

**Preservation and Redevelopment Feasibility Options
for the Concord Gasholder
Concord NH**

for the
City of Concord Ad-hoc Gasholder Committee



Submitted by



January 4, 2021

Table of Contents

Executive Summary	p. 1-3
Recommended Next Steps in Three Phases	p. 4-5
Details of Feasibility Concepts for Phased Approach	p. 6-8

Additional Background

A. Report Purpose and Guiding Principles for Redevelopment	p. 10-11
B. ADG Scope and Approach	p. 12-14
C. List of Members of City of Concord's Ad-hoc Gasholder Committee	p. 15
D. National Register Nomination Excerpt and Link and Additional Information on Historic Significance	p. 16-17
E. Redevelopment Options; includes link to GZA Environmental Report issues by City of Concord and Liberty Utilities, July 2020	p. 18-19
F. Examples of Vibrant Interpretation/Access and Industrial Structures as Part of Brand Redevelopment	p. 20-23
G. Local Efficient District, Catalyst Concept Site Plans and Link to 2006 Master Plan for the Southern Opportunity Corridor Excerpt	p. 24-28
H. Market Options Worksheet, Site Plan with Added Building and Gasholder Building Models	p. 29-33
I. Gasholder Remedial Action Plan, N.H. DES, 2015	p. 34
J. Report by Structures North, December 2020	

Executive Summary

At committee meetings and public forums during the course of this explorative study, **stakeholders have expressed a strong preference for preservation**, rather than loss, of the historic Concord Gasholder building in Concord, NH, noting its future is being determined in the 60th anniversary year of the loss of Concord's Victorian-era railroad station. Preservation investment in the Gasholder will rescue a last-of-its-kind national landmark and save an important—and visually arresting—icon of Concord's industrial history, while offering community and economic development opportunities.

It has become clear that preserving and redeveloping this distinctive, round, brick building is the best approach to pursue—and that it will be best achieved in phases that are both incremental and aspirational.

However, immediate action and investment is needed to prevent accelerated deterioration or total loss. This will provide the necessary time to secure interim and/or long-term owner/developer(s) and to access funding and financing from private and public sources. With an approach that celebrates the property as an iconic landmark with unique traits, the building's restoration and the property's development can be a catalyst for adding value and amenities to the city's southern gateway.

Summary findings and recommendations

The building is on the National Register of Historic Places and is the last of the fourteen known gasholders in the U.S. with its inner workings intact. Once it has been stabilized, **a historic preservation approach is the best solution for the building.** This approach would repair the building and add an unobtrusive support system that offers 1) the chance to retain what's most unique about the building, 2) unlocks access to certain preservation funds and incentives, and 3) readies the building for additional commercial or institutional investment. The preservation approach keeps the possibility of re-use open as it keeps the interior space open (free of structural framing).

The 2.4 acre property can offer **a vibrant experience** with a restored landmark and creative interpretation and access for the Gasholder and its now-lost auxiliary structures. Additional development on the site gives it more feasibility and viability. A 5,000-10,000 square-foot structure fits on the southeastern part of the lot. Restaurant, special event, and recreation-related uses on the property are possibilities when considering market and constraints; hotel, housing and other uses seem less likely.

The redevelopment of the Gasholder property is most successful, and has the best return on investment for any private and public sector investors, if it is **part of a broader preservation and revitalization approach for the southern gateway of Concord.**

A Vision

Imagine the Gasholder's neighborhood with a cachet that attracts housing and additional businesses such as S&W Sports and Evo Rock+Fitness and offers access to future trails along the river and a bus/rail transportation center. Picture meeting spaces, food trucks and scooter rentals, as well as a gateway to Downtown, the City parks, the marsh preserve and adjoining neighborhoods.

Imagine a restored Gasholder that people can enjoy with 24/7 access through actual and creatively-designed "windows" and engaging interpretation of how the site and building worked for Concord's residents and industrial growth. Restored gas lamps along the sidewalks and innovative exterior art-lighting that can be seen from Interstate 93, welcoming visitors to Downtown. Picture compatible, next-generation-type use in the building and/or on the property related to recreation, arts, history, energy, and innovation.

The area's proximity to downtown, existing city parks, significant natural resources, and two interstate exits could encourage this "smart, sustainable" mixed-use neighborhood that could generate jobs, housing, community vitality, as well as significant new property tax revenues

Our **recommended three-phase approach** improves opportunities for success and reduces risk for the parties. It features an initial investment by Liberty Utilities, then later a City of Concord commitment during an Opportunity Bridge Phase. This tees up full restoration and redevelopment of the Gasholder and its site as well as other investments in the surrounding area. Key concepts for supporting and accelerating progress for the Gasholder and surrounding area include committing adequate project development resources to this venture over the next two years, and making the project a priority for City incentives like a Tax Increment Financing (TIF) District and grant support.

Redevelopment is most feasible with a mix of private and public investment. A new or expanded TIF district can, over time, generate City revenues sufficient to invest in initial and broader-scale improvements as well as private fundraising, grants and private investment.

In terms of environmental issues, the **Gasholder currently serves as a cap on contaminants** created during its industrial history. Demolition of the building would create additional assessment and likely additional clean-up work and costs, according to the owner's consultant and state agency information. Future preservation and redevelopment of the property must minimize ground disturbance to lessen costs associated with the management of existing contaminants.

This project will benefit greatly from adopting prior plans for the area, as well as both the sophistication of City staff and a commitment from the community and civic leaders.

Redeveloping the building offers benefits to both Liberty Utilities and the City of Concord. A working group led by the City and Liberty with other stakeholders should draft a Memorandum of Understanding (MOU) that addresses short-term stabilization needs, ownership/management options and concepts for next phases.

This report was prepared for an ad-hoc committee formed by Concord's Mayor, Jim Bouley, and City Council in response to news that the property's owner, Liberty Utilities, planned to secure a demolition permit for the building.

The ADG Gasholder team included ADG principals Stuart Arnett and Patrick McDermott as well as landscape architect Mitchell Rasor, David Versel of the Versel Group and Jackie Barton of Birchwood Planning. www.ADG.com

ADG wishes to thank the many participants that assisted in this work, including members of the public, the Ad-hoc Committee, city and state professional staff, Liberty Utilities, and the New Hampshire Preservation Alliance. www.nhpreservation.org

The project was funded, in large part, by the Concord City Council with an additional grant from the New Hampshire Preservation Alliance made possible with support from the Land and Community Heritage Investment Program.

Recommended Next Steps: Incremental Investment with Aspirational Community Development Goals

Immediate Action Phase

Liberty Utilities facilitates emergency repairs that keeps cap on environmental issues, saves the building through a preservation approach and leaves open commercial and institutional investment opportunities.

- \$400,000+ repair costs based on Structures North report (Attachment J) borne by Liberty Utilities
- Liberty's contribution to total project based on estimated demolition and remediation costs determined in consultation with the NH PUC
- Liberty Utilities aided by appropriate project management and construction expertise
- Work starts as soon as possible

City of Concord, Liberty Utilities and other stakeholders create a Memorandum of Understanding to work out specific terms for Opportunity Bridge Phase, including short and long-term issues, ownership/management model and ways to accelerate positive activity.

- Phase will likely run 1/8/21-6/30/21

Opportunity Bridge Phase

To secure public and private redevelopment investment, City of Concord, Liberty Utilities and other stakeholders need to determine and create a short-term ownership/management structure to best meet those goals. Then:

- Owner/manager works to secure private developer for Gasholder and/or new building on site.
- Owner/manager seeks community development grant/resources, and philanthropic interest. City makes project a priority for support through TIF creation/expansion and other incentives and grants and connects project development to other area investments as appropriate.
- Owner/manager, in concert with City as appropriate, seeks funding sources, such as the Land and Community Heritage Investment Program, Save America's Treasures Program, Community Development Finance Authority, New Markets Tax Credits and Federal Historic Preservation Tax Credits, in addition to private investment and private fundraising. Based on Structures North report, restoration estimate including the emergency stabilization phase is approximately \$3 million (likely more for commercial use, but that would be borne by new end user, if applicable).
- City, Liberty and others as appropriate invest in cost of development of this phase including dedicated personnel and consultants as needed. Cost TBD.
- Phase will likely run 4/1/21-12/31/22 based on schedule of grants, permitting and other development factors.

Restoration and Redevelopment Phase

- New 5,000-10,000 sq. ft. structure constructed on Gasholder site to add value and tax base. TIF revenues are equal to or greater than required to service the TIF debt.
- Gasholder restoration is underway.
- Commercial and mixed-use taxable development continues.

Details of Feasibility Concepts for Phased Approach

Need for Emergency Stabilization:

There is a need for immediate action to secure the property's future potential. The building is at imminent risk of irreversible deterioration and total loss due to localized damage. Overall, however, it is relatively sound and salvageable.

There is no inexpensive, "blue-tarp" winterization fix that works. To reasonably assure there is no irreversible damage, approximately \$400,000 needs to be invested soon according to Structures North (December, 2020) to minimize winter (snow load) and non-winter (water infiltration) damage. This investment serves as an important component of a full restoration plan, which preserves the historic value of the building and leaves open the possibility of re-use. See full report Attachment J.

Benefits of Design by Structures North

The design to preserve the building as recommended by Structures North adds an unobtrusive structural system that 1) offers the chance to retain what's most unique about the building; 2) unlocks access to certain preservation funds and incentives; 3) readies it for additional commercial or institutional investment; and 4) keeps the possibility of re-use open as it keeps the interior space open (free of structural framing).

The Structures North \$3 million restoration (after stabilization) estimate is less than a preliminary monument and stabilization concept suggested by GZA GeoEngineering in an earlier report (July 2020). Additionally, the GZA estimate was based on work that would reduce the building's preservation values and its ability to meet national preservation standards and, thus, reduce or limit grant funding and commercial tax credit eligibility.

Potential for Institutional or Commercial Use of Gasholder

A stand-alone redevelopment of the site as a historic attraction would be expensive and need up-front subsidies and innovative revenue streams to be a success.

While interest has been expressed in reusing the Gasholder for commercial purposes, there are serious limitations to consider:

- Keeping the one-of-a kind mechanisms in-place and preserved greatly limits the interior for reuses like a restaurant, and greatly increases the costs of an already expensive industrial-to-commercial conversion.
- Commercial redevelopments increase the clean-up thresholds, both from a permitting perspective and from the general public's willingness to enter a brownfield building with less than total remediation, especially as a food service or office facility.
- Residential redevelopment is not considered feasible in this type of brownfield redevelopment.

Adding Value to Site With Additional Development

Even though the inside of the building has limited redevelopment potential, its exterior and 2.4-acre parcel have potential for a multi-use, private (taxable) anchor building. A 5,000-10,000 square foot structure fits well on the southeastern part of the lot. Restaurant, special event, and recreation-related uses are possibilities when considering market and constraints; hotel, housing and other uses seem less likely. See Appendix H for analysis of uses relative to market conditions. Adding a commercial building adds value to the property but likely falls short of generating enough revenue by itself to cover restoring and operating the Gasholder.

