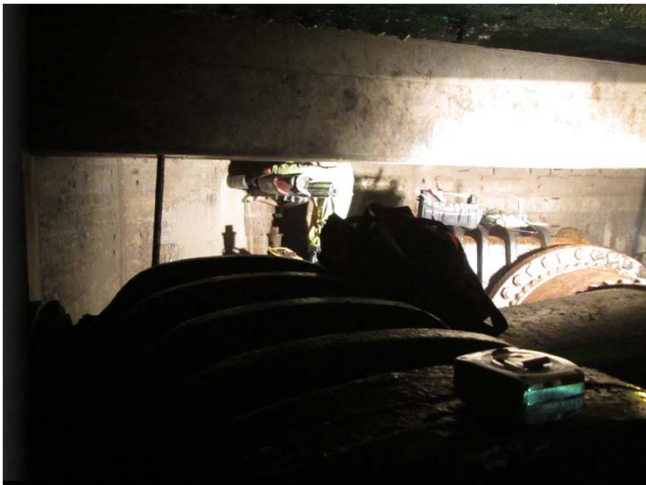
# Record Drawings vs As-Built



Section A-A



# Detailed Structural Inspection



## Concrete

6 cores

Low = 5030 psi

Avg = 5900

High = 7080 !!

f'c = 5,000 psi

## Steel

fy = 33 ksi

Rebar in walls, good condition

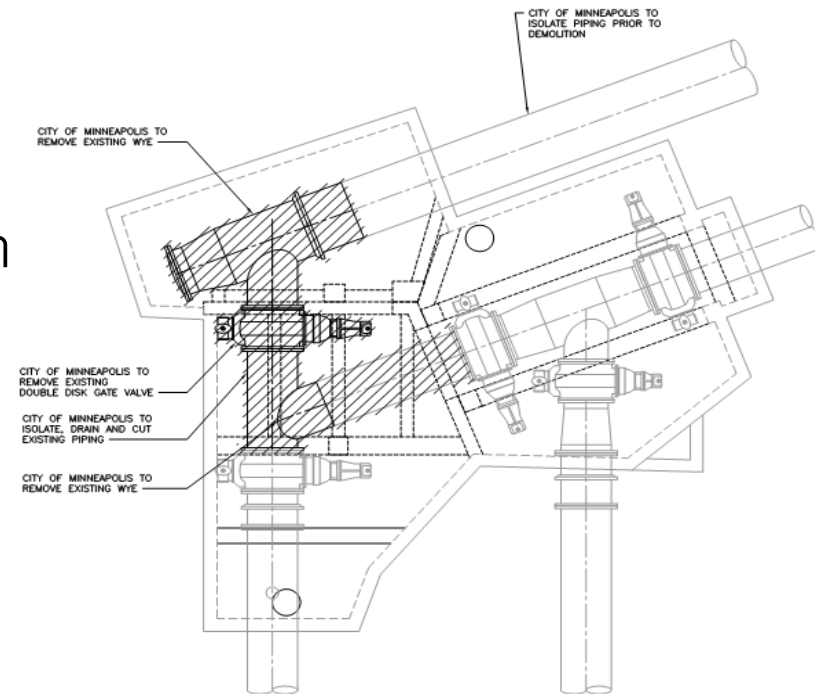
Concrete in walls sound

Primary deteriorated elements:  
roof slab and roof beams

# Structural Design Challenges

Desire to make entire roof removable for future valve maintenance or replacement.

