

Exhibit D

Existing Structural Condition Report by Keast & Hood Structural Engineers

**Structural and Masonry Evaluation Reports
1904, 1906, and 1920 Sansom Street
Philadelphia, PA 19103**

*Existing Conditions and
Recommendations for Repairs
October 12, 2015*

*Prepared For:
Southern Land Company*



Image by Keast & Hood Co.

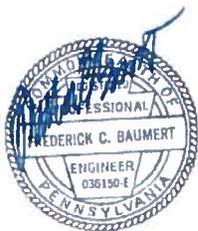


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FOREWORD

Keast & Hood was requested to perform structural condition assessments on three adjacent properties at 1904, 1906, and 1920 Sansom Street in Philadelphia. The properties had been vacant for several years before being obtained by the current owner. The following pages present our observations on each property, and recommendations to address the deterioration of the structural elements.

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1904 SANSOM - COFFEE SHOP

INTRODUCTION

Keast & Hood was requested to review the structural condition of 1904 Sansom Street in Philadelphia, PA. The first visit was made on July 22, 2015, in the company of other members of the project team to observe the general conditions of this building and others. A second visit was made on August 19 to focus on the condition of the masonry front. This report describes the observations and recommendations for the structure. The reader should understand that this report focuses primarily on structural issues and does not address the greater work that would be required for a full historic restoration.

In overview, the building was found to be in very poor condition. While it seems the roofing was replaced after several years of leaking, water continues to find entry through broken drain pipes and cracks in the masonry, causing masonry deterioration and advanced wood decay. Of greatest concern is the partial collapse of the first floor. Extensive repair work is required.

OBSERVATIONS

The Coffee Shop was built in the late 19th century. It was constructed with three stories plus a basement in the usual configuration with a rear yard. At some point in the 20th century the rear yard was infilled with a three story addition used for commercial and residential occupancies. It is believed that the stucco and terra cotta ornamentation were added to the front in 1923.

The current building in plan is a fat C-shape – the east side of the addition is pulled inward for the middle third of the north-south length to create a light-well, a common design in Philadelphia. The structural system of the original building consists of wood joists spanning east-west across the width of the property, bearing on the exterior brick walls. The roof rafters in the front section running north-south to brace the front wall and slope to the front and rear for drainage (center ridge oriented east-west). The basement walls are field-stone laid in mud mortar, with parging containing what is left of the bed material (most of the lime has washed out). The addition is of similar construction – wood joists spanning between brick bearing walls; its foundation walls were not seen, as described below.

The roof was not accessed during our visit to check the condition of the parapets. Evidence was seen in the third floor of past roof leaks that may have initiated decay of the roof framing. Areas of the third and second floor were buckled due to water exposure, so there may be hidden decay along the top of the floor joists. What could be seen of the exterior walls through the lightwell windows did not seem to indicate significant erosion or spalling of the bricks, although the mortar joints need 100% repointing. The interior face of brick of those walls was not seen due to finishes but it is likely that repairs and repointing will be necessary, considering the state of the exterior faces.

The first floor framing was found to be collapsing in the center section due to decay of the wood joists, thus the center and rear portions of that floor were not accessed. The basement was extremely

humid and large fungal blooms were found on the wood framing supporting the first floor in the front section. Multiple varieties of mold were observed on all surfaces. It is likely that the roof drain pipes have broken and the water is collecting in the basement. Due to the collapsing floor above, the remainder of the basement was not visited. It must be emphasized that the first floor should be considered dangerous and thus entry to the property should be barred. Caution should be exercised when using the stair to the basement as well, and respirators should be required for protection against the mold spores in the air.

The front façade is brick coated with a single coat of plaster stucco, adorned with polychromatic terra cotta at the roof cornice and second floor frieze, as well as around the first floor doorway and carriage way. Water staining on the upper part of the front wall indicates erosion of the mortar joints above and below the windows. The corner quoins are likely painted plaster over brick. Several relatively wide cracks were noted in the plaster which are initiating de-bonding from the brick behind it, ascertained by “sounding” the coating. The plaster stucco at the first floor level was damp despite the lack of rain, suggesting that moisture from the basement is rising up through the masonry. It will take significant time and effort to dry the lower masonry and address the mold.

