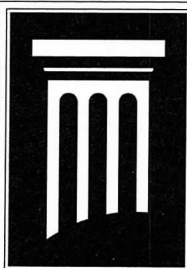


WINDOW ASSESSMENT NOBLE BUILDING

324 PUJO STREET
LAKE CHARLES, LOUISIANA 70601
APRIL 2014



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INTRODUCTION

As the “eyes” of a structure, windows are extremely important, character-defining features of a building. Their design, craftsmanship and quality make them worthy of preservation. However, property owners commonly are faced with a decision about replacement or repair. Many factors, such as budgetary restraints, energy efficiency, and noise reduction, inform this decision. The rehabilitation of the Noble Building in downtown Lake Charles is facing this same debate. There are three primary window types in the Noble Building: storefront windows at the street level, wooden counterweight windows in the second level of the street façade, and industrial steel and glass windows at both levels at the rear of the building. This study assesses the condition of these windows, provides research on the different approaches for window treatment, and outlines viable alternatives and methods for meeting the budgetary and performance goals of the property owner while maintaining the historic integrity of the structure.

DESCRIPTION OF METHODOLOGY AND RESEARCH

This window study was conducted in three phases: documentation and condition assessment of the existing windows, research of available products and techniques, and site visits to nearby successful window applications.

First, documentation and a condition assessment of each individual window within the Noble Building was performed. The inspection consisted of a visual evaluation of the state of each window and manual testing of working parts and material integrity. The following items were evaluated for each wood window: general description, paint condition, frame and sill condition, sash condition, hardware condition, glazing condition, overall condition, recommended repair category, and presence of noise and thermal concerns. The evaluation of each metal window includes the following: general description, level of corrosion, paint condition, sash condition, deterioration of metal sections, glass and glazing compound condition, hardware condition, condition of window surrounds, overall condition, recommended repair category, and presence of noise and thermal concerns. Additionally, each window was photographed, and field measurements were recorded. All of these findings are recorded in a database that is included as Appendix A of this report.

The treatments and techniques that are presented within this report are informed by research about past and present procedures for addressing concerns of historic windows. Two primary sources of information are collections of reports entitled *Preservation Briefs* and *Preservation Tech Notes*, which are published by the National Park Service. However, a full listing of references can be found in the Resources section of this report.

Finally, through a site visit to several window installations in New Orleans, the aesthetics and functionality of magnetic storm windows were investigated. The sites visited included a variety of historic window types such as metal window and wooden windows as well as a variety of installation details. These storm windows addressed the concerns of thermal efficiency and noise reduction, both of which are primary concerns at the Noble Building.

TREATMENT OPTIONS

REPAIR

Repair should always be the primary goal of a rehabilitation project. Not only does this maintain these valuable character-defining features, but, more often than not, it is the most cost-effective solution in the long run.

Advantages

Repair boasts several advantages over replacement. First and foremost, repair achieves the desirable outcome of retaining the original windows as well as preventing the ill effects on the surrounding historic materials due to removal and replacement. Additionally, because of the quality of construction materials and craftsmanship, historic windows have a longer service life than modern replacements. With proper maintenance, these windows will continue to serve the building for years to come. If, for some reason, a part breaks or decays, the original construction methods allow for repair or replacement of singular parts rather than replacing an entire sash or frame, which is largely the outcome with modern replacements. Repairing historic materials, including windows, can save time rather than developing, manufacturing, and shipping custom designs. This can also lead to a more cost-effective solution because developing custom windows is an expensive prospect. In a building with a large number of windows, this can prove successful. However, in a project with few windows, the custom process can be cost prohibitive. Repair will cost less than any replacement of equivalent quality. Finally, modern replacements often are considered the environmentally responsible solution because of their increased energy efficiency. However, with a few simple solutions such as storm windows or shading devices, historic windows can approach the performance of double-glazed replacement windows. Some storm windows can even be manufactured with insulated, low-emissivity (low-e) glass, further increasing the performance of the original units. Removing sound building materials and shipping them to a landfill also does little to meet environmental objectives.

Disadvantages

As desirable as repair is, there are some associated disadvantages such as thermal and sound efficiency, difficulties associated with thermal solutions, and the inability to maintain the frames while installing upgraded glass. Historic windows can meet modern recommendations for thermal efficiency and sound insulation, but not without some assistance. Additional means must be applied to the openings to achieve standards regarding heat loss, air infiltration, comfort of occupants, and noise reduction. There is a simple remedy to this setback, though. Storm windows can be applied to the openings to realize the desired level of comfort. Additionally, the addition of storm windows sometimes can cause a problem with condensation, but there are techniques for preventing this complaint. Finally, owners may think that the window frames and sashes may be retained while adding insulated glass. However, the thin size of the glazing bars or muntins often prohibits, both in depth and structural capability, this seemingly convenient alteration.

REPLACEMENT

Although the primary goal should be repair, there are certain situations that require replacement. If the existing windows are decayed or deteriorated beyond repair, replacement may be the only recourse. If replacement is required, the new windows should match the original windows as closely as possible. The pattern of openings and the size of the window should be the same, including the proportions of the frame and sash. The replacement windows should be constructed of the same material as the originals as well. For example, if the originals were wood windows, they should be replaced with wood windows to maintain the historic character of the building. The same thought process of matching the original applies to the details of the window such as the muntin profile, characteristics of the glass, and any decorative elements such as arched tops. Finally, if the original windows are divided into lites, the replacements should be true divided lite windows. A grid that is attached to the exterior of the window or sandwiched between the panes of glass modifies the appearance of the building and has negative effects on the character.

