# THE UNIVERSITY OF IOWA REPLACEMENT OF GRAND AVENUE STEAM DISTRIBUTION SYSTEM





SHIVEHATTERY

ARCHITECTURE + ENGINEERING

#### Agenda



- Why we need the project
- Project scope and schedule
- Design challenges
- Construction experience

STEAM VAULT.

DEMOLISH PORTION O
RIVERSIDE VAULT.

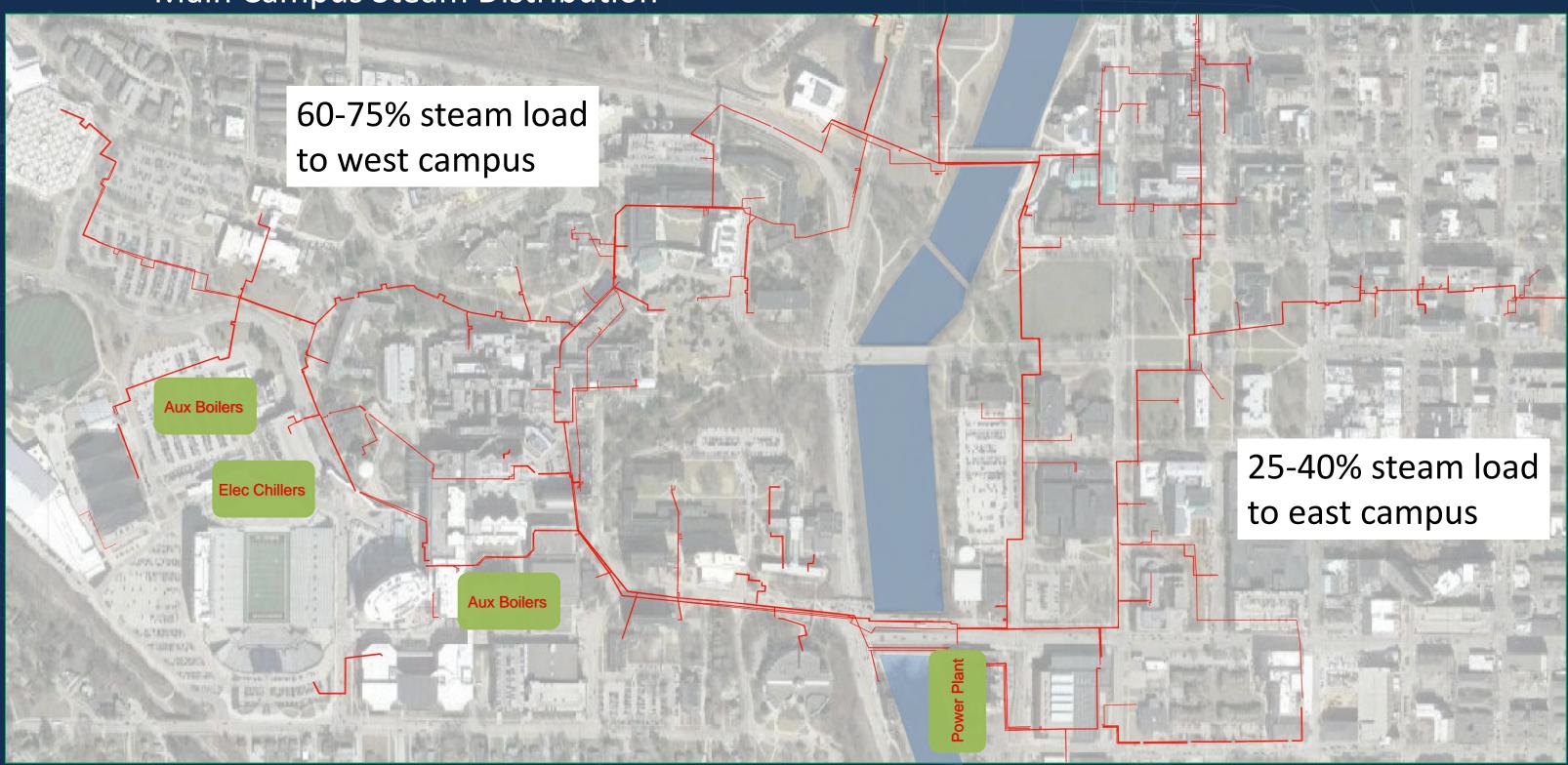
- DIRECT BURIED STEAM. REMOVE ROOF SLAB OF GRAND AVE. TUNNEL.

EXISTING DIRECT
BURIED 16" LPS AND 12"
HPS TO REMAIN. TIE
INTO NEW VAULT

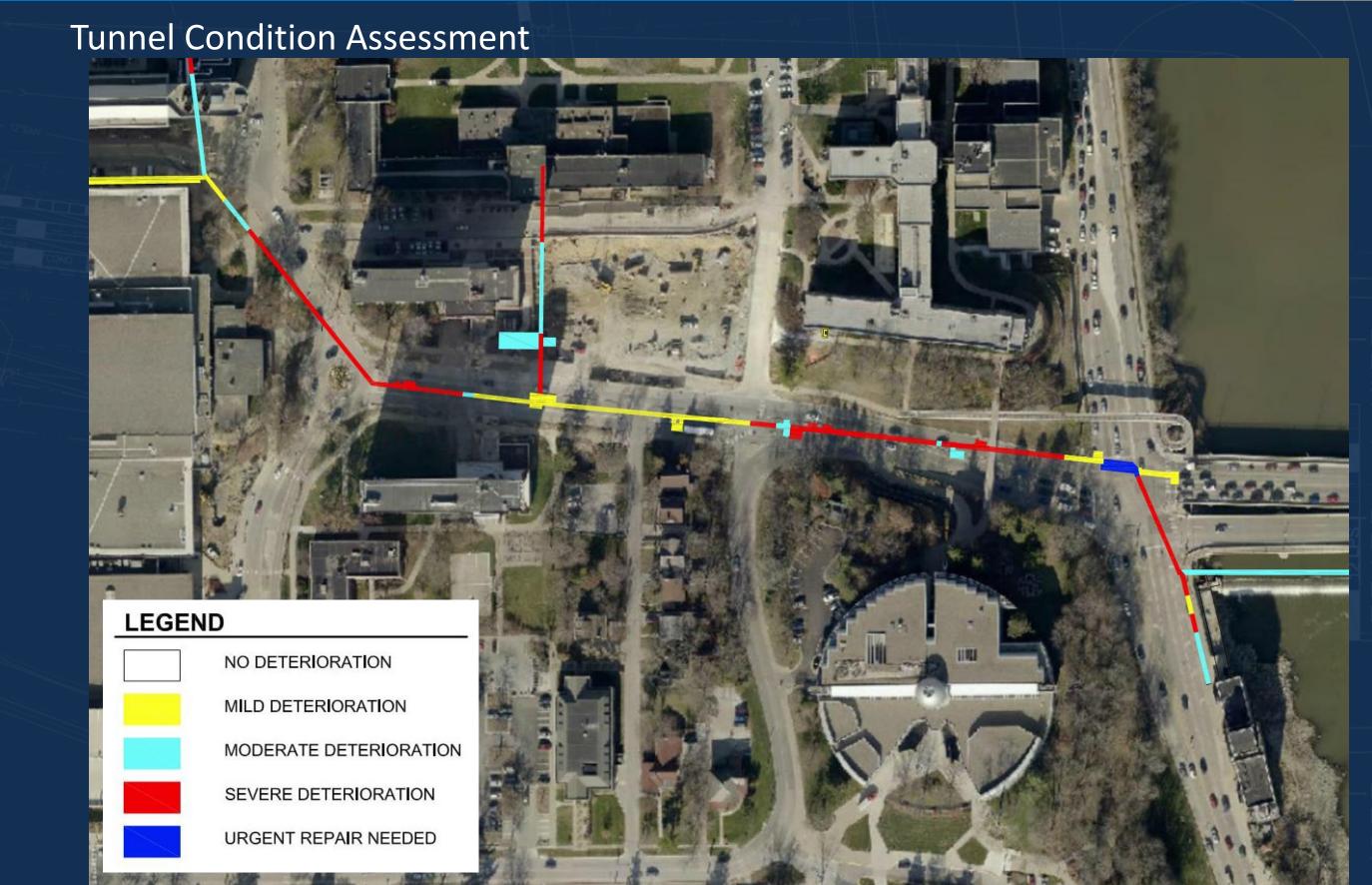
— INSTALL BULKHEAD AT GRAND AVENUI TUNNEL





