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Title: Historic Buildings Report: Five-Year Preservation Planning for Manhattan Project National Historical Park Sites

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Abstract: This document will serve to guide preservation treatments to Manhattan Project National Historical Park buildings and structures for the next five years. The document will be used primarily by internal personnel for planning, funding, and on-site preservation decision making. Outside organizations such as the National Park Service and the New Mexico State Historic Preservation Office will utilize this document for purposes of consultation and concurrence.

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January 2022

# Historic Buildings Report: Five-Year Preservation Planning for Manhattan Project National Historical Park Sites

## Fiscal Years 2022 - 2026

Historic Building Report No. 394

Survey No. 1257

Los Alamos
NATIONAL LABORATORY

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# EXECUTIVE SUMMARY

This report offers s a preservation maintenance plan for the next five years for buildings and structures included in or eligible for inclusion in the Manhattan Project National Historical Park at Los Alamos National Laboratory. There are twenty-three buildings, structures, and ruins of previously standing buildings covered within this report. Many of the preservation maintenance issues addressed here concern problems with health and live safety of staff and visitors alike, and also structural concerns that affect the long-term preservation of these important buildings.

The intention of this report is not for the authors to authorize, order, or assign work, but instead to offer a clear and concise reference document for decision makers as funds become available. With that, this document does not stand on its own as an approved plan for specific work as outlined, but as a guiding document to get a conversation started on necessary work, planning needs, and consultation prerequisites. The information provided will allow decision makers an opportunity to assess and determine the best path forward. We hope that this five-year plan will make their jobs easier and give the needed information in a format that is quick and easily referenced.

The report is organized by Technical Area (TA). It starts at TA-06 and moves through each TA with a Manhattan Project property (eight in all) to finally end at TA-67. Beyond the TA number, each TA section is further divided by building or structure. In an effort to provide a quick frame of reference, most of the concerns are afforded a single page that includes a photograph and brief narrative. The narrative contains three subsections that include a priority designation, the current condition of the noted concern, and recommendations moving forward.

The priority designation is intended to provide a quick assessment of a subject matter expert's professional opinion of the urgency the problem presents to either health and life safety of individuals or the structural stability of the building moving ahead in time. Priority levels are defined as "low", "medium", and "high". "Low" represents little to no concern for the problem in affecting health and life safety or of structural stability. A "medium" ranking indicates the there is some concern, but there is still time for planning and action, while "high" signals that time is of the essence to at least provide a temporary solution to the problem that has implications for health and life safety or the structural stability of the building.

A current assessment of the condition is also provided in the narrative. The assessment is usually brief and often time consists of only a sentence or two. Some condition assessments may be a paragraph or two, but overall these examinations are meant to be conveyed as succinct as possible. The provided recommendations also follow this line of thought. As noted above, the recommendations provided in this report are not meant to be stand alone plans for future work. On the contrary, they are aimed to start a conversation between various experts in various fields with the intent to end up with a suitable solution that takes many perspectives into consideration. Essentially, recommendations are meant to provide a baseline for planning

Finally, it is not our expectation that every single issue will be addressed in the next five years. Obviously higher priority level problems should be looked at first, but issues covered in this five-year plan that are not addressed will be reassessed and carried over to the next five-year plan.

# 1 INTRODUCTION

This preservation maintenance plan includes twenty-three Manhattan Project buildings, structures, and ruins of buildings no longer standing. The plan catalogues pressing maintenance concerns and furnishes recommendations for the priority and treatment of issues over the next five-years. Structural stability and the health / life safety of individuals guided much of the coverage in this plan. For example, a reoccurring theme for every building was rodent incursion and activity. The moth-balled nature of many of the Manhattan Project buildings congruent with periodic visitation cause rodent activity to be considered a health / life safety issue that merits continuous persistence to mitigate. Many noted structural issues derived from compromised concrete that exhibited various degrees of deterioration. Sometimes problems fell into both concerns, such as the fit and operability of doors and windows. This problem can be considered structural, yet at the same time, fall into a health / life safety issue since this presents rodents with a chance to enter a building.

Presently, twenty-three buildings, structures, and ruins in eight Technical Areas (TA) were assessed for this plan. These historic properties are included or are eligible for inclusion in the Manhattan Project National Historical Park. Specifically, nine buildings are formally included in the park while the rest are considered eligible, and may one day be officially included. Despite whether a property is included or eligible for inclusion, consistent and thoughtful preservation maintenance is vital to safeguard these nationally significant properties.

TAs - 06, 08, 11, 14, 16, 18, 22, and 67 include Manhattan Project historic properties. Each TA is covered in numerical order and follows with a brief description of the significance of the TA regarding Manhattan Project history. Each building, structure, or ruin is listed under the TA heading. A brief description is given for each property and a broad scope of the preservation issues that are noted in more detail below the property description are alluded to.

Each property listing includes preservation concerns examined through a short assessment of the current condition, a priority designation for mitigating the problem, and recommendations for addressing the problem from the perspective of a preservationist. The recommendation section is not an “end all”, but should be used as a primer to start the planning process if an issue is determined to be moved from the consideration phase to the mitigation phase.

The following assessments and recommendations will hopefully provide the users of this five-year plan an expedient method to identify problems and provide the baseline knowledge needed to move forward with developing a plan of action. Collaboration between diverse teams will bring together those with specialized knowledge and skills to develop the best possible plan that solves many of the problems described herein. This document is only an initial step we will all take in improving the health and safety of Laboratory employees, as well as the preservation of immensely significant buildings that help bring the history of the Manhattan Project alive for all those lucky enough to experience the building’s continued presence.

# 2 ASSESSMENTS AND RECOMMENDATIONS

What follows are assessments and recommendations attributed to a preservation maintenance plan for the next five years. The following sections cover each of the eight technical areas and are divided by building or structure from there, then presented in numerical order by technical area designation. After a brief introduction to the specific resources, narratives are included for each impact affecting the preservation of the resource.

## 2.1 Technical Area 06

Technical Area 06 includes one site listed in the legislation as eligible for inclusion in the Manhattan Project National Historical Park. TA-06-0037, commonly referred to as the Concrete Bowl, is a circular, shallow bowl-shaped structure, 200 feet in diameter. Sixteen wedge-shaped, poured-in-place concrete slabs slope to an elevated concrete and metal drain structure at the center of the bowl. Project Y personnel designed and constructed the Concrete Bowl to test the effectiveness of preserving scarce amounts of plutonium via capture and collection (McGehee et. al. 2004). While never employed for full-scale testing, the enduring presence of the Concrete Bowl offers a testament to the magnitude that the Manhattan Project extended to ensure every possibility was considered and followed to a logical completion.

### 2.1.1 *Concrete Bowl TA-06-0037*

The size and material construction of the 200-foot diameter Concrete Bowl surrenders to specific, yet wholly uncommon preservation circumstances with abnormal contributing impacts. As a consequence of an area that measures over 31,000 square feet of inwardly sloping concrete slabs designed to interact with water in ways not typical of concrete structures, the Concrete Bowl offers unique preservation challenges requiring thoughtful planning and maintenance.

The outer perimeter of the concrete is level to the height of a constructed earthen berm that fully encircles the structure. The concrete slabs gradually slope downward in sequence toward the center. At the center of the Concrete Bowl is a raised platform that effectively stops the movement of water downward and to the structure's center. A drain adjacent to the raised platform was placed and designed to capture the flowing water and transported heavy metals. The drain is no longer operable allowing water to remain trapped in the center of the structure for long periods of time. In addition to long periods of standing water, expansion joints between the sixteen pie-shaped wedges are deteriorated and allow moisture penetration and vegetation to root and establish between long durations of maintenance.

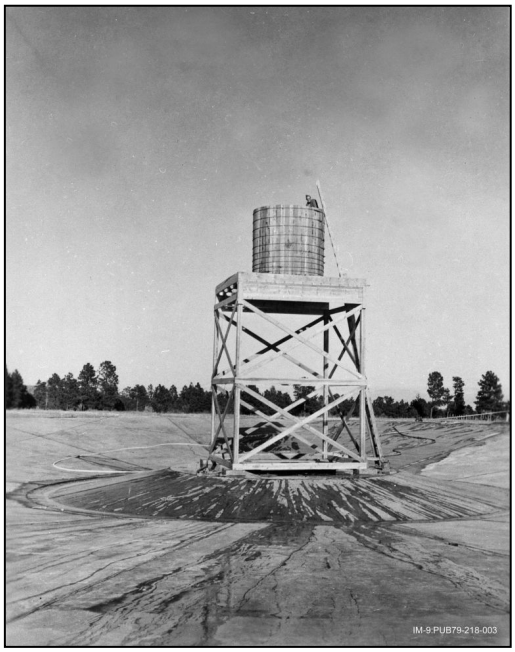


*Figure 1. Center of the Concrete Bowl with tower and basin holding water that cushions the explosion. Everything captured within the perimeter of the bowl was washed to the center for easier collection.*

*Continue Vegetation and Duff Removal*

Priority: Medium

Current Condition:

A large effort took place in the summer of 2020 to remove accumulated duff and vegetative debris off the surface of the concrete. Additionally, live vegetation was removed from the deteriorated expansion joints. While the surface of the Concrete Bowl shows a marked difference of vegetative debris on the surface compared to prior the 2020 project, accumulation will continue to occur due to nearby conifer trees dropping material directly on the surface of the Concrete Bowl and wind blowing debris from nearby trees on to the Concrete Bowl. Dirt and water trapped in the deteriorated expansion joints continues and will continue to promote vegetation growth in these areas.

Total Linear Feet of Expansion Joints = 1400'

Recommendations:

Routine maintenance of the removal of vegetative debris and live plants should be a priority to maintain the structural stability of the Concrete Bowl. Removal should take place on a yearly basis, however, a scheduled work schedule of every six months is considered optimal. Frequent removal of live vegetation from the expansion joints will help prevent live plants from seeding and help inhibit larger plant growth.

In addition to the routine maintenance discussed above, a full replacement of the expansion joints should occur. Newly installed expansion joint material will increase success in keeping live plants from growing in the structure while decreasing the time and labor needed for routine maintenance.

*Figure 2. The majority of the vegetation growth occurs in the expansion joints seen here as green lines radiating out from the center.*

*Remove Trees*

Priority: High

Current Condition:

Two trees are growing adjacent to the edge of the concrete on the northwest side. One tree is a medium to large Ponderosa pine and the other is a mature juniper. The root systems of both trees are pushing up on the adjacent concrete slabs promoting severe cracking and structural destabilization. Due to the close proximity of the both trees, duff and conifer litter is deposited at a far greater rate than that of trees farther from the structure. These deposits promote moisture retention in the underlying concrete resulting in weaker concrete and accelerated deterioration.

Recommendations:

Remove both trees with a chainsaw. Any digging is discouraged due to the close proximity of the trees to the concrete. Remaining stumps should be left as close to the ground as possible and treated to help accelerate decay of the visible stump and subsurface root system. All removal debris including trunks, branches, and needles should be completely removed from the site.

*Figure 3. The two trees create uplift on the nearby concrete slab and deposit duff on top of the Concrete Bowl.*

*Stabilize Deteriorated Concrete*

Priority: Low

Current Condition:

The majority of the visible concrete deterioration represents surface friability. The surface concrete has separated from the main structure and broken up into smaller pieces. This condition is prevalent throughout the entire structure.

Total Surface Area of Concrete Slabs = 31,416 square feet

Recommendations:

Research should be conducted prior to any on-the-ground treatments. Initial monitoring of the amount of deterioration currently occurring to better quantify the amount of deterioration occurring over a given period of time is needed to better understand the degree of loss and establish an appropriate timeframe for a prescribed treatment.

Other research should take place that definitively determines the causes of the impacts. Many factors likely contribute to the deterioration – moisture, vegetation, and animal.

*Figure 4. Extreme friability is exhibited in the photograph - a typical occurrence on the surface of the Concrete Bowl.*

*Control Water Retention*

Priority: Medium

Current Condition:

Standing water lingers in the sunken basin of the Concrete Bowl's center for much of the year. The sloped concrete surface performs as designed by directing water to the bowl's center where the concrete acts as a perfect barrier between soil and water; drastically limiting absorption into the ground. As a result, evaporation represents the principal mechanism of water release from the center. During dryer parts of the year, water evaporates leaving a thick layer of mud in its place. The damp mud and standing water provide a superb environment for excessive vegetation growth usually reserved for areas of natural water collection and storage. This artificial, yet unintentional, wetland enables plant life to flourish.

Animal life also flourishes here. In response to a near permanent water source and abundant lush vegetation, elk are common in and around the Concrete Bowl. In contrast to much of surrounding arid setting, the bowl makes for a reliable and easily accessible source of water for wildlife. The combination of longstanding water, moist soils, and plant and animal life near the center of the structure create an observably greater degree of concrete deterioration near the center.

Recommendations:

A solution to this problem will not be easy or cheap. In order to better preserve the structure, the water must be removed at regular intervals to ensure a non-permanent presence of water. It may be possible to reinstate the original drain and possibly expand the basin reservoir underneath. Nevertheless, additional research will be required to ensure the Concrete Bowl's historical significance is not impacted if this action is considered further. Removing this water source will undoubtedly have a detrimental effect on wildlife. Accordingly, discussions have explored the possibility of creating an artificial watering hole nearby, out of view from the site. A high chain-link fence may offer a temporary solution, but is problematic due to the wildlife concern and the overall visual impact to the Concrete Bowl.

*Figure 5. Standing water can be seen collected at the center of the bowl which sits for months at a time.*

## 2.2 Technical Area 08

Technical Area 08 contains four buildings included in the Manhattan Project National Historical Park. Three of the four buildings (08-0001, 08-0002, and 08-0003) were constructed of poured-in-place, board-formed concrete. The north elevation façade of buildings 08-0001 and 08-0003 are connected; building 08-0002 is separated from the other two. The fourth building, 08-0172 is a rectangular-in-plan, one-story guard station designed to be mobile and is currently located at Bandelier National Monument awaiting preservation treatment from the National Park Service.

Gun Site was instrumental in the development of the gun-type device ("Little Boy") used over Hiroshima at the end of World War II (McGehee et. al. 2003; McGehee et. al. 2008). Explosives testing of gun-type mechanisms took place on the flat area above buildings 08-0001, 08-0002, and 08-0003. This site design allowed for ample shielding from the gun-device testing above, but today poses weighty preservation challenges for the existing buildings most crucial in the development of Little Boy.

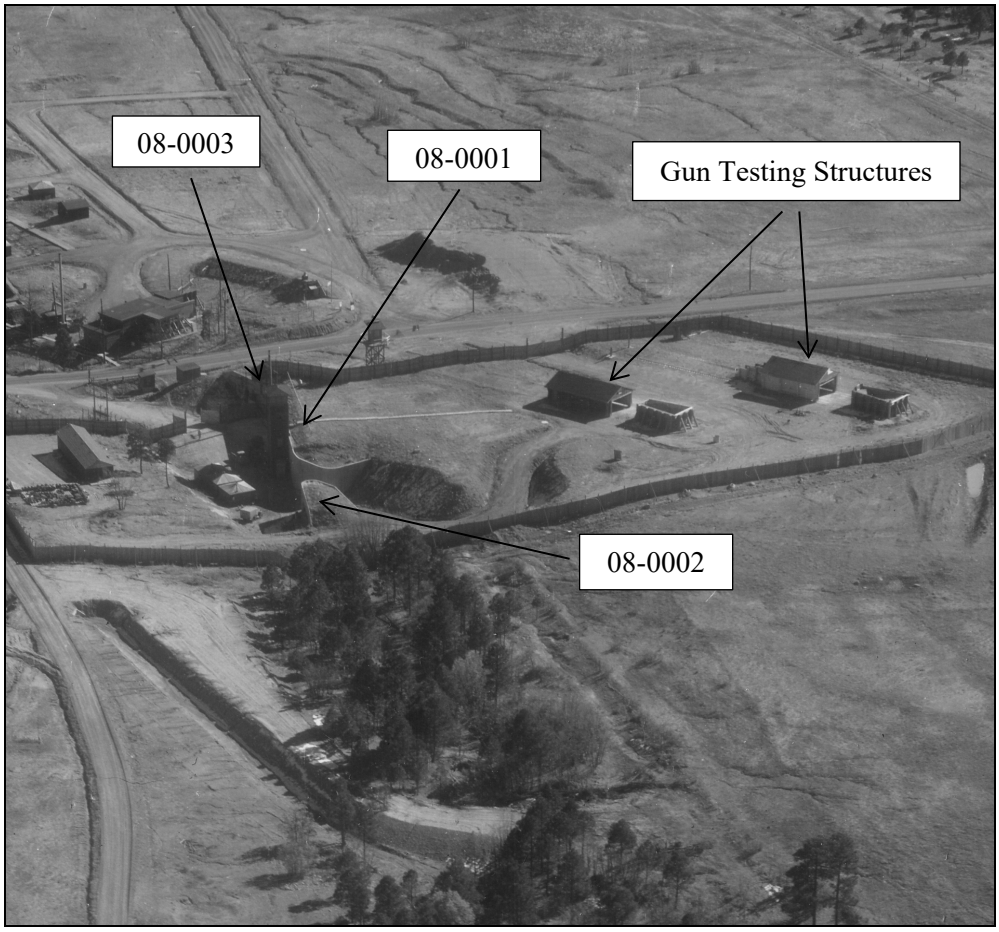


*Figure 6. Historical overview of the Gun Site from the Manhattan Project – circa 1946.*

### 2.2.1 *Laboratory and Shop TA-08-0001*

The Laboratory and Shop building is a rectangular-in-plan, one-story building constructed of poured-in-place concrete and set into the north-facing slope of a drainage that flows from the west. The building is attached to building 08-0003 on the east and separated from building 08-0002 to the west by a driveway that leads to the testing area on top of the south hillside. The north façades of 08-0001 and 08-0003 connect at an angled junction and are bordered by an open area currently used for vehicle parking when accessing the building.

The historic setting of building 08-0001 supplied necessary protection from the testing that occurred on top of the escarpment by way of an earthen covered roof and exposed exterior walls facing away from the test area. Work to the roof in 2012 installed a French drain and promoted erosion control through netting. Today the high, north-facing exterior wall produces an almost constant shadow during the winter months. The rigid concrete wall breaks blowing snow and allows high banks to collect against the north elevation through most of the winter. The enduring shadow promotes snow retention against the historic concrete and enables abnormally high concentrations of moisture exchange with the outside environment and the substrate of the concrete wall.

Other issues mentioned below primarily include work to window and door openings and the sealing of the building's envelope. While work on window and door openings is typical to resolving issues of outside impacts reaching the interior of the building, they are addressed separately here due to the specificity and frequency of other documented issues effecting the proper seal of the building. The main goal of the work included in this five-year plan is one of preserving the building and providing safe access with a longer view toward increased use appeal past the scope of this five-year plan.

*Figure 7. Present-day photograph of 08-0001.*

*Seal the Building*

Priority: High

Current Condition:

There are many areas of the building that lead from the outside to the inside as well as areas that give access to interior of walls, and between rooms. The areas that lead from the outside to the inside allow pest unrestricted access to the interior of the building. Evidence for pest intrusion is prevalent in the form of an excess of rodent excrement scattered throughout the interior of the building. Regular cleanings and removal of the excrement occur throughout the year, yet rodent droppings increasingly return entailing another round of cleaning.

There are many areas inside the building where holes in the interior siding allow pests entry into the inner framework of walls or to an adjacent room. Rodents that are allowed entrance to the interior of walls or to rarely accessed rooms are given greater opportunity to reproduce and build habitat suitable for increasing numbers of offspring and more rodents from the outside. A survey of the building's interior noted numerous opportunities for this type of access and evidence from droppings and nests.

