

CONDITION ASSESSMENT

Project: **Conway Public Library**
15 Greenwood Avenue
Conway, NH 03818

Client: David Smolen

Date: June 9, 2022

Attendees: David Smolen, Client (Conway Public Library Director)
Liz Reynolds, PE, Preservation Engineer, Barba + Wheelock (B+W)
Mike Cunningham, PE, Structural Engineering, Lincoln/Haney Engineering Associates, Inc.

Distribution of the Field Report:

- David Smolen, Client (Conway Public Library Director)
- Mike Cunningham, PE, Structural Engineer, Lincoln/Haney Engineering Associates, Inc.
- Nancy Barba, AIA, Barba + Wheelock (B+W)
- Liz Reynolds, PE, Barba + Wheelock (B+W)

General:

Liz Reynolds, PE, of Barba + Wheelock and Mike Cunningham, PE, of Lincoln/Haney Engineering were onsite on May 9, 2022, to take measurements of the Conway Public Library (CPL) and review existing conditions of the front entrance. The Conway Public Library is a circa 1900, one-story, Neo-Classical-style masonry building designed by Boston architect Thomas W. Silloway (Figure 1). At dawn of March 31st, 2022 a truck collided with the center section of the building, the original brownstone entrance of the Library, knocking down three columns on the entrance's west side (Figure 2). Observations, discussion, and recommendations are provided herein. B+W included all observations we believe were caused by the accident. The assessment team's observations were limited to the Library's original entrance on the north facade, where the accident occurred.

Exterior Description:

The Conway Public Library is one-story, Neo-Classical-style masonry building. The original Library massing has mass brick masonry walls on a raised foundation of gray granite and the window openings have brownstone lintels and sills. The primary (north) facade has a brownstone portico supported by Ionic columns (and temporary wood posts). The roof is slate, with a clock tower, cornices, cresting and other trim of pressed sheet copper. A circa 2003 addition to the east side of the original library building is similar in scale and form to the original Library. The Library grounds are planted with grass, trees and flower beds.

The north facade entrance consists of granite steps leading to a brownstone arched portico entrance with wood double doors to the interior. Granite plinth stones support two tall brownstone Ionic columns on either side of the entrance (replaced with two temporary posts on the west side where original columns broke). These tallest columns support a brownstone entablature with dentils and a frieze marked "CONWAY PUBLIC LIBRARY." A shorter brownstone Ionic column and engaged pilaster (replaced with a temporary post on the west side where the original engaged pilaster broke) are set one level above, and behind the taller columns. These elements support another broken entablature supporting the springing points of a brownstone arch. The arch has a projecting keystone unit at the top. The wood double doors are surrounded by a brownstone architrave with the construction date "1900" carved in the frieze of the architrave entablature. Above the brownstone entrance is a copper-clad gable-end roof with a copper-clad clocktower above. See attached drawings for reference.

Definitions:

The following definitions are provided for technical terms used herein:

- Dutchman: A piece of material used to cover a defect, to infill a broken element, or to hide a badly made joint.
- Incipient Spall: Deterioration of a material that has begun the process of spalling but has not yet fully broken away from the facade.
- Spall: A fragment removed from the face of a stone or masonry unit by a blow or by action of the elements.

Observations:

The following observations of resultant damage from the accident were made at the exterior and interior of the north building entrance. Exterior observations were made from grade and an extension ladder:

- The most considerable damage to the facade are the two missing brownstone columns and one missing engaged pilaster on the west side (Figure 3). Pieces of broken brownstone are stored either inside of the Library or at the Town Garage. The missing engaged pilaster was keyed into the brownstone facade every other brownstone unit course vertically. As a result, every other unit of brownstone in that area has an uneven broken edge (Figure 4).
- The two fallen column capitals are largely whole, with a few spalled sections. The largest spalls are the scrolls on the back face of the capital (Figure 5). The capitals have a layer of mortar intact on the bottom surfaces (Figure 6).
- The fallen column shafts broke into several pieces – roughly three large pieces per column (Figure 7). The breaks occurred largely on horizontal planes, but are on a slight angle.
- The column bases were largely intact with some spalls along the top (a maximum of roughly 20% of the top is spalled) (Figure 8). The bottom of one of the engaged brownstone plinth elements was also spalled (Figure 9). The column bases also have some mortar intact on the top surface.
- Three wooden posts were installed in place of the broken columns and engaged pilaster prior to B+W's inspection. These posts are anchored with steel angles at the sill and head. A self-adhered membrane was installed at the base of these posts (Figure 10).
- The one remaining brownstone column on the west side of the entrance is broken with discolored scratches at the bottom half (Figure 11).
- Some of the brownstone remaining on the facade has cracked (Figure 12), spalled, or displaced, including at the base of the west end. At the return on the west end, there is a 12 inch by 15 inch incipient spall that has displaced several inches off the granite foundation unit below (Figure 13).
- There is a wide vertical crack in the frieze of the entablature between the words "CONWAY" and "PUBLIC" carved into the brownstone (Figure 14).
- The brownstone elements have a stippled carved surface finish (Figure 15).
- The two iron railings broke off from their embeds at the granite stone steps and brownstone facade on either side of the door (Figure 16). Discolored scratches and spalled stone are present near the prior embed locations (Figure 17). These railings were not original to the building.
- Sections of several granite elements were spalled, such as a piece beneath the remaining west brownstone column (Figure 11) and one of the missing column plinths (Figure 18).
- Several units of stone have displaced, causing a void in the mortar joints (Figure 19 and Figure 21). The plinth units at grade (formerly supporting the two largest west columns) experienced the largest displacement, 1-3/4 inch (Figure 20) and 1-1/4 inch, both laterally to the west.
- Some mortar joints are displaced and project beyond the surface of the brownstone facade (Figure 21 and Figure 22).
- Some mortar, including mortar overhead appeared loose, but was not able to be removed from the facade by hand (Figure 23).
- Select mortar is missing from joints (Figure 24).
- B+W reviewed the interior surface of the masonry entrance. The backup walls behind the brownstone are composed of brick (Figure 25). Wood framing is installed above the masonry walls, which frames out the

clock tower. There is roughly 2 feet 9-1/2 inches from the interior face of the outer brick backup wall to the interior face of the inner backup wall (Figure 26).

- Broken glass and other debris is still present on granite step and floor surfaces at the entry.
- The client conveyed that bushes were displaced from the soil west of the entry during the accident and that these bushes have since been removed (Figure 27).

Other conditions are present at the brownstone facade which are not a result of the accident that occurred in March 2022. Some of these conditions include discoloration, staining, and biological growth on brownstone, and worn wood door finishes. It would be most efficient for the Library to complete repairs to these conditions at the same time as accident-related repairs. Pre-existing conditions could be segregated from accident-related conditions for ease of insurance review and payment.

Discussion:

- The column capitals can likely be reused, with poured brownstone patches at the spalled pieces. A mold of the most intact brownstone elements can be made to reproduce spalled areas (such as the broken scrolls) with a poured patch product to replicate the brownstone. The poured details can then be anchored to the original brownstone with an appropriate anchor system. An alternative to this option includes installing a brownstone dutchman repair. A dutchman repair involves using matching brownstone, carving it to match the original detailing, and anchoring it to the parent stone using a mechanical anchor. This alternative is less feasible because it is much more difficult and time-consuming to find a qualified contractor to carve stone than it is to find a mason to create a mold and pour a patch repair.
- Reinstalling the column shaft pieces is possible but would be more difficult and likely less durable than having replacement column shafts fabricated out of cast stone. In order to reinstall the original brownstone shafts, the center of each piece would likely have to be cored out, creating a vertical cylindrical shaft to embed a metal anchor rod through to provide continuous support and bed in an appropriate sealant or mortar. This anchor rod could be fed through all of the shaft pieces to provide continuous support through the broken elements. This installation may also require a metallic anchor embedment at the sill and head of the columns. Introducing metallic elements introduces potential for additional means of masonry deterioration. If any water enters the system, metallic elements can corrode, which causes the metal to expand and adjacent stone to spall or crack.

If column shaft pieces are reinstalled mortar would have to be installed between shaft pieces. This mortar would have to be specially formulated to match the color of the brownstone. Even a close mortar color match layered between pieces of brownstone will be visually apparent. Therefore, either aesthetics would have to be sacrificed, or a layer of a patch material could be applied around the whole surface of the column shaft to match the brownstone color. An applied coating will require more regular maintenance to be performed.

For all of these reasons, a cast stone product column shaft replica would likely be the most effective option.

- The column bases can also likely be reused, but either patch or dutchman repairs would have to be made to fill in where brownstone has spalled. Again, a patch repair is likely the best method for the reasons outlined above.
- Since the railings installed at the time of the accident were more modern, the library could consider a new railing design to match the design of the original construction.

Recommendations:

B+W recommends the following:

- Reset granite column plinths (originally supporting the brownstone columns), and any other stone that has shifted, back to their original locations.
- Patch granite spalls where present.