Advantages

Replacement does have its advantages in that the frames can be fabricated to hold insulated glass, eliminating the need for storm windows. Also, replacement is less labor intensive than repair work.

Disadvantages

However, there are several disadvantages that should be considered as well. If insulated glass is used, the muntin thickness and frame thickness often must be increased to accommodate the increased thickness and weight of insulated glass. It is impossible to find standard windows that match the proportions, dimensions, profiles, configuration, and materials of the original windows. Window openings in historic buildings are not standard, so extra time and money will be required to complete a custom design.

Modern replacements have exhibited a lack of durability compared to historic windows. For example, the seal of insulated glass units can fail, which is irreparable, leading to the replacement of an entire sash or frame. Because of construction details, modern windows cannot be repaired if the need arises, which also leads to wholesale replacement rather than a repair of a specific part. Modern replacements cannot boast the service life of historic windows that are properly maintained, so they will not survive the life of the building, leading to another expensive replacement project in the future.

Except in the direst of situations, replacement of windows does not fit within the Secretary of the Interior's Standards and could jeopardize the receipt of tax incentives, which could supplement the financing of the project. Most importantly, the loss of historic materials can be devastating to the character, appearance, and value of a historic structure and should be avoided to the greatest extent possible.

WEATHERIZATION

If historic windows are retained, all windows should be weatherized during the course of a rehabilitation project. Factors such as single glazing, lack of weatherstripping, and gaps around the window frames lead to the inefficiency and discomfort that are common complaints. Solutions can be applied to the windows themselves, or devices such as storm windows, awnings, and other shading devices can be applied to address these concerns.

Weatherization can be achieved with simple, cost-effective methods such as proper caulking and glazing compound, weatherstripping, and sash locks. Care should be taken to make certain that caulk is applied at the edges of all frames. All deteriorated glazing compound at the perimeter of the glass should be removed, and fresh glazing compound can be applied, sealing the edges of the frames and glass. Proper weatherstripping installed at the top, bottom, and meeting rails of wood windows and where any operable sash, like a ventilator, and the fixed frame meet in metal windows will greatly reduce air infiltration. Sash locks at the meeting rail of wood windows will insure that sashes close tightly. Research into the appropriate materials and techniques for each window type should be performed before undertaking these projects to safeguard the windows and achieve the maximum results.

Another method of achieving thermal efficiency as well as sound reduction is through the use of storm windows. Storm windows, whether interior or exterior, allow for the retention of the original windows and diminish the visual and physical modifications that must occur to the window. Also, the installation can be reversed at any time, returning the building to its original condition. Storm windows may be applied to either the exterior or interior of the windows. Exterior storms can accomplish the desired energy conservation and protect the windows themselves. However, installation can prove difficult if there is any detailing in the window opening and if access is challenging. Interior storms achieve the same outcome at a lower cost because the mullions are not required to resist any wind pressure and installation within the existing interior jamb is easier. If the color and frame configuration of the storm panel reflects that of the window, the storm window will not be visible from the exterior of the building, and the character of the facades will be unaltered. Condensation sometimes can occur between the window and an interior storm sash, so care should be taken to provide sufficient ventilation. All storm windows, whether exterior or interior, should be installed with adequate space between the two windows, should be tight-fitting, and should be adequately sealed and caulked to provide energy conservation and maximum comfort. Storm windows should be selected based upon the following criteria: reduction of the visual and physical modifications to the original window and historic materials, preservation of the historic character, achievement of the desired thermal and sound efficiency, maintenance of the functional requirements (such as whether or not the window must open to allow ventilation or escape), and operation with discreet hardware. Research into the appropriate installation techniques for each type of storm should be undertaken before any project to assure proper installation.

The installation of awnings, blinds, or other shading devices is another cost-efficient and extremely simple approach to weatherization and reduction of energy consumption. Application of these straight-forward systems can greatly reduce heat gain through windows and storefronts and

greatly assist with bolstering the comfort of the building occupants. If a building originally had awnings, retain the awnings if they are in good condition, or replace them if the condition is deteriorated or they have been removed. New awnings should be installed only when they are compatible with the style and character of the building, and they should replicate what was originally used with similar material and design. Interior blinds, shades, or shutters can be used if the building did not originally have awnings.

ROUTINE MAINTENANCE

Above all else, routine maintenance is key. Do not let these significant features decay or deteriorate. It is much easier to perform minor maintenance than to face an entire building of neglected windows. Conducting regular maintenance of sound frames will achieve the longest life possible. When windows remain in use, identification of repair needs is prompt. The windows of the Noble Building have endured 95 years of use and exposure. A lifespan of this length demonstrates the quality of materials and craftsmanship. With appropriate repairs, the original windows can continue to offer this extended service life as the building enters its next phase. There is not a replacement window on the market today that can boast such longevity.

EVALUATION CRITERIA

When considering the available treatment options for addressing the concerns of historic windows, the following criteria should be used for evaluation: historic appearance, economics, and window performance.

Windows are of utmost importance to the aesthetics of historic buildings. Saving and maintaining these character-defining features should be the primary goal. Only after exhausting all the possibilities for preserving the original windows should replacements be considered. The advantages and disadvantages of each approach is discussed in detail in the previous section.

