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Boston, MA 02118

Attention: Chris Genter, AIA, LEED AP
Senior Associate

Reference: Pioneer Village Evaluation Reference: Pioneer Village Conditions Assessment

Dear Chris:

On July 27 we performed interior and exterior structural conditions evaluation of six structures at Pioneer Village in Salem, MA. The assessment also included a study of the feasibility of re-locating the structures to present site of Camp Naumkeag's near the Salem Willows. Figure 1 below shows the overall view of the cottage layout; please note that elevations facing Salem Harbor will be referenced as east facing throughout this report.



Figure 1: Overall view of the surveyed cottages

As shown in Figure 1, the cottages that were evaluated during our visit are referenced by number as (1) the Admissions and Gift shop, (6) Woodbury Cottage, (7) Governor's Fayre House, (8) Blacksmith shop, (9) Blacksmith Cottage, and (10) Arbella Cottage. The overall structural stability and soundness of the cottages were documented along with the capability of each to be moved to a new site. Our findings are described below.

GENERAL DESCRIPTION:

Three of the six small building structures at Pioneer Village were built in 1930, these being the Woodbury Cottage, Governor's Fayre House, and the Arbella Cottage. The Admissions and Gift Shop was built between 1960-1970 while the Blacksmith Shop was built around 1986 and the Blacksmith Cottage was reconstructed at some point after the initial 1930 build. Despite the different decades of construction, all of these structures are styled to represent a first period colonial village set in the late 1600s. Today, these little buildings continue to serve as an interactive museum piece for tourists and residents alike. In its current location, Pioneer Village is a part of Salem's Forest River Park and is in close proximity to active recreational facilities and a turn-of-the 20th century residential neighborhood, all of which distract from the experience of the visitor. In an effort to keep the sanctity and authenticity of this resource and what it represents, it has been proposed that the location of Pioneer Village change. The current collection of structures would be relocated to Salem's Camp Naumkeag property, where the more protected and peaceful environment would better contribute to the visit or experience.

Four of the structures that were evaluated during our visit all maintain a relatively similar exterior, consisting of wooden board siding, wooden roofing shingles or thatching, and masonry chimneys, some of which are coated with a cementitious parging. The interiors of these consist traditional, mostly exposed, sawn lumber and/or timber framing and wood plank flooring and wall coverings. Structures (1), (6), (9), and (10) are all single levels with partial second floor lofts at the eave level that are accessible by ladder.

Of the remaining two structures, Governor's Fayre House (#7) is two floors plus a full attic, accessed by a staircase extending from the first to the second floor, and then a ladder from the second to the third floor, and the Blacksmith shop (#8), is unique amongst these structures, as the wall posts and studs are exposed from the interior and there are no wooden floor planks, rather just



exposed soil. Despite variations in construction, the similar use of materials resulted in alike conditions, which are further explained below.

STRUCTURE BY STRUCTURE DESCRIPTION AND NOTED CONDITIONS:

Structure #1 / Admissions & Gift Shop

Structure Description

The Admissions and Gift Shop is the only structure of the six that is constructed of modern dimensional lumber framing with plywood sheathing. Wrapped on the exterior by the same vocabulary of exterior finishes as the other structures the interior is finished in modern gypsum wallboard and exposed painted plywood.



The roof is structured with 2x6 rafters tied above the eave level landing on 2x4 stud walls.

There is a partial loft covering approximately two thirds of the floor plan. This is constructed with 2x4 lumber joists running front to back with a plywood floor and a gypsum wallboard ceiling below.

The floor is a concrete slab on grade.

Noted Exterior Conditions

The outside of the cottage is lined with horizontally aligned wooden siding boards and the gable roof is covered with wooden shingles. The chimney, which is only present on the exterior, has stucco panels framed by wood half-timbers. The chimney does not extend into the interior of the structure and is a non-functioning architectural adornment.

South Elevation-

The south elevation has a wooden door and window opening that is currently boarded up. We found the base of the lowest siding board to be rotted, which is partially exposing some of the plywood and concrete slab behind it. This is due to wood's constant contact with the exterior grade and water exposure. Environmental factors such as these can rapidly deteriorate the wood material, especially if there is no maintenance done (Photo 1).

West Elevation-

This elevation is the back of the structure, with neither doors nor windows for use. The bottom horizontal siding board is missing in its entirety, allowing the potential for rot to attack the interior plywood. The condition is similar to the south face, occurring from the exposure to water and soil (Photo 2).

East Elevation-

The east elevation is the front entrance to the cottage, with a door and two windows, one at the main level and the other at the peak of the gable. Similar to the other two elevations, there is missing siding board, however, at this face the board is missing below the doorway at the southeast corner. We also found signs of rot, at the northeast corner, in the ends of the face boards.

At the base of the northeast corner, the soil covers some of the board siding. Though this can be potentially harmful for the wood, as we saw on the south and west elevations, the face is currently intact (Photo 3).

North Elevation-

This face is showing signs of rot at its northeast corner siding board ends, as mentioned above. The entire side base board is covered by grade but does not appear to be harmed.

At the roof, the shingles are worn, covered in algae and lichen along its surface. This growth is an indication that the environment in which it is developing, in this case, the shingles, is moist and shady enough for their growth. If the wood is constantly wet, it can lead to rotting and loss of the material.

At the base of the chimney, above the roof, no flashing is present. This means that water can enter the gaps where the chimney penetrates the shingles. If water traps itself in the roofing system, it can encourage deterioration and weakening of the wooden materials (Photo 4).

Noted Interior Conditions

This cottage is the only one of the six to have been finished on the interior with modern materials. The floor is concrete slab and the interior walls have been insulated and covered with gypsum board. As mentioned before, the chimney does not enter into the interior space of the cottage and likely sits above the roof sheathing.

The two most concerning conditions we found are at the east facing elevation. The door interrupts the framing of the wall, and most critically the wall plate of the roof. The wall plate ends at the door jamb, which can potentially allow for spreading of the roof eaves. There is also gypsum board missing next to the doorway, exposing the electrical wiring of the cottage. This can be a safety hazard if water or even unsupervised children find their way to this area (Photo 5).

