The Design Process

From “What’s Wrong with My Building?” to “Open for Business!”

John Bennett and Amanda Brown

South Carolina State Historic Preservation Conference
SCDAH

April 24, 2026

Bennett
PRESERVATION
ENGINEERING PC

What We Do

We are a structural engineering firm that focuses exclusively on historic structures.

It is our job to evaluate and analyze historic buildings, and develop sensitive structural design solutions.

National Park Service jobs are highlighted in black boxes

What We Do

We have worked on several hundred structures built in the 17th through early 20th centuries.

The structures range from ruins to historic structures in regular use.

Over 25 are National Historic Landmarks, and many are listed on the National Register of Historic Places or are contributing to a listed historic district.

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Structural Engineering for Historic Buildings

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Structural Engineer

John S. Bennett, PE, SE
Structural Engineer

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Engineer in Training

Darcy Neufeld
Preservationist

Ege Arslaner
Graduate Engineer

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A Quick Poll

Does the word “procurement”
cause you to go into a cold sweat?

A Quick Poll

Do you enjoy writing grant proposals?

A Quick Poll

Have you had an HSR or condition assessment report completed on a building you own or steward?

A Quick Poll

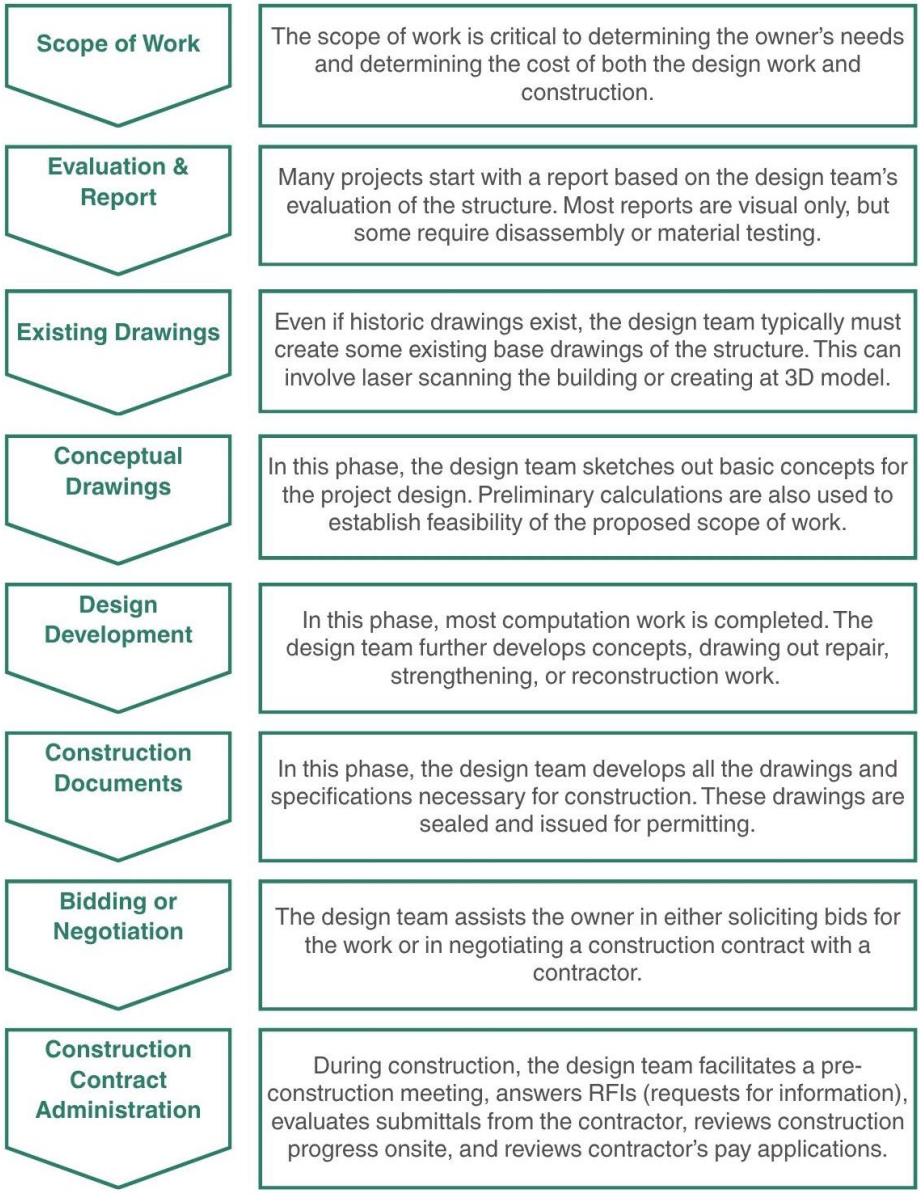
Are you getting ready to undertake a preservation project?

A Quick Poll

Are you familiar with the design process?

The Design Process

- Investigation and Report
  - Understand the Building
  - Define the Scope
- Construction Documents
  - Concept
  - Development
  - Construction Drawings
  - Material Specifications
- Bidding
  - Contractor Selection
- Construction



What is a "Design Process"? [broadly]

The architecture and engineering (A/E) design process is:

- The structured, step-by-step method that architects and engineers use to move a project from an initial idea to a buildable, functioning reality
- Blends creativity (architecture) with technical problem-solving (engineering)
- Ensuring that buildings are safe and responsive to client needs

What is a “Design Process”?

When speaking specifically to historic structures…

- The standard “design process” plus added layers of:
    - Preservation philosophy & sensitivity to historic fabric
        - Protecting, repairing & adapting what already exists
    - Historic research
        - Archival documents, historic photos, Sanborn maps, etc.
    - Documentation
        - Identifying character defining features
    - Regulatory compliance
        - Preservation guidelines & standards (Secretary of the Interior)
        - Building codes

What is a “Design Process”?

Is there a typical design process for my historic building?

What is a “Design Process”?

Is there a typical design process for my historic building?

- Spoiler… no!
- Historic structures are unique – every project is different, and that’s what we love about them!
  - Unique requirements
  - Unique materials
  - Unique geometries
  - Unique decay mechanisms

So many steps! Why should I go this route?

Why do we suggest working in this linear path?

- This benefits you as the client (and your building!) in the long run
- Before jumping headfirst into repair work, the flow of the design process allows your A/E team to understand…
    - Your building
    - Your goals
    - Your concerns

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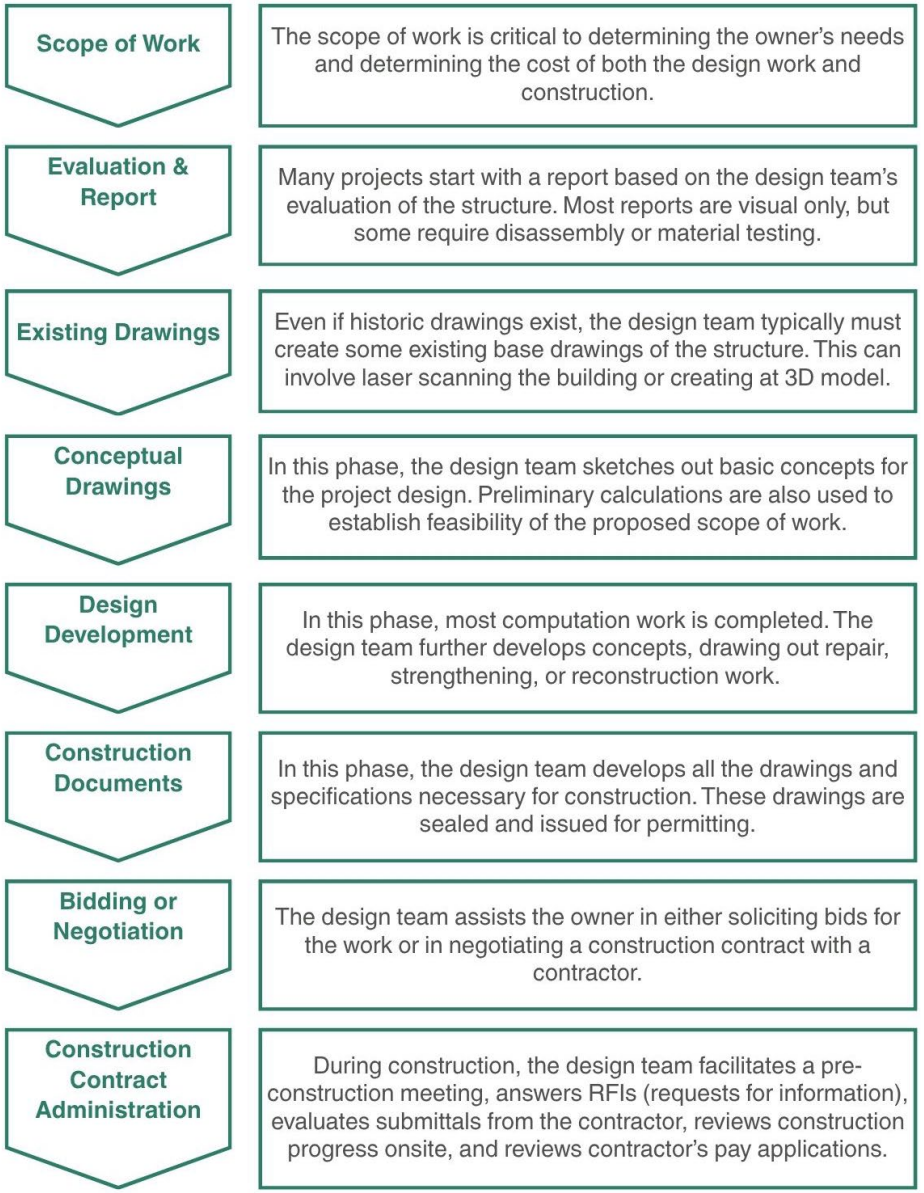


Investigation & Report

Scope of Work

The scope of work is critical to determining the owner's needs and determining the cost of both the design work and construction.

