## Gutter and Downspout Projects

This document assumes that maintenance has been implemented, the performance of the system has been documented, and it has been determined that the system is not functioning as designed or deterioration was identified. A new project also could be identified if it is documented that water is not effectively being carried away from the building by the existing drainage options. Removing existing or adding new components to a roof drainage system to properties with a restriction under the jurisdiction of a state, local or other entity will require review and approvals. This type of activity should trigger internal interpretive review and discussion for any museum property regardless of whether an outside entity has review authority as well.

*Assessment and Planning*

Prior to the repair or replacement of any roof drainage system, it is essential to understand and document all existing conditions and failure mechanisms. An understanding of the conditions that led to the deterioration of the existing material will help inform the selection and installation of any necessary replacement components. This information is documented in a conditions assessment and any applicable planning documents. Documentation of existing conditions should include both a written narrative as well as scaled drawings and/or annotated photographs indicating conditions and any other unique factors.

- Document any visible damage or decay to the system and the surrounding materials and identify the underlying cause(s) of decay. For example, standing water in the gutter may indicate improper pitch or debris in the gutter or downspout blocking water movement.
- Look for visible cracks or breaks in the system and review all joints for proper connections.
- Damage, decay, peeling paint or increased levels of biological growth may be evident in the siding, trim or other millwork adjacent to and below the system. These areas often correspond to a failure point in the system and can help pin point areas for repair. Repairs to these adjoining features should be incorporated into a siding replacement, repair or painting project.
- Gutter and downspout failure may also result in structural damage to the building. Though not visible to the eye, gutters or downspout connectors pulling out of the building may be evidence of such an issue.
- A proper inspection should also review the performance of the roof drainage systems during rain events.
    - Always inspect during a storm to determine whether the system is capturing water and directing it away from building in light and intense rainstorms.
    - Review conditions after a storm and note wet areas, drips, pooling water, and other signs that the system is not operating effectively.

The character defining details of the roof drainage system should be identified. These may include the materials used, the decorative elements and detailing, the fasteners, and how the components are attached to each other and the building. The primary approach is always to replace materials, features, and installation details in kind and therefore accurate identification of these items as they exist on the structure supports a well-planned project. This can be a complex

task and the following list is to help document what might be important, in order to support the project development and review process:

- Type: Note whether the gutter is attached or integral, half round, v-trough, K-shaped or other. Identify the key elements of the system including the type of outlet (scupper, a flange, a gooseneck, etc.) and downspout (pipe, boxed, rectangular, etc.).
- Dimensions: Note length, outer and inner width (outermost edge to corresponding outermost edge and inner edge to inner edge), depth of the gutter, height, and angles of any curves. It may be useful to sketch a cross-section profile. Outlet and downspout dimensions include the diameter of the opening if it is a cylinder or dimensions if either is rectangular.
- Material: Identify the existing material. If necessary samples should be removed from inconspicuous places in order to determine the exact specie, if wood.
- Liner: Note if there are materials used to line the gutter, what kinds, and if there are seams.
- Physical attachment method: Identify how and where the gutters and downspouts attach to the structure. Identify what is used to attach these elements to the structure.
- Outlet Connection: How the outlet connects to the gutter and the downspout. Take note of whether the top of the outlet is inset in the gutter or if there are elements that are not flush. Determine if the outlet visible or hidden by the downspout or other element.
- Joints: Are there joints in the gutter or downspout.
    - Type of Joints: How do the sections meet
    - Attachment: How are the sections joined together
- Pitch: Measure the pitch of the gutter in several locations. A rule of thumb is that the pitch of a gutter should be between a ¼ inch and ½ inch per 10 feet of gutter.
- Decorative Elements: Identify any decorative elements or shaping associated with the features.
- Finishes: Document the type of paint or stain coating currently in place noting the color, sheen, and age.
- Outflow: Identify how the water is released from the downspout. Determine whether the downspout connects to a short elbow, a longer runout, a subsurface drainage system, or nothing.

Identify the historic chronology of roof drainage systems for the structure and determine the appropriateness of the current system. Gutters may be an original architectural feature or they may reflect the adaptations to the building by former owners and residents over time. A roof drainage system may be historically significant whether it is original to the building or not. For example, in a house museum setting, the components of the roof drainage system may be relevant to the period of interpretation even if they are not original to the house. It is important to research the roof drainage elements and begin to ascertain the significance of the system. Conversely, roof drainage systems can also detract from the integrity of the structure. A gutter added to the structure may obscure or damage original architectural details. The addition of later gutters may also be the result of a detail change elsewhere in the building. For instance, integral gutters are sometimes covered over by a later roofing project or gutters may be added if the drip edge is compromised when a wood-shingled roof is replaced with asphalt shingles.

