

The background of the left side of the image is a photograph of the Austin skyline, featuring several tall skyscrapers. In the foreground, there is a concrete wall and a paved area. On the paved area, there are several concrete repair projects, including a large star-shaped patch with the word "AUSTIN" and a star inside it, and another patch with the word "BRAUN" and "250 MILES" inside it.

# Keep Concrete Weird

## UNUSUAL PROJECTS



# 2025 **SPRING CONVENTION**

**AUSTIN, TEXAS • APRIL 13 – 16, 2025**

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# Concrete Repair or Artwork Conservation? – The Whispering Bench

Matthew Sherman, P.E., F.ICRI  
Senior Principal  
*Simpson Gumpertz & Heger, Inc.*

Guy Battaglia  
Operations Manager  
*Reg Hough*



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# Safety Minute – Winter Heat

- Can produce CO and CO<sub>2</sub>
- Consume O<sub>2</sub>
- Fire Hazard
- Keep clear of flammables
- Store fuel separately
- Fire watch as appropriate



# Learning Objectives

- Understand how evaluation (3-D scanning, material testing) allowed maximum retention of original materials while providing for future serviceability of the bench.
- Examine the use of cleaning and repair mockups and trials for meeting aesthetics of restoration.
- Demonstrate the use of artistic and special techniques in conservation projects.
- Learn how integration of concrete repairs, landscaping, and provenance can improve the owner and user experience with outdoor spaces.

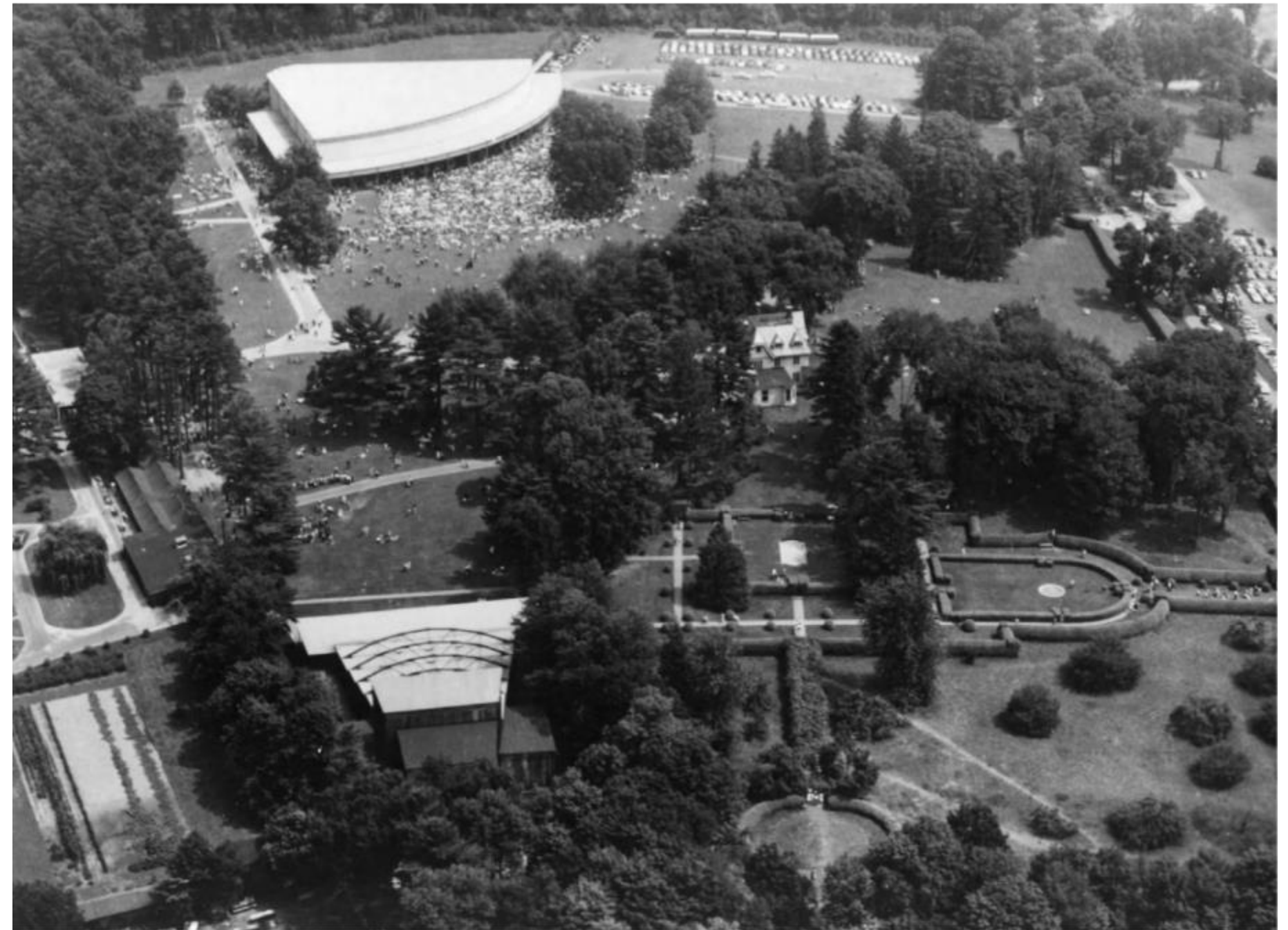
## *Live Content Slide*

*When playing as a slideshow, this slide will display live content*

**Poll: What interests you the most about this project?**



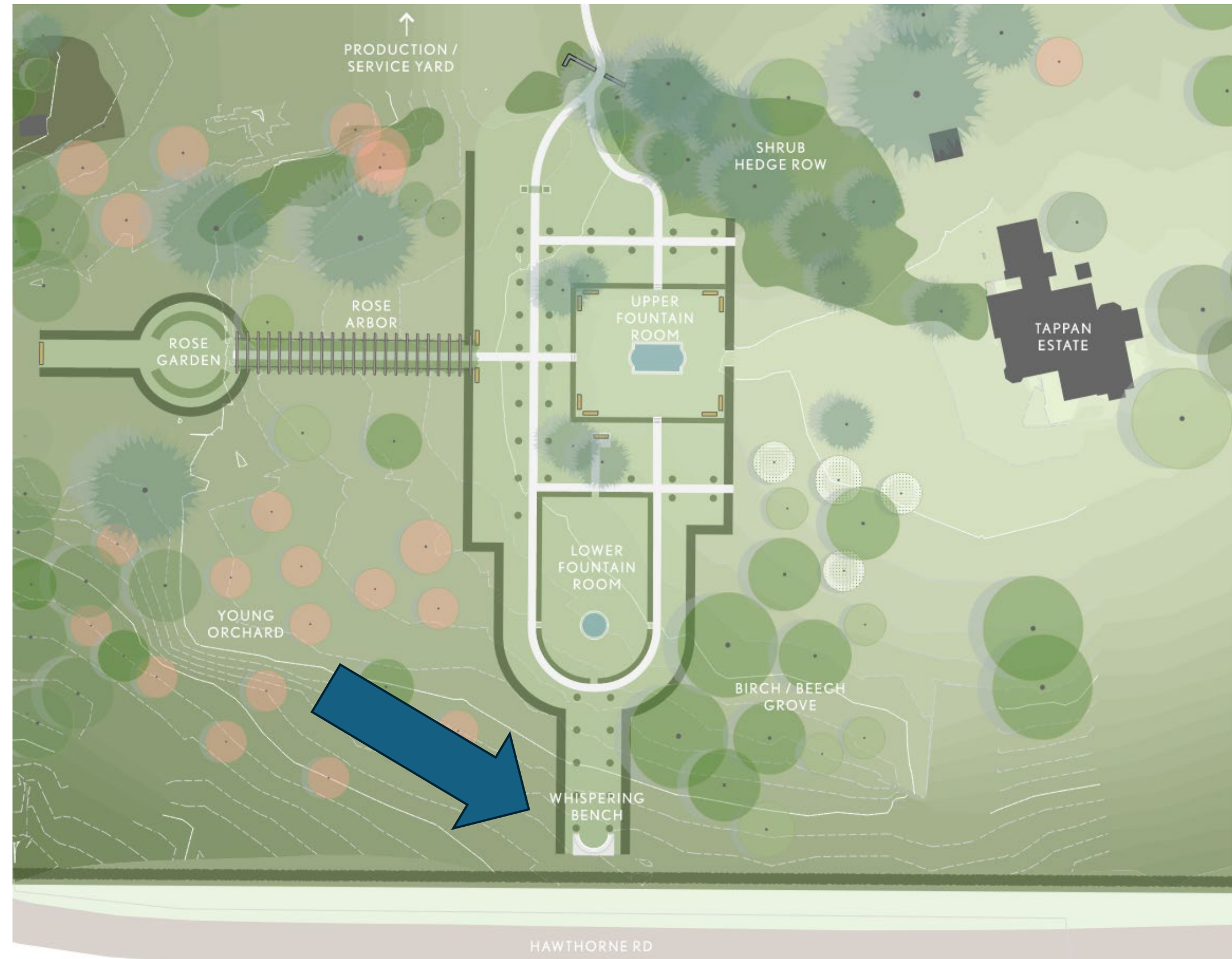
- Boston Symphony Orchestra's summer home
- Established in 1936 with the donation of the Tappan family estate
- Annually draws over 350,000 visitors to experience its concerts, teaching, and events





# Gardens

- Built in early 1900's by original owner
- Whispering Bench formed one of the anchor points