Evaluation & Report

Many projects start with a report based on the design team's evaluation of the structure. Most reports are visual only, but some require disassembly or material testing.

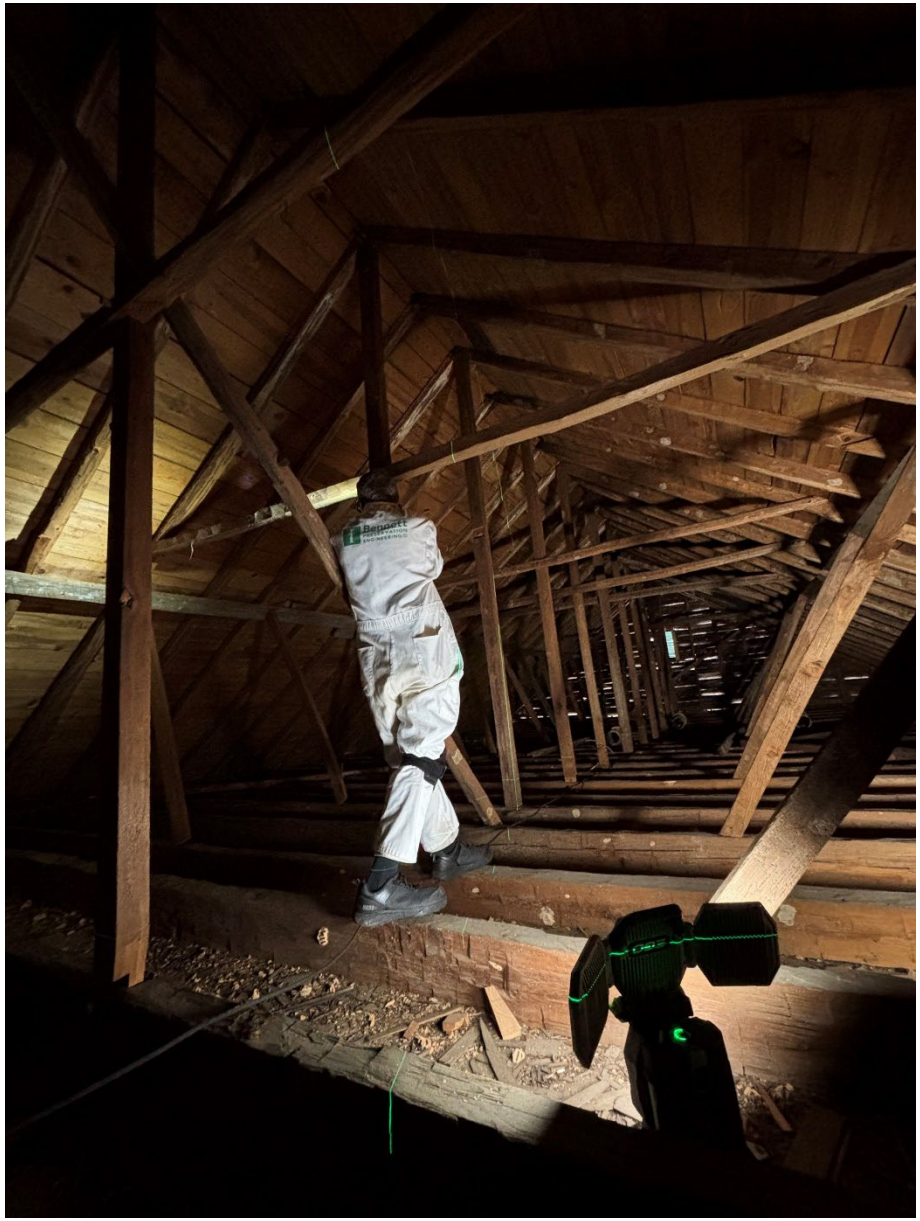
Investigation & Report

First step… an onsite evaluation!

- Also known as an investigation, walk-through, conditions assessment, feasibility studies, historic structure report

- This allows the design team (and you as the building's steward!) to understand the building's:

    - History
    - Materials
    - Current conditions
    - Safety concerns
    - Future use



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Scope of Work | Evaluation & Report | Existing Drawings | Conceptual Drawings | Design Development | Construction Documents | Bidding or Negotiation | Construction Contract Administration

Investigation & Report

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Investigation & Report

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Investigation & Report

Investigation & Report

First step… an onsite evaluation!

- This might also include:
    - Laser scanning and digital documentation
    - Site measurements
    - Photography (no such thing as too many photographs!)
    - Historic research
    - Non-destructive testing (material testing)

Investigation & Report

First step… an onsite evaluation!

- This might also include:
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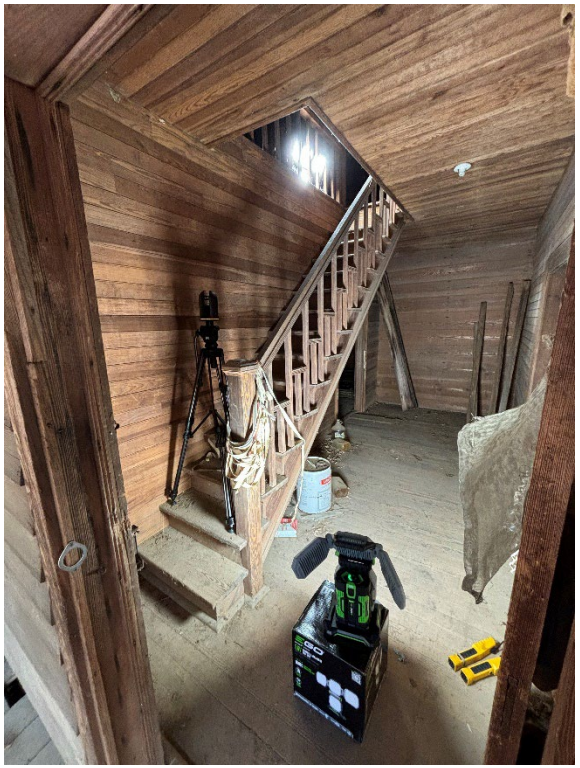

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Scope of Work | Evaluation & Report | Existing Drawings | Conceptual Drawings | Design Development | Construction Documents | Bidding or Negotiation | Construction Contract Administration

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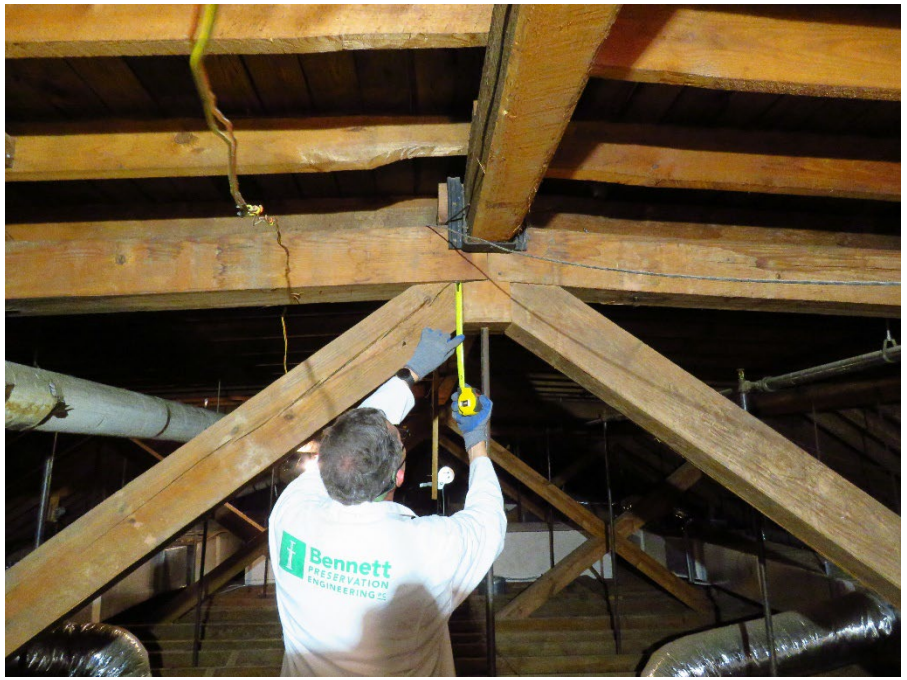

