Building Conditions Survey

by CSI Section

Division 2: Sitework

2.1 Landscaping & Site Features

The landscaping around Baker House is generally in fair condition. The trees on the north side appear healthy, although the willow on axis with the north building entry is nearing the end of its life. Some of the Norway Maples on the south side of the building have become overgrown to the point where they are facilitating the growth of moss and fungi on the limestone of the dining pavilion (Fig. 67), and the trees themselves are showing signs of stress. There has been some erosion at the terraced berm to the northwest of the dining pavilion (Fig. 68), and minor soil erosion at several of the grade points around the building.

The planting beds on the north side of the building were all added in the mid-1980s when Amherst Alley was moved away from Baker House (Fig. 69). The garden at the Master's Suite was also recently configured (late 1970s or 1980s), although the bicycle shed gate and brick wall to the east of the gate were added during the 1960s, when the bicycle shed was created. All of the north side plantings are well cared for and appear healthy. The bicycle shed itself is not well used although it is easily accessed from within the building. The students do not generally feel comfortable leaving their bicycles in a partially protected area, and it has become home to derelict bicycles and a few motorcycles.

A parking area for the masters' cars for Baker and Green Houses was added at the northeastern corner of the site. This means that the cars are the first objects in one's line of sight when approaching the building from the central campus.

The barbeque on the south lawn was added in the 1960s. It is popular with the students and is well used in nice weather, but is poorly located relative to the efficient use of the site, and is not aesthetically compatible with the building.

Site lighting consists at present of the soffit lights at the main building entry, pole lighting along Amherst Alley, a mix of incompatible and unsympathetic pole lights along the south lawn, and a few of the original copper lanterns over the doors at the Moon Garden Pavilion lower entrances and at the Master's Suite terrace doors.

<u>RECOMMENDATIONS:</u>

2.1A The grading on the south lawn and terraces should be reworked to improve the drainage and more carefully conform to the original grades shown around the building. Serious consideration should be given to installing the bluestone terrace, originally planned for the lower level against the Memorial Drive retaining wall, which will serve to extend the lower level of Baker Dining outdoors, as well as mitigate the negative impact of the tree roots on this area.

Fig. 67 *South lawn showing barbeque and eroded terrace edge*

Fig. 68 *Moon Garden Pavilion with spalling concrete terrace and eroded soil.*

Fig. 69 *1980s Planter at North Entry Wall*

2.1B As part of the optimum renovation of Baker House, the gate to the bicycle shed should be replaced with a new gate designed to be more in harmony with Aalto's aesthetic. It may also be useful to look at options for providing a more complete enclosure for the bicycle shed, although any extension of the present roof could not interfere with the existing windows, nor should it be visible from outside of the enclosure.

2.1C It would be desirable to either screen or relocate the cars in the masters' parking area

2.1D We recommend that the existing barbeque be removed and a new barbeque designed to fit into the bank that forms the west side of this lower terrace. This will augment the desirability of this terrace as an extension of Baker Dining, allow for the design of a barbeque more in keeping with what might have been Aalto's intent, and free up the southwest lawn for other activities.

2.1E A program of planting and plant maintenance should be established and reviewed by all parties at MIT. The program should include replanting of the terraced bank off the dining pavilion, and a redesign of the plantings at the building entrance to coordinate with the proposed handicapped access ramp for the main entrance. An alternative landscape design should also be studied for the extreme west side of the site between Baker House, the loading dock and the adjacent fraternity, in order to improve both the function and appearance of this area. The pre-1948 scheme for Baker House showed plantings on and around the library roof (which then developed into the northwest

All photos in this section were taken in the summer of 1996 terrace). It would be desirable to see plantings introduced into the raised level of the terrace to embellish this part of the site.

2.1F The site lighting, especially along the south side of the building, should be studied with the idea of developing a comprehensive scheme that integrates new lighting that is sensitive to the design of Baker House, with whatever scheme is ultimately agreed upon with the MDC for the city lighting along Memorial Drive. Aalto has utilized a simple pole lamp with a metal reflector in several variations for lighting the sites of many of his buildings in Finland. It is conceivable that such a fixture may be used for the immediate precinct around Baker House, assuming that it utilizes a light source that is similar to the MDC lights that precede and follow it as street lighting. All of the fixtures would be of the same scale and spacing, and the change in fixture type might actually serve to subtley (and positively) heighten the presence of Baker House along Memorial Drive.

2.2 Pavement, Terraces and Walks

The areas of bituminous and concrete paving around the building are generally in good condition, although there are some areas at the Master's suite driveway and in the bicycle shed area that will need to be patched or re-done in the near future. The north and west sides of the building are set off on a raised concrete terrace that is paved along the north edge in bluestone, which now edges the new planting beds. These stones have shifted over time, as is evidenced by the large caulk joints between many of the pieces (Fig. 70). At the northwest terrace, there is a portion covered with a scored concrete slab that is raised an additional 18" above the surrounding pavement. The concrete has been re-done (probably in the mid-1980s), at which time a new membrane was put on the structural slab. There is no evidence of water infiltration in this area.

The bluestone pavers around the Moon Garden Pavilion are natural cleft finish on the plaza and steps and are cut into strips which are set diagonally on the landing(Fig. 71). The stones themselves are in good condition, although a number have come out of alignment and will have to be reset. These are set in a bed of mortar and lightweight concrete fill, which were thoroughly saturated at the test cut locations made south of the pavilion (Figs. 72, 73). There is also evidence of water penetration beneath the waterproofing system below the lightweight slab in the form of leaks in the kitchen, dining and storage areas.

The retaining wall at the northeast corner of the Moon Garden Pavilion, adjacent to the door into the dining room, has been raised recently in order to relieve a site drainage problem that had existed in the well at the bottom of this stair.

The Master's Suite has a bluestone terrace on the south side, which has recently been rebuilt with a new membrane and flashing.

Fig. 70 *Bluestone North Terrace wall cap*

Fig. 71 *Bluestone Steps and gravel landings at Moon Garden Pavilion*

Fig. 72 *Detail of Waterproofing at underside of Moon Garden Terrace paver*

Fig. 73 *Detail of paving substrate at Moon Garden Pavilion Terrace*

Fig. 74 *Loading Dock - South Facade*

Fig. 75 *Loading Dock - East Facade*

RECOMMENDATIONS:

2.2A All of the bluestone pavers, setting bed and waterproofing systems around the Moon Garden Pavilion should be removed, and the structural slab patched and prepared to receive the new paving system. A new membrane waterproofing system should be installed over a lightweight concrete topping slab that is contoured to drain. We recommend that a PVC membrane be considered for this application in that the seams are heat welded and do not rely on an adhesive to maintain a watertight application. The existing stones should then be reset in a soft mortar bed and pointed.

2.2B The northeast terrace area waterproofing is over 10 years old and should probably be replaced as part of any comprehensive upgrade, especially if this area is to be landscaped.

2.2C The new bluestone terrace proposed above for the south lawn should be constructed of pavers to match the existing in kind. They should be set either on a concrete slab on grade, with a drain to a drywell or perimeter foundation drain, or in a sand bed over a drainage course of 12" of crushed stone. The joints can either be pointed, filled with stone dust, or be left wide to allow grass to grow between the stones. This latter solution was Aalto's original design for the terrace.

2.2D The northeast pavilion retaining wall should be lowered. This will only be possible if the stairs and well adjacent to the wall are reconfigured to better accommodate run-off.

See Conservators Report, in the Appendix, for further commentary.

2.3 Loading Dock

The loading dock area is sheltered by a small concrete pavilion with a wood-framed strip window. This element is, in its utilitarian guise, perhaps the purest "modern" or functionalist element of the building, and as such, it deserves the same careful restoration as the main portion of Baker House. The present condition of the building is fair; the walls (which have just been repainted) are faced with painted stucco, and the painted wood windows (also just repainted) are the only original windows, aside from the fixed units at the upper level of the Dining pavilion, in Baker House. The central window has been altered (to its detriment) by the insertion of a metal door opening to the south side of the building (Fig. 74). This door was inserted to allow the adjacent fraternity house to bring its trash through the Baker dock for deposit in the dumpster parked in the Baker loading area. The structure has a raised dock that is served by an elevator that opens through the floor. The depth of the dock and the overhead clearance are inadequate to allow larger trucks to pull up to the dock, which severely hampers its operation (Fig. 75).

Fig. 75A *North Entry Canopy w/ triangular concrete support*

Fig. 76 *Concrete support for cantilevered north stair*

At the time Amherst Alley was extended, the service yard was also enlarged to the north by approximately 17'-0". A large part of the width of the yard is occupied by one or sometimes two dumpsters, which hinder or prevent access to the loading dock.

There is a service entrance to the east of the dock, down a flight of stairs into the basement. Although this area functions well, it is not covered, and is often propped open, which creates a building security problem.

RECOMMENDATIONS:

2.3A The loading dock structure should be restored and renovated to improve its operation. The roof should be extended further out over the driveway, and this portion of roof should be raised to allow full size trucks to back up to the dock (This will actually permit trucks to back in closer to the dock than is possible at present). The raised portion should be designed in such a way that its visual impact is minimized from the south side. An extension should also be put onto the dock itself (we suggest that this be moved out to align with the bottom of the stairs, see the attached sketches, SK 13A-C), and a new elevator installed.