Future preservation and redevelopment of the property must minimize ground disturbance to lessen costs associated with managing existing contaminants. The site has several limiting factors, including the capped brownfield, the slopes, limited sight lines for traffic entering onto Main Street, the adjacent railroad tracks, and rights-of-way.

Opportunities Associated with an Iconic Structure

The Gasholder is an icon; it is authentic; it is Concord's version of Chicago's Water Tower or Boston's Citgo sign. Such beloved architectural landmarks brand a city and can stimulate nearby redevelopment and economic activity. See Attachments F and H for ideas about interpretation, access and redevelopment.

Benefits of Phased Approach to Redevelopment

The redevelopment of the Gasholder property will be most successful—and have the best return on investment for any private and public sector investors—if it is part of a phased preservation and revitalization approach that links this project to additional enhancements on the property and in the southern gateway area of Concord. See Attachment G.

The new building on the site – as well as a stabilized and showcased Gasholder building—could provide an authentic and highly visible amenity to build around. It can serve as a gateway to the southern section of Main Street, an anchor to the redeveloped Main Street, a magnet for cars off-ramping from the interstate into the city, and an amenity for the many residents in the area.

Related Management and Financial Considerations

The recommended three-phase approach offers the best opportunities for success and reduces risk for the parties.

Liberty Utilities representatives have stated their interest in contributing the cost of demolition and remediation to a redevelopment project and are best-positioned to make initial investment in the property. The Gasholder currently serves as a cap to contaminants created during its industrial history. Demolition of the building would create additional assessment and likely additional clean-up work and costs, according to the owner's consultant and state agency information.

The City, Liberty Utilities and other stakeholders need to explore the best management and ownership structures to address short- and long-term issues. Consider possibilities including two years of ownership by Liberty Utilities with a development entity as an exit strategy, short-term or longer-term ownership by the City with long-term leases, a new subsidiary or third party, and other options. Lease payments could be structured to help cover maintenance costs. Stewardship agreements or easements may be used to guard private or public investment in the restoration and public access.

Redevelopment is the most feasible with a mix of private and public investment. Possible sources include the Land and Community Heritage Investment Program, Save America's Treasures Program, Community Development Finance Authority, New Markets Tax Credits and Federal Historic Preservation Tax Credits.

The expansion or establishment of a TIF district can generate City revenues sufficient to invest in initial and broader-scale improvements to leverage private fundraising, grants and private investment with and without use of incentives. By adopting a TIF soon— before any bonding – the feasibility of additional commercial interest can be tested in the real marketplace. Captured funds can then either be used in the district or be returned to the general fund. Waiting to adopt a district lessens the readiness of the area for redevelopment and forfeits captured funds – however minimal – from being used within the district or for the gasholder site.

In a phased approach, an expanded or new TIF district can generate new revenues to fund any public investment in the project area and to promote opportunities in the surrounding area. No TIF funds would be committed without these new revenues from redevelopment identified.

This project benefits greatly from revisiting the adopted prior plans for the area. Additional assets are the sophistication of City staff with similar redevelopments, a community-minded utility-owner, and the expressed commitment from the community and civic leaders.

While there are challenges to success, the property's proximity to downtown, existing city parks, significant natural resources, and two interstate exits could encourage the development of a "smart, sustainable" mixed-use neighborhood that generates jobs, housing, community vitality, as well as significant new property tax revenues. The demolition or collapse of the Gasholder building makes the innovative redevelopment of this area less interesting - less "cool" - for a future residential, commercial, sustainable, and amenity-rich neighborhood. The technology and innovation of this 1888 fossil-energy innovation will be of interest to the current and future advocates of green, fossil-free energy, such as the suggested solar farm adjacent to the south marsh.

It can be a win-win for every stakeholder, and a great place to live, work, play and visit.



Preservation and Redevelopment Feasibility Options Additional Background

- A. Report Purpose and Guiding Principles for Redevelopment
- B. ADG Scope and Approach
- C. List of Members of City of Concord's Ad-hoc Gasholder Committee
- D. National Register Nomination Excerpt and Link and Additional Information on Historic Significance
- E. Redevelopment Options; includes link to GZA Environmental Report issues by City of Concord and Liberty Utilities, July 2020
- F. Examples of Vibrant Interpretation/Access and Industrial Structures as Part of Brand Redevelopment
- G. Local Efficient District, Catalyst Concept Site Plans and Link to 2006 Master Plan for the Southern Opportunity Corridor Excerpt
- H. Market Options Worksheet, Site Plan with Added Building and Gasholder Building Models
- I. Gasholder Remedial Action Plan, N.H. Department of Environmental Services, 2015
- J. Report by Structures North, December 2020

Attachment A: Report Purpose and Guiding Principles

This report was prepared for an ad-hoc committee formed by Concord’s Mayor Jim Bouley in response to news that the owner of the Gasholder, Liberty Utilities, would file for a demolition permit for the building in December, 2020. Working under contract with the NH Preservation Alliance, which is providing support to the Committee, ADG was contracted in October 2020 to help the City determine what to do – if anything – about the possibility of the Gasholder building being demolished.

Factors including time, money, pandemic limitations, and market changes were all taken into consideration, as was a set of Guiding Principles adopted by the Committee at the outset of this effort.

The specific deliverables are possible redevelopment options, with explanation and recommendations, to be presented to the Committee for its consideration before its report to the City Council. While the primary audience for this report is the Committee, its findings will be shared with the public and future developers or investors.

Given the short-time frame for this report, it relies heavily upon previous work, especially in the technical areas, as well as on selected public records, similar situations elsewhere for envisioning concepts for redevelopment, third-party expert opinion, and concept level planning.

We appreciate the opportunity to assist in this very worthwhile effort, and hope that this work will help those responsible make more informed and better decisions.

ADG LLC

Concord, NH

December 2020

Guiding Principles for the Gasholder Redevelopment

Reviewed with Ad-hoc Committee in September, 2020 and used to shape report:

- Investment that preserves this iconic symbol of Concord's industrial growth, considered the last of its kind in the country. Listed on National Register for Historic Places in 2018.
 - Some public access to building or site preferred over none -- and likely on limited basis.
 - Auxiliary interpretation/documentation could help take place of physical access.
 - Retention of historic interior structure strongly preferred.
- Investment that improves historic character, aesthetics and economic strength of the City's southern gateway/corridor.
 - Creates visible symbol of entrance into downtown from the south.
 - Becomes a catalyst for further development in this section of the city.
 - Addresses environmental contaminants through containment and/or clean-up.
- Investment that helps meet other master plan goals such as
 - Uses that complement other land uses in immediate vicinity.
 - Considers whole site and not just structure.
 - Considers policy priorities beyond historic preservation such as housing, public open space, and others.
- Investment that preferably has neutral or positive impact on municipal services and revenues.
 - Understood that certain municipal investments may take several years to see positive return.

Attachment B: ADG Scope and Approach

Discovery Process

The following sources of information were reviewed for this report:

- GZA engineering report (issued July, 2020) with three Options, including a structural report and a demolition estimate.
- A report from Structures North (December, 2020) an engineering company contracted by the NH Preservation Alliance for an estimate of various costs for the building to be preserved in a manner that better accommodates historic preservation values
- Select NH Public Utility Commission public records
- Select NH Department of Environmental Services records
- City of Concord plans, including the 2006 redevelopment plan for the South Opportunity Corridor
- City Tax Rate and Tax Assessing records
- Local market reports on demand for residential and commercial properties, and knowledge of private and public funding tools
- Two virtual meetings of the Task Force with comments by Task Force members, invited expert guests and the public, and their incorporated suggestions
- Two NH Preservation Alliance-hosted virtual meetings, which were well attended and in one that ADG presented initial thoughts and concepts, and incorporated subsequent suggestions
- Research on similar sites elsewhere provided by three other consulting firms, each with experience in similar redevelopments situations
- Many on-line and off-line conversations, correspondences and discussions concerning city, utility, permitting, redevelopment, real estate, marketing, engineering, legal, neighborhood and general interests regarding the site. ADG is grateful for the assistance from these many sources in providing helpful information in an understandable and timely fashion.

Questions Considered That Affected the Redevelopment Feasibility Options Presented Utilizing ADG's 360 Opportunity Assessment Factors of *Money, Market, People and Place*

Money (Sources and Uses, or Costs and Revenues):

A. Costs:

- How much is required, and when?
- Who pays?
- How is a cost justified by either the city or the utility?
- How is any authorized expenditure commenced and overseen?
- What are the on-going costs?

B. Revenues:

- What are the possible Revenue sources; one-time and on-going?
- How might they be realized and increased?
- What are the possible investment sources?

Market:

- What is the current and projected market for landmark/educational redevelopments?
- What is the market for Historic-based redevelopments?
- What is the local market for mixed-use development that include residential, commercial, and public uses? Will the current over-heated residential demand continue? Post-COVID considerations?
- How well served is the area for local “3rd place” amenities?
- How can this site be leveraged to:
 - Enhance other City assets, including downtown, Main Street, City parks, natural resource areas, public and commuter transit, and branding?
 - Catalyze the long-planned South Opportunity Corridor development?

Who (or what entity) will own and operate any redevelopment, while ensuring historic, community and environmental requirements?

People:

- What are the owner's interests and plans?
- Why should either the utility or the city act?
- How will other key entities – such as the NH PUC and NH-DES – respond?
- What are the interests of the adjacent property-owners and neighborhoods?
- Who else is interested, and what do they know and think about the options?

Place:

- To safely remain as an effective brownfields' "cap", and as a possible future redevelopment, is rehab work necessary?
- As is, does the building have any use?
- As Stage 1 stabilized, does the building have use?
- Does the fully stabilized building have serious potential for commercial (taxable) redevelopment that meets historic standards?
- What does the 2.4 acres site with capped brownfield allow?
- Are there additional covenants or similar restriction to consider?
- What are the possible effects of demolition or further development upon:
 - Permitting, permits and agreements
 - Area redevelopment
 - Neighborhood traffic, services, amenities, property values
 - Tax revenues and demand for services
 - Public acceptance and consistency with each entity's Mission?

Attachment C: Members of City of Concord's Ad-hoc Gasholder Committee

Mayor Jim Bouley and City Council created an ad-hoc committee after learning of Liberty Utilities' plans to secure a demolition permit for the Gasholder.

City Councilors:

Byron Champlin, chair

Jennifer Kretovic (also serves on Concord Heritage Commission)

Linda Kenison

Brent Todd

Robert Werner

Additional committee members with business, preservation, real estate and design expertise:

Jon Chorlian, developer

Liz Durfee Hengen, historic preservation consultant

Huck Montgomery, Liberty Utilities

Frank Lemay, Milestone Engineering and Construction

Bill Norton, Norton Asset Management

Tim Sink, Concord Chamber of Commerce

Benjamin Wilson, N.H. Division of Historical Resources

The N.H. Preservation Alliance, the statewide historic preservation organization, is supporting the effort. ADG, LLC was hired to provide analysis and conceptual feasibility options.