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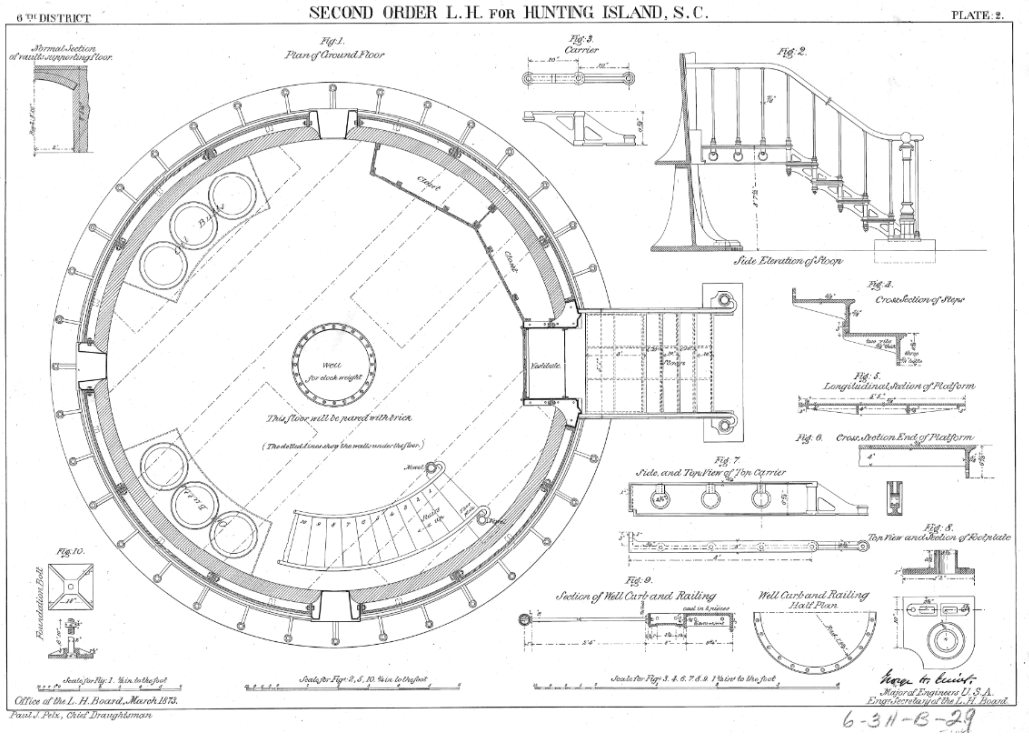
Investigation & Report

First step… an onsite evaluation!

- This might also include:
  - Historic research



Investigation & Report

First step… an onsite evaluation!

- This might also include:
    - Non-destructive testing (material testing)

Investigation & Report

What goes into a report?

- Introduction (executive summary)
- Building history
  - Brief or substantial depending on the nature of the report
- **Findings**
  - “When we looked at your building, here is what we found.”
- **Conclusions**
  - “Based on what we found, here is what we can conclude.”
- **Recommendations**
  - “Here is how we recommend you proceed (and spend your money).”

Investigation & Report

What goes into a report?

- Some optional “add-ons”…
    - Existing building drawings
    - Cost estimate
    - Preliminary conceptual design
    - Presenting to stakeholders

Investigation & Report

What is the “end goal” or deliverable?

- Dealer’s choice… this should be catered to your structure and your needs

- Examples:

    - Drayton Hall – visitorship study
    - Cape Lookout Lighthouse – design alternatives & decision-making document
    - Emanuel AME Church – structural report: roof truss deterioration
    - Cape Hatteras Lighthouse – condition assessment report
    - Hunting Island Lighthouse – structural report: stair loading
    - Old State Bank – historic structure report + condition assessment report
    - St. Stephen’s Episcopal Church – structural report: car accident damage
    - Robert Mills Courthouse – condition assessment report
    - 141 Ashley Avenue – structural report: feasibility of building relocation
    - Asheville Federal Courthouse – structural report: exterior lintels & brick

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STRUCTURAL ENGINEERING FOR EXISTING STRUCTURES
Seismic Retrofit • Historic Preservation • National Historic Landmarks

A Report on Structural Issues in the Glendale Mill Towers at Glendale, Spartanburg County, South Carolina

Submitted to:

Spartanburg Area Conservancy

Friday, June 27, 2025

Bennett Preservation Engineering PC
17 Lockwood Drive, Suite 500
Charleston, SC 29401

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843-577-8850

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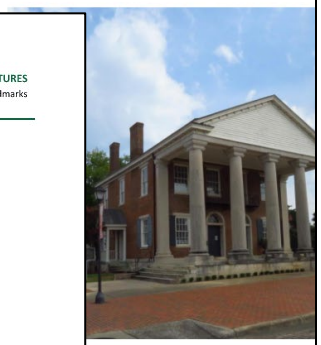
STRUCTURAL ENG
Seismic Retrofit • Historic

A Report on Structural Issues at the

Decatur, Alabama



Submitted to:

Lord Aeck Sargent and the City of Decatur
February 5, 2024

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TURAL ENGINEERING FOR EXISTING STRUCTURES
it • Historic Preservation • National Historic Landmarks

ral Issues at the Lighthouse

ort County, South Carolina

Submitted to:

Al Hester
South Carolina Department of Parks, Recreation and Tourism
December 31, 2018

State PO: 4600655577

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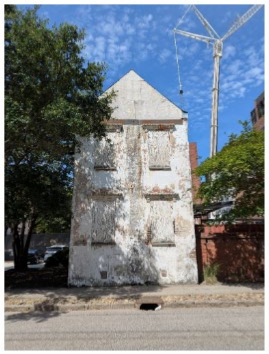
STRUCTURAL ENGINEERING FOR EXISTING STRUCTURES
Seismic Retrofit • Historic Preservation • National Historic Landmarks

Conditions Assessment Report and Feasibility Study for

141½ Ashley Avenue
Charleston, South Carolina



Submitted to:

The Medical University of South Carolina (MUSC)
Friday, September 26, 2025

Bennett Preservation Engineering PC
17 Lockwood Drive, Suite 500
Charleston, SC 29401

www.BennettPE.com
843-577-8850

G STRUCTURES
toric Landmarks

Submitted to:

First Missionary Baptist Church
Thomasville Landmarks

September 10, 2025

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Charleston, SC 29401

www.BennettPE.com
843-577-8850

Investigation & Report

This is the step we see often overlooked by clients, owners, grant-facilitators

- We argue that is the most important!

Investigation & Report

This is the preliminary step needed to establish the scope of work and a clear plan for everything that comes after; the design drawings and construction

- This benefits you as the client (and your building!) in the long run
- Investment “up-front” to help prevent unnecessary costs later in the project

Construction Documents

Existing Drawings	Even if historic drawings exist, the design team typically must create some existing base drawings of the structure. This can involve laser scanning the building or creating at 3D model.
Conceptual Drawings	In this phase, the design team sketches out basic concepts for the project design. Preliminary calculations are also used to establish feasibility of the proposed scope of work.
Design Development	In this phase, most computation work is completed. The design team further develops concepts, drawing out repair, strengthening, or reconstruction work.
Construction Documents	In this phase, the design team develops all the drawings and specifications necessary for construction. These drawings are sealed and issued for permitting.

Construction Documents

What goes into Construction Documents (CDs) process

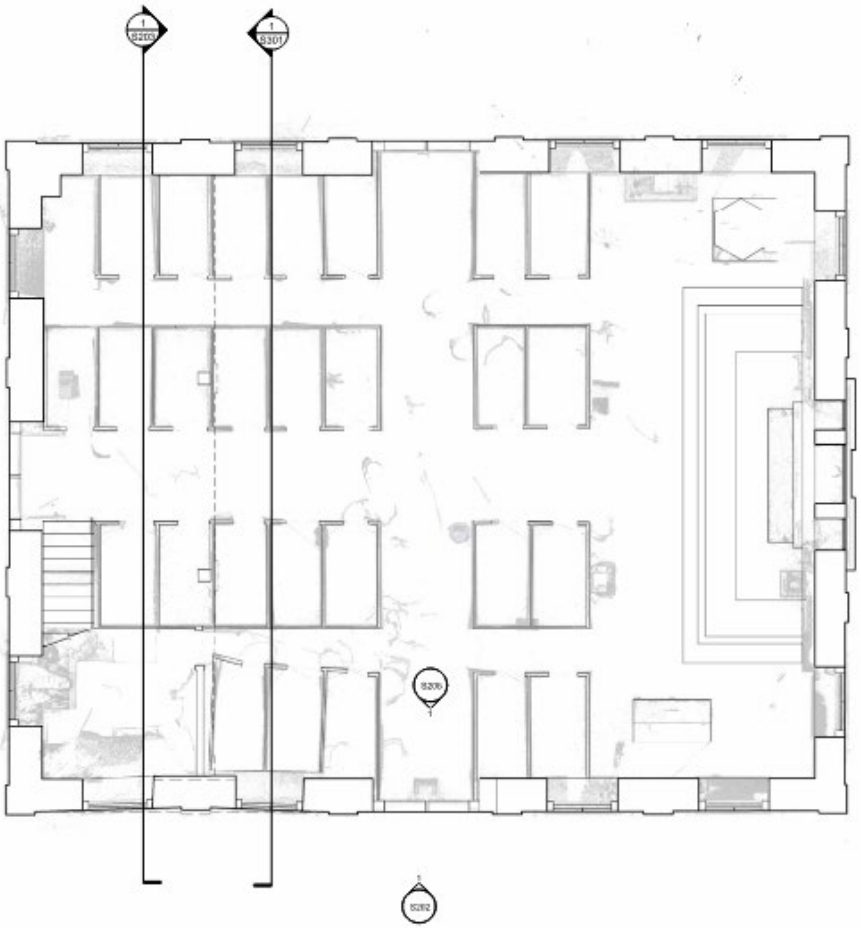
- Base drawings (existing building drawings)
- Schematic Design Drawings (35%)
- Design Development Drawings (65%)
- Construction Drawings (100%)
- Specifications

