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REPORT ON THE LOCOMOTIVE ROUNDHOUSES WEST LEBANON (WESTBORO), NEW HAMPSHIRE

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This report records an inspection of the engine houses, sand house, bunk house, and other structures made on April 7, 2000. Present were James L. Garvin of the New Hampshire Division of Historical Resources and Joyce McKay of the Bureau of Environment, New Hampshire Department of Transportation. The purpose of the inspection was to develop initial familiarity with the railroad structures owned by the State of New Hampshire at the West Lebanon (Westboro) railroad yards, and especially to assess the structural system and general condition of the locomotive roundhouses.

Summary: The locomotive roundhouse at West Lebanon was built at two periods, with evidence of a third element, perhaps older than those remaining, formerly attached to the south wall of the existing structure. Both remaining units of the roundhouse were built by the Boston & Maine Railroad to shelter and service steam locomotives, and both employ essentially the same structural system. This system employs brick outer walls as a load-bearing structural shell, with the flat roofs of the building units being supported by a

series of concentric wooden bents. These bents are composed of wooden columns arranged on radii focused on the center pivot of the former turntable. The columns support heavy timbers that span each locomotive bay and support roof joists that extend from the front walls of the structures, facing the former turntable, to the rear brick walls. Both sections of the roundhouse were designed to capture ample natural light both through expansive glazed windows in the rear walls of the buildings and through clerestories that face in a generally easterly direction toward the former turntable. Both buildings have been altered to varying degrees, with windows in the rear walls having been enlarged as doorways, closed with concrete blocks, or partially boarded, and with the clerestory windows having been covered with corrugated metal sheets. Both sections of the roundhouse are in fair but long-neglected and deteriorating structural condition.

History: The history of the present locomotive roundhouse at West Lebanon has not yet been investigated in detail. The Northern Railroad, and later the Boston & Maine, maintained locomotive servicing facilities at West Lebanon (Westboro) beginning in 1847. The *History of Lebanon, New Hampshire, 1761-1994* reportedly states that a brick roundhouse replaced a 130-foot-long stone roundhouse (1848) in 1890. It is likely that this brick structure was the now-missing building, and that the two current units were added still later. A study of Sanborn Insurance Company maps for West Lebanon should permit a fairly accurate dating of the existing roundhouse structures.

Meanwhile, it can be said that the existing structures appear to be of modern, post-1900 construction and to have been built within a few decades of one another. The southernmost end wall of the southernmost roundhouse, measuring some 95 feet in overall depth (excluding an attached fan room at its rear corner) appears to be the oldest surviving fabric in the complex. It appears to be a former party wall shared by the current roundhouse and a now-missing older roundhouse to the south. Instead of having been built as a party wall, this construction was perhaps the end wall of a free-standing building that pre-dated the current roundhouse, and to which the present building was attached. At the demolition of the earlier structure, the former interior face of its end wall would have been exposed to view and to the weather, explaining its rather underburned bricks, its bricked-up girder pockets, and its exposed areas of whitewash.

To judge from roof and wall outlines that are visible on the now-exposed face of this wall, the missing roundhouse apparently had low walls on both its front (facing the turntable) and rear, with an elevated clerestory at the center of the roof span, probably with sashes on both the front and rear faces of the clerestory. Brick-filled pockets for the ends of heavy girders that supported the lower roofs and the clerestory roof are visible in the brickwork that forms the end wall of the existing southern roundhouse.

The current buildings appear to date from the early decades of the twentieth century. The larger southern structure, having eight locomotive bays running the ninety-foot depth of the building, is notable for the expansive steel window sashes that once filled much of its western wall area. These steel sashes are largely missing or replaced by an infill of concrete blocks, but appear to be typical of industrial sashes of the early twentieth century.

The smaller northern structure, having three locomotive bays, is a longer building. It has a total depth of some 120 feet, and is lighted both by rear windows and by a series of windows on its northern side elevation. Four of these windows, behind the line of the clerestory, are tall rectangular units; a fifth, in the lower front section of the side wall, is square.