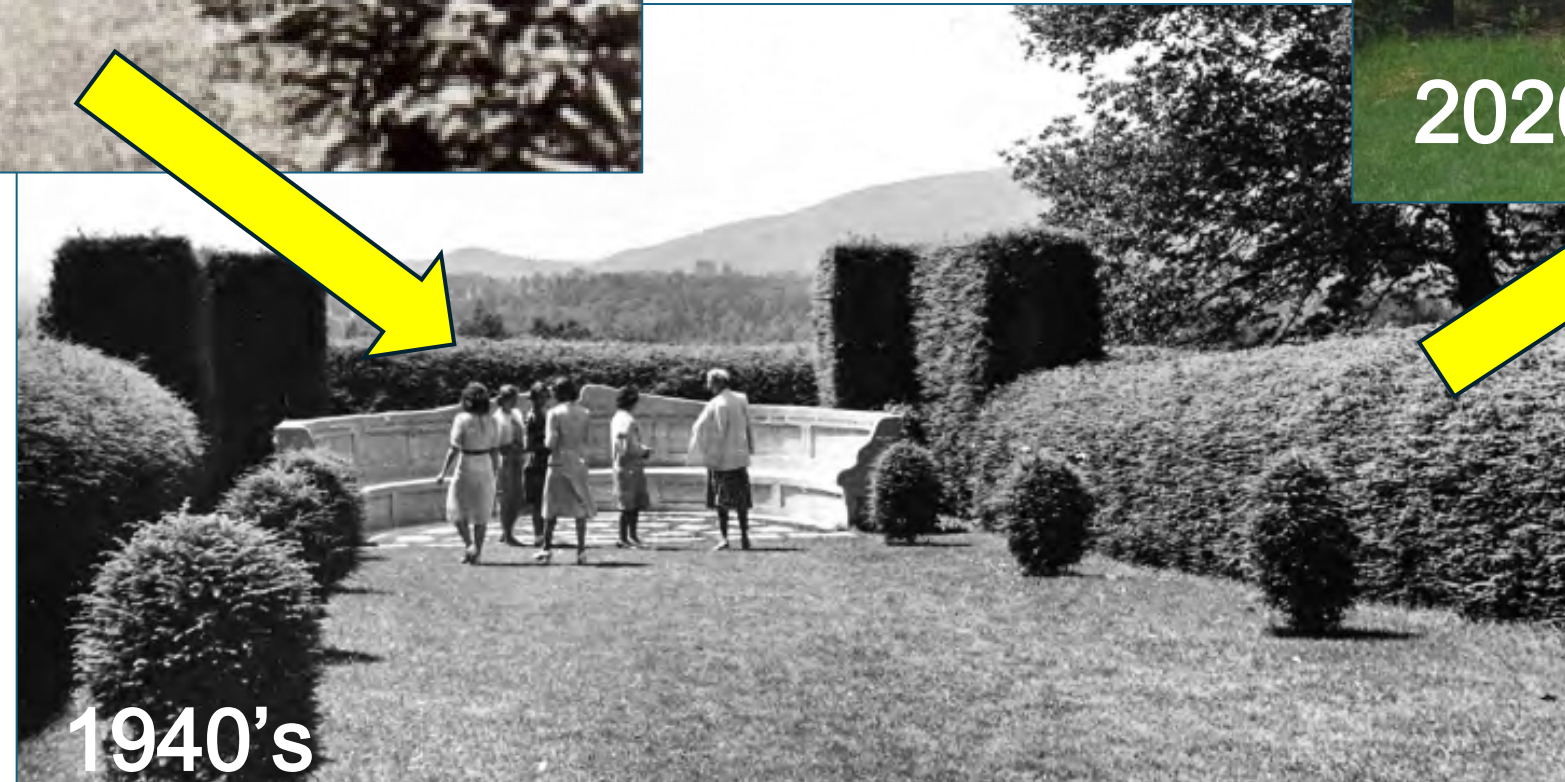
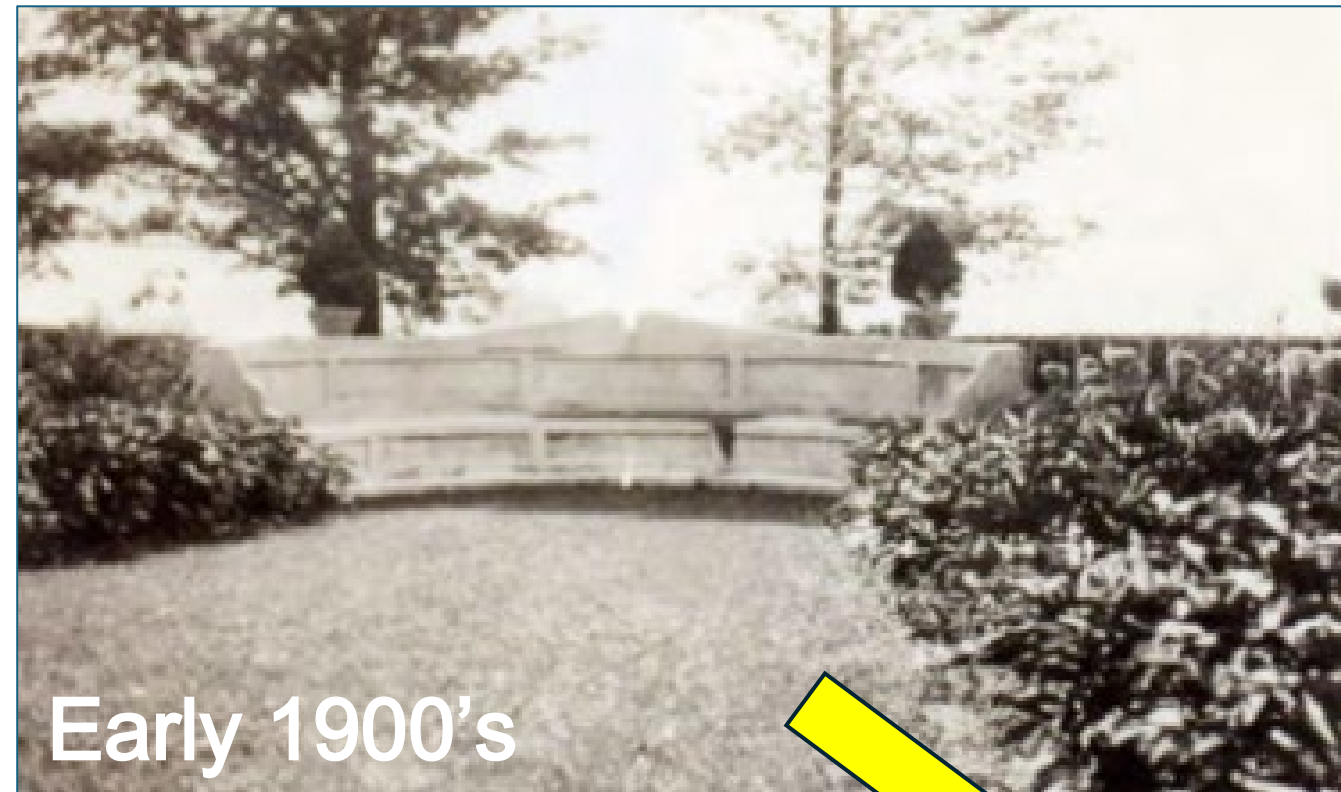


- Little is known about the construction of the bench
- Designed to amplify sound, allowing a whisper spoken into one end to be clearly heard at the opposite end.





# Gardens





# The Vision for the Garden



Images by Reed Hilderbrand & Tanglewood



# Understanding the Situation

- Garden and building project was in planning – this could be a visible focal point
- Needed completion by late spring for opening
- Did not want a “patched” appearance
- An alternate, new bench was being considered





# Field Investigation

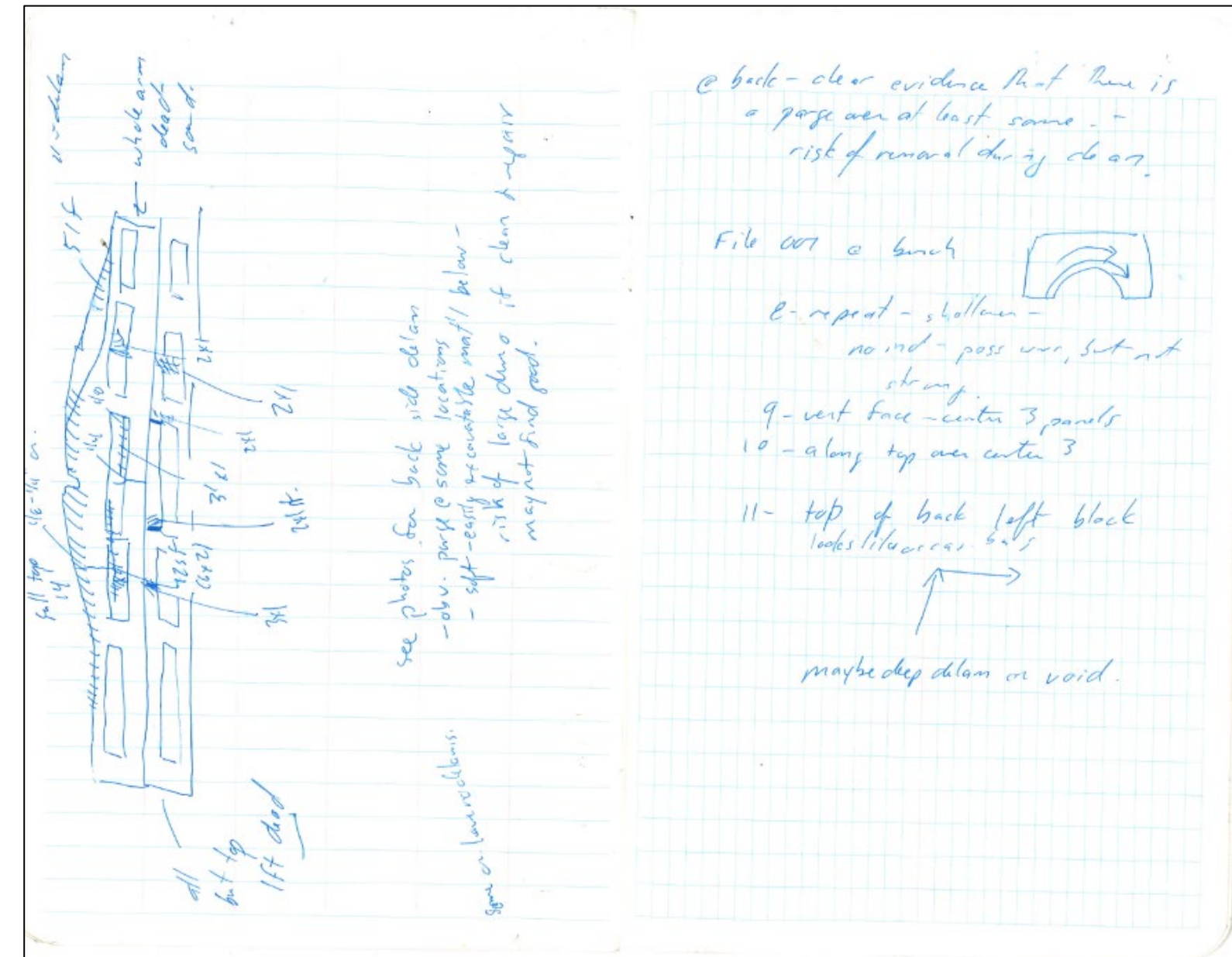
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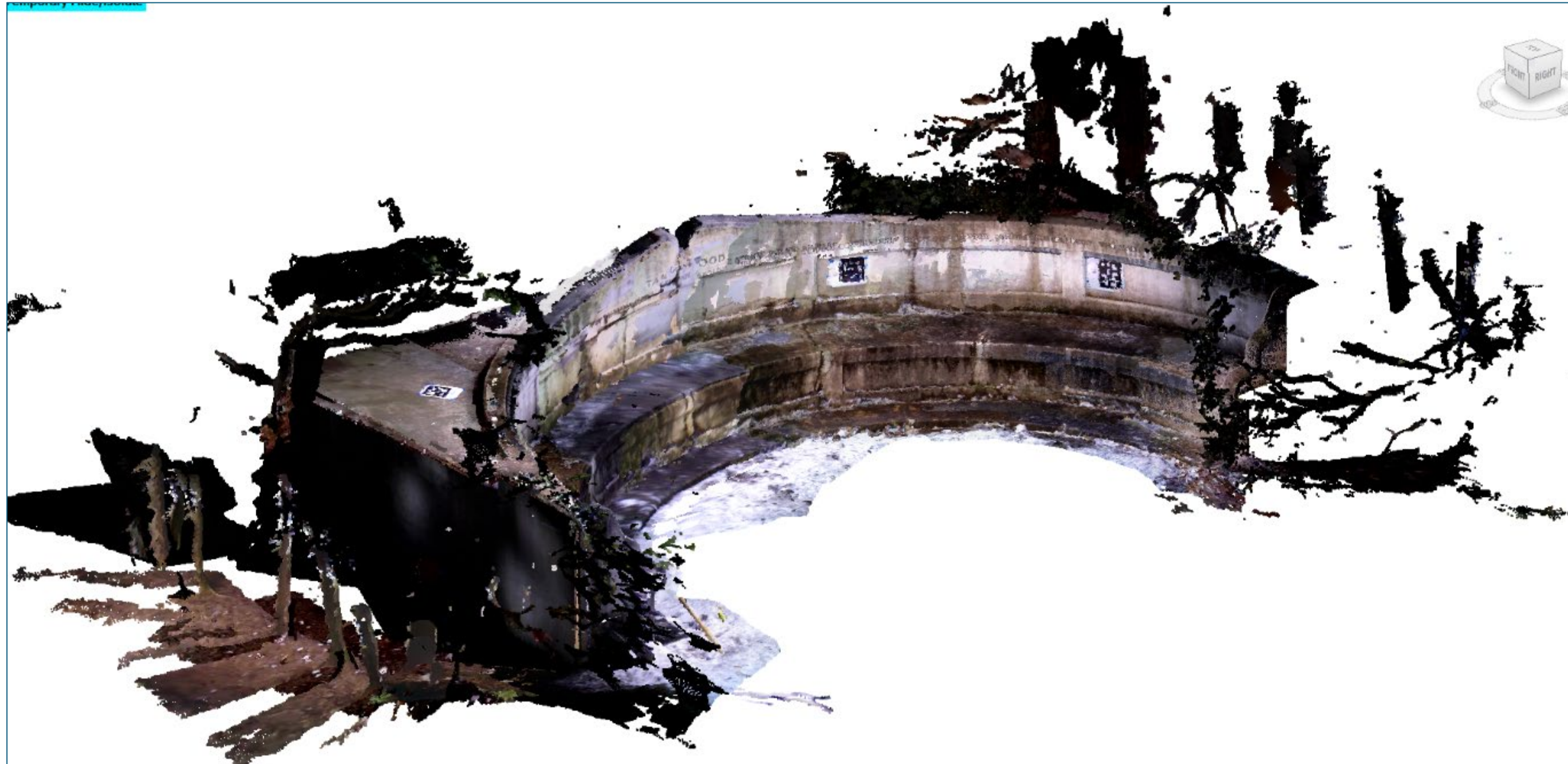