Recommendations:

Although a perfect seal of the building is not likely due to the nature of historic buildings, pest intrusion will dramatically decrease if a serious attempt is made to close off access points into the building from the outside, and to seal voids found in the interior walls. A continuous cleaning regime is also recommended to prevent inviting more rodents from the outside of the building to the inside. The smell and awareness of rodent habitation through fresh rodent droppings and nesting, lures in more rodents to a safe, habitable space.

Preventing access will involve continuing to remove nesting and excrement debris from the floor and other horizontal surfaces, properly sealing window and door openings (to be followed up with specific recommendations in a later section), replacement of missing vent covers, repairing louvers, installing screen to penetration pipes. There are many instances on the interior of the building where drywall will need repair or replacement.

*Figure 8. Example of a type of hole frequently found throughout the interior of the building.*

*Figure 9. Holes like this one allow rodents an nice place to nest and reproduce.*

*Figure 10. A larger example of the type of damage seen in the interior walls.*

*Figure 11. This example is fairly typical of the types of holes throughout the building.*

*Figure 12. Whole sections of interior siding will need replacement.*

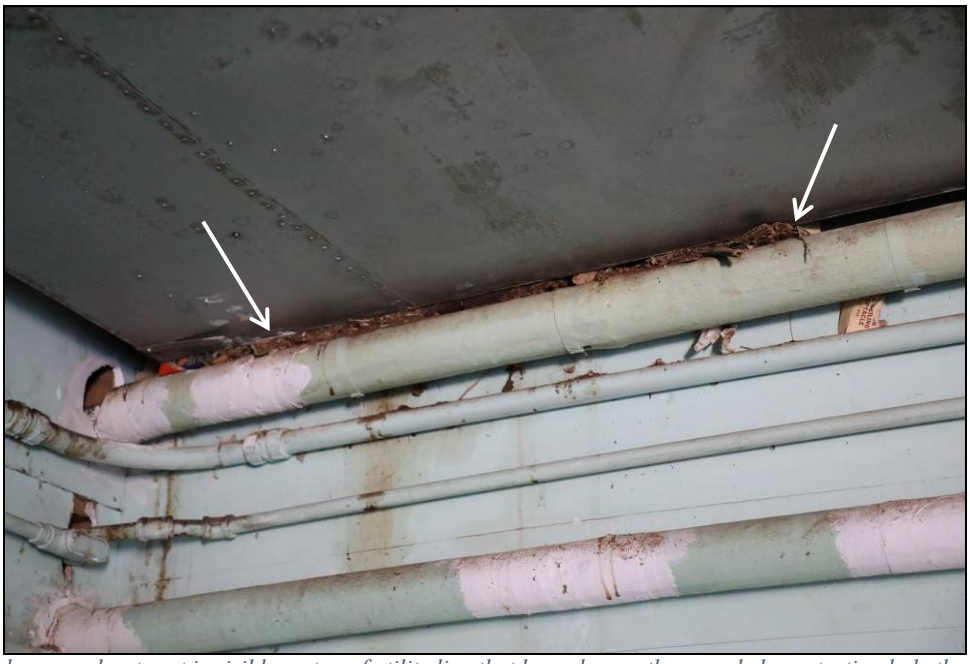

*Figure 13. A large pack rat nest is visible on top of utility line that has a larger-than-needed penetration hole through the wall.*

*Figure 14. The vent cover is missing and needs replacing.*

*Figure 15. The broken louver is unsightly and the worn screen cover needs replacment.*

*Figure 16. The screen covering this wall penetration is cracked and aged; allowing access for pests to the inside.*

*Repair Front Bay Door*

Priority: High

Current Condition:

The repairs required for the front bay door involve closing off pest access from the outside to the inside of the building. There is a substantial separation at the top of the bay door that contributes to this access. Paint marks indicate that this opening was covered at one time (Figure 18), but the covering has since been removed. A metal plate that extends vertically to cover the space between the wall and the bay door on the east edge is bent toward the base of the door opening (Figure 19). Utility holes are present in the upper left from the interior of the bay door (Figures 20 and 21). Below the utility conduit holes is a plywood-patched vent hole (Figure 22). Although the seal of the hole is sufficient, further deterioration of the plywood covering may change this in the future and the current aesthetics suffer because of the sloppy nature of this repair.

Separation above Bay Door = 1" x 4'
Bent metal at Bottom of Bay Door = 4" x 5'
Utility Holes = ½" diameter
Vent Hole Covered by Plywood = 17" diameter x 2" thick

Recommendations:

For the separation at the top of the bay door, a temporary wood cover that matches the dimensions of the removed board evident by the paint lines can be used for the short-term. A better long-term solution, however, is one that places an inset wood strip to fill the gap between the top board and the frame. The long, metal plate at the bottom of the bay door should be bent back in order to sufficiently cover the area between the door and the wall. Weather stripping or wood trim may need to be used to help further close in the gap. The utility holes in the upper corner should be filled with a wood plug that will be less noticeable when properly installed and painted over. Conduit can be cut prior to plugging the hole. The plywood covering he large vent hole should be removed. A wooden plug should be made the can be inset into the circular ductwork hole. The plug should be constructed from boards that match the width of the surrounding boards and inserted into the existing hole with no voids around the edges present.

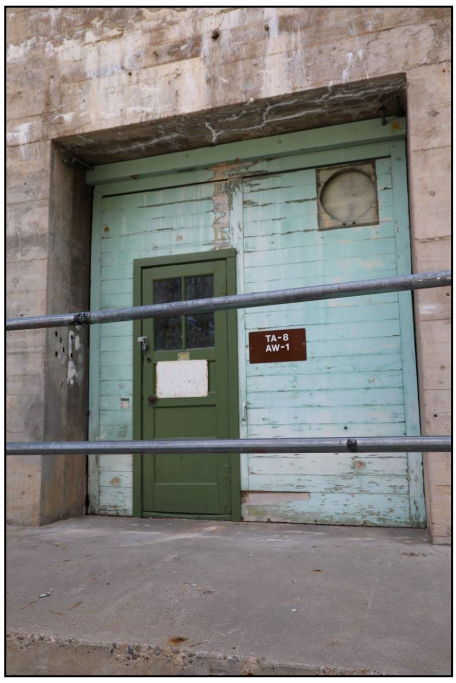


*Figure 17. Overview of the exterior of the bay door.*

*Figure 18. Daylight can be seen through the separation above the bay door.*

*Figure 19. Front and side views of the bent metal plate and basal void at the bottom of the bay door.*

*Figure 20. Utility hole in the upper left-hand corner above the bay door.*

*Figure 21. Exterior view of the utility line holes.*

*Figure 22. Interior view of the plywood piece covering the round ducting hole.*

*Figure 23. Exterior view of the duct hole and plywood cover.*

*Repair Walk-In Door*

Priority: High

Current Condition:

The walk-in door opening west of the bay door on the north elevation is covered with a plywood sheet. Daylight can be seen along the edges from the interior of the building indicating that pests have an entry point into the building (Figure 24). The original door is in pieces and awaiting repair and reinstallation.

Dimensions of Door Opening = 34 ½" x 78"

Recommendations:

The door should be repaired to the exact specifications as noted in the original drawings. The frame will also need repaired in the process to help with fit and operability of the door (Figure X). Original hardware should be used if suitable operability can be achieved.

*Figure 24. Interior and exterior views of the door cover.*

*Repair Broken Window Pane*

Priority: Low

Current Condition:

A noticeable crack is present in the bottom right corner (from inside) glass pane of an interior widow of Room 3. Also of note, a lab employee etched their name into the same pane at an unknown date in the past.

Dimensions of the Glass Pane = 12” x 12”

Recommendations:

The pane should be removed and replaced with pane of matching dimensions. Care should be taken not break any of the remaining glass panes during the replacement process. Additionally, the name etched into the pane should be researched to determine any historical importance prior to removal.

*Figure 25. View from the interior of the cracked glass pain with etching.*

*Repaint Interior Walls*

Priority: Low

Current Condition:

The interior paint exhibits severe deterioration from general wear and tear, past roof leaks, and interior efflorescence. Paint is flaking, worn, and stained.

Recommendations:

The interior of the building should be repainted with the same colors that are currently present on the wall surface. Failing paint should be removed to provide a stable surface for the new coating, however, paint that is structurally sound should remain in-place to provide historical evidence for future paint analyses. A primer is recommended to help with adhesion and durability. Non-period significant conduit may also be removed in preparation for this job. Subject matter experts with the Historic Buildings Program should be consulted prior to any removal of conduit in order to ensure period significant conduit is not removed.

*Figure 26. Example of peeling interior paint.*

*Figure 27. Peeling paint on and near the concrete ceiling.*

*Figure 28. Peeling paint on an interior wood surface.*

*Remove HVAC Ductwork*

Priority: Medium

Current Condition:

The large HVAC ductwork hangs from the ceiling and travels along much of the length of the building. The ductwork does not date to the buildings period of significance and acts as platform that supports rodent nesting and movement within the building.

Recommendations:

Complete removal of the ductwork is recommended along with the possible removal of the main core of the HVAC system if appropriate. The core system is covered in what may be asbestos. Care should be taken during the removal process when removing elements that are anchored into walls. Harsh removal techniques can cause irreversible damage to the concrete walls and ceiling.

*Figure 29. The non-period ductwork stands out in the interior rooms, and also provides a surface for rodent movement.*

*Remove Damaged Asbestos Floor Tiles*

Priority: High

Current Condition:

8” x 8” asbestos floor tiles near the west end of the building are chipping and releasing asbestos into the environment. Only the outer edge of the tile work is damaged and chipping.

Linear Feet of Damaged Tiles = Approx. 20’

Recommendations:

At this time only the damaged tiles should be removed. Intact tiles do not currently cause and immediate health/safety risk and time can be taken to determine the best course of action. A more intensive plan should be conceived later to remove all the tiles in the building or to encapsulate them as a preservation technique that also mitigates the likelihood of asbestos release from damaged tiles.

*Figure 30. The 8" x 8" asbestos tiles are cracking and breaking apart at the edges.*

*Remove Tripping Hazard (Utility Conduit)*

Priority: Medium

Current Condition:

A short length of conduit sticks up from the floor near the damaged asbestos tiles. This presents a substantial tripping hazard due to its location in the middle of floor. A traffic cone is usually placed on top to direct people around the hazard.

Recommendations:

The conduit should be cut flush with the floor. Additionally, concrete plug/infill (also flush) should be put in the cavity.

*Figure 31. An old utility conduit rises up out of the floor and presents a substantial tripping hazard.*

*Treat Efflorescence*

Priority: Medium

Current Condition:

Efflorescence is prevalent throughout the interior and exterior of the building. This is a complicated process that essentially produces damaging crack patterns and fundamental structural instability over a long period of time. The white staining and buildup is indicative of major problems occurring inside the wall.

Recommendations:

The efflorescence, the staining and buildup of materials leeching from the interior of the concrete walls, can be removed via mechanical processes, however, the root problem will still exist. Removal will really only improve the aesthetics of the buildings for a short time, and end up doing very little to help structural stability and overall preservation. Extensive research, examination, materials testing is required to effectively treat this impact.

*Figure 32. Examples of efflorescence on an interior wall and an exterior wall.*

*Replace Exterior Expansion Joints*

Priority: Low

Current Condition:

The vertical expansion joints have outlived their performance life. Some areas have deteriorated completely, while others are only partially deteriorated. The failing expansion joints allow moisture access deeper into the concrete walls and help to accelerate deterioration and efflorescence.

Recommendations:

As much material as possible should be pulled out of the current expansion joints and replaced with a modern replacement. The modern replacement can be of a different material (approved by Historic Buildings SMEs) than the original, but should be consistent in color to preserve the aesthetic character of the building.

*Figure 33. An overview shot of a typical vertical expansion joint to show height followed by a close up to show material color.*

*Repair Failing Parapet Cap*

Priority: High

Current Condition:

The cap along the parapet was constructed to act a protective covering for the reconstructed parapet below it in 2012. This cap was not anchored to the parapet in any way and quickly failed as a result. The loose concrete caps disconnect from the main parapet and repeatedly flakes off to either side. This separation poses a considerable safety hazard for a person unlucky enough to be below when a piece falls.

Recommendations:

Complete removal of the failing cap is needed. Most section still attached to the parapet can likely be removed with simple hand tools. Some power tool work may be required in some areas.

*Figure 34. An example of the failing parapet cap.*

*Repair Failing Parapet Cap*

Priority: Low

Current Condition:

Vegetation growth has been sparse over the past decade since the French drain system was installed and contouring occurred upslope in 2012. Heavy runoff from above is currently meeting less resistance and the French drain is seeing more water than it would if vegetation would be thicker upslope.

Recommendations:

Reseeding should be attempted prior to the wet season. Increasing native grasses will show potential sheet washing from above and better regulate the amount of water managed by the French drain system during heavier rain events.

*Figure 35. View of installed matting and degree of vegetation growth since 2012.*

### 2.2.2 Shop and Storage TA-08-0002

The Shop and Storage building is a rectangular-in-plan, one-story building with two separate rooms and constructed of poured-in-place concrete (Figure 36). It was isolated from buildings 08-0001 and 08-0003 likely due to its original function of high explosives storage. Blast walls with inset doors were built to face away from the testing area above and to the south. The roof is earthen covered and offers sufficient protection from the test shots above. A retaining wall is appended to the northwest corner of the building to hold back soils washed down from the adjacent drainage. Historically, a road was situated just behind the wall (Figure 6).

Preservations issues are similar to that covered under 08-0001. Rodent infestation is prominent and there are several access points leading from the outside to the interior of the building. Expansion joint materials are deteriorating, and efflorescence is present on the concrete walls. Additionally, parapet capping is failing and interior paint is chipping. These issues were covered above for 08-0001 and will not be repeated for this building, however, this work should still be addressed within the next five years with recommendations consistent with 08-0001.

*Figure 36. Overview of 08-0002.*

*Replace Doors*

Priority: Low

Current Condition:

Two sets of doors on the north exterior of the building do not provide an adequate seal or aesthetic quality for the building. Rust is present near the bases and fit is inadequate for a proper closure. The doors are a modern substitution in a non-original concrete-block wall. The original doors were wooden, set into a framed-out blast wall.

East Set of Double Doors = 36” x 84”
West Set of Double Doors = 36” x 84”

Recommendations:

The more immediate need is for a replacement of the inoperable doors; however, replacement of the doors offers a strategic opportunity to bring back the lost historic character that dates to the period of significance. Replacement doors should be made of wood and resemble in character the original doors but fit the current openings if the concrete-block construction is not removed. If the concrete-block construction is removed, then the doors should be reconstructed to the exact specifications as presented in the original drawings.


*Figure 37. Both sets of double doors as viewed from the exterior of the building.*

*Remove Concrete Blocking*

Priority: Low

Current Condition:

The addition of concrete blocks in place of the original blast walls does not greatly affect the structural stability of the building. The block work, however, dramatically affects historical character, important educational potential, and aesthetic qualities. Original construction was of wood-framing and triple-sealed gypsum board siding instead of concrete block. The wooden construction helped direct an accidental blast in a safe direction away from buildings 08-0001 and 08-0003, as well as the testing area above and to the south. A wood-framed wall would require greater maintenance obligations, but in exchange, offer heightened integrity and provide greater opportunities in presenting a more accurate account of the buildings history and purpose.

Recommendations:

A reconstruction of the original blast walls would require a near exact rebuilding as defined by the original construction drawings. Location of doors within the blast walls would change from the present configuration. The original configuration had both sets of doors nearly adjacent to the dividing center wall. Reconfiguring the doors back to the original design will provide a much logical and safe use of the landing out in front of the doors (Figure 38); eliminating the half-over situation currently utilized when entering and exiting both rooms.


*Figure 38. The non-original concrete block can be seen here around the green double doors.*

*Fill Duct Holes*

Priority: High

Current Condition:

Two square holes that once supported ductwork are covered with plywood pieces slightly larger than the holes. The plywood is affixed at the four corners resulting in an incomplete seal toward the middle edges. The resulting small slits allow access to smaller pests. Additionally, the covers present a poor appearance.

Dimension of Holes = 9" x 9"

Recommendations:

If the concrete-block wall remains in place for an extended length of time, the plywood covers should be removed and replaced with a similar-looking concrete block cut to fit. The block would be mortared in place and fitted in such a way that does not draw the eye.


*Figure 39. Interior and exterior shots of the eastern vent hole.*

*Figure 40. Interior and exterior shots of the western vent hole.*

*Remove and Fill Conduit Holes*

Priority: High

Current Condition:

Multiple conduit lines and former utility line holes are present in the concrete-block construction. Open holes and poor cover around the conduit lines allow pests access to the interior of the building.

Diameter of Holes = 1”

Recommendations:

If the concrete-block wall remains in place for an extended length of time, the holes should be filled with a concrete mix stained to blend with the surrounding concrete block. Holes with conduit can either be filled in around the edges with the same mix used to fill in the holes without conduit.

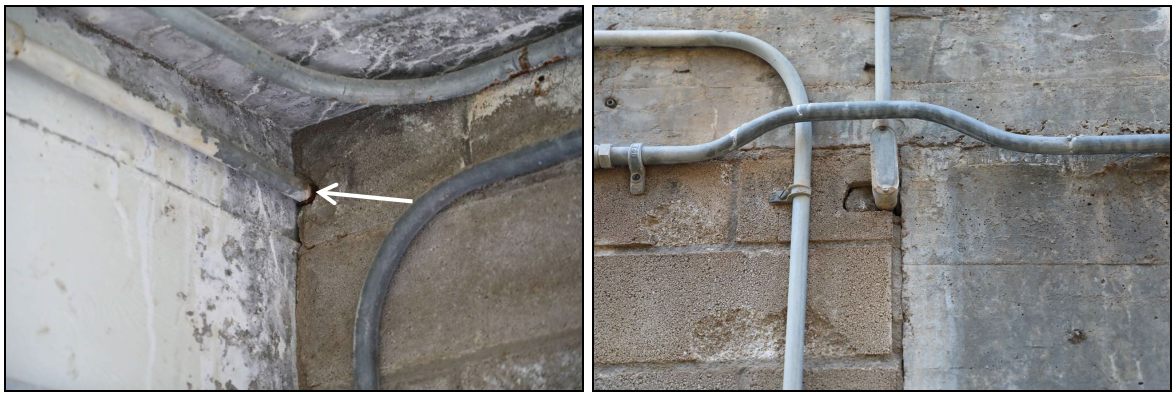

*Figure 41. Example of utility conduit from the interior and exterior of the building.*

*Figure 42. Example of a utility hole with the conduit removed.*

*Replace Utility Pit Cover*

Priority: High

Current Condition:

The plywood cover over an interior utility pit has rotted through and presents a fall safety hazard. Additionally, the exposed pit harbors substantial rodent activity. Successfully closing off the pit will deny rodents this opportunity and resolve the fall hazard.

Dimensions of the Utility Pit = 27” x 36”

Recommendations:

A reinforced cover should be constructed and installed after removal of the unsalvageable plywood cover. A plywood replacement is not recommended due to the likelihood of people standing on top of this area in the future. A double-layer plank construction is recommended where the two layers of planks run perpendicular to each other. The new cover should be flush to the surrounding floor surface to avoid a tripping hazard.

*Figure 43. The plywood cover that once successfully covered the utility pit no longer functions properly.*

*Repair Cracking Hubbelite Flooring*

Priority: Low

Current Condition:

The Hubbelite flooring is experiencing significant cracking and failure; especially around the edges. This cracking will continue to worsen to a point where preservation of the original fabric will not be possible.