- Repair cracks in existing brownstone facade by routing and sealing them. Repair lower spalls or incipient spalls (larger than 3 inches by 3 inches) with dutchman repairs anchored to parent stone with mechanical anchors. Repair lower spalls or incipient spalls (less than 3 inches by 3 inches) with patch repairs. Review each higher spall or incipient spall on an individual basis to determine if a patch or dutchman repair is most prudent.
- Have engaged pilaster shafts fabricated in cast stone to replicate the dimensions and stippled carved surface texture of the originals.
- Have a mold taken of the most intact sections of the column capitals to be replicated. Create patch repairs for the spalled areas using the mold. Install the patch repair against the parent stone with a mechanical anchor (recommended by a structural engineer).
- Similarly, complete patch repairs on column bases. Mechanical anchors are not required in this application as the patches are not overhead.
- Have column shafts fabricated in cast stone to replicate the dimensions and stippled carved surface texture of the originals. We recommend requiring the manufacturer to send samples and/or mockups of the cast stone to the library to be reviewed in different types of lighting to make sure they are a good match to the existing original brownstone.
- Remove the temporary wooden posts, one at a time, once the repaired column and pilaster elements are ready for installation. Reinstall column capitals and bases and install fabricated cast stone column shafts with a layer of historically-appropriate mortar between each successive unit. Ensure adequate temporary structural support of the entablature between the period when the wooden posts are removed, and the combination new/repaired columns are installed.
- Reinstall original pilaster capital, repairing as needed, and install new cast stone pilaster shaft, keying into the brownstone facade, like the original pilaster. Install a layer of historically-appropriate mortar between each successive unit. Ensure adequate temporary structural support of the entablature between the period when the wooden post is removed, and the combination new/repaired pilaster is installed.
- Grind down discolored scratches on remaining west brownstone column. If necessary, install patch to fill in profile of column if more than 1/4 inch depth of stone is ground off. Ensure that finished surfaces have stippled pattern to match existing, whether hand-chiseled on stone or cast on the surface of the patch.
- Consider a new railing design to match the design of the original construction. Embed railings at different locations from the original so that anchors are embedded in solid parent stone and bed in non-shrink grout.
- Remove mortar from entire entrance and install historically-appropriate mortar. Installing modern cementitious mortars can cause damage to the less porous stone.
- Clean all debris from entrance.
- Clean scratches and staining from granite where present.



Figure 1. Conway Public Library north facade entrance circa 2014, prior to accident.



Figure 2. Conway Public Library accident aftermath.



Figure 3. Location of missing brownstone columns at west side of Conway Public Library entrance.



Figure 4. Broken edges of keyed units in backup brownstone masonry.



Figure 5. Spalled scroll from back side of column capital.



Figure 6. Spall (yellow arrow) and crack (white arrow) in column capital. Mortar (blue arrow) on bottom surface of capital.



Figure 7. Broken pieces of column shafts.



Figure 8. Spall at top of column base.



Figure 9. Spall at top and bottom of column base.



Figure 10. Temporary wood post with self-adhered membrane, anchored with metal angle to partial brownstone column base.



Figure 11. Broken masonry and discolored scratches on base of existing west end brownstone column.



Figure 12. Cracks in brownstone facade behind missing columns.



Figure 13. 12 inch by 15 inch brownstone return incipient spall.



Figure 14. Vertical crack in frieze of entablature.



Figure 15. Stippled carved surface on existing brownstone surface.



Figure 16. Scratch on granite step near embed to former iron railings.



Figure 17. Spalled brownstone facade near former railing anchor embeds, adjacent to front entrance doors.



Figure 18. Spalled granite plinth which supported prior column.