Potential for Reuse and Relocation

Although this is probably the least “historic” appearing structure of the six, it is in generally good condition and can be repaired in place, lifted off of the slab in “sedan chair” fashion, and moved to the new site. *Please see “Lifting and Moving Methods”, below.*

Of concern, however, is the fact that several large trees block the pathway to the waterfront and would need to be trimmed or taken down to allow the passage of this small building. Given these concerns, the structure could be stripped of external siding and trim, the false chimney taken off, and the wall and roof planes separated from each other and moved out as flat slabs to be reassembled and sided at the receiving site.

Structure #6 / Woodbury Cottage

Structure Description

Woodbury Cottage was constructed as a small timber frame structure with six posts supporting knee-braced wall plates under each eave with three tie girts, one at each post pair. Walls are framed with vertical sawn lumber studding and exposed board sheathing which acts as siding running horizontally across each face. The roof is constructed with sawn lumber rafters and flat board purlins supporting thatch. The ground floor is sawn lumber planking on wood joists or sleepers.



There is a partial loft covering approximately two thirds of the floor plan. This is constructed with sawn lumber joists running front to back and a sawn lumber plank floor.

Exterior Conditions:

The exterior walls of the Woodbury Cottage have horizontal wood siding boards under a thatched gable roof. The exterior of the chimney is hidden from view because it is encased in a wooden “box” that is open on its top side. The chimney is made of rubble stone and mortar that connects to a stone hearth at the north end of the cottage. There is an interior loft at the south end of the structure that is supported by the exterior walls at eave height.

South Elevation:

This elevation is the point of entry and maintains a wooden door and window at its face. At the base of the southeast corner of the cottage, there is extensive tree root growth, which is pushing up the soil and cottage, covering the base of the wall. From the prolonged exposure to grade, the siding boards at this location are deteriorated and missing, exposing the interior framing.

Just below the eave, the siding board is slightly bulging out, which is related to the torsional behavior that the structure is experiencing on a global scale from the root uplift (Photos 6 & 7).

East Elevation:

The gable end of this wall is coplanar with the wooden box of the chimney. Unfortunately, when the modification to the chimney was made, the box was designed to be wide enough to reach the outside wall of the east elevation. In doing so, a gap was created between the chimney itself and the surrounding wood cover because the existing chimney is inboard of the exterior wall. The gap allows for easy entry of water into the cottage. This is contributing to some of the interior issues we are seeing at this elevation, which will be discussed in the “Interior Conditions” section.

Additionally, the rake boards at the gable end have separated at the base where the wooden chimney box meets the roof surface. This is a result from the overturning behavior the cottage is experiencing where the south side tree is pushing the structure up and over into the north grade. The rake boards separated at the base of the chimney because the chimney structure is fixed in place while the wooden framing of the structure is rotating around it.

We found several of the siding boards rotting at their top and bottom edges, exposing the internal framing to environmental factors. This is especially present at the northeast corner where the boards are shifting into the north end grade (Photo 8).

West Elevation:

The west face has two windows, one at the main level and one at mid-height of the interior loft space. The northwest corner of the wall leans down into the grade and is covered by soil. From constantly being covered by soil and kept in a moist environment, the boards the lower portion of the wall is being aggressively consumed by rot (Photo 9).

North Elevation:

This elevation leans the most into grade, as this is the opposite side from where the tree is pushing the structure over. There are starting signs of rot in the base siding boards, exposing the interior posts which are badly deteriorating as well (Photo 10).

Interior Conditions:

As mentioned above, the chimney extends from the hearth on the east side of the cottage to above the roof ridge. The base of the hearth was constructed out of concrete slab and then built up with stone and mortar. The chimney is also stone and mortar but is covered with cement parging panels which are framed with wood trim. The wooden floor planks are built around the base of the fireplace and sit

beneath the interior horizontal wood bead board. The roof rafters vary slightly in size and material, from 3x3½" to 4x5 wood members to 4 ½" diameter log members. The rafters run north to south and either meet at the peak or are supported by the chimney sides. There are four corner posts that penetrate the ground, some of which were partially exposed during our visit.

North Side Interior Elevation:

Due to the overturning that the structure is experiencing, the interior wood panels are overlapping one another at the northwest corner and have moved below the floor plank level. At the northeast corner, the bottom of the corner post was visible and severely rotted at its end, to the point that the interior of the member has started to hollow out. Considering the severe signs of rot and movement, we performed several resistance drill tests in the two north corner posts. The results showed severe deterioration of the northeast post from its base to about 3' above the ground. Meanwhile, at the northwest corner, the post was found to be rotted about a foot above the base to the bottom. From being buried in the soil for an extended period of time, the posts are badly rotted and have weakened, and ultimately have become vulnerable to the overturning behavior of the overall frame. The floor planks at the northeast corner sag and bounce when walked on, indicating weakening of the material in this area and/ or loss of support from beneath (Photos 11 & 12).

East Side Interior Elevation:

There are several areas of rot at this frame because of the exposed opening between the stone chimney and its surrounding wooden "box." The gable end rafters, and wall plate are deteriorating as well as the vertical wall studs supporting the exterior sheathing (Photo 13). This part of the frame is experiencing water penetration, and it remains in a dark and shaded environment, ultimately prolonging its water exposure, encouraging rot.

The concrete slab of the hearth is cracked and lifting at its midspan, likely from the unresolved overturning of the structure which is exerting an unbalanced load onto the chimney and its fireplace (Photo 14) as well as the possibility of frost heaving. Another side effect of the leaning structure is the shifting floorboards to the northeast corner of the cottage.

West Side Interior Elevation:

At the loft space level, several of the siding boards are darkened along their edges, stained from water exposure and will have the propensity to rot (Photo 15). Additionally, the floor framing at the main floor leans down towards the northwest corner of the cottage.

South Side Interior Elevation:

At the southwest corner of the cottage, the floorboards have uprooted and started to decay while the interior siding board is rotting away as well. The upward force of the tree roots at this location brought the grade up to the base of the cottage, promoting decay and movement (Photo 16).