Attachment D: National Register Nomination Excerpt and Link and Additional Information on Significance

The Concord Gasholder is listed on the National Register of Historic Places thanks to the efforts of the Concord Heritage Commission. Here is an excerpt below (paragraph breaks added). Full nomination [here](#).

From Statement of Significance:

The Concord Gas Light Company Gasholder House is significant at the national level under Criterion C in the area of Engineering as the last remaining example of a gasholder house in the United States that retains its gasholder. Concord Gas Light Company (chartered 1850), suppliers of illuminating gas to the City of Concord, New Hampshire, installed the Gasholder House in 1887–1888 during one of several late-nineteenth-century improvements to its facility on South Main Street. The structure was designed and erected by Deily & Fowler of Laurel Iron Works, Philadelphia—a nationally recognized firm in the field of gasholder design and fabrication. During the second half of the nineteenth century, coal gas was an important fuel for municipal and industrial illumination, as well as domestic purposes, and therefore played a significant role in the growth of American cities and industry. In this period, gasholder houses were emblematic of urban progress generally and the coal gas industry in particular, and, as one of the larger buildings or structures on a city’s skyline, often came to have landmark status in a community. In Concord, the introduction of coal gas coincided with a dramatic period of physical and economic expansion, as well as the community’s incorporation as a city.

The Gasholder House is located in South Concord, a residential and industrial area with strong associations to the late nineteenth century development of the City as a manufacturing and transportation hub. In the period 1900–1950, coal gas manufacturing and distribution facilities became obsolete as electricity and natural gas emerged as viable competitors. Concord Gas Light Co. discontinued use of the Gasholder House in 1952 when it switched to the sale of natural gas. Wholesale demolition of disused coal gas plants and their iconic gasholders has occurred across the country, and currently only a handful of gasholder buildings or gasholders survive. The Gasholder House is now the only known gasholder house in the country that retains its metal gasholder. It is demonstrative of typical late nineteenth-century gasholder house and gasholder design and retains all the essential physical features required to convey its engineering significance. The period of significance for the Concord Gas Light Company Gasholder House begins and ends in 1888, when the structure was completed and entered active use as a gasholder.

Additional Information on Historic Significance and Protections

At an October 29, 2020 presentation that was part of this feasibility study, state historic preservation officer Benjamin Wilson, preservation consultant Liz Durfee Hengen, retired state architectural historian Jim Garvin and National Park Service historian Roger Reed described the gasholder as an icon of Concord's history of industry and innovation, its last-of-its-kind national status, and how people and organizations across the U.S. who understand this kind of place want to see it saved.

Garvin discussed how gas revolutionized the way people lived and industry grew. Hengen showcased the multitude of diverse industries that propelled Concord's growth in the late 19th and early 20th centuries and their dependency on manufactured gas, though virtually none of these factories survive. She noted that, in the 60th anniversary year of the loss of Concord's railroad station, she and many others hope we will not see the same fate for the gasholder.

A video recording of the program on the history and significance of the landmark is [here](#).

The building and its accompanying 2.4 acres are listed on the National Register of Historic Places (thanks to the Concord Heritage Commission) and may well be worthy of (even higher) National Historic Landmark status. Neither designation prohibits demolition, but they do afford recognition and access to some resources. Similarly, Concord's demolition delay ordinance would allow time to explore alternatives to demolition but would not prevent it.

Attachment E: Redevelopment Options Worksheet

ADG analyzed the options analyzed by [GZA GeoEnvironmental in their report issued in July 2020](#), guiding principles set forth by the committee, market conditions, and explored three conceptual redevelopment Models-Options:

1. **Monument/landmark** with an educational element.
2. The Monument/landmark and **a commercial new building** being erected on site
3. The Monument/landmark and the commercial building as **Catalyst**, designed to initiate and catalyze a redevelopment of the areas around and adjacent to the site, by offering a unique theme and authentic asset. The site would act as the “hub” of a “hub and spoke” redevelopment scenario.

ADG’s recommended option is the third Option, the Gasholder site as Catalyst.

The Monument/Landmark – as stand-alone redevelopment – would require substantial capital and operating subsidies. It then becomes competition for other institutions seeking charitable contributions and grants, and the visitor market for museums with a narrow market is poor and - post covid – projected to get worse.

The **Monument/Landmark plus a commercial building** is less of a subsidy requirement for the site, but the stand-alone value of the small area available here (10,000sf max footprint, maximum 2 floors, limited parking, train noise, vagrancy issues), the off-street location, the availability of other underutilized commercial properties near-by, and dead-end location would probably not attract a standalone, commercial development that would generate significant property tax revenues.

The **Catalyst Option**: Monument/Landmark and commercial buildings themed around the Gasholder building and history. Utilize the building’s outside and the site commercially as a food and meeting place, e-scooter, bike-rental, and downtown walkway trailhead, to be the gateway to a:

- a) Redeveloped mixed-use “walk, live, play” 40+ acre neighborhood
- b) An adjoining natural resource park and solar farm
- c) A commuter and pedestrian transit hub
- d) A “3rd space” destination for the near-by residents and a
- e) Destination for interstate off-ramp visitors

The area’s proximity to downtown, existing city parks, significant natural resources, and two interstate exits could encourage this “smart, sustainable” mixed-use neighborhood that could generate jobs, housing, community vitality, as well as significant new property tax revenues.

The existence of an authentic “logo” to provide a theme for the area is not a guarantee that it will happen; there are many impediments to success. There are examples where similar post-industrial sites have attracted investment and people; some examples are included in this report.

The technology and innovation of this 1888 fossil-energy innovation will be of interest to the current and future advocates of green, fossil-free energy, such as solar, which is included in the Catalyst concepts.

Conversely, the demolition or collapse of the Gasholder building makes the innovative redevelopment of this area less interesting - less “cool” - for a future residential, commercial, sustainable, and amenity rich neighborhood.

Attachment F: Examples of Vibrant Interpretation/Access and Iconic/Industrial Structures as Part of Brand Redevelopment

Examples from around the state, country and the world offer ideas for how to add 24/7 access and interpretation to the site.

This former mill in Mansfield, NJ has windows linking viewers to the water power that once fueled it. Photo: Realtor.com.



Common Man Restaurant in Claremont, NH has a design treatment to allow visual access to water to help interpret its industrial past as well.



This Philadelphia visitor destination features sculptural depiction of lost structures as well as “windows” to archeological evidence and interpretation. Photo: Pinterest/Google.

Examples of exterior lighting that adds vibrancy and interpretation to a site.





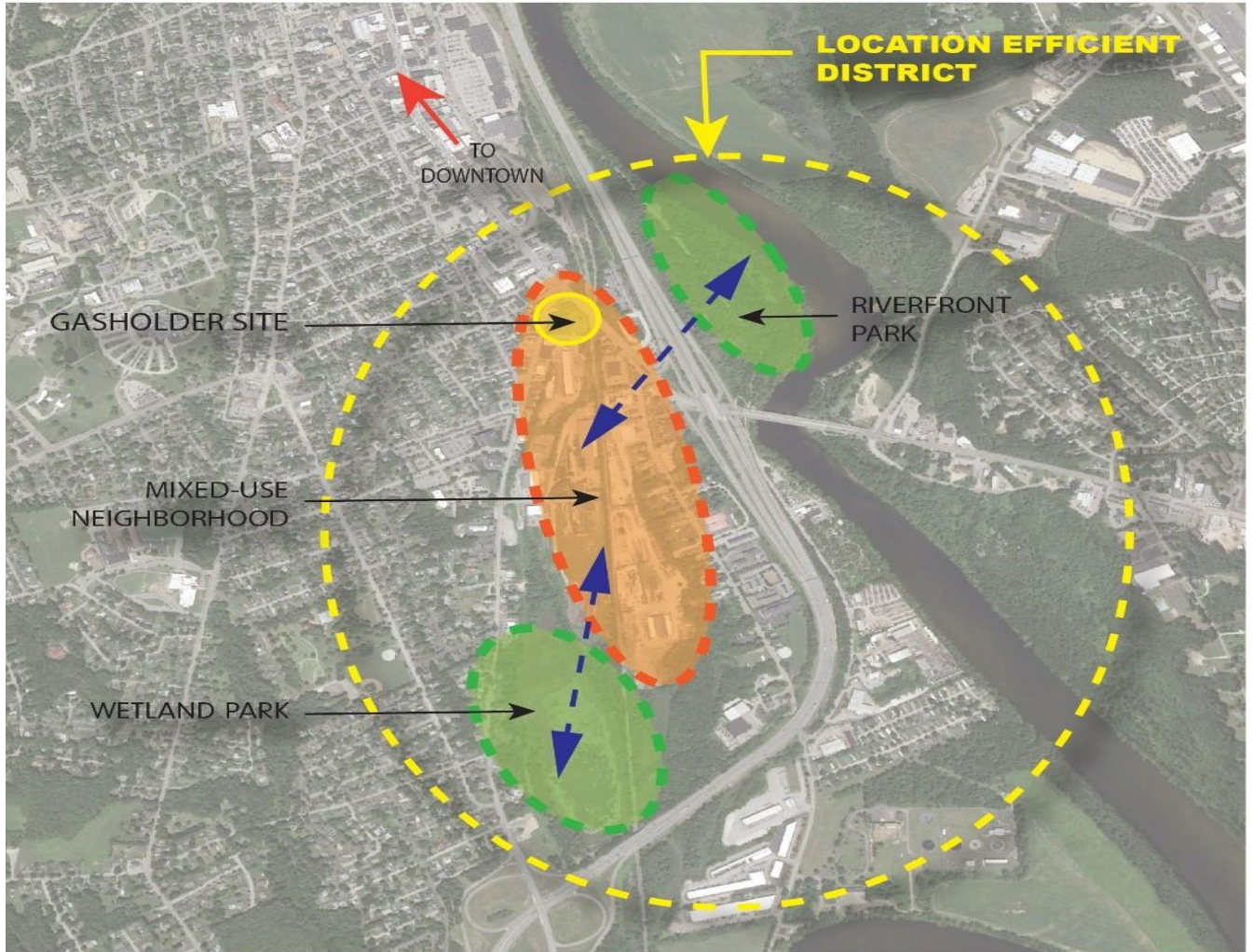
The 19.1-acre Seattle Gas Works Park revived a former coal gasification site and features recreational and other uses.



Five decommissioned 20-story blast furnaces in Bethlehem, PA, make up the backdrop for [SteelStacks](#), which includes commercial space, an outdoor concert stage, and a casino amidst an extensive and picturesque complex of historic blast furnace equipment.