2.3B Consideration should be given to reworking the basement level entrance to provide better shielding from the weather and improved security. The metal door at the rear wall should be removed and the original window configuration restored. A new door should be provided hard against the west edge, to allow trash from the fraternity to be removed through the Baker dock, and not accumulate along the south and west sides of this enclosure. The dock elevator/lift should be replaced.

2.3C Finally, we strongly recommend that MIT consider installing the iron gates originally proposed for the service yard by Aalto. These gates will serve to enhance both the building and the streetscape of Amherst Alley. If this is not possible (the maintenance staff asserts that these gates would be left open most of the time, and that they would likely be hit often by trucks), we recommend that an enclosure be designed for the dumpsters, or that some alternative measure be devised for dealing with the trash, which would alleviate the necessity of maintaining the large dumpsters in their present locations. It is possible that the overall effect of this end of the building (the west terrace, the loading dock and the space between Baker House and the Fraternity) could be greatly improved with some minor changes, and we feel that this will add significantly to the overall impact of the structure in its environment.

Division 3: Concrete

3.1 Concrete Frame

Baker House is a reinforced concrete structure with exposed slabs, columns and beams on the building's interior, and an exposed basement level on the exterior. The structural frame appears sound; we have seen no cracking from settlement or other movement over the years, and with no distress evident in any interior finishes, the building can, on the basis of a visual analysis, be pronounced structurally sound. It must be noted however, that Baker House was built prior to the introduction of the seismic requirements that govern the present codes, and we therefore must assume that it is not in compliance with these provisions of the code. LeMessurier Consultants, our structural engineer, has not yet performed a seismic analysis of the structure, although we recommend that this be done as we enter the design phase of the work, even if we do not intend to upgrade the building to meet the present code as part of the restoration.

See Structural Engineering Report, in the Appendix, for further commentary.

3.2 Architectural Concrete

The most prominent architectural concrete feature of the building is the triangular block supporting the roof of the entry pavilion (Fig. 75A). It has a board formed finish, which is still well articulated; there has been very little weathering of this element and it remains in good condition. Olaf Hammerstrom maintains that this is in fact the only architectural concrete on the building approved by Aalto, and that he personally instructed the workmen on how to produce its distinctive, board formed finish. Elsewhere around the building, the only exposed concrete is at the basement level, the bracket supporting the east end of the cantilevered stair (Fig. 76), and the stoops at the base of the egress stairs, which are all plywood formed. The Finns, who invented plywood, have high regard for this material, and Aalto felt it sacrilegious to be using what in their experience is a finely crafted material for the forming of concrete. Like LeCorbusier and the first generation of the Brutalists, Aalto preferred the rustic, articulated appearance achieved through the use of rough boards.

Some of the stoops will need spot repairs, especially around the metal tread inserts, which have corroded in many places. There is also evidence that the exposed basement level concrete has been cosmetically patched with a material that does not match the poured in place stock. It is, however, possible that this work was done when the forms were taken off the concrete at the time of the original construction.

<u>RECOMMENDATIONS:</u>

3.2A The exposed architectural concrete should be cleaned with a warm water, medium pressure wash and (if necessary) a mild detergent solution.

See Conservators Report, in the Appendix, for further commentary.

3.3 Exposed Interior Concrete

The concrete frame of the building is exposed as piers, beams and flat slab ceilings throughout the interior of Baker House. These surfaces are all painted, and are generally in good condition.

<u>RECOMMENDATIONS:</u>

3.3A Minor cracks and spalls should be filled and prepared for finish painting. They should be painted with a latex masonry paint.

Division 4: Masonry

4.1 Brick Masonry

The primary cladding of Baker House is a very hard, irregular, New England water-struck brick, which was fabricated (according to legend and anecdotal memory) by a small company in Northern New England or Southern Quebec. Records from Aberthaw, the original building contractor, indicate that it may be an Enos brick, although it bears a close resemblance to the Morin or Kane-Gonic bricks available today. The bricks were set without culling in a dark gray mortar, and consequently have a very irregular pattern and broad, weather-struck mortar joints*. The brick remains in very good condition although the mortar has weathered, severely in places, and has bleached to a beige color (Fig. 77, 78). At the west end of the north wall, adjacent to the loading dock there is an area of approximately 100 square feet where the brick has been se-

Fig. 77 *West wall brick detail*

Fig. 78 *South-West corner brick detail*

Fig. 79 *Main Lounge Brick at Fireplace*

verely damaged, probably as the result of a harsh cleaning or sandblasting to remove graffiti. Here the hard-fired surface of the brick has eroded away, exposing the more porous heart to the weather. This will yield increased water penetration into the wall, and more rapid deterioration of the brick.

**The Conservators report, in the Appendix, notes that the joints were struck flush. This is based upon the conditions found at the only unweathered joints in the building, on the interior walls, and at the covered entryway. They have seen evidence on other structures that flush joints can weather to the appearance noted here. The protected joints may have been struck flush however due to their being in locations that would not require a weathered finish. Given Aalto's particular concern with the aesthetics of the masonry detailing in general and on Baker House in particular, it would not be surprising if he dictated this variation in the jointing.*

The MIT Housing Office and building maintenance staff have informed us that the brick was coated with a penetrating sealer during the repointing campaign undertaken two years ago. We have found no visible evidence of this coating in the course of our investigations, and are not able to evaluate its present impact on the potential life of the brick.

The brick is also exposed on the building's interior in the main lobby, north stair tower, the dining room, and other areas of the lower level. Aside from some staining on the dining room and lounge brick (Fig. 79), it remains in excellent condition, and shows clearly the dark gray color of the original mortar.

RECOMMENDATIONS:

4.1A The brick is generally in excellent condition at present. It may be prudent to remove a brick in an inconspicuous area in order to confirm the presence of a chemical sealer, and to determine whether this agent may potentially impact the projected life of the brick.

Areas where the mortar has experienced weathering should be cut out by hand and repointed with a soft mortar compatible with the brick and the original pointing mortar. As an initial strategy, we recommend that a sample portion of the work be done on an inconspicuous panel in order to evaluate the contrast between the old and new mortars.

4.1B At the damaged area on the north facade, serious consideration should be given to cutting out and removing all of the deteriorated bricks, and replacing them with a new brick to match the original in kind. This will of course necessitate locating a brickworks that can make units that are a close match to those found on Baker House (we do not anticipate that this would be a problem).

4.1C An argument could be made that the entire building should be repointed based upon the fact that the original mortar was a dark gray color, and that, even in areas where it has remained in relatively good condition, it has bleached, as noted above.

4.1D The soiled areas of brick on the interior of the building should be cleaned with a mild detergent solution in warm water, applied with scrub brushes. If this does not prove effective in removing all of the stain, a test area should be mocked-up with a stronger restoration cleaner in order to insure that no damage will occur to the brick if the stronger solution is utilized.

See Conservators Report, in the Appendix, for further evaluation of this work.

4.2 Limestone Masonry:

Limestone is used as the cladding material for the moon garden (dining) pavilion, which Aalto perceived as being the white, ceremonial element or "jewel" of the complex, set off against the dark back-drop of the serpentine brick dormitory block (Fig. 80). The limestone is of unknown provenance, although its source is probably one of the major Indiana quarries. It is used solely as a veneer cladding material, and is not load-bearing. The jointing, which has an interlocking pattern on the blank sides of the building and a grid pattern on the glazed elevations; and the detailing of the stone relative to the ribbon window elements, where the lintel stones are projected slightly beyond the stones at the normative plane of the wall, display Aalto's concern with the subtleties of the iconographic representation of a particular material, and how the ensemble of components is meant to interact in a harmonious fashion (Fig. 81).

Fig. 80 *Limestone Moon Garden Pavilion from Southwest*

Fig. 81 *Detail of Moon Garden Pavilion*

Fig. 82 *Moon Garden Pavilion limestone and aluminum replacement windows*

Fig. 83 *Limestone detail showing failed sealants and fungal growth*

Fig. 84 *Limestone detail showing soiling and sugared stone*

Fig. 85 *Slate panels at North Entry*

The limestone originally had a smooth sawn finish similar to the exposed stone at the interior rear wall of the moon garden pavilion that forms the south wall of the main first floor lounge. Exposure to the weather and atmospheric pollutants has caused a sugaring effect on the surface, which yields a grainy, sand-like texture. There is evidence of water penetration behind the stone at the corners of the upper level behind the lower parapet level and at lintel veneers, where corrosion to the steel behind may be the cause of the local cracking and spalling seen in some areas (Figs. 82-84).

<u>RECOMMENDATIONS:</u>

4.2A The sugaring of the limestone surface is not serious in itself, but should be monitored, as it will tend to grow worse over time, especially if the air quality around the building is not improved. If however we are to project the life of this cladding over a period of several centuries, the use of a penetrating sealer to increase the resistance of the stone to the weather should be considered. Initially this would be done as a small, inconspicuous test area and left to weather for a period of at least two years before any decision would be made regarding the choice to coat the building. After at least two years of weathering, visual inspection of the sample and removal of a small portion of the coated area for laboratory testing will yield a much better idea of the potential long-term impacts of any treatment on the limestone.

4.2B We also recommend that a section of the limestone veneer be removed to examine the condition of the various elements of the substrate. An allowance is being carried in the estimate for the rebuilding of the limestone parapet wall and the fascia.