Overall, the cottage has moved 3" down in a span of 4' and will continue to do so as the south side tree continues to grow, and the north side deterioration persists. From the amount of observed damage between the shifting walls and displaced roof on the east side, the cottage is considered unsalvageable for this study.

Potential for Reuse and Relocation

Structure (6): The Woodbury Cottage currently suffers from extensive damage that also make this structure very challenging to transport. The cottage is experiencing global torsional behavior from the upward force of the tree located at its southwest corner. The northwest and northeast corner posts of the structure are also substantially deteriorated at their ends which means the structure is weakened at this elevation.

Given the very poor structural condition of this cottage and the fact that it is land-bound by trees, we do not recommend it for reuse at the new site in its present form. Instead, we recommend that it be dismantled in a careful and controlled manner and all components evaluated as to their condition. Reusable components should be shipped to the new site and incorporated into a reconstructed replication of its former self. For historical interpretive reasons, it might be nice to leave the fireplace along with its chimney intact at their present location following the dismantling of the structure around it as a memorial to what was there. A new replicated fireplace and chimney would be built at the new site.

Structure #7 / Governor's Fayre House

Structure Description

Governor's Fayre House was constructed as a two-story timber frame structure with eight posts that are part of eight north-south running "bent" frames that run from the ground to the roof ridge where they form the gable, dividing the structure into three bays.

In addition to the "bent" rafters, there two additional rafter timber pairs, each centered within the east and west bays, with a large brick chimney ascending through the center, creating a total of five roof framing bays. Bisecting each bay are east-west running mid-span purlins that support regularly spaced common rafters that run up and down the roof slopes with plank sheathing.



The attic floor is framed with north-south running tie girts that correspond to the timber roof rafters and bisect the east and west framing bays and support east-west running floor joists with plank flooring.

The second floor is framed with east-west running summer beams bisecting the east and west bays and supporting north-south running joists and plank flooring.

Interestingly, the first floor appears to have been constructed (or reconstructed) at a later date than the others using modern preservative pressure treated (P/T) dimensional lumber 2x10 joists running in the north-south direction between multiply built-up P/T 2x10 sills that run around the perimeter of the structure and support the post and stud wall framing above. Given the 16-foot depth of the structure and the 2x10 framing size, it is possible that the north-south framing was given center support, however it is likely that the 2x10 framing members run continuously from front to back. The wall studs are 2x4 that sit vertically on the sill with a 4x8 false bottom plate or sleeper around the structure's perimeter above the sill.

Walls are constructed with sawn lumber studding and plank sheathing and there is a large brick multi-flue chimney that ascends through the center of the structure up through the roof.

Exterior Conditions:

Governor's Fayre House is the largest structure of the group, with two main floors and an attic. Its chimney and hearth are constructed from brick masonry, while the other structures are all of stone construction. There is flashing on all four sides of the chimney that runs over the wooden roof shingles.

South Elevation:

The south exterior wall has a door at the center of the main floor with two windows at either side and three stained-glass window units at the second level. There are several wood boards at the second-floor level that appear newer than the original boards. This suggests that repairs were made prior, potentially due to water infiltration within the structural frame. Between the easternmost windows and above the doorway at the second level, some of the newer boards are protruding slightly from the plane of the main face. This deformation likely corresponds with warping of the material and separation from the frame due to deterioration of the wood.

There are a few areas where the siding boards are rotting, both at the end grain of the boards on the east and west sides as well as at the base board next to the doorway. In addition to this, we could see that at the east corner of the structure and adjacent to the doorway, the baseboards and sill members are notched to bear down on a foundation stone. The moisture from the stone transferring to the wood may be why the base boards are experiencing some deterioration. The right-angle notch in the members is typically a poor design because a stress concentration will develop, causing splits and cracks in the member when the stress releases. Though this was not visible in the siding, we were unable to fully inspect the sill member at the time of our investigation.

At the roof level, the ridge cap, west of the chimney, is starting to loosen. This gap in the construction creates an easy pathway for water to penetrate the structure (Photo 17).

West Elevation:

There are three sets of windows at the west elevation. The window at the main floor is closed off with wooden shutters and appears to be in good condition. At the second floor, the window is wood framed with stained glass panes. Part of the siding that is in contact with the wood trim of the window is missing, leaving an opening for water penetration. At the attic level, the window is wood framed with only a screen for protection. Additionally, the wood trim is missing from the south side. The screen and missing trim leaves the interior space extremely vulnerable to the exterior elements, the side effects of which will be detailed in the "Interior Conditions" section next.

At the northwest corner of the house, the sill is completely rotted, causing the bottom edge of the siding boards to start deteriorating as well. The grade slopes up towards the north direction, covering the sill at this location, creating a moist environment for the wood members (Photo 18).

North Elevation:

The north elevation is entirely covered by wood siding, without any openings or access points. In conjunction with some slight rotting at the base boards, there are entire siding members that are loose or missing, exposing the floor framing and sill behind. At about mid-height of the elevation, the siding is covered in algae, which if not cleaned and maintained, will lead to deterioration of the wood (Photo 19).

East Elevation:

The east elevation shares a similar layout to the west elevation, with the three sets of windows each having different protection surfaces. From the screen and minimal trim around the attic level window, the siding right below has begun to rot extensively, creating gaps between the horizontal members. This deterioration is also warping part of the wood surrounding the second-floor trim. The side grain of the siding on the elevation is rotting at both ends and the base board is pulling away from the framing, exposing the timber sill.

At the roof level, the wood shingles are starting to pull away from the rake board, indicating that that shingles may be starting to wear away in this area (Photo 20).

Interior Conditions:

Considering this structure is made up of several different floors, the conditions will be organized according to level rather than elevation.

First Floor Level:

The hearth at the main level is made entirely of brick, including its chimney. On the west facing side of the hearth, we found that the first wythe of brick on the fireplace is starting to collapse. With the hearth being in direct contact with the grade, the brick may be suffering from rising dampness. When the brick absorbs and retains the groundwater, the mortar in the joints, collar joint included, can start to deteriorate after several freeze-thaw cycles. With the mortar joints deteriorating, the brick units loosen and fall out of place, similar to what we observed during our inspection.