# Field Investigation - Initial

- Initial scoping to determine overall conditions and feasibility of repair
- Hammer sounding showed many areas as “dull” and “dead”
- 3-D scanning to support imaging and planning



# [Field Investigation - Scanning





# [Field Investigation - Scanning



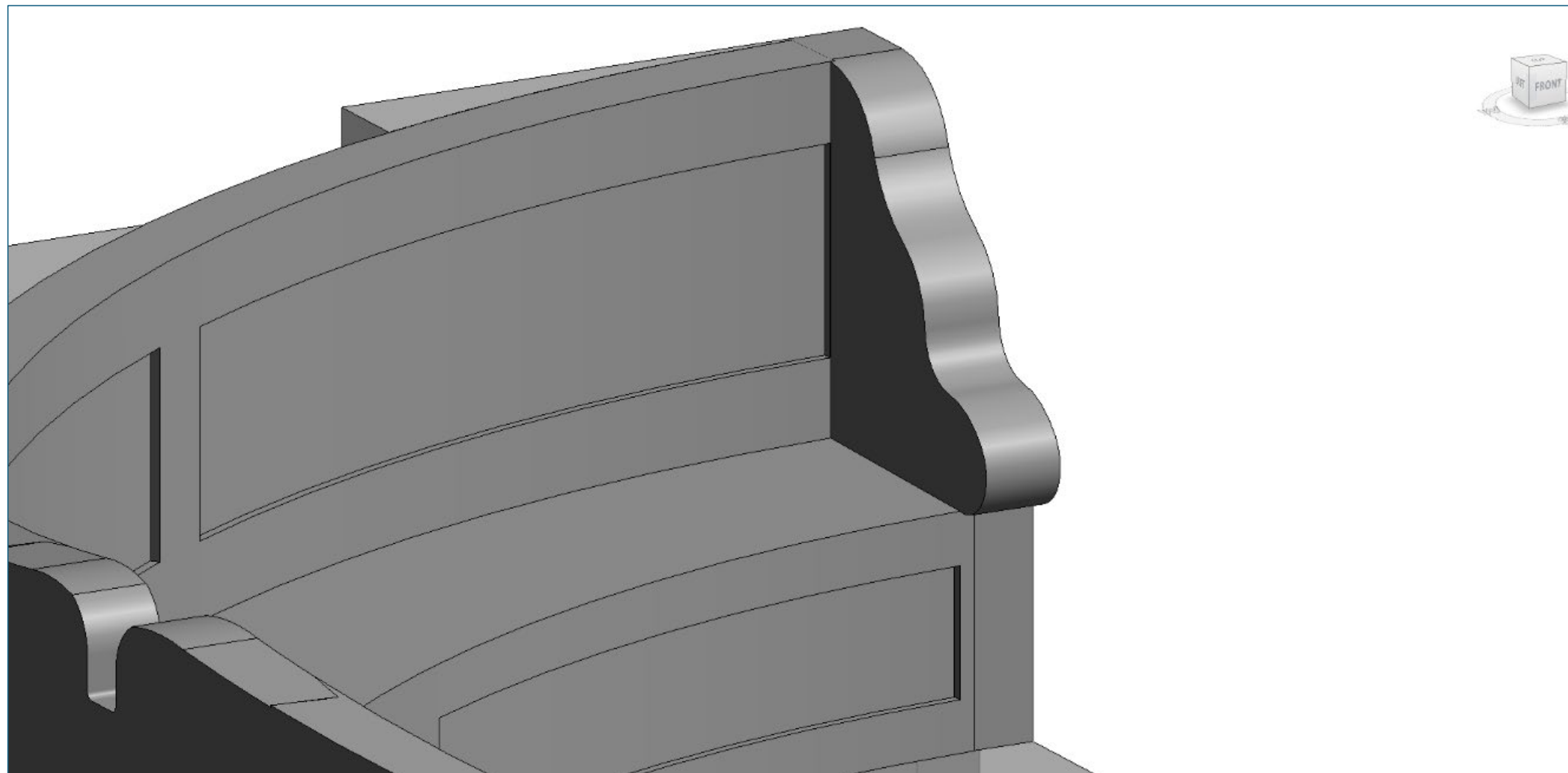


# [Field Investigation - Scanning

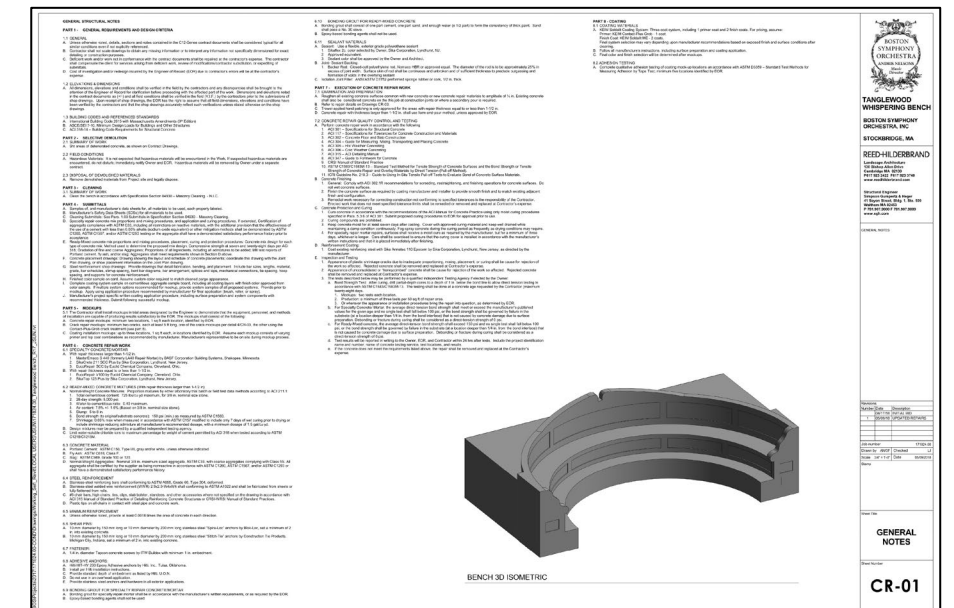
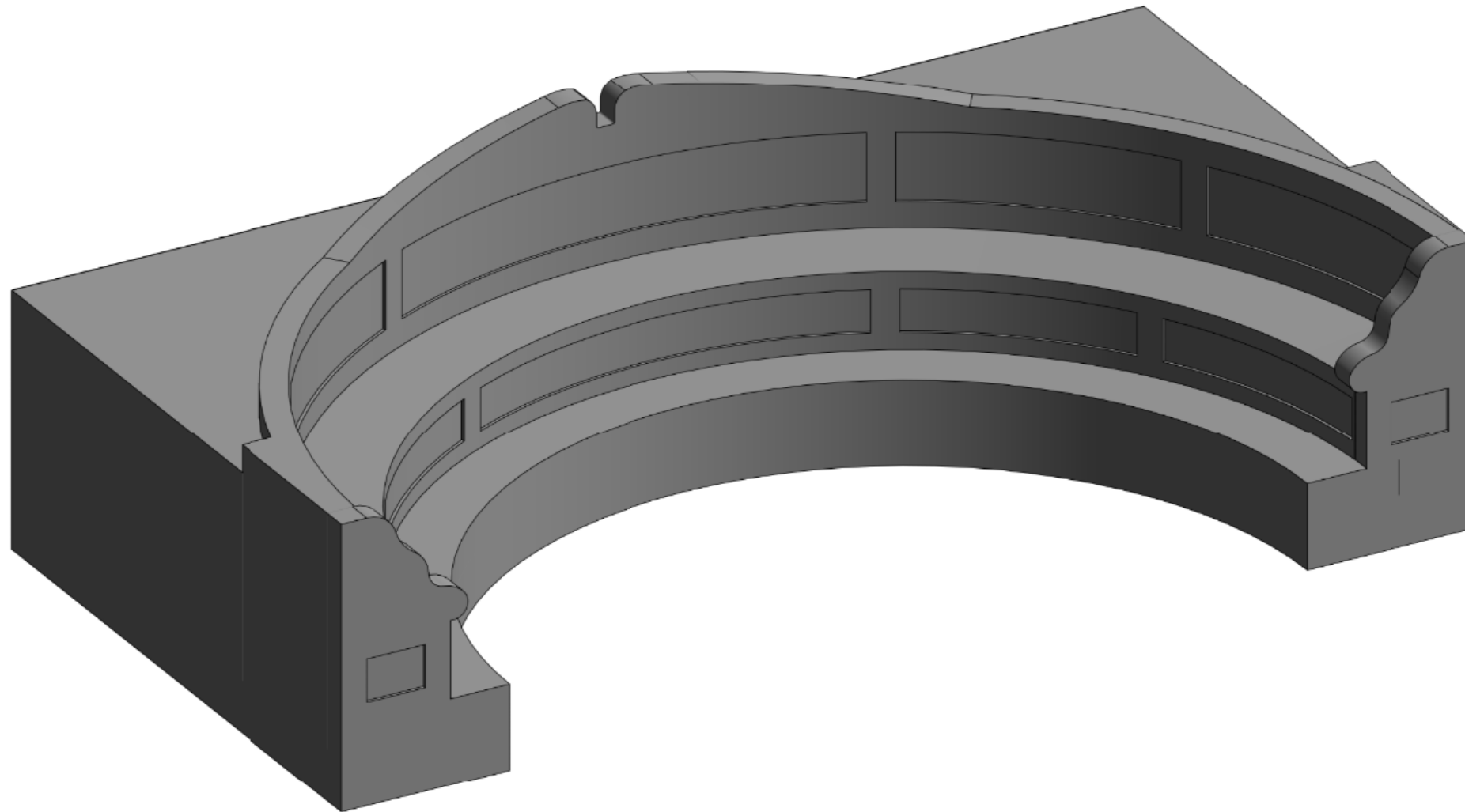