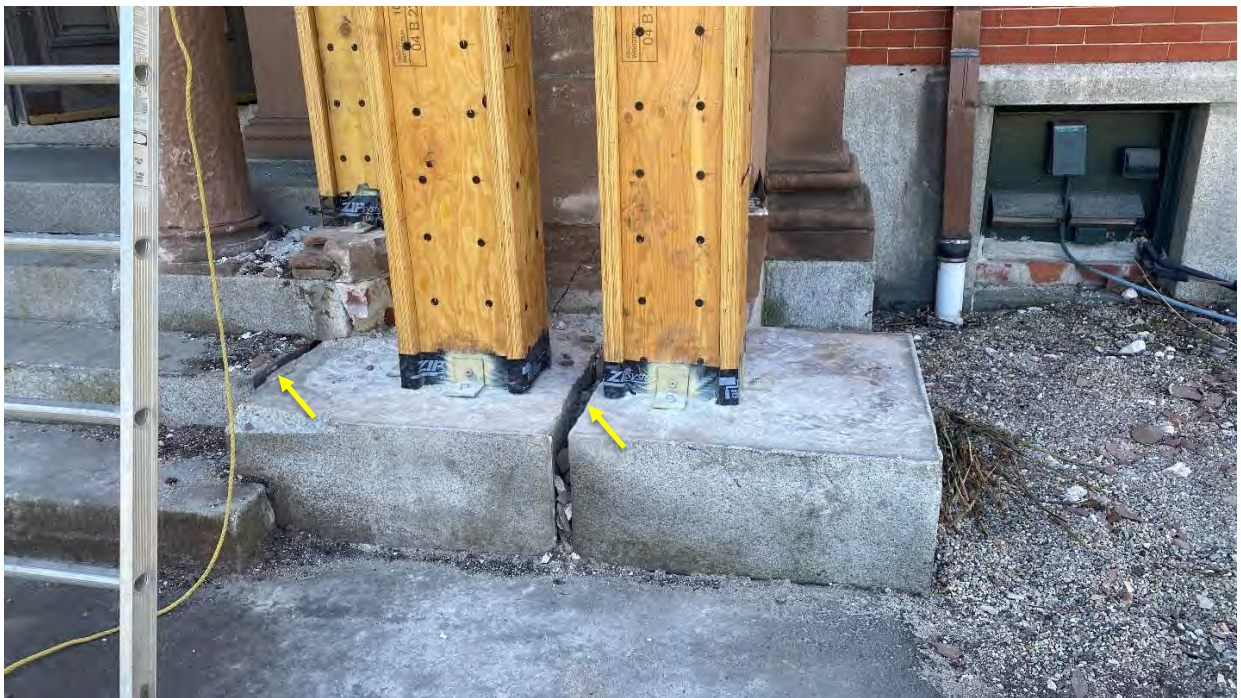


Figure 19. Displaced granite plinth units which support former columns.



Figure 20. Additional 1-3/4 inch displacement between granite plinth units.