There is a hole beneath the hearth at its north corner, east facing side. The presence of this hole can potentially undermine the chimney creating an unstable condition (Photo 21).

There is some rot at the timber sill below the south side doorway. More wood deterioration was discovered at the east-west spanning beam of the second-floor framing that extends from the hearth to the east exterior wall. This member has signs of beetle action, with sporadic holes along the surface of the wood.

The floor tends to slope downwards towards the exterior walls. This could be an indicator that the sills are weakening and deforming more than what we could visualize from the exterior rot.

Second Floor Level:

The wood floor planks at the entire east section are all water stained. Considering where we saw the exterior openings on the east elevation (attic level window and siding above the second-floor window) it is expected that water is easily accessing the second-floor space, damaging not only the wall framing, but also the floor system. The damage follows over to the south interior elevation where there is a rotted bead board member at the base of the second-floor wall. This corresponds with the bulging and newer siding at the south exterior wall.

The second floor framing also slopes downwards towards the exterior walls, corresponding with the first floor. We also found a loose board member at the northeast corner of the hearth, likely from deterioration.

Attic Level:

The most serious damage in the house is found at the attic level. At the east end, there is extensive water related rot damage that has caused the east gable wall to loosen, and detach (Photo 22) from the floor, which is rotted as well. The wall boards and floor planks are all stained from the prolonged water exposure this space has been vulnerable to. Much of the gable wall needs to be rebuilt.

Some of the floor planks at the west end are seeing rot as well, caused by the same exterior exposure that the east side is suffering from (Photo 23).

The roof ridge that runs east to west has a gap at the very peak where the shingling and sheathing boards appear to have rotted away (Photo 24) and must be replaced.

Potential for Reuse and Relocation

Beyond the specific issues noted above, Governor's Fayre House was found to be in relatively good condition. The deterioration concerns identified at the attic level can be repaired before moving the structure. The mansion is also located at the

end of a clearing to the harbor gate; therefore, it is well worth restoring and relocating a new site. Following completion of the above-recommended repairs, the structure should be able to be moved with relative ease.

Because of its considerable mass, the chimney must be documented and dismantled as it would be prohibitively difficult to lift and move. The structure would then be needed, raised, and moved offsite (*please see “Lifting and Moving Methods”, below*).

Structure # 8 / Blacksmith Shop

Structure Description

The Blacksmith Shop is very different from the other structures within Pioneer Village. To start, the entirety of the north elevation is composed of two doors that open outwards, each braced by two metal hinges. The east, west, and south sides are covered by horizontally spanning wood board shingles. At the back side (south elevation), the shop space extends outwards, framed



and covered by smaller siding boards, suggesting it was added on at a later date. The main gable roof is covered by wood shingles and there is an existing chimney covered with cement parging panels that sits on the south slope of this roof. The shed roof of the addition is covered with horizontally spanning lap board wood members that limit water penetration within.

Structurally, the Blacksmith Shop is constructed of board-sheathed with light sawn lumber studs and rafter framing built around an open-front gable-roofed timber frame and a one-sided, stick-framed lean-to joined at the rear. There is no floor other than the earthen ground surface that is roughly coplanar with the exterior grade.

Exterior Conditions

North Elevation:

The north elevation is the main entrance to the shop. Behind the two doors (which have detached and will need to have their connections repaired), there are three vertical posts, one at each end and the other at midspan. The center post has some rot on its bottom end where it makes direct contact with the soil. The shop doors are also experiencing some rot along the bottom ends of their plank boards. Since the posts and boards at these locations are vertical in their orientation, the end grain of the wood is in contact with the ground. The pores at the end grains act like straws, absorbing moisture from the ground. With water entering from within, the members start to deteriorate, losing portions of their member and overall strength.

The wood shingles of the roof are worn and covered in algae and lichen, again showing signs of a moist environment where the wood is prone to rot.

The overall north elevation appears to be leaning down towards the west corner, potentially from rot occurring on the interior, which will be discussed in more detail in the “Interior Conditions” section next (Photo 25).

West Elevation:

The west elevation has one window and is covered by the siding boards. There are several areas where the top or bottom edges of the siding board is rotting away, exposing the interior framework to the outside elements. The rot is most severe where the northwest bottom corner of the addition’s siding boards meets the bottom south face of the shop. Not only is this area in direct contact with the soil, but it does not receive a lot of sunlight and the water that runs off the roof collects at this corner. The constantly wet environment is causing accelerated deterioration of the boards (Photos 26 & 27).

East Elevation:

From what could be observed behind the brush, the siding boards of the main part of the shop are experiencing deterioration not only at their top and bottom edges, but also at their end grain with the rake boards included. The east elevation of the addition just has some gaps between the siding boards, likely from the way it was constructed (Photos 28 & 29).

South Elevation:

There is loose and missing siding at both the east and west ends of the south elevation. We understand that some of this damage is from vandalism, while the remainder is from water damage (Photos 30, 31, & 32).

Some of the roof shingles are missing on the south facing slope of the main part of the shop (Photo 33). Additionally, the cement stucco panels are cracking and displaced, while some of the wood framing surrounding it is loosening as well.

Interior Conditions

The interior framing of the shop sits directly on the soil and there are no wood floor planks unlike what we observed with the other cottages. There are 6x6 timber posts at each corner of the main area of the shop as well as at the midspan of the of the wall plates of each face. There are 2x4 braces between the posts and wall studs at each face as well. The roof rafters are 2x4 members and they are built around the wooden chimney shaft that enters down to just mid height of the shop. There is a separate brick hearth beneath the shaft directly on top of the dirt floor of the shop. Please note that the hearth is starting to crack and crumble from the water penetration through the chimney shaft and the rising damp from the ground water (Photo 34).

The addition of the shop is built from vertical 2x4 wall studs that sit beneath the 4x3 wall plate with 2x6 rafters sloping downwards in the south direction.

West Side Interior Elevation:

The framing for the interior west wall appears to be in good condition. The only concerns are with the rotting wood panels that were identified in the "Exterior Conditions" section (Photo 35).

The west wall of the addition has some rot at the wall plate where a gap between the rafter and outside paneling is allowing for environmental factors to penetrate.