This building was evidently added to the other when the Boston & Maine Railroad placed longer locomotives in service on its Northern Division. The evolution of Boston & Maine motive power is chronicled in Harry A. Frye, *Minuteman Steam: Boston & Maine Steam Locomotives, 1911-1958* (Littleton, Mass.: Boston and Maine Railroad Historical Society, Inc., 1982). Older American (4-4-0) locomotives, most dating from the 1880s and 1890s, averaged about fifty-five feet in length from pilot coupler to tender coupler. Mogul locomotives (2-6-0), mostly built in the 1890s and early 1900s, approached sixty feet in comparable dimensions. Ten-wheelers (4-6-0) averaged some sixty-two feet. Consolidation freight locomotives (2-8-0), added to the Boston & Maine fleet in the first two decades of the twentieth century, ranged from about the same length as the ten-wheelers up to nearly sixty-eight feet. All of these locomotives could have been accommodated in the shorter of the two surviving roundhouse units at West Lebanon.

The Boston & Maine took delivery of Pacific (4-6-2) locomotives beginning in 1910. Varying series of these machines measured between seventy-two and seventy-seven feet between couplers. The railroad began to purchase heavy Santa Fe (2-10-2) locomotives beginning in 1920. These large freight machines measured over eighty-nine feet between pulling faces. In the late 1920s, the B&M began to purchase still heavier Berkshire (2-8-4) freight locomotives. These measured over ninety-seven feet between pulling faces. If they were stabled in West Lebanon, these large freight locomotives would have demanded the longer bays seen in the northern roundhouse unit.

The 1914 valuation of the Northern Division describes a sixteen-stall roundhouse and turntable. This implies that both surviving roundhouse components had been built by that date, and that the now-missing southern unit, with an additional five bays, was also standing.

Description: The two surviving roundhouse units both have exterior walls of brick, thickened by pilasters at points where the walls support the ends of roof timbers. Where the frogs of bricks can be seen, most are marked “D B Co,” identifying their maker as the Densmore Brick Company of Lebanon, New Hampshire. These are hard, sand-struck bricks.

The rear or western brick walls of the southern roundhouse are pierced by expansive window openings, a few of which have been lengthened to the ground to become wide doors. Wherever fragments of the original sashes remain, they are multi-light steel industrial sashes of the type that were common in the early twentieth century. Window openings are (or formerly were) divided by steel transom bars placed somewhat above the mid-height of the openings, with independent sash units installed above and below these beams. Some former window openings have been entirely filled by concrete blocks.

The northerly roundhouse is similar in design and construction to the southern building, except that its northerly side wall is also pierced by a series of large windows. Window openings in both the western and northern walls of this building are spanned by lintels of reinforced concrete in place of the steel lintels employed in the larger roundhouse.

In both buildings, the roof membranes are supported by a series of wooden bents. These are composed of columns, measuring about twelve inches square and supported on concrete footings, which are arranged at the intersections of concentric circles and radii, both having their centers on the pivot of the former turntable (see attached floor plan). The tops of the columns support wooden beams that follow the lines of the concentric circles. These beams are further supported by diagonal wooden braces that rise from the four sides of the columns (see lateral section drawing, attached). The beams support wooden roof joists that follow the lines of radii. The joists are covered with wooden sheathing boards. The roof covering was not examined, but may be presumed to be some form of asphalt-impregnated roll roofing.

The openings of each locomotive bay are presently filled with hinged wooden doors, most of which have been damaged. The clerestory windows above the low, inner roofs of the two roundhouse structures have been covered with corrugated metal sheathing, applied vertically. Like the main windows in both roundhouses, the sashes behind these sheets may be presumed to be damaged or missing.

Each of the eight locomotive bays in the larger roundhouse is (or was) fitted with a smoke funnel that projects through the roof near the faceted rear wall of the structure. These funnels appear to be composed of sheets of cement-asbestos board supported within a frame of steel angles. Cement-asbestos board was introduced to the United States shortly after 1900.