See Conservators Report, in the Appendix, for further commentary.

4.3 Slate

The canopy and roof at the entrance and over the manager's office are capped with a fascia of black (probably Pennsylvania) slate panels (Fig. 85). They are fastened to the concrete frame with bronze clips, with caulked joints between the panels (Fig. 86). There is one panel at the front edge of the canopy that is cracked and has been removed, as it could potentially constitute a hazard to pedestrians passing below.

See Conservators Report, in the Appendix, for further commentary and recommendations

<u>RECOMMENDATIONS:</u>

4.3A Loose or broken slate should be removed and refastened or replaced with new slate. Consideration should be given to extending a lead coated copper cap over the top of the stone to protect the exposed edge from weathering. This can be done when the area is reroofed. *See Division 7.*

Fig. 86 *Slate panel bracket detail*

Fig. 87 *Structural Tile in student room*

Fig. 88 *Structural Tile in corridor*

Fig. 89 *Exposed lintel behind limestone at Pavilion*

Fig. 90 *Aluminum valence at upper level of Pavilion*

Fig. 87 *Aluminium valence and column w/steel fins in lounge #1 (basket/trellis wood trim has been removed)*

4.4 Structural Glazed Tile

Most of the interior partitions at Baker House are modular units of single or double-sided 4" (nominal) structural glazed tile. The exposed finish on the tile, which is a red similar to the brick deployed around the building, constitutes the dominant visual element in the dormitory rooms and corridors (Figs. 87, 88). The condition of the tiles is generally very good, although there is evidence of stress cracking at corners where the partitions jog within the rooms, such as at the mid-point of the #27 and #28 room lines, perpendicular to the outer wall, throughout the building. In some cases, these cracks have resulted in the subsequent spalling of the face. It is also possible that some of this damage may be due to impact rather than any movement within the partitions.

Due to the lack of tack space within the rooms and the corridors, notices and posters etc., have been fastened directly to the tile with adhesives, or punched, either directly or with lead sleeves, into the grout lines. This has left unsightly residue and small holes scattered throughout the building on these surfaces.

RECOMMENDATIONS:

4.4A Cracked or spalled tiles around corners should be carefully cut out and replaced with new units to match the existing in kind. The corner joints at locations that show consistent stress should be cut out and replaced with a two-part sealant, colored and tooled to match the grout lines as closely as possible. The tile should be cleaned with the mildest possible solution that will still remove the adhesive that has built up on these surfaces over the years. As we have recommended with the cleaning of the brick, this process should begin with the use of a detergent cleaner in warm water, and only proceed to harsher solutions, such as a solvent based cleaner, if the first method proves ineffective. Finally, the introduction of a tack surface, such as the birch strips originally planned for the dormitory room wall, would go a long way to preventing the recurrence of this kind of damage.

Division 5: Metals

5.1 Structural Steel

The only structural steel items at Baker House aside from the canopy structure at the bicycle shed are the lintels and other miscellaneous items used to frame openings and set equipment. The exterior lintels, exposed and painted at the lower face, generally appear to be in good condition; the details as to how they are set and flashed are sound for this type of construction, and they have weathered well . There is however some surface corrosion evident at some of the windows, and this is especially pronounced at the heads of the window on the upper level of the Moon Garden Pavilion. As is noted in the limestone section above, this may be due to the infiltration of water from the roof down through the wall, where it is weeped out at the lintel (Fig. 89).

RECOMMENDATIONS:

5.1A The lintel condition should be carefully inspected as part of the condition assessment behind the limestone panel.

5.2 Miscellaneous Metals

The use of metals throughout Baker House is relatively limited. The only original exterior metal feature of note is the aluminum valence at the top of the southeast upper level window wall of the dining pavilion (Figs. 90,91). This is a fine though modest example of an element displaying Aalto's concern with the filtering of light and softening of transitions through the use of filigreed materials, and it remains in good condition. The most prominent architectural metal features are the painted steel security grates located at the basement level of the south side windows, which are not original, and will be recommended for replacement (Fig. 92). The gate to the bicycle shed is of the same design and vintage as these grills. The interior security screens on the west wing first floor rooms are of even more recent vintage. They are in good condition, and will not need to be replaced as part of this scope of work.

The painted steel handrail supports at the dining pavilion are original to the building but of questionable design origin, as was recounted in the history of the design evolution of the building (Fig. 93). The present assembly does not meet code in regard to the height of the top rail or the opening spacing at the guard rails. They are in fair condition; some of the intermediate steel rods are missing and the members are slightly bent, but the assembly could be easily restored.

The aluminum handrails in the stairs are in worn but serviceable condition. In the main fire stairs (1 and 4) at the ends of the building, the center rails will have to be modified to meet present code requirements for guard rail height and spacing.

See Code and ADA report, in the Appendix, for further commentary and recommendations

RECOMMENDATIONS:

5.2A There is little beyond routine maintenance and repairs that will be required on the metals, short of the additional materials that will have to be added at the stairs to meet current code requirements. The exterior steel security grates and bicycle shed gate should be replaced with units more in harmony with Aalto's design as part of the optimum restoration work.

5.2B Two guard rails will have to be provided on the inside portions of stairs 1 and 4 to meet code height and spacing requirements. It may also be necessary to provide security gates between the lower level and the main level to help direct patrons to the outside during an emergency, by impeding their passage to the lower level.

Fig. 92 *Basement window grates*

Fig. 93 *Stair/rail at interior of Pavilion*

Fig. 94 *Fire stair #1 railing*

Fig. 95 *Wood railing at North side of Pavilion*

Fig. 96 *Wood convector covers at west side lounges*

Fig. 97 *Railing at west side of entry*

Division 6: Wood and Plastics

6.1 Wood and Plastics

There are no exterior wood elements (aside from the remaining wood windows and doors, which are covered under Division 8) that remain from the original building, with the exception of the wood railing on the East side of the Moon Garden Pavilion (Fig. 95). This element, which is designed in the same motif as the radiator covers in the lounges (Fig. 96), originally had a clear finish, which has been painted over to match the bronze anodized windows. The roof deck and garden screen walls and gate at the Master's Suite entrance have all been added within the last 15-20 years. They are both in weathered but sound condition. Further discussion of the roof deck is to be found under Division 7 of this section of the report, and in the design recommendations.

The interior has lost many of the original Aalto designed millwork features such as the screens for the upper level lounges, the double room divider panels, the handrails at the entry lobby stair and the trelliswork at the fan columns in the upper level of the dining room. The status and condition of the bedroom furniture will not be dealt with in this report except to state that an excellent program of restoration is in progress at present for the Aalto designed beds, wardrobes, shelving units, desks and file drawers.

The major remaining millwork elements are the handrails at the west side of the entry lobby and the Moon Garden Room (Figs. 97, 98), the counters at the entry lobby and snack bar, the paneling and booths along the corridors and the enclosure/benches over the heating elements in the lounges (Fig. 99). These are all of birch except for the handrails which are (according to the working drawings) of Brazilian pine. All of these have a high gloss clear natural finish. The condition of these elements varies from excellent, at the main lobby west rail, to poor, at the enclosures around the radiation in the lounges, with the majority of the millwork being in fair but restorable condition.

There is also some painted millwork, although this is primarily concentrated in the soffits, window surrounds and transom panels in the main lounge and the upper level of the dining room. Photos taken at the time of the building's opening in 1949 clearly show that the main lounge was originally painted monochromatically in white or a light color. The slatted soffit pipe covers at the main lounge are an original feature, although their execution is of substandard quality (Figs. 102, 103).

The Tutors' apartments have been created from two pre-existing double rooms, and no longer retain the character of the original spaces. Finally, the upper level of the Master's Suite contains some paneling and cabinetry, all apparently in natural birch, that was either original or has been carefully crafted to the aesthetic of the original work (Fig. 100). There is also original painted pine trim and cabinetry of a later date that was retrofit into the suite when it was expanded in the early 1950's.

See The Conservators Report, in the Appendix, for discussion of the original millwork finishes.

Fig. 98 *Detail of Pavilion stair rail*

Fig. 99 *Bench/convector cover at 1st floor lounge*

Fig. 100 *Closet doors in Master's suite*

Fig. 101 *Newer oak rail at main lobby stair*

Fig. 102 *Slatted soffits at main lounge*

Fig. 101 *Slatted soffits at main lounge*

Fig. 108 *Roof penetrations Level"A"*

Fig. 109 *Tiered deck Level"A"*

Fig. 110 left *Decking supports Level"A"*

Fig. 111 above *Decking supports Level"A"*

7.2 Building Insulation

The walls at Baker House are typically of cavity wall construction with 1/2" of insulation at convector unit locations. The typical wall section has a 1" cavity and 2" interior facing tile, and an exterior brick veneer of 1 to 3 wythes. (4-12 inches). The R value is not up to present building standards, and could only be improved by adding insulation and a new interior finish at the heating unit wall recess locations along the perimeter of the building. This option, which will involve the addition of 2" of rigid insulation and the installation of new facing tiles to match the existing wall finish, as well as improved heating and controls, will be pursued for pricing. Roof insulation, which is also minimal, can be more easily improved through the introduction of tapered roofing insulation, which will be discussed below in this section of the report.