South Side Interior Elevation:

There were some areas of rot identified on the wall plate above two of the three middle posts. There was some rot found around the frame of the chimney shaft, likely where water is entering past the exterior flashing (Photos 36, 37, & 38)

The loose and missing sheathing boards mentioned in the "Exterior Conditions" is visible here and harming the internal wood members.

East Side Interior Elevation:

Some rot was found at the base of the timber posts that are in contact with the soil. The rotted top and bottom edges of the siding boards is also visible here as the light shines through the gaps between the boards.

North Side Interior Elevation:

The only structural damage that was observed at the interior north wall is some rot at the end of a northwest rafter end. This may be contributing to the downward sag in the roof that is visible from the exterior.

It is feasible to relocate the Blacksmith shop by disassembling the wall panels, transporting to the new site, and then rebuilding to match the existing. Further efforts can be done to make sure that the deterioration issues seen currently do not manifest. For example, the posts that are currently embedded into the ground can be rebuilt to sit atop a double 2x6 wall plate, so the end grain of the post does not absorb the groundwater.

Potential for Reuse and Relocation

The Shop is essentially a lightly framed open-bottomed box that sits on the ground. This fact along with the lack of horizontal ground level tying members, the relatively poor condition of many of its components and its relatively deep, 16' by 18' footprint makes difficult to move in one piece. We therefore recommend that it be separated into sections.

The lean-to should be removed from the rear of the front section. The roof and walls can be separated from each other and either taken apart and rebuilt at the receiving site or shipped as flat slabs. Alternatively, the lean-to could remain intact, diagonally braced, and lifted and moved in "sedan chair" fashion as described below.

The hearth and chimney would be documented and dismantled.

The front section could be lifted and moved as one in "Sedan Chair" fashion (*please see "Lifting and Moving Methods", below*).

Structure #9 / Blacksmith Cottage

Structure Description

The Blacksmith Cottage was constructed as a small timber frame structure with six posts supporting knee-braced wall plates under each eave with three tie girts, one at each post pair. Walls are framed with vertical sawn lumber studding and exposed board sheathing which acts as siding running horizontally across each face. The roof is constructed with sawn lumber rafters and flat board purlins supporting thatch. The ground floor is sawn lumber planking on wood joists spanning over an open airspace below the structure.



There is a partial loft covering approximately half of the floor plan. This is constructed with sawn lumber joists running front to back and a sawn lumber plank floor.

Exterior Conditions:

Similar to Cottage (6), this structure is rectangular in plan, covered by wood siding board with the entrance at the south elevation. The gable roof is protected by thatching and there is a stone chimney at the west end that has cement stucco paneling around its exterior.

West Elevation:

The main concern at this face is at the roof level. The cement stucco is starting to spall off which means it is a safety hazard while it is deteriorating. The flashing at this side of the chimney is also insufficient considering there are two large holes in its sky-facing surface, allowing water to penetrate through the roofing system (Photo 39).

North Elevation:

The thatching alongside the ridge of the cottage appears to be discontinuous, creating an open gap for rainwater and snow to enter within. This can be potentially harmful to the rafters and purlins within if this condition persists.

The grade rises up and over the base siding board along the north elevation, along with some built up plant growth. Though not visible at the time of our inspection, the siding board will be prone to deterioration in the moist environment (Photo 40).

East Elevation:

Some of the horizontal siding boards are loose at the southeast end of the wall face. There is an entire stucco panel missing from this side of the chimney, leaving it exposed to collect water (Photo 41).

South Elevation:

The south elevation is the point of entry into the cottage. There is severe rot of the siding boards beneath the doorway. At the roof level, the thatching is missing at the base of the chimney, there are holes in the flashing, and the cement stucco is cracked and spalling (Photo 42).

Interior Conditions:

The floor framing of the cottage is raised above the ground meaning that the members are less prone to deterioration from being out of contact with the grade and ground water. The floor joists are 2x6 wood members that support the wood floor planks on the interior. The joists sit on a sawn timber frame that rests on stones at its corner locations. The floor framing at this cottage was found to be in very good condition.

The wall framing is similar to the other cottages, with posts at each of the four corners with additional timber posts beneath the end of the loft framing and 4x4 vertical wall studs. There are bracing members at the posts and a wall plate above to support the 4x4 rafters.

West Side Interior Elevation:

The stone hearth has a vertical crack down its center, potentially indicating settlement of the chimney and ground below or water entry into the masonry system.

At the time of our inspection, the north, south, and east side interior walls were found to be in good condition.

Potential for Reuse and Relocation

The Blacksmith's Cottage is in generally good condition with a stable and sturdy first floor framing system. Its location near to the Harbor suggests that it can be moved as a whole unit with minimal brush and tree removal.

The needed structural repairs should be made and the chimney should be documented and dismantled. Manufactured lumber scabs should then be affixed to the exterior walls and the structure should be lifted and moved in "sedan chair" fashion (*please see "Lifting and Moving Methods", below*).

Alternatively, because it is raised up on supporting piers, the structure can be jacked and then lifted on needle beams as an intact wooden box.

Structure # 10 / Arbella Cottage

Structure Description

The Arbella Cottage was constructed as a small timber frame structure with six posts supporting knee-braced wall plates under each eave with three tie girts, one at each post pair. Walls are framed with vertical sawn lumber studding and exposed board sheathing which acts as siding running horizontally across each face. The roof is constructed with sawn lumber rafters and flat board purlins supporting thatch. The ground floor is sawn lumber planking on wood joist sleepers set on the ground.



There is a partial loft covering approximately half of the floor plan. This is constructed with sawn lumber joists running front to back and a sawn lumber plank floor.

Exterior Conditions:

Cottage (10) is a wood framed cottage enclosed with wood siding board, just as the others, maintaining wood floor planks and a concrete base fireplace with stone walls leading up to the concrete panel encased chimney. The variation in design is most pronounced at the roof level where the east side displays a traditional gable roof while the west side is jerkinhead style roof where it meets the chimney. It is predominantly thatched aside from the west side where the outward slope of the roof away from the chimney meets the rake board of the gable ends; this sloped portion is made with overlapping wooden boards.