RECOMMENDATIONS

To rehabilitate the building, the structural work will include:

- All of the first floor framing must be replaced. This work may require temporary bracing of the bearing walls to brace the weakened foundation walls against earth pressure.
- It is estimated that 20% of the remaining joists and rafters will be found to be decayed enough to require replacement, along with the associated flooring and subflooring.
- A “hands-on” review of the terra cotta cornice should be performed before the framing work is started, to ensure that any loose pieces will not be jarred off the building.
- It should be assumed that all roof sheathing, flashing and drainage should be replaced.
- The basement floor in the front section appeared to be a “mud slab” (thin concrete) that is probably not suitable for reuse and should be replaced. The rear section was not accessed.
- The basement floor may need to be lowered to provide proper clearances, which may require underpinning the foundation walls. This should only take place after the first floor framing (or equivalent bracing) is in place.
- All exterior walls should be re-pointed, which will require removal and replacement of the plaster stucco on the front elevation. However, the repointing and plaster work should not take place until after the masonry has been dried out so that moisture is not trapped in the core of the walls. The drying effort may take as much as eight months; a specialty contractor will be needed for this work.
- It is likely that at least 30% of the interior face of the exterior walls will also need re-pointing.
- If the front wall were to be retained and the balance of the structure replaced, the wall would need to be braced with a steel frame inside the building footprint, as there is not sufficient distance in front of the building to brace it without intruding into the street. Sidewalk

protection would nonetheless be necessary. The steel frame might consist of two vertical trusses, one each centered on the windows, with walers spanning horizontally to brace from corner to corner at two levels per floor, both inside and outside to clamp the wall.

Following are a few photographs of the conditions.



Front façade showing terra cotta elements.



Detail showing water migration and salt deposits through cracks.



Large fungal blooms on all wood elements
Indicate accelerating decay.
Photo by G. Thomas

1904 Sansom - Table of Conditions

*Building vacant since 1997 – no heat has contributed to the deterioration
Table indicates extent of repairs or replacement required*

<u>Exterior (note 3)</u>	pointing	brick failure	TC failure	windows (2)	cornice	cleaning
Sansom Façade (1)	100%	covered	10%	altered	TC coping 20%	note 1
East façade (Itwell)	50%	10%	N.A.		TC coping 10%	10%
West façade (rear)	50%	10%	N.A.		TC coping 10%	10%
South façade	100%	20%	N.A.	altered	TC coping 10%	50%
Parapets	100%					

<u>Interior</u>	plaster / GWB	flooring	columns	framing
basement	100%	100%	100%	N.A.
first floor	100%	100%	not seen	100%
second floor	100%	40%	not seen	10%
third floor	100%	50%	not seen	20%
roof framing and sheathing		30%		30%

Notes:

- 1 Replace all stucco after repointing brick; terra cotta dentils should be checked for corrosion of anchorages
- 2 All north and south window openings have been infilled with smaller windows
- 3 Masonry is damp to saturated and needs to be dried

1906 SANSOM – WARWICK APARTMENT BUILDING

INTRODUCTION

Keast & Hood was requested to review the condition of 1906 Sansom Street in Philadelphia, PA. The first visit was made on July 22, 2015, in the company of other members of the project team to observe the general condition of the building. A second visit was made on August 19 to probe the condition of the masonry. This report describes the observations and tests that were performed to arrive at these conclusions. The reader should understand that this report focuses primarily on structural issues and does not address the greater work that would be required for a full historic restoration.

In overview, the building was found to be in fair to poor condition. While it appears the roof was repaired, extensive prior leaks caused a great amount of damage to the building. There are critical concerns for the extent of damage to the cinder concrete floor slabs – as much as 30% of the total will need to be replaced. Continued leaks and retained moisture mean it will take several months to dry out the structure, especially the masonry. Most of the exterior masonry requires repairs, and it is recommended that the entire roof structure be replaced.

OBSERVATIONS

The Warwick apartment building is an early twentieth century structure constructed using the hybrid materials and construction methods of the early modern period. The building has seven stories plus a basement that is not fully below grade – as was common in those days, the first floor is raised almost three feet above the street level to allow natural light into the basement. The structural system consists of steel beams supporting cinder concrete floor slabs; the concrete turns down to rest on the bottom flange of the beams. The top of concrete is flush to the top of the beams, and there are perpendicular wood sleepers (joists) on top of the beams with cinder fill between them under the floor boards. Plaster ceilings below the beams completed the “fireproof” assembly as the bottom of the beam flanges would otherwise be exposed. The interior columns are built-up riveted steel enclosed in plaster except in the basement. However, there are no perimeter columns; the beams bear on steel plates built into the inner coursing of the brick walls. This is a reflection of the transition taking place in the construction industry, moving from masonry bearing structures to complete frames with exterior enclosure systems.