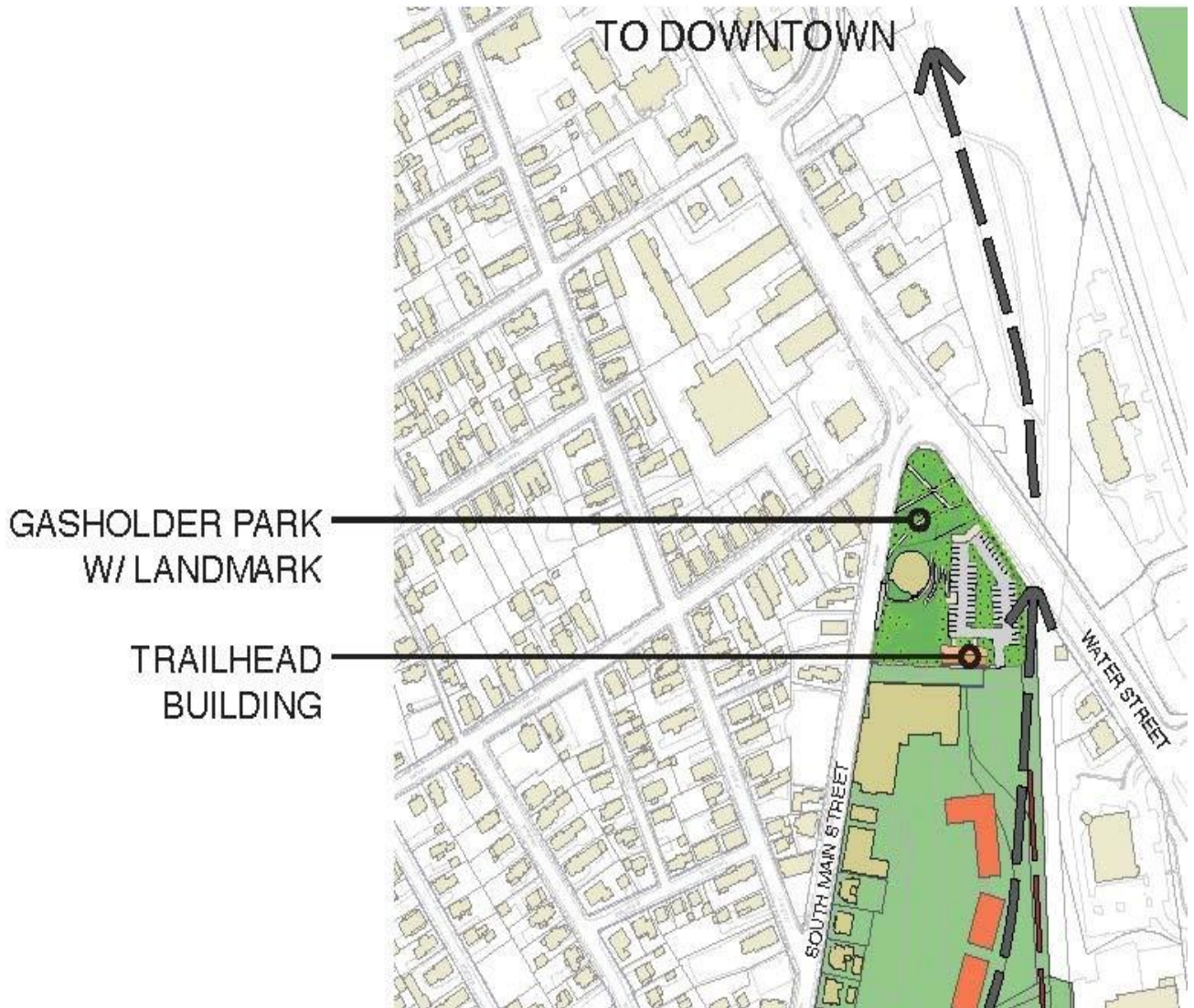
Attachment G: Local Efficient District, Catalyst Redevelopment Site Plans and Link to 2006 Master Plan for the Southern Opportunity Corridor Excerpt

The Gasholder property benefits from its site in what's considered a local efficient district, with close proximity to downtown, mixed-use neighborhoods and natural and recreational assets.



Catalyst Scenario Site Plan

This site plan uses the [City of Concord's 2006 Southern Opportunity Corridor Redevelopment Plan](#) as a starting point. Buildings are depicted in orange. Note trails, pedestrian-bikeways, and solar farm ideas as environmental buffer to marsh area. Closer looks of sections of plan follow.



ADAPTIVE REUSE OF
EXISTING BUILDINGS

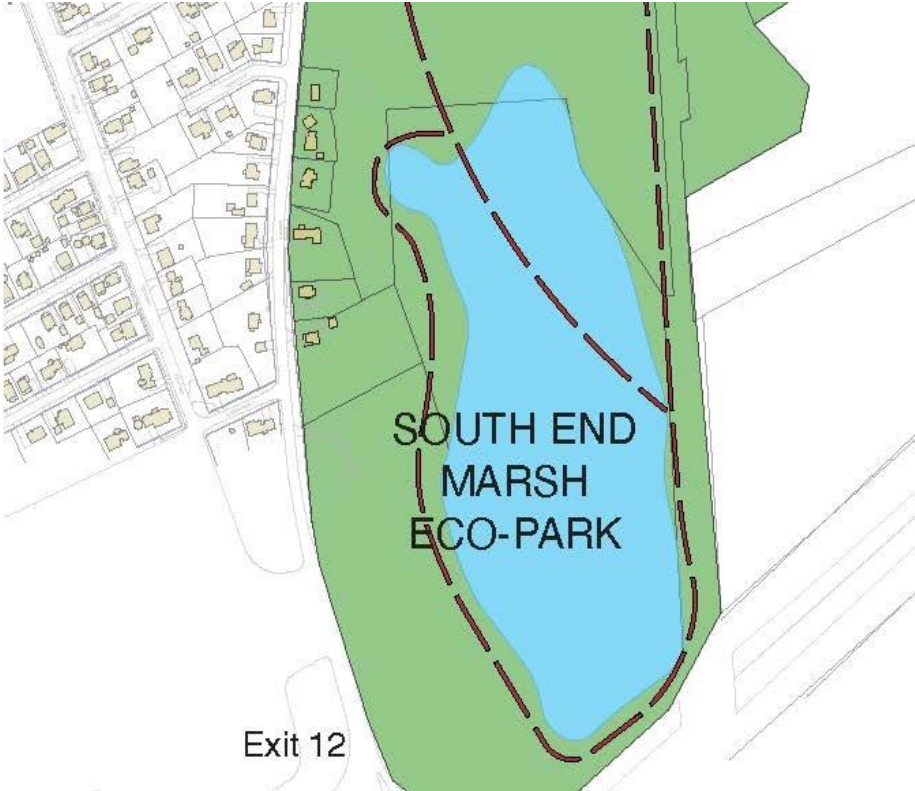
TRANSIT HUB
W/ HISTORY
EXHIBITS



2006 MASTER PLAN
W/ EXPANDED TRAIL
AND STREET
CONNECTIVITY

SOLAR FARM



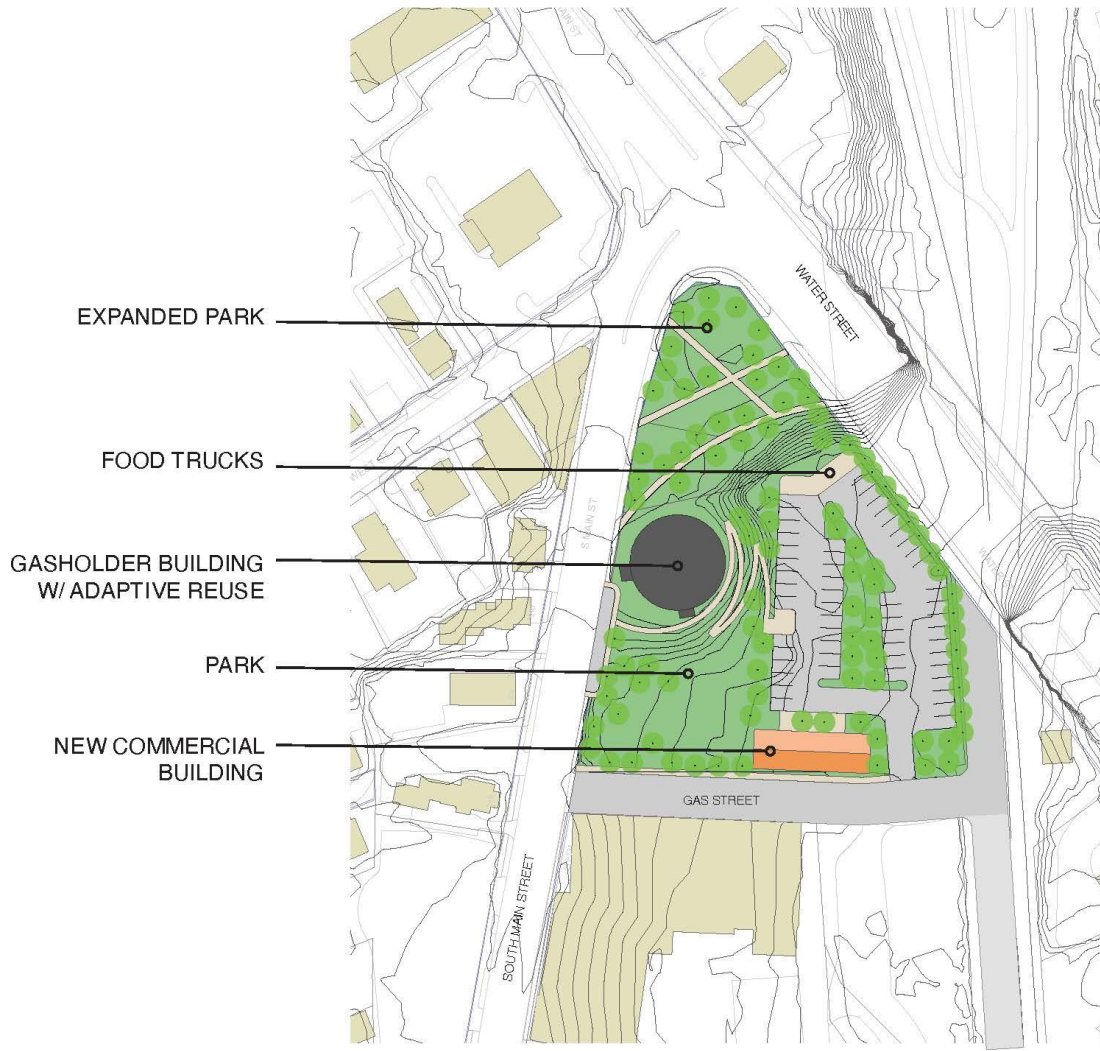


Attachment H: Market Options Worksheet, Site Plan with Additional Structure and Gasholder Building Models

