

4.29.2026

# Gatewood Elementary

Historic Wood Window Refurbishment & Glazing Replacement

Seattle Public Schools

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Seattle Department of Neighborhoods  
Historic Preservation & Landmarks

## BRIEF AGENDA

*1.0 \_ Mock-up Intent and Goals of Mock-up*

*2.0 \_ Mock-up Scope of Work*

*3.0 \_ Refurbishment of Windows and Lessons Learned*

*4.0 \_ Photos of Refurbishment*

*5.0 \_ Photos of Completed Mock-up*

*Appendix-A, Gatewood Elementary Wood Window Condition Survey*

*Appendix-B, Condition Photos*

*Appendix-C, Mock-up Product Submittal*

## 1.0 \_ Mock-up Intent and Process

The goal of this mock-up was to test the feasibility of installing laminated glazing and vacuum insulated glazing with low-e coatings as options for single pane glazing replacement as part of a historic wood window refurbishment.

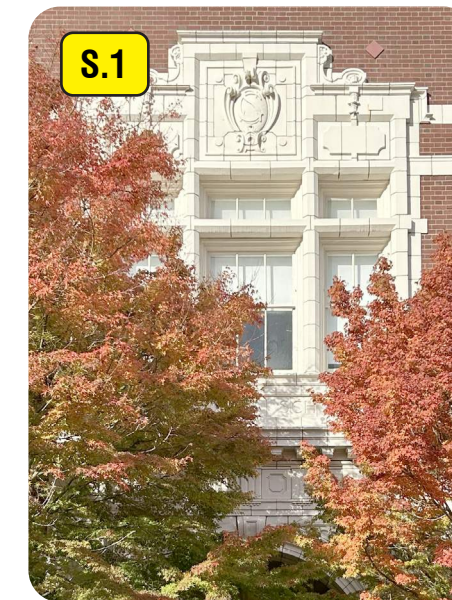
The location of this mock-up was selected because:

1. It represented a single or isolated window location with no shared exterior casings with other windows.
2. It represented the most common window rough condition at the school.
3. It provided an opportunity to test glazing replacement at all operable window types found at the school, i.e. double hung, and pivoting transom.
4. A previous condition survey indicated that this window would require the largest amount of refurbishment repairs and would offer the best opportunity to test all expected levels of refurbishment and how they might relate to the thicker vacuum sealed glass.



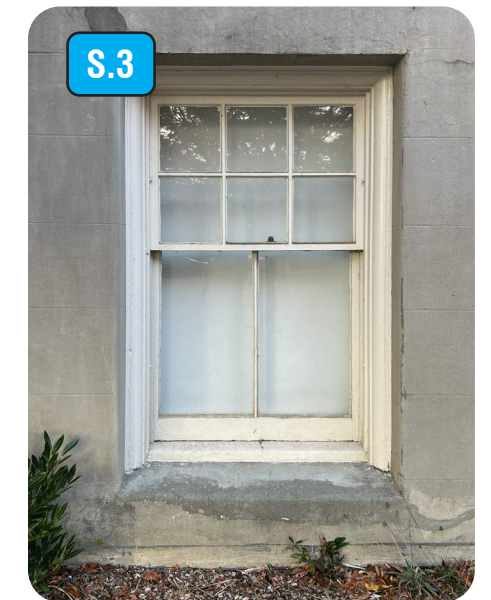
**Level 2-3**

Operable pivoting transom window over double hung operable windows at classrooms. The window in this photo is the mock-up window



**Level 2-3**

Operable pivoting transom window over double hung operable windows at 2nd floor offices and 3rd floor classrooms.