The economics, or cost effectiveness, of any selected treatment refers to the immediate expense as well as the long-term financial effects of any available treatment options. Of course, each treatment option has an immediate associated construction cost. Additionally, there are long-term costs such as the energy expenses and maintenance costs associated with each window. An owner also must evaluate the long-term performance of the units and how quickly another replacement project may arise. In an income-producing property such as a building with living units for rent, the owner must maintain the marketability and viability of the property. If the construction costs of the rehabilitation force an increase in rent that exceeds what the local market will support, the project is no longer feasible.

Another critical consideration in addressing the windows of the Noble Building is that the building is eligible for listing on the National Register of Historic Places. In fact, at the time of this window assessment, the application is complete, and the property is on the schedule for review by the state board. Upon listing on the National Register, rehabilitation work performed on this property may be eligible for state and federal tax credits, which can be of great benefit in financing a project. In order to receive these tax credits, the rehabilitation work must follow the Secretary of the Interior's Standards for the Treatment of Historic Properties. Replacing windows that are not damaged beyond repair would be in violation of these standards and would negate any application for tax credits. If replacements are necessary, the replacement windows must meet certain criteria as outlined in the previous section.

Finally, the performance of the window units is equally as important as the treatment options are considered. A common myth is that historic windows cannot meet modern requirements for thermal and sound efficiency. This has proved untrue with the proper application of economical techniques, such as the weatherization methods and storm windows, discussed in the previous section. The owner and design team must evaluate the performance level of each option and make a decision accordingly.

TREATMENT RECOMMENDATIONS

The following categories are used as treatment recommendations for each window in the Noble Building. Following each repair category is a brief explanation of the type of work involved with each treatment level. Please see Appendix A at the end of this report for the database that summarizes the current state of each window in the Noble Building and treatment recommendations.

The recommendation given for each window in the Noble Building is based on the aforementioned evaluation criteria: historic appearance, economics, and window performance. The windows of the Noble Building are important character-defining features of the building, and the primary goal is to maintain the windows in place. Due to the relatively good condition of the majority of the windows, this goal should be achievable. With appropriate care and treatment, all windows, except for possibly windows 2 and 20, can be retained. Not only would replacing existing windows with modern replacements irreparably alter the character of the building, but undertaking a replacement project also can prove to be cost prohibitive.

WOODEN WINDOWS

Repair Category A – Routine Maintenance

Repair Category A includes, but is not limited to, the following types of work:

- Remove and repair window sashes. Reglazing (replace glass and glazing compound) should occur as necessary.
- Repair window frame as necessary.
- Repair or replace counterweights, sash cords, and pulleys if appropriate.
- Repair existing hardware, and replace missing hardware.
- Repaint frame and sash.
- Weatherize window with caulk, weatherstripping, and properly functioning sash locks.
- Install interior magnetic storm windows.

Repair Category B – Partial Decay

Repair Category B includes, but is not limited to, the following types of work:

- Some wood is partially decayed and requires waterproofing, patching, or consolidation in addition to previously mentioned maintenance.

Repair Category C – Severe Decay or Deterioration

Repair Category C includes, but is not limited to, the following types of work:

- Some wood is deteriorated beyond repair and should be replaced with new matching pieces. New pieces can be spliced into the existing frame, sash, and sill to avoid wholesale replacement.

Following this selective replacement work, the previously mentioned maintenance steps should be undertaken.

Category D – Replacement

The entire window unit, frame and sashes, is completely deteriorated and repair is not possible. This is a very rare occurrence, but when decay is this extensive, replacement is necessary. Replacements must replicate the original windows as follows:

- Material
- Pattern of openings
- Size of windows
- Proportions of frame and sash
- Muntin profile
- Glass characteristics
- Decorative elements (i.e. arched tops)
- True divided lites, if present

METAL WINDOWS

Repair Category A – Routine Maintenance

Repair Category A includes, but is not limited to, the following types of work:

- Ensure building is weathertight before work commences to eliminate any excess moisture.
- Remove light rust and flaking paint.
- Prime exposed metal with rust-inhibiting primer.
- Replace cracked or broken glass and glazing compound as necessary.
- Clean and lubricate hinges, and replace any missing hardware.
- Repaint metal sections with two coats of finish paint. Make certain paint is compatible with substrate and primer.
- Caulk window surrounds prior to finish coat.
- Weatherize window with weatherstripping and properly functioning locks.

Repair Category B – Increased Corrosion or Misalignment of Metal Sections

Repair Category B includes, but is not limited to, the following types of work:

- Window requires more extensive repairs that can occur in place.
- Remove heavier corrosion through mechanical or chemical means.
- Prime exposed metal with rust-inhibiting primer.
- Repair misaligned or bowed metal sections.
- Patch small holes and other uneven areas.

- Replace cracked or broken glass and glazing compound as necessary.
- Clean and lubricate hinges, and replace any missing hardware.
- Repaint metal sections with two coats of finish paint. Make certain paint is compatible with substrate and primer.
- Caulk window surrounds prior to finish coat.
- Weatherize window with weatherstripping and properly functioning locks.

Repair Category C – Severe Damage

Repair Category C includes, but is not limited to, the following types of work:

- All previously mentioned work items apply to this category, but the window requires extensive repairs that require removal of the unit and transfer to an alternate location for adequate repair access.
- Extreme care must be taken to label and number all windows and parts to ensure proper reinstallation.
- Extreme care also must be taken to minimize any damage to surrounding historic materials during the removal and replacement process.