RECOMMENDATIONS:

Provide wall insulation in a new cavity behind room radiators, as described in the Program section and the Heating sections of the Conditions Surveys. Provide roofing insulation as described in section 7.3 below.

7.3 Roofing

The Baker House roofing systems were surveyed in detail and generally found to require replacement. With the exception of the penthouse roofs and the northwest terrace plaza deck, most of the roofs are at or near the end of their useful lives. A detailed series of observations and recommendation follows below.

7.3A Roof Level "A": (12,955 sq. ft.)

The roofing system installed is an integrated roofing membrane assembly, (IRMA), system comprised of stone ballast , 1 1/2" Styrofoam insulation board, 4 plies roofing felt w/ interply moppings of coal tar pitch and a base sheet "spot" mopped to light weight concrete fill. The substrate, as shown on the original drawings, is a 5 1/2" structural concrete slab.

OBSERVATIONS:

A 4'-0" high lead coated copper clad parapet wall surrounds the majority of this roof level. Areas where the lead coating has worn have a patina and can be seen at locations on the parapet metal cap. Many holes can be seen in the cladding throughout the roof level (Figs. 104-105).

Base flashing of the parapet and vertical penetrations have had an liquid aluminum coating applied to their surfaces. Many areas of the base flashing have been patched with asphaltic mastic patching material (Fig. 106).

Drainage of this roof level, including run-off of Roof Levels A1, A2, B, C, D & E, consist of seven 4" roof drain inserts. One drain was observed to be blocked by vegetation at the time of this survey preventing timely evacuation of water (Fig. 107).

Penetrations and roof top equipment are predominately located at the west side of this roof level (Fig. 108).

A painted wood tiered deck has been installed between Roof Levels "C"&"D" (Fig. 109). Support posts rest directly on concrete pavers (Fig. 110).

Due to the stone ballast and insulation board being installed over the built-up roofing it is difficult to ascertain the condition of the roofing system installed on the lightweight concrete. A test cut of the roofing system, *(Test Cut # 1)*, did not reveal any sign of wet lightweight concrete.

RECOMMENDATIONS:

Removal and replacement of the entire roofing system, including tiered deck, at this roof level is recommended at this time.

Numerous areas of patching at the base flashings, age of the roofing system and interior renovations warrant a new roofing system.

The recommended roofing system for this particular roof level would consist of :

1. 2.5" polyisocyanurate flat insulation (25psi.), loose laid over the existing lightweight concrete tapered to drains. Wet and/or damaged L.W. conc. to be removed and replaced in-kind.

2. .045 EPDM loose laid ballasted roofing system.

3. Protection mat.

4. Stone ballast.

5. New low profile drain units.

6. New concrete deck paver between Roof Levels "C" & "D".

7. Install walkway system to accessible penthouse doorways while protecting ballasted membrane from unauthorized traffic.

8. Replacement of parapet cap w/ new L.C.C. cap.

9. Restore L.C.C. parapet wall cladding.

9a. Pressure treated plywood at parapet w/ fully adhered EPDM installation.

7.3A.1 Roof Level "A1": (260 sq. ft.)

Roof Level "A1" is a built-up roofing system made up of pea stone gravel, 7 plies of roofing felt w/ interply moppings of coal tar pitch and a base sheet mopped to a concrete plank substrate (Fig. 111), *(Test Cut # 2)*.

OBSERVATIONS:

Ballast pavers have been installed at the roof Level "A" perimeter to restrict the gravel from washing away. Pavers have absorbed water and cracked through freeze thaw cycling (Fig. 112).

Fig. 112 above *Ballast paver deterioration asphaltic mastic patching Level "A1"*

Fig. 113 right *Edge condition Level "A2"*

Metal work at Roof Level "A" has been streaked by coal tar pitch leaching onto its surfaces.

RECOMMENDATIONS:

Removal and replacement of the entire roofing system at this roof level is recommended at this time.

The recommended roofing system for this particular roof level would consist of :

1. 2.5" polyisocyanurate flat insulation (25psi.), loose laid over the existing concrete plank.

2. .045 EPDM loose laid ballasted roofing system.

3. Protection mat.

4. Roof pavers.

5. L.C.C. scupper assembly.

6. Replacement of parapet cap w/ new L.C.C. cap.

7.3A.2 **Roof Level "A2"**; (420 sq. ft.)

Roof Level "A2" has a similar make-up to Roof Level "A1" with the exception that the original drawings show light weight concrete sloping to the edge of the penthouse for positive water flow to drain (Fig. 113).

OBSERVATIONS:

Similar observations of the roofing system were made to Roof Level "A1".

RECOMMENDATIONS:

This roof should be replaced with the following system:

1. 2.5" polyisocyanurate flat insulation (25psi.), loose laid over the existing concrete plank. Wet and/or damaged L.W. conc. to be removed and replaced in-kind.
2. .045 EPDM loose laid ballasted roofing system.
3. Protection mat.
4. Roof pavers.
5. L.C.C. scupper assembly.
6. Replacement of parapet cap w/ new L.C.C. cap.

7.3B **Roof Level "B"**; (212 sq. ft.)
7.3C **Roof Level "C"**; (887 sq. ft.)
7.3D **Roof Level "D"**; (772 sq. ft.)
7.3E **Roof Level "E"**; (647 sq. ft.)

Roof Levels "B", "C", "D"& "E" have recently been replaced within the past five years with a fully adhered EPDM membrane system.

OBSERVATIONS:

Outlets in gutter, servicing the downspouts, are too high and ponding water has been observed (Fig. 114). Downspouts have been vandalized (Fig. 115).
Membrane lap seams in gutter have failed.

RECOMMENDATIONS:

1. Clean existing and Strip in seams w/ 6" uncured Epdm membrane.
2. Rework downspout assembly at gutter to evacuate standing water.

Fig. 114 above *Ponding water in gutter Level "D"*

Fig. 115 right *Vandalized downspouts Level "D"*

Fig. 116 *Open base flashing Level "F"*

Fig. 117 *Water behind base flashing Level "F"*

Fig. 118 *Organic vegetation Level "F"*

Fig. 119 *Failed pitch pocket Level "F"*

7.3F **Roof Level "F"; (2,100 sq. ft.)**

The roofing system installed on Roof Level "F" is comprised of pea gravel , 4 plies roofing felt w/ interply moppings of coal tar pitch, 2 1/4" Fesco board and a base sheet mopped to the substrate. The substrate, as shown on the original drawings, is a 5 1/2" tapered structural concrete slab.

OBSERVATIONS:

Base flashing at west side is open to the weather allowing water to enter the roofing system (Figs. 116, 117).

Organic vegetation has developed on the roofing system (Fig.118).

The pitch pocket located near the drain area has failed (Fig. 119).

Drainage of the roof surface is currently accomplished by the use of one 4" drain.

A test cut, *(Test Cut # 3)*, revealed saturated Fesco board.

RECOMMENDATIONS:

Water infiltration through open flashings has caused the failure of the roofing system; we therefore recommend its removal and replacement at this time.

The recommended roofing system for this particular roof level would consist of :

1. 2.5" polyisocyanurate flat insulation (25psi.), loose laid over the existing lightweight concrete tapered to drains. Wet and/or damaged L.W. conc. to be removed and replaced in-kind.

2. .045 EPDM loose laid ballasted roofing system.

3. Protection mat.

4. Stone ballast.

5. New low profile drain units.

7.3G **Roof Level "G"; (264 sq. ft.)**

Roof Level "G" has a built-up roofing system installed. The substrate, as shown on the original drawings, is a 5 1/2" structural concrete slab.

Fig. 120 *Level "G" (left), Roof level "H"*

Fig. 121 *Level "I"*

OBSERVATIONS:

Organic vegetation has developed on the roofing system.

Drainage of both Roof Levels "G" & "H" is currently accomplished by the use of one 4" drain.

RECOMMENDATIONS:

1. Remove B.U.R. system and install flat seam L.C.C. roofing system.

2. Install new low profile drain unit.

7.3H **Roof Level "H";** (1.508 sq. ft.)

Roof Level "H" at the dining pavilion has a built-up roofing system installed at the perimeter of the roof and lead coated flat seam copper roofing installed at the base of the central skylights (Fig. 120). The substrate, as shown on the original drawings, is a 8" structural concrete slab. The pavilion roof is dotted with a grid of 24 circular skylights of the type used by Aalto throughout his career, from the Turun Sanomat Building and Viipuri Library in the 1920s, to the end of his career. They are sheathed on the outside in lead coated copper, and inside in painted sheetmetal. The glass is an obscure slanted circular light, over which is mounted an Aalto designed light fixture. They have had a history of leaks throughout the life of the building.

OBSERVATIONS:

Organic vegetation has developed on the roofing system.

Drainage of this roof level is achieved by four through wall scuppers depositing water onto Roof Level "G".

L.C.C. flat seam roofing appears to be in good condition.

RECOMMENDATIONS:

Refurbish/replace the existing roof as follows:

1. Re-solder all L.C.C. seams at central skylights.

2.Consider the replacement of the present glass with obscure wire glass.

3.Remove B.U.R. system and install flat seam L.C.C. at remaining areas to match area of skylight.

4. Refurbish all light fixtures and their connections to skylight curbs.

7.3I Roof Level "I": (382 sq. ft.)

Roof Level "I" has a built-up roofing system installed (Fig. 121). The substrate, as shown on the original drawings, is a 5" structural concrete slab.