There is an extensive literature on cinder concrete which finds it a reasonable system though sometimes difficult to assess for load capacity. The cinders were an industrial by-product of coal fired furnaces and provided a light-weight aggregate that bonded well with the cement. Cinder concrete is prone to significant failure when exposed to water because the cinders can release acids from the

coal-firing that attack the metal mesh of the draped slab system.¹ These systems are quite stable when they are well-maintained and most critically when they are kept dry so that acids are not released and the steel is not attacked by acids. This has not been the case in the Warwick, which has suffered from roof leaks and high moisture levels, magnified by lack of heat and minimal ventilation. We return to this topic below.

The concrete was found to have virtually no reinforcement. There is a vertical steel bar every 18" along the length of the floor beams, set just below the top flange, and over these bars are draped 1/8" diameter steel wire approximately 12" on center. This minimal reinforcement means the concrete must arch between the beams in compression and has little ability to be interrupted by openings larger than several inches across.

With the perimeter steel buried in the masonry of the exterior walls in what is termed "barrier wall" construction, corrosion becomes a serious problem. Barrier walls have the liability of permitting moisture to penetrate the building skin – especially likely in the case of brick as in this building – which causes the steel to rust and expand. This further opens the wall to moisture and accelerates the deterioration of the steel and masonry.

The façade had been repointed by the previous owner using a modern cement mortar. There are significant amounts of spalling of the face of the brick. This was caused by the Portland cement mortar that is stronger than the brick, directing thermal expansion forces into the weaker face shell and fracturing it. With the lack of heat for many years, freeze-thaw cycles in the moisture-laden brick are now damaging that material, making large areas candidates for replacement (especially on the projecting bays, which have thinner walls and thus more damage) and creating a long-term maintenance problem. The exterior walls, as well as some of the interior partitions, are brick that is similar to and likely made by the regional Sayre & Fisher Company. This type of brick is no longer manufactured and is difficult to match.

There are two projecting bays on both the front and rear façades; these are supported by cantilevered framing at the floors. At the bottom of each of these is a large limestone "base" that is hung from the second floor framing. Apparently the original hangers had failed because there are now several large (and unsightly) bolts supporting each of the four limestone slabs; it may be desirable to replace these as part of the renovation. One of the four base sections had fractured into five pieces and is very poorly patched. The front face of the building has numerous carved limestone trim pieces. On the rear most of those limestone inlays had been removed and replaced with modern (non-matching) bricks. A substantial number of the remaining limestone sections have fractures, likely also caused by the introduction of too-hard mortar and lack of internal heating to drive out moisture.

The building plan is a T-shape, with the broadest part facing Sansom Street. No access to the roof was found, so we could not check the condition of the parapets; photos provided by the owner show that the coping stones are displaced and the parapet brickwork cracked in several locations. The roof

¹ For a recent discussion of draped slab mesh systems, see Kirk M. Stauffer and Kevin C. Poulin, "Repair of Draped Mesh Concrete Slabs," *Concrete Repair Bulletin* (January / February 2015) pp 12-17
http://www.icri.org/publications/2015/PDFs/janfeb15/CRBJanFeb15_Stauffer-Poulin.pdf

structure consists of wood joists and wood board sheathing. Because large areas of the ceiling had fallen on the top floor, we could see that there had been large areas of the roof framing which were replaced. Judging from the amount of water staining seen on the underside of the sheathing, it is likely a substantial portion of the original framing and sheathing is decaying. Therefore we recommend the entire roof structure be replaced. The parapets should be reconstructed as needed at the same time.

It appeared the roof had leaked substantially prior to the repairs, causing extensive damage to the ceilings, walls, and the flooring. There were concerns that the floor structure has suffered deterioration of the cinder concrete due to cycles of water saturation (the slag in the cinders expands), and that acids from the cinders are corroding the steel bars and beams within the concrete – corrosion damage is obvious on the seventh floor and to a lesser extent on the sixth floor. Therefore concrete cores were taken from the seventh floor in four locations (report attached). One was sent for petrographic analysis, and the other three tested for density and compressive strength. It was found that the long-term exposure to wetting cycles has indeed compromised the strength of the floor slab, as the range of values was reported to be from 2,640 psi (expected) to only 450 psi (alarmingly low). The lower figures indicate internal micro-fractures due to the slag expansion and freeze-thaw cycles; this may be further proved when the petrography results are received.