Category D – Replacement

The entire window unit, frame and sashes, is completely deteriorated and repair is not possible. This is a very rare occurrence, but when decay is this extensive, replacement is necessary. Replacements must replicate the original windows as follows:

- Material
- Pattern of openings
- Size of windows
- Proportions of frame and sash
- Muntin profile
- Glass characteristics
- Decorative elements (i.e. arched tops)
- True divided lites, if present

Hiring a craftsman with the appropriate skill level to undertake these tasks, especially as the intervention becomes more extensive, is crucial to the success of the project. Additionally, research into the appropriate techniques for each work item should be undertaken before commencing window rehabilitation.

WEATHERIZATION AND SOUND REDUCTION

Storm Windows

In addition to the weatherization techniques mentioned within the repair categories, an interior storm window should be installed at each window within the Noble Building. The only windows that may be excluded from this addition are windows 19, 20, and 21, which are the three storefronts that face north. Not only do all windows of the Noble Building cause the typical concern for thermal efficiency, particular windows have the added nuisance of noise intrusion. The City of Lake Charles located a mechanical yard immediately adjacent to the south wall of the building. The equipment operates at a volume level that would be disturbing to the occupants of the Noble Building, particularly for the proposed residential use on the second level. The building owners commissioned an acoustical study of the building in 2012 to verify and search for resolutions to the noise intrusion. In addition to measures that the City can take to improve the noise environment, HFP Acoustical Consultants, Inc. recommended supplementing the existing windows with another layer provided by a storm window. Based on research performed during this study, a magnetic storm window will provide the desired aesthetic solution while improving the thermal and sound performance of each window.

Magnetic storm windows snap onto a thin metal strip that is pre-attached within the interior window opening, sealing the perimeter of the original window. The installation method allows for minimal impact on the surrounding historic materials, and, if care is taken with the color and configuration of the mounting bars and storm panels, there is little to no visual impact on the exterior appearance of the building. Magnetic storms are minimally intrusive on the interior. The addition of magnetic storms in combination with the historic windows provides a system of double-glazing that greatly enhances the energy efficiency of the original windows by resisting heat transfer and nearly eliminating air infiltration. The greater the air space between the storm panel and the existing window, the more successful the installation will be.

During the research phase of this window study, one particular brand of magnetic storm windows, Magnetite, was investigated through technical data and site visits. Magnetite, which features acrylic panels, claims that its storm windows can reduce energy costs by up to 50 percent and reduce noise by up to 70 percent. Although these particular numbers could not be verified through the site visits, the clients claim increased energy savings, increased occupant comfort, and reduced noise intrusion after the installation of the Magnetite product. The site visits verified the ease of installation and use and the minimal physical and visual impact of the storm windows. Magnetite windows are constructed on site to fit any shape or style of window, further enhancing the appeal for a historical setting. Additionally, because of the magnetic attachment, the storm panels are easily removed for any necessary cleaning or access to the original window. If required for ventilation or egress purposes, the original window can remain functional.

In the acoustical study recommendations, HFP Acoustical Consultants, Inc. stated that their company has seen and tested some Magnetite systems in place and attests to their success in improving noise intrusion situations. Additionally, Magnetite com has engaged independent laboratories for testing, which resulted in the following statistics and technical data:

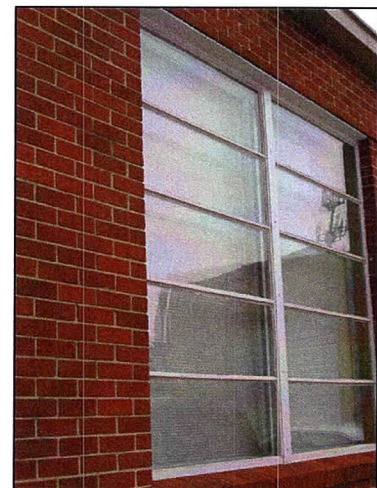
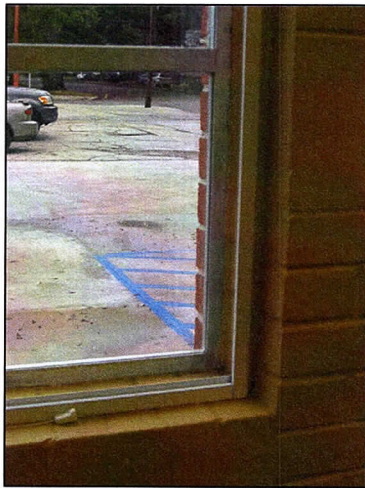
	Single- Glazed	Standard Double- Glazed	Single-Glazed w/Magnetite addition
U-Factor ₁	0.89	0.44	0.48
Sound Control (STC) ₂	26	29	41
SHGC ₃	0.69	0.61	0.66
Air Infiltration ₄			<0.01 cfm/lineal foot

Note 1 The overall heat transfer coefficient, or how well a building element conducts heat. The lower the u-factor, the better the window insulates.

Note 2 How well a building element attenuates airborne sound. The higher the sound transmission class (STC) the better a material resists the transfer of sound.

Note 3 The ability of a building element to transmit or resist solar radiation, or how well the element blocks heat caused by sunlight. The lower the solar heat gain coefficient (SHGC), the less solar heat the element transmits.

Note 4 2.0 cfm/lineal foot of crack space is the Department of Energy standard for storms.



Pictures taken at Ed Smith's Stencil Works in New Orleans show the combination of interior Magnetite panels and historic metal windows. The first image demonstrates the attachment method while the second picture was taken from the interior of the building. The final picture illustrates the view from the exterior of the building.