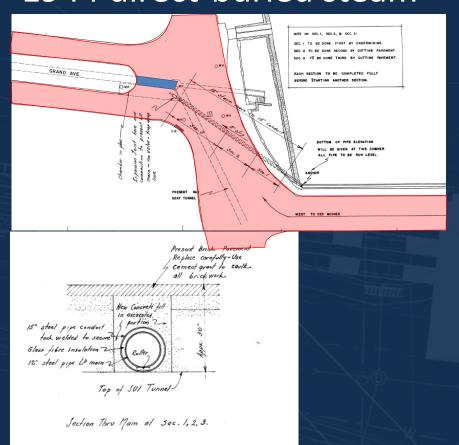




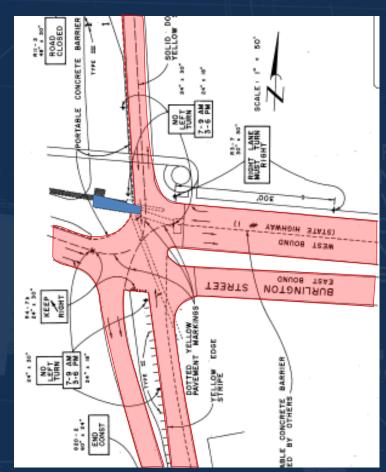




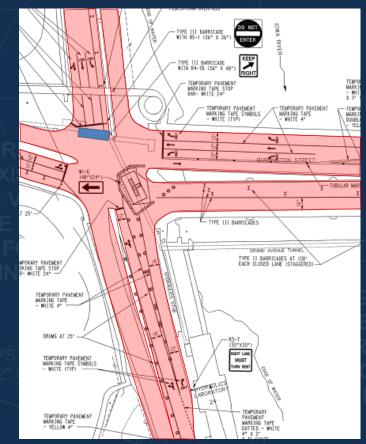
#### 1944 direct-buried steam



#### 1986 Vault addition



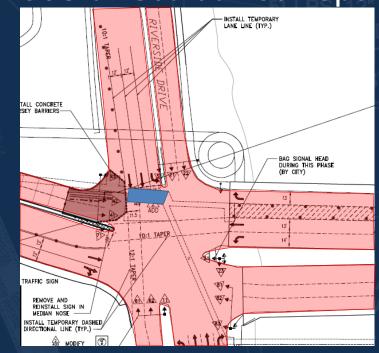
#### 1993 Vault repair



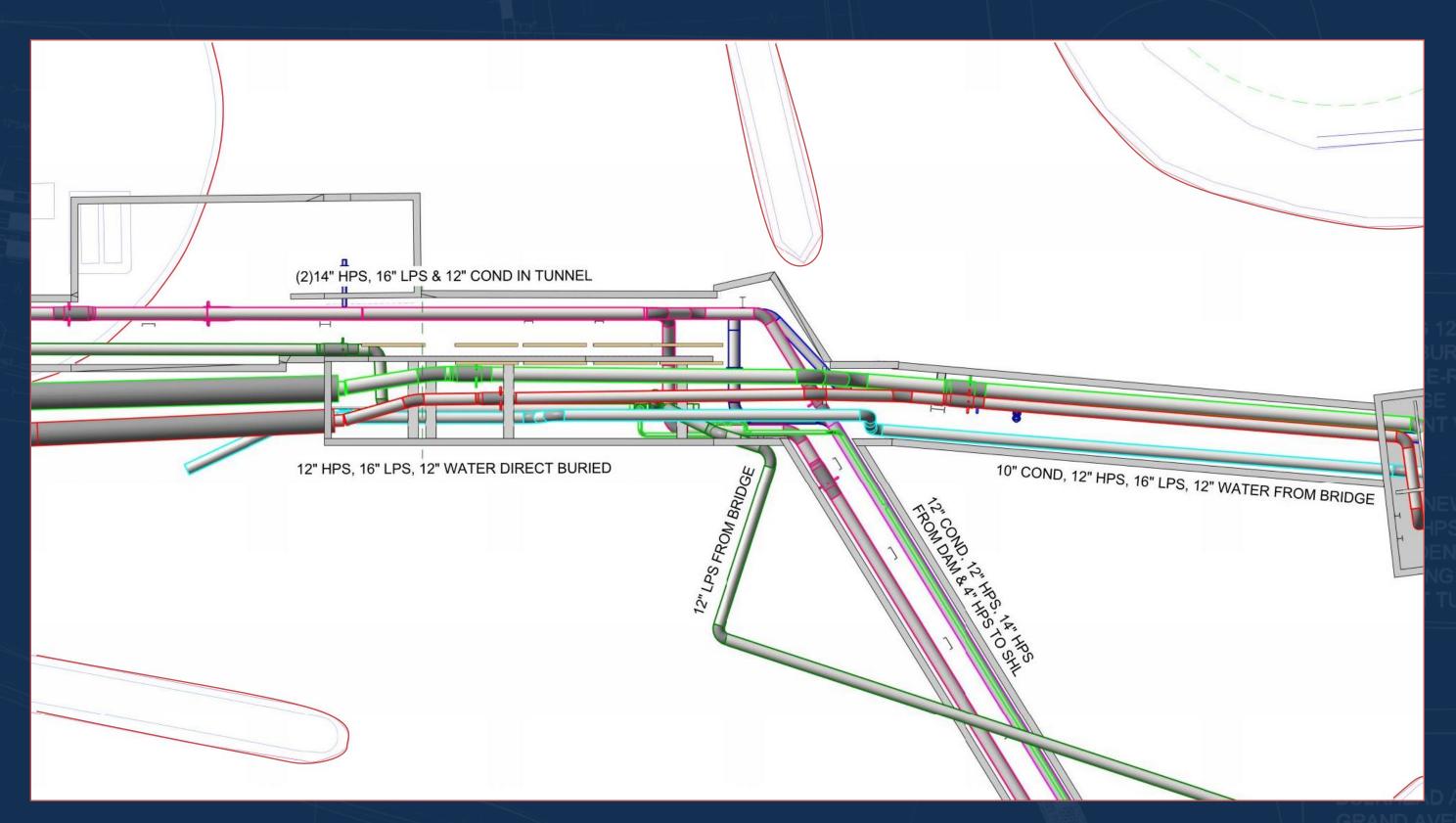