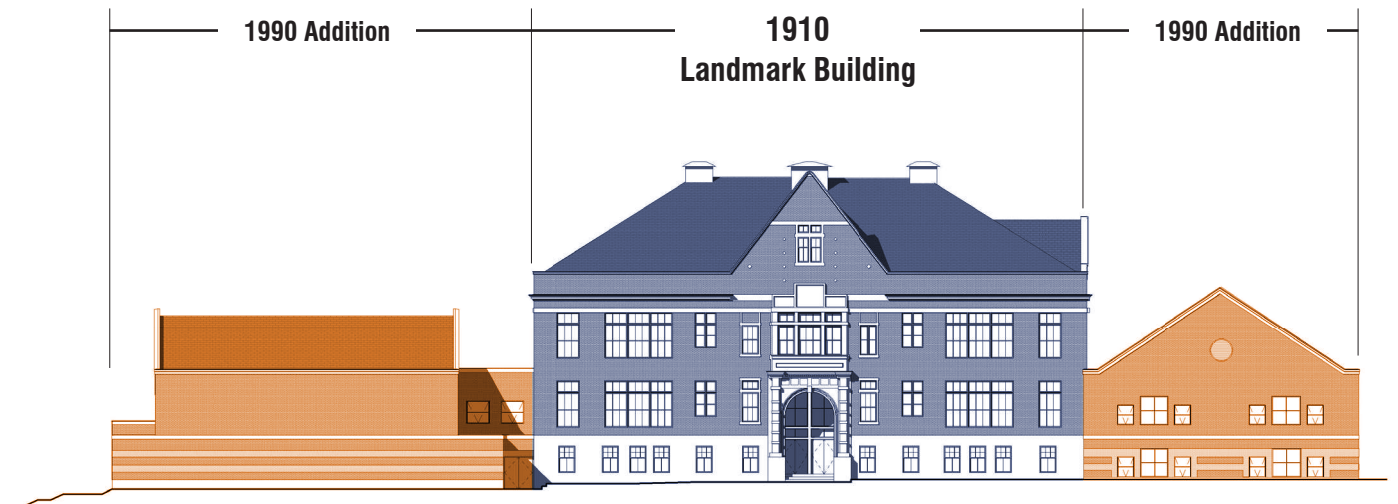


**Level 1**

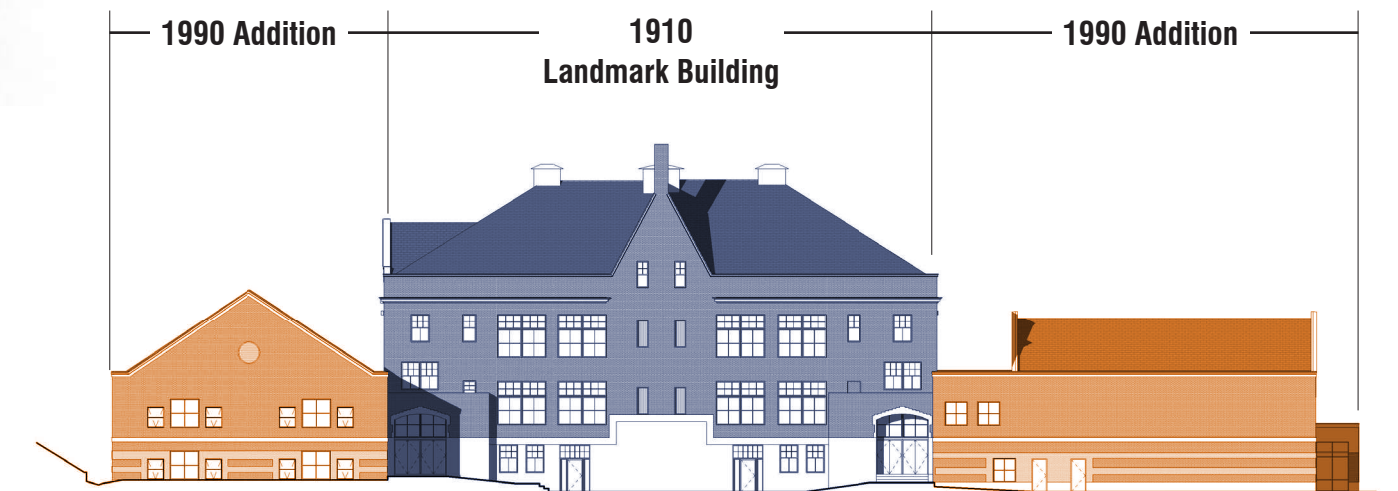
Double hung operable windows at Kindergarten classrooms.

## 1.1 \_ Mock-up Goals

Based on Landmarks Board review of the completed mock-up Seattle Public Schools intends to propose the selective refurbishment of historic wood windows and selective replacement of glazing for operable windows on the North, South, East, & West elevations located at Gatewood Elementary's original 1910 building. The goal of this proposal is to refurbish the deteriorated historic wood windows to extend their service life, and to replace the existing glazing with vacuum insulated glazing units to significantly improve the thermal comfort of school occupants and reduce exterior noise. It is expected that similar proposals will be requested at other historic school buildings with single pane wood windows.



South Elevation



North Elevation



## 2.0\_ Mock-up Scope of Work

The proposed mock-up scope included:

1. Removal of sashes consistent with a developed site specific safety program.
  2. The opening would have temporary painted OSB protection with 6 mil reinforced white plastic.
  3. The frame component trim/casing pieces and non-historic elements would be removed if necessary, cataloged and documented for future reinstallation or disposal and replacement as appropriate.
  4. The window frames would be treated in the field. The frames restoration consists of the following and covers from the exterior joint sealant to the interior sash stop of the bottom sash. All materials would be treated with "Board Defense" solution and have repairs made with the "Wood Care" epoxy repair system which includes "Rotfix" and "Sculptwood". The window subsill would be epoxy repaired if appropriate or replaced as required with clear vertical grained lumber milled to match original historic profiles.
  5. As needed, new historic matched window components will be built and finished to match the original material in species, dimension, profile, and style of manufacture.
  6. The sashes would be thoroughly inspected and have selective areas of paint stripped to accommodate repairs.
- All material would be treated with Board defense solution and have repairs made with "Wood Care" epoxy repair system which includes "Rotfix" and "Sculptwood". The sashes would then be feather sanded prepped and primed.
7. New glass consisting of 5/16-inch (8mm) thick LuxWall vacuum sealed insulated glazing consisting of the following;
    - i. Outdoor Lite: Cardinal Clear Glass with LowE 270 on glass face 2
    - ii. Indoor Lite: Cardinal Clear Glass
  8. The sashes weatherstrip would be inspected and repaired or replaced.
  9. All Broken hardware that can be repaired would be repaired and refurbished. Broken or missing hardware would be replaced with either a solid cast, available product that is a match.
  10. Finish paint and interior finish would be installed to sashes.
  10. Joint sealants would be installed at perimeter of frame and trim.
  11. Final paint would be installed to frames.
  12. All sashes would be returned to the site and installed in the prepared openings. Attempts would be made to test if operability of all sashes could be restored. Noet: The understanding is that the upper pivoting transom and upper double hung sash would be rendered inoperable at the end of the mock-up.
  13. The lower double hung operable sash will be limited to 4-inch operation via a stopper per Seattle Public School Request do to safe concerns.
  14. All touch-up and final adjustment would be made on-site.

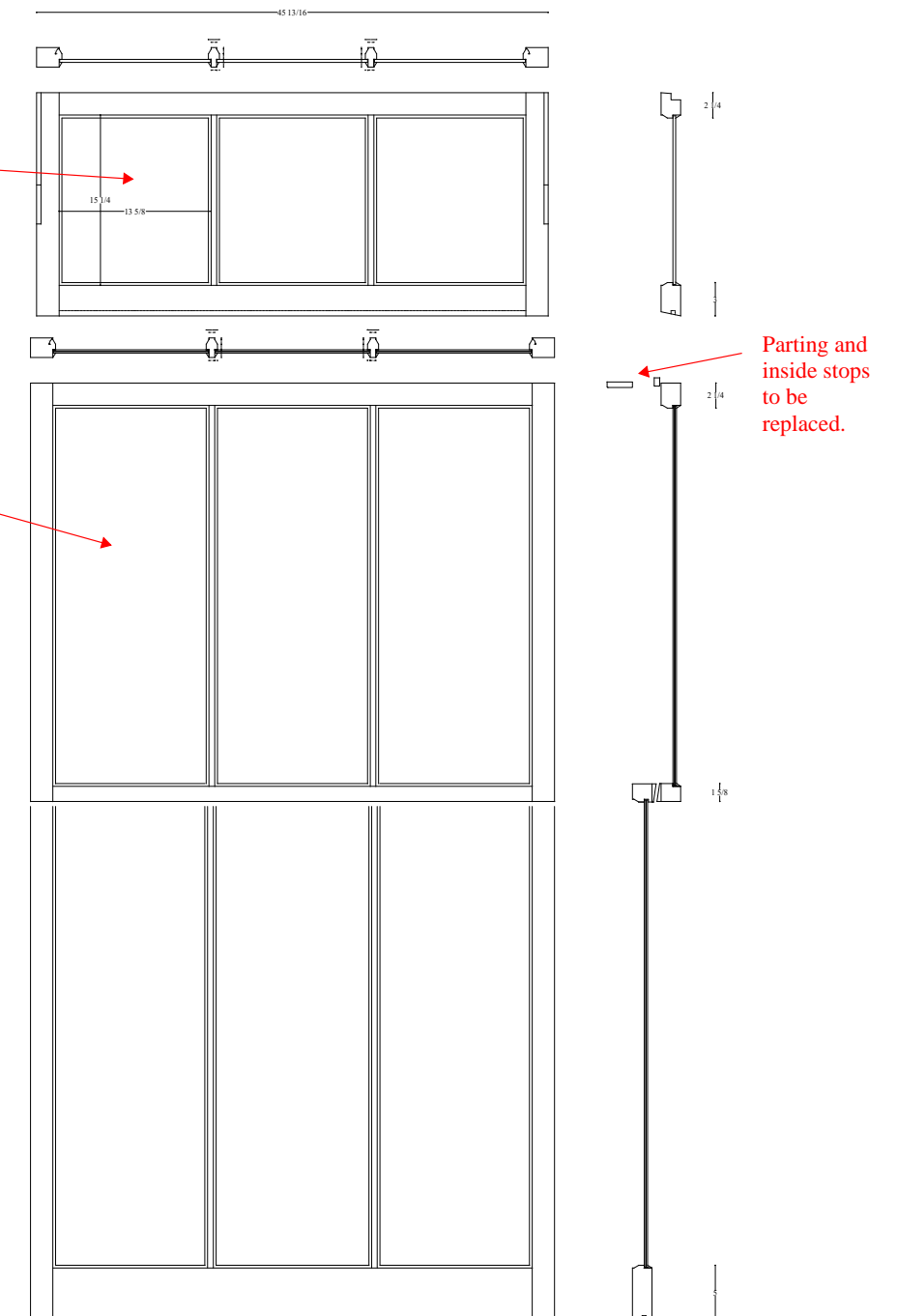
Note: Other than potential replacement of deteriorated wood components and paint the intent is to perform refurbishment rather than modification or replacement of historic elements and allow the work performed to be reversable.