Based on visual observation and the technical data provided, the addition of Magnetite panels to the interior of the windows of the Noble Building is a viable and recommended solution to the thermal and sound concerns present in the building. In combination with the historic single-glazed window, Magnetite windows seem to outperform conventional replacement windows and films while maintaining the original windows.

Interior blinds or shading devices

Another method to further reduce the heat gain of the windows and increase the comfort of the building occupants is the addition of interior blinds, curtains, or shades. This simple solution can take many forms, and the level of expense can be tailored to the owners' needs. There is no evidence, physical or photographic, of the presence of awnings on the Noble Building in the past, so the current recommendation is for interior treatment only.

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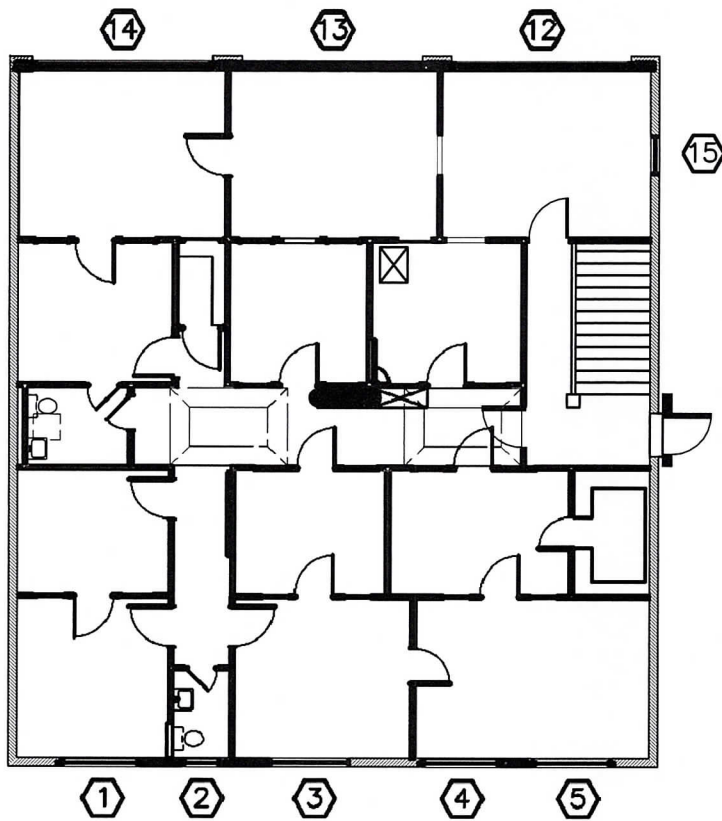
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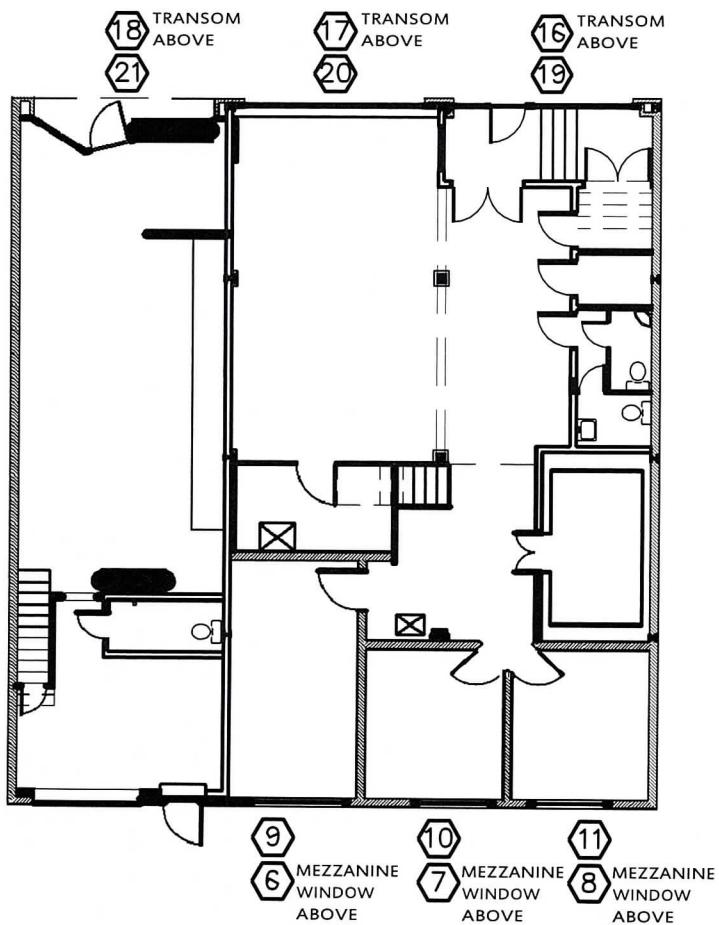
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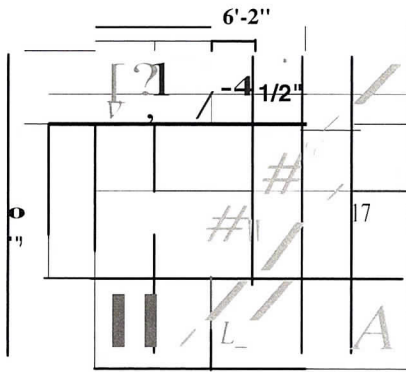


2ND LEVEL FLOOR PLAN
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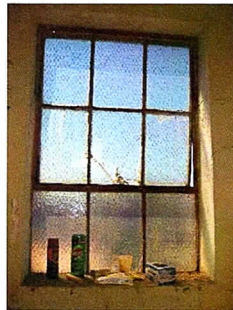
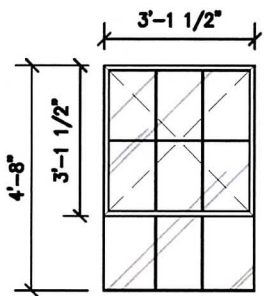
1ST LEVEL FLOOR PLAN
N.T.S.