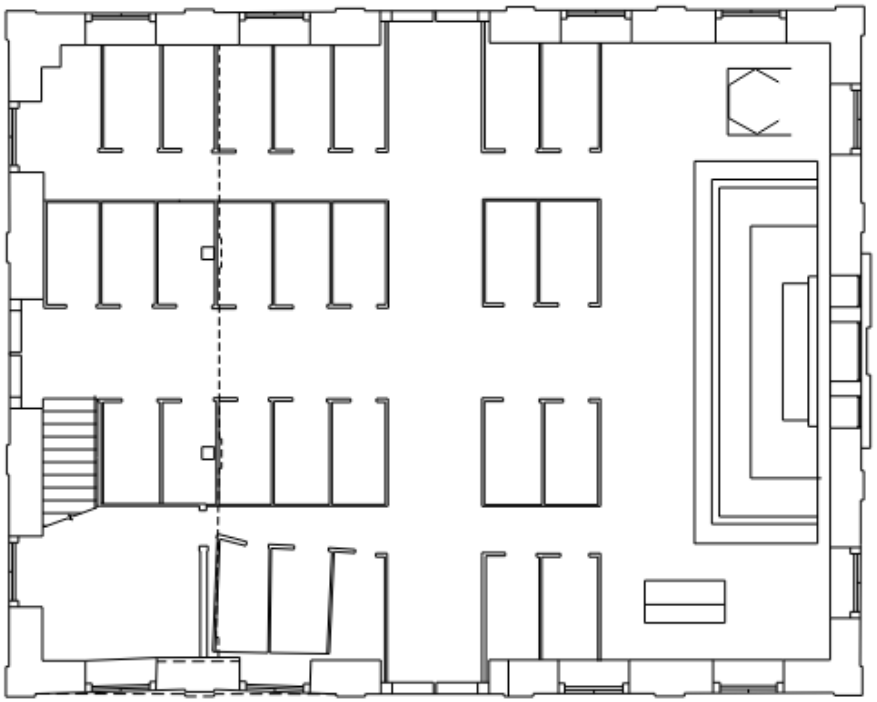
Construction Documents

First step… base drawings!

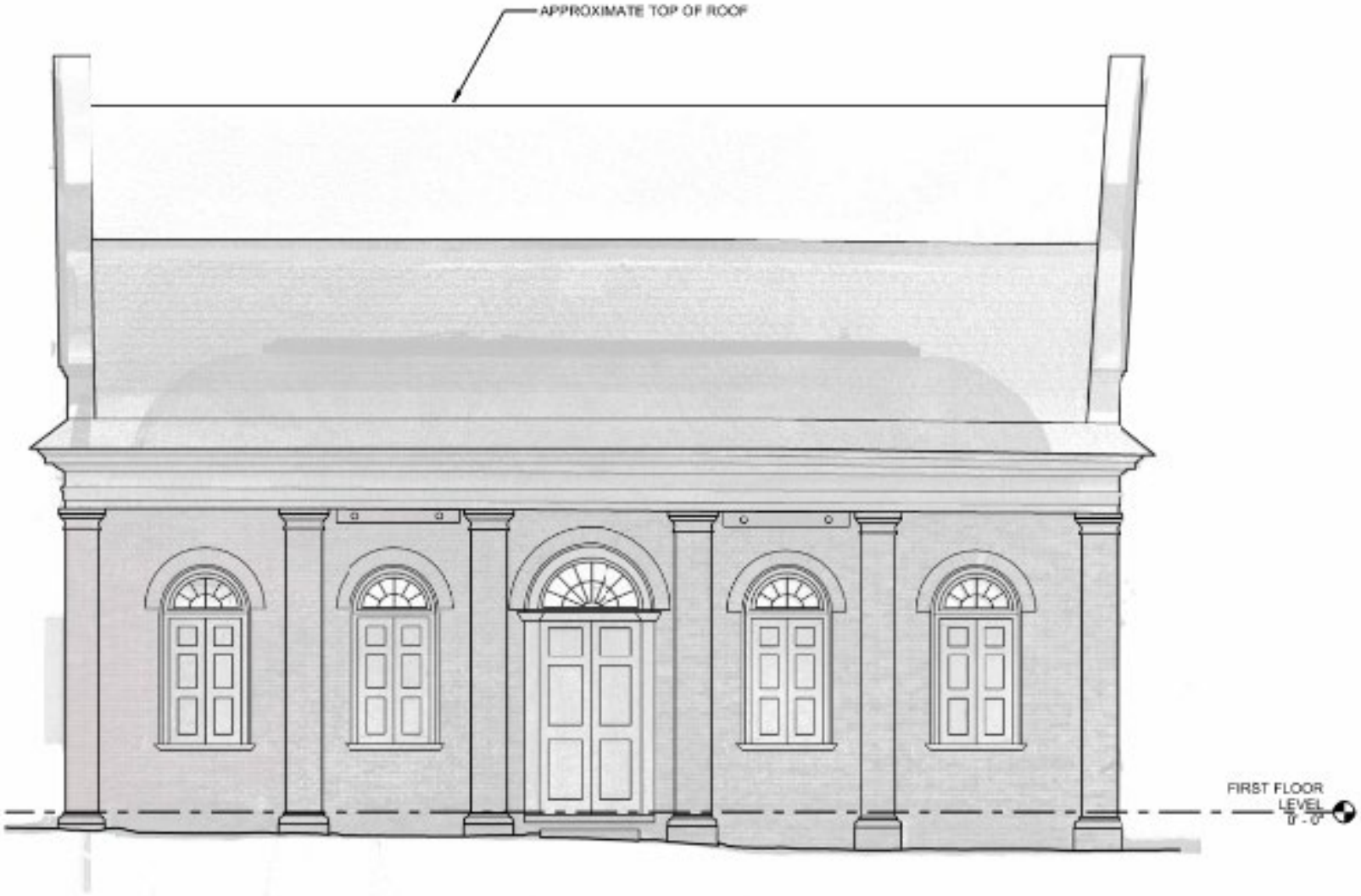
- Can be formed from:
    - Existing building drawings
    - Laser scans
    - Original construction drawings (GOLD!)
    - HABS drawings