#### 1995 Tunnel repairs



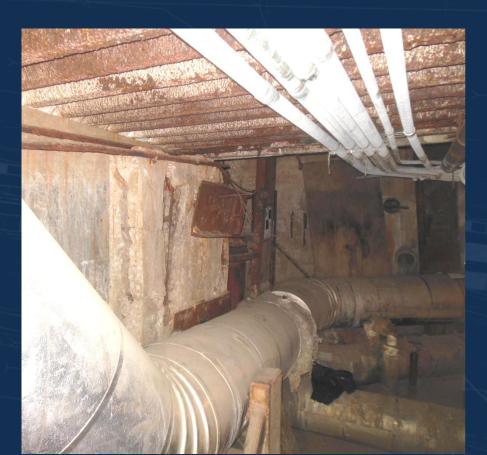
#### 2008 direct-buried repairs















NSTRUCT NEW EAM VAULT. MOLISH PORTION OF /ERSIDE VAULT.

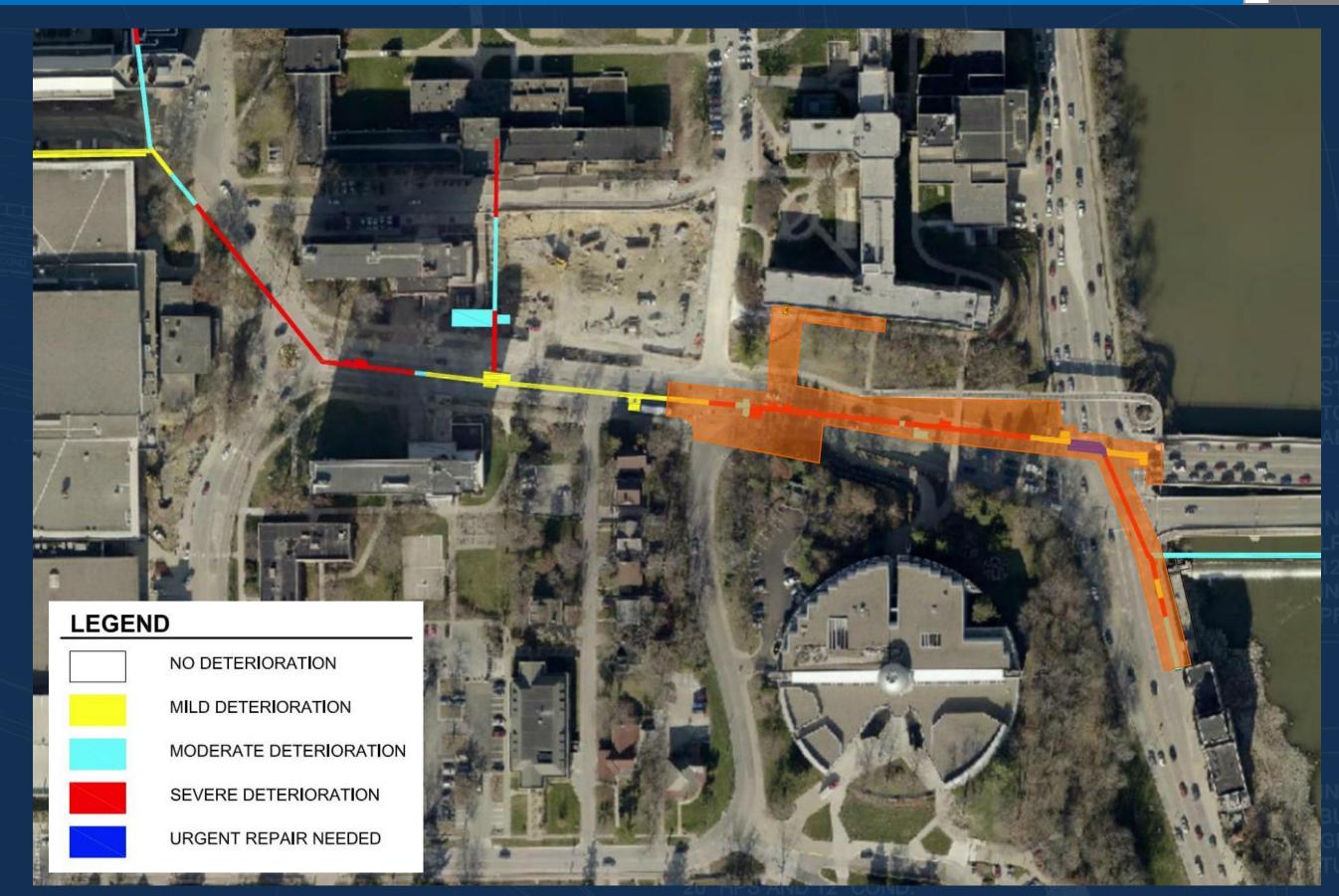
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### **Project Scope**