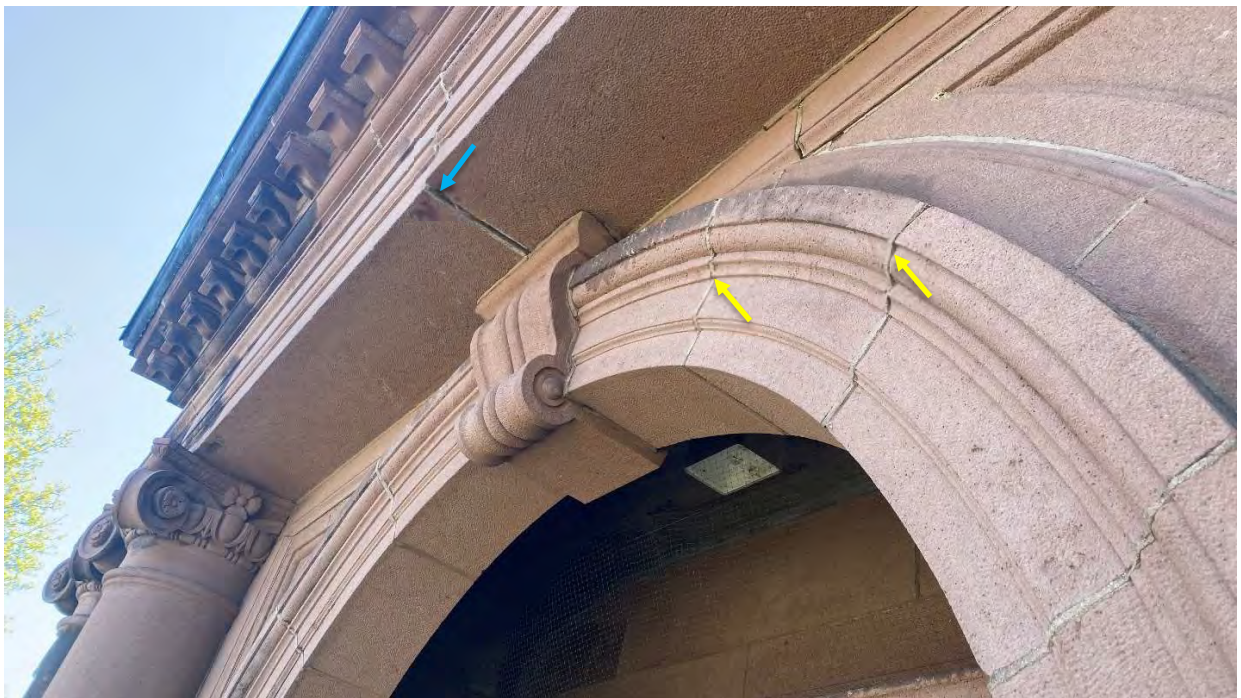


Figure 21. Displaced mortar (yellow arrows), protruding beyond the surface of the brownstone facade surface. Void in joints above arched opening (blue arrow).



Figure 22. Displaced mortar, protruding beyond the surface of the brownstone facade surface.



Figure 23. Exposed backup mortar appeared loose, but was not removable from the facade by hand.



Figure 24. Mortar missing from brownstone joints.



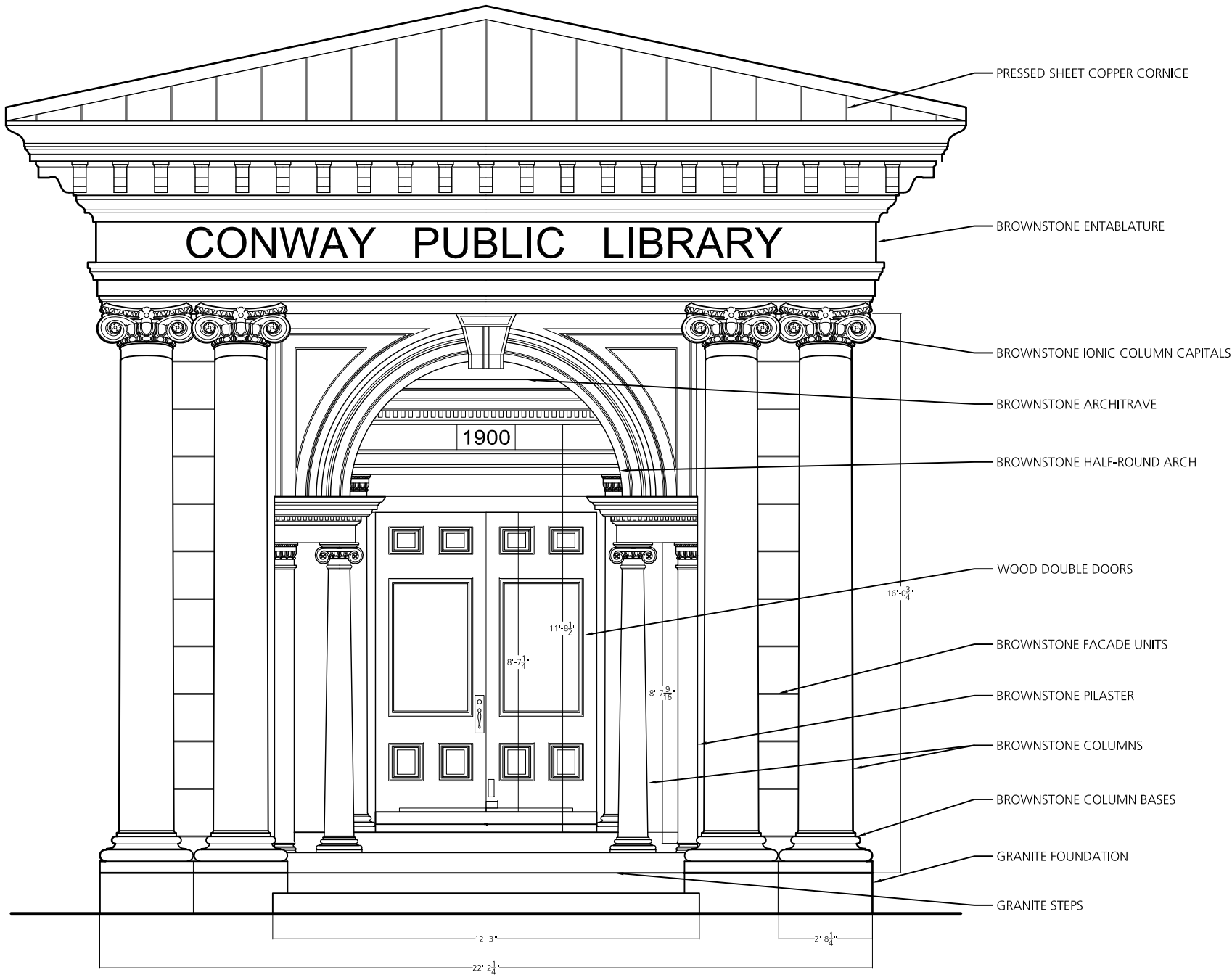
Figure 25. Brick masonry backup walls above north entrance. Wood framing above.