Existing Building Drawings





Existing Building Drawings



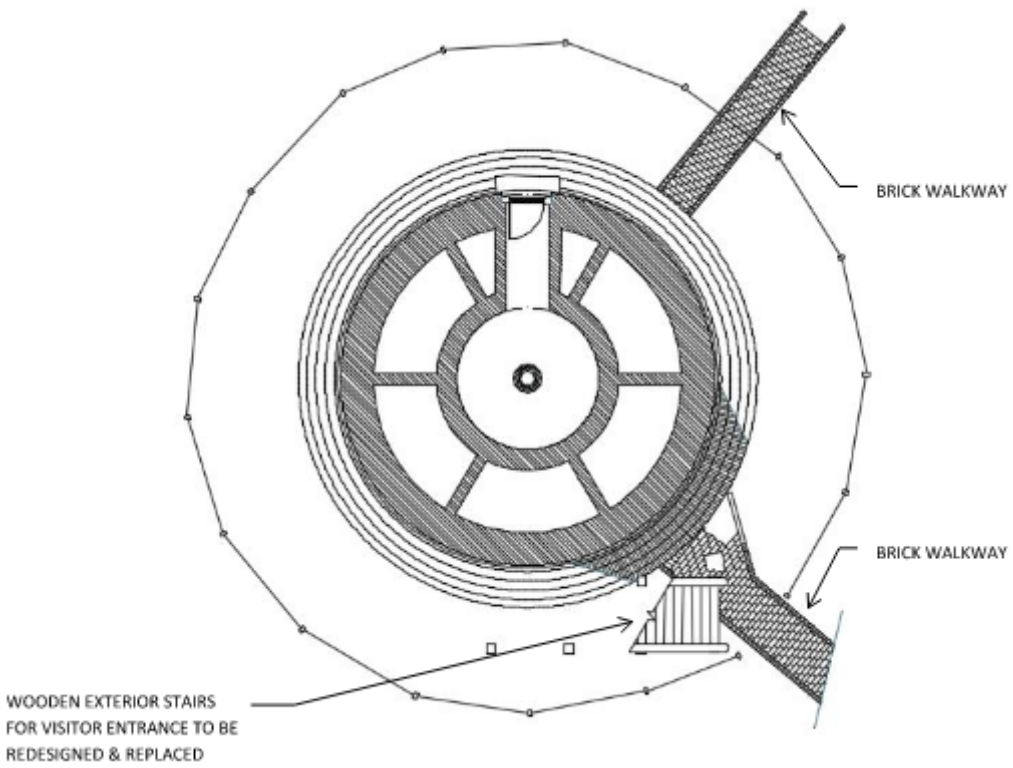
Existing Building Drawings

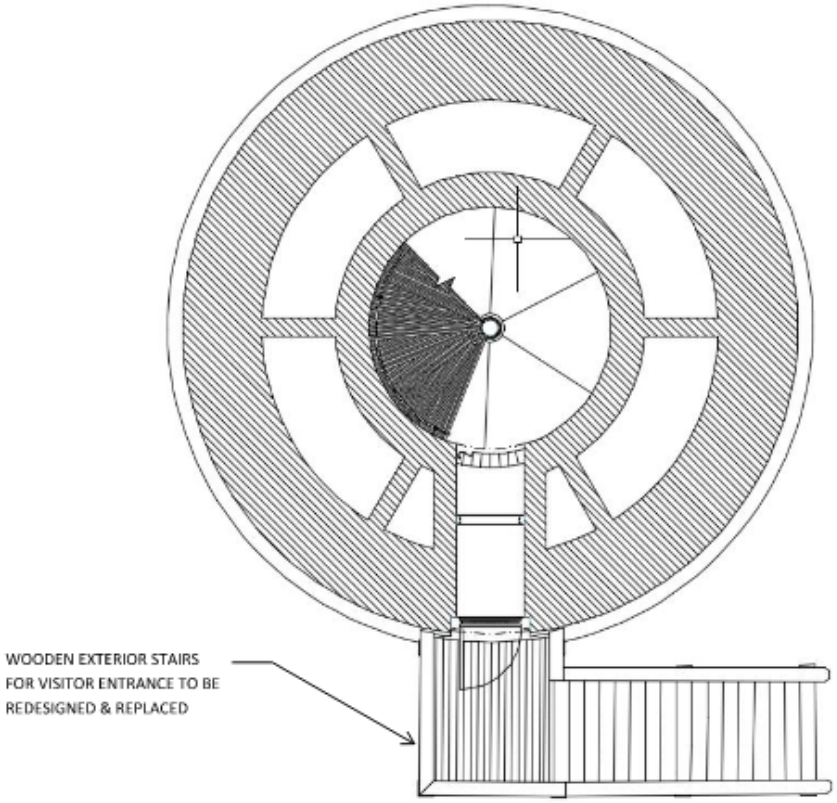
Construction Documents

Schematic Design Drawings (35%)

- Identify areas where modern interventions are required
- Preservation scope
  - What stays
  - What gets repaired
  - What gets strengthened
  - What is altered or replaced

Schematic Design Drawings





Construction Documents

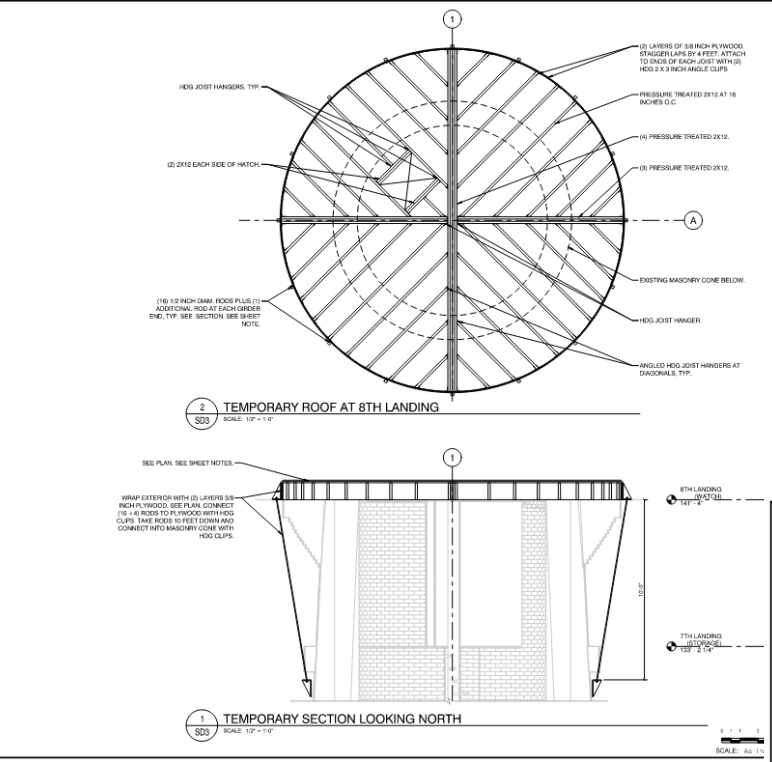
Design Development Drawings (65%)

- Refine strategies for repair vs. replacement of historic materials
- Develop integration of modern systems
- Complete basic engineering calculations
- Coordinate closely with preservation agencies, review boards, the SHPO

Construction Documents

Construction Drawings (100%)

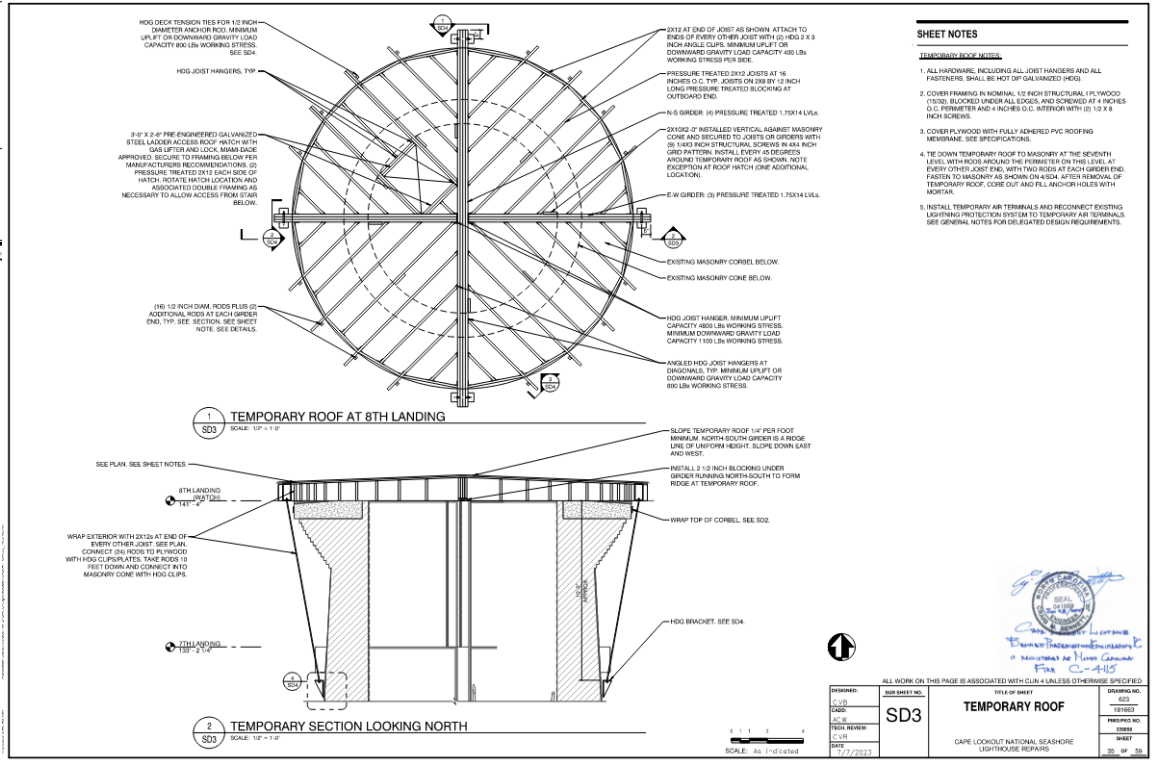
- Produce detailed drawings
- Includes specifications (project manual)
    - Technical specifications
    - Material requirements
    - Contractor qualifications
- Sealed by a licensed design professional
- Ready for permitting



SHEET NOTES

TEMPORARY ROOF NOTES:

1. ALL HARDWARE, INCLUDING ALL JOIST HANGERS AND ALL FASTENERS, SHALL BE HOT DIP GALVANIZED (HDG).
2. COVER FRAMING IN NOMINAL 1/2 INCH PRESSURE TREATED STRUCTURAL I PLYWOOD (15/32), BLOCKED UNDER ALL EDGES, AND SCREWED AT 4 INCHES O.C. PERIMETER AND 12 INCHES O.C. INTERIOR.
3. COVER PLYWOOD WITH FULLY ADHERED EPDM OR PVC ROOFING MEMBRANE.
4. TIE DOWN TEMPORARY ROOF TO MASONRY AT THE STORAGE LEVEL WITH (16) 1/2 INCH HOT DIP GALVANIZED RODS EQUALLY SPACED AROUND THE PERIMETER ON THIS LEVEL. FASTEN TO MASONRY WITH 3/4 X 8 INCH STAINLESS STEEL THREADED RODS IN EPOXY ANCHORS. AFTER REMOVAL OF TEMPORARY ROOF, CORE OUT AND FILL ANCHOR HOLES. PUT (1) ADDITIONAL ROD ON EACH GIRDER END.