Note: Current manufacturing limits vacuum insulated glazing to a minimum size of 12x18 inches

1/4" Low-e Laminated glass here instead of vacuum sealed units because of minimum size requirements.

5/16" Overall Low-e tempered vacuum sealed units.



Parting and inside stops to be replaced.

## 2.0 Mock-up Products

### Mock-up Glass:

1. Vacuum Insulated Glazing installed was 8mm (~5/16") and included LoE2 - 270 on glass face #2. This provides an R-value of R-15.87 and SHGC of 0.35
2. Laminated glass included LoE2 - 270 on face #2. This provides an R-value of R-0.9 and SHGC of 0.35



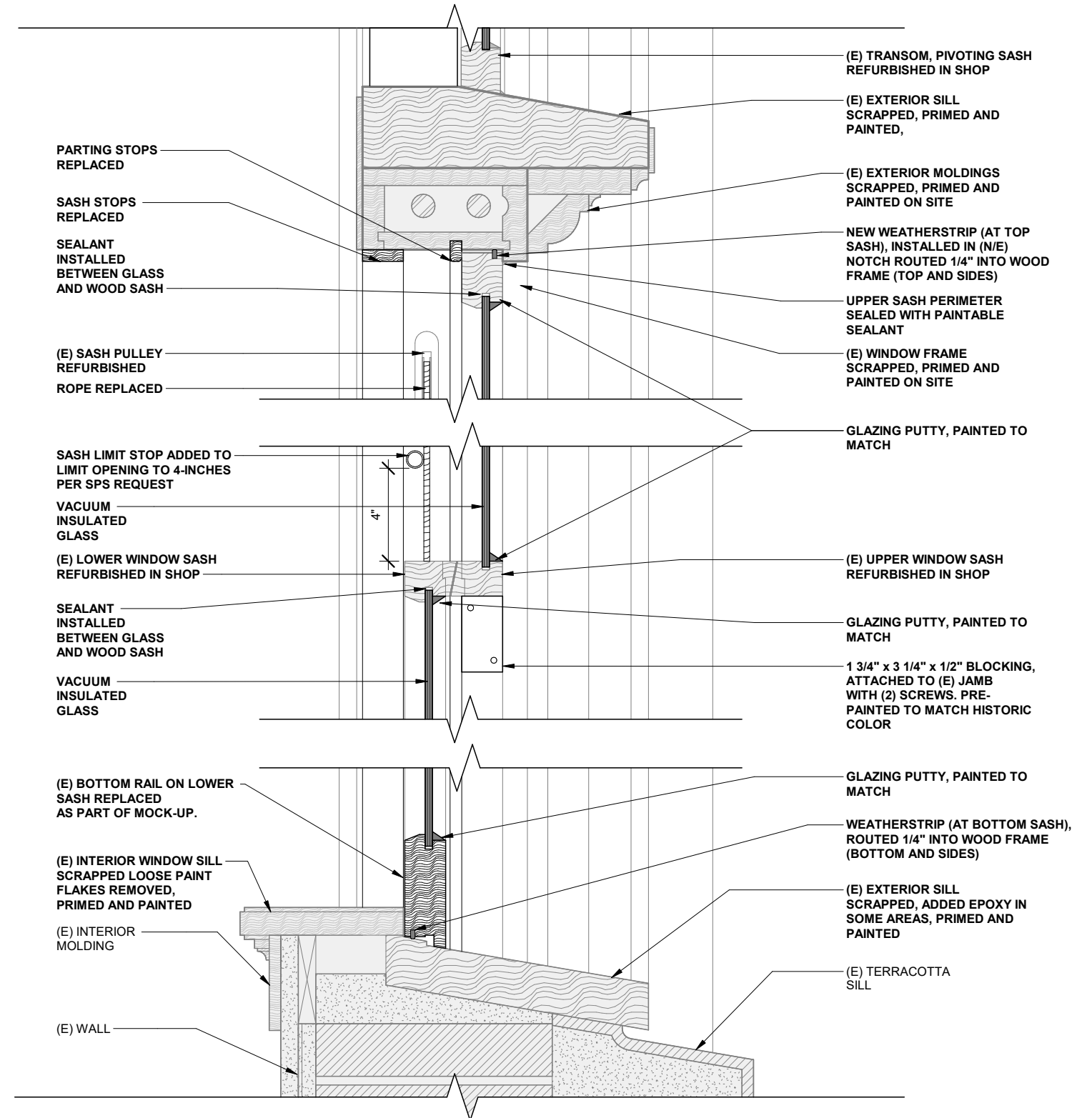
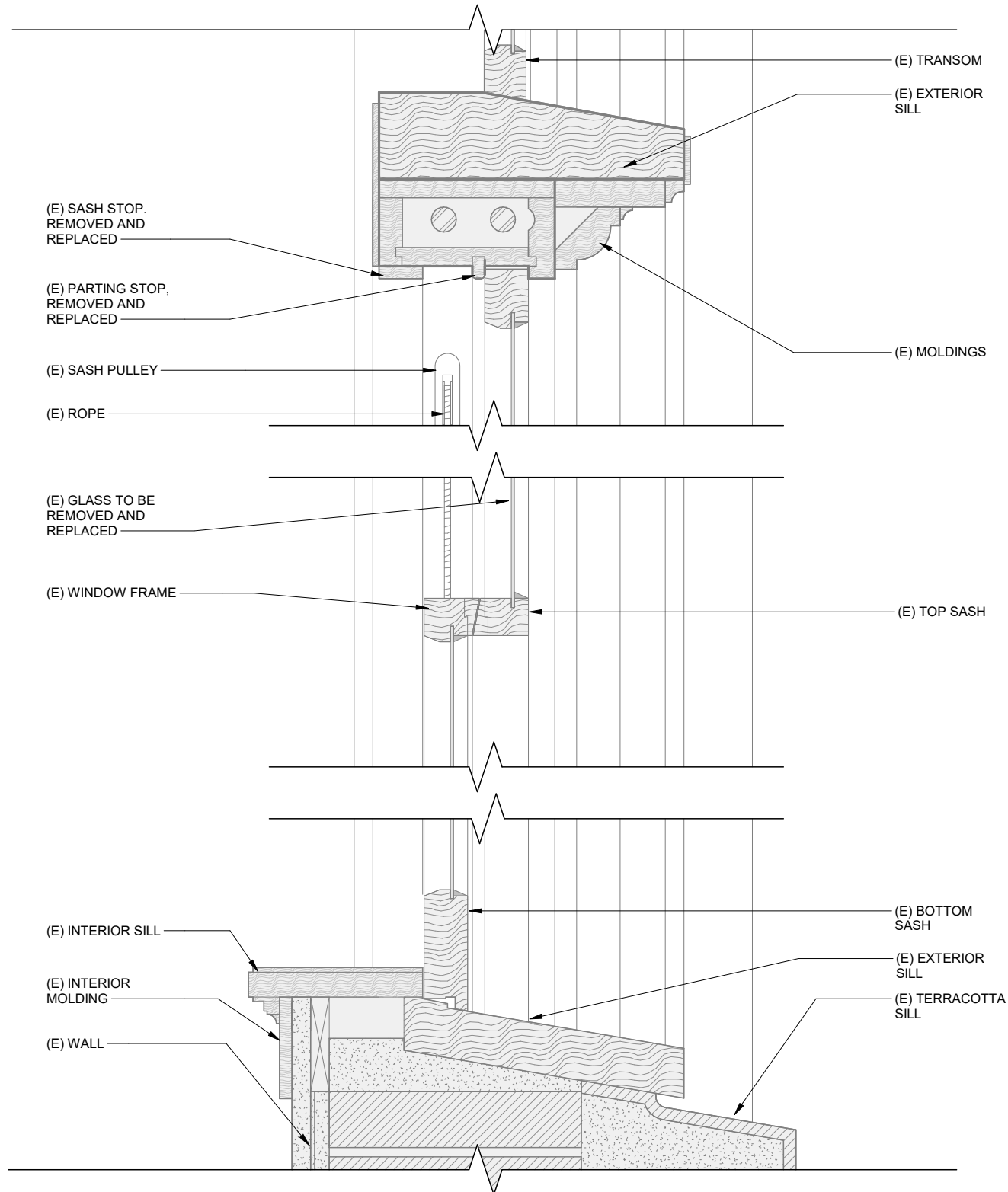
|   |   |   |
|---|---|---|
| <b>R-18</b><br>Center of Glass LoE <sup>3</sup> - 366 | <b>77</b><br>Condensation<br>Resistance Factor            | <b>33+</b><br>Sound Transmission<br>Coefficient |
| <b>8 to 12-mm</b><br>Enthermal Thickness              | <b>4.6 kg/ft<sup>2</sup></b><br>Embodied Carbon Emissions | <b>20-year</b><br>Product Warranty              |

| 5-mm/5-mm              | Visible Light Transmittance | Exterior Reflectance | Fading UV | Fading ISO | SHGC COG | U-factor COG |
|------------------------|-----------------------------|----------------------|-----------|------------|----------|--------------|
| LoE - 180              | 78%                         | 14%                  | 26%       | 61         | 0.67     | 0.084        |
| LoE <sup>2</sup> - 270 | 69%                         | 12%                  | 13%       | 50         | 0.35     | 0.063        |
| LoE <sup>3</sup> - 366 | 64%                         | 11%                  | 5%        | 42         | 0.26     | 0.056        |
| LoE <sup>3</sup> - 340 | 38%                         | 13%                  | 2%        | 27         | 0.16     | 0.056        |