The three locomotive bays in the smaller (but longer) northern roundhouse are ventilated both by smoke funnels (also placed near the rear or western wall) and by rectangular metal louvers set into the flat roof above the center of each bay. The latter appear to be later additions to the building.

Throughout both buildings, supplementary wooden framing of modern, pressure-treated Douglas fir planking has been placed at about the level of the feet of the diagonal braces that connect columns and roof beams. Attached to this framework are sheets of corrugated aluminum, much of it damaged by locomotive exhaust. It appears that these lower exhaust shields were placed in the building after World War II, probably to protect the flammable wooden roof framing from sparks generated by Diesel-electric locomotives. Unlike coal-fired steam locomotives, Diesel engines sometimes emit brands of burning carbon.

Condition: The two remaining roundhouse structures are in fair but unmaintained condition. Unsympathetic alteration, vandalism, and neglect have combined to damage the integrity of the two buildings, yet the structures clearly express their identity as early-twentieth-century locomotive roundhouses. The West Lebanon roundhouses may be the largest and most intact roundhouse complex remaining in New Hampshire.

The following departures from original condition are evident: 1. loss of window sashes in clerestories and in main walls of the two brick structures; 2. enlargement of some rear window openings for doors; 3. deterioration or misalignment of some wooden columns from apparent impacts, from salt damage (quantities of rock salt are placed throughout the structures), and possibly from frost action; 4. loss or damage to roof membranes through removal or leakage; 5. loss or damage to front doors of locomotive bays; 6. removal of tracks and locomotive turntable; 7. deterioration of the concrete turntable pit wall; 8. erosion of mortar joins in brick walls due to splashback of roof water, rising damp, and salt migration; and 9. removal of machinery and loss of roof and wall fabric from the fan room, located at the southwestern rear corner of the larger roundhouse.

Despite these losses, the structures are presently in repairable condition if need were demonstrated and funding were available.

Hazardous substances: It is beyond the scope of this report to assess the presence of hazardous substances in the soils within and around the roundhouses. The construction of the basic roundhouse structures, however, follows traditional early twentieth-century practice. Construction of that period normally introduced no hazardous substances except for the commonplace use of asbestos for a few specialized purposes.

Among the frequent uses of asbestos in the early twentieth century was steam pipe and boiler insulation. Several steam mains, once connected to the now-missing boiler plant nearby, run through the two roundhouse buildings. These pipes were presumably intended to provide minimal heating at times when the roundhouses were not occupied by warm locomotives, and so have no insulating coverings.