Extensive moisture damage was also observed in the basement. Advanced corrosion was noted at the bottom of the columns where they are embedded in the floor slab – the condition of the hidden portion is likely to be worse. These columns are made of steel angles and plates that were riveted together. Repairs would entail excavation of the area around the column, removal of rusted steel, and reinforcement with new steel plates or angles. The contractor doing the work should be prepared to install temporary shoring if the corrosion is found to be severe below the slab surface. The beams supporting the first floor also are corroded because there is no ceiling (or paint) protecting the bottom flanges and exposed areas of the webs. Additionally, moisture penetrating the concrete or masonry from multiple sources would be held against the steel, causing hidden corrosion. A few areas of the beams have been exposed, revealing that the corrosion has not advanced to the point of significant loss of cross-section, except where the bearing ends are buried in the exterior masonry.

RECOMMENDATIONS

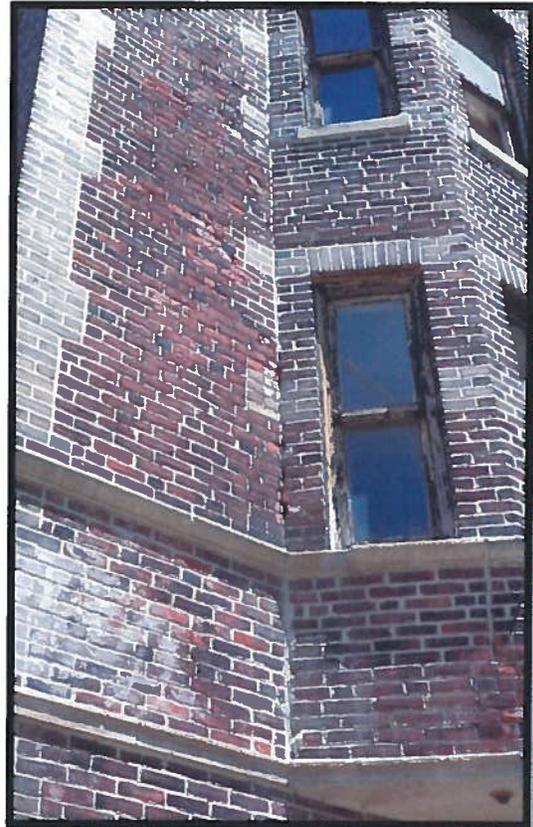
To be rehabilitate the building, there are several considerations that will affect the construction sequence and details.

- The roof structure should be replaced in its entirety, and portions of the parapets rebuilt.
- The limited testing program indicates that the concrete floor slab at the seventh floor has areas that are significantly deteriorated. A more thorough testing program may identify the limits of those areas, but for the moment it is recommended that the entire seventh floor and sixth floor be scheduled for replacement of the concrete; the second floor should be investigated due to water intruding from 1920 Sansom. With careful analysis, it is probable

that the beams can remain in place for reuse. The beams will need fire protection, of course, as will the exposed areas supporting the first floor.

- The corroded columns need to be reinforced at the base of each one.
- The corroded bearing plates where the beams pocket into the walls should be replaced.
- The exterior walls have been damaged by the too-hard mortar and should be fully repointed with an appropriate mortar mix. Spalled bricks should be replaced with suitable matched units.
- The moisture content of the masonry should be checked at several locations on each exterior wall and a drying program initiated as needed. There are signs of significant “wash” across the front of the Warwick from the adjacent building on the west. The drying process could take as long as eight months.
- Fractured limestone elements should be pinned and the cracks repaired, or the sections replaced.
- There are exterior steel fire balconies on the east and west walls (which are the only access to the upper floors from the fire stairs) that are in poor condition; they should be renovated before the rest of the building is opened to construction crews, even if they are eventually removed.
- The wood flooring will need to be removed and replaced in many places due to warping. It is likely the sleepers can remain and be reused.
- The exterior door on the west side opens onto a collapsed concrete platform over a basement areaway. The platform should be replaced as soon as possible.
- The perimeter foundation walls are a combination of stone and brick. The stone areas need deep pointing, and the brick areas need standard repointing.