Operable pivoting transom windows

# Enthermal<sup>®</sup> Performance

### 3.1 Drawings Describing Original vs After Refurbishment and Glazing Replacement



## 3.0 \_ *Refurbishment of Windows and Lessons Learned*

1. The exterior and interior window frames and exterior sub sill were able to be refurbished without replacement of any wood components.
2. All of the parting and inside stops split during removal because of their thin profiles or because of existing wood deterioration. Although an attempt was made to save the stops during this mock-up Legacy Renovations was not successful and believes replacement of the wood stops will be required for any window where the stops are removed for sash refurbishment.
3. Replacement of wood components on the sashes included.
  - a. The bottom rail of the lower sash which was expected as we could poke through it with a probe before we even started this mock-up. Estimate for the other windows is that somewhere around 25% of all bottom rails will need replacement and potentially a handful of vertical stiles.
  - b. Both vertical muntins on the lower sash could not be repaired and were replaced. Troy thinks that replacement of muntins on the lower sashes will be required for most but not all of the other windows.
4. An attempt was made to add weights to allow for both double hung sashes to remaining operable but there was insufficient room in the weight pocket to add enough lead weights to achieve this goal.
  - a. With the Luxwall vacuum insulated glass the double hung sashes increased in weight from approximately 37lbs to 68lbs each and Legacy had to nearly completely fill the weight pocket to get enough lead to make just the lower sash operable.
  - b. A small black rubber stop was installed to limit the lower sash to a maximum opening operation of 4-inches. This stop is not visible from the exterior and the expectation is that SPS will want this kind of stop for all windows do to safety/security concerns. This stop is removable.
  - c. The upper sash was kept as inoperable but secured with a painted wood block that can be removed.
  - d. The upper pivoting transom was previously made inoperable with painted sealant because the original windows didn't have any hardware to secure them closed. An interior wood trim piece was added in lieu of just sealant to prevent the upper pivot window from being blown open by wind. It is possible to add new closing hardware that fits within the historic context but it would still be new.
5. For the Luxwall glass, when you view the windows up close you will notice a thin 1/8-inch gray band around the perimeter of the glass. This is the ceramic seal for the vacuum. We installed the new glazing putty at the same 45 degree angle as the original which leaves the ceramic seal visible but keeps the same width of the visible white profile and glass size. It is possible to increase the glazing putty slope to hide this gray ceramic band but I think the gray is less noticeable than an increase in the white painted putty. The other option to hide the gray ceramic band would be to rout or dado the sashes and muntins but we didn't want to alter any historic sash components beyond refurbishment.
6. Other than replacement of deteriorated wood components which are now permanent, everything included in the mock-up is reversible. Note the historic single pane glass was salvaged.

4.0 \_ Photos of On-Site Refurbishment



Upper frame with pivoting transom sash removed



Lower frame with double hung sashes removed



Subsill with loose paint removed and prior to epoxy repairs



Careful removal of exterior sealants and minor wood rot

# 4.1 \_ Photos of Shop Refurbishment

Tuesday, February 24, 2026 1:14 PM



Rot beginning in Muntins and failing paint





# Patched

Friday, March 27, 2026 8:21 AM



Paint has been removed to expose deterioration

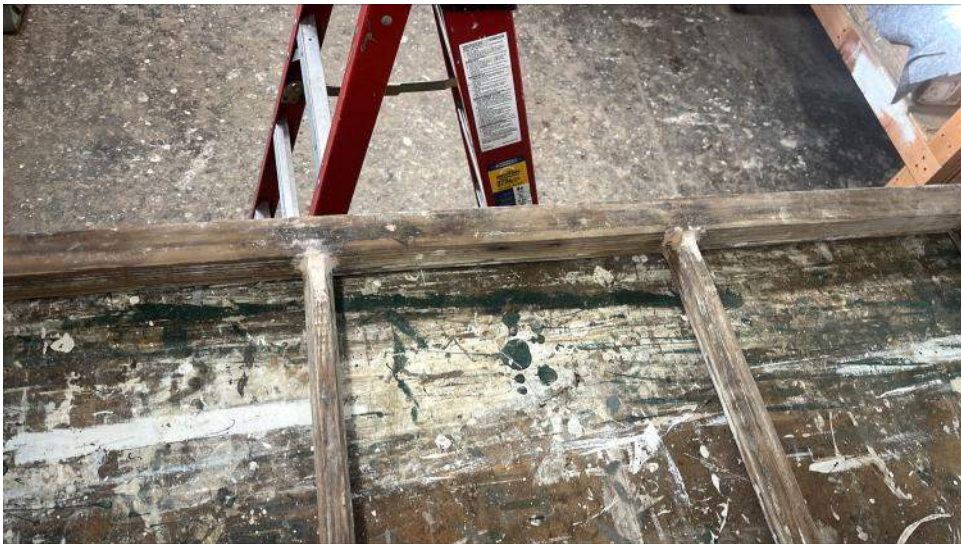


Rot has been removed and consolidated with System three "Rot Fix" then filled and patched with "Sculpwood" Epoxy