#### **Project Schedule**



# PROJECT SCHEDULE

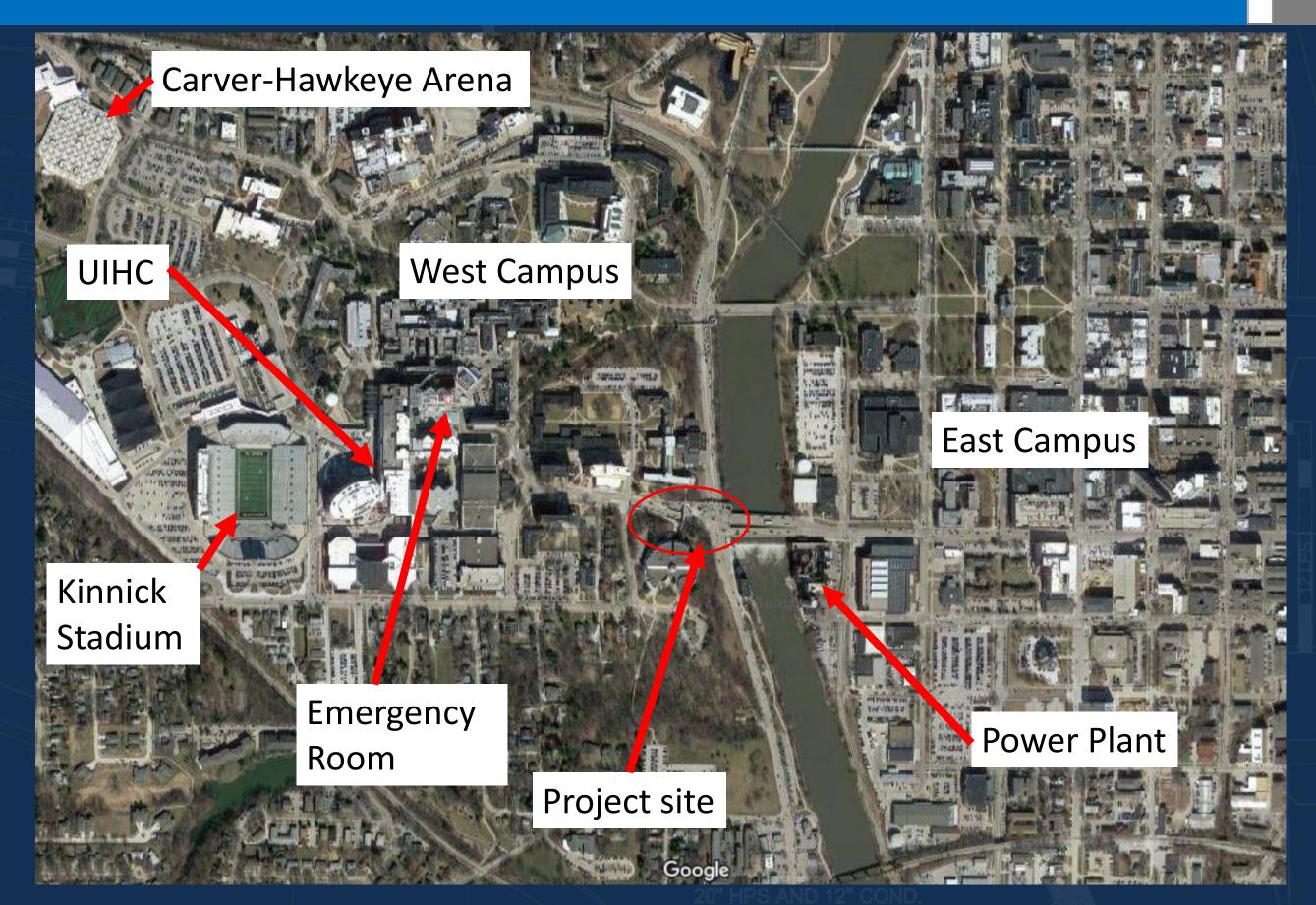
Start Design
Bids Received
Began Construction