	CONCLUSIONS		CRITERIA							
	OVERALL COMMENTS	Compatibility for Site	Neighborhood Impact	Market Supportability	Social Needs and Inclusion	Historic Preservation	Employment Opportunities	Environmental Considerations	Cost/Level of Risk	Potential Catalytic Effects
Conference/Special Event	Excellent opportunity to activate building with sustainable use that engages community, but may face short-term market challenges.	HIGH	Can present "best face" to neighborhood, keep exterior largely intact while improving property	Event business is in crisis, but strong longer-term potential	Activation of outdoor space can be huge boost to entire neighborhood	Potential to leave building and Gasholder infrastructure intact, minimal alteration to exterior	Direct impact for event/catering business, good amenity for broader business community	Potentially limits disturbance of capped site	Minimal alteration to building, but will need kitchen, bathrooms, and other interior improvements	Potential complementary use with restaurant, maker space, retail, etc.
Restaurant/Drinking Establishment	Strong potential to attract destination business that catalyzes revitalization of neighborhood and activate outdoor space.	HIGH	Maximizes access to community	Very strong residential base and appeal to regional market	Activation of outdoor space can be huge boost to entire neighborhood, especially if family oriented	Exterior could stay intact, but significant interior upgrades are needed	Good job opportunities, though many are lower paying	Potentially limits disturbance of capped site	Minimal alteration to building, but will need kitchen, bathrooms, building systems, and life safety improvements	Anchor business that can drive revitalization of whole South End. Best way to activate outdoor space
Distillery/Brewery/Maker Space	Good opportunity to attract entrepreneurs, create jobs, and provide complementary use to retail, dining, and event spaces.	HIGH	Opportunities for programming to engage with public	Very strong opportunities for a variety of related uses	Activation of outdoor space can be huge boost to entire neighborhood	Exterior could stay intact, but significant interior upgrades are needed	Strong entrepreneurship opportunities, creation of higher-skilled jobs	Potentially limits disturbance of capped site	Shell cost is fairly low, but tenant fit-out could be expensive	Potential complementary use with restaurant, conference, retail, etc.
Housing	Strong market support and positive impact to community, but would disturb building and site and makes the site exclusive to residents.	MEDIUM	Adds people to neighborhood, increasing spending power	Very strong, high demand for housing in Concord	Makes it an exclusive property, limits community access to it	Would need significant added footprint for multifamily, extra parking	Limited, only construction and property management	Need to disturb more of the property, could cause issues	High due to need for modifications to building, but low risk due to stronger market	Adds people and life to site, but makes it exclusive to residents
Retail	Strong potential, but would require unique users and may not be compatible with the needs of the community.	MEDIUM	Depending on exact users could draw significant activity from neighborhood	Potentially strong due to unique nature of space and proximity to revitalized downtown	Depends on goods and services, could either add to inclusion or take away from it	Potential to leave building and Gasholder infrastructure intact, minimal alteration to exterior	Potential for one of a kind "showroom" space for unique retail businesses, especially local manufacturers	Potentially limits disturbance of capped site	Shell cost is fairly low, but tenant fit-out could be expensive	Depends on type of business and if it draws a regional clientele
Cultural Use	Potential for strong impact to community, but very expensive and risky to launch and operate.	MEDIUM	Potentially very strong, can create enormous pride and value	Very difficult to launch and sustain cultural facilities in this environment	Activation of outdoor space can be huge boost to entire neighborhood	Very compatible use of building, user will be most sensitive to preservation of building	Limited	Potentially limits disturbance of capped site	Very high risk of financial failure, will need ongoing funding support	Depending on programming, can spur additional activity
Hotel/Lodging	Would require significant disturbance to building and site, may not be market supportable, and adds little to the neighborhood.	LOW	Minimal	Business travel market is in crisis, may not be supportable	Makes it an exclusive property, limits community access to it	Would need significant added footprint for hotel, iron would have less impact	Good job opportunities, though many are lower paying	Need to disturb more of the property, could cause issues	High due to need for modifications to building, high risk due to market	Minimal
Office	Opportunity to attract jobs to unique space, but market outlook is weak and would have very limited positive impact on the community.	LOW	Minimal	Office market is uncertain, demand may stay low for several years	Makes it an exclusive property, limits community access to it	Would need to make major modifications to building, would need to add significant parking	Could attract new business, but not significant	Need to disturb more of the property, could cause issues	High due to need for modifications to building, high risk due to market	Minimal
Health Care/School	Would create good job opportunity, but would require major alterations to building and site and is not ideal for the community.	LOW	Limited to students and patients	Potentially strong demand for certain types of uses	Makes it an exclusive property, limits community access to it	Potentially very invasive to building, negative impacts to integrity of building	Good opportunity to create jobs in education and health care sectors	Need to disturb more of the property, could cause issues	Very expensive to retrofit for these uses, unlikely to find funding sources	Minimal

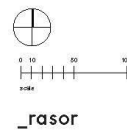
Site Plan with Additional Building -- Two Versions





GASHOLDER SITE I SCENARIO C

CONCORD, NH
5.20.20



Concord Gasholder Building Models

Jackie Barton, 10-13-2020



Monument/Park Enhancement

In this approach, the community will protect the building, preserving it for future use and ensuring it is secure and structurally intact. Periodic access could be granted depending on safety assessment. The surrounding 2+ acres would be improved as parkland. Ownership could be a public entity, a nonprofit, a land bank/trust, or similar organization. Examples of successful projects that incorporate historic structures into park sites without active use include the following:

- Kings Cross Gasholder Park (UK) utilizes creative lighting effects in a pocket park to make an 1850s cast iron gasholder frame structure the main experience of this space. “During the day the park sees local families, visitors on the King’s Cross Heritage Trail and Central Saint Martins’ students stepping away from the bustle of the city. This is the perfect place to relax and watch the narrow boats at St Pancras Lock. The circular lawn is also a great play space for local families as well as the children who attend the new school in the neighbouring Plimsoll Building.”
 - <https://www.architectmagazine.com/technology/lighting/gasholder-park-kings-crosslondon> ◦
 - <https://www.kingscross.co.uk/gasholder-park>
- One applicable example is St. Dunstan’s in the East (London, UK):
<https://www.atlasobscura.com/places/the-ruins-of-st-dunstan-in-the-east-london-england> ◦ A small park site in an urban setting ◦ Draws tourists and photographers as well as park-seekers ◦ Site is valued for its history and historic integrity
- Another particularly interesting example is the Seattle Gas Works park, which can be viewed on a continuum from a passive inclusion of historic structures to a deeper investment in the site. This 19.1-acre park on the site of a former coal gasification site is a signature site for Seattle’s parks: <https://parkways.seattle.gov/2018/10/05/gas-works-park-play-area-opens/>
- Though they are run as a site, some of the uses and passive stabilization is applicable from Sloss Furnaces (AL): <https://www.slossfurnaces.com/>
 - Former iron furnaces ◦ Open as a museum and venue, photography site
- The Bethlehem Steel Blast Furnaces and Hoover Mason Trestle (PA) use the trestle as a viewing walkway for the blast furnaces to explore the site’s history. They are the backdrop

for the Levitt Pavilion, which is a grassy amphitheater. Good lighting of the blast furnaces makes them interesting to see day or night.

- <http://hoovermason.com/>
<https://levitt.org/bethlehem>
- Bulow Plantation Ruins State Park (FL) offers examples of how ruins can enhance a larger park experience: <https://www.floridastateparks.org/parks-and-trails/bulow-plantation-ruins-historicstate-park>
- Five decommissioned 20-story blast furnaces in Bethlehem, PA, make up the backdrop for **SteelStacks**, which includes commercial space, an outdoor concert stage, and a casino amidst an extensive and picturesque complex of historic blast furnace equipment. The artifacts were able to be saved in this case because of the commercial development and its revenue. Steelstacks is 9.5 acres and attracts 1.5 million visitors per year.
<https://www.steelstacks.org/about/what-issteelstacks/>
- The Troy Gas Light Company (NY) is used today for storage, a garage and “occasional music and arts presentations,” according to Wikipedia.
https://en.wikipedia.org/wiki/Troy_Gas_Light_Company.

Attachment I: Gasholder Remedial Action Plan, N.H. Department of Environmental Services, 2015

Link to copy of document is [here](#).

Attachment J: Structures North Report, December 2020 follows with its own page numbering.

21 December 2020

Jennifer Goodman
Executive Director
N.H. Preservation Alliance
7 Eagle Square
Concord, NH 03301

Reference: Concord Gasholder House Evaluation

Dear Jennifer:

On December 2, 2020 I visited the disused Concord Gasholder House on Gas Street to perform an evaluation of the structure and to look at ways that it might be saved. The following is a summary of my observations and my findings.

STRUCTURE DESCRIPTION

According to the NPS HEAR drawings that we were forwarded, the Concord Gasholder House is a 27-foot tall by 88-foot diameter above-grade brick bunker structure with a 27-foot high self-supporting conical roof, enclosing what is believed to be the last intact gasholder in North America. Set on the side of a hill, the above grade structure rests upon the rim of a 25-foot deep by 88-foot reservoir that was once filled with water and out of which the inverted gas containment tank raised and lowered depending upon supply.

The perimeter bunker wall is 12" thick mass masonry with sixteen 8" x 44" nominal brick pilasters distributed about the exterior.



The roof is framed with sixteen 3" x 14" principal rafters that ascend from the tops of the pilasters to a compression ring at the top of cone, on which rests a wooden cupola. The sides of the cone are framed with three tiers of 2" x 8" common rafters that are supported by

wooden purlins that span between the principal rafters. The upper purlins are 3" x 12" and the lower purlins are 3" x 14". The compression ring at the top of the cone measures 10" x 10" and is made up of multiple wood plies. The tension ring at the bottom of the cone is approximately 12" wide by 8" tall and is made up of 10 interwoven laminations of wood.

STRUCTURAL THEORY

The gasholder house superstructure is composed of three primary elements: (1) The circular brick bunker (2) the conical wooden roof and (3) the wooden cupola.

Bunker Wall

The bunker is basically a circular brick wall with punched window openings that takes the vertical roof loads and brings them to the ground. The bunker wall is stiffened by the 16 brick pilasters and the corbeled cornice that runs around the exterior. The bottom ends of the principal rafters land over the pilasters and the guide rails for the movable inverted tank are attached to the pilasters on the inside.

Conical Roof Structure and Cupola

In the most basic sense, one could think of the roof as a large teepee that bears on the top of the circular bunker wall.

The supporting ribs or the teepee would be the principal rafters, which all lean on each other at the top, and want to spread out at the bottom. This concept, however, is a bit deceptive, as the principal rafters are in this case not strong enough in bending to span from the base to the apex and hold up the the conical roof. Instead, I believe that the roof actually functions



more like a stacked segmental dome, which is not dependent on the principal rafters for primary support, rather, its stacked components support themselves.

The first step in construction would have been laying the circular tension ring atop the bunker walls and then building falsework up the center of the cone to support the compression ring at the top. The sixteen single piece, principal rafters would then have been erected to span between the tension ring and the apex of the roof where this was installed a compression ring that left an open oculus below the cupola. The intent of the principal rafters were to

provide a geometric form about which the cone would be erected, and to help the cone retain its shape under unbalanced loading.