Recommendations:

The deterioration of the Hubbelite flooring will require and in-depth examination of the material and potential preservation strategies to retain the floor. Work to the Hubbelite should only be completed following expanded research and the development of a structured and a carefully thought-out work plan.


*Figure 44. Examples of cracking Hubbelite.*

### 2.2.3 *Laboratory TA-08-0003*

The Laboratory building is an irregular-in-plan, one-story building set into a hillside. Constructed of poured-in-place concrete with two separate rooms, the building is joined with Building 08-0001 on its west side. The roof is earthen covered to and only the north elevation remains uncovered to help protect from the testing that occurred on the rise behind the building.

Similar to Buildings 08-0001 and 08-0002, preservation issues include rodent infestation and voids between the interior and the exterior. Efflorescence is prevalent and the parapet capping above is failing. Interior painting is also needed. These issues were covered above and will not be repeated for this building.

*Figure 45. Overview of 08-0003.*

*Repair Entrance Doors*

Priority: High

Current Condition:

The doors are operable to an extent. The open and close, however, they do not allow for a suitable seal around the edges. The wood is a little soft in some areas and paint is flaking on both the interior and exterior surfaces. Of particular note is the severe deterioration around the door knob and associated hardware. The panic bar on the interior of the door is inoperable. The threshold is in poor condition.

Dimensions of each Entrance Door = 30” x 82” x 1 ¾”

Recommendations:

The interior and exterior of both doors should be repaint to the historic color as specified by Historic Buildings staff. Hardware should be inspected, cleaned, and return to a functional condition. Deterioration of wood around the knob and associated hardware should be repaired via a Dutchmen repair. All hardware should be retained unless determined to be not repairable by subject matter experts. The should be retained if possible; however, preliminary examination suggests a replacement may be necessary.

*Figure 46. Exterior and interior photographs of the entrance doors.*

*Construct New Entrance Door*

Priority: High

Current Condition:

The door is completely missing and the opening is currently covered on the interior by single piece of plywood. Closure of the opening and a seal of the plywood with the frame is achieved with two boards and tensioning wires. This closure represents a temporary solution that is past its designated life cycle.

Dimensions for the Reconstructed Door = 36” x 82” x 1 ¾”

Recommendations:

A new door should replicate the door as presented in the original drawings. Slight changes can be made in order to ensure a proper fit and ease of operations. Paint should match that of the nearby double doors. The frame and threshold will require some work to ensure a proper fit. Existing wood used to construct the frame should be reused whenever possible; however, a good fit is more important to the preservation of the building. Irreparable wooden elements may be replaced as necessary to ensure a good fit.

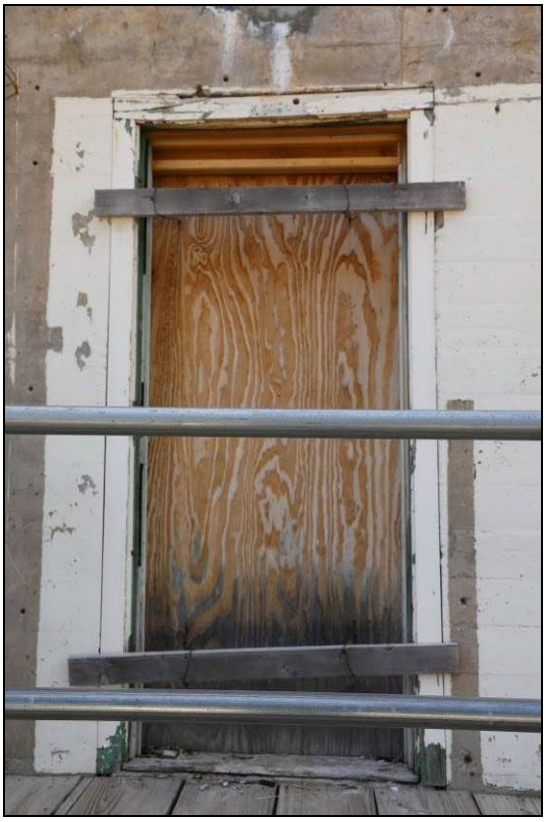

*Figure 47. Exterior photograph of the door opening needing a reconstructed door.*

*Seal Vent*

Priority: High

Current Condition:

The exterior ventilation ductwork has been retained. The interior has been removed with a temporary covering (cardboard) installed many years ago. The temporary covering no longer serves to provide a complete seal around the vent hole and allows access to the interior of the building by weather and pests. Large voids are present along the majority of the edges.

Dimensions of Vent Hole = 13” x 18”

Recommendations:

The interior of the hole should be framed-out and concrete parging that matches the surrounding fabric installed. An effort to match any surrounding board-forming should be made to present a consistent look to the repair.


*Figure 48. View of the exterior and interior vent penetration.*

### 2.2.4 *Guard Station TA-08-0172*

The 08-0172 Guard Station (along with most of the guard stations constructed for the Manhattan Project) was built to serve as a mobile building that could be transported to various locations depending upon need. This particular guard station is currently located on-site at Bandelier National Monument awaiting a near-complete rehabilitation to preserve the building for the purposes of structural stabilization, safety, and site interpretation.

The guard station is a wood-frame building, rectangular-in-plan, and one story. The roof is a pitched, shed-type roof. A single entrance leads to the interior, flanked by two double-hung windows. The exterior siding is of a drop-type style characteristic of many of the other Manhattan Project guard stations.

The entire building is in need of stabilization work. Rot and general deterioration is prevalent throughout the exterior and interior, especially along the basal regions. Window and door openings are in need of extensive repair. The roof is in need of replacement, and the floor requires a broad stabilization strategy prior to reliable and safe entrance to the interior. Due to the overall poor condition and the need for a complete rehabilitation, specific issues are not documented here and will be addressed in a forthcoming detailed condition assessment.

*Figure 49. Overview of 08-0172.*

## 2.3 Technical Area 11

The buildings of Technical Area 11 are significant to the Manhattan Project due to their employment in analyzing implosion device testing (McGehee et. al. 2003). While there are four surviving buildings from the Manhattan Project, only three are currently maintained as eligible candidates for the park. Building 11-0004 is not, at this time, considered eligible for park inclusion, but may be reconsidered at a future date. Buildings 11-0001, 11-0002 and 11-0003 were structurally separated originally, but now Buildings 11-0002 and 11-0003 are connected on the exterior by a parged-over, earthen berm that was constructed at a later date. Implosion testing during the Manhattan Project occurred between the two buildings prior to the construction of the connecting berm. A long metal building is currently located between buildings 11-0002/11-0003 and 11-0001, but is scheduled for removal soon. This building is historic, but does not date to the Manhattan Project, and its removal will return a degree of integrity to the Manhattan Project cultural landscape of K-Site.

Buildings 11-0001, 11-0002, and 11-0003 present unique preservation challenges due to earthen-covered roofs and sides. The cavern-like nature of the interior of the buildings offers a cool, dry setting for rodents allowed access to the interiors. The earthen berms require attendance to routinely address vegetation and erosion issues.

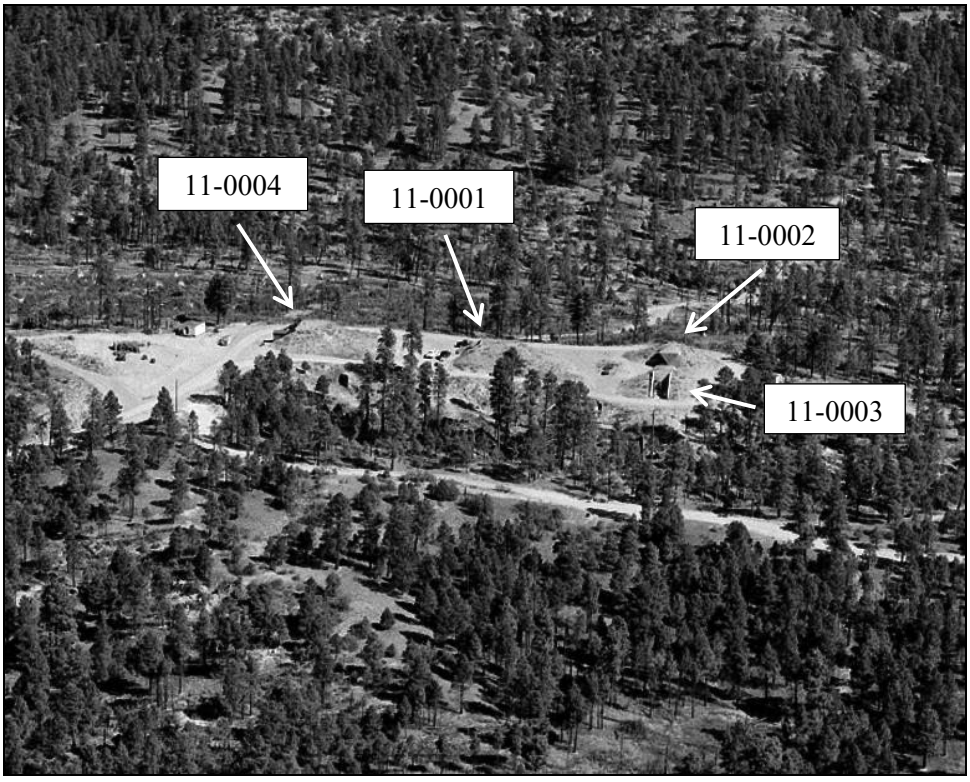


*Figure 50. Historical overview of K-Site - circa 1946.*

### 2.3.1 *Control Laboratory TA-11-0001*

As a control laboratory for the implosion testing that occurred at K-Site (Buildings 11-0002 and 11-0003), Building 11-0001 was physically separated from the two testing buildings. The exposed west elevation faces away from the testing area and is constructed of reinforced, poured-in-place concrete. The north, south, and east elevations are earthen covered to offered additional protection from the implosion tests. The structure under the earthen berms is a rectangular-in-plan, one-story building with the front entrance flanked by wing walls.

Major preservation issues for Building 11-0001 primarily involve concrete deterioration. Also covered in the plan, though, are issues dealing with metal flashing on top of the wing walls, wood deterioration at the base of the entrance door, and concerns with the earthen berm that include vegetation growth, the presence of modern equipment, and slope erosion.

*Figure 51. Front view of 11-0001.*

*Repair Concrete*

Priority: High

Current Condition:

Critical deterioration has occurred at the upper most corner of the south elevation.

Recommendations:

The top corner will likely require rebuilding once an appropriate mix is determined. Other areas and cracks can be patched as needed.

*Figure 52. Photo shows the missing corner along with cracking and other issues.*

*Stabilize Base of Entrance Door*

Priority: Medium

Current Condition:

The bottom of the door shows significant signs of rot. The rot has migrated up to the hardware and may eventually affect the operability the bottom hinge and latch. Voids are starting form at the bottom edges of the outer boards which allows moisture access to the interior of the door. If left unchecked, the structural stability of the door will be severely compromised.

Recommendations:

The bottom portion the boards will need removed and replaced. A less intrusive repair may present itself with further planning, however, Dutchman repairs should be made to each board to provide an appropriate seal between the metal and the wood. This type of repair will help prevent moisture from reaching the interior of the door and provide better protection for the entire door.


*Figure 53. Photograph shows wood deterioration at the base of the door.*

*Reattach Metal Flashing*

Priority: Low

Current Condition:

The metal flashing on the top of the south wing wall has detached from the wall. The flashing was installed at an unknown date to help protect the top of the concrete from direct impacts related to rain and snowfall. This detachment at the flashing's edge presents an opportunity for further detachment farther up the wall if a strong wind or some other natural or mechanical factor gets underneath and pulls the flashing away from the wall. This may cause greater damage at the anchor points embedded within the concrete.

Recommendations:

The immediate recommendation should be to re-affix the flashing to the concrete. Reuse of the original anchor hole would be the most appropriate for preservation purposes in order not to create additional holes in the original concrete. A long-term plan should be developed however to assess the prospect of entirely removing the flashing. Complete removal of the flashing will help with the aesthetics of the building and possibly be beneficial for the preservation of the wing walls. Metal capping over historic concrete can trap moisture in the top of the wall and accelerate deterioration. If complete removal is not recommended after further consideration then painting should be considered to help blend in the metal to the rest of the building.

*Figure 54. The detached flashing can be seen in the middle of the frame.*

*Introduce Fill Material to Berm*

Priority: Low

Current Condition:

Two corners (northeast and southeast top corners) of the building are exposed due to erosion. This presents and open-air environment that can accelerate concrete deterioration of the exposed portions. Rain and snow fall currently have a direct impact to these exposed corners and will promote deterioration faster than if these surfaces were covered with earth.

Recommendations:

Fill material similar in color and consistency should be brought in to sufficiently cover both areas. On-site material from the berm should not used and cover only as much as necessary to retain the general shape of the berm. Seeding of native grasses should be promoted to help with soil retention. Larger plants are discouraged due to the impact that more extensive root systems can have on the underlying concrete structure. While the removal of larger vegetation is encouraged, grasses should be allowed time to seed and regenerate on the berm. Less aggressive vegetation management (i.e., longer intervals between weed eating and grass cutting activities) is encouraged. Larger growth plants and shrubs should be individually removed on an at-least yearly basis.

*Figure 55. Arrows point to the exposed concrete roof corners on the southeast and northeast corners.*

*Remove Shrub*

Priority: Low

Current Condition:

A small to medium shrub is growing adjacent to the top of the north wing wall. The root system of the plant, while helping to slow soil erosion in this particular spot, will eventually cause subsurface damage to the adjacent concrete wall.

Recommendations:

The plant should be cut as close to the ground as possible. The root system will eventually decompose. Digging up the plant is not recommended and the plant should be discarded off-site.

*Figure 56. The scrub can be seen here soaking up the sun and moisture from gradual snowmelt.*

*Remove Monitoring Device*

Priority: Low

Current Condition:

A stand with monitoring equipment of unknown function to the author is tied into the electrical connectivity of the building. Modern utility conduit runs from the piece of equipment on top of the berm to an electrical box mounted on the west elevation façade. This creates an adverse visual impact to the front of the building. The gleaming conduit stands out and draws the eye of the observer. In addition to the visual impact of the conduit to the front of the building and the height of the stand on top of the berm that distracts from the whole of the form, maintenance and routine inspections of the monitoring equipment cause excessive traffic and opportunity for increased erosion on the top and sides of the berm.

Recommendations:

Relocation of the monitoring equipment is preferred. Utility conduit should also be removed with care taken with the removal of any anchoring points in to the concrete of the building.

*Figure 57. The monitoring device may be operational, but may not be. Either way relocation of the device will benefit the overall preservation of the structure.*

### 2.3.2 *Betatron Building TA-11-0002*

The Betatron Building was constructed with protection from implosion testing in mind. The exposed elevation faces north while the east and west elevations were covered with earthen fill. The south elevation historically consisted of steel prow similar to the battleship bunkers at TA-18. Unlike the TA-18 battleship bunkers, a long steel tube connected buildings 11-0002 and 11-0003 and was instrumental for the implosion testing that occurred during the Manhattan Project. 11-0002 is a one-story building constructed of poured-in-place concrete and rectangular in plan. The east, west, and south elevations, along with the roof are covered in earth and capped with a Shotcrete-like product. The front entrance has been enclosed with framed-out metal siding and an extended roof. The addition was constructed in 1947 (McGehee et. al. 2003:80) and incidentally provided a good degree of protection interior features.

Preservation of the 11-0002 is relatively stable. The concrete wing walls and north façade are in excellent condition compared with 11-0001 and 11-0003. The 1947 addition effectively sheltered the concrete and the wooden door, which is also in exceptional condition compared to the doors on the other two buildings. Preservation issues are therefore limited to access paths between the addition and the original building interior. Rodent activity is evident in both rooms and presents the chief preservation issue at this time.


*Figure 58. Overview of 11-0002.*

*Repair Holes in Berm*

Priority: Low

Current Condition:

Several small holes have been present in the Shotcrete-like product that was used to cover the earthen infill between 11-0002 and 11-0003. Recently, animal activity has been recorded at one of the holes and active burrowing is evident (Figure 59). Increased burrowing will eventually cause instability of the berm covering and present a safety hazard to individuals accessing the berm surface.

Recommendations:

The burrow hole should be filled back in with soil, lightly compacted, and covered with a similar-looking concrete mix patch. The other smaller holes should also be tested and the same recommendation for the active burrow hole should be applied.

*Figure 59. Active burrowing is evident in this recent photo.*

*Fill Utility Holes*

Priority: High

Current Condition:

Former utility line holes are present between the addition and the original room. These holes allow an avenue for rodents to access the original room from the addition. The addition can be rodent proofed to some extent, but it is unlikely that a total seal will be achieved. Achieving a good seal between the original room and addition will dramatically increase the preservation of the interior of the original room.

Recommendations:

Temporary measures should include the use of steel copper packed tightly into all existing utility holes. Long-term mitigation will include the selection of a proper concrete mix and a meticulous in-fill repair that does not draw attention to the patch.

*Figure 60. Utility hole with conduit no longer occupying it.*

*Replace Metal Access Port*

Priority: High

Current Condition:

The metal access door (similar to the one pictured in Figure 60) has been removed. This opening allows rodents access to the interior of the original room and is unsightly. Rebar was welded diagonally to the anchor bolts and piece of square tubing was installed as possibly some sort of brace.

Recommendations:

A metal access door similar to the one pictured in Figure 60 should be reconstructed and installed. An effort should be made to reuse the same anchor bolts and anchor bolt locations. Rebar should be removed along with the square-tubed bracing that currently spans the existing hole.

*Figure 61. Exterior and interior photographs of the access port with missing door.*

*Remove Front Addition*

Priority: Low

Current Condition:

An addition was constructed in front of the entrance to the original building in 1947. The addition has provided beneficial preservation to the concrete and wooden elements from the original construction episode. The addition, however, is not properly sealed and allows entry to rodents which nest inside and, in turn, affect the health/safety of personnel entering the both rooms. More importantly, the addition detracts from the historic significance of the original Manhattan Project construction.

Recommendations:

The eventual removal of the addition should only take place after careful consideration and consultation. The addition dates to 1947; one year after the Manhattan Project ended, but offers a great deal of preservation to original fabric. Returning historic significance and architectural integrity is the prime reason for removing the historic addition. If removal is ultimately settled on, then care should be taken to not damage the original building and a satisfactory preservation maintenance plan should be agreed upon and implemented. The protection that is currently provided by the addition will need to be sustained through appropriate and timely preservation treatments.


*Figure 62. Overview of the addition.*

*Remove Connecting Berm*

Priority: Medium

Current Condition:

The connecting berm between 11-0002 and 11-0003 presents an interpretation inconsistent with the significance of both buildings during the Manhattan Project. Originally, the space between the buildings was open and long pipe connected both and was engaged with the implosion experiments that took place at K-Site. In addition to the presentation that the berm depicts, there are potentially serious, yet unknown, preservation issues that may be occurring underneath. Both buildings 11-0002 and 11-0003 have large metal blast deflectors on the sides facing each other. That metal is now underneath conceivably moist soils that contribute to increased oxidation. The potential rusting is heightened by the Shotcrete-like material that covers the earthen berm and effectively traps moisture in the underlying soils. An open-air environment in an arid setting will undoubtedly serve to better protect these large metal elements currently trapped under the earthen berm.

Recommendations:

The berm should be completely removed with the exception of east and west elevations that were originally covered. A temporary measure could consist of at least removing the Shotcrete-like product currently trapping moisture in the underlying soils. As with the removal of the addition, a suitable preservation maintenance plan should be developed and agreed upon prior to full removal. The preservation maintenance plan should not only include appropriate treatments to inhibit further oxidation of the newly-exposed iron, but also strategies for avoiding erosion on remaining berm slopes.