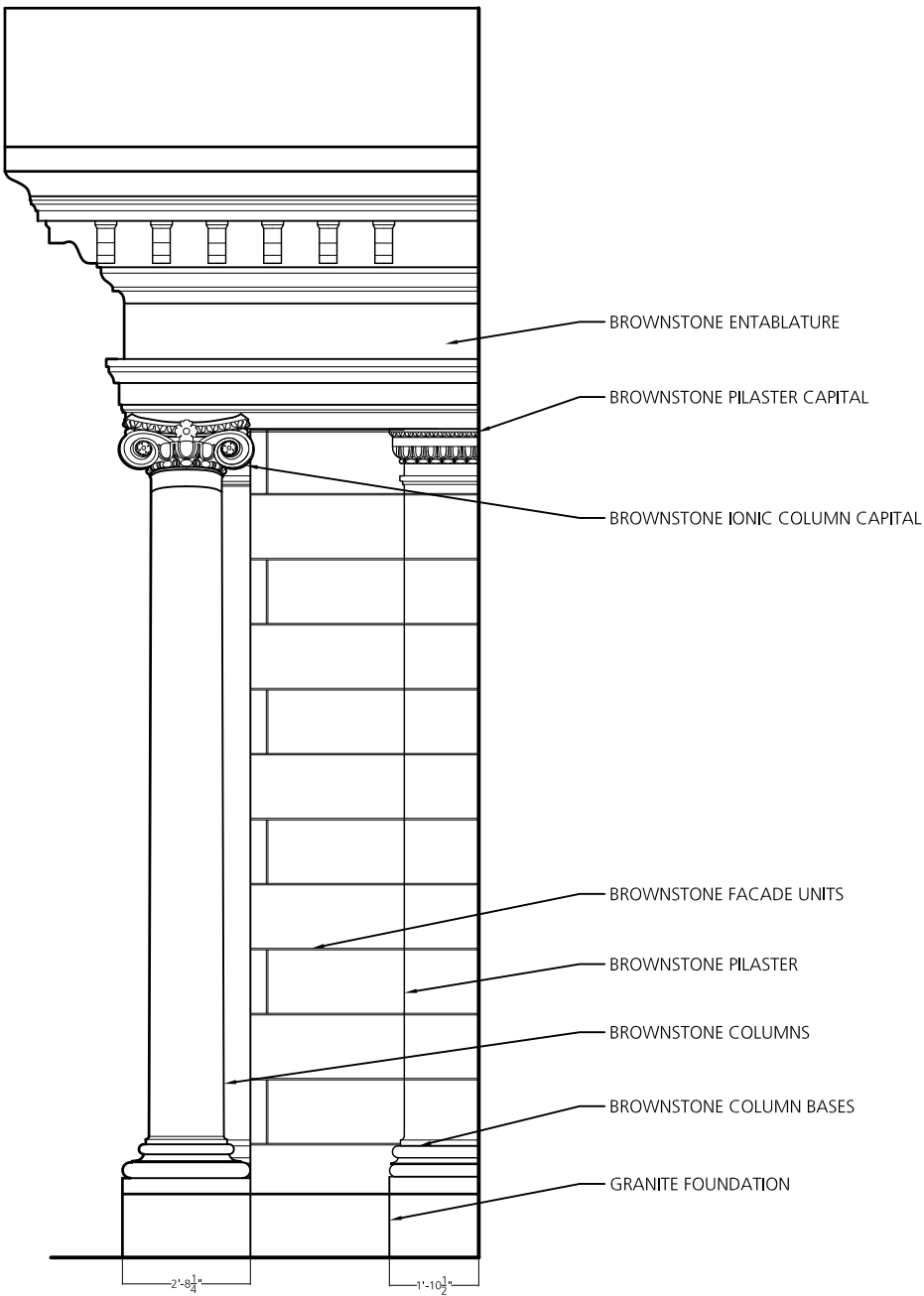
Figure 26. Two foot 9-1/2 inch distance from the interior face of the outer brick backup wall to the interior face of the inner backup wall.



Figure 27. Area where prior bushes were removed west of entrance.



NORTH FACADE



WEST FACADE RETURN