# [Field Investigation - Scanning



# [Field Investigation - Scanning





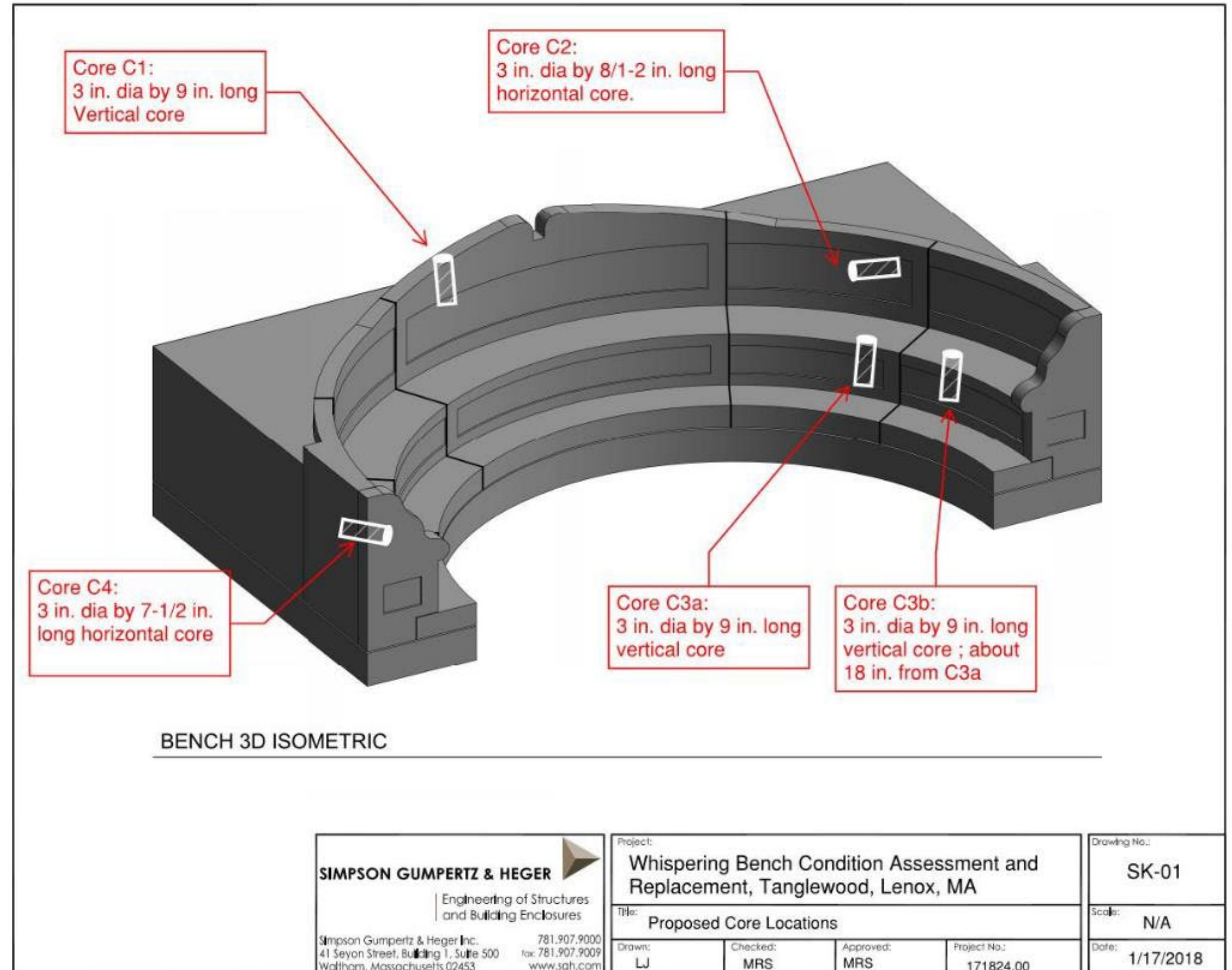
# Field Investigation - Sampling

- Understanding internal conditions and cause(s) of distress critical
- Cored from areas of different performance to understand initial and current conditions
- Petrography to evaluate
- Samples served as basis for go/no-go decision on restoration



# Field Investigation - Sampling

- Used initial visit as basis
- Removed four 3-in. dia. cores from different areas
- Installed partial depth patches





# Field Investigation - Sampling

- Multiple materials and layers
- Prior patches
- Unusual materials
- Isolated honeycombing
- Generally sound underlying material





# Laboratory Testing

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# Laboratory Testing - Petrography

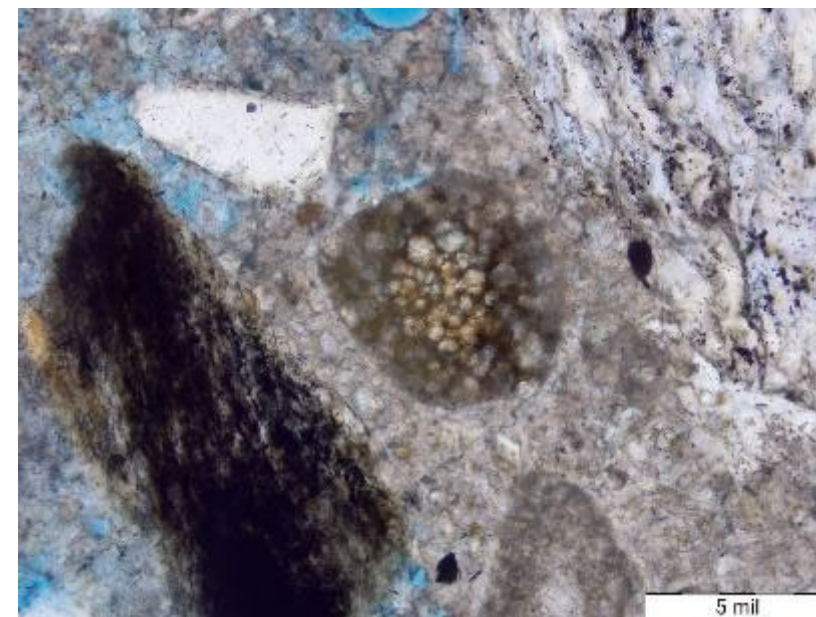
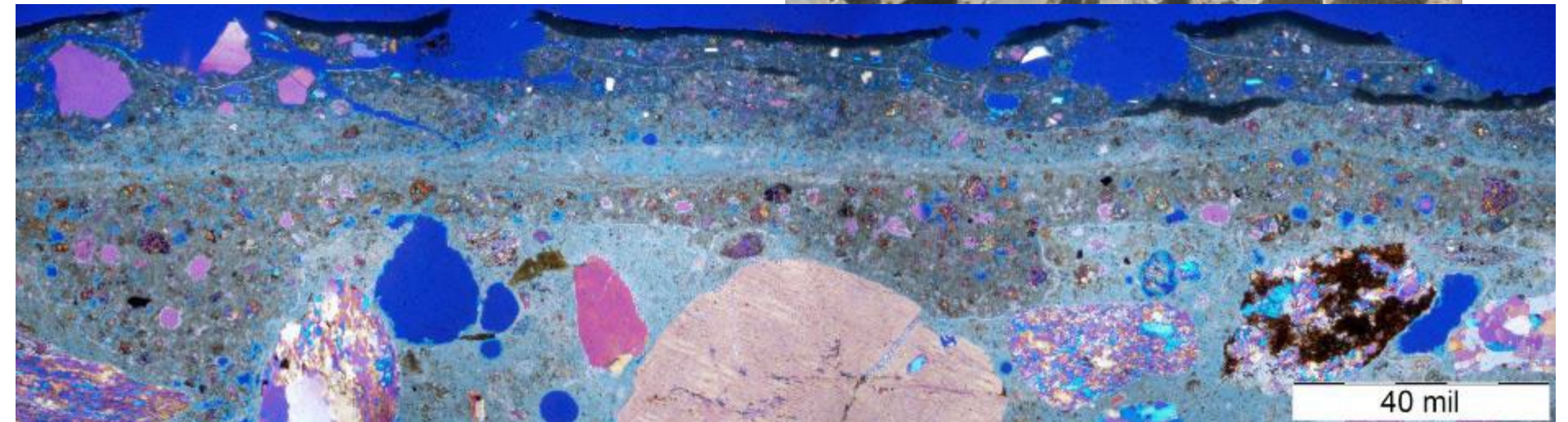
- Damage from cyclic freezing and thawing in outermost concrete
- No air entrainment
- Very large aggregates
- Multiple repair materials
- Generally sound at deeper areas
- Multiple colors