*Figure 63. The berm extends along the back of 11-0002 to 11-0003 which can be near the back.*

### 2.3.3 *Cloud Chamber TA-11-0003*

The Cloud Chamber was constructed opposite 11-0002. The entrance to the building is located on the south elevation facing away from the testing area. Similar to 11-0002, the east and west elevations were covered with a protective earthen fill and the north elevation was protected via angled blast deflectors resembling the battleship prow construction at the TA-18 battleship bunkers. 11-0003 is a one-story building constructed of poured-in-place concrete, and rectangular in plan. The roof, and the north, east, and west elevations are covered in earthen fill and capped with a Shotcrete-like product. The front entrance is flanked by wing walls. Non-original additions include a bathroom constructed up against the interior of the west wing wall and a staircase and viewing platform along the exterior of the west wing wall on the roof (McGehee 2003).

Preservation issues covered in the following subsections parallel those addressed with 11-0001 and 11-0002. Concrete stabilization is problematic here and the entrance door requires some work to keep out rodents. There are issues related to the covered berm, vegetation growth on the berm, and roof penetration seals.


*Figure 64. Overview of 11-0003.*

*Repair Deteriorated Concrete*

Priority: Medium

Current Condition:

Severe deterioration is occurring near the bottom of the west wing wall. A highly likely scenario is that this are of the concrete became extremely weakened when the benchmark was put in.

Recommendations:

The interior of the hole should be framed-out and concrete parging that matches the surrounding fabric installed. An effort to match

*Figure 65. Major concrete deterioration is occurring near the benchmark on the west wing wall.*

*Figure 66. Significant cracking can be seen on the cap of the east wing wall.*

*Figure 67. Efflorescence is present on the exterior of the east wing wall.*

*Repair Concrete Threshold*

Priority: Medium

Current Condition:

Portions of the concrete just outside of the entrance door threshold has flaked away. This produces a tripping hazard and an area for water to pool; causing even more damage. It looks as if this concrete patch was applied at a later time over the original concrete and is now failing.

Recommendations:

The rest of the failing concrete should be removed; taking care not to damage the concrete threshold under the door or the original concrete underneath the patch. The initial reason for the patch is unclear, however, it may have been to reduce the height of the original threshold and prevent trip hazards when the building was in use. The recommendation for now would be not to replace the patch – only remove it, and if we find that it is required in the future, then replace it.

*Figure 68. Patched concrete on the interior of the threshold is worn and presents a trip hazard.*

*Clean Rodent Debris*

Priority: high

Current Condition:

Rodent debris can be found throughout the interior of the building. The most likely point of entrance is the door, vent holes on the south elevation, and improperly sealed utility line holes.

Recommendations:

Sealing the envelope of the building is best way to prevent rodent access into the building. Copper wool can be used to temporarily seal around vent holes and larger-than-needed utility line holes found above the rodent debris pictured below.

*Figure 69. Rodent debris scattered under vent and utility hole openings to the left of the entrance door.*

*Seal Entrance Door*

Priority: High

Current Condition:

Daylight can be seen from the interior of the building when the door is closed. This allows enough space for rodents to access the interior of the building.

Recommendations:

A wood threshold should be constructed to close the gap. This is preferred over a door sweep that would decrease the integrity of the door. The door is more significant historically and architecturally than the threshold and would be impacted more by the addition of a sweep. The wood threshold should be installed and anchored to the current concrete threshold as gently as allowable. A maximum of four anchor points should be drilled into the concrete (two would be better). A mild adhesive that can be easily removed from the concrete could also be used if it means minimizing the number of anchor points into the original concrete.

*Figure 70. Daylight can be seen under the entrance door when closed.*

*Reseal Roof Penetrations*

Priority: Low

Current Condition:

The tar sealant is past its design life. Cracks and tears have formed resulting in decreased performance.

Recommendations:

A new tar sealant can be applied over the top of the old sealant. Previous applications, however, were sloppy next to the original concrete and a direct application of the new sealant should avoid being placed directly on top of original fabric. A barrier that separates the sealant from the concrete is recommended.

*Figure 71. The age of the sealant around the points of penetration can be seen in this photo.*

*Replace Sweep on Bathroom Door*

Priority: High

Current Condition:

The door sweep for the bathroom addition is well past its design life. There are holes that allow rodents and other pests access to the interior of the bathroom.

Recommendations:

Full replacement of the sweep is required. A typical door sweep may suffice, however, rodents typically chew on the rubber and gain entry to the building's interior. If a stronger metal sweep can be obtained, then this problem will not have to be address for a longer period of time.

*Figure 72. The rubber underside of the door sweep exhibits serious deterioration and allows passage of pests from the exterior to the interior.*

*Remove Shrub*

Priority: Low

Current Condition:

The root system of the shrub is growing adjacent to the original concrete construction of the building. This is likely causing subsurface damage to the concrete. Also, the shrub grew out of a penetration in the protective covering which allows moisture entry under the covering. The shrub stem and root system widens this penetration and, as a result, allows more moisture to enter through the larger hole to soils under the covering; effectively trapping excess moisture an area that is sensitive to impacts from moist soils (i.e., the original concrete and the iron bulkhead that is now covered).

Recommendations:

Clip the shrub as close to the ground surface as possible. Additional fill will likely be necessary to line against the adjacent parapet to help keep moisture from pooling up against the structure.

*Figure 73. The shrub is growing up against the parapet and causing damage to the original architecture.*

*Remove Connecting Berm*

Priority: Medium

Current Condition:

The connecting berm between 11-0002 and 11-0003 presents an interpretation inconsistent with the significance of both buildings during the Manhattan Project. Originally, the space between the buildings was open and long pipe connected both and was engaged with the implosion experiments that took place at K-Site. In addition to the presentation that the berm depicts, there are potentially serious, yet unknown, preservation issues that may be occurring underneath. Both buildings 11-0002 and 11-0003 have large metal blast deflectors on the sides facing each other. That metal is now underneath conceivably moist soils that contribute to increased oxidation. The potential rusting is heightened by the Shotcrete-like material that covers the earthen berm and effectively traps moisture in the underlying soils. An open-air environment in an arid setting will undoubtedly serve to better protect these large metal elements currently trapped under the earthen berm.

Recommendations:

The berm should be completely removed with the exception of east and west elevations that were originally covered. A temporary measure could consist of at least removing the Shotcrete-like product currently trapping moisture in the underlying soils. As with the removal of the addition, a suitable preservation maintenance plan should be developed and agreed upon prior to full removal. The preservation maintenance plan should not only include appropriate treatments to inhibit further oxidation of the newly-exposed iron, but also strategies for avoiding erosion on remaining berm slopes.

*Figure 74. The parging over the earthen berm extends from the sides and back of 11-0003 to the back and sides of 11-0002.*

## 2.4 Technical Area 14

Small-scale implosion testing to support the *Fat Man* device constituted the primary activity at TA-14 during the Manhattan Project (McGehee et. al. 2003). The last remaining building from this period is 14-0006 which operated as a shop and dark room.

### 2.4.1 *Shop and Dark Room TA-14-0006*

The shop and dark room building (14-0006) is a rectangular-in-plan, one-story building. This wood-frame building sits on a poured concrete foundation and has a shed type roof.

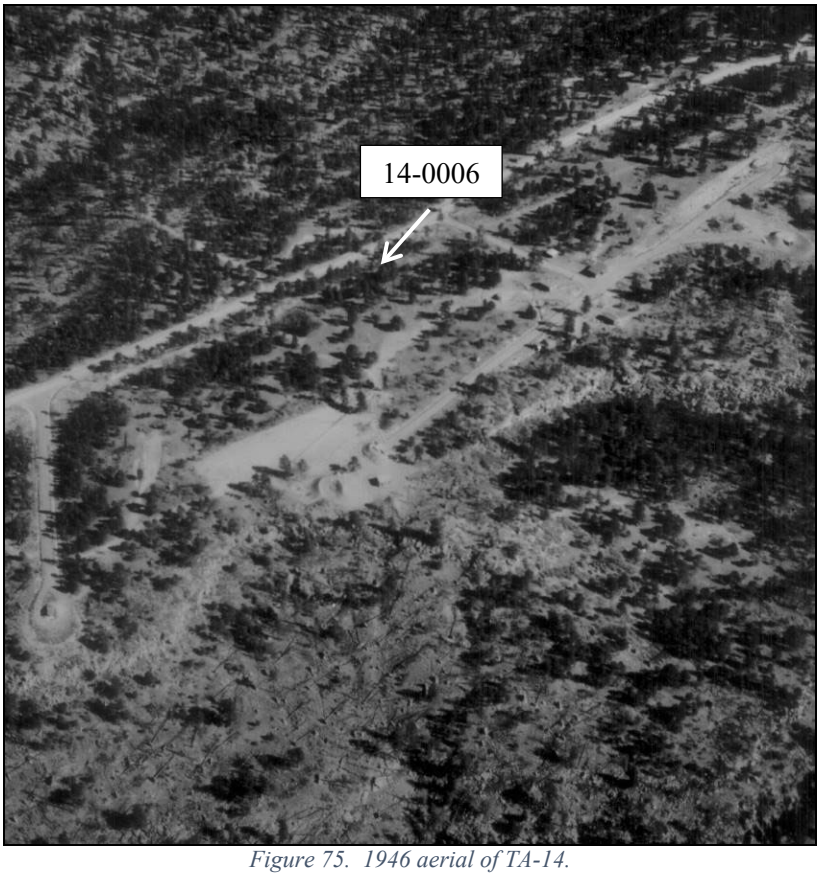


*Figure 75. 1946 aerial of TA-14.*

*Repaint North Elevation Door*

Priority: Low

Current Condition:

The exterior has recently been painted, but the interior has flaking paint. The door panels have bubbled out and showing signs of cracking.

Recommendations:

The interior of the door should be repainted soon while the exterior can likely wait until the end of the upcoming five-year period. Prior to repainting bubbling in the panels should be removed with some light sanding. The paint over the bubbled-up areas will fail quickly.

*Figure 76. Exterior and interior views of the north elevation door.*

*Repair Window Openings*

Priority: Low

Current Condition:

The widow sashes and frames on the north elevation of the building are in fair condition. Minor work is required to maintain operability and stabilization of the wooden elements. The exterior has been repainted recently and requires very little work. The interior of the window openings require a bit more work that includes repainting and wood stabilization.

Recommendations:

Focus should be placed on the interior of the window openings. Wood consolidant may be needed in small amounts on the bottom portion of the stiles and the interior sills. Repainting should be undertaken to extend the life of the window openings. The exterior of the window openings are in good condition but should be repainted toward the end of upcoming five-year period.

*Figure 77. The three window openings from the exterior of the north elevation.*

*Figure 78. Interior view of the three window openings.*

*Figure 79. Interior view of the three window openings from an angle.*

*Repaint Interior Walls*

Priority: Low

Current Condition:

The interior walls show scuffing and chipping in some areas.

Recommendations:

Repaint the walls with the same color that is present. If time and funds permit, consult with historic building subject matter experts to perform a paint analysis. A paint analysis will help determine the original color of the interior and help with selecting a color that is offers greater historical accuracy.

*Figure 80. A view of the east interior where scuffing is more prominent.*

*Rehang Light Fixture*

Priority: Low

Current Condition:

Two light fixtures are missing. One is currently sitting on a table inside the building.

Recommendations:

Rehang the fixture on the table. Consult with Historic Buildings staff to obtain another similar fixture for the second installation.

*Figure 81. Historic lamp shade on table-top awaits installation.*

*Seal Basal Voids*

Priority: High

Current Condition:

Voids between the concrete base and drywall allow pests a place to enter the interior of the walls. These areas promote nesting and breeding.

Recommendations:

The voids along the base of the interior walls should be sealed with either copper wool as a temporary measure or thin lengths of trim slats for a more long-term solution. The addition of trim slats should be as thin as possible and painted the same color as the bottom portion of the walls.

*Figure 82. A long-running void can be seen just above the concrete base and the interior siding.*

*Seal Utility Line Penetration*

Priority: High

Current Condition:

Utility conduit exits the building in the upper northeast corner. The hole was drilled larger than the conduit and not sufficiently sealed. This insufficient seal allows pests access to the interior of the building.

Recommendations:

The hole should be temporarily filled with copper wool packed tightly. A more long-term mitigation should occur when the shingles are removed and the diameter of the hole can be made smaller to more closely fit the diameter of the conduit. If the utility lines running through the conduit are deemed unnecessary, then the conduit should be removed and the hole completely filled.

*Figure 83. Conduit and related hole can be seen exiting the building in the upper corner of the north elevation.*

*Install Heater in Utility Room*

Priority: Medium

Current Condition:

Last winter the water pipes in the utility room burst. Luckily, much of the building avoided flooding and the water was directed away from the building once entering the adjacent bathroom. The pipes have since been insulated and heating tape has been applied to the area where the pipe burst.

Recommendations:

While the mitigation described above may sufficient to avoid burst pipes in the future, the installation of a ceiling mounted heater would provide better insurance when temperatures drop well below freezing.

*Figure 84. The newly insulated plumbing can be seen in white in the foreground of the photograph. Still-to-be-repaired water damage can be in the bottom right hand corner.*

## 2.5 Technical Area 16

The buildings of V-Site (16-0515, 16-0516, 16-0517, 16-0518, 16-0519, 16-0520; see Figure 84) were once in TA-25. The V-Site buildings were later incorporated into TA-16. The only Manhattan Project building from the original TA-16 that dates from the Manhattan Project is 16-0058 (a storage magazine). V-Site was instrumental in the high-explosives assembly for the *Gadget* that was detonated at Trinity Site (McGehee et. al. 2003). Today, only two of the six buildings remain standing at V-Site. The four other buildings were burned during the Cerro Grande Fire of 2000 and now only the slabs remain of three buildings, with one building (16-0515 Radiography Building) still retaining the ruins of steel structural supports. Other elements counted in this planning document include earthen berms, a large wooden gate and fence, and a paved courtyard area. The 16-0058 magazine is included in this plan, but separated from the V-Site core of buildings by a short distance to the south.

The 16-0058 magazine recently received considerable work and requires little in the way of preservation maintenance. Preservation challenges at V-Site include pest infiltration, historic wood repair, and concrete work. A particular challenge may come from the need to preserve the burned buildings as ruins rather than standing buildings. Preservation work at the ruins will require slightly different methods and philosophy as compared with standing buildings. The standing V-Site buildings received considerable work in 2006.

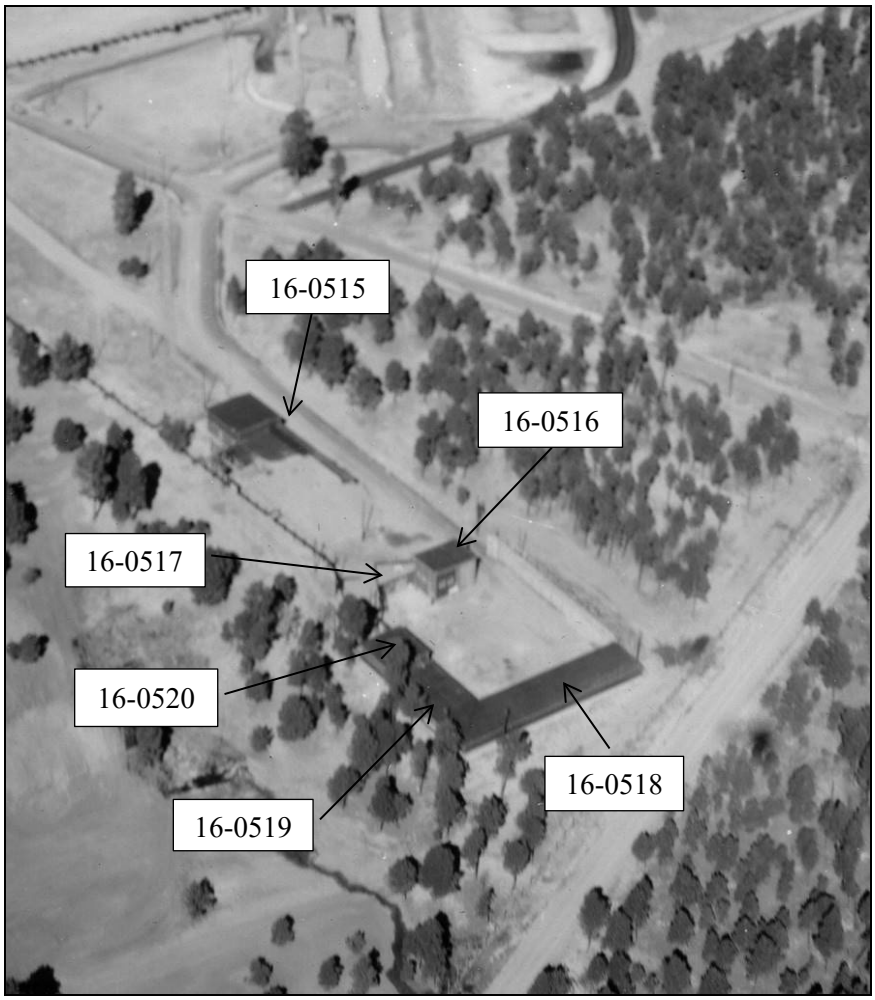


*Figure 85. Historic overview of V-Site - circa 1946.*

### 2.5.1 *Radiography Building TA-16-0515*

The Radiography Building was constructed for use in the Manhattan Project but burned down during the Cerro Grande Fire in 2000. The ruins presently consist of the skeletal form that includes iron support beams on a Hubbelite pad, two stained concrete pads, and an unstained concrete pad on the north edge with six support beam pilings. A wrap-around earthen berm that once butted up to the east elevation and the east portion of the south elevation is still present. A semi-subterranean room is located off the south elevation of the main building near where the berm terminates on the south end.

Preservation issues covered here include the stabilization of the iron support beams and the concrete bases along the northern-most concrete pad. The future stabilization of the remaining building pads is also addressed. Concrete repairs and cleaning of the semi-subterranean room south of the main building footprint will be required. Finally, the stabilization of the berm to the east of the building pad is discussed.

*Figure 86. Overview of the 16-0515 ruins.*

*Stabilize Support Beams*

Priority: Medium

Current Condition:

The support beam on the south end of the remaining pad does not sufficiently make contact with the poured concrete base surface. A concrete base represents a modern pour to help make contact, but the iron beam is still loose depending upon weather conditions. The welds of the standing iron supports are currently holding, but are suspect, as is the stability of conduit hanging from the supports.

Dimension of Metal Base = 13 7/8" x 6"
Dimension of Concrete Base = 15" x 30"

Recommendations:

The support beam on the south end should be reattached to the base by either boring into the modern concrete pedestal and bolting the beam to it, or by removing the modern concrete pedestal entirely and repouring a higher pedestal to make contact with the base of the beam. The welds of the remaining beams should be inspected by a qualified professional, and conduit should be further evaluated and tied down for safety.

*Figure 87. The beam does not make sufficient contact with the concrete base underneath it.*

*Stabilize Concrete Bases*

Priority: Low

Current Condition:

The concrete bases along the north side of the building are severely deteriorated. These bases show the location of the original posts that held up the north elevation overhang. They represent important markers for visualizing the form of the building prior to it burning down.

Dimensions = 12” x 12” x 12”

Recommendations:

Reconstruction or replacement is not recommended, but slowing further deterioration should be the main focus. An approved stabilizer solution will be needed to preserve the blocks in place.