OBSERVATIONS:

Organic vegetation has developed on the roofing system.

Drainage of this roof level is achieved by one 3" drain.

RECOMMENDATIONS:

Refurbish/replace the existing roof as follows:

1. Remove existing B.U.R. system.

2. 2.5" polyisocyanurate flat insulation (25psi.), loose laid over the existing lightweight concrete tapered to drain. Wet and/or damaged L.W. conc. to be removed and replaced in-kind.

3. .045 loose laid ballasted roofing system.

4. Protection mat.

5. Stone ballast.

6. New low profile drain unit.

7.4 Sealants

A variety of sealants are found throughout the building. Many of the sealants around the windows, especially at the stucco wall, exhibit cohesion as well as adhesion failures, and are admitting water into the substrate.

RECOMMENDATIONS:

As part of any comprehensive restoration, all of the sealant joints at the building exterior should be redone, and all dissimilar material interesections not presently sealed that may potentially admit water into the building should be sealed. The sealant generally should be an exterior grade two part sealant such as Tremco Dymeric.

Division 8: Doors and Windows

8.1 Metal Doors & Hardware

Most of the metal doors at Baker House are at service entrances and into the fire stairs. The interior corridor and stair doors are Kalamein doors, which were designed as fire doors, but do not carry a current UL label. If the City of Cambridge is not willing to recognize these as legal fire doors, they will have to be replaced. The doors are in serviceable but worn condition, and will require new hardware to meet ADA compliance.

When Baker House first opened, a bank of swinging glazed doors was present between the Main Lounge and Lounge #1. The door schedule on the construction documents indicates that these were in fact metal doors, although it had been our belief that they were done in birch.

See The Conservators Report, in the Appendix, for discussion of finishes.

RECOMMENDATIONS:

8.1A Given the difficulties inherent in creating aesthetically acceptable patches and repairs in sheet metal, we may want to consider their replacement as part of any comprehensive restoration. We also recommend that MIT consider restoring the swinging doors between the Main Lounge and Lounge #1. This will provide acoustic separation between these areas, which will be important if Lounge #1 is to regain its place as part of the dining hall.

8.2 Wood Doors & Hardware

The Baker House exterior wood doors are of two primary types. One is the staved oak doors found at egress points around the building, such as the lower level of the Moon Garden Pavilion, in the Master's Suite and the fire stairs (Fig. 122). The second are the birch veneered glazed doors found at the upper level of the moon garden room and the main building entry. The entry doors are the original units, one of which has recently been restored by the company presently engaged in the furniture restoration project. We recommend that the other three doors be restored to the same standard.

Fig. 122 *Staved oak door at Pavilion lower level*

Fig. 123 *New flush door at stair #4*

Fig. 124 *Typical south facade windows (and damaged roof coping)*

Fig. 125 *North facade detail w/ cascading single-glazed windows & insulated windows below*

Fig. 126 *Detail of westwall aluminum window*

Fig. 117 *Aluminum windows in penthouse*

We note that in the course of the survey the staved egress doors at the bottom of the east and west fire stairs were removed and replaced with new, solid core flush doors (Fig. 123). Although it is certainly possible that these doors were beyond the point of restoration, it must be stressed that any work performed henceforth on Baker House should be done with the intent of matching the original fabric to the greatest possible extent. This is a relatively minor issue, but it would have been worthwhile nonetheless making the effort to design replacement doors that replicate the original units in kind.

The balance of the interior doors throughout the building are natural finish birch veneer solid core doors. Most of the doors are original and have chipped or gouged veneers, which will make their repair difficult and expensive. These doors will also require hardware replacement to meet ADA regulations. There are several sets of corridor doors that have been recently replaced, although the hardware and finish are not compatible with the original aesthetic of the building.

<u>RECOMMENDATIONS:</u>

8.2A To summarize what we have outlined above, all of the building doors should be replaced, with the exception of the staved exterior and main entry doors, and those doors that have recently been replaced under the program of ongoing maintenance. An alternate can be carried for the restoration of these elements for pricing. The newly replaced corridor swinging doors should be refinished to match the warm glow of the original birch doors, and should have their hinges replaced with units that are more compatible in size and finish with the original doors.

8.3 Aluminum Windows

The original Baker House wood windows were replaced in two campaigns in the early-mid 1970s with bronze anodized aluminum units. The earlier replacement windows, which include all of the student rooms and the north stairway, are single-glazed. The balance of the north wall windows, stairs 1 and 4 and the lower level of the dining pavilion, are fitted with 1" insulating glass. These are generally in better condition than the single glazed units, except for the dining room windows. They are primarily fixed or of double-hung operation, with some projected windows at the lounges and the egress stairs (Figs. 124-125). They are outfitted with screens in most of the student rooms. These windows, especially the earlier single-glazed units, which are not of the best quality, have reached the end of their useful life. Many of the units leak, especially along the river elevation and in the main north stair, as a result of the failure of weatherstripping and glazing seals (Fig. 126).

The design development and early construction document phases of Baker House (1946-late 1947), show that there was intent at this stage to pursue an option for utilizing aluminum windows throughout the building. There is some question as to whether or not this was Aalto's final design intent (see the discussion of this issue in the design section). The details that were developed for these windows are interesting in that they document an industry in relative infancy, with extruded sections that are essentially indistinguishable from contemporary (and long established) steel window sections. A few of these windows were finally executed, and they survive in the roof-top penthouses (Fig. 127). We also believe that they may have been used in stairs 1 and 4, as the drawings detailing these units were never updated, as were the balance of the window drawings, to show the change from aluminum to wood. The remaining units are in fair condition, but should be restored, as they are rare artifacts of this nascent era of the aluminum window industry.

RECOMMENDATIONS:

8.3A The restoration of the original appearance of the windows will be one of the critical elements in recapturing Aalto's original design intent for Baker House. Given this premise and that most of the existing windows are no longer serviceable, and lack performance glazing of any kind, we recommend that these units be replaced with modern wood or aluminum units, finished as closely as can be determined to Aalto's original colors and finishes.

As stated in the Executive Summary, our base scope of work recommendation is to specify an aluminum window with insulated glass. However, given that A.) there appears to be some ambiguity regarding Aalto's final intent, B.) that the original windows were wood, and C.) that arguments can be made in favor of the wood window; we suggest that mock-ups be constructed of each type.

Various options should be explored for enhancing the performance of the glazing. The simplest solution is to recreate the original window sections with a modification in the mullion and muntin section sufficient to accept an insulated glazing unit (IGU). This modification would have less aesthetic impact in Baker House than it would in many restorations, in that there are not multiple lights of glazing within a single sash. The drawback to this option is that the glazing seals will deteriorate in 10-20 years, and the glass will have to be replaced, which will be a significant maintenance cost. Another option would be to build single-glazed units with a sash mounted integral interior glazing panel. This solution would allow the exact replication of the original mullion/muntin sections, in that they would be only supporting the weight of a single light of glass. In this scenario, the cavity between the glass lights would be ventilated and weeped to preclude condensation and to allow any potential moisture that may occur in the cavity to be released. This is a common means of achieving enhanced energy performance in Finland; Aalto's own studio in Munkiniemi utilizes triple lights of glass on the fixed windows in the drafting rooms, and there is no evidence that condensation has had any adverse effect upon these units (they have been in place for over thirty years).

Fig. 128 *Wood windows at Pavilion upper level*

Fig. 129 *Detail of wood windows showing checked sills and deteriorated finish.*

Fig. 130 *Mullion detail at wood windows*

Mock-ups of each variation in the window and glazing types should be placed on the building prior to the completion of design documents. Wood windows should ideally be constructed of Honduran mahogany (Swietenia Macrofilia) for weather resistance and longevity. This would be ideal for a painted window, although it may prove difficult if we determine that the original units were of natural clear pine and that it would be desirable to match this finish. New trim on the interior of the windows should be of pine or birch, depending upon the final determination that is made concerning the interior room finishes.

Aluminum windows, if chosen, should be thermally broken and either executed with a clear anodized finish, or a very light gray baked enamel (Kynar, Duranar) paint finish. The baked enamel finish is not permanent; it is a 15-20 year solution, which is not appreciably different from the 10-plus years that a Duracron type factory finish will give on a wood window. A clear anodized finish will also require periodic clear-coating to prevent the metal from becoming pitted and chalked over time.

We recognize that there are maintenance impacts to recommending wood windows. These will need to be further explored during the design phase, but there is also no reason why a well-built wood window, with proper maintenance, cannot out last an aluminum unit. At this point in history, no one really can predict how well a modern aluminum window will perform in 50-100 years, whereas quailty wood windows will easily last upwards of 100 years.

Fig. 131 *Corner window condition at manager's office*

Fig. 132 *Corner window at loading dock*

Although we recognize that there are significant heat gain problems on the south side of the building, we do not recommend that these be addressed through the use of coatings on the glass. This is due to the fact that any existing coating, including all of the available varieties of low "E" coating, will alter the appearance and reflectivity of the glass to an unacceptable degree. One possible acceptable alternative would be to treat the interior light of glazing (in a non-sealed unit), if this can be accomplished in such a way that it does not affect the exterior appearance of the window. Other means of mitigating the heat gain problem (such as the wall furring scenario discussed above) are being pursued as conceptual design options, and will be included in the initial cost estimates.