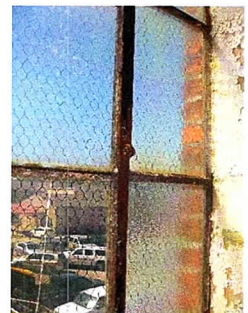
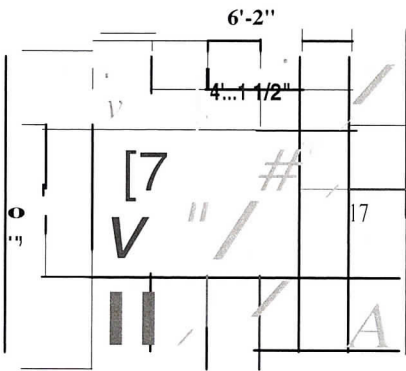
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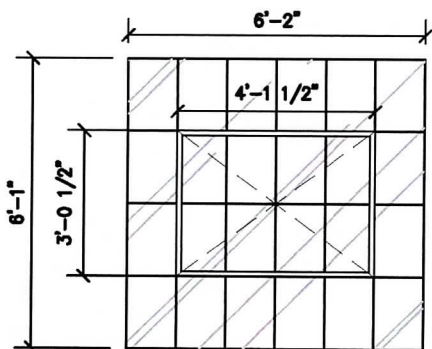
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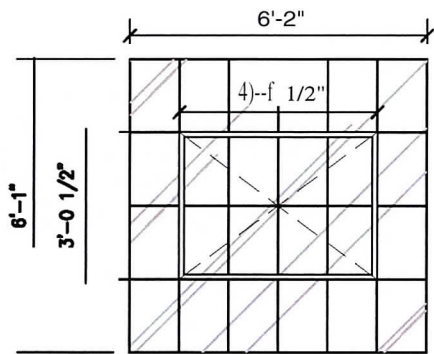
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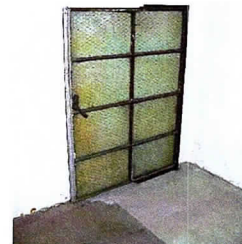
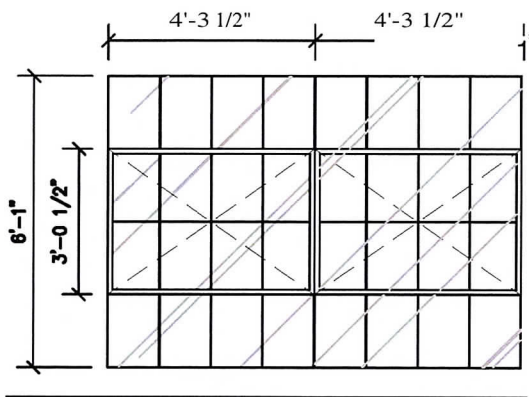
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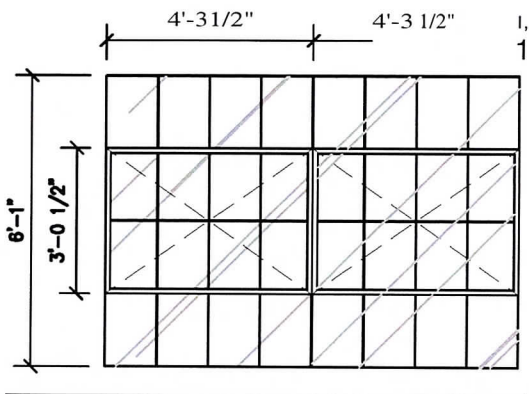
WINDOWS

SCALE 1/4" = 1'-0"



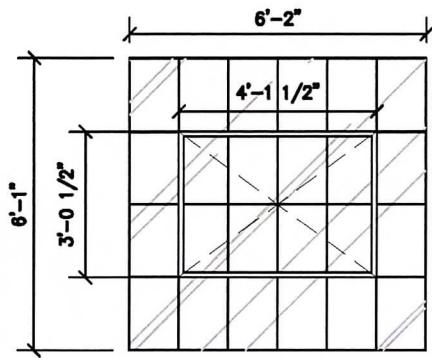
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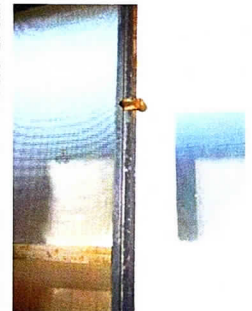
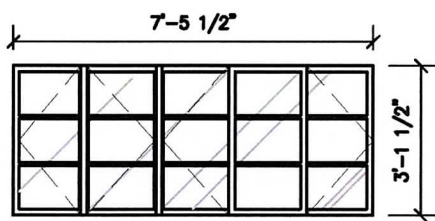
WINDOW?