*Figure 88. The line of concrete bases used to support bracing that held up an overhang.*

*Figure 89. Close-up photograph of one of the support blocks.*

*Figure 90. 16-0515 prior to burning down. Arrow points to one of the blocks.*

*Stabilize Hubbelite*

Priority: Low

Current Condition:

The Hubbelite top coating is deteriorating and shows significant heat spalling at the western portion and fragmentation along the northern edge. Hubbelite is an asbestos-containing material that presents a potential safety and environmental hazard as breakage occurs.

Hubbelite Pad Dimensions (West Pad) = 24' x 38'
Stained Concrete Pad Dimensions (Middle Pad) = 41' x 24'
Stained Concrete Pad Dimensions (East Pad) = 20' x 24'

Recommendations:

This issue will require encapsulation either with a clear sealant or covered over with a similar product. If covered with a similar product, then the failing loose edges would likely need to be removed in order to achieve a satisfactory seal.

*Figure 91. The Hubbelite pad is farther pad in the photograph. Chipping and breakage is severe and likely releases low levels of asbestos into the nearby environment.*

*Clean Out Semi-Subterranean Room*

Priority: Low

Current Condition:

A minor amount of debris has accumulated inside the semi-subterranean room south of the main Radiography Building pad. Debris mainly consists of wind-blown soil and rodent excrement. The debris currently traps moisture underneath it and negatively affects the original concrete underneath.

Interior Room Dimensions = 15’ x 9 ½’

Recommendations:

Clean out and dispose of debris in the presence of a monitor. A quick look at the contents of the debris indicates the presence of artifacts that should be identified and not be removed from the room during the cleaning process.

*Figure 92. Debris has collected on the surface of the floor; trapping moisture and presenting an untidy appearance.*

*Repair Concrete Stem Wall of Semi-subterranean Room*

Priority: Medium

Current Condition:

The southwest and northeast corners exhibit the most deterioration. Complete separation has occurred in some areas and if left unaddressed, will help to accelerate deterioration by letting in moisture to the interior of the wall.

Recommendations:

The large cracks will need to be repaired. Extensive research into the proper repair material, however, will need to be undertaken prior to any on-the-ground repair work.

*Figure 93. A larger corner separation is evident in the southwest corner and a utility hole can be seen in the northeast corner.*

*Figure 94. The corner separation is easily seen here in the southeast corner of the room.*

*Figure 95. A large utility hole was chipped out of the northeast corner of the room.*

*Stabilize Berm Erosion*

Priority: Low

Current Condition:

Moderate erosion is occurring due to the degree of the slopes and the lack of vegetation on some areas of the slopes. The north and west facing slopes are particularly worrisome. These two slopes represent the grades that were up against the building and now that the building is gone, lack the proper resistance and incline to prevent further erosion. The south and east facing slopes present a more manageable incline; however, vegetation growth is not sufficient to prevent moderate erosion from occurring during rain events and snow melt that allow for an uncontrolled runoff of moisture.

Recommendations:

The first choice for the least impact preservation work would be reseed with native grasses. Larger plants are not recommended due to root intrusion and aesthetic characteristics. Seeding would need to be attempted at least three times for proper coverage and growth rate. If seeding fails to take hold, additional options to consider are the use of matting material to help hold soils in place or some other mechanical solution such as reinforcing the sub-grade to some extent. Preliminary ideas include stabilizing bars inserted perpendicular into the slope. However, any mechanical solution should only be undertaken in the event that reseeding fails to produce satisfactory results, and after additional planning and discussions.

*Figure 96. View of the berm that once wrapped around the southeast corner of 16-0515.*

*Figure 97. A view of the south exterior of the berm.*

*Figure 98. View of the east interior of the berm.*

*Figure 99. View of the south interior of the berm.*

*Figure 100. Profile shot of the east interior of the berm shows the extent of slope and lack of erosion controlling vegetation.*

### 2.5.2 *Assembly Building TA-16-0516*

The Assembly Building was used during the Manhattan Project to assembly the high-explosive components for the *Gadget* used at Trinity Site (McGehee et. al. 2003). Shake and mockup testing of the gun and implosion devices also took place here. 16-0516 is a rectangular-in-plan, high-bay, one-story building. This wood-framed building sits on a poured concrete foundation and has a low-pitched shed style roof.

Preservation issues include those related to sealing the envelope of the building and preventing rodent incursion into the interior. Previous roof leaks caused damage to the interior in the past and are addressed below. Wooden elements, such as door and window openings also require maintenance preservation within the next five years.


*Figure 101. Overview of 16-0516.*

*Relocate Gutter System*

Priority: Medium

Current Condition:

The roof currently drains to the roof of 16-0517. This approach increases the possibility of roof leaks in 16-0517 due to an amplified moisture management load during rainfall events and periods of snowmelt.

Recommendations:

To decrease the opportunity for roof leaks, the most direct drainage route is recommended. A new gutter system designed to transport rainfall and snowmelt to the northwest corner of 16-0516 should be developed and installed. Although this recommendation does not follow the historic drainage pattern, the overall preservation of 16-0516 and 16-0517 will ultimately benefit from this action. This gutter work may be best suited to coincide with an addition of a new roof system for both 16-0516 and 16-0517. The roof on this building will need replaced at the same time as the roof on 16-0517, which is a recommendation that follows in this report.

*Figure 102. Photo shows the current drainage system from 16-0516 on to the roof of 16-0517.*

*Repair Large Hole in Ceiling*

Priority: Medium

Current Condition:

The hole is located in the southwest quadrant of the building.

Approximate measurement of the hole = 5” x 5”

Recommendations:

A patch can be engineered that covers the hole, yet remains flush with the ceiling. A square piece that extends over to the ceiling joist should be removed and the existing hole squared off at the other end. A replacement piece cut to the exact measurements can be tacked to the joist on the one side and on the other side, a wood strip placed above the hole can be tacked down as an anchor point for the other end of the repair. A fresh coat of paint should sufficiently hide the repair.

*Figure 103. The 5" x 5" hole in the ceiling requires a patch - a difficult task, but achievable.*

*Repaint Interior of Large Bay Doors*

Priority: Low

Current Condition:

Paint is failing and flaking off the interior of the doors. This flaking promotes an environmental exposure of lead.

Dimensions of the bottom two doors = north door is 57 ½", south door is 58"; 12' high
Dimensions of the top two doors = north door is 59", south door is 57"; 69" high

Recommendations:

Failing paint should be chemically removed. A chemical paint stripper will help prevent further release of lead into the environment and contain toxins for easy cleanup. The historic paint scheme as determined by subject matter experts should be used to repaint the interior of the doors.

*Figure 104. Interior view of the large bay doors for 16-0516.*

*Repair Warped Door*

Priority: High

Current Condition:

The door bows outward at the top and bottom. This condition allows elements of deterioration easier access to the interior of the building. The less-than-ideal closure permits moisture in the form of snowmelt and windblown rain to enter the building through both the top and bottom. Rodents and other pests also have a simpler avenue for entering the building due to the spaces created by the warped door.

Dimensions of the door = 32” x 80” x 1 ¾”

In addition to creating easier access of various elements of deterioration, the present shape of the door puts undo stress on the frame and operational hardware. The act of opening and closing the door places strain on the frame and increases the likelihood of catastrophic failure of the wooden components and fastening elements of the hinge.

Recommendations:

The door should be removed and repaired. If properly executed, the warp of the door can be removed using a large steaming system that will gradually return the door to its required vertical plane. This process requires that the door be repainted and possibly reglazed.

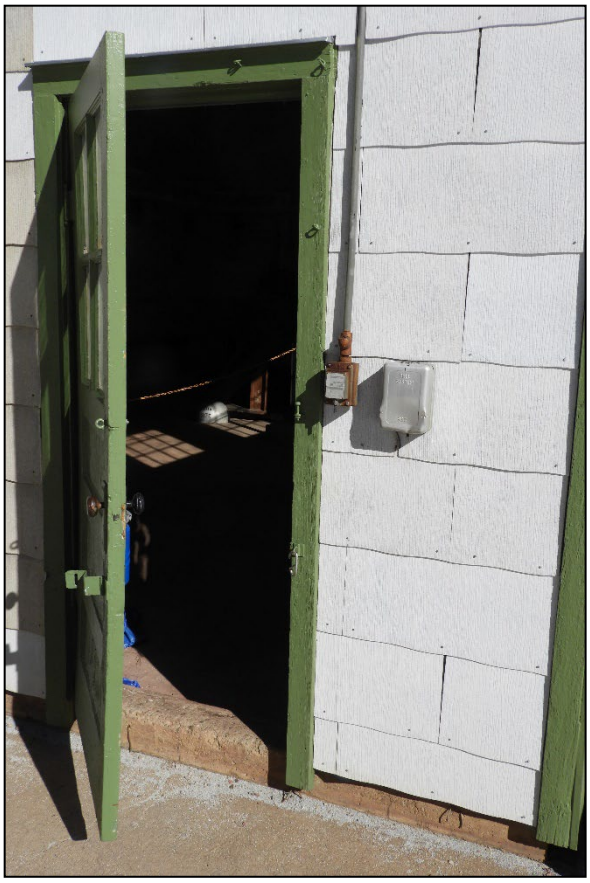

*Figure 105. Warp in door can be seen in this photograph.*

*Cover Window Handles*

Priority: High

Current Condition:

The three window sashes on the south elevation were constructed with openings in the bottom-center. The precise function of the holes is only speculative at this point, however, the openings allow pests and weather access to the interior of the building and affects the thermal insulation of the building.

Dimensions of the three south elevation window sashes = 42” x 42”
Dimensions of the two east elevation window sashes = 46” x 42”

Recommendations:

Being that the function is yet uncertain, efforts should be taken to preserve the integrity of the window sashes by treating the condition in a way that is easily reversible. Therefore, the holes should be filled with material easily removed without damaging the original wood fabric.

Wooden inserts cut precisely to the same dimensions of the holes may be constructed and inserted into the holes without the use of adhesives. Temporary, short-term mitigations may also include the use of darkened copper wool. Copper should be used instead of steel due to the oxidizing nature that steel would have on the surrounding wood fabric. Screen mesh is not recommended due to the transfer of outside temperature extremes to the interior. If the visual nature of the holes become important to preserving the character of the windows and the building itself, then the attachment of Plexiglas with small diameter fasteners may be an acceptable solution to completely filling in holes.

*Figure 106. Interior view of the three window sashes with constructed holes on the bottom rail.*

*Replace Deteriorated Interior Plywood*

Priority: Medium

Current Condition:

Extensive damage from a past roof leak has caused considerable but reparable damage to the interior siding in the southwest corner of the west elevation. The interior siding consists of 4' x 8' sheets of plywood. The top three sheets in the southwest corner exhibit water damage beyond repair, while the sheet under the top three exhibits less damage. The warped plywood allows pest access to the interior of the wall fostering habitation and nesting. Additionally, the diminished protection that is now afforded by the interior siding is compromised in the event another roof leak occurs.

Dimensions of Individual Panels = 4' x 8'

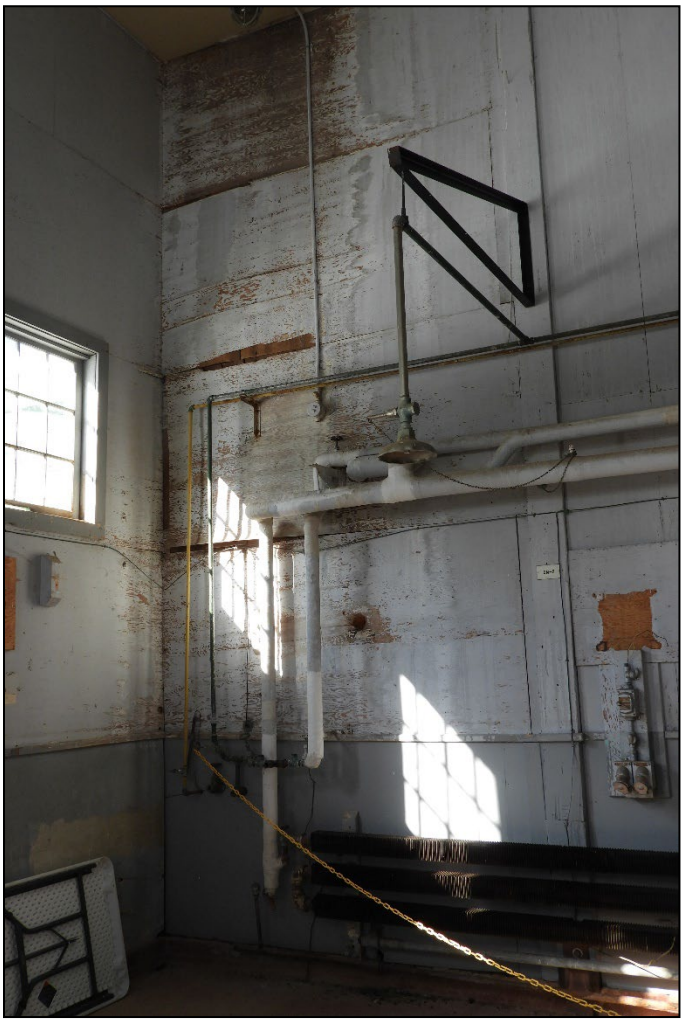

*Figure 107. Water damage from a past roof leak is evident in the southwest corner of the building.*

Recommendations:

The top three sheets of plywood should be replaced in-kind. The sheet under the top three sheets should be repaired if possible, however, if repair cannot be achieved, then replacement is acceptable. Care should be taken to simulate exposed wood grain if the interior is left unpainted or a clear coat is used.

*Repair Hole in Interior Plywood Siding and Replace Trim in Top Corner*

Priority: High

Current Condition:
A small, but significant hole located on the east elevation near the top of the southeast corner allows access to pests. Pests such as rodents gain entry into the wall and are able to nest with little to no disturbance. Furthermore, the support beam that runs underneath the hole allows a generous pathway for rodents to access the hole, and, subsequently, the interior of the wall. This area also requires the replacement of missing trim at the junction of the ceiling and wall.

Approximate measurement of the hole = 3” x 5”

Recommendations:
A Dutchman repair would be sufficient to close off this access point while preserving the character of the interior of the building. To help ease the application of a Dutchman repair, the smallest amount of original wood fabric necessary to square up the hole may be removed. The repair piece may be tacked into the visible support framing using small finishing nails. Small amounts of wood glue may also be applied around the edges of the repair to assist with the permanence of the repair.

*Figure 108. The small hole allows access to the interior of the walls.*

*Seal Voids between Interior Concrete Base and Plywood Siding*

Priority: High

Current Condition:

Voids present between the interior concrete base and the plywood siding currently allows rodents and other pests access to the interior of the building. Rodent droppings are prevalent throughout the interior of the building, but are most prolific near these access points. Pest control specialist with LANL require periodic visits to clean up the mess. Droppings present a health and safety hazard for workers and visitors to the V-Site. Closing off voids that allow access to the interior of the building will provide significant help in reducing disease carrying rodent feces.

Linear feet of repair work = 86”

Recommendations:

Mitigation in the short term would consist of copper wool packed into the voids. In the long term, the fix would involve reinforcing the wall substrate behind the backing.

*Figure 109. Photo shows cracking of the baseboard that allows rodent access to the interior of the wall.*

*Mitigate Interior Lead-Based Paint*

Priority: Medium

Current Condition:

Paint is failing through the entire interior of the building. Failing paint flakes are currently allowing possible lead-based paint to enter the environment. This release into the environment is a health safety issue for staff and visitors to the building.

Approximate surface area = 1045 sq. ft.

Recommendations:

The interior walls may not have been painted during the building's period of significance. More research is needed, but if so, the complete removal of paint would bring back the interior plywood look while mitigating the risk of lead exposure to individuals within the building.

*Figure 110. The underlay of the plywood sheathing is becoming exposed as the paint flakes away from the surface.*

*Stabilize Hubbelite*

Priority: Low

Current Condition:

The Hubbelite top coating is deteriorating adjacent to the east elevation of the building.

Dimension of the Hubbelite pad = 9’ x 30’

Recommendations:

Deterioration of the Hubbelite is so great that removal and replacement is likely in order. Hubbelite contains asbestos and care must be taken in the removal process. Research will need to be done to find a suitable replacement that closely matches the color and texture of the original Hubbelite.


*Figure 111. West facing view of the Hubbelite pad.*


*Figure 112. The Hubbelite separation is considerable and likely irreversible.*

*Figure 113. North facing view of the Hubbelite pad.*

### 2.5.3 *Testing Building TA-16-0517*

The Testing Building primarily served as an equipment room for the activities in 16-0516. Its initial use was as a processing/inspection building (McGehee et. al. 2003). 16-0517 is a triangular-in-plan, one-story building. This wood-framed building sits on a poured concrete foundation and has a low-pitched shed style roof. This facility features a wood-framed retaining wall along its south elevation.

Preservation issues concern rodent incursions into the interior of the building, a leaking roof, a broken window pane, and repainting. Exterior issues include work to the entrance doors, concrete pad, and the wood-framed retaining wall. The building has been well-maintained since the large rehabilitation nearly 20 years ago.

*Figure 114. East elevation of 16-0517.*

*Repair Ceiling Leak*

Priority: High

Current Condition:

Small leaks are evident on the ceiling of the south portion of the building. Staining has already occurred to portions of the ceiling joists.

Approximate Area of the Roof = 320 sq. ft.

Recommendations:

A new roof system is required to better address the overall protection of the building. A PVC membrane roof system is recommended. Additionally, it is recommended to proceed with a roof system replacement for the adjacent building (16-0516) at the same time.

*Figure 115. Evidence of recent leaks are evident on the ceiling joists and roof decking.*

*Relocate Gutter System*

Priority: Medium

Current Condition:

The roof of 16-0516 currently drains to the roof of 16-0517. This approach increases the possibility of roof leaks in 16-0517 due to an amplified moisture management load during rainfall events and periods of snowmelt.

Recommendations:

To decrease the opportunity for roof leaks, the most direct drainage route is recommended. A new gutter system designed to transport rainfall and snowmelt to the northwest corner of the 16-0516 should be developed and installed. Although this is recommendation does not follow the historic drainage pattern, the overall preservation of 16-0516 and 16-0517 will ultimately benefit from this action.

*Figure 116. Photograph shows the current gutter and drainage system from the roof of 16-0516 to the roof of 16-0517.*

*Replace Window Pane*

Priority: Low

Current Condition:

A window pane on the window on the east elevation of the building exhibits a large crack.

Dimensions of the broken glass pane = 16” x 21 ½”

Recommendations:

The window should be removed and then the pane removed and replaced. Reglazing should also occur.

*Figure 117. Arrow points to the crack in the window pane.*

*Mend Screen on Vent*

Priority: High

Current Condition:

The screen on the vent exhibits rips, loosening, and protrusions from the aging and slackening of the screen. At their current measurements, tears in the screen are large enough to allow small rodents access to the interior of the building. As the tears get larger, pest infestation will increase.

Dimensions of the screen to replace = 28" x 16"

Recommendations:

The screen should be removed and replaced in kind. Temporary screen patch may be a good temporary repair, however, full replacement of the protruding screen is needed to prevent further damage.

*Figure 118. Screen over the louvered vent has aged and needs replaced.*

*Repaint Interior*

Priority: Medium

Current Condition:

Paint is rapidly deteriorating and likely contains lead.

Approx. measurement of the surface area = 820 sq. ft.

Recommendations:

Encapsulate lead paint with historically appropriate color.

*Figure 119. Paint has worn off considerably.*

*Seal Interior Voids*

Priority: High

Current Condition:

Rodent droppings are evident throughout.

Recommendations:

Perform wood repairs for larger voids and seal smaller voids with copper wool.