Overall the building is considered to be in fair to poor condition, with a significant investment required that may entail replacement of up to 30% of the floor slabs; beam and column repairs; and exterior masonry work. It should be noted that the present owner would not have had any reasonable way of knowing about the concrete issues at the time of sale. A summary table of the conditions appears after the photographs.



Front and rear respectively. Note the missing limestone on the rear, extensive brick face spalls, and the fractures in the limestone. The fake jack arches are poorly executed as well.



The water migration through the masonry has washed out the calcium and caused the mortar to turn to powder due to freeze-thaw cycles.



Corrosion of an embedded beam in the rear of the basement. Notice all the calcium deposits, too



Typical corroded column base. What is hidden within the slab and below is likely to be worse.



Seventh floor exploration of the cinder concrete system. It was found that the concrete under major roof leaks was extremely weakened and brittle, and should be replaced.

1906 Sansom - Table of Conditions

*Building vacant since 1997 -- no heat has contributed to the deterioration
Table indicates extent of repairs or replacement required*

<u>Exterior (1)</u>	pointing	brick failure	stone repair	windows	cornice	cleaning	Fire escape
Sansom Façade (2)	100%	50%	25%	25%	1005%	100%	N.A.
West façade	100%	10%	N.A.	50%	100%	40%	100%
East Façade	100%	10%	N.A.	50%	100%	30%	100%
South façade (2,3)	100%	50%	sills 70%	50%	100%	100%	N.A.
Parapets	100%		10%				

<u>Interior (4)</u>	plaster	flooring	columns	slab
basement	N.A.	N.A.	reinf 100%	note 5
first floor	100%	70%		25%
second floor	100%	25%		10%
third floor	100%	10%		0%
fourth floor	100%	10%		0%
fifth floor	100%	25%		10%
sixth floor	100%	100%		30%
seventh floor	100%	100%		75%
roof framing and sheathing		100%		100%

Notes:

- 1 Exterior walls are load-bearing, all elevations – interior beams pocket into the walls
- 2 Front & rear were repointed with modern Type N mortar -- much too hard, spalling brick faces
- 3 Rear limestone ornamentation (lintels, bands, quoins) were removed and replaced with modern brick
- 4 Floors are cinder concrete encasing steel beams; removal will require applied fire protection on the beams
- 5 The excavation for the column base reinforcement will probably result in replacement of the basement slab

1920 SANSOM - GARAGE / FUNERAL PARLOR

INTRODUCTION

Keast & Hood was requested to review the structural condition of 1920 Sansom Street in Philadelphia, PA. The first visit was made on July 22, 2015, in the company of other members of the project team to observe the general conditions of this building and others. A second visit was made on August 19 to probe the condition of the masonry. This report describes the observations and recommendations for the structure. The reader should understand that this report focuses primarily on structural issues and does not address the greater work that would be required for a full historic restoration.

In overview, the building was found to be in very poor condition. While it seems the roofing was replaced after several years of leaking, there continues to be extensive water infiltration from torn flashing, clogged and broken drain pipes, and cracks in the masonry. Water permeation and the resulting deterioration of the masonry require that most or all of the front wall be reconstructed, as well as portions of the side walls.

OBSERVATIONS

Reportedly this building was constructed in the very early twentieth century as a garage and thus has the main floor slab on dirt fill; there is a small mechanical room basement at the rear. There is a full second floor, but at a height inconsistent with a garage occupancy. This observation coupled with all of the structural details used (concrete mix components¹, steel beam sizes, and encasement forming details) point to the internal structure having been replaced in the 1940s or 1950s, and the front façade may have been replaced at the same time.

The existing structural system consists of steel beams at the second floor and roof levels that clear-span between the east and west brick bearing walls. These are topped with a cast concrete slab that turns down to fully encase the beams. There appears to have been a skylight near the front that was closed up with corrugated deck and roofed over. Where the original stair would have been, there is a relatively modern elevator that has a shallow pit and shaft made with concrete masonry walls, and the modern staircase to the second floor wraps the shaft. There is no "second exit" from the second floor so the building cannot be occupied in its current configuration.