Joints have been patched and reinforced at stile and rail joints and muntins

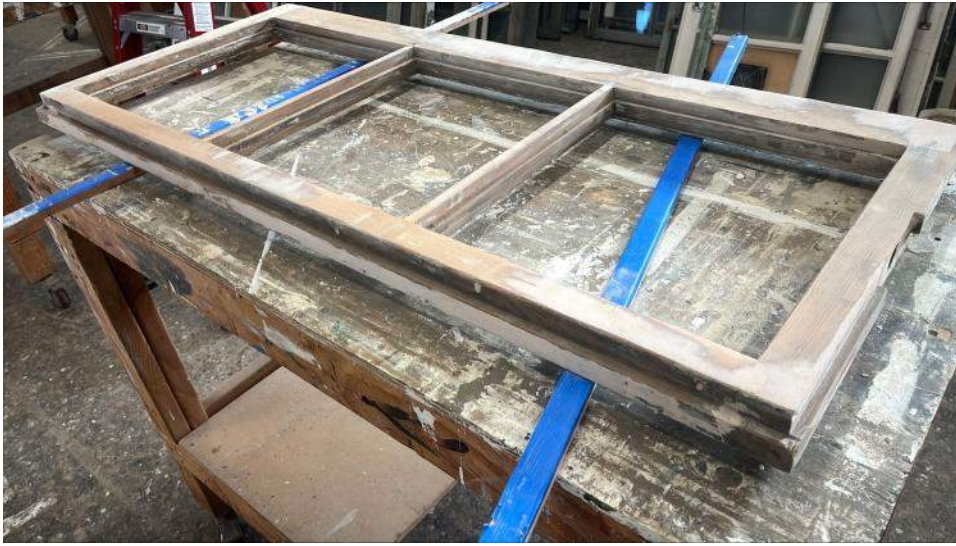












The mortises for the center pivot hopper hardware have been cleaned up and patched/reinforced