8.4 Wood Windows

The major surviving wood windows are the magnificent fixed units at the upper level of the moon garden room. They are of Brazilian pine, with a unique oval mullion section, and originally had a clear finish inside and out; the outside has subsequently been painted to match the bronze anodized aluminum units (Fig. 128). They are in fair condition, with extensive damage at the base of the mullions and on the interior sills from accumulated condensation. The exterior sills and glazing stops are also severely checked and could not be repaired to accept a clear finish (Figs. 129, 130).

The other wood windows are at the loading dock; these probably retain the approximate section profiles found on the lost original units. The windows at the Manager's Office were originally of a similar detail, as can be seen at the remaining exposed wood corner mullions (Figs. 131, 132).

RECOMMENDATIONS:

The windows on the upper level of the Moon Garden Pavilion should be restored to the greatest extent possible. This will mean the replacement of the exterior sills and glazing stops, and the careful reconstruction and possible dutchman* replacement of some of the interior mullion pieces. A solution will have to be devised for preventing drafts at these windows in cold weather. This can be done either by changing the detail of the window to incorporate a storm panel, or by introducing a source of heat above or below the glass. The former would obviously be preferable from an energy use standpoint, but may prove difficult to accomplish in an aesthetically acceptable fashion. The latter would most likely involve the introduction of heating vents over the windows at the perimeter of the ceiling. Given the strong possibility that air conditioning will be introduced into this area, there will be ductwork introduced into the ceiling, and adding heat would be a simple and relatively inexpensive upgrade. Both of these options will be pursued for pricing. The loading dock windows should be restored, and the lost center window rebuilt when the door is moved to the west edge of the dock (see Sketch SK 13C).

* *A dutchman is the cutting out of a deteriorated piece of material and infilling the distressed area with new material to match.*

Division 9: Finishes

9.1 Stucco

The cascading north stair is clad in a system of light gauge metal framing sheathed in celotex board, over which a grid of furring channels is fastened. The channels are then covered with "Clinton wire cloth" onto which is applied a three coat stucco system. This material is structurally in fairly sound condition, but the topcoat has worn away in many places, and the overall appearance of the walls are mottled and uneven. Spider cracking has appeared in numerous places along the wall, and there is evidence of some stress in the material at the corners of many of the windows. Water damage inside the stair is very likely due to infiltration around the perimeter of the windows, or at the roof copings, rather than migration directly through the wall.

RECOMMENDATIONS:

9.1A There are issues surrounding the debate on the cladding of the north stair which go far beyond the question of the condition of the stucco. Aalto's intent from all anecdotal evidence was clearly to clad the stair in terracotta tile, and the change to stucco during construction was a source of debate and consternation among the project participants at the time (see the Design Evolution section). It should be stressed however here, as it is elsewhere, that stucco is a relatively ephemeral material, requiring constant maintenance, when compared to a well built tile wall; and that the switch to tile will improve the quality of the structure, and thereby become an aid to its long term preservation. The budget pricing carries three levels of upgrade for this wall: The first restores the existing stucco, the second involves the removal and the replacement of the full stucco system in kind, and the third replaces the stucco with terra-cotta tile.

See The Conservators Report for further description and analysis of the stucco

9.2 Interior Finishes

Excerpted and edited from Conservators Report

The interior finishes of Baker House are simple and repetitive. Aalto seems to have clearly chosen interior finishes that were durable and easy to maintain. For the floors, he chose a 9" square black and gray asphalt tile. This tile was used for the corridors, dining room, and student room floors. It was also used for the treads in the north stairs. In the main lounge, the floor is covered with bluestone and bluestone is used for the dining room stair treads and the treads of the first floor stairs that lead to the north elevation stairs (*fig. A24 - Conservators Report*).

The walls of Baker House are covered with a red clay structural facing tile. The tiles measure 3 -3/4" x 11-3/4" . The surface of the tile is 3/4" thick and originally had a matte finish. The tiles are laid in a dark gray mortar and have a 3/8" wide joint that is flush tooled. Many of the wall tiles are presently covered with a glossy anti-graffiti coating (*fig. A26 - Conservators Report*).

The tile sections of the walls are set into the concrete clad framing members of the building. The concrete surfaces are painted. In the corridors there are also some walls that are constructed of vertical birch paneling. These walls enclose the Janitor's and utility closets. This same paneling is also used for the phone booths (*fig. A25 - Conservators Report*).

The ceilings in Baker House are covered with metal lath and plaster. The plaster has a textured surface and is painted white.

There are several decorative interior trim details in the public spaces that are noteworthy. A section of the west wall of the main lounge is clad with limestone, like the exterior walls of the dining room. This wall bears an inscription to Dean Baker. The fireplace in the main lounge is also a unique component of the Aalto design. It is a raised, open fireplace, with a bluestone hearth and firebox (*fig. A27 - Conservators Report*). Also of interest were the wooden trellises that originally surrounded the metal columns in Lounge No. 1. (the mezzanine lounge above the dining room.)

Fig. 133 above *9" square black and gray asphalt tile in student rooms*
Fig. 134 right *12" square black and gray replacement tile on treads in north stair*

9.3 Plaster

Limited sections of the walls and the ceilings in Baker House are plastered. The plaster is installed over metal lath. It is a relatively hard plaster, with a textured surface. The plaster ceilings have always been painted white.

The condition of the plaster ceilings is good. No areas of cracking or detachment were observed that would be indicative serious plaster deterioration. There are some holes in the plaster from which locations light fixtures and other items have been mounted, that will require minor patching. Some deterioration of wall plaster can be found in the north stair due to water penetration.

RECOMMENDATIONS

9.3A The ceiling plaster should be patched as necessary to fill areas of loss. The patches should match the original plaster in color and surface texture. Once repaired, the ceilings should be painted. The areas of the north wall deteriorated plaster should be cut out and patched.

9.4 Clay Facing Tile

This is discussed in Division 4: Masonry, and in more detail in the Conservators Report.

RECOMMENDATIONS

9.4A Broken Tile should be replaced with custom fabricated units to match the existing tiles. The walls should be thoroughly cleaned of all dirt, tape residue and markings, and the existing anti-graffiti coating.

Fig. 135 right *Main lounge fireplace wall/ bluestone floor.*
Fig. 136 above *Junction of red clay structural facingtile & waterstruck brick at walls, asphalt tile and bluestone at floor*

9.5 Ceramic Tile

The shower areas and some of the bathroom walls in Baker House are clad in a white 4"x4" ceramic tile. Aside from a few areas where tile is missing and some failed grout joints the tile is in good condition.

<u>RECOMMENDATIONS</u>

9.5A Wherever possible, the existing shower areas should be retained and expanded. New valves and heads will be installed, which will include opening the wall to some degree. If tile could be found to match the existing, we should try to patch and restore the ceramic tile surrounds. If no match can be found, the tile will have to be replaced.

Flooring

9.6 Asphalt Tile

Most of the original flooring in Baker House is made up of gray asphalt tiles, 9" square with a flecked black pattern (fig. 133). The exact composition of the tile has not been determined, however, it must be assumed at this time that the tile contains asbestos. The tiles are adhered directly to the concrete floor with a mastic that probably also contains asbestos. The asphalt tiles were originally used in the entire building except in the entry, main lounge and for some of the stair treads. In the dining room, the original tiles have been replaced with a yellow tile. In the dining room lounge and in the north stairs, they have been replaced with 12" square gray tiles with a light colored speckled pattern (fig.134).

The tile is in poor condition. After nearly fifty years, it has exhausted its life's expectancy. In many areas, it has worn through to the concrete floor *(fig. A 28 - Conservators Report)*. In the dormitory rooms, small sections of the tile have been replaced, frequently around the sinks. As noted above major areas of tile replacement include the dining room, the dining room lounge, and the north stairs. In the hallways carpeting has been installed. It is assumed that the carpeting was installed over the tile, but this has not been verified by lifting large areas of carpet.

<u>RECOMMENDATIONS</u>

9.6A Within the student rooms, we recommend retaining the existing tile to the greatest possible degree. The damaged asphalt tile in these areas should be replaced with solid vinyl tile that complements the original tiles. It may be possible to develop a pattern so that the tile at consistently damaged areas, such as the sink and heating riser locations, may be replaced; without having to replace (and consequently abate) the balance of the tile (see SK 14A, 14B). The tile in the dining rooms, stairwells, and lower level recreation areas should be entirely replaced with a new solid vinyl tile. Prior to undertaking this work, a sample of the tile should be analyzed to determine its original material composition. The replacement tiles should match the original (1949) tiles as closely as possible, in size, color, and pattern, and would be installed directly onto the concrete slab.

If it is ultimately decided that all of the original tile be removed, a sample area of the original tile should be preserved, although we recognize that the presence of asbestos in the tile that makes its handling very difficult and costly. Ideally, an entire dormitory room might be preserved by replacing worn tile with unworn tile from other rooms. The original tiles should be cleaned and stripped of their heavy build-up of wax.

9.7 Bluestone

The bluestone paving in the entry hall and main lounge is large slabs of stone set in mortar. The stone surface is smooth and is presently covered with multiple layers of wax. It is assumed that the bluestone is laid directly on the cement slab, like the floor tile, although this has not been verified by opening up a section of the floor.