# Laboratory Testing - Petrography

- No internal distress mechanisms such as ASR, sulfate attack, or DEF
- Large cement particles
- 0.40 to 0.50 w/cm
- Multiple layers of cementitious and polymeric coatings





# Decision Time!

**Table 1 – Repair/Replacement Options**

Attribute	Repair	Replace with Cast-In-Place Concrete	Replace with Precast Concrete	Replace with Stone
Strategy	Repair currently deteriorated material and stabilize remaining material	Replace with new bench built using the same approach as the original	Replace with new bench built off-site and placed on new foundation	Replace with new bench built from stone and placed on new foundation
Summary of	Rout and seal all cracks	Remove existing bench to	Remove existing bench to	Remove existing bench to

Attribute	Repair	Replace with Cast-In-Place Concrete	Replace with Precast Concrete	Replace with Stone
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	Can be performed over-winter in enclosures	Can be performed over-winter in enclosures	Foundation under local control	
Relative Cost	\$\$	\$\$\$	\$\$\$\$	\$\$\$\$\$
Advantages	Maintains existing geometry and effect nearly perfectly	Retains local control of schedule and costs Very similar appearance to existing, but new Best match to existing geometry (via templating)	Best color and texture control Built indoors under stricter QA/QC	Replaces bench with very durable material
Disadvantages	Does not provide a “like-new” condition Fundamentally vulnerable material remains Requires preemptive work to prevent future exposure	Color and texture match will be difficult, possibly requiring an aesthetic coating Requires over-winter outside construction	More detailing and design required at start to match existing precisely	New “look” to bench Unknown effect on acoustics of bench May require reconfiguration of back block of bench
Main Risks	Repairs could greatly increase in scope and extent to find a sound substrate to which to attach repairs	Will require winter construction, with associated weather-related risks Schedule risk due to mockup sample review process	Dependent on precaster to meet schedule, with limited potential to accelerate	Understood to be very long lead times

# Decision Time!

- Findings indicated that repair and restoration was possible
- Met hopes and desires of the Owner
- Maintained much of original fabric and avoided demolition
- Some portions were too far gone to repair (mainly the “headrest” and part of back “ledge”)
- Would require careful restoration, continued protection, and ongoing maintenance.





# Repair Design

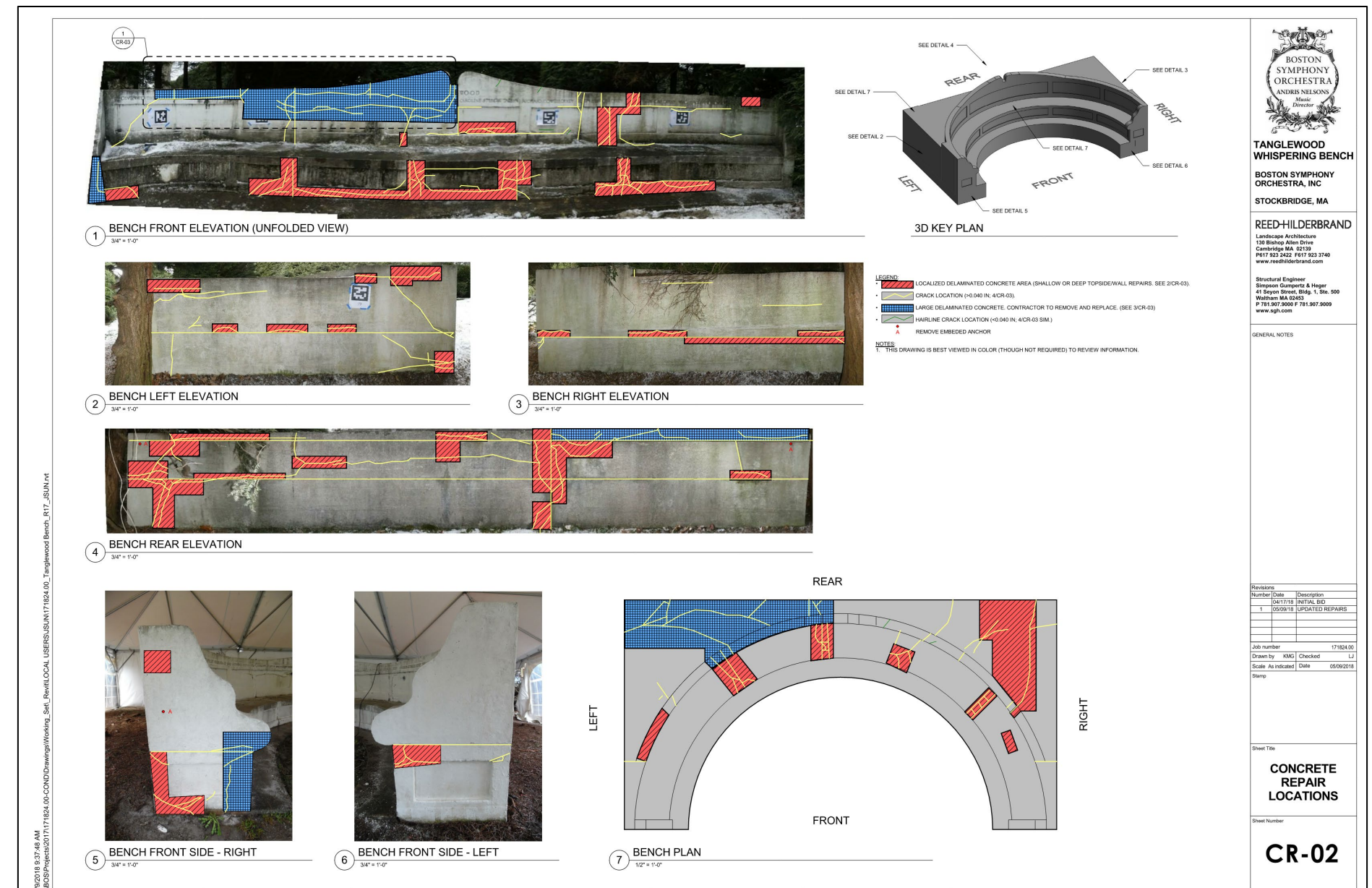
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# Repair Design Parameters

- Maintain as much of the original fabric as possible
- Protect material to remain
- Durable, long-term repairs
- Breathable coating to restore original aesthetic and protect material to remain
- Program of wintertime protection and periodic coating maintenance



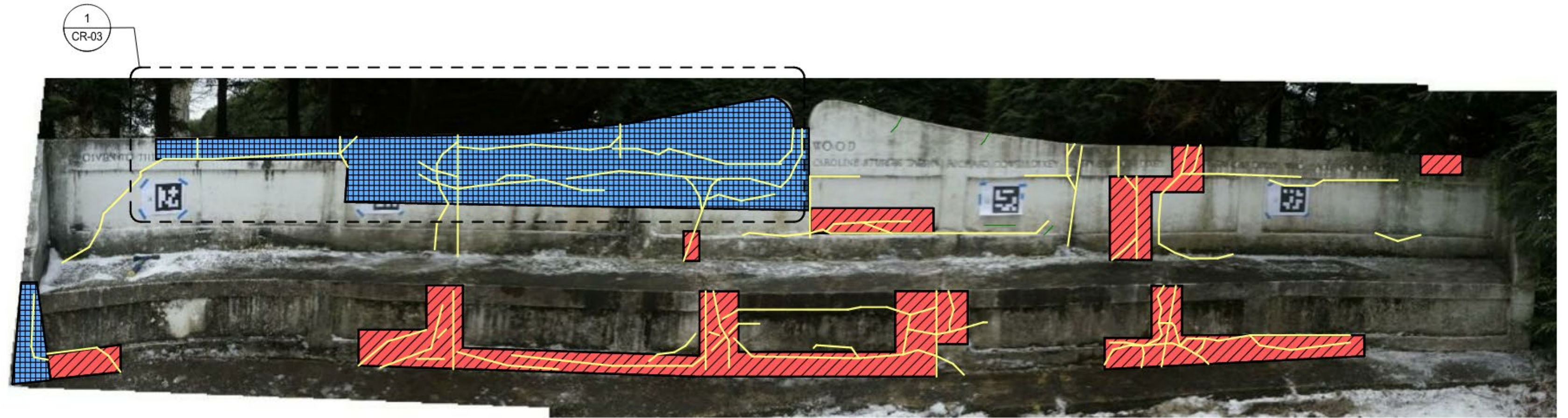
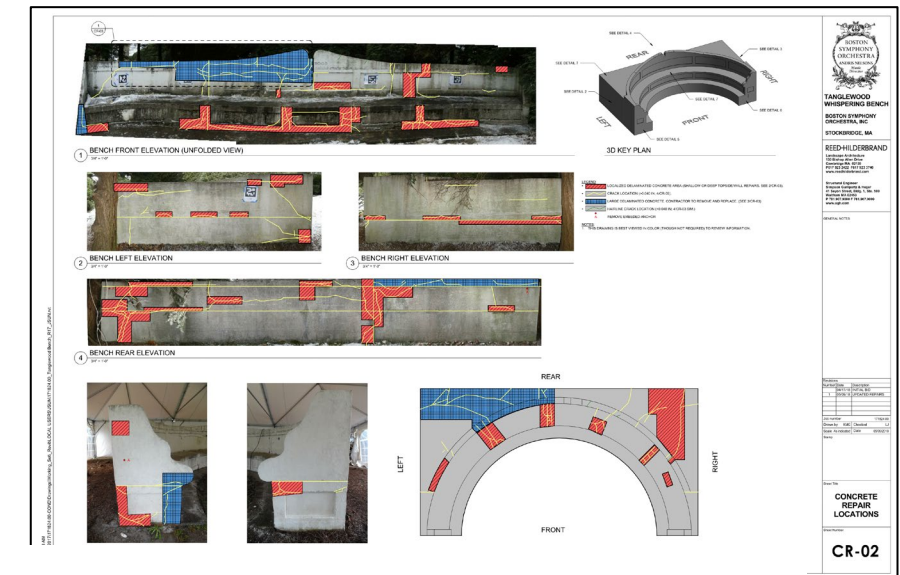


# Repair Design – Methods & Materials

- Demolition
  - Selective demolition of worst areas.
  - Selective removal of f/t damaged near-surface concrete
- Cleaning
  - Progressive system of steam, chemical, and water
- Stainless steel reinforcement
- Concrete
  - Max. cement content
  - SRA
  - 0.40 max w/cm
  - Air entrainment
- Breathable 3-layer mineral coating for protection