*Figure 120. Rodent droppings are prevalent on the floor of 16-0517.*

*Paint Bottom of Entrance Doors*

Priority: Medium

Current Condition:

Snow rests on at the bottoms of both doors. Rain may pool in this area and further affect the base.

Dimension of the north door = 3 ½’ x 10’ 4”
Dimension of the south door = 4’ x 10’ 4”

Recommendations:

Paint the bottom of each door with the same color as current paint. Priming and painting the bottom of the doors will help keep the moisture out. Consistent and routine painting will drastically help with the preservation of the doors. If an exact match cannot be attained, the painting of the entire door will work.

*Figure 121. Damage is starting to occur at the base of both doors due moisture penetrating the bottom of the doors.*

*Install Screen to Drainage Pipe*

Priority: Medium

Current Condition:

The drainage pipe leading from the roof of the building is open.

Diameter of the opening = 6”

Recommendations:

Place a 1/4” screen on each end to ensure access by pests will not be obtained. The hardware cloth should be installed in a way that makes it easy to remove if clogging occurs.

*Figure 122. Drainage pipe needs a hardware cloth cover that can be easily removed if clogging occurs.*

*Repair Wing Wall Bracing*

Priority: Low

Current Condition:

The bracing has completely detached in some areas or is loose and about to detach from the main structure.

Recommendations:

Reattach the existing bracing and replace any missing pieces.

*Figure 123. Arrow points to a detached piece.*

*Repair Top Panel of Utility Box*

Priority: Low

Current Condition:

The top panel of the utility box on the east elevation of the wing wall has split.

Dimension of the top panel = 3’ x 1’ x ¾”

Recommendations:

Replace the top cover in-kind.


*Figure 124. The top of the cover box is in need of repair.*

*Clean Out Adjacent Pit Structure*

Priority: Medium

Current Condition:

The pit structure adjacent to the east elevation of the wing wall is full of rodent debris.

Dimension of the room = 6’ x 6’ x 6’

Recommendations:

Remove rodent debris from the interior of the structure. Specialized training required in confined space and respirator safety.

*Figure 125. Photograph of the interior floor of the pit structure.*

### 2.5.4 *Covered Storage Area TA-16-0518*

The Covered Storage Area offered covered storage during the Manhattan Project. All that remains after the Cerro Grande Fire is the concrete slab, concrete post holders, and a stem wall. Preservation issues considered in this five-year plan include separation of the slab.

*Figure 126. Overview of 16-0518 before its destruction by fire.*

*Repair Slab Separation and Bulging Walls*

Priority: Medium

Current Condition:

The walls have pulled away from the slab due to moisture infiltration and the pressure of forces under the slab. The slab has not only separated from the stem wall, but has also slumped a few inches lower due to the absence of material underneath that has washed out and settled over time. Currently separation from the stem wall is only a few inches.

Linear feet of the separation = 177'

Recommendations:

Introduce infill to prevent the slab from further slumping.

*Figure 127. The photo shows the slab separation from the stem wall from above.*

*Figure 128. The separation extends most of the length of the wall.*

*Figure 129. Photo shows the bulging stem wall along the south perimeter.*

### 2.5.5 *Garage and Shop Buildings TA-16-0519 and 0520*

The Garage and Shop Building also burned down in the Cerro Grande Fire. Today only the Hubbelite slab remains. The deteriorating slab presents the main preservation challenge for the building.

*Figure 130. Overview of 16-0519 and 16-0520 prior to the fire.*

*Stabilize Slab*

Priority: Low

Current Condition:

Prior to the most recent stabilization attempt, severe undercutting was occurring to the south side of the slab. In order to prevent further undercutting, large stones were placed along the bottom of the slab. The addition of the stones helped to slow the erosion, however, they were intended as a temporary measure and currently decrease the integrity of the site.

Linear feet along the south edge = 79’

Recommendations:

Eventually remove stones from the makeshift berm once a suitable plan to prevent undercutting while retaining some of the historic character is developed.

*Figure 131. Photos show the introduced rock berm that prevented increased undercutting of the slab.*

*Stabilize Hubbelite*

Priority: Low

Current Condition:

The Hubbelite top coating is deteriorating - mostly around the edges.

Surface area of pad = 1810 sq. ft.

Recommendations:

A protective coating represents the most likely solution here. The slab will preserved as a ruin, so stopping the deterioration is key. More research is needed to come up with an appropriated coating.

*Figure 132. Cracking and general deterioration of the Hubbelite are severe.*

## 2.5.6 *Other Elements*

Other elements within the V-Site complex that require preservation maintenance include the 16-0528 berm attached to buildings 16-0516 and 16-0517, the open area at the center of the complex, the reconstructed no-peek fence and gate, the boundary chain link fence, and the interpretive signage.

**TA-16-528 (Berm against 516 and 517)**

*Stabilize Berm*

Priority: Low

Current Conditions:

Only minor to moderate erosion is occurring due to the degree of the slopes and the lack of thick vegetation on some of the slope areas.

Recommendations:

Erosion is minimal, therefore, reseeding with native grass seed is in order. Routine grass cutting should be performed sporadically to allow grasses time to seed out once they take hold. Larger shrubs and weeds should be taken out more routinely than the grass is cut back to help native grasses thrive.

*Figure 133. The west facing slope directly behind 16-0516 and 16-0517 after cutting.*

*Figure 134. A comparison of the berm with cut areas and uncut areas.*

**Center Area Drainage**

Priority: Medium

Current Conditions:

Currently rainwater and snowmelt drain toward critical architectural elements. The entrance road into the complex drains to the base of the north elevation of 16-0516. Drainage from the south portion of the central parking area of the complex drains to the Hubbelite pad of 16-0519 and 16-0520. Drainage from the central parking area and the concrete pad immediately east of 16-0517 has contributed to significant deterioration of the concrete pad. There are low spots within the concrete pad that hold rain and snow/ice. These areas drain directly to the double doors on the east elevation. The threshold for the double doors is not high enough and does not make contact with the bottom of the doors in order to help stop and redirect flowing water away from entering the building. The dip in front of the doors also allows moisture in the form of rainwater puddles and snow and ice to build up. Subsequently, melt runoff is directed under the doors and into the building. Wood at the base of the doors show evidence of moisture damage.

Area of parking area = 9,975 sq. ft.

Recommendations:

Recommendations include removing the deteriorated asphalt topping from the site and re-contouring the parking area to drain away from critical architectural elements. Topping the parking area should consist of gravel that helps absorb and slow drainage away from the site. Care should be taken to retain the depression feature in the center of the asphalted area which is significant to the historic of the Manhattan Project. The concrete pad on the east side of 16-0517 should be replaced in areas of total deterioration only, with stable areas of the pad retained. The threshold under the double doors on the east elevation of 16-0517 should be preserved in place if possible.

*Figure 135. This portion of the central area drains directly to the north wall of 16-0516.*

*Figure 136. Drainage to the Hubbelite pad of 16-0519 and 16-0520 present significant preservation challenges.*

*Figure 137. Water drains to the original concrete pad in front of 16-0517 and threatens the preservation of the doors and the interior of the building.*

**Biological Growth on Entrance Gates**

Priority: Medium

Current Conditions:

The biological growth amounts to a dark staining of the wooden elements used to reconstruct the gates leading into the V-Site complex. This staining results from the use of processed linseed oil prior to the present-day use of raw, unprocessed linseed oil. Processed (boiled) linseed oil promotes biological growth on wood and is common occurrence at other historical sites.

Approximate surface area of interior and exterior = 1500 sq. ft.

Recommendations:

Recommendations include the use of an appropriate biocide to kill the growth and return the wood to its natural finish. Unprocessed (raw) linseed oil should continue to be used for preservation purposes, however, biocide treatments should be considered every three to five years to not only improve appearance, but also preserve the wood which deteriorates faster where biological growth occurs.

*Figure 139. Interior view of the gates and no-peek fence.*

*Figure 140. Exterior view of the gates and no-peek fence. Blackened areas on the wood represent biological growth.*

*Figure 141. Close-up of a section of the fence to highlight extent of biological growth.*

**Realign Metal Gate Posts**

Priority: Low

Current Conditions:

The bottom pins that hold the large wooden gates leading into V-Site are bowed and proper operation of the mechanism is no longer possible.

Recommendations:

The pins will need to be straightened out to resume the appropriate closure function of both gate leaves.

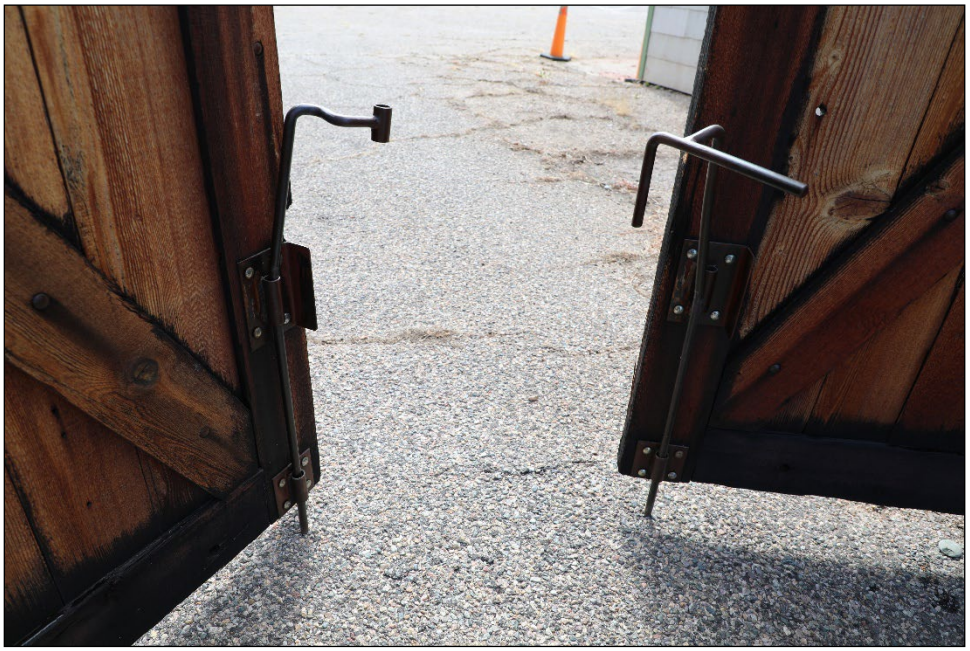

*Figure 142. The metal rods that tie in both gate leaves when closed are no longer straight and functioning properly.*

**V-Site Perimeter Fence**

*Correct Erosion Issues and Remove Fallen Tree*

Priority: Medium

Current Condition:

Larger erosional voids along the east perimeter fence allow wildlife access to the site which can, in turn, can cause damage to the buildings and the remaining building pads. A large tree fell on the fence causing significant damage (Figure 142).

Linear feet along fence to correct erosion = 75'

Recommendations:

Fill in erosion areas and better direct water runoff. Care should be taken to not affect the nearby historic road bed only a couple feet away. Cut tree off fence and repair/replace section.

*Figure 143. Erosion at the base of the fence may cause the fence to topple in the future.*

*Figure 144. A large tree fall caused considerable damage to the perimeter fence east of the V-Site complex.*

*Replace Interpretive Panels*

Priority: Low

Current Condition:

Interpretive panels are faded due to sun exposure. The metal stands remain in good and usable condition.

Number of Panels = 3
Panel Measurements = 3’ x 2’

Recommendations:

The stands are good condition. The interpretive insert panel should be replaced and possibly redesigned.


*Figure 145. Panel in front of 16-0515.*


*Figure 146. Panel for the main V-Site complex.*


*Figure 147. Panel at the entry point for V-Site.*

### 2.5.7 *Storage Magazine TA-16-0058*

The Storage Magazine represents the last known example of a Manhattan Project magazine and Los Alamos. 16-0058 is a one-story, one-room building constructed of poured concrete along the bottom of three sides, and timber framing along the top and front side. The construction design helped to direct any accidental blast in a desired location away from other buildings.

A considerable amount of preservation work has recently occurred to the building that included new exterior siding shingles, reconstructed wing walls, and a new roof. Preservation maintenance issues, however, continue to include restricting access of pests, ensuring a proper fit of doors, and retaining original architectural features.

*Figure 148. Overview of 16-0058.*

*Mitigate Rodent Intrusion*

Priority: high

Current Condition:

Rodent activity is evident inside the building. Insufficient seal of the entrance doors, concrete damage, and holes in transom vent screens contribute to this intrusion.

Recommendations:

Properly fitting door sweeps and replacement of transom vent screens will help to correct this issue. Any holes in the concrete can be temporarily filled with copper wool; however, once a more permanent concrete plan is developed, filling the voids with an approved concrete mix will the most beneficial long-term solution.

*Figure 149. Rodent droppings can be seen on the freshly laid white paper.*

*Replace Entrance Doors*

Priority: High

Current Condition:

The double doors which offer the only entrance to the building have a poor fit to each other when closed. The doors are not original to the structure.

Dimensions of Doors = 36” x 84” x 1 ¾”

Recommendations:

Full replacement of both doors is recommended. Since neither door is original (or historic), door replacement with something closer to the originally designed doors will increase the historic character of the building while providing a better closure to keep out weather and pests.

*Figure 150. The non-original doors do not provide a proper fit to keep out pests.*

*Replace Transom Vent Grates*

Priority: Low

Current Condition:

The vent grates located on the east and west elevation transoms are not original and distract from the original louvered construction that currently resides underneath. The overall historic character of the Manhattan Project era suffers from this visual intrusion.

Dimensions of Grates = 19 1/2" x 78"

Recommendations:

Carefully remove grates and perform any woodwork that may need to be done to the original louvers and protective screening.

*Figure 151. The metal grate over the louvered vents hides a prominent architectural feature.*

*Figure 152. The interior screens over the louvered vents require maintenance.*

*Regrade in front of Doors and Remove Asphalt*

Priority: Medium

Current Condition:

The current slope of the asphalt and concrete adjacent to the entrance doors allows moisture to pool close the base of the doors. This allows too much moisture to be near the building and risks moisture entering the building through the bottom of the doors. Much of the concrete deterioration to the entrance pad outside the double doors and the original wing wall foundations is likely attributable to this lack of positive grade and the resulting pooling of moisture.

Recommendations:

The original concrete pad is likely irreparable and will need to be fully replaced following further investigation. Further investigation would include removal of the loose, deteriorated concrete on the surface to better analyze the structural stability of the underlying material. Preliminary investigations suggest that the pad is unfortunately not salvageable and that a new pad will need to be constructed.

The asphalt immediately adjacent to concrete pad should be removed to a distance consistent with keeping circular drive paved. A minor slope should be constructed leading away from the building's entrance and gravel should be laid down in its place. Asphalt accelerates sheet washing while gravel will help moisture to be soaked up by the ground during average rain fall and snow melt events.

*Figure 153. Photo shows that moisture accumulates near the entrance and requires a way to drain away from the building.*

*Stabilize Berm*

Priority: Medium

Current Condition:

Recent work to install new wooden wing walls has placed loose soil in place of the vegetated berm around the rest of the building. The loose soil will erode away without some erosion control installed. Additionally, the vegetation around the rest of the berm is considerably sparse and could use some reinforcement to help keep erosion at minimum. The top of the berm around the building actually slopes to the building in most places. This directs water and snow melt to the building instead of away which is preferred.

Recommendations:

An approved matting and seeding of native grasses is preferred to help minimize erosion to the berm. A minimal amount of fill should be introduced to the top of the berm especially where the slope inclines toward the building. Reseeding should also occur to the introduced fill.

*Figure 154. The berm requires new vegetation growth, especially in the front where the fill was just replaced.*

*Re-establish Original Wing Walls*

Priority: Low

Current Condition:

The original wing walls were closer to doors than the current wing walls. Re-establishment of the original wing wall locations will change the look of the front of the building closer to what it looked like during the Manhattan Project. The original wall foundations were constructed of concrete and are severely deteriorated. The original post holes in the foundations are still present and provide a good indicator for vertical support location.

Recommendations:

Extensive research will need to take place prior to on-the-ground work commencing. A plan for the extent of preservation versus reconstruction of the original concrete foundation will be produced once suitable mixtures have been identified. Additional documentation research will be needed to determine the construction design of the no-longer-extant wooden walls.


*Figure 155. The original wing wall foundations are in poor condition, but still exhibit the original post holes for the vertical support beams.*

## 2.6 Technical Area 18

The Manhattan Project built environment at TA-18 today consists of four buildings. The Slotin Building (18-0001) dates to near the end of the Manhattan Project and is significant for the accident that resulted in the death of Louis Slotin. Pond Cabin (18-0029) dates to the homesteading era, but also served personnel during the Manhattan Project. Two battleship bunkers (18-0002 and 18-0005) remain on site and were instrumental in analyzing firing tests performed at TA-18.

TA-18 was historically known as the "Pajarito Laboratory Site" or just "Pajarito Site". Pajarito Site was set up to study spontaneous fission rates and was led by Emilio Segrè (McGehee et. al. 2009). Segrè's group reused preexisting buildings in the canyon such as the Pond Cabin to aide in their research, however, many others were built during the Manhattan Project. The remaining buildings offer an interesting preservation challenge due to contrasts in modes of construction and materials used.

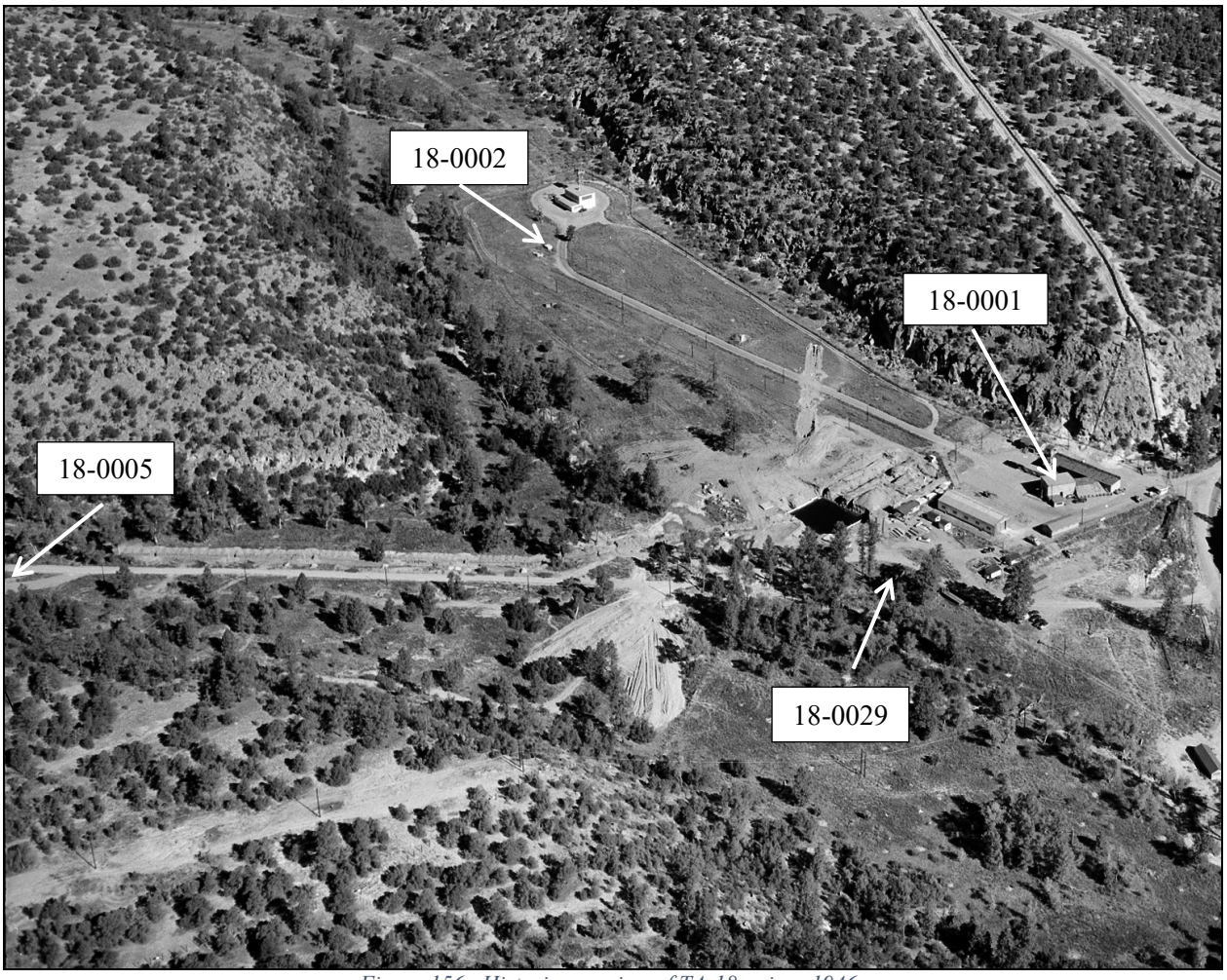


*Figure 156. Historic overview of TA-18 - circa 1946.*

### 2.6.1 *Slotin Building TA-18-0001*

The Slotin Building (18-0001) is a rectangular-in-plan, high-bay, one-story building. This wood-framed building sits on a poured concrete perimeter foundation and has a low-pitched gabled roof. It represents the near end of the Manhattan Project and is significant for the fabled Slotin accident where 'tickling the dragon's tail" proved to be as ominous as it sounds. Louis Slotin passed away due to radiation exposure after botching an exhibition of the "dragon" experiment inside the building.