In the case where gutters were added to the structure and are not contributing to interpretation or significance of the structure, it is reasonable to assess if the gutters are a necessary component to the roof drainage system. Traditionally, if a building did not have gutters it relied on a landscape related solution to carry water away from the structure.

- Study the systemôs functionality in various weather conditions and understand if the material choice and installation technique is appropriate for the general protection of the building or appropriate historically.
- The decision to not utilize gutters may require a landscape solution to ensure that the grade around the building slopes away from the building.
- See the site drainage white papers for more information. Work with a civil engineer is strongly recommended to determine drainage options.

Obstructions around or in the outlets may further restrict what is already an undersized component. Bad solder joints, caulk and tar repairs at the connection of the gutter to the outlet may block water flow and trap debris water flow and trapped debris in the gutter. De-icing cables (heat tape) running through the gutter, down the outlet and into the downspout may also restrict the amount of water allowed in the system.

At the base of the downspout, it is necessary to move water away from the structure. There are essentially four options: an extension to the downspout, also called a runout, to lead water away from the foundation; the downspout connects to an underground drainage system; there is a splash block to bear the impact of the falling water and then direct it away from the structure; or the water is taken away from the building using a landscape solution. More information on these systems can be found in the Site Drainage White Papers. Below are notes on downspout extensions.

- At Historic New England, there are a variety of runout shapes, sizes, and materials.
- Documentary evidence should be reviewed to determine if any clues can be gleaned regarding the previous existence and style of the runout.
- If no previous clues can be found and an outlet or splash block is necessary, a new one should be installed that is pitched to route the water away from the building, does not obstruct the use of the surrounding landscape, is sensitive the interpretation of the site, and is made from a material that respects the low maintenance attention and constant ground contact that the device is likely to experience.

*Changes to Existing Conditions: Materials or Details*

In keeping with Historic New Englandôs preservation philosophy as well as the Secretary of the Interiorôs Guidelines for the Preservation and Rehabilitation of Historic Properties, components requiring replacement should be replaced in kind matching materials, dimensions and profiles, textures and finish.

Historic New Englandôs approach to replace in kind sometimes is not in compliance with local or state code or may not represent current standards for construction or installation. Determine if any of these considerations will require changes that will have a negative impact upon the historic integrity of the building. If so consult with your preservation professional, contractor, or local building official to determine what steps can be taken to mitigate the issue and potentially

alleviate the requirements of the regulations. The following two examples are the most common reasons for changing positioning or sizing of a roof drainage system or component.

Existing gutters may be positioned historically too close or too far from the roof to properly collect runoff. Addressing this issue may be worthwhile because it should have minimal visual impact. Shingles need to overhang at least 1 ½ò off the fascia to allow a proper drip edge to support rain runoff from the roof and, at the very least, the shingles should be pointed into the trough of the gutter. The gutter should be positioned in a way to collect this water in order to operate effectively. In order to justify a change in the distance from the gutter to the roof one should include evidence of the resulting effect caused by the scenario. Justifications can include:

- Repositioning from the fascia in order to be appropriately positioned to catch the water.
- Adjustment of spacing will help air movement around the gutter, which can help with the longevity of wooden gutters.

Roof drainage systems should be designed to accommodate the volume of water collected on the roof during a heavy rain. If not sized properly, the water can overwhelm components and spill over on to components of the building and foundation. The increased exposure to moisture can accelerate deterioration and water infiltration issues in the structure. Historic New Englandôs research has shown that many existing gutters and outlets on historic buildings are too small for the flow of rainwater in an intense storm and that determining the optimal flow is a worthwhile endeavor.

- Justification for a change in size should include calculations about the flow of water on the roof and evidence of the damage caused by the overflow.
- Note: Valleys are often overlooked areas; the volume of water collected in a valley can easily overshoot a gutter installation that does not accommodate this scenario.
- See Historic New Englandôs discussion of Climate Change and Roof Drainage Systems for information on how climate change is affecting our thinking about the size and capacity of the components of a roof drainage system.

There may be a perceived need to add a gutter and/or downspout to a structure that currently does not have one. The following are suggestions as to how to justify the change:

- Produce research documenting the previous existence of gutters or downspouts identifying the type, appearance and location of gutters on the structure and when they were used; or
- Provide evidence that shows the damage to the resource resulting from the lack of the gutter or downspout and a plan that includes the following:
    - Whether or not water runoff from the roof is a problem;
    - Whether other solutions, including landscape solutions, are feasible;
    - The existence of additions to the roof, such as dormers, ells, or bays, that are disrupting the effectiveness of the gutter system;
    - The location and type of gutter and downspout configuration.