**Substantial Completion** 

August 1, 2014
January 13, 2015
February 4, 2015
October 21, 2016

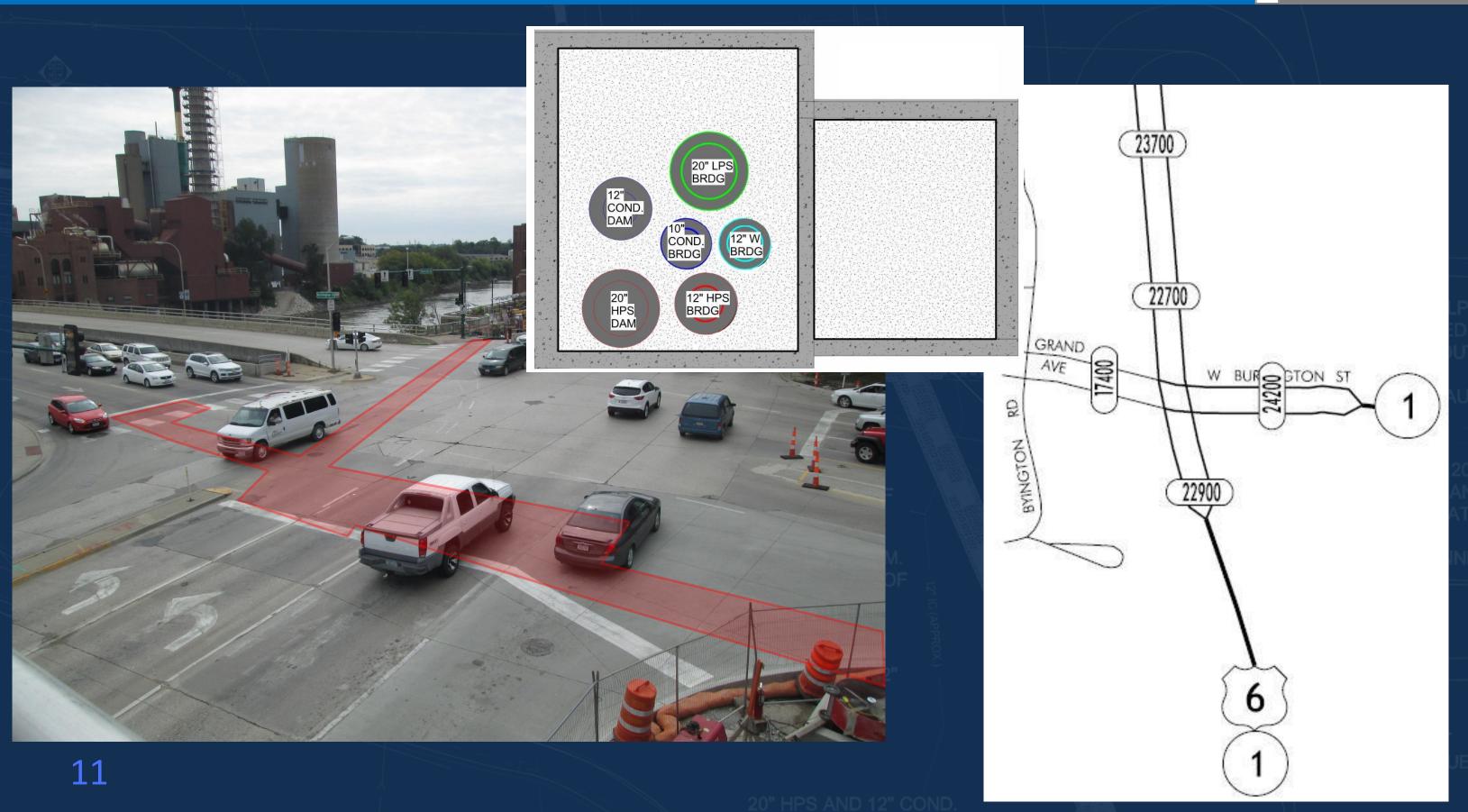
### **Design Constraints**





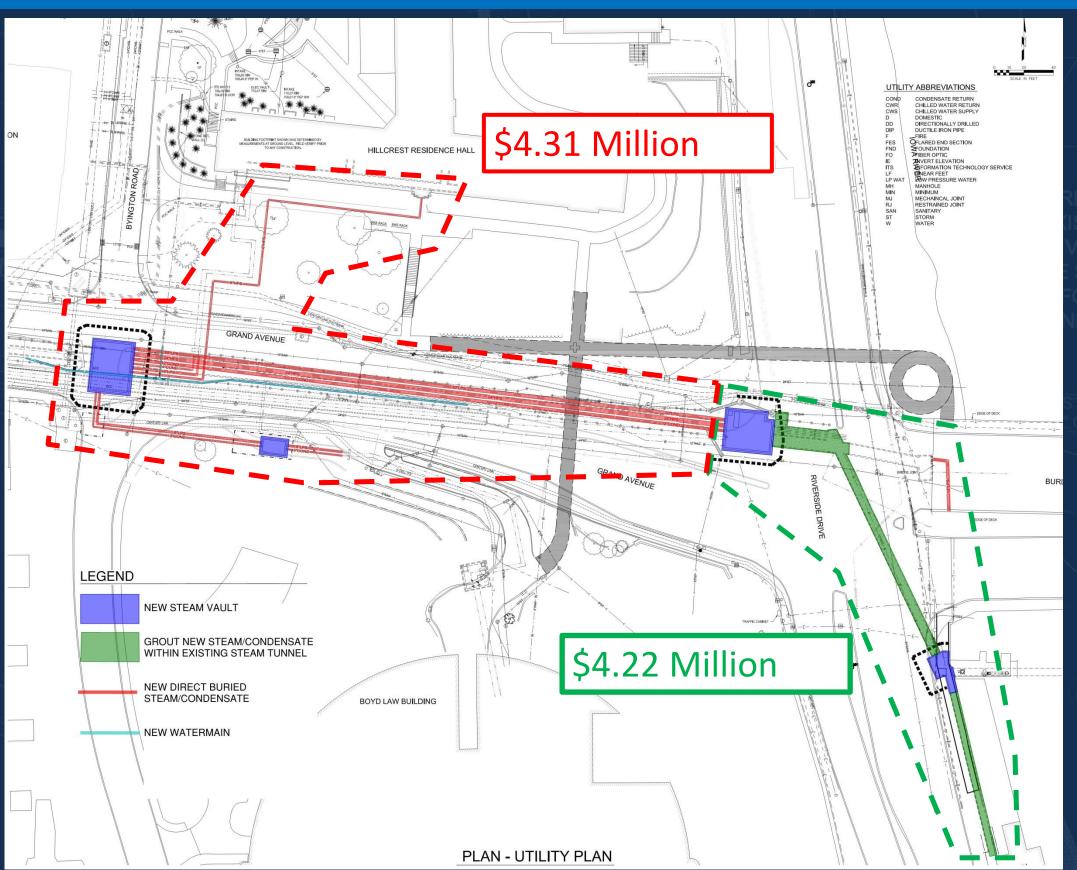
### **Design Constraints**





#### **Design Constraints**



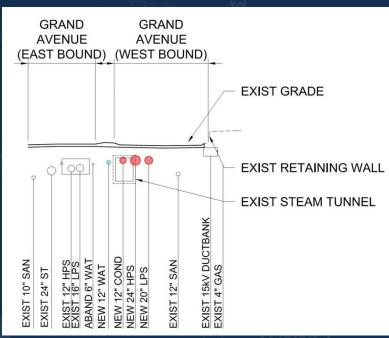


New tunnel and piping \$14,000/LF

Boring under highway \$13,000/LF (rock)