The bluestone flooring is in very good condition. It is discolored by an accumulation of wax and dirt on its surface. This wax and dirt extends up the walls roughly 4".

<u>RECOMMENDATIONS</u>

9.7A The bluestone floor paving and the walls should be cleaned and stripped of their heavy build-up of floor wax.

9.8 Carpet

Carpet is present in some of the corridors, although none of the carpet is original to the building. It is generally in fair condition.

RECOMMENDATIONS

9.8A We recommend that the present carpet be removed and that all of the corridors and lounges in the residential areas be provided with new carpet, largely for acoustic reasons. The carpet should be a commercial grade loop pile, non- static material, in a color close to the gray of the asphalt tile.

Division 10: Specialties

10.1 Metal Toilet Partitions

The bathrooms still have the original metal toilet partitions, many of which have been painted a bright blue or yellow, which are not their original colors. They are worn, dented and in some cases showing corrosion near the floor.

RECOMMENDATIONS

10.1A The partitions should be replaced as part of the bathroom upgrade, even where fixtures are remaining in the same location. They should be painted white or a pale, neutral color, or be executed in stainless steel.

10.2 Toilet Accessories

Some of the original toilet accessories are still present in the bathrooms, but they are of no design significance to the building.

RECOMMENDATIONS

10.2A A full complement of new toilet accessories should be provided as part of any comprehensive building renovation.

Division 11: Equipment

11.1 Food Service Equipment

The present kitchen at Baker House is antiquated and no longer suited to the present needs of Baker Dining. Although it is not possible within the scope of this report, to set out a program recommendation for the kitchen and servery at this time, it is safe to assume that the space occupied by the present kitchen will be completely redone, with all new equipment. It is our hope and intent that the amount of space required for the new food service area will be less than the area presently dedicated to this function, and that the remaining space can be given over to other program functions for Baker House.

See also the Program section.

Division 14: Vertical Conveyances

14.1 Elevators

Baker House is equipped with two elevators; a main traction elevator for passenger and freight service to all levels at the center of the building, and a hydraulic service elevator at the west end of the building that travels from the loading dock to the basement. The main elevator is in fair condition, but the controls do not meet ADA standards, and it does not allow wheelchair access to the main entry level, or to the roof. The freight elevator is serviceable though small, and operates in a confined area which hampers its use.

RECOMMENDATIONS:

14.1A There are several different scenarios that can be envisioned for the upgrade of the main elevator. The simplest would be to retain the present cab and cable configuration, and to extend this unit to the roof. Under this scenario, a separate wheelchair lift would be required to transport the disabled from the entry lobby to the main level. If we are to opt for adding a second door opposite the present entrance in order to access the entry level (and eliminate the requirement for a wheelchair lift), it would be necessary to build a new cab, reconfigure the cabling and possibly enlarge the shaft in order to meet code with the new unit.

Present Code will allow the reuse of the existing cab with control modifications (including the extension to the roof), without having to provide access for a stretcher. If we opt for the two entrance cab, a new unit will have to be provided, which may necessitate the enlarging of the present shaft to accommodate a fully accessible elevator.

See the Code and ADA Report, in the Appendix, for further discussion of the elevator issue.

Division 15: Mechanical Systems

The following discussion of the conditions and recommendations for all the mechanical, electrical, plumbing fire protection systems is a summary of the material found in R.G. Vanderweil Engineering's report, in the Appendix.

15.1 Plumbing Systems

The plumbing systems in Baker House have reached the end of their useful life. The supply piping is in poor condition, although patchwork replacements have been made over time to correct failures, most noticeably in shower lines that back onto the West lounges. The sanitary waste system, with the exception of the basement ejector pumps, which were replaced about five years ago, is also in poor condition

The plumbing fixtures and fittings have also outlived their useful lives. Many of the showers do not work, showers, lavatories and the water closet do not meet present water use standards, and many of the units have to be changed to accommodate people with disabilities.

RECOMMENDATIONS

15.1A The sanitary plumbing systems should be replaced in their entirety. This will include new supply and waste piping and all new low-flow lavatories, drinking fountains, water closets and showers. New, steam fired hot water heaters should also be included, both for the kitchen and for domestic (general) use.

The roof/storm drainage system should be tested for leaks, but should be able to be retained if it is found to be in sound condition.

15.2 Fire Protection System

In 1960 partial sprinkler systems fed from the domestic water system were installed in the ground floor in both the East and West ends. The systems were limited and covered mainly the storage rooms in those areas.

In 1987 the building was completely sprinklered and fed from a new 6" service which enters the ground floor on the West end. This service is fed from the existing water main on Memorial Drive. There is no backflow protection on this service. The sprinkler piping feeder main was distributed at the ground floor level to several risers which then feed up the building to the sprinklers. This was done to minimize horizontal sprinkler piping on the floors due to the low and exposed ceiling height. Sprinkler piping on the floors is exposed and runs along the corridor and several rooms. The majority of the sprinkler piping is exposed with either sidewall, pendant or upright heads. None of the heads have good sprinkler guards. The kitchen hood over the range is protected by an ansul dry chemical system. The building presently does not have a fire pump, roof manifold, or standpipes. The existing sprinkler system is generally in good condition.

RECOMMENDATIONS

15.2A The existing sprinkler system can remain with one flow alarm for the whole building. This can be supplemented with an additional piping system to feed standpipes. Two standpipes will have to be located in the East and West stairways, and 2 along the corridor. Standpipes are required by code for this type of building.

The ground floor sprinkler system piping can be modified to isolate the sprinkler system to indicate East and West sections with flow alarms. An additional option would be to provide a flow alarm at the base of each sprinkler riser.

In accordance with current code a double check valve assembly should be installed on the main sprinkler service. Should the code change prior to construction this could be eliminated. Initial pressure calculations indicate that a fire pump will be required, though this will have to be confirmed.

Another option is to replace the system in its entirety, which would allow for a system that is more carefully integrated with the architecture of the building. The standpipes in the East and West stairs would feed the sprinkler system. Piping on the floors would run horizontally at the ceiling to feed the rooms. This option has more distribution piping on each floor, but it could be concealed in the soffit over the door to each room.

15.3 HVAC

EXISTING CONDITIONS

Steam Piping

Baker is presently served by an underground high pressure steam main which enters the building at the Northeast ground floor mechanical room. The steam main appears to run in a concrete trench outside the building. The high pressure steam in the building is reduced within the building by two pressure reducing valves.

Steam condensate is returned back to the underground mains by a steam condensate pump receiver located respectively in the Northeast mechanical room and fan room 1. The condensate pump sets seem to be relatively new and appear to be in good condition.

Perimeter spaces are heated by convectors and fin tube radiation. Many of the convector covers were found to be falling off and in poor condition.

It is apparent that the steam and condensate piping throughout the building has passed its useful life. Some sections of the steam piping are presently leaking and being replaced. The piping has started to develop pinhole leaks and joints are failing. Presently there are plans to remove sections of the piping for inspection to determine its condition. The steam piping throughout the building is covered with asbestos insulation. Protective PVC covers have been added over the pipe insulation to improve appearance and to provide further protection to the pipe insulation.

Building Ventilation:

The ground and first floor interior spaces are ventilated by five 100% outside air heating and ventilating units and one kitchen exhaust fan in the ground floor mechanical room. The upper corridors and main stair wells are served by 3 air handling units and 10 exhaust fans located in the roof fan rooms.

The lobby is presently being provided with approximately 5-8 air changes per hour, the dinning room with approximately 13 air changes, and lounge 2 is provided with approximately 10 air changes. It was noted that the outside air intake to the lounge, dining room and corridor is blanked off. The fans are sucking against a closed plenum and no return air openings could be seen connecting to the outdoor air plenum.

The air handling units located in the roof fan rooms all have recirculating duct work. The duct work serving the stairs along the north side of the building runs exposed up tight along the stair ceiling. This duct work shows signs of damage and is unsightly. The air handling units and fans in the roof fan rooms are operating and show signs of good maintenance. Casing panels were in place, little sign of corrosion on the outside of the equipment casings, piping insulation was intact and the machine rooms for the most part were clean with little or no debris. The air handling equipment is original to the building and although still running has exceeded its useful service life.

The ventilation units have steam heating coils and are individually controlled. Server units have duct mounted coils for zone heating. The exposed duct work appears to be in good condition. The majority of duct work is concealed in chases and above plaster ceilings. The outdoor louvers on the roof fan rooms were damaged.

Student Rooms

Student rooms are heated by steam-fed wall mounted 4 inch deep convectors. The convectors sit flush with the walls and are located under the windows. The pipe risers feeding the convectors run exposed throughout the building. Exposed piping to the convectors rise along the outside walls. The convectors were found to be plugged with dust but for the most part seemed to be in fair condition.

Kitchen & Laundry

The kitchen is equipped with a full hood exhaust system for the cooking area and the dish-wash area. The kitchen is exhausted by a 10,000 CFM fan located in the ground floor and duct up to the roof. Air make up to the hood exhaust system is from the surrounding spaces. Transfer screens along the kitchen wall and door openings transfer air to the kitchen. No direct make up air to the kitchen or hoods is provided.

The Laundry dryers are exhausted up through the building in what appears to be an abandoned incinerator chute. The exhaust louver at the roof shows signs of lint buildup. No indication of lint filters was observed. The system did not have a barometric damper or a relief damper.