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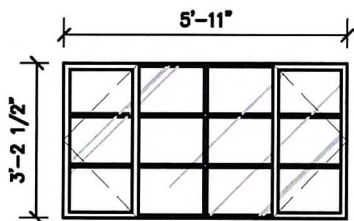
WINDOWS

SCALE 1/4" = 1'-0"



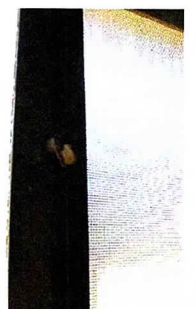
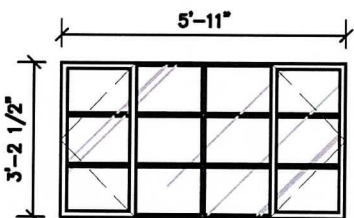
WINDOW9

SCALE 1/4" = 1'-0"



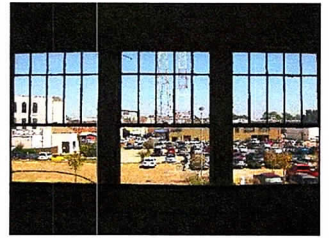
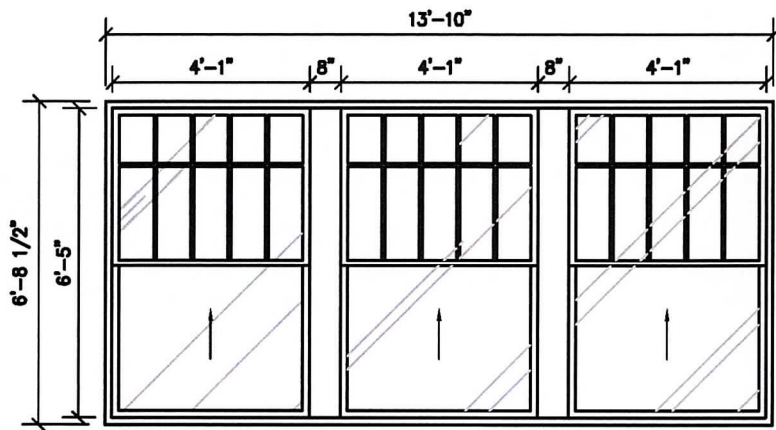
WINDOW10

SCALE 1/4" = 1'-0"



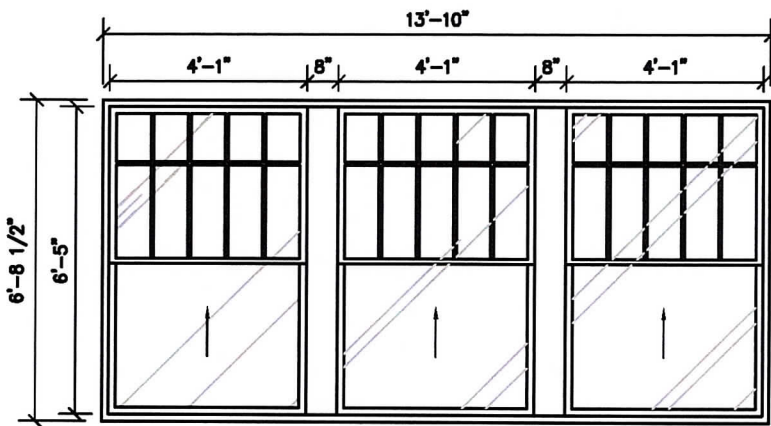
WINDOW11

SCALE 1/4" = 1'-0"



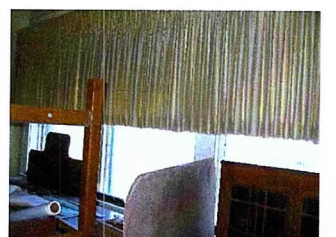
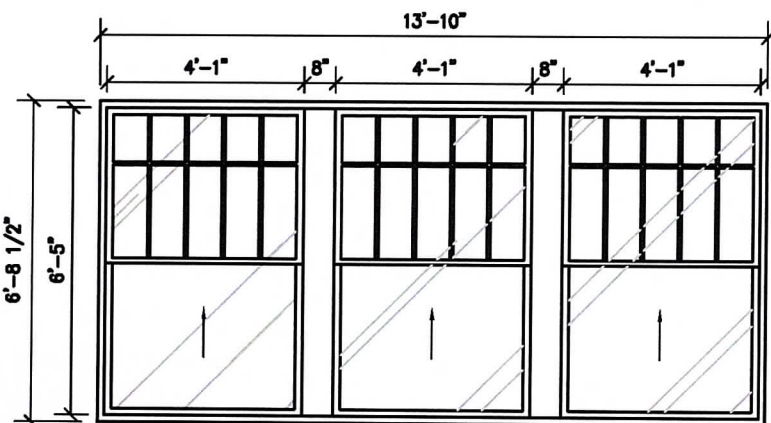
WINDOW 12

SCALE 1/4" = 1'-0"



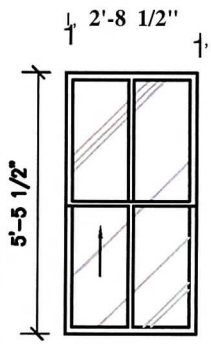
WINDOW 13

SCALE 1/4" = 1'-0"



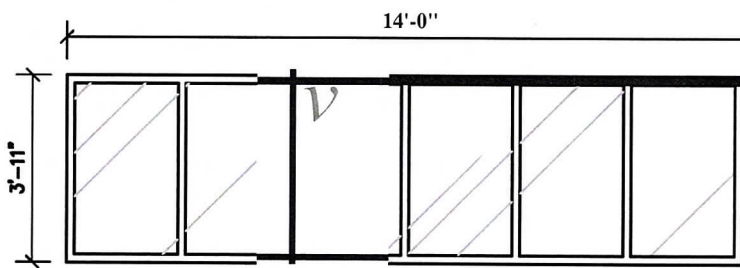
WINDOW 14

SCALE 1/4" = 1'-0"