Direct Buried Piping in Tunnel \$10,000/LF

Direct Buried Piping \$7,000/LF



## **Utilizing Multiple Steam Sources**





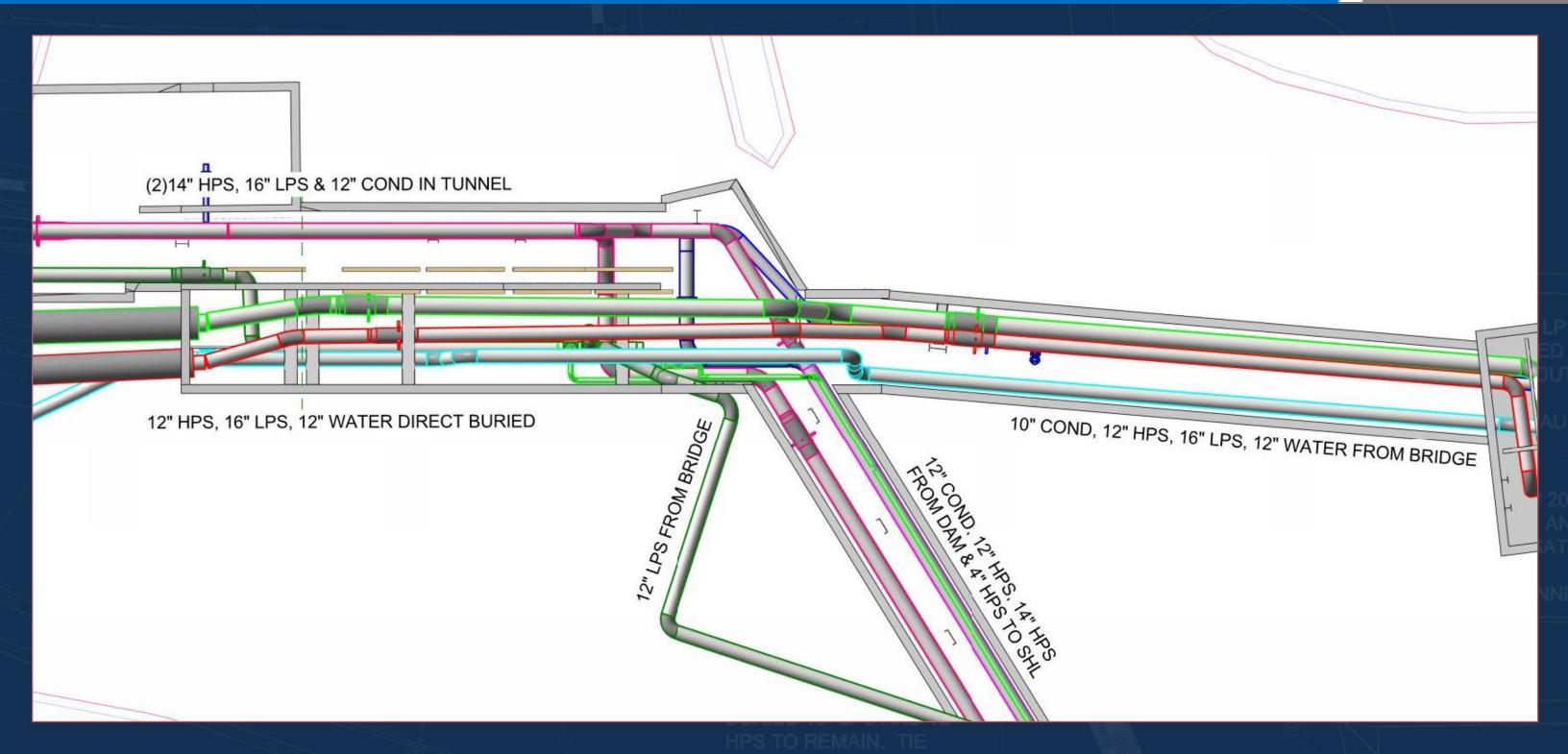
EXISTING 12" LE DIRECT BURIED STEAM RE-ROU FO BRIDGE ABUTMENT VAL

INSTALL NEW 20 LPS, 12" HPS, AN 12" CONDENSAT IN EXISTING PRECAST TUNN

- INSTALL BULKHEAD AT GRAND AVENUE TUNNEL

### Finding an Alignment







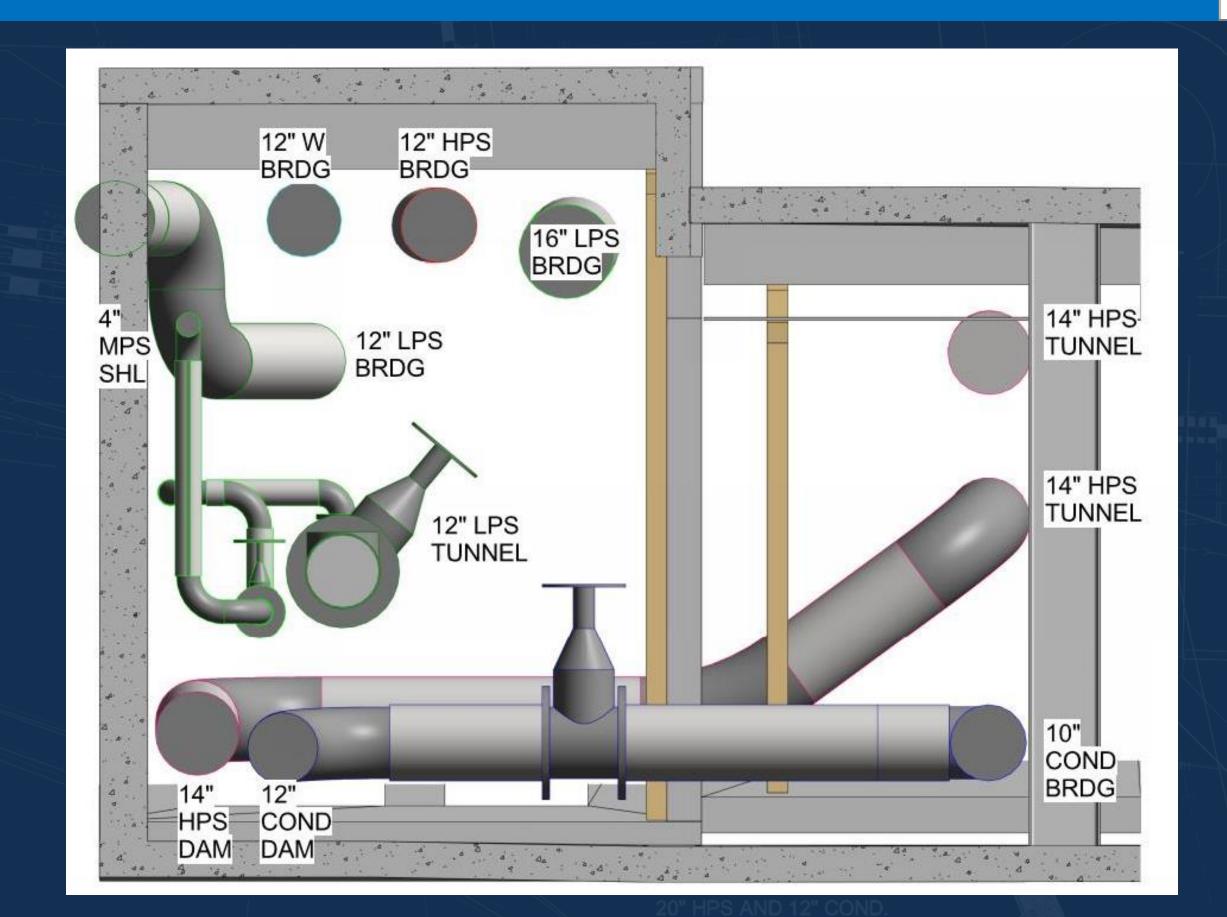


XISTING 12" LP IRECT BURIED TEAM RE-ROU' O BRIDGE BUTMENT VAU

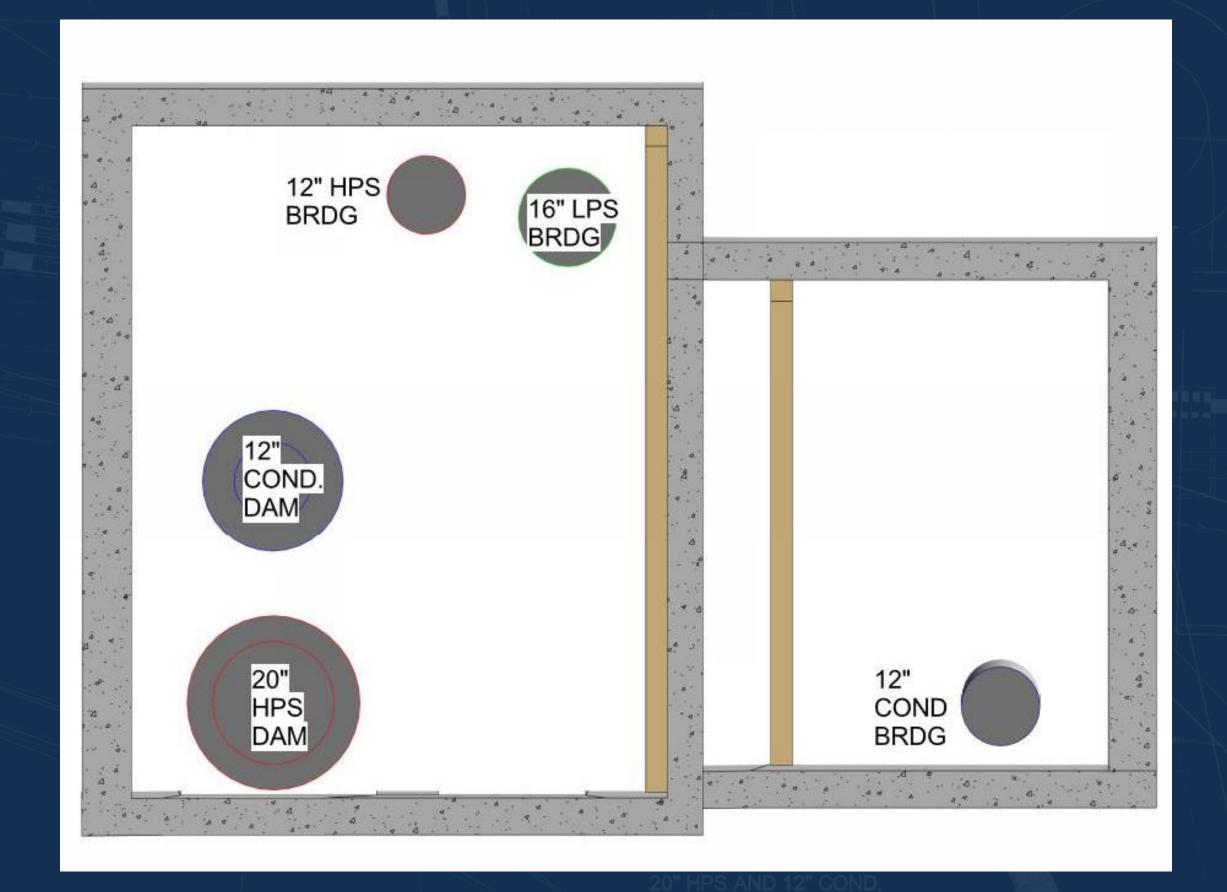
NSTALL NEW 20 PS, 12" HPS, AI 12" CONDENSAT N EXISTING PRECAST TUNN

INSTALL BULKHEAD AT GRAND AVENUE

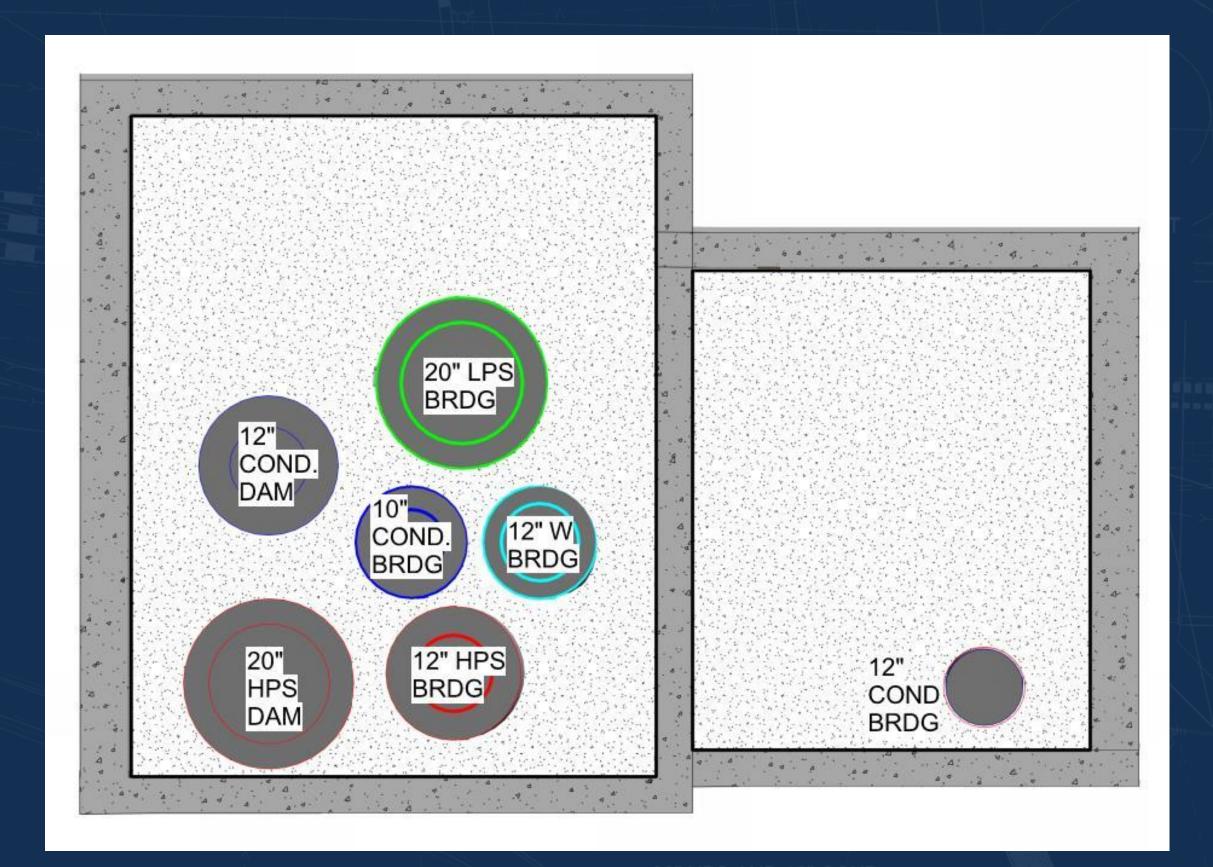