The Slotin accident represents a significant event in the history of the laboratory and *the* significant event for the building. For that reason, the interior of the building carries an elevated significance for the historical narrative of laboratory safety and procedures that extend to the present day.

*Figure 157. Overview shot of 18-0001.*

*Paint Entrance Door Exterior*

Priority: Low

Current Condition:

The exterior paint of the door and frame shows some fading from the 2018 paint application. Chipping has not yet occurred, but may be expected within the next five years.

Recommendations:

Repainting of the exterior will extend the life of the door and help protect against outside elements. Painting should typically occur every five to seven years. Color selection should be consistent with the color selected from the 2018 application. Care should be taken to not paint over hardware.

*Figure 158. Exterior of the west entrance door.*

*Maintain Door Operability*

Priority: Low

Current Condition:

The turn handle and locking mechanism is a modern addition and is difficult to operate at times. The weather stripping and door sweep are in poor condition.

Recommendations:

Basic maintenance should take place to the existing locking mechanism to ensure ease of operability. However, the mechanism may be replaced with a period-correct mechanism that utilizes the original locations as shown in the photos below. If this replacement occurs, Dutchman repairs will be needed to the frame and door where the existing equipment is removed, and in the original area to prep for a new system and to shore up any rotted or worn portions.

*Figure 159. Close-up views of the west entrance door hardware and frame.*

*Repaint and Maintain Window Operability*

Priority: Medium

Current Condition:

The 2018 repainting episode is beginning to fade; particularly on the east elevation which receives a greater concentration of sunlight. Paint flaking is occurring on the sills. The spring pins that hold up the upper sashes should be maintained. Two of the pins show signs of failure. Two glass panes are broken and the bottom sash of one window opening is missing.

Recommendations:

Repainting of the sashes and frames should occur with the same color as used previously. The two failing spring pins should be repaired or replaced if repair is deemed unachievable, and the others checked for routine maintenance to maintain proper operability. The missing bottom sash (Figure 157) should be reconstructed to exact specifications as shown on original drawings or from using another sash as an example.

*Figure 160. Photographs of the windows on the east elevation.*

*Figure 161. Photographs of the windows on the west elevation.*

*Repair Leaking Bay Doors*

Priority: High

Current Condition:

Rainwater gains entry into the building via the top of the bay doors.

Recommendations:

Readjustment of the existing drip edge is likely required; however the drip edge may not extend far enough out and my need to be reconstructed.

*Figure 162. The large bay doors after a rain. Water was noticed to be leaking into the building from the top of the doors.*

*Repair Ceiling Water Damage*

Priority: Medium

Current Condition:

Plywood sheathing exhibits damage from a previous roof leak in four separate identified areas.

Recommendations:

Replacement of the plywood pieces should be undertaken. The entire piece should be removed instead of only cutting out the damaged area. An exact plywood cut should be inserted and painted to match the surrounding area.

*Figure 163. Damage from a previous roof leak in the southwest corner of the building.*


*Figure 164. This damage can be seen on the western side of the building.*

*Figure 165. Previous roof leak damage on the southeast portion of the ceiling.*

### 2.6.2 *Battleship Bunker TA-18-0002*

18-0002 was designed and constructed to act as a protected control room for studying implosions using the magnetic method (McGehee et. al. 2003). It is a one-story building partially buried below grade and constructed of poured-in-place concrete. Generally, rectangular in plan, the building features a prow-shaped end. Below-grade stairs provide access.

Preservation issues mostly center around keeping pests out of the interior of the building and managing moisture in and around the building.

*Figure 166. Overview of 18-0002.*

*Mitigate Pack Rat Activity*

Priority: High

Current Condition:

Extremely recent packrat activity is evident at the base of the entrance door and along the floor of the structure.

Recommendations:

Routine cleaning will help prevent excessive accumulation of debris inside the building and sealing up entry points to the interior of the building, particularly around the door, will help prevent further incursions.

*Figure 167. Recently accumulated packrat nesting material near the entrance door.*

*Repair Door Frame*

Priority: High

Current Condition:

The wooden door frame exhibits deterioration from maintenance neglect and weathering. The seal to the door is no longer complete which allows access by pests. A larger hole is present at the base of the frame just under the bottom hinge.

Recommendations:

A Dutchman repair should be made to the larger hole at the base of the frame to retain as much of the original frame as possible and the wood should be painted. Carpentry work around the edges may be needed in the interior if rodent activity persists after the initial Dutchman repair is complete.


*Figure 168. Photos showing the condition of the entrance door frame.*

*Figure 169. Close-up view of the missing piece of the frame.*

*Clean Out Drain*

Priority: Medium

Current Condition:

The drain is partially clogged with sediment and live vegetation.

Recommendations:

Routine cleaning should occur to keep the drain operable.

*Figure 170. Close-up view of the drain.*

*Install French Drain*

Priority: Medium

Current Condition:

Soil moisture currently collects against the underground portion of the building. The other battleship bunker (18-0005) shows evidence of moisture seeping in through the concrete underground. While there is no evidence of this happening to this building, preventive maintenance should be considered.

Recommendations:

The installation of a French drain around the structure will help prevent damage that is occurring at the other battleship bunker. This work should be done in conjunction with 18-0005 to save time and money. Additionally, archeological monitoring will be required for the type of excavation that will be required to install a French drain system.


*Figure 171. View of the ground surface up against the bunker.*

### 2.6.3 *Cruetz Test Battleship Bunker TA-18-0005*

The Cruetz Test Bunker was an important control room for the test that determined the success of the impending Trinity test. 18-0005 is a one-story building partially buried below grade and constructed of poured-in-place concrete. Generally, rectangular in plan, the building features a prow-shaped end. Below-grade stairs provide access.

Preservation issues by and large consist of moisture intrusion into the interior of the building and intrusions of pests.

*Figure 172. Overview of 18-0005.*

*Mitigate Rodent Activity*

Priority: High

Current Condition:

Progress has been made to achieve a good seal of the entrance door. Extensive work was completed to the door and frame in 2021. However, monitoring for rodent activity will be needed to determine if further adjustments will be needed.

Recommendations:

Routine cleaning will help to keep rodent debris at minimal level. Further adjustment to the fit of the frame and the door may be required.

*Figure 173. Rodent droppings accumulate on the floor the building.*

*Repair Roof Leaks*

Priority: High

Current Condition:

Roof leaks have been identified along the seams of the metal and the concrete towards the front of the structure (west elevation). The door to the metal box on top of the structure is slightly open and allows water to enter the inside of the box. Water has also been noted to pool on the southeast portion of the roof (Figure 173). No leaks, however, have been noted with this area though.

Recommendations:

An easily removable silicon seal can be applied temporarily along the metal-concrete seams. A long-term solution will likely require and approved concrete mix to be applied at the junction that does not allow moisture to pool at the seams.

The pooling in the southeast corner will require an approved concrete mix that builds up the area and effectively sheds to the edge.

*Figure 174. Photograph shows the areas where leaks have been identified.*

*Figure 175. Photographs show active leaks and standing water on the roof.*

*Remove Characterization, Repaint Interior, Inhibit Rust*

Priority: Medium

Current Condition:

The interior of the building shows a substantial amount of oxidation; particularly on the north side. Characterization marks are also prevalent on the painted surfaces. This creates and unsightly appearance for the interior of the structure and also weakens the metal.

Recommendations:

Further research should be conducted prior to work commencing that addresses the rust issue. An appropriate rust inhibitor will be needed prior to painting the interior. Covering up the problem will not solve it, and may even make it worse. The origin of the oxidation issue must be determined first – either something on the inside is producing the rust or moisture is coming in from the outside. Repainting may need to be held off until an appropriate rust inhibitor is selected and tested for a duration of time.

*Figure 176. Rust is prevalent throughout the interior.*

*Remove Stairwell Concrete Block*

Priority: Medium

Current Condition:

The stairs that once led to the door are no longer present. In place of the stairs is a formed concrete block. The distance of the drop from the concrete block or the adjacent side walls presents a safety hazard for personnel entering the building. The block is just resting in the old stairwell and does not seem to be tied in to the structure.

Recommendations:

While the concrete block does not appear to be tied in to anything, removal of the block should be done in a careful and deliberate manner to ensure that the original elements of the structure are not damaged. Once the block has been removed, stairs replicating the dimensions of the originals should be reconstructed.


*Figure 177. The block is in-place of stairs and should be removed.*

*Clean Out Drainage*

Priority: Medium

Current Condition:

The drainage at the bottom of the stairwell does not currently function. Dirt and debris have collected at the bottom and exacerbate the situation.

Recommendations:

Debris should be shoveled out of the bottom of the stairwell and the drain cleared. Care should be taken to contour the bottom of the stairwell toward the drain and away from the door.

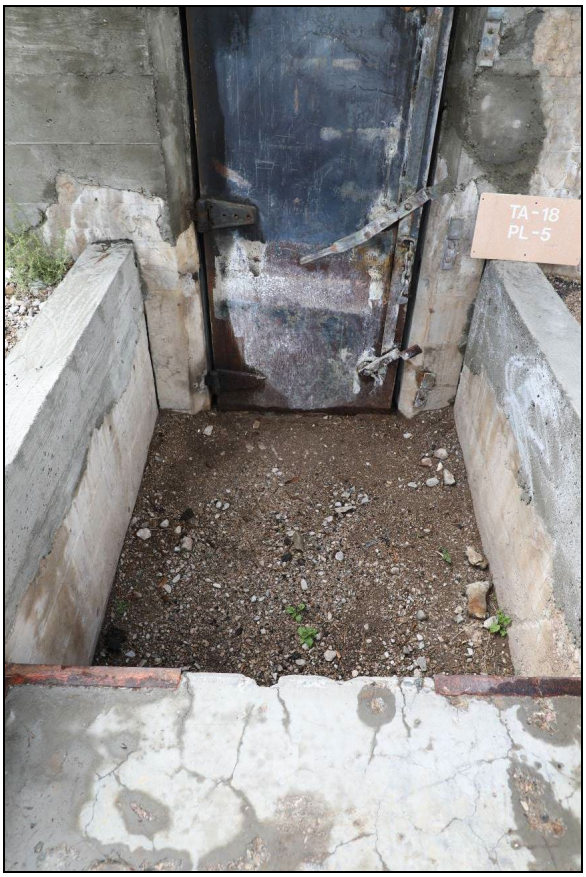


*Figure 178. Water has no way out of the stairwell.*

*Remove Asphalt and Install French Drain*

Priority: High

Current Condition:

Asphalt currently surrounds each side of the structure. Some areas drain directly to the building and any moisture that gets trapped under the asphalt has a much more difficult time evaporating out of the soil. Water during rain events seeps its way into the building from underground and collects on the floor.

Recommendations:

The asphalt around the building should be removed. This will prevent sheet washing in the direction of the building and dramatically help to allow moisture to drain down and away. A gravel surface will offer a good replacement option to help with drainage of moisture and control muddy areas during rain and snow events. A French drain system around the building should also be installed to help with the side wall leaking that has been noted.

*Figure 179. Photograph showing the asphalt that runs right up against the building.*

### 2.6.4 *Pond Cabin TA-18-0029*

Pond Cabin dates to the homesteading era but gained significance during the Manhattan Project as a support building for Emilio Segrè's research that ultimately concluded plutonium could not be used with a gun device (McGehee et. al. 2003). Pond Cabin is a rectangular-in-plan, one-story log building with a metal-clad, gabled roof. This building type is markedly unique within the Manhattan Project National Historical Park and presents uncommon preservation challenges vastly different from most of the other buildings included in this plan.

Preservation issues at Pond Cabin include common themes of window and door repair, rodent activity inside the building, and leaking roofs; however special concerns with stone fireplaces, log condition, and daubing run tangent to the typical concrete concerns at many of the other Manhattan Project sites.


*Figure 180. Overview of 18-0029.*

*Rehabilitate Roof*

Priority: High

Current Condition:

The roof leaks during rain events at a point somewhere near the southeast quadrant. Water from the leak collects on the floor near the east entrance door. Each rain or snow melt event will cause accelerated deterioration of the wooden floor as well as roof elements where the water is penetrating through.

Recommendations:

A plan for a full roof repair should be developed and implemented. The existing corrugated metal should be retained along with the original plank decking. Appropriate materials such as marine grade plywood, additional planks, and roofing paper should be considered to upgrade the roof system between the metal and the original planks.

*Figure 181. Arrow points to evidence of an active roof leak.*

*Seal Around Stovepipe*

Priority: High

Current Condition:

Open spaces around the stovepipe allow water to enter the building and collect on the floor.

Recommendations:

This should be addressed long-term during the recommended roof repair; however, a temporary solution could include appropriately place flashing and/or pond lining to restrict moisture entry at this particular location.

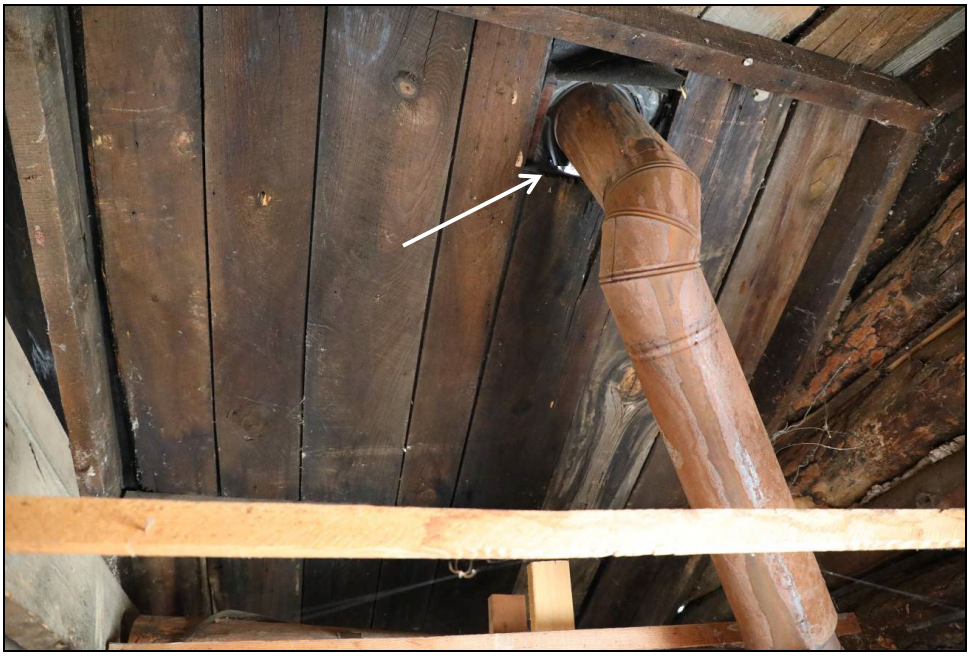

*Figure 182. Arrow points to daylight as seen around the stovepipe penetration from the inside of the cabin.*

*Redaub Log Joints*

Priority: Medium

Current Condition:

Redaubing of the log joints occurred in 2017. The work was expected to last five to seven years with minor repairs taking place every year or two. Voids are forming in the repair daubing which provides an avenue for pests and weather to enter the building.

Recommendations:

A temporary solution would be to perform patchwork with a lime-based earthen mortar that resembles the existing daubing in color and texture. Eventually, the existing daubing should be raked entirely and replaced on the interior and exterior.

*Figure 183. Arrow points to missing daubing.*

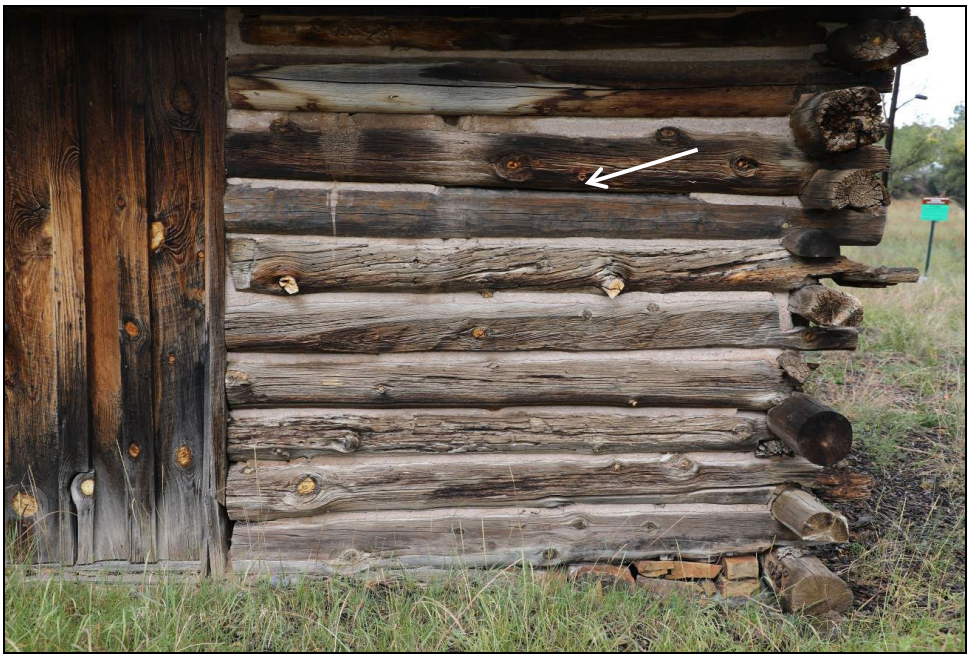

*Figure 184. Daubing has also eroded from this area.*

*Stabilize Interior Log Wall*

Priority: Medium

Current Condition:

The interior log wall likely built later than the original construction is unstable. Currently 2" x 4" boards are anchored in place to provide additional stabilization to the wall.

Recommendations:

Bracing should be removed and logs should be pinned together at strategic locations using wood or fiberglass rods. An effort should also be made to tie in the log ends to the main structural walls of the cabin.