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3. COVER PLYWOOD WITH FULLY ADHERED PVC ROOFING MEMBRANE. SEE SPECIFICATIONS.
4. TIE DOWN TEMPORARY ROOF TO MASONRY AT THE SEVENTH LEVEL WITH RODS AROUND THE PERIMETER ON THIS LEVEL AT EVERY OTHER JOIST END, WITH TWO RODS AT EACH GIRDER END. FASTEN TO MASONRY AS SHOWN ON eSD4. AFTER REMOVAL OF TEMPORARY ROOF, CORE OUT AND FILL ANCHOR HOLES WITH MORTAR.
5. INSTALL TEMPORARY AIR TERMINALS AND RECONNECT EXISTING LIGHTNING PROTECTION SYSTEM TO TEMPORARY AIR TERMINALS. SEE GENERAL NOTES FOR DELEGATED DESIGN REQUIREMENTS.

ALL WORK ON THIS PAGE IS ASSOCIATED WITH CLIN 4 UNLESS OTHERWISE SPECIFIED.

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CADD: A.C.R.	SD3	TEMPORARY ROOF	623 / 181663
TECH. REVIEW: C.V.R.			PRES/PROJ NO. 23033
DATE: 7/7/2023		CAPE LOOKOUT NATIONAL SEASHORE LIGHTHOUSE REPAIRS	SHEET 35 OF 55

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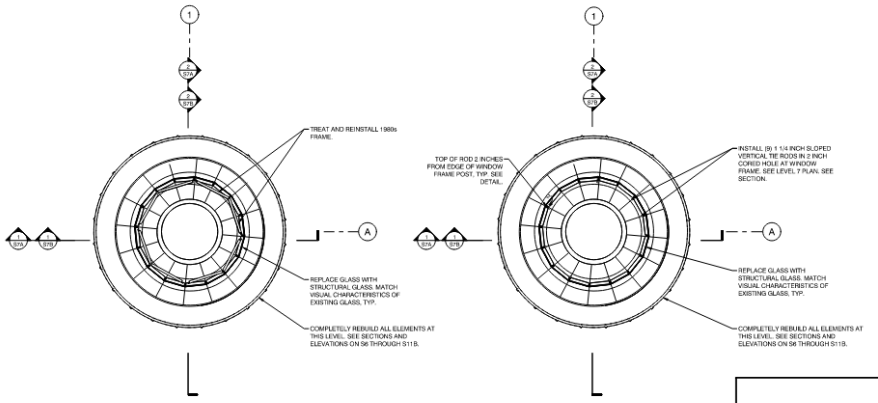
Design Development to Construction Documents

SHEET NOTES

1. COORDINATE WORK WITH MECHANICAL/ELECTRICAL DRAWINGS AND WITH UNITED STATES COAST GUARD.



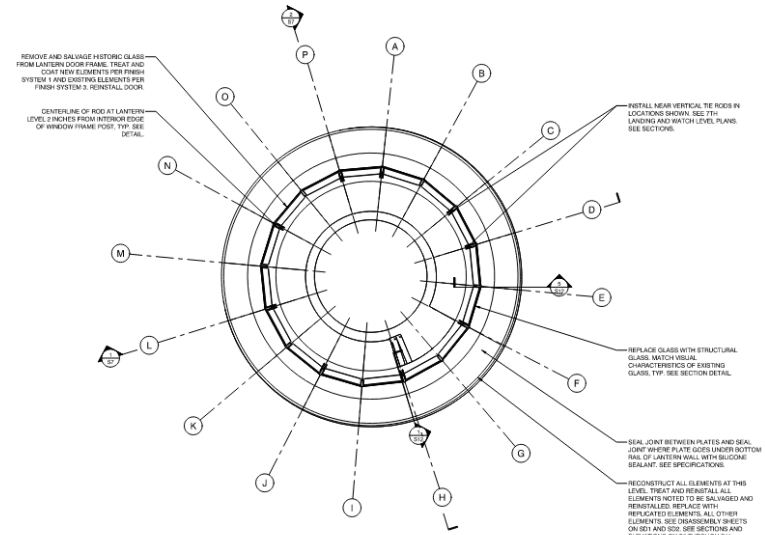
1 S4 LANTERN ROOM PARTIAL PLAN - OPTION A
SCALE: 1/8" = 1'-0"

2 S4 LANTERN ROOM PARTIAL PLAN - OPTION B
SCALE: 1/4" = 1'-0"

SCALE: As Indicated

SHEET NOTES

1. COORDINATE WORK WITH MECHANICAL AND ELECTRICAL DRAWINGS AND WITH UNITED STATES COAST GUARD.
2. GRID LINES ARE ALIGNED WITH ORIGINAL LOCATION OF LANTERN LEVEL WINDOW FRAME POSTS ABOVE. GRID LINES ARE APPROXIMATELY 22.5 DEGREES APART. ORIGINAL LOCATIONS OF WINDOW FRAME POSTS ON LANTERN LEVEL WILL HAVE BEEN MARKED BY GC AS PART OF THE WORK SHOWN ON SD1 AND SD2.



1 S4 LANTERN ROOM PARTIAL PLAN
SCALE: 1/2" = 1'-0"

ALL WORK ON THIS PAGE IS ASSOCIATED WITH CLIN 10 UNLESS OTHERWISE SPECIFIED

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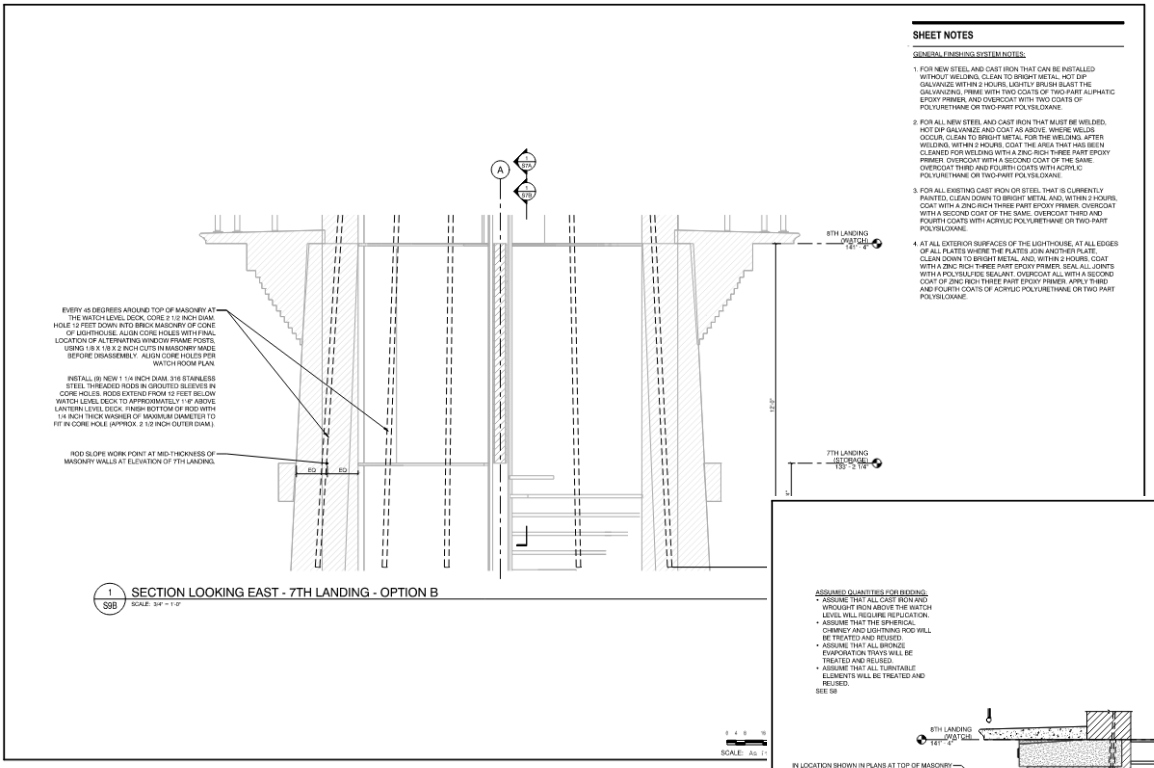
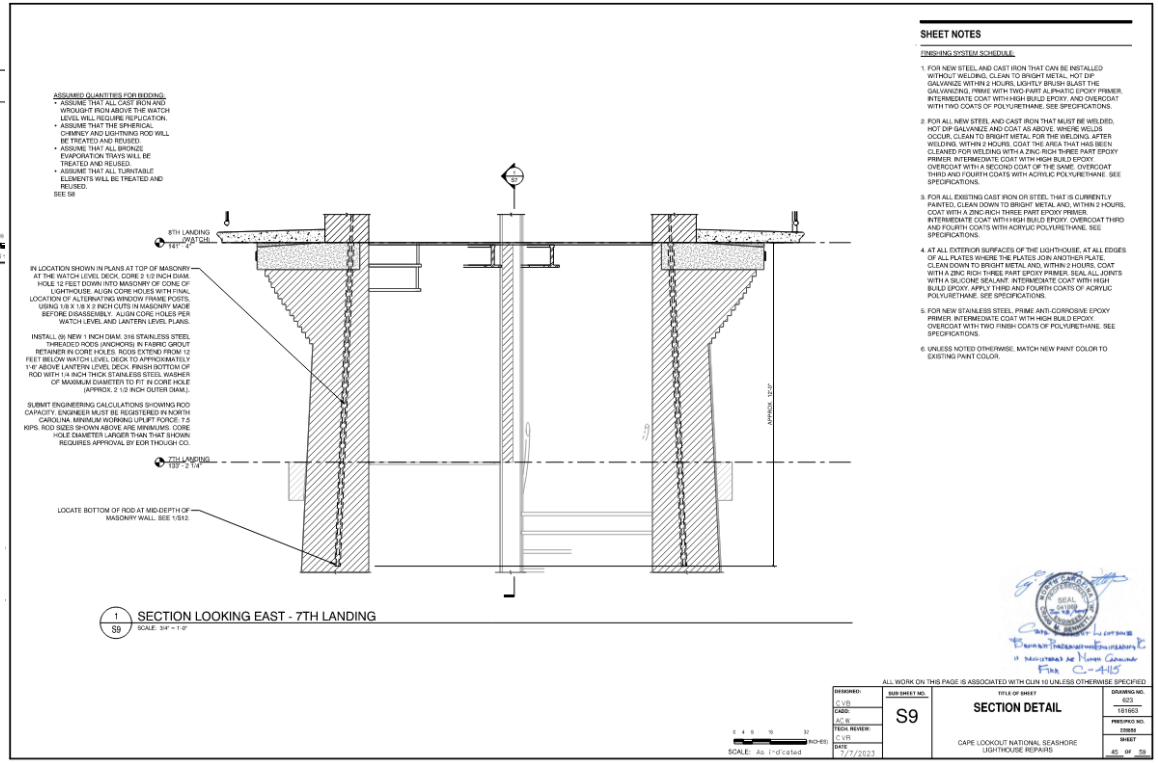
CADD: ACR		CAPE LOOKOUT NATIONAL SEASHORE LIGHTHOUSE REPAIRS	PRES/PKG NO. 22659
TECH. REVIEW: CVB			SHEET 40 OF 59
DATE: 7/7/2023			