South Elevation:

The main concern with the south face is the deterioration of the cement parging panels of the chimney. Parts of the panels have begun to fall off and the wood frame holding the panels in place are rotting at the ends in contact with the roof (Photo 43).

East Elevation:

The chimney persists to be of issue on the east elevation; the wood framing of the parging panels is missing, which is a safety hazard if the panels loosen and fall from not being secured in place. Water that enters through these openings can penetrate the panels as well as the interior stone and mortar, causing rusting in the parging mesh and deterioration of the mortar joints. If this goes unmaintained, the stability of the entire chimney structure is threatened.

The siding boards near to the southeast corner of the cottage is seeing some warping and rotting, especially along the base board of the structure (Photo 44).

West Elevation:

The wooden boards that slope outwards from the chimney are rotting at their ends. There is also some missing framing from the cement parging panels at this location (Photo 45).

North Elevation:

The majority of the thatching is missing and falling off from the north side of the roof. Currently, there is tarp over the damaged areas in an effort to keep water from entering the interior. The chimney is also missing some of its wood framing around the parged panels. The remainder of the siding was difficult to observe behind the overgrown brush and plants in this region (Photo 46).

Interior Conditions:

The interior of cottage (10) is built similarly to cottage (6) with both lumber and log rafters, a loft at its east end, and a stone chimney and fireplace with a concrete base at its west end.

South Side Interior Elevation:

The interior of this elevation has minor damage, with some rotting at a rafter end and slight deterioration at the southwest corner of the siding board.

East Side Interior Elevation:

There are minor amounts of rot beneath the loft at the wall plate.

West Side Interior Elevation:

Where the gable roof changes direction and slopes back towards the chimney, there are some loose and missing sheathing boards allowing for easy water penetration (Photo 47). The chimney at this end is also losing some of its wood framing which can ultimately end with falling parging as the water enters through the roof opening.

North Side Interior Elevation:

Where the thatching is missing, the roof rafters are starting to deteriorate at their ends (Photo 48). In one case in particular, the rafter end is rotting away to the point that is very little of it is bearing on the ridge. Any added weight on top of this can displace the damaged member and then place larger loads on the surrounding rafters, causing unbalanced loading.

On all sides of the structure, the floor is sloping downwards, towards the exterior walls (Photo 49). The floor planks appear to be supported by sleepers that rest on the soil. It is possible that the sleepers are decaying and therefore the planking is starting to shift downwards as the sleepers weaken.

Potential for Reuse and Relocation

The Arbella Cottage is worth moving to the new site. The needed structural repairs should be made and the chimney should be documented and dismantled. Manufactured lumber scabs should then be affixed to the exterior walls and the structure should be lifted and moved offsite in “sedan chair” fashion (*please see “Lifting and Moving Methods”, below*).

LIFTING AND MOVING METHODS

We have identified two ways of lifting and moving the structures off of their present foundations, with their use dependent upon size and conditions of the existing structures and whether or not they have framed first floors.

Needling (applies to the Governor's Fayre House):

A trench should be dug around the perimeter to expose the sill and then jacks could be installed below the sill to lift the mansion upward several feet. The first floor framing should be inspected to confirm that it does run continuously from front to back, otherwise the mid-span should be suspended from above by front-to-back sleepers that are laid atop the floor with rods that run down and fasten to a flat wooden "runner" nested below the middle of the framed floor.

Steel "needle" beams should then be passed below the structure and extended beyond either side. Depending upon the spacing of these beams and condition of the sill, the sill and structure above may need to be supported by secondary beams that would be run between the needles.

In its raised and needled position, the structure would then be lifted by crane or additional jacks and set onto a flatbed truck that will move it off of the site.

Sedan Chair (applies to the Blacksmith Cottage, Arbella Cottage and the front section of the Blacksmith Shop):

Manufactured lumber "LVL" or "PSL" scabs would be placed horizontally against the outsides of the exterior walls and lag screwed or bolted through the sheathing into the studs and posts. The long, side walls would have the scabs run a few feet above the bottoms of the walls and extend 6" or more beyond each corner. The end wall scabs would be fastened in a similar fashion but tucked tightly up against the bottoms of the long side scabs in a "#" pattern. The ends of these lower scabs would be extended several feet beyond each corner. These extensions would then be used to lift the structure like a sedan chair, either by crane or jacks, and lowered onto a flatbed truck to move the structure off of the site.

METHOD AND PATH OF TRANSPORT BETWEEN SITES

The most economical and practical path of transport between the present site at Forest River Park and the proposed site at Camp Naumkeag is by water. Transportation would be by barge between the two locations, starting out at Forest River, passing through Salem Harbor, around Abbot Rock and the Willows and landing at Dead Horse Beach.

Although weather dependent, such a method of transport would avoid shutting down roadways and removing utility lines as would be necessary if the path were over land and through the downtown.



At Pioneer Village, the lifted structures would be moved a short distance from their present locations to an awaiting barge. The wide gate at the wooden stockade fence would be opened, two or three bays of the metal handrail atop the sea wall would be unbolted and removed and a temporary wooden ramp or gangway would be laid down from the top of the sea wall to the water's edge, and up onto the barge. The structures would be hoisted by crane



onto a flatbed truck and transported onto the barge onto which they would be lifted off and laterally braced for their seaward journey.

At the receiving end, the barge would be landed at Dead Horse Beach. The ramp components, crane and truck would move by road or barge to Dead Horse beach and the ramp reassembled to run down from the barge and up over the top of the low Sea Wall at Memorial Drive. The structures would be lifted back onto the flatbed and moved from the barge via ramp to Memorial Drive, up the gentle incline and then onto the north portion of Camp Naumkeag over a wide pathway that accesses the lower portion of the site. There they would be set down on their new foundations.



Thank you for the opportunity to evaluate these wonderful and mostly reusable structures at Pioneer Village and to study the viability of relocating them to another site.

Please feel free to reach out to our office if you have any questions or concerns.

Respectfully yours,
Structures North Consulting Engineers, Inc.

A stylized signature in blue ink, consisting of a large loop followed by a horizontal line and a small upward stroke.