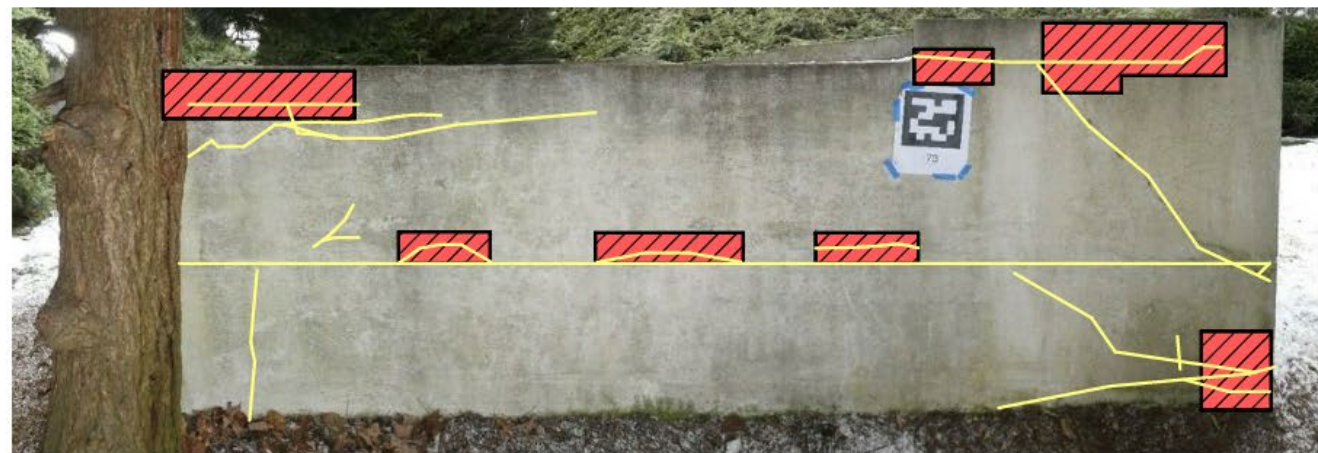
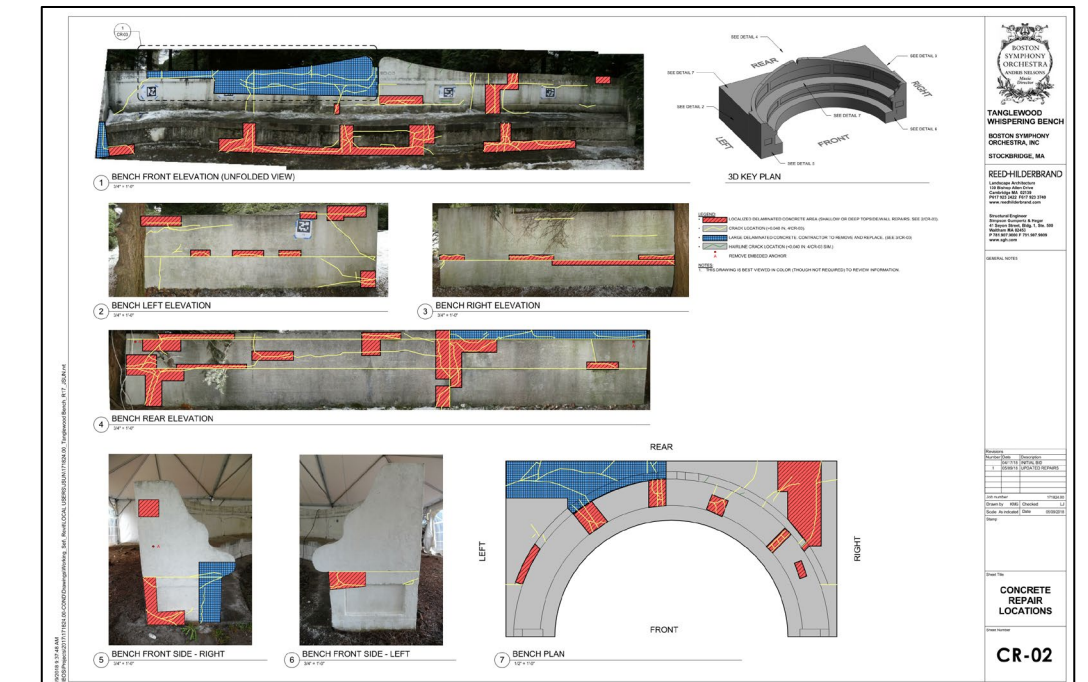
# Repair Drawings



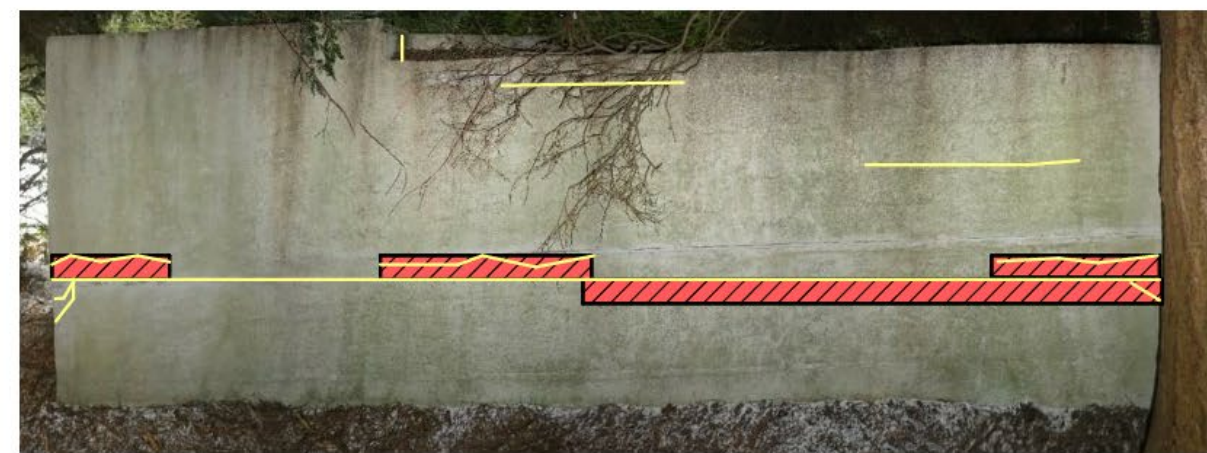
1 BENCH FRONT ELEVATION (UNFOLDED VIEW)  
3/4" = 1'-0"



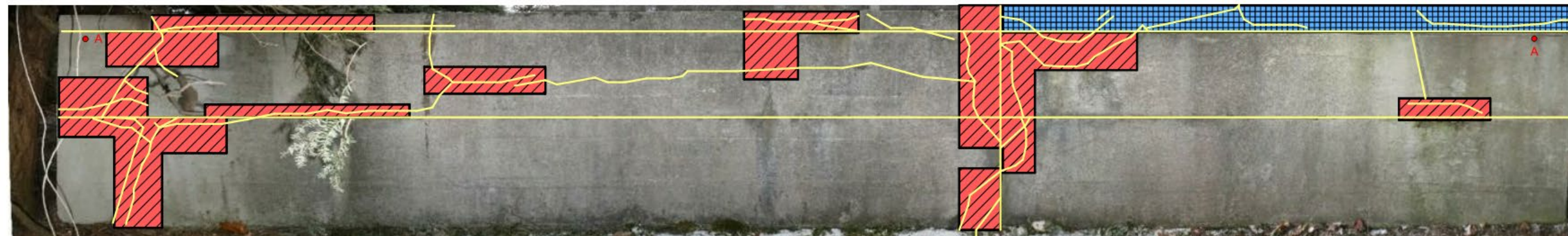
# Repair Drawings



2 BENCH LEFT ELEVATION  
3/4" = 1'-0"



3 BENCH RIGHT ELEVATION  
3/4" = 1'-0"

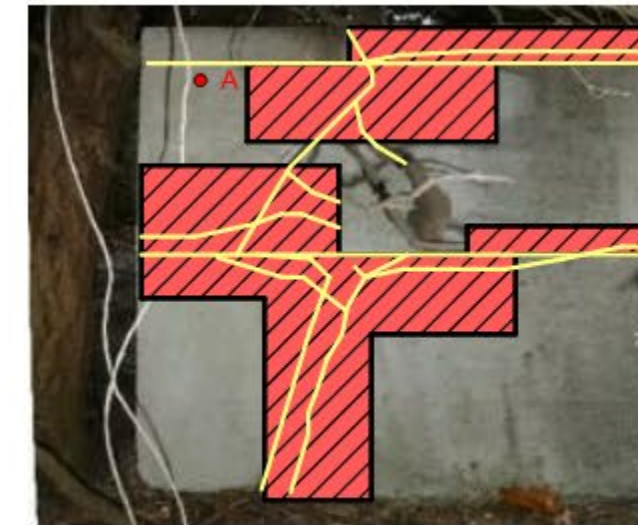
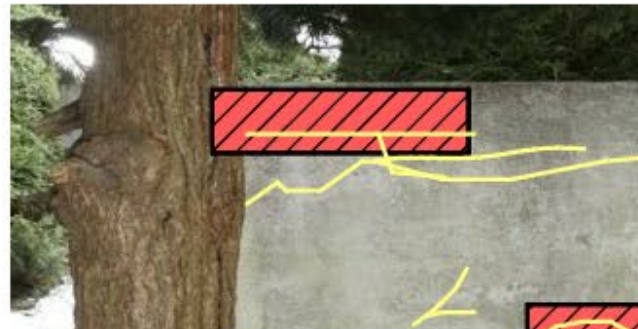
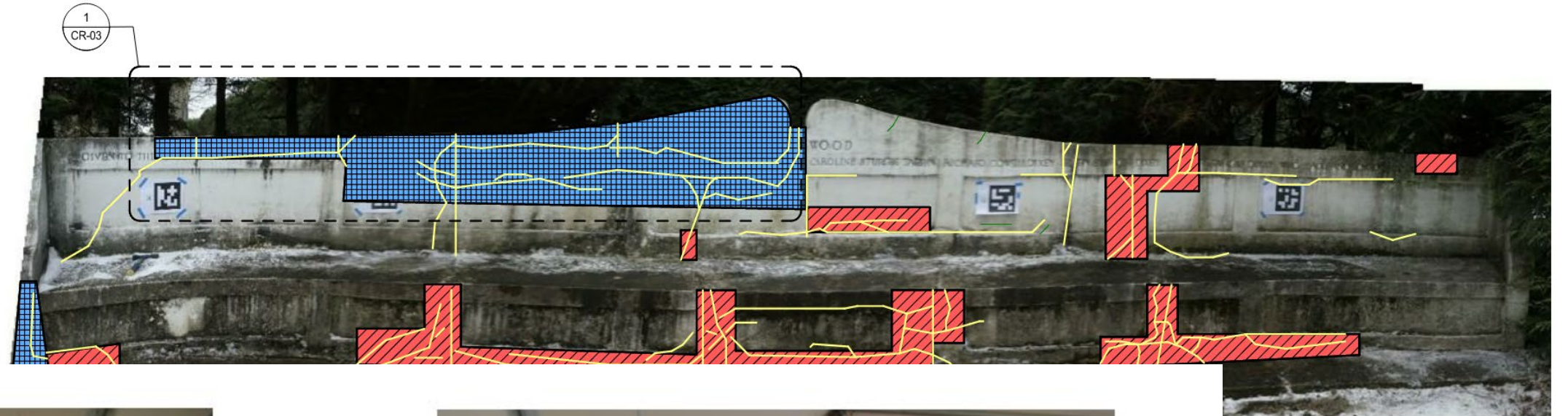