SCALE: As Indicated





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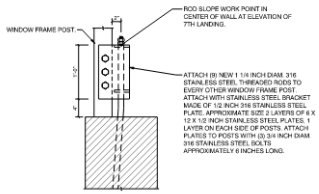
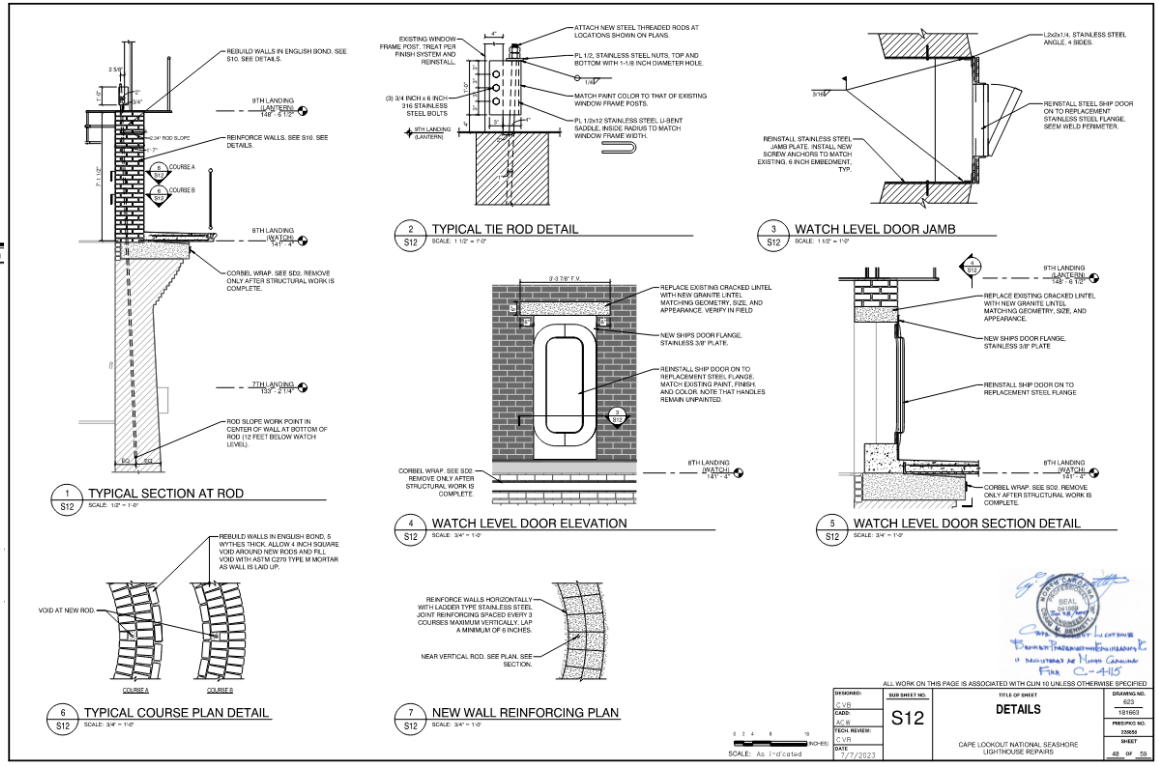
Design Development to Construction Documents



1 S12 TIE ROD DETAIL (OPTION B)
SCALE: 1 1/2" = 1'-0"



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Design Development to Construction Documents

Bidding & Negotiations

Bidding or Negotiation

The design team assists the owner in either soliciting bids for the work or in negotiating a construction contract with a contractor.

Bidding & Negotiations

Procurement

- Public bidding of a project
  - Lowest, qualified/responsive bidder
- Invited qualified contractors

- Forms to follow
  - AIA standard forms for contracts, invitation to bid, etc.

- Project Delivery Methods
  - Design-Bid-Build
  - CM-r
  - Design-Build

Construction Contract Administration

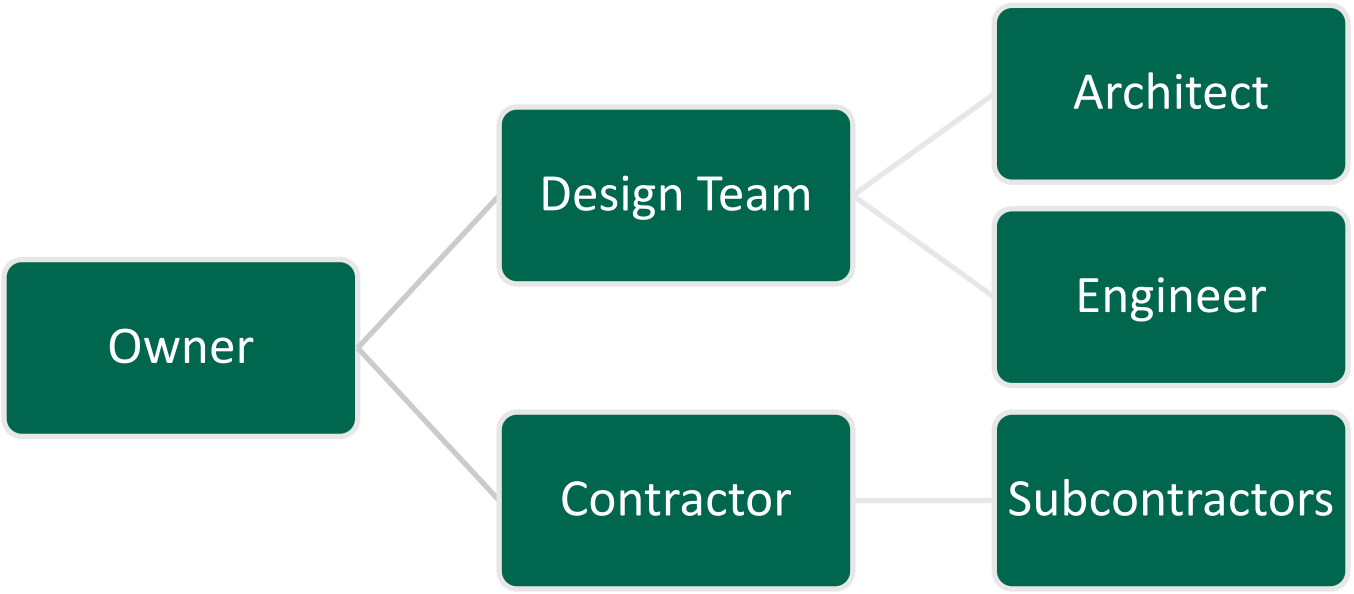
Construction Contract Administration

During construction, the design team facilitates a pre-construction meeting, answers RFIs (requests for information), evaluates submittals from the contractor, reviews construction progress onsite, and reviews contractor's pay applications.