Next, the first ring of purlins would have been installed between the principal rafters- these are at about the third point up the roof. Common rafters would then have been installed between the base tension ring and the ring of purlins, and then covered over with sheathing boards. At this point, the lower third of the roof would have now functioned like a truncated dome, with the tension ring at the bottom resisting the outward thrust and the purlin ring resisting the inward.

In similar manner, the second ring of purlins would have been installed along with rafters and sheathing between them and the first purlin ring. At this point the second course of roof construction would be supporting itself between the first and second purlin ring, with the inward thrust going into the second ring and the outward thrust actually passing through the first purlin ring and first rafter course into the tension ring at the bottom.

The third course of roof construction would have been constructed in similar fashion but with the compression ring at the very top of the cone taking the inward thrust.

Following the construction of the cone, the cupola would have then been constructed on top.

Calculated Loads and Stresses

We ran some approximate load calculations to test the “coursed dome” theory described above, considering the weights of component materials and anticipated snow loads. We found the following:

The tension load in the tension ring is approximately 90,000 lbs, resulting in tension average tension stress of about 1,400 psi, which is reasonable for design stress for the type of high grade lumber material that would have been used for this application.



The compression loads in the first and second purlin rings came out to about 30,000 lb. and 10,000 lb., resulting in compressive stresses of 700 psi and 260 psi, respectively. These stress levels are within an acceptable range. Because of their segmental geometries, the purlins also experience bending stresses between the principal rafters, where the segmental forces are resolved. Checking these for bending, the first and second rings of purlins have

bending stresses of 1,800 and 860, respectively. Unfortunately, the stresses on the lower purlins are higher than they should be, and may not have been properly accounted for in the original design, whereas the upper purlins are OK. *The first ring of purlins should be reinforced for bending.*

I also checked the common rafters in bending and the stresses came to about 1,200 psi, which is on the high side of reasonable.

We have not analyzed the principal rafters since these are theoretically unloaded elements, except for unbalanced loading, which would be resisted by a combination of the rafters and the existing sheathing, the analysis of which is beyond the initial scope of this investigation. *Based upon observed conditions, as noted below, it is likely that the more complex analysis will determine that the principal rafters and sheathing are technically insufficient under unbalanced conditions and will need to be reinforced.*

NOTED STRUCTURAL CONDITIONS

During my investigation I note the following conditions:

Cone Structure



The most obvious damage that has occurred involves the impact site where a large tree crashed through the roof in the northern portion of the structure. The impact damage was addressed by Preservation Timber Framing who patched the hole and erected staging to help support the surrounding roof structure and reinforce staging to support the apex of the roof. Although this has been helpful to stop further water ingress and localized collapse, one can still see the wider ranging effects of the event in the significant sag that has occurred in the surrounding portion of the roof.

The sag has put significant bending stresses in the principal rafters. In addition, many of the common rafters in the area are bent in the horizontal direction due to lateral shifting of the structure in response to this event. *The principal rafters should be stiffened and the roof sheathing improved in order to arrest this deformation.*

Unfortunately, the tension ring has materially failed due to wood rot fungus and is essentially severed, shifting all of the tie action to whatever reserve capacity is achieved with the sheathing boards and roof purlins.



Tilting Cupola

The cupola is leaning toward the west. According to an 80+-year old mother of a good friend who grew up in Concord, she remembers having marveled over the cupola's tilt in her youth. The theory that this was caused by the hurricane of 1938 may have some validity, given the timeframe.

Bunker Wall

The bunker wall is in generally intact condition except for the north end. There are scattered areas where the mortar joints are eroded *and in need of cutting and repointing with a compatible mortar.*



Other than for the tree impacted north portion of the bunker wall, typically all of the brickwork except for the top 4 to 6 courses is in materially good, well-bonded condition. The top courses on the west and part of the south portions of the structure appear to have undergone repeated freezing and thawing cycles under wet conditions and are lifting and separating and need to be incrementally taken apart and rebounded back together.

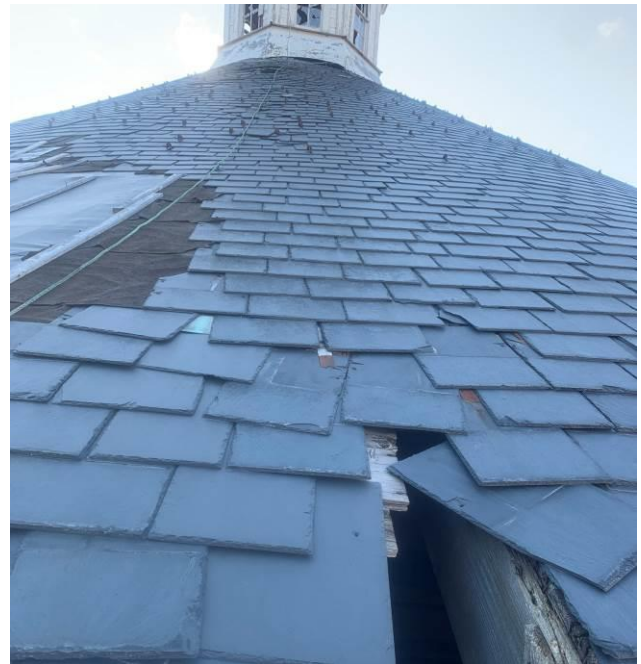
At the north portion of the wall, the tree damage has allowed water to rain in for several years. This water infiltration not only caused the tension ring in this area to rot away but the eave to shift outward, dragging the bunker wall's cornice with it. In addition, the uninhibited rainwater appears to have soaked deeply into the brickwork and caused the masonry assembly to materially degrade through repeated freezing and thawing cycles.



The result is an approximate 80 foot long by 4 foot deep section of brickwork that has broken into loose fragments that are bent outward and remain loosely perched on the intact portions of the wall below. *All this will need to be reconstructed.*

Slate Roof

While the roof slates themselves appear to be in materially good condition, there are areas where slate are loose, missing or are creased or folded. Also, one can see numerous points of light from the interior, where the roof has been breached. *The slating should be removed and reapplied.*



RECOMMENDATIONS

Based upon the observed conditions and upon our analysis, we have the following recommendations, which are also summarized graphically on our Concord Gasholder House Stabilization Schematic. We see the work taking place in two phases.

Phase 1/ Emergency Stabilization

The purpose of this initial emergency work is to eliminate the possibility of immediate collapse. This work would also be focused on preserving the unique and historic elements of the gasholder house that define its significance while meeting the intent of the Secretary of the Interior's Standards for Historic Preservation. Work would consist of the following in the following order:

- E1- Add wooden dunnage restraints to the failed masonry by carefully drilling through it and installing threaded steel rods to between vertical 4x4s on each side of the masonry to tightly clamp them together. This will require safe access via the existing staging on the exterior and interior, and some additional access beyond the staging using ropes and ladders. Drilling would be done with a coring bit so as not to vibrate or disturb the brickwork as it is being done.*
- E2- Extend the existing staging and remove the existing roof eave cornice along an 80 foot length to expose the existing laminated wood tension ring. At each end mount a fabricated steel drag strut made of a bent heavy duty galvanized steel angle with thick plates at each end. These would be lag screwed or bolted onto the face of the tension ring.*
- E3- Between the opposing ends of the drag struts run two large diameter wire rope ties terminated against the end plates with threaded rods. Tighten the wire ropes to a tension of 75,000 lb using a torque wrench in order to take load out of the failed portion of the tension ring by bypassing it.*
- E4- Remove all of the slate from the roof and stockpile it on site. Removal will save about 60 to 70 percent of the existing Munson black slate, which is no longer manufactured and has significant salvage value.*
- E5- Temporarily cover the existing roof with two layers of 30 lb felt. Install a wooden cover for the hole at the top of the cone where the cupola has been removed. (Phase 2)*

The above work should be done as soon as possible but without snow on the roof, making it dependent upon an at least partially mild winter. Restoration of the tension ring at the bottom of the cone, bracing of the falling masonry, and reduction in weight should get the structure through the coming season and is a necessary first stage in what will hopefully be a multi-step, multi-phase effort to stabilize and restore this last-of-its-kind historic structure.

As long as after the completion of each effort the structure is maintained in a weather-tight and structurally secure condition, a multi-step, multi-phase approach may take as long as fundraising might require without further jeopardizing structure.

Phase 2/ Cone Stabilization

The purpose of this work is to bring the cone up to a serviceable state of good repair.

- C1- Remove the temporary roof protection and inspect the existing sheathing, replacing damaged boards and creating access points for work below by temporarily removing others.*
- C2- Brace, cut free and remove the cupola with a large crane and land it on the property for repair.*
- C3 Into the hole left by the cupola, insert rectangular galvanized steel tube shape rafter scabs into the interior via crane. These would be used to help strengthen and realign the 16 principal rafters and would be fabricated to their approximate geometries. They would have clips along their lengths to press-fit against the bottoms of the rafters and the bottom ends would be fastened to the inner face of the bunker wall and the tops would protrude out of the open hole at the top. Fastenings would be made from above via the holes made by sheathing board removal. Once these have been installed, the extended tops of the scabs on the low side of the hole would be jacked upward (and the high side slowly lowered) using the existing staging tower in an effort to realign them toward a common elevation. When they are reasonably close to vertical alignment, a field-adjustable node connection would be installed to create a common apex, which is lacking in the original design.*
- C4- Bring PSL manufactured timbers into the interior via the grade level entrance and rope up into position against the bottoms of the lower purlins as scabs to reinforce them. Hoisting and fastening would be done via board removal the holes made in the roof.*
- C5- Inspect the roof framing and make as many miscellaneous framing repairs as possible via roped access from removed sheathing board holes.*
- C6- Reinstall the removed sheathing boards and cover the existing roof in plywood, and then with rolled roofing. Because of the roof's conical geometry, the plywood would need to be oriented vertically with sides cut in a trapezoidal manner and laid in ascending courses.*
- C7- Cut off the failed plies of the ring and splice in new plies by bolting them in place. These will resist more compression than tension due to the tightening of the wire ropes.*
- C8- Remove the remaining cornice around the base of the cone and install two high capacity wire rope ties around the remainder of the tension ring with intermediate turnbuckles for tightening. The ends of the wire ropes would be terminated into the unused ends of drag struts that were installed under item E2, and the entire loop would be tensioned to up to 75,000 lb.*

C9- Reinstall and/or recreate the wood trimmed cornice to conceal the wire rope.

C10-Reinstall the cupola on a new, leveled base atop the compression ring. The cupola itself should be restored while on the ground.

C11-Re-slate the roof. Because of the 30% to 40% loss from removal, either find replacement Monson black slate, which will be difficult, or sell the salvaged Monson slate and purchase new, dark gray slate or similarly appearing synthetic material for a uniform appearance.