4 BENCH REAR ELEVATION  
3/4" = 1'-0"

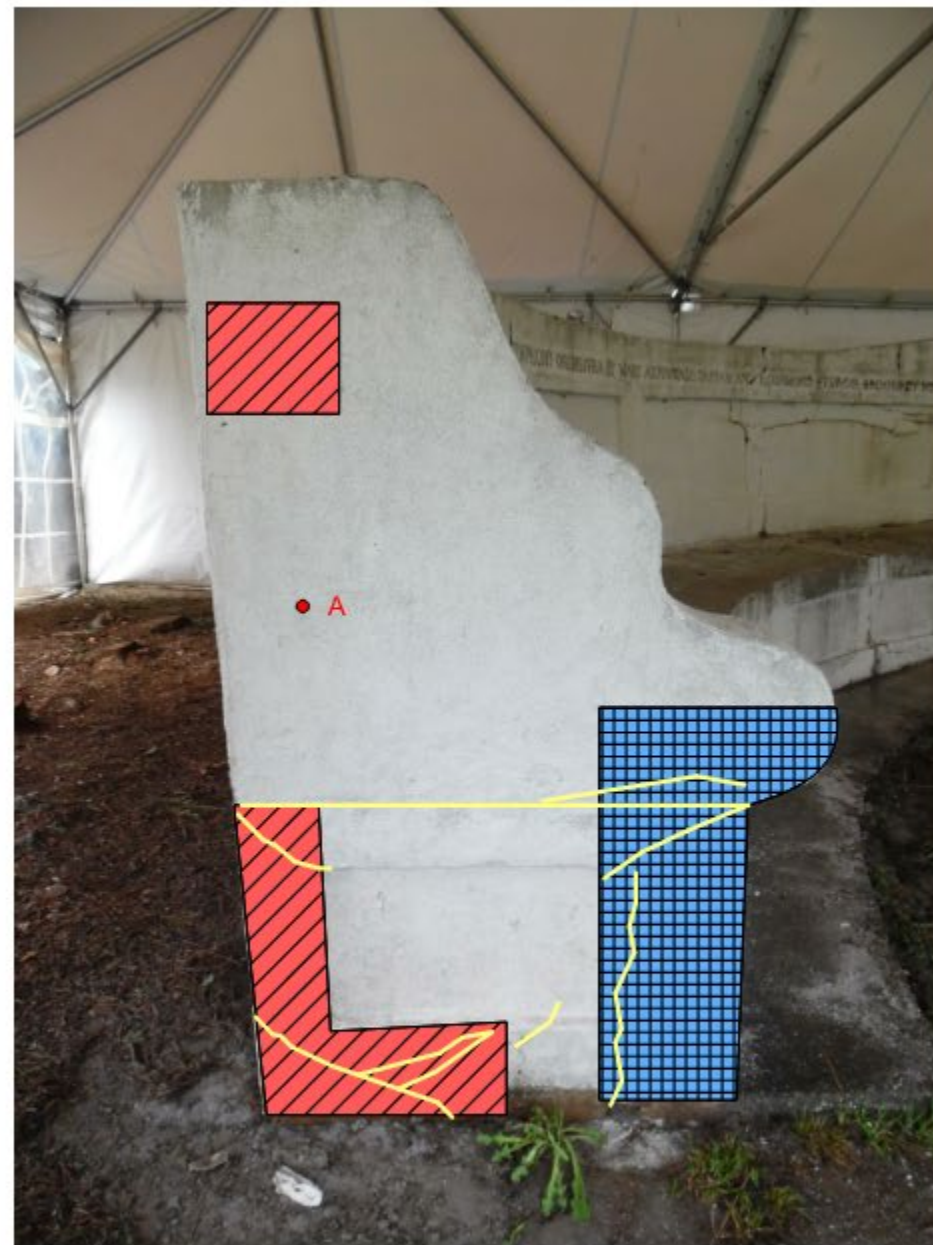


# Repair Dr

• [title]



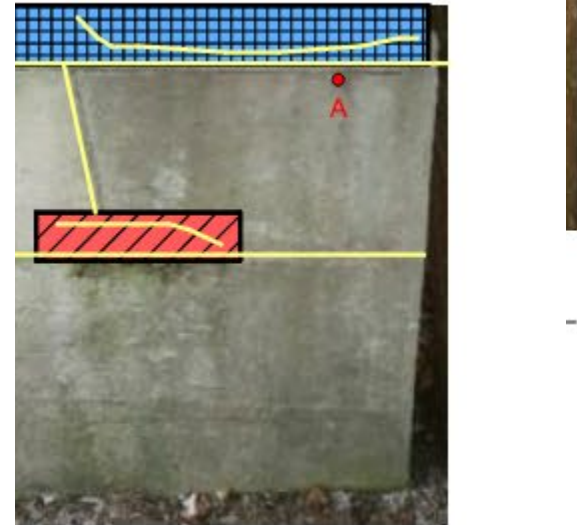
4 BENCH REAR ELEVATION  
3/4" = 1'-0"



5 BENCH FRONT SIDE - RIGHT  
3/4" = 1'-0"



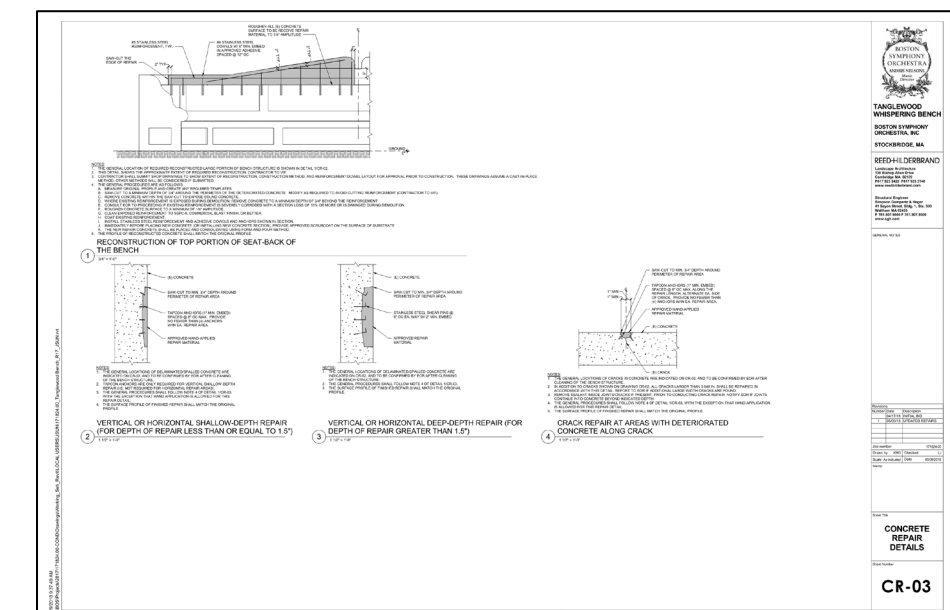
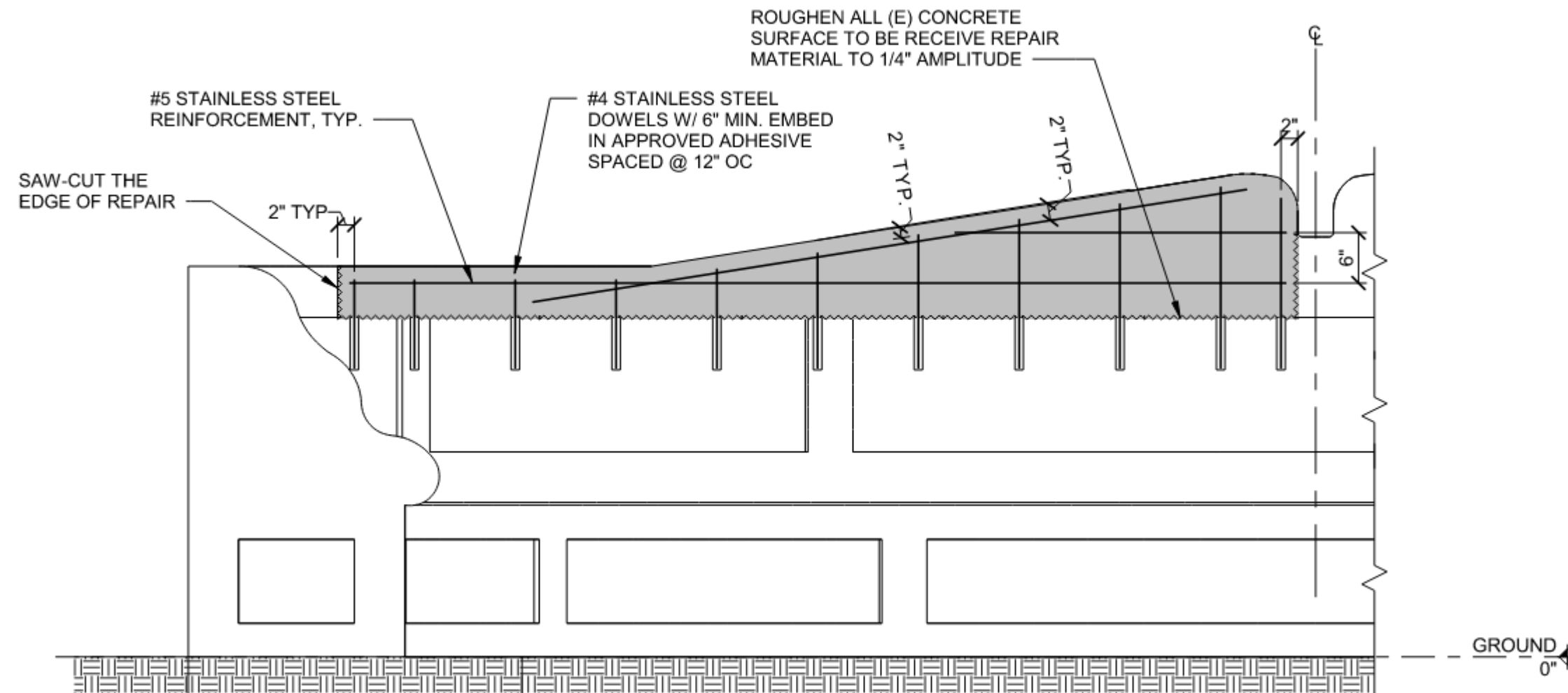
6 BENCH FRONT SIDE - LEFT  
3/4" = 1'-0"