All of the exterior walls consist of multi-wythe brick masonry. The front face has carved limestone ornamentation, stained green from algae and lichens. Most of the front wall is coated with salt deposits from efflorescence, and several bed joints were turning to friable powder. Sections of the plaster stucco covering part of the west wall (a party wall that may consist of soft "salmon" brick) is peeling off as a result of long-term water intrusion and should be removed; the condition of the underlying brick should then be examined and addressed as necessary.

¹ Cores were taken through the roof concrete. When tested, it was found that the compressive strength was well over 5,000 psi and the density was 162 pcf; normal would be 3,000 to 3,500 psi and 144 to 150 pcf.

Checked from the interior, the front wall and portions of the side walls were saturated from roof to first floor, with mold growing on all finishes. Two sample bricks were removed from the wall, one from the exterior and the other from the interior face; both were found to be saturated and have completely wetted the sealed bags in which they are stored. We observed advanced deterioration of the bricks and mortar behind the wall finishes, especially above the second floor. The extent of damage will require reconstruction of most of the front wall and portions of the side walls.

The front spandrel beams for the second floor and roof are partially embedded in the front wall and were found to be suffering corrosion within the concrete encasement². Other beams have less severe corrosion – although the extensive failure of the concrete fireproofing around the beams suggests rust jacking of the steel surface caused by the moisture. Likewise there is significant corrosion where the beams pocket into the walls.

It was found that the roof drains were clogged, causing failure of the roofing and water migration into the walls. Additionally, the drainage pipes have split, sending water into the building. These two conditions have led to many of the issues described above. The floor and roof slabs are saturated in the front section of the building. The masonry and concrete are so saturated, it is our opinion that an active, rigorous drying program would take up to two years to sufficiently remove moisture from the structure to allow the interior to be inhabited, even if the plan was to retain only the front wall. A passive drying system (natural ventilation only) may take much longer. An expert contractor should be consulted on this topic.

RECOMMENDATIONS

To rehabilitate the building, the structural work will include:

- Remove (and eventually replace; see below) the stucco on the outside face of the west wall
- In some areas of the side and rear walls the inside wythes of brick should be cut out and replaced due to excessive freeze-thaw degradation
- Multiple passes on the front façade will be necessary to clean the stone and draw out some of the crystalized salt deposits embedded in the brick. However, because most of the back-up (interior) brick has been so weakened by freeze-thaw cycles, it is recommended that the entire front wall be reconstructed
- After the masonry is sufficiently dried out so as to not trap moisture in the core of the walls, all exterior and interior faces of the masonry would have to be re-pointed; and in the case of the west wall, the application of the stucco would follow if it is needed
- The concrete encasement removed from the internal steel beams, and the beams reinforced where corrosion is found, cleaned, painted and fire-protected
- The spandrel beams embedded in the front wall replaced, and possibly the same at the rear. This operation requires shoring the adjacent span of floor / roof slab.

² Only the inside face of the web could be exposed for review; the outside face is expected to be worse due to trapped moisture.

- If significant openings in the floor and roof slabs are expected, a study should be undertaken to determine the size(s) and spacing of the reinforcing bars so the structural engineer can perform its design work.

Following are a few photographs.



A tremendous volume of water permeation over many years left extensive salt deposits and damaged embedded wood elements such as window frames.



The water migration has washed out the calcium and caused the mortar to turn to powder due to freeze-thaw cycles.



Condition of the wire mesh that supported the plaster on the second floor. Behind this, the salmon brick is saturated. Many bricks are crumbling from freeze-thaw cycles and must be replaced, or the wall rebuilt.



Concrete encasement is spalled at the underside of the beam due to corrosion (rust jacking).

1920 Sansom - Table of Conditions

*Building vacant since 1997 – no heat has contributed to the deterioration
Table indicates extent of repairs or replacement required*

<u>Exterior</u>	pointing	brick failure	stone failure	windows	cornice	cleaning
Sansom Façade (1,3)	100%	100%	25%	100%	100%	100%
West façade	100%	10%	coping 20%	N.A.	N.A.	50%
South façade (3)	100%	50%	coping 20%	50%	25%	25%
Parapets	100%					

<u>Interior</u>	plaster	flooring	beam reinf	slab
first floor	100%	100%	N.A.	N.A.
second floor	100%	100%	10%	5%
roof	N.A.	0%	30%	10%

Notes:

- 1 Front wall is saturated; other walls holding moisture as well
- 2 Slab on ground; saturated within sixteen feet of front wall
- 3 Front & rear walls repointed with hard mortar that is too strong for the brick