Ideally this work should ideally take place in the spring of 2021, however the slating work could be delayed until funds become available.

Phase 2/ Bunker Wall Stabilization

The purpose of this work is to bring the bunker wall up to a serviceable state of good repair.

B1- Incrementally dismantle and reconstruct failed brickwork to the original planes and geometry, using as many of the original bricks as possible.

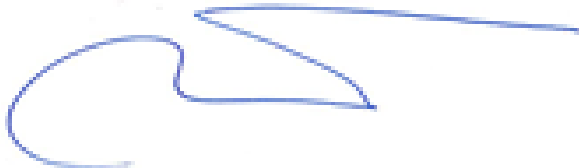
B2- Remove the temporary roof protection and inspect the existing sheathing, replacing damaged boards and creating access points for work below by temporarily removing others.

This work should take place in the late spring and summer of 2021.

Thank you for the opportunity to investigate this lovely and historic landmark. I must say that I have been impressed with the amount of familiarity and interest that so many of my colleagues have in this last of a kind structure and the prospect that it can be preserved. We are all fans and I am personally excited to be part of this effort.

Please contact me if you have any questions or concerns.

Respectfully Yours,



John M. Wathne, PE, President
Structures North Consulting Engineers, Inc.

**Concord Gasholder House Stabilization
COST ESTIMATE**

**12-21-2020
Structures North Consulting Engineers, Inc.**

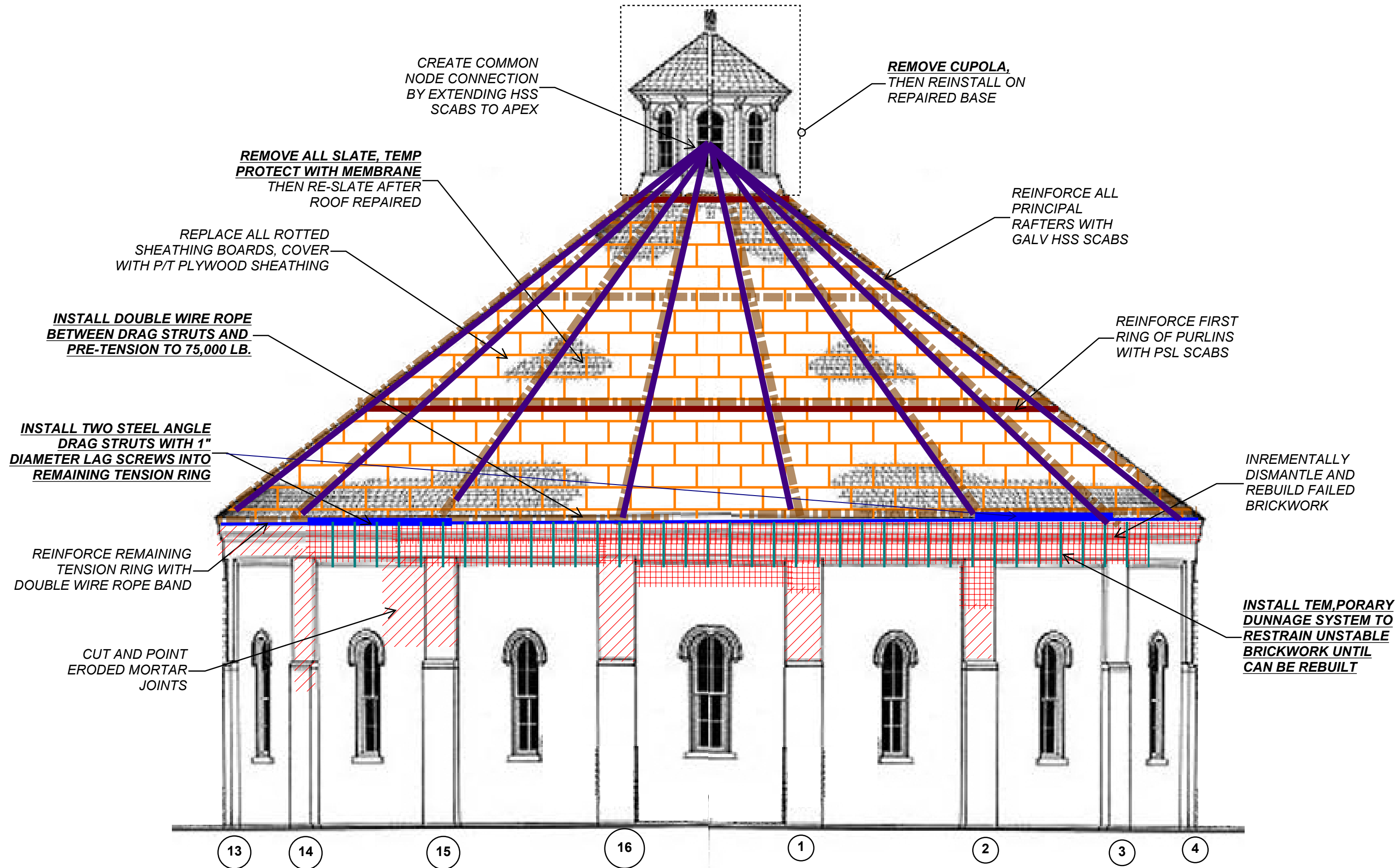
ITEM	QUANTITY	RATE	UNIT	LOG. FACT.	TOTAL
<u>EMERGENCY WORK (WINTER 2020/21)</u>					
Expand Staging to Eave	1	\$10,000	LS	1.1	\$11,000
DBL Wire Rope Tie Link	48	\$100 / LF		2	\$9,600
Drag Strut Assemblies	2	\$20,000 / EA		2	\$80,000
Temporary Bricwork Dunnage	400	\$100 / SF		1.5	\$60,000
Cornice Removal + Prep	90	\$50 / LF		1.5	\$6,750
Slate Removal/ Temp Protect	8,700	\$12 / SF		1.2	\$125,280
Subtotal/ Emergency =					\$292,630
SUGESTED DESIGN CONTINGENCY @25% =					\$73,158
A/E FEES @ 12.5% =					\$45,723
SUGGESTED EMERGENCY PHASE PROJECT BUDGET =					\$411,511
<u>CONE AND BUNKER STABILIZATION (2021)</u>					
Remove Cupola	1	\$30,000	LS	1.5	\$45,000
Plywood Cover Roof + Felt	8,700	\$18 / SF		2	\$313,200
Sheathing Repair	8,700	\$5 / SF		1.5	\$65,250
Galv HSS Rafter Scabs	960	\$120 / LF		4	\$460,800
PSL Purlin Scabs	194	\$50 / LF		4	\$38,800
Tens Ring Dutchman Splice	1	\$10,000	LS	2	\$20,000
Misc Framing Repairs	1	\$50,000	LS	4	\$200,000
Apex Node Connection	1	\$50,000	LS	2	\$100,000
Re-Set Cupola	1	\$40,000	LS	2	\$80,000
New Slate Roof (Incl Flash)*	8,700	\$20 / SF		1.5	\$261,000

**Concord Gasholder House Stabilization
COST ESTIMATE**

**12-21-2020
Structures North Consulting Engineers, Inc.**

Extend Staging All Around	1	\$35,000 LS	1.1	\$38,500
Cornice Removal + Prep	166	\$50 / LF	1.5	\$12,450
DBL Wire Rope Tie Assist	256	\$100 / LF	2	\$51,200
Rebuild Cornice	256	\$75 / LF	1.5	\$28,800
Brick Masonry Reconstruct	750	\$120 / CF	2	\$180,000
Cutting and Pointing	1,000	\$60 / SF	1.5	\$90,000
<hr/>				
Subtotal/ Cone and Bunker Wall =				\$1,985,000
SUGESTED DESIGN CONTINGENCY @25% =				496,250
A/E FEES @ 7.5% =				186,094
SUGGESTED CONE AND BUNKER TRUCTURAL PROJECT BUDGET =				\$2,667,344
<hr/>				
GRAND TOTAL =				3,078,855

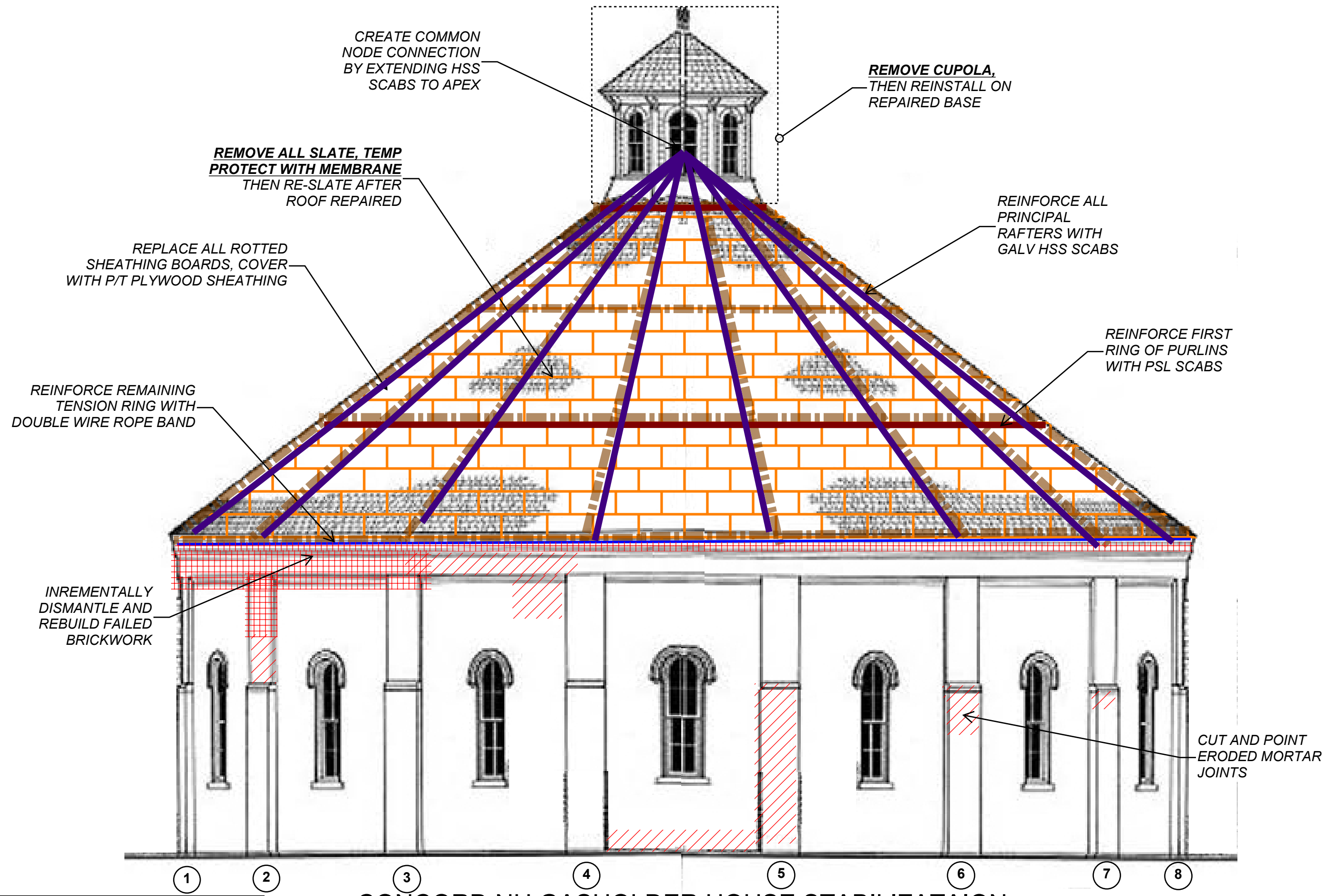
* Please note that a less expensive and lighter weight material might be considered in lieu of slate if it will allow the project to move forward.