*Figure 185. Arrows point out the interior log wall.*

*Clean Windows*

Priority: Low

Current Condition:

The glass panes have collected dirt and spider webbing producing an unsightly appearance.

Recommendations:

Glass panes can be cleaned with a mild glass cleaner and light wiping.

*Figure 186. The glass panes are dirty and full of spider webbing.*


*Figure 187. Dirty glass present on the Pond Cabin windows.*

*Figure 188. View of the south elevation window opening.*

*Replicate Historic Door Hardware*

Priority: Low

Current Condition:

The door is held closed with a padlock latch.

Recommendations:

A replica door knob and lock system similar to the one on the opposite door should be installed. The hardware on the other door is consistent with the knob that would have originally been on both doors. This treatment will give a more authentic look to the door and provide a better closure.

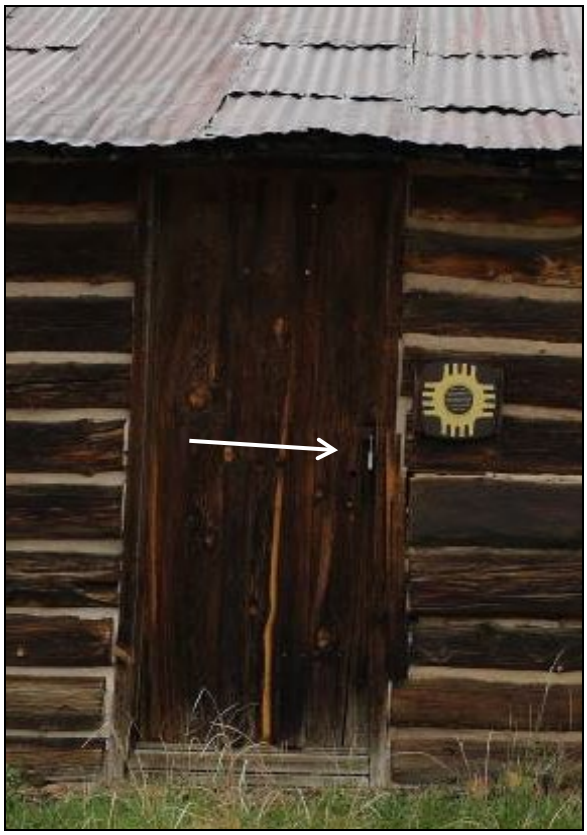

*Figure 189. Arrow points to the current latching and locking device which is not sufficient...*

*Repair Masonry Fireplace and Chimney*

Priority: Medium

Current Condition:

Several loose stones are present near the top of the fireplace. They not only present a preservation maintenance issue, but also a safety issue if one was to fall on someone's foot. Basal voids are also present, as are many voids throughout the stone work.

Recommendations:

Once an appropriate earthen-based mortar mix is determined, the stones should be reset in place. Voids in the masonry can be filled with the same mix.

*Figure 190. Arrows point to the loose stone visible in the photograph.*

*Figure 191. Minor voids can also be found on the exterior of the chimney.*

*Repair Hearth*

Priority: Medium

Current Condition:

The hearth in front of the fireplace is experiencing moderate deterioration. Cracks have formed and pieces have broken away.

Recommendations:

An appropriate mortar mix must be selected that is relatively soft compared with original mix. A sacrificial parging is appropriate in this situation to approve the aesthetics, but to also protect the original material as gently as possible.

*Figure 192. Photograph shows the current condition of the hearth.*

*Mitigate Rodent Droppings*

Priority: High

Current Condition:

Rodents are active in the Pond Cabin.

Recommendations:

Continued routine mitigation will help with the preservation of the building until a better seal for the entire building can be attained.

*Figure 193. Photograph shows rodent droppings scattered across the floor.*

*Repair Floor*

Priority: High

Current Condition:

The floor needs significant repair in a few area and especially along the edges. Rodents and other pests are allowed access through these areas that also provide a tripping hazard for individuals in the building.

Recommendations:

The floor may require lifting up in some areas to rejoin the floor slats with the underlying support system that was installed during a 1987 National Park Service treatment project.

*Figure 194. Photograph illustrates a typical section of flooring in need of repair.*

### 2.6.5 *Guard Station TA-18-0111*

The 18-0111 guard station was brought to TA-18 from TA-21 just after the Manhattan Project officially ended. The building still dates to the Manhattan Project, but was constructed in such a way to be easily moved to different locations as needed. This particular guard station was donated to or bought by Bandelier National Monument many decades ago. The process has been initiated to return the guard station to LANL, then have preservation maintenance completed prior to stationing it once again at TA-18.

18-0111 is a rectangular-in-plan, one-story building, currently located at Bandelier National Monument. The wood-frame building sits on a temporary foundation and has a gabled roof. The guard station in relatively good condition and will require very little work (compared with 08-0172 mentioned earlier in this document) to bring it up to par. Repainting and some structural shoring will likely be the majority of the work needed, however, window and door openings will need basic repair work completed.

*Figure 195. 18-0111 as it sits at Bandelier National Monument.*

## 2.7 Technical Area 22

The last remaining building from TA-22 Manhattan Project era is the 22-0001 Quonset Hut. Work at TA-22 was instrumental for detonator research and development, and test assembly (McGehee et. al. 2003). Of particular note to the importance of the Quonset Hut, TA-22 was the place where high explosive assemblies took place for the Fat Man device.

Quonset Hut TA-22-0001

The Quonset Hut played an integral role in the development of the Fat Man device (McGehee et. al. 2003) and represents one of (if not the last) Quonset hut design-style buildings from Project Y in the area. TA-22-1 rectangular-in-plan, half-round, one-story building. This metal-framed and metal-clad building sits on a poured concrete foundation.

Many of the preservation maintenance issues (and there are many) are covered in a separate document to begin the process for an adaptive reuse of the building. Those issues listed here involve more immediate needs that help to provide a more complete seal of the building and provide greater operability for doors and windows.

*Figure 196. Historic photo of the Quonset Hut - circa 1946.*

*Rehabilitate Outer Coating*

Priority: Low

Current Condition:

The aluminizer application currently on the outer shell of the Quonset Hut was applied in 2017 after leaks had formed and were wrecking havoc on the interior. The application serves its purpose and stopped the leaks, however, the goopy nature of the application is not attractive. Additionally, the sheen is too much and draws the eye in a negative sense.

Recommendations:

Removal of at least the top application is recommended prior applying a new material that will protect the building while providing a pleasing aesthetic quality. Abundant research will be required to select the correct material and protective measures will need to be taken during the removal process as underlying layers probably contain lead. Removal of the top coat should be completed using a chemical paint stripper in order to better contain any possible lead. Penetrations should be minimized and removed where possible, and patches should be determined to be either corrugated metal or some form of composite material.

*Figure 197. The photo on the left gives an example of the state of the top coat, while the photo on the left shows an original finish section that will help with researching the correct application.*

*Seal the Building Envelope*

Priority: High

Current Condition:

There are numerous holes (more than can be counted) that provide access between the exterior and the interior. The vast majority occur along the bottom portions of the building. Some represent old utility holes, while some are just from maintenance neglect and general structural deterioration.

Recommendations:

A temporary would be to patch the holes with copper wool packed tight in each one. Long term solution will vary per instance, but would generally involve a tedious patch with the same material that surrounds the hole.

*Figure 198. Just two examples of the types of holes found throughout the building.*

*Screen Open Pipe Penetrations*

Priority: High

Current Condition:

There a few pipes extending from the interior of the building that require new screening to be installed around the outside opening. These openings allow rodents access to the interior of the building.

Recommendations:

Quarter-inch screen should be securely attached to the exterior opening of all exposed pipe ends.

*Figure 199. Photo shows two examples of pipe ends needing new screen.*

*Repaint and Maintain Operability of Doors*

Priority: Medium

Current Condition:

All doors seem difficult to operate, although most are at least partially operable to some extent. Paint is aged and faded on all doors and door seals are particularly problematic, especially around the bases.

Recommendations:

Paint colors should be selected based upon historic buildings staff recommendations for each door. Door sweeps can be installed where needed. Operability will need to be dealt with on a case by case basis.

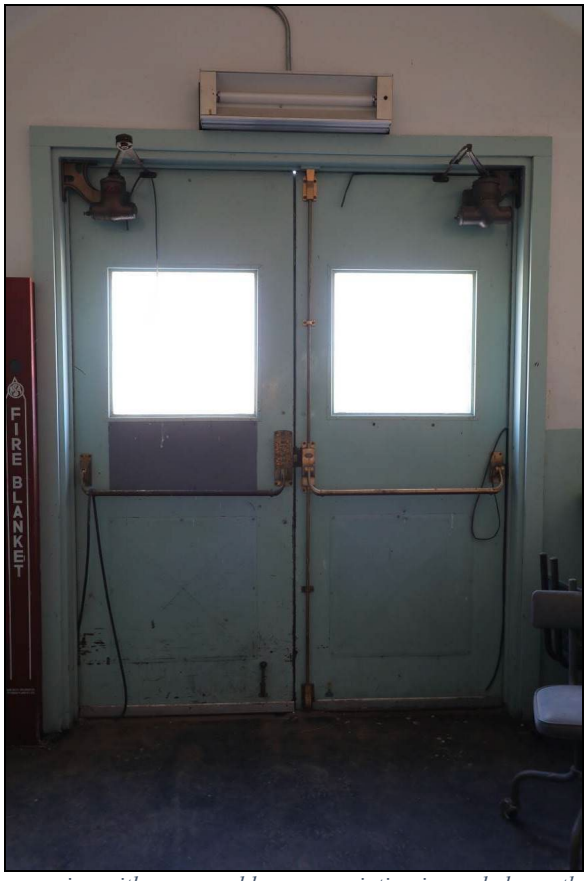


*Figure 200. Example of a door opening with some problems - repainting is needed, weather stripping is sagging, and the operability is problematic.*

*Replace Glass in Door*

Priority: Medium

Current Condition:

The glass in the door on the east elevation (south side) is shattered.

Recommendations:

Replace the shattered glass. Care will need to be taken since this is a metal-clad door with blast-prevention caging over the pane.


*Figure 201. Photograph showing the shattered glass in the east elevation door.*

*Repair Metal Windows*

Priority: Medium

Current Condition:

All metal window openings require extensive work. Glass panes require intensive cleaning and in some cases removal and replacement with a historically accurate pane. Panes and frames have been aluminized over.

Dimensions of North and South Elevation Windows = 56” x 40”
Number of Window Openings on the North Elevation = 23
Number of Window Openings on the South Elevation = 10

Recommendations:

A metal window specialist will be required to develop a detailed preservation maintenance plan.

*Figure 202. An example of metal windows requiring preservation work.*

*Repair Wooden Window*

Priority: High

Current Condition:

The east elevation window opening currently consists of only screen. No glass sashes are present. Screen is in disrepair and the absence of glass containing sashes allows outside temperature to dramatically effect the inside of the room.

Dimension of the Window Opening = 46” x 94”

Recommendations:

Screen requires a repair to prevent pests from accessing the interior of the building. Additional research is required to determine the appropriateness of fabricating and installing window sashes with the correct number of lites per sash.

*Figure 203. The window opening above consists of only screen material.*

*Repair Room Junction*

Priority: High

Current Condition:

A sizable gap currently exists between the utility annex and main building. This gap allows pests and weather access to the interior of the utility annex. The separation may be a result of minor flexing of the metal outer shell of the Quonset Hut.

Linear Feet = 9

Recommendations:

A sealing agent should be determined that has some flexibility so that minor movements between the two buildings will not result in the failure of the seal.

*Figure 204. The utility annex has separated from the main building.*

*Replace Eaves of Utility Annex*

Priority: Medium

Current Condition:

The eaves around the utility annex are severely weathered and deteriorating. Painting does not look to have occurred in many years.

Recommendations:

Replace the eaves with new wood cut the exact specification required to replicate the original. Paint should be an approved color.

*Figure 205. The eaves above the door can be seen here as weathered and lacking paint.*

*Repair Utility Annex Door Frame*

Priority: High

Current Condition:

The frame is severely weathered and deteriorating and does not provide a good fit for the door. The improper fit will allow pests entry into the building. It does not look as if it has been painted in a long time.

Recommendations:

Adjust fit and repaint.

*Figure 206. The door trim will require extensive work due to a long period of neglect.*

*Repair Utility Annex Window Openings*

Priority: High

Current Condition:

The wooden window openings on the east and west elevations of the utility annex are in extreme disrepair. The wood of the frame and the east elevation sash is nearly irreparable, however, extensive work can help preserve the original fabric. The louvered insert in the west elevation opening is irreparable and not original to the building.

Sash Dimensions = 28” x 35”

Recommendations:

Extensive preservation work to the east elevation sash and frame will be required. Wood consolidant and filler should be used in enough quantity to preserve as much of the original fabric as possible. Broken glass panes will need replaced and glazing for the entire sash will need redone as well. The louvered insert in the west elevation opening should be removed and a sash constructed to the design similar to the one in the other opening should take its place.

*Figure 207. The east elevation window opening (left) and the west elevation opening (right) will require extensive work.*

## 2.8 Technical Area 67

The area containing the firing pit was once designated as TA-12 or "L-Site". Implosion diagnostic testing occurred here during the Manhattan Project and the 67-0004 "Firing Pit" is the last standing structure from L-Site.

### 2.8.1 *Firing Pit TA-67-0004*

The Firing Pit is an impressive structure. It is a hexagonal-in-plan firing pit constructed of wood and steel and surrounded by earth. Atop the firing pit sits a square-in-plan, steel-plate structure. Wildfire consumed much of the wooden elements which can now be seen in a few place on top of a concrete foundation. The concrete foundation offers the primary preservation concern moving forward.


*Figure 208. Overview of the Firing Pit, 67-0004*

*Repair Concrete Foundation*

Priority: Low

Current Condition:

The concrete foundation is crumbling to much the same effect as all the other Manhattan Project concrete structures. Corners and edges are particularly bad.

Recommendations:

Significant research is needed to come up with a solution. Reconstruction is not recommended in this particular instance; however, putting a stop to active deterioration of the concrete should be strived for.

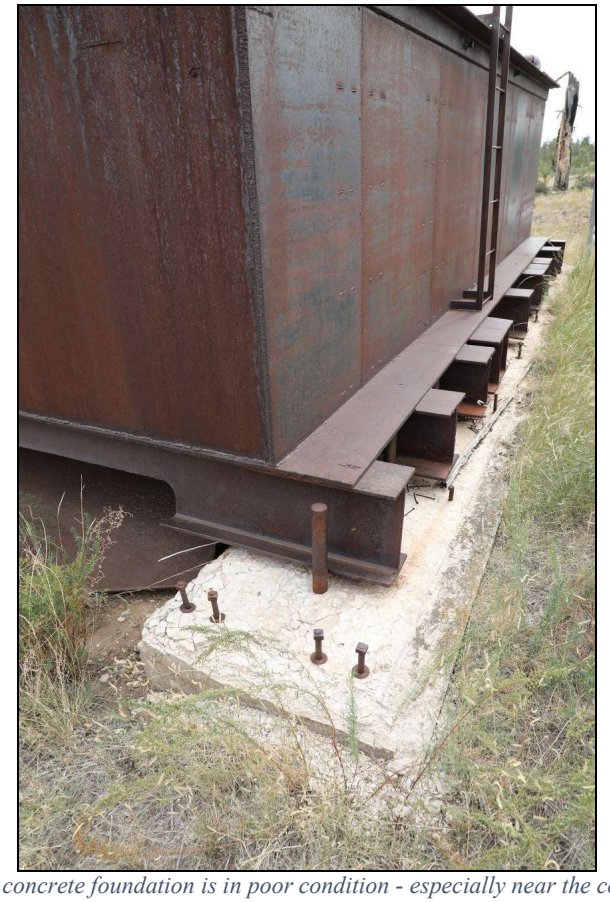

*Figure 209. The concrete foundation is in poor condition - especially near the corners and edges.*

*Treat Exposed Rebar and Anchor Bolts*

Priority: Low

Current Condition:

Exposed rebar and anchor bolts have oxidized and consequently affect the structural stability of the concrete foundation.

Recommendations:

A treatment solution will need to be developed to halt corrosion. There are several techniques available, however, further research and consultation with subject matter experts is warranted.

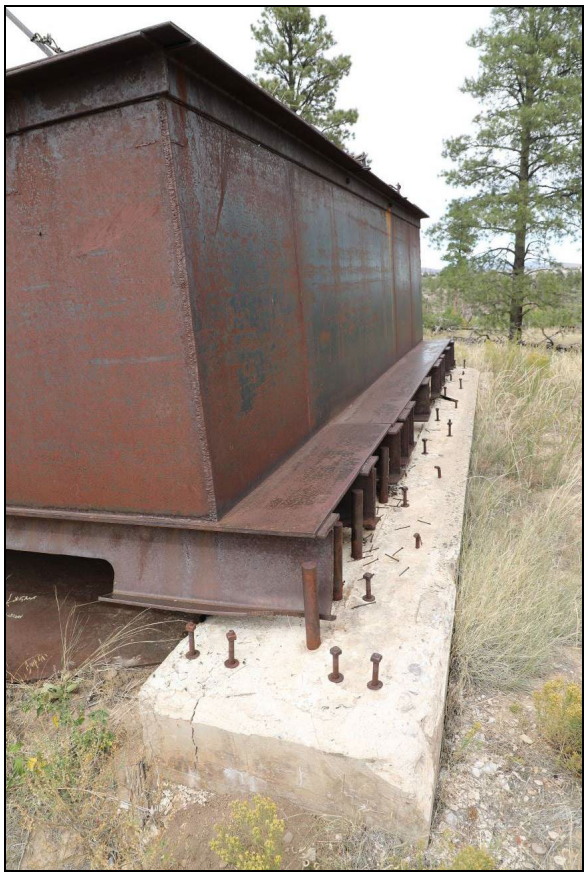

*Figure 210. Oxidized metal that enters the interior of concrete often times has a detrimental effect on the preservation of the concrete.*

*Cover Exposed Openings*

Priority: High

Current Condition:

A large opening at the top center of the structure remains exposed. The opening allows in water and possibly animals. A skunk carcass was recently noted at the bottom. It is likely that the skunk fell into the structure from the top opening or one of the side openings and could not escape. Pooling water has also been noted and most likely entered through the top during rain and snow events. The top of the structure can be accessed by a welded-on ladder, so the opening also represents a fall hazard for individuals on top.

Recommendations:

A steel-plate cover should be constructed to rest on top of the opening.

*Figure 211. Test were lowered into the square hole using the adjacent boom.*

*Figure 212. View looking from above into the square hole.*

*Figure 213. The side opening allow wildlife access to the bottom of the pit. This will be harder to close off compared with the top hole.*

*Regrade Access Road*

Priority: Low

Current Condition:

A small road is evident on the north side of the firing pit. The road is believed to date to the Manhattan Project and used in relation to the activities at the firing pit. Although visitation by groups in relatively large shuttles is a rare occurrence, it happens from time to time and may increase in frequency in the future. Standard-sized vehicles have limited space to turn around when leaving the site on the one-way-in, one-way-out road to the south. Larger shuttles have a nearly impossible space to turn around and exit the site.

Recommendations:

The historic roadbed should be brought back into use. The historic surface seems to have been compacted and perhaps lightly graveled during the time of use. The original path should be regraded as minimally as necessary and the surface compacted and graveled over. Gravel should be close in color to surrounding soil so as not to detract from the firing pit itself. Ponderosa pines have grown up along the eastern portion of the roadbed and will require removal. Asphalt paving is not recommended in an effort to retain as much of the historic character of the site as possible.

*Figure 214. The historic roadbed skirts around the firing pit here at the left side of the photograph.*

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