Construction Contract Administration

The construction phase

- Also known as ‘CA’
- The architecture and engineering (A/E) team is representing the owner and is charged with managing the project during construction



Construction Contract Administration

The construction phase

- Frequent site observation to ensure drawings are followed

Construction Contract Administration

The construction phase

- Unforeseen conditions are common in historic preservation projects; the design team adapts to solutions quickly to keep work moving

Construction Contract Administration

The construction phase

- Typically involves:
    - Progress meetings (OAC or OEC)
    - Site visit reports
    - Reviewing & signing pay applications
    - Project schedule & milestones
    - Requests for Information (RFIs)
    - Submittals
    - Change orders
    - Mock-ups
    - Special inspections
    - Drawing revisions
    - Project close-out

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Construction Contract Administration

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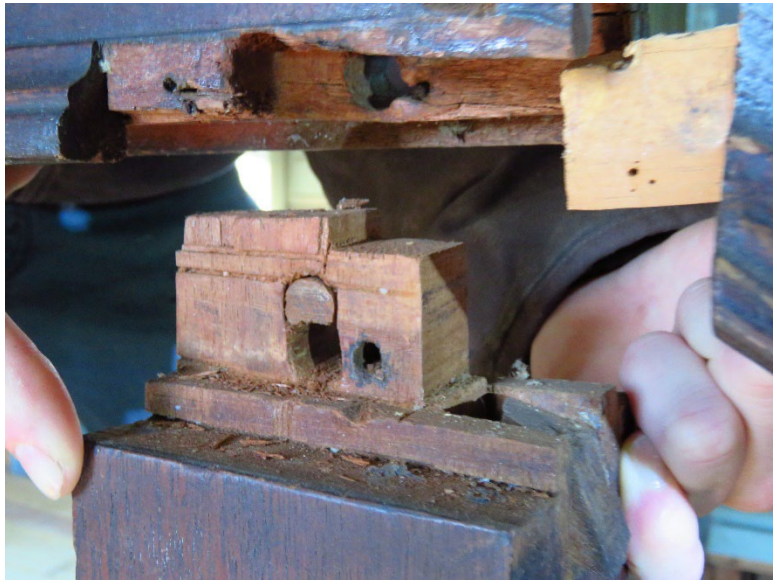

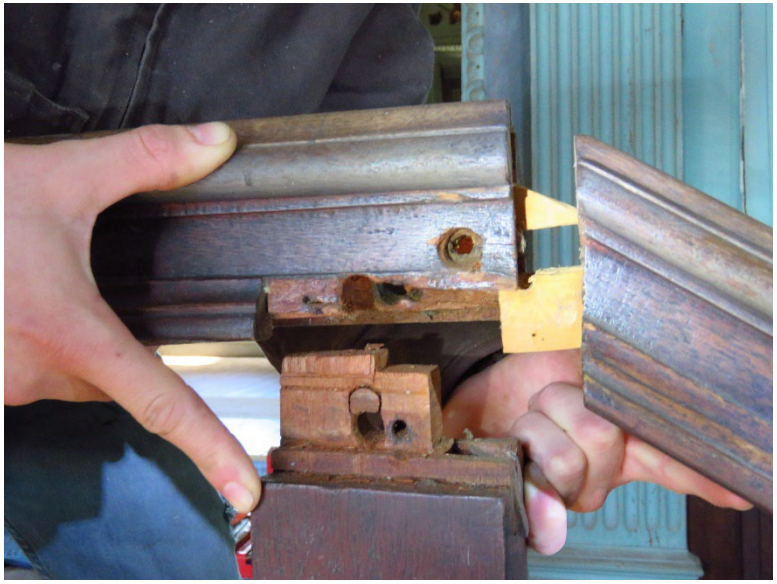

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Scope of Work | Evaluation & Report | Existing Drawings | Conceptual Drawings | Design Development | Construction Documents | Bidding or Negotiation | **Construction Contract Administration**

Construction Contract Administration

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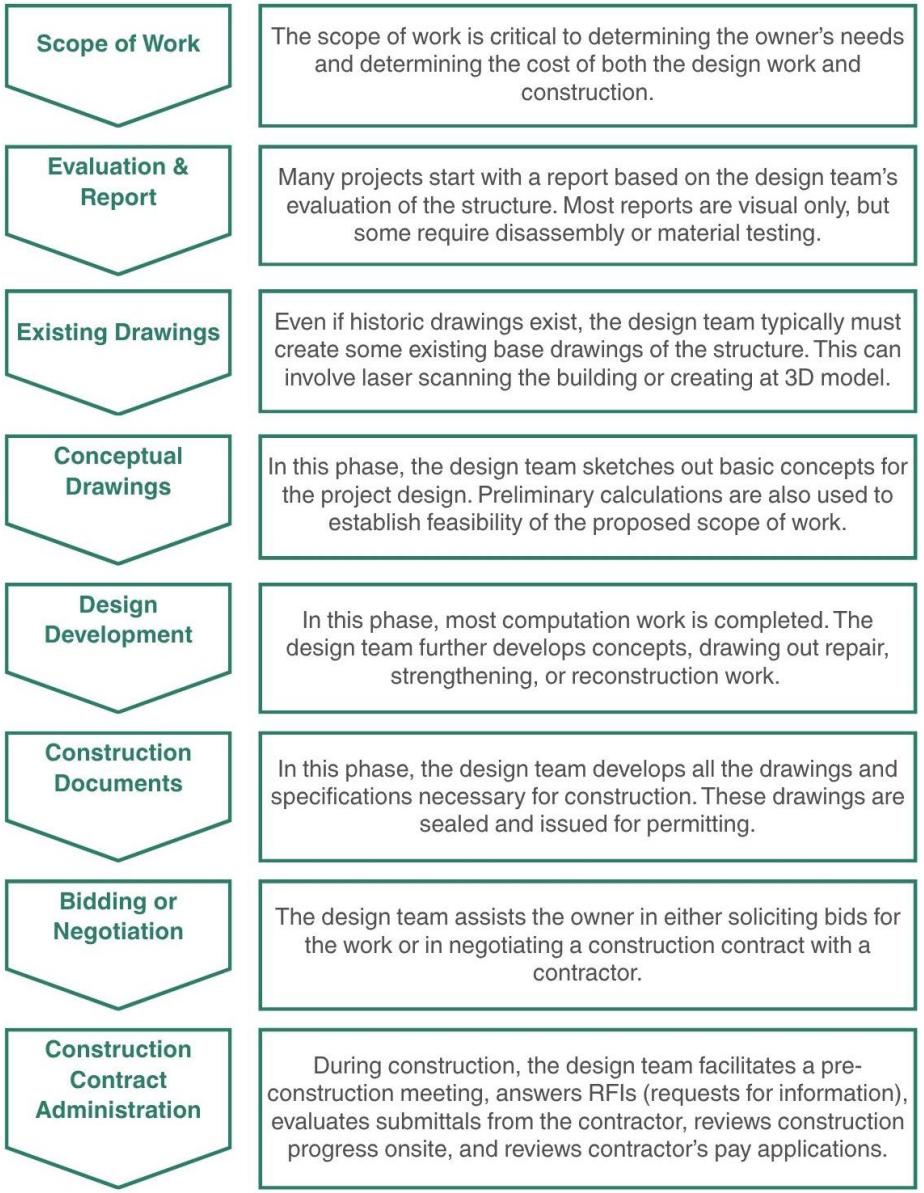
Construction Contract Administration

The Design Process

- Investigation and Report
  - Understand the Building
  - Define the Scope
- Construction Documents
  - Concept
  - Development
  - Construction Drawings
  - Material Specifications
- Bidding
  - Contractor Selection
- Construction



Have We Overwhelmed You Yet?

Don’t be afraid of a phased approach

- We typically see [large] time gaps between the investigation and report phase, the construction documents phase, and the construction phase

- Use each phase to fundraise, budget, and plan

Have We Overwhelmed You Yet?

Don’t be afraid of a phased approach

- **Cape Lookout Lighthouse**
  - Report: **2014**
  - Drawings: **2023**
  - Construction: **2025**
- **Emanuel AME Church**
  - Report: **2015**
  - Drawings: **2019**
  - Construction: **2022** (phase 1…)
- **Hunting Island Lighthouse**
  - Report: **2018**
  - Drawings: **2023**
  - Construction: **2024**
- **Drayton Hall**
  - Report: **2016**
  - Drawings: **2015/2021/2025**
  - Construction: **2015/2021/2026**

In Summary

The design process is important to the overall success of the rehabilitation or renovation project.

Historic buildings have unique challenges.

Every structure is different. There is not a one-size-fits-all approach for undertaking a historic project.

A deep understanding of your historic structure, achieved through the initial evaluation and report [planning] phase, will set the stage for the successful development of repair drawings.

Questions?

Bennett Preservation Engineering

John Bennett and Amanda Brown

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