- 1 – Slab removal, lateral force resisting system
- 2 – Beam removal, vertical load distribution
- 3 – Keep existing walls, repairs as-needed
- 4 – Brick elements
- 5 – Challenging geometry / no perfect solution
- 6 – Ease of future valve removal





# Excavation





# Demolition / Removals



# Demolition / Removals



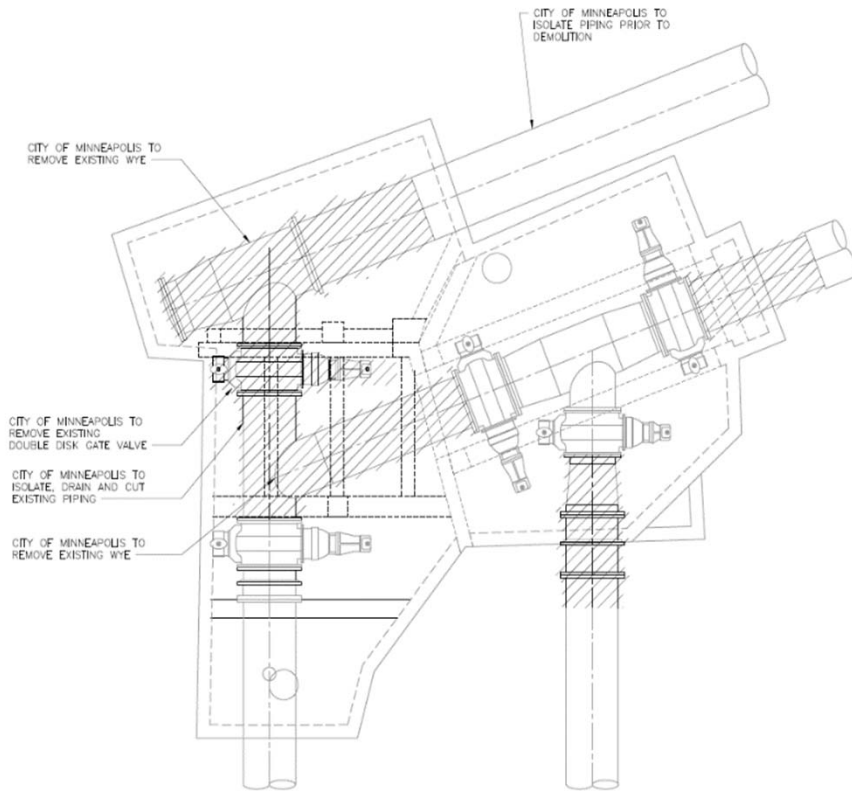
# Interior



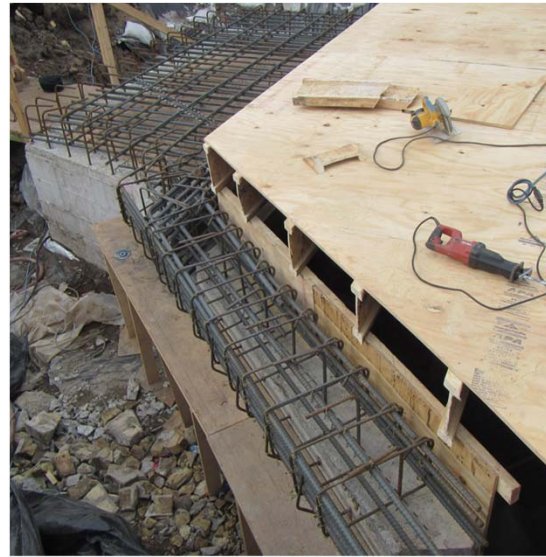
# Interior



# Opportunistic Rehabilitation



# New Partial Roof Slab and Horz Beams



# New Valve Installation



# Winter Construction





# Interior Walls and Base Slab



# Roof Beams and Slabs



# Precast Roof Plank Placement



# Precast Roof Plank Placement



# Despair to Repair!



# Despair to Repair!



# Despair to Repair!



# Despair to Repair!





# Questions?

Michael J. Mitchell, PE, SE  
GCP Applied Technologies  
1-978-402-5095  
michael.j.mitchell@gcpat.com



INTERNATIONAL CONCRETE REPAIR INSTITUTE  
1000 WESTGATE DRIVE, SUITE 252  
ST. PAUL, MINNESOTA 55114 USA  
P: +1 651-366-6095 | E: [INFO@ICRI.ORG](mailto:INFO@ICRI.ORG) | [WWW.ICRI.ORG](http://WWW.ICRI.ORG)