John M. Wathne, PE (MA), President

A stylized signature in blue ink, appearing to read 'Jillian Borghardt' in a cursive script.

Jillian Borghardt, EIT

Please see attached Appendix (29 pages including cover)

APPENDIX, 29-pages, including cover pages

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Photo 1: Structure (1), south facing exterior elevation conditions

Photo 2: Structure (1), west facing exterior elevation conditions

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Photo 3: Structure (1), east facing exterior elevation conditions

Photo 4: Structure (1) north facing exterior elevation conditions

Page 3

Photo 5: Structure (1), modern framing and interior with break at wall plate, facing east

Photo 6: Structure (6), south facing exterior elevation conditions

Page 4

Photo 7: Structure (6), severe rot and material loss at southwest corner

Photo 8: Structure (6), east facing exterior elevation conditions

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Photo 9: Structure (6), west facing exterior elevation conditions

Photo 10: Structure (6), north facing exterior elevation conditions

Page 6

Photo 11: Structure (6), downward shift in NW corner wall and rise in NW floor

Photo 12: Structure (6), badly rotted post end at northeast corner

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Photo 13: Structure (6), rot and openings on the east interior wall

Photo 14: Structure (6), crack in concrete hearth slab

Page 8

Photo 15: Structure (6), water-stained boards of west interior façade

Photo 16: Structure (6), deteriorating bead board at SW interior wall

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Photo 17: Structure (7), south facing exterior elevation conditions

Photo 18: Structure (7), west facing exterior elevation conditions

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Photo 19: Structure (7), north exterior elevation conditions

Photo 20: Structure (7), east facing exterior elevation conditions

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Photo 21: Structure (7), northeast corner of hearth with missing grade

Photo 22: Structure (7), east interior wall at attic level with openings at siding and
window

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Photo 23: Structure (7), rotted floor planks at attic level

Photo 24: Structure (7), gap in roof ridge

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Photo 25: Structure (8), north facing exterior elevation conditions

Photo 26: Structure (8), north end of west facing exterior elevation conditions

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Photo 27: Structure (8), south end of west facing exterior elevation conditions

Photo 28: Structure (8), north end of east facing exterior elevation conditions

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Photo 29: Structure (8), south end of east facing exterior elevation conditions

Photo 30: Structure (8), west end of south facing exterior elevation conditions

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Photo 31: Structure (8), east end of south facing exterior elevation conditions

Photo 32: Structure (8), south facing exterior elevation conditions of addition

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Photo 33: Structure (8), south facing roof with missing shingles

Photo 34: Structure (8), deterioration of interior brick hearth

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Photo 35: Structure (8), gaps in rotting wood panels of west interior wall

Photo 36: Structure (8), rotting on southeast side wall plate near chimney shaft

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Photo 37: Structure (8), rotting post and wall plate at southeast wall with missing boards

Photo 38: Structure (8), rotting on southwest side of wall plate near chimney shaft

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Photo 39: Structure (9), west facing exterior elevation conditions

Photo 40: Structure (9), north facing exterior elevation conditions

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Photo 41: Structure (9), east facing exterior elevation conditions

Photo 42: Structure (9), south facing exterior elevation conditions

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Photo 43: Structure (10), south facing exterior elevation conditions

Photo 44: Structure (10), east facing exterior elevation conditions

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Photo 45: Structure (10), west facing exterior elevation conditions

Photo 46: Structure (10), northwest facing exterior elevation conditions

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Photo 47: Structure (10), south side of chimney showing missing roof

Photo 48: Structure (10), missing roof at north side of cottage with rotting rafters

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Photo 49: Structure (10), sloping floor at southwest corner



Photo 1: Structure (1), south facing exterior elevation conditions



Photo 2: Structure (1), west facing exterior elevation conditions



Photo 3: Structure (1), east facing exterior elevation conditions



Photo 4: Structure (1) north facing exterior elevation conditions



Photo 5: Structure (1), modern framing and interior with break at wall plate, facing east