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# Repair Drawings







# Construction

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# Construction - Overall

- Done in winter – full “event tent” enclosure
- Supplemental heating was a considerable concern
- Required multiple mockups, trials, and testing
- Skilled craft workers
- Material supplier support





# Cleaning Trials

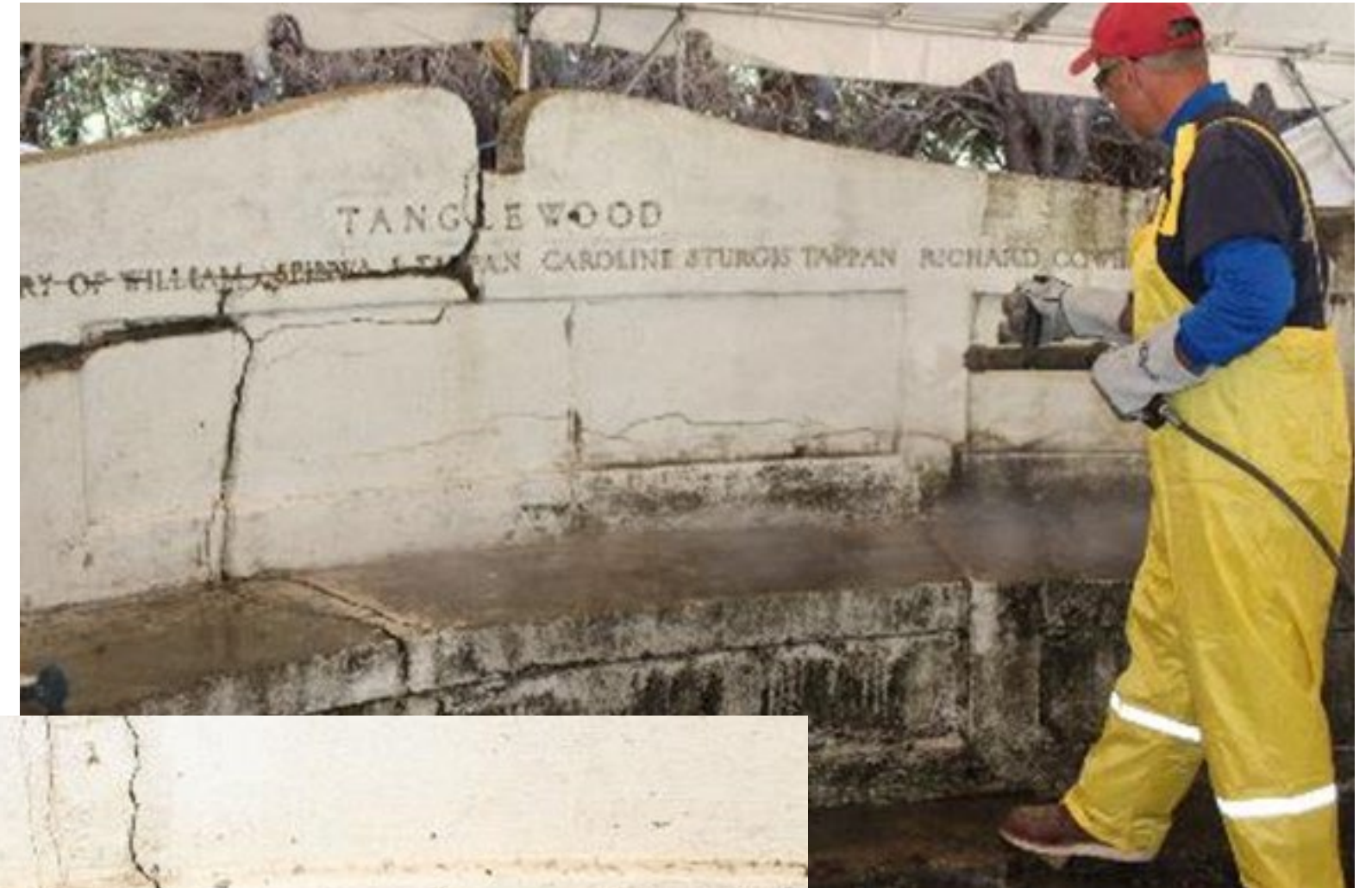
- Chemical cleaning mockup





# Cleaning Trials

- Chemical cleaning mockup
- 200 psi and hot water
- 1000 psi and 140° water





# Cleaning Trials

- Chemical cleaning mockup
- 200 psi and hot water
- 1000 psi and 140° water
- 1400 psi appeared to pit the concrete





# Cleaning

- Final procedures removed deteriorated coating and damaged concrete, but left sound material
- Required a high level of craft skill and care



# Cleaning

- Overall cleaning went well





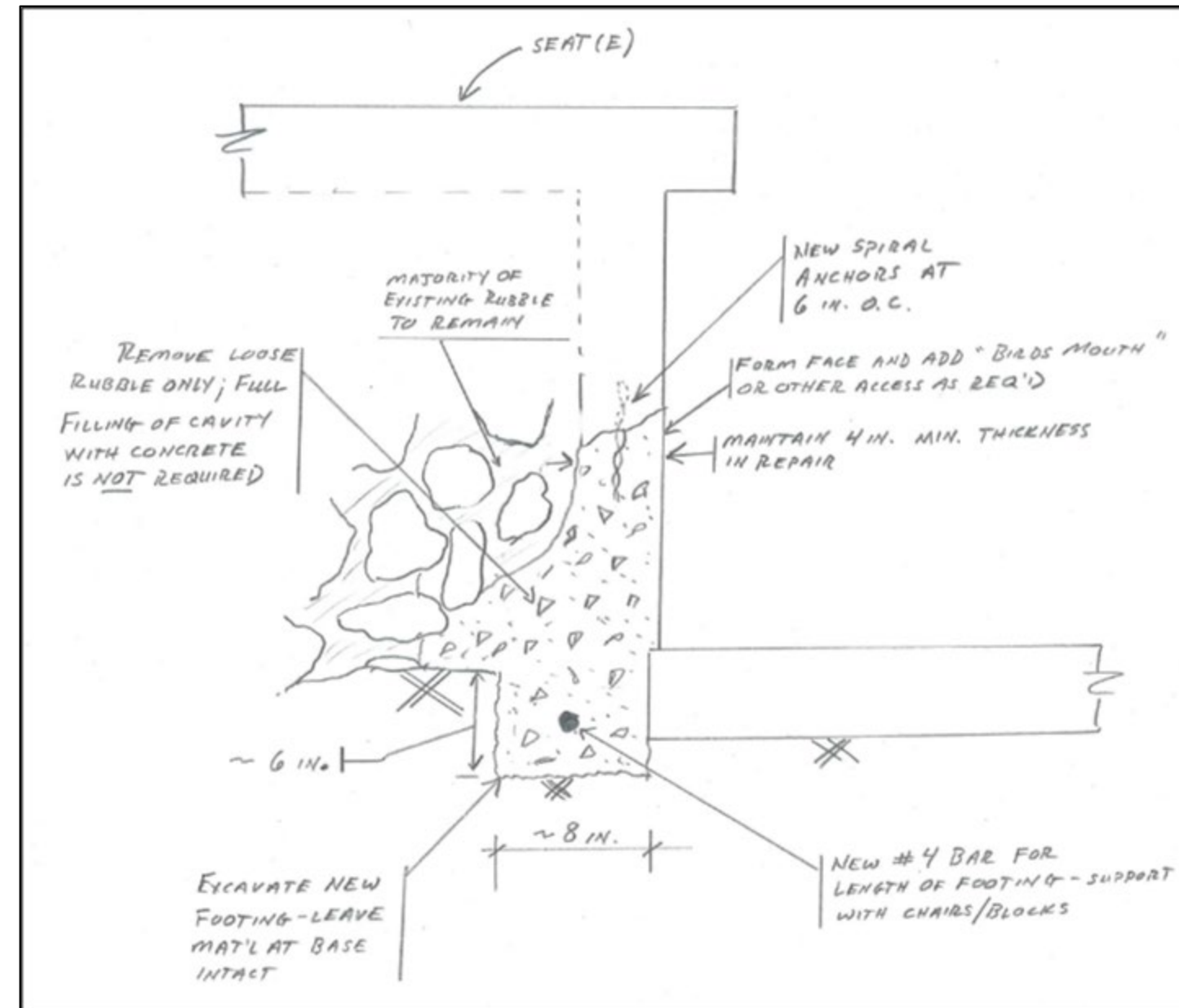
# Cleaning

- About that lettering...
- Lettering was first stenciled
- Cast letters were removed, cleaned, & repaired
- A local artist was hired to custom-cast some new bronze letters due to damage



# Repairs – First Snag...

- Early preparation at base of bench revealed that the base was hollow and rubble-filled
- Additional site visit to review situation
- Drawings updated to reflect actual situation





# Repairs

- Standard preparation procedures
  - Saw cutting
  - Light chipping guns
  - Cleaning





# Repairs

- Larger areas prepared using heavier equipment
- Followed by lighter equipment to remove bruising





- Maximized retention of original material
- Removal was deeper at cracks and spalls





# Formwork

- Custom site-built formwork
- Curved to match bench profile
- Watertight where needed for form-and-pump





# Placement

- Large areas used direct placement





- Placement also used a mix of form-and-pour and hand applied repairs





# Finishing

- “Headrest” section placed and “carved” into shape while still plastic
- Shape recreated using tracing of original and to match remaining portion





# Coating

- Multi-coat mineral paint
- Allows some breathability
- Provides uniform color
- Supported by historic photographs









# Conclusions

- Materials testing and 3-D scanning provided understanding of the project and allowed maximum retention of original materials.
- Cleaning and repair mockups used to show possibility of restoration.
- Trade and Craft were able to use artistic and special techniques to great effect.
- Integration of the concrete repairs, landscaping, and provenance dramatically improved the owner and user experience.



# ANY QUESTIONS?

Also special thanks to:

Liying Jiang and Kyle Schusler who were key to SGH's work

Curt Fetzner who was Reg Hough's Lead Specialist on the project

Bobby Lahart and all the Tanglewood and BSO staff





# SESSION EVALUATION

## Resources

Evaluate this Session



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Under **Plan Your Event**, select Schedule, and then the Technical Session you are attending. Select the sub-session you are attending, scroll down to Resources, and select Evaluate this Session.