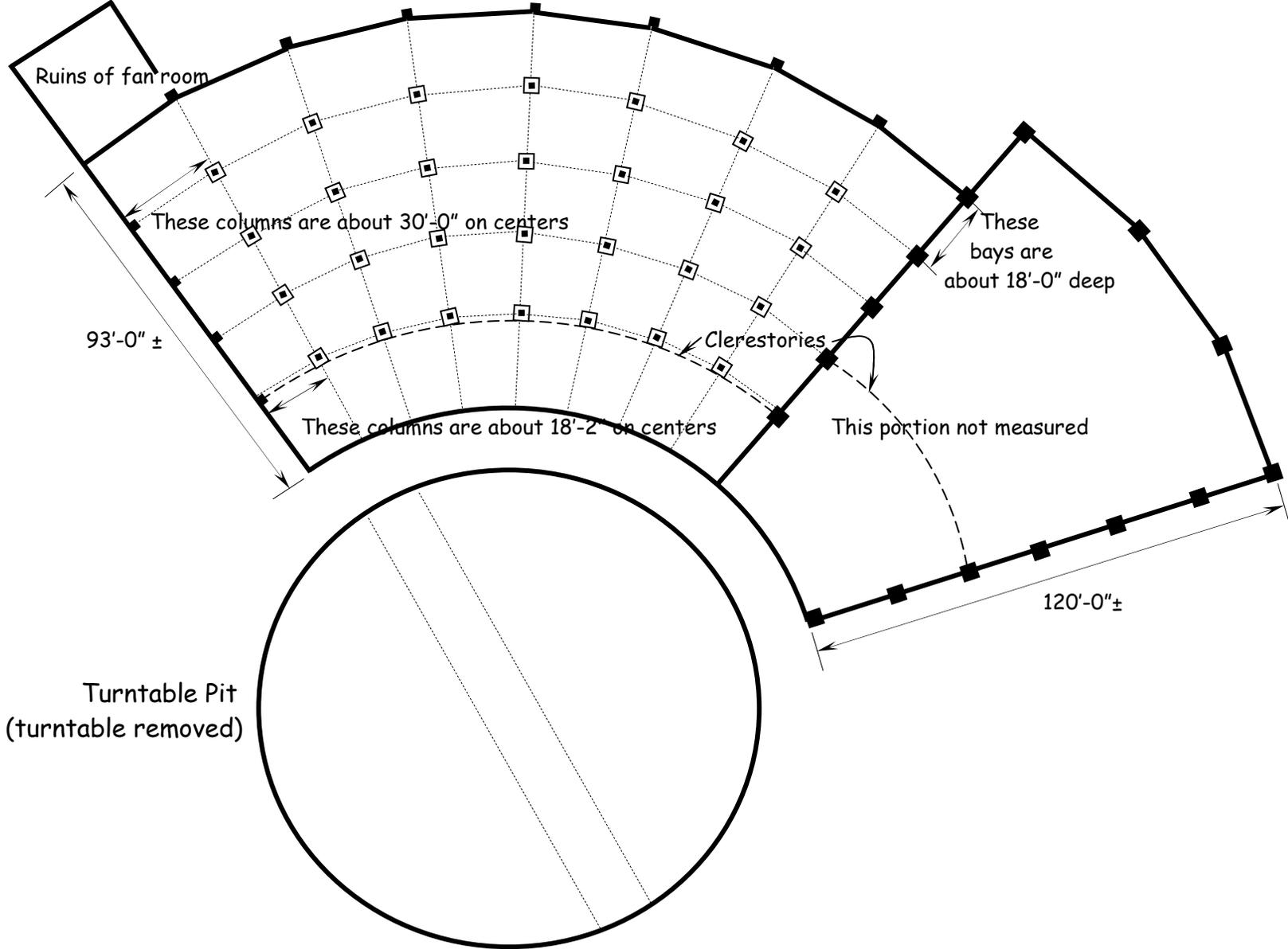
A second common use of asbestos in the early twentieth century was as a component of fireproof sheets or cladding. In such uses, asbestos fibers were combined with Portland cement and molded into sheets or shingles under great pressure. The technology for producing cement-asbestos products of this kind was introduced to the United States from Germany shortly after 1900. The pioneering American manufacturers were Keaseby and Mattison Company and Johns-Manville Company; the latter became dominant. Johns-Manville manufactured a number of cement-asbestos products under the generic trade name of "Transite." An enduring and versatile substance, Transite is commonly encountered in fireproof applications throughout much of the twentieth century.

As noted above, the smoke funnels that penetrate the roofs of both roundhouses near their rear or western walls may be formed of cement-asbestos board. The lower edges of these funnels are chipped or damaged in most cases, but fragments of the board are not evident on the ground.

Because of their nature, cement-asbestos products are generally regarded as self-encapsulating. Unless broken or abraded, Transite and kindred materials contain the asbestos fibers within a hard, impervious board, making it improbable that airborne asbestos fibers will be released. If broken, cement-asbestos boards can be re-sealed through the application of encapsulants to the damaged edges.

Except for the possible use of asbestos in the smoke funnels, the roundhouses at West Lebanon are constructed of traditional materials: wood, brick, lime-sand mortar, steel, glass, and probably asphalt and slate aggregate in the roof covering. None of these traditional building materials can be regarded as hazardous.

Schematic Floor Plan - Boston & Maine Railroad Roundhouse, Lebanon, New Hampshire
(Not to Scale)



Lateral Section through Roundhouse Bays, Showing Structural Bents (Not to Scale)