ITEMS IN BOLD TO BE COMPLETED DURING WINTER 2020/21, ITEMS NOT IN BOLD TO BE COMPLETED DURING SUBSEQUENT PHASE

**CONCORD NH GASHOLDER HOUSE STABILIZATION
ELEVATION VIEW FROM NORTH**

Structures North
CONSULTING ENGINEERS, INC.
60 WASHINGTON ST, SALEM, MA 01970
JMW/ DRAFT 12-10-2020



CREATE COMMON
NODE CONNECTION
BY EXTENDING HSS
SCABS TO APEX

REMOVE CUPOLA,
THEN REINSTALL ON
REPAIRED BASE

REMOVE ALL SLATE, TEMP
PROTECT WITH MEMBRANE
THEN RE-SLATE AFTER
ROOF REPAIRED

REINFORCE ALL
PRINCIPAL
RAFTERS WITH
GALV HSS SCABS

REPLACE ALL ROTTED
SHEATHING BOARDS, COVER
WITH P/T PLYWOOD SHEATHING

REINFORCE FIRST
RING OF PURLINS
WITH PSL SCABS

REINFORCE REMAINING
TENSION RING WITH
DOUBLE WIRE ROPE BAND

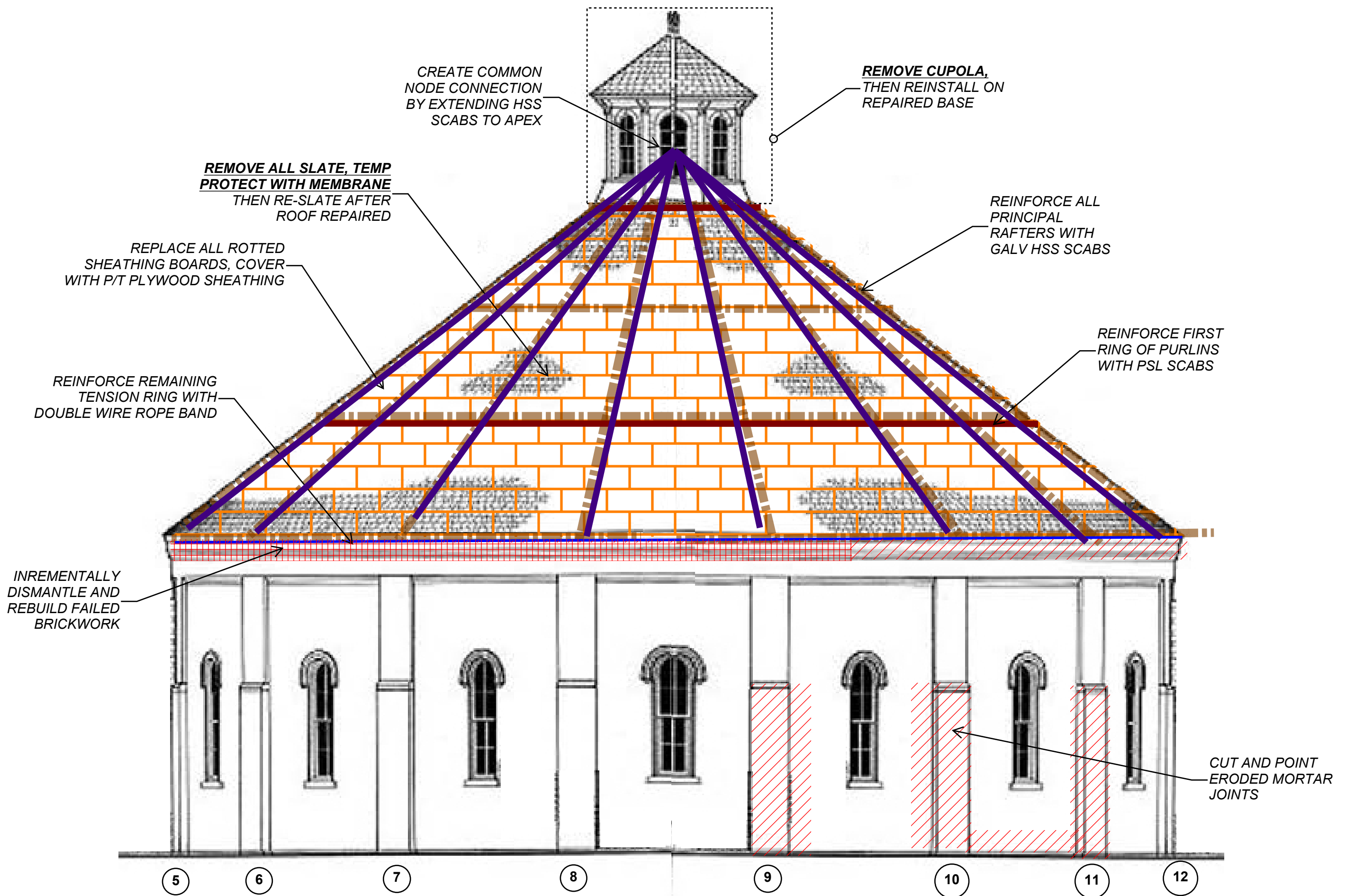
INCREMENTALLY
DISMANTLE AND
REBUILD FAILED
BRICKWORK

CUT AND POINT
ERODED MORTAR
JOINTS

1 2 3 4 5 6 7 8

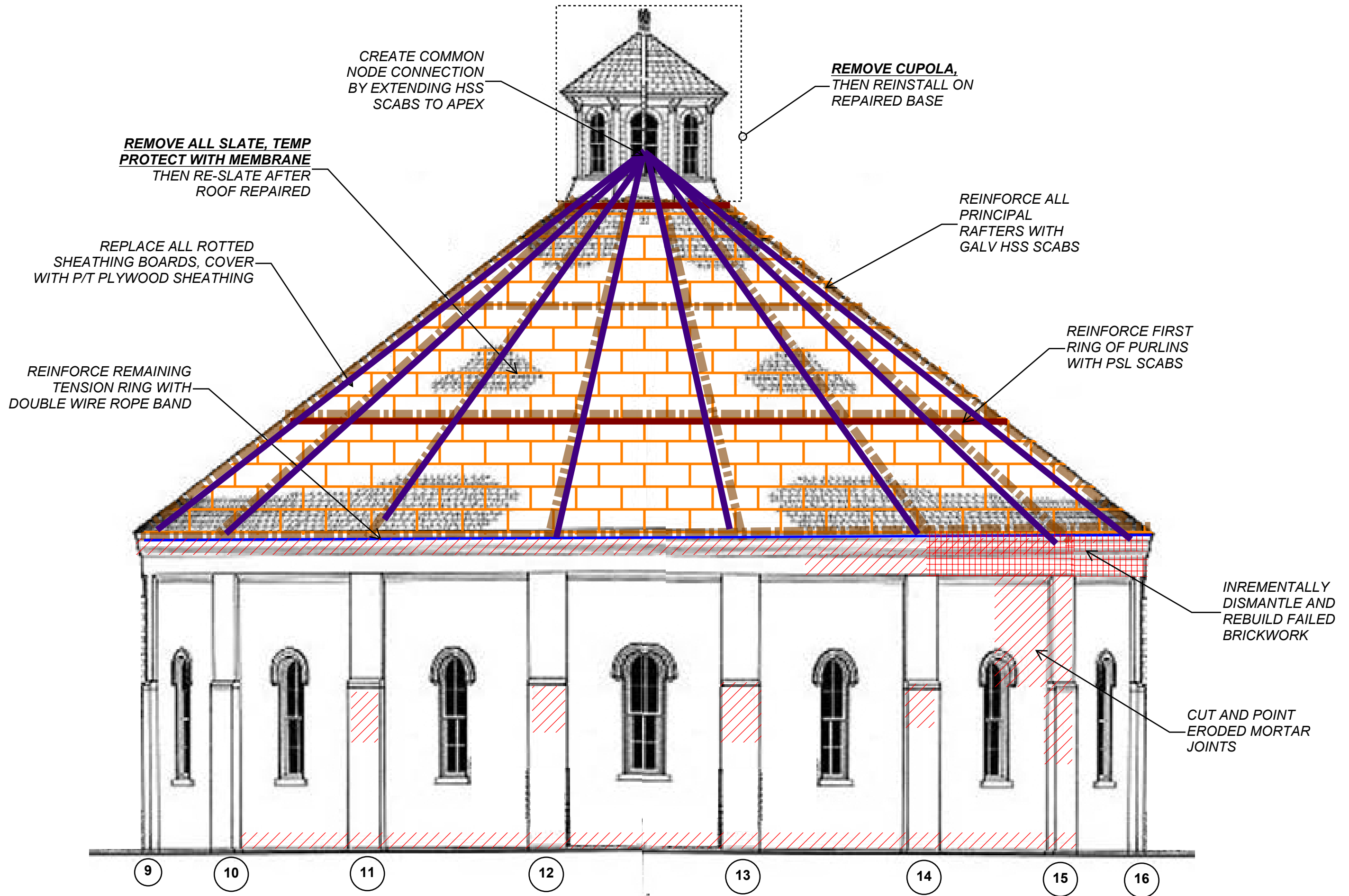
ITEMS IN BOLD TO BE COMPLETED DURING WINTER 2020/21, ITEMS NOT IN BOLD TO BE COMPLETED DURING SUBSEQUENT PHASE

**CONCORD NH GASHOLDER HOUSE STABILIZATION
ELEVATION VIEW FROM WEST**



ITEMS IN BOLD TO BE COMPLETED DURING WINTER 2020/21, ITEMS NOT IN BOLD TO BE COMPLETED DURING SUBSEQUENT PHASE

**CONCORD NH GASHOLDER HOUSE STABILIZATAION
ELEVATION VIEW FROM SOUTH**



ITEMS IN BOLD TO BE COMPLETED DURING WINTER 2020/21, ITEMS NOT IN BOLD TO BE COMPLETED DURING SUBSEQUENT PHASE

**CONCORD NH GASHOLDER HOUSE STABILIZATION
ELEVATION VIEW FROM EAST**