Controls

Automatic controls consist of pneumatic thermostats and actuators to controls the air handling unit steam coil. Spence self contained pressure regulating valves regulate the building steam pressure. There appears to be approximately seven zone controls valves operated by an old weather master control system with outdoor thermostats. Self contained radiation control valves have been added to the convectors throughout the building to allow individual space temperature control, although most of these do not function. Many of the thermostat components are damaged.

RECOMMENDATIONS

15.3A Heating

Our preferred recommendation for the heating system is to replace the existing system with a new hot water system. A hot water system will last longer, require lower operating and maintenance costs, and would be easier to control than a steam system.

To install a hot water system, new pumps and supply and distribution have to be provided throughout the building. We recommend as a preferred option that fewer risers be run to the floors and that the distribution piping be run to the floors and in soffits along the student room window walls. These then would feed up through the floor to exposed runtal type thin-line radiators, set below the window in a new, insulated pocket.

The stair wells could also be provided with radiators and some of the existing exposed duct work removed. We recommend that the cascading duct in the North stair well be replaced with a new, heavier gauge unit.

15.3B Air Conditioning

As we have noted elsewhere, there is not a lot of pressure from the user groups to introduce air conditioning into Baker House. Certain areas of the building have significant heat gain issues, however, and the availability of the main common areas for group use in the summer dictates the desirability to air condition these areas. Several options are being explored for air conditioning Baker House. Briefly, they are as follows:

1. Air condition only the entry lobby, main lounge, dining/kitchen areas and master suite (East end of building) with a DX type air handling unit located on the lower level. The system would also require an exterior, pad mounted condensing unit. This is our preferred option.

2. The six tutors' apartments on the West side of the building receive significant West sun heat gain. It would be desirable to provide a DX cooling system for these apartments.

3. There are several options for providing air conditioning throughout all of Baker House.

Please refer to R.G. Vanderweil's report for further explanation of these options.

15.3C Ventilation

Mechanical ventilation for the building should be able to be largely upgraded in place. All bathrooms and shower rooms will be exhausted per current code. New air handling units should be included as part of this package, but much of the existing, concealed (or exposed service area) ductwork can be retained.

15.3D Controls

New Direct Digital Controls (DDC) should be provided in accordance with present MIT standards. These will include a central building system that ties back to MIT's central monitoring facility. Individual rooms will not be controlled by the central system, but will have individual thermostats on each radiator. DDC controls will be provided on all of the new air and water systems.

Division 16: Electrical Systems

See MEP Engineering Report, in the Appendix, for further discussion

16.1 Electrical Service and Distribution

Baker House is served from the MIT campus 2400V loop. All equipment is original except the two oil filled loop switches. The main building appears adequate in capacity.

The 120/208 volt distribution equipment is circuit breaker panelboard wired with PVC insulated wire. Equipment grounding is by conduit. Generally equipment is original, wiring is new.

RECOMMENDATIONS

16.1A The existing electric service was reviewed with MIT Physical Plant. Bill Wohlfarth indicated that the manufacturer of the oil switches indicated that they were unsafe to operate under load. We reviewed the 2400 volt service for upgrading to 13.8 kV. MIT prefers to retain the 2400 volt service and provide new equipment.

Renovation work includes new service, transformers, switchgear and panelboards. The existing equipment will not provide a further 25 years service as much is original and has already provided extended useful life.

Throughout the building provide larger capacity branch circuit panelboards with more circuits, reusing existing conduit systems.

Existing conduit systems for both feeders and branch circuits are large enough to accept larger feeders or more branch circuits. Some new feeder conduits may be required in basement and in electric closets.

16.2 Emergency Service and Distribution

A 35 kVA diesel fired emergency generator, automatic transfer switch and distribution were installed to present codes in 1984. The system appears to be in good condition. Emergency system provides life safety lighting and exit signs. The generator also serves sump pumps and heating circulating pumps. These loads are considered optional loads by the NEC.

RECOMMENDATIONS

16.2A The existing system is moderately loaded and has significant useful service life remaining. If no further demands are made for emergency power this system is adequate. Should smoke exhaust be required for the dining room, these fans could be added, however a larger load, such as the elevator could not be added.

Consider reusing existing non-code compliant exit signs, retrofitted with PL lights to light exit signage, and to provide code compliant exit signs on egress routes.

16.3 Branch Circuits and Lighting Fixtures

The electrical system was rewired with PVC insulated copper cable and grounding type receptacles installed generally in existing conduits. Existing conduits are installed in basement corridors, electric closets and in concrete slabs. A majority of lighting has been replaced with energy savings PL fluorescent fixtures. We note that several recessed, glass lensed fixtures with incandescent lamps are still in place. These may be the original general use light fixtures.

The luminaires over the dining area have been retrofit with with mercury vapor lamps within the Aalto designed fixtures, which are installed above the skylights.

Emergency exit lights are non code compliant due to small lettering size and black lettering. Many of the existing signs are original and of unique design. They will have to be replaced, but should be retained by the Institute for their value as artifacts.

Lighting fixtures are energy saving flourescent which provide only minimal light to space.

The receptacles in the student rooms are presently circuited as follows: every receptacle in on a 20 amp circuit. Each may serve more than one room, but each room is also served by several circuits. Typically several circuits are grouped in clusters of 4 or 5 rooms.

RECOMMENDATIONS

16.3A Generally existing branch circuits have 8-12 duplex receptacles on each circuit. Generally buildings have 4-6 receptacles on each circuit today. MIT has indicated that they would prefer that branch circuits have larger capacity than existing. Rewiring would provide greater capacity availability and stop nuisance tripping from overloaded circuits.

Generally the lighting fixtures installed do not light the building adequately. New fixtures with appropriate energy savings lamps should be installed to provide both historic compatibility and adequate lighting.

Student Room lighting is inadequate and should be replaced with energy saving fixtures of compatible historic design.

Consider reusing existing abandoned telephone conduits for telephone or data raceway.

We should consider using surface metal raceway with multiple outlets as extension from the existing conduit outlet box above each desk. These would be intergrated with the proposed wood tack strips.

We recommend rewiring the electrical system and replacing all devices in anticipation of higher branch circuit loads. Existing receptacles do have remaining life but will need replacing if extensive renovation is undertaken.

The code required single station smoke detector does not comply with MIT standards. A single station smoke detector alarming the room occupants and a central station shall be installed. This should be mounted close to the corridor wall to reduce unsightly wireway.

16.4 Fire Alarm System

The fire alarm system is not code compliant. The system is deficient in smoke alarms, ADA compliance and elevator recall.

RECOMMENDATIONS

16.4A The existing fire alarm system was reviewed with MIT Physical Plant. Howard Harrison indicated that the Baker House system did not conform to MIT standards, had minimal useful life and did not comply with current building codes.

Building fire alarm should be an analog addressable ADA compliant system and incorporating the following alarms and devices:

Manual pull stations
Smoke and duct detectors
Heat detectors
Sprinkler switches
Audible/visual alarms
Elevator recall
Reporting to central station

The main fire alarm control panel would be located in the electric room with an annunciator at the front desk. The fire alarm system will require added conduits in corridors to incorporate ADA alarms incorporated into each room, and wiring to student room single station smoke detectors.

Separate student room fire alarm system should be an addressable fire alarm system installed to monitor student room individual station smoke detectors only.

16.5 Other Systems

Data and telephone are routed through the building along corridors and to individual outlets utilizing surface raceways. Original telephone outlets have been abandoned.

Security is provided by individual card access on main entry doors and by battery detex alarms on secondary egress doors.

Video wiring for campus television is wired in surface metal raceway on corridor walls to an outlet above each room's entry door.

See MEP Engineering Report for further information

Supplement: Hazardous Materials

1.0 Lead Paint

A lead paint survey of Baker House was conducted by the MIT Department of Environmental Medical Service (EMS), Industrial Hygiene Division on August 5,6, and 29, 1996. The findings of their survey were published under a cover letter to Design and Construction Services on September 17, 1996.

The only areas found to contain lead paint in an amount that will require legal abatement are a percentage of the painted doors and door frames (roughly 24% of the door frames as defined in the report).

RECOMMENDATIONS:

1A Those frames identified as being over the legal limit will have to be abated in the course of the renovation, as all of the affected areas will be scheduled to be stripped and repainted. The affected doors can be replaced, which may eliminate the need for lead abatement on these units.

2.0 Asbestos

Asbestos is found as thermal insulation, primarily on the ground floor (which has been partially abated at this time), and is likely present in the original asphalt floor tile used throughout the building. The MIT EMS report/cost estimate of July 24, 1996 notes that the tile mastic may also contain asbestos, although this has not yet proved positive. They also carry a budget amount for the removal of asbestos in various miscellaneous materials such as caulking and lighting fixtures, and for the asbestos containing roofing and flashing.

RECOMMENDATIONS:

2A Any remaining pipe or other insulation containing asbestos will have to be abated or encapsulated in the course of the renovation, as will any sealants or other miscellaneous materials. The asphalt tile should be covered with carpet in the corridors and lounges on floors 1-6. At the lower level, especially in the new or reconfigured program areas, we recommend that the tile be abated and that new vinyl tile be installed. In the student rooms, we have discussed trying to retain a portion (60%-80%) of the tile by only removing damaged tile around wet areas, and substituting solid vinyl tile for the damaged units.