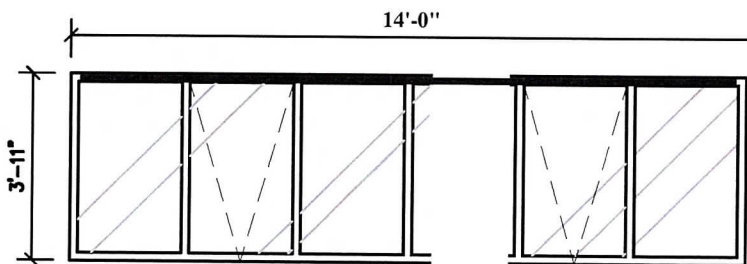
WINDOW15

SCALE 1/4" = 1'-0"



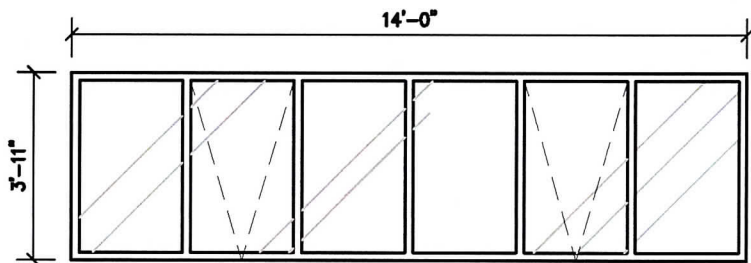
WINDOW16

SCALE 1/4" = 1'-0"



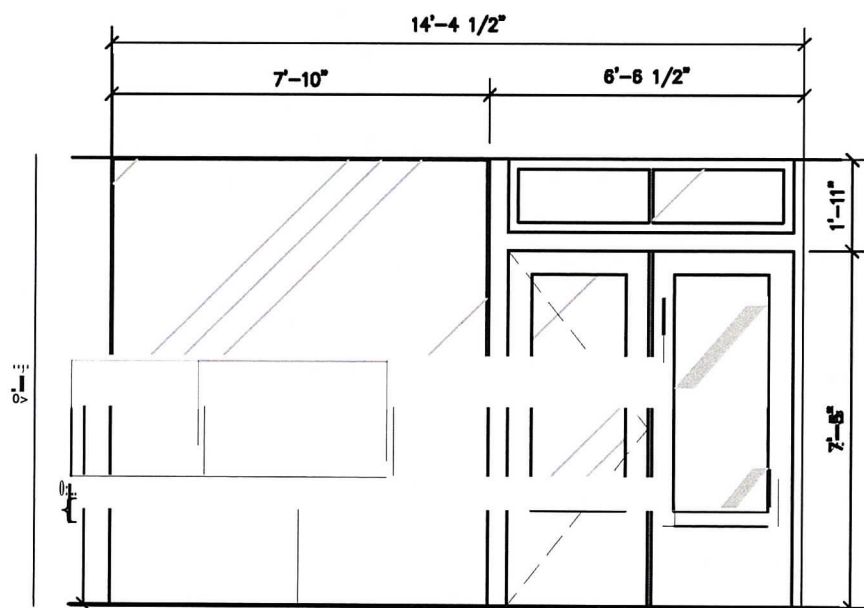
WINDOW17

SCALE 1/4" = 1'-0"



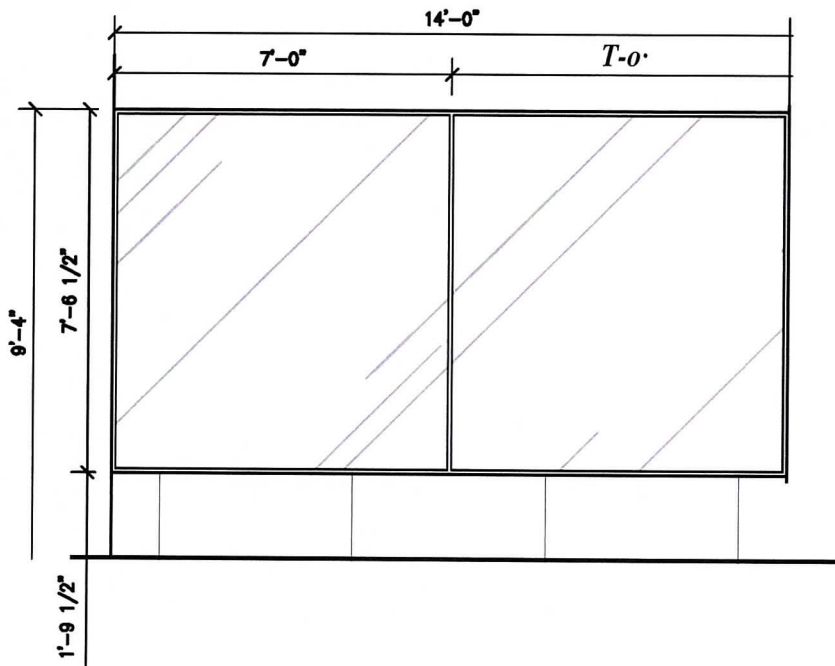
WINDOW 18

SCALE 1/4" = 1'-0"



WINDOW 19

SCALE 1/4" = 1'-0"



WINDOW20

SCALE 1/4" 1'-0"



WINDOW21

SCALE 1/4" 1'-0"