Photo 6: Structure (6), south facing exterior elevation conditions



Photo 7: Structure (6), severe rot and material loss at southwest corner



Photo 8: Structure (6), east facing exterior elevation conditions



Photo 9: Structure (6), west facing exterior elevation conditions



Photo 10: Structure (6), north facing exterior elevation conditions



Photo 11: Structure (6), downward shift in NW corner wall and rise in NW floor



Photo 12: Structure (6), badly rotted post end at northeast corner



Photo 13: Structure (6), rot and openings on the east interior wall



Photo 14: Structure (6), crack in concrete hearth slab



Photo 15: Structure (6), water-stained boards of west interior façade



Photo 16: Structure (6), deteriorating bead board at SW interior wall



Photo 17: Structure (7), south facing exterior elevation conditions



Photo 18: Structure (7), west facing exterior elevation conditions

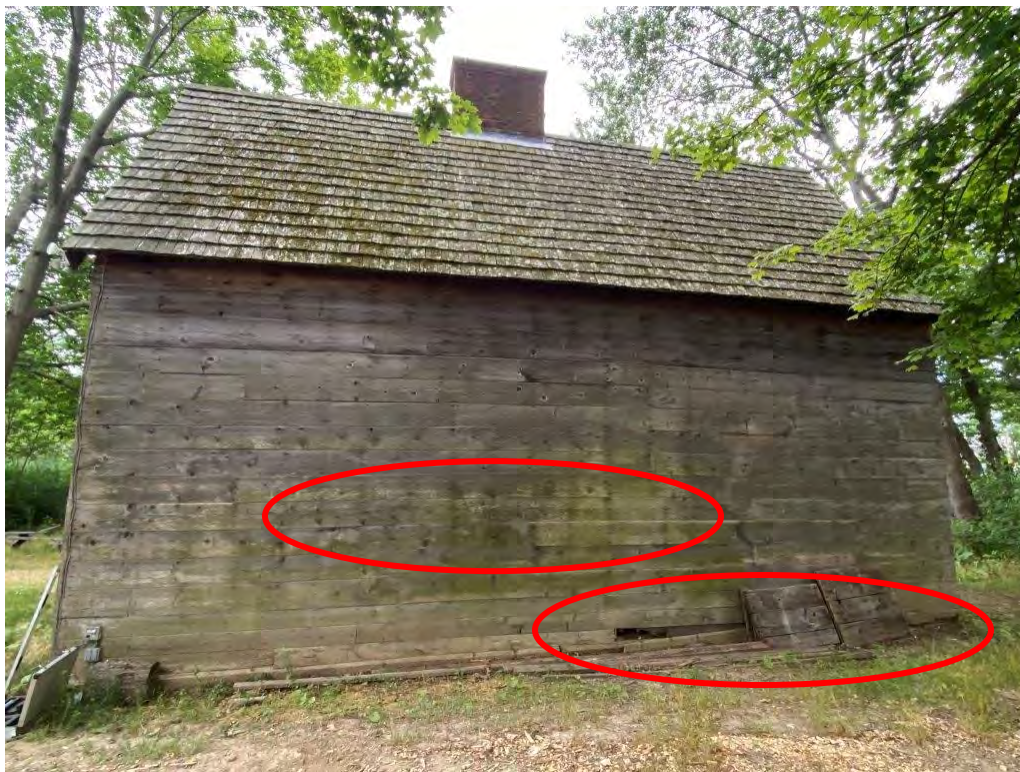


Photo 19: Structure (7), north exterior elevation conditions



Photo 20: Structure (7), east facing exterior elevation conditions



Photo 21: Structure (7), northeast corner of hearth with missing grade



Photo 22: Structure (7), east interior wall at attic level with openings at siding and window

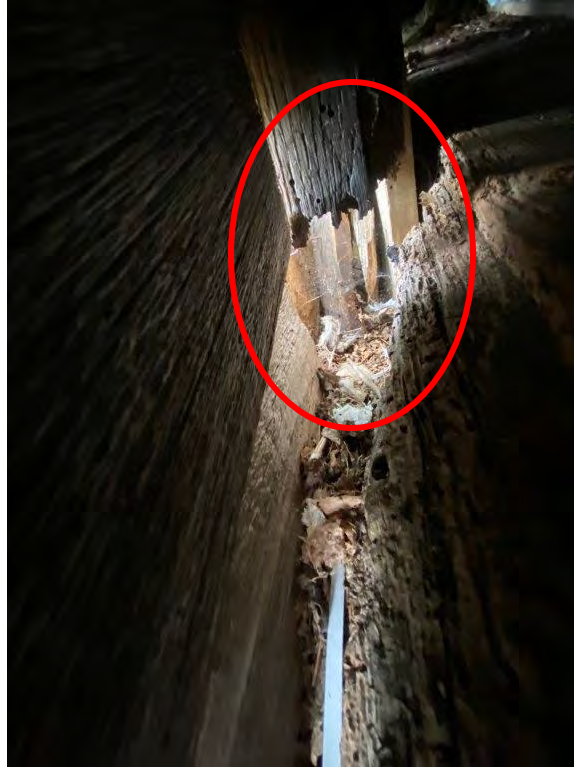


Photo 23: Structure (7), rotted floor planks at attic level



Photo 24: Structure (7), gap in roof ridge



Photo 25: Structure (8), north facing exterior elevation conditions



Photo 26: Structure (8), north end of west facing exterior elevation conditions



Photo 27: Structure (8), south end of west facing exterior elevation conditions



Photo 28: Structure (8), north end of east facing exterior elevation conditions



Photo 29: Structure (8), south end of east facing exterior elevation conditions



Photo 30: Structure (8), west end of south facing exterior elevation conditions



Photo 31: Structure (8), east end of south facing exterior elevation conditions



Photo 32: Structure (8), south facing exterior elevation conditions of addition



Photo 33: Structure (8), south facing roof with missing shingles



Photo 34: Structure (8), deterioration of interior brick hearth



Photo 35: Structure (8), gaps in rotting wood panels of west interior wall



Photo 36: Structure (8), rotting on southeast side wall plate near chimney shaft



Photo 37: Structure (8), rotting post and wall plate at southeast wall with missing boards



Photo 38: Structure (8), rotting on southwest side of wall plate near chimney shaft



Photo 39: Structure (9), west facing exterior elevation conditions



Photo 40: Structure (9), north facing exterior elevation conditions



Photo 41: Structure (9), east facing exterior elevation conditions



Photo 42: Structure (9), south facing exterior elevation conditions



Photo 43: Structure (10), south facing exterior elevation conditions



Photo 44: Structure (10), east facing exterior elevation conditions



Photo 45: Structure (10), west facing exterior elevation conditions



Photo 46: Structure (10), northwest facing exterior elevation conditions



Photo 47: Structure (10), south side of chimney showing missing roof

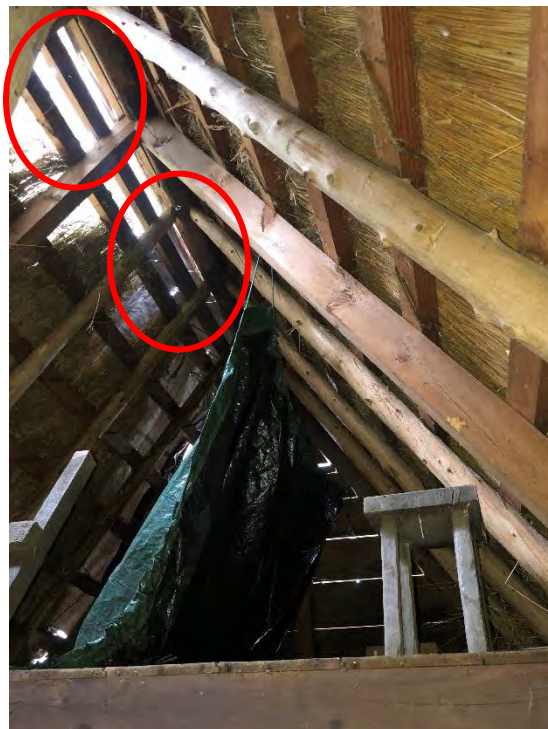


Photo 48: Structure (10), missing roof at north side of cottage with rotting rafters



Photo 49: Structure (10), sloping floor at southwest corner