## **Working in Tight Spaces**





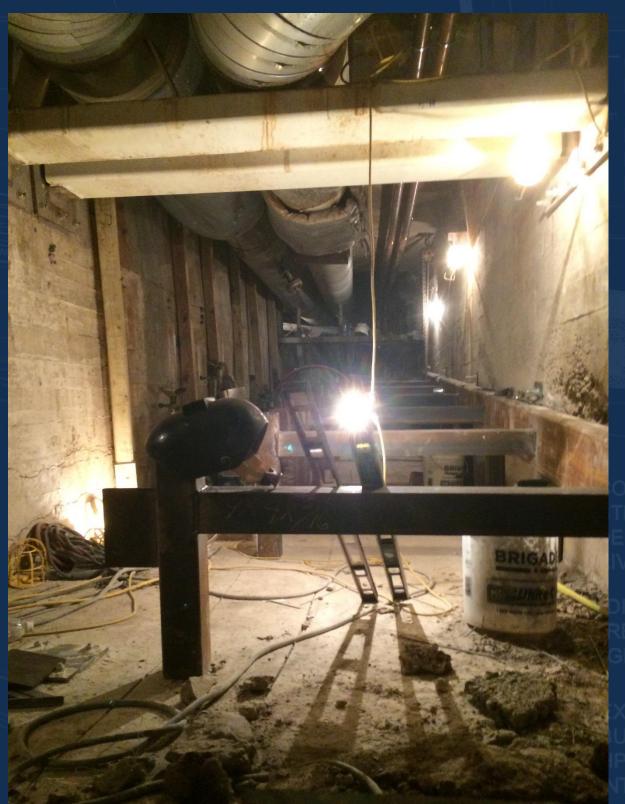
EXISTING 12" LF DIRECT BURIED STEAM RE-ROU TO BRIDGE ABUTMENT VAL

INSTALL NEW 20 LPS, 12" HPS, AN 12" CONDENSAT IN EXISTING PRECAST TUNN

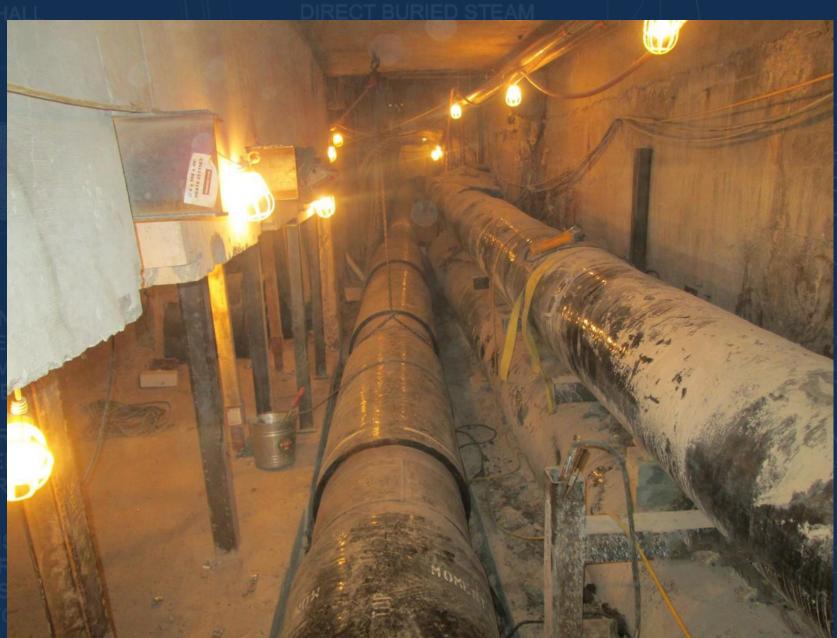
NSTALL BULKHEAD AT GRAND AVENUE TUNNEL

# **Preventing Collapse During Construction**





6" HIGH
PRESSURE
STEAM TO
HILLCREST
DINING



### **Installing Pipe in Short Sections**

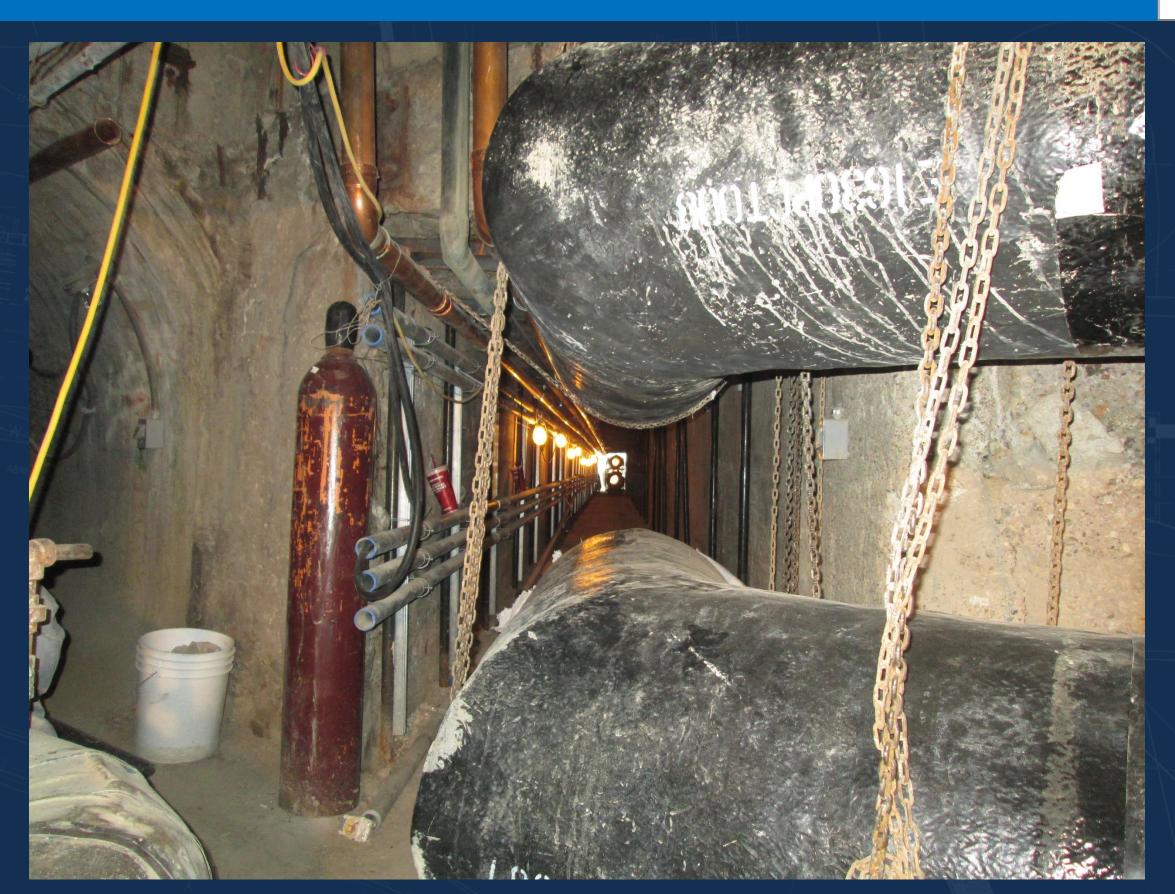




– INSTALL BULKHEAD AT GRAND AVENU TUNNEL

### **Contractor Innovations**





EXISTING 12" LP DIRECT BURIED STEAM RE-ROU' TO BRIDGE ABUTMENT VAU

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INSTALL BULKHEAD AT GRAND AVENU TUNNEL

#### **Contractor Innovations**







DIRECT BURIED STEAM LINES IN EXISTING RIVERSIDE VAULT. GROUT SOLID. SEE SHEET S1.01 AND S1.02 FOR MORE DETAILED INFORMATION.

EXISTING 12" LI
DIRECT BURIEL
STEAM RE-ROU
TO BRIDGE
ABUTMENT VAI



### **Effective Waterproofing**





DIRECT BURIED STEAM
 LINES IN EXISTING

DIRECT B REMOVE GRAND A

EXISTING
BURIED 16
HPS TO RI



BULKHEAD AT GRAND AVENUI TUNNEL

#### Value of Existing Information and Coordination



- Bid Amount = \$8.461M
- Change Orders for Unforeseen = 2.0%
- Change Orders for Phase 2 = 2.6%



# Questions?





EXISTING 12" LF DIRECT BURIED STEAM RE-ROU TO BRIDGE ABUTMENT VAL

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INSTALL BULKHEAD AT GRAND AVENU TUNNEL