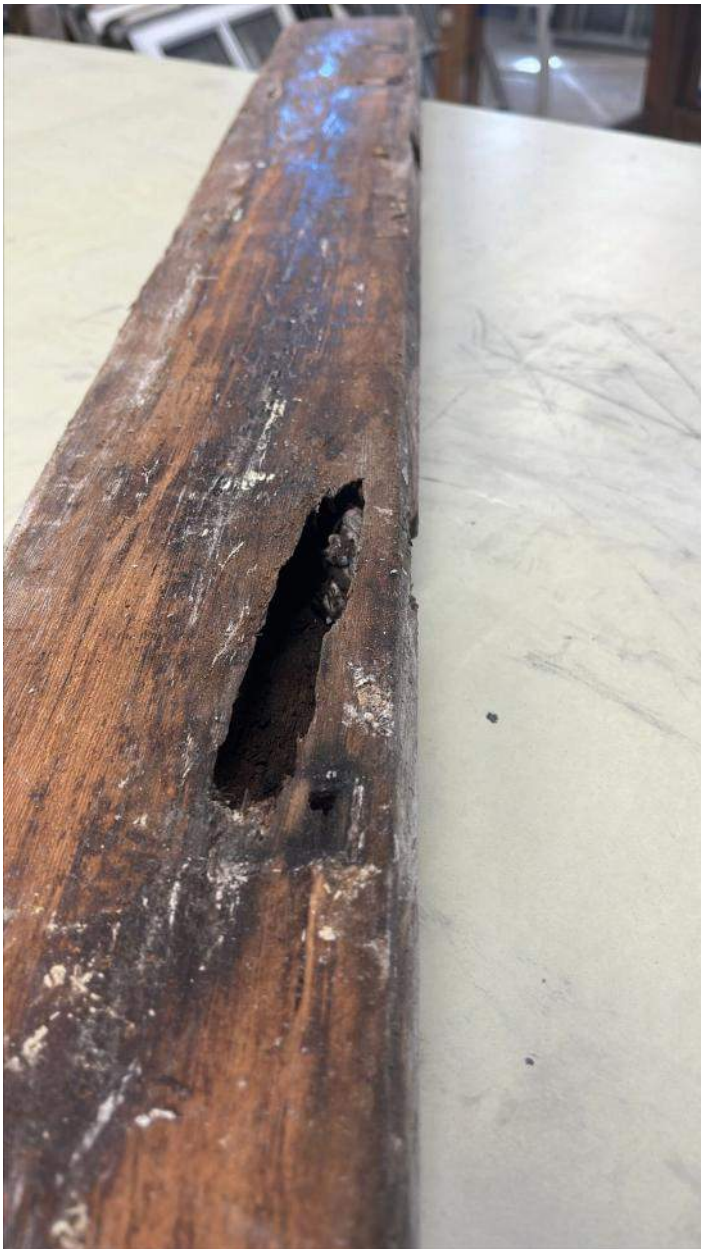
# Bottom rail repair

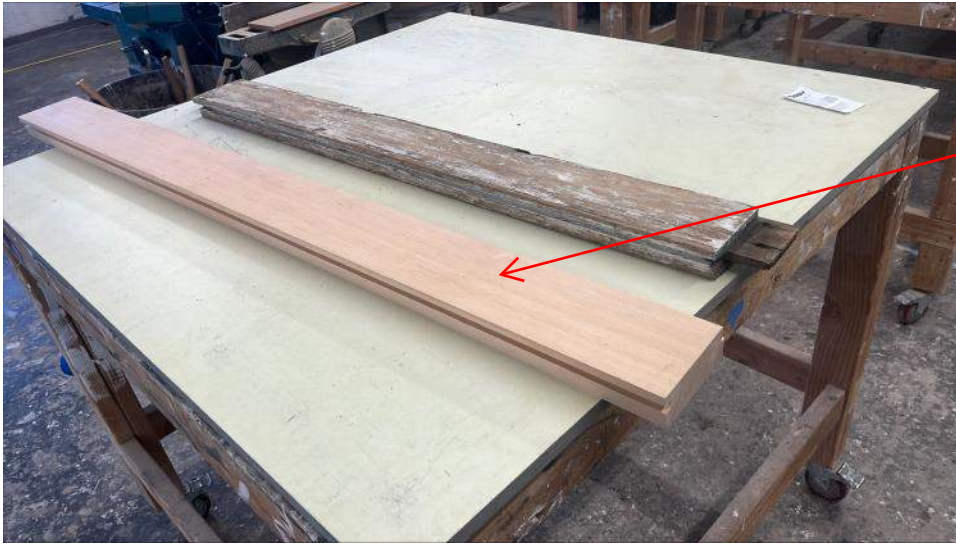
Monday, March 30, 2026 11:36 AM



The bottom rail of the bottom sash was rotten beyond repair







Newly manufactured bottom rail. We are finishing the machining of the tenons this week and will have the sash reassembled

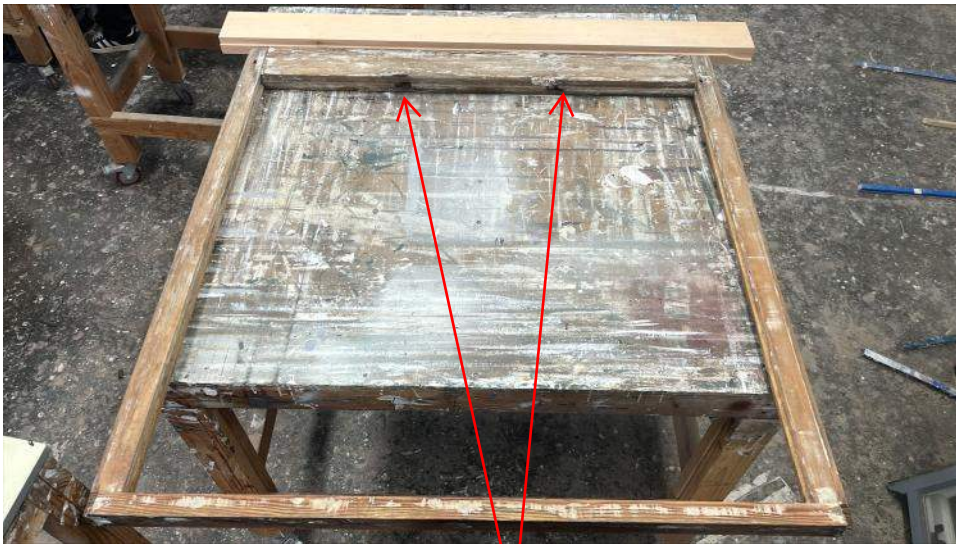












Sticking (Muntins) will be reassembled along with the bottom rail replacement

## 5.0 \_ *Photos of Completed Mock-Up*



2026/04/16 14:21

Possessive Nouns  
Shows ownership

- ① Singular noun → Add "s" at end
- ② Plural noun → Add apostrophe at end
- ③ Irregular noun → Add "s" at end

- ① cow → cow's
- ② kids → kids'
- ③ children → children's

Subject, Object, and Possessive Pronouns

|      |              |        |
|------|--------------|--------|
| Me   | My/Mine      |        |
| You  | Your/Yours   |        |
| Him  | His          | plural |
| Her  | Her/Hers     | only   |
| It   | Its          |        |
| Us   | Ours/Ours    |        |
| Them | Their/Theirs |        |

Who/Whom Whose





2026/04/16 13:42



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10/30/2026  
STC0925011017

2026/04/16 13:42



2026/04/16 14:00



2026/04/16 14:10



2026/04/16 14:11



2026/04/16 14:13



is.





### Reading Comprehension Strategies

- \* Preading
- \* Asking questions
- \* Make inferences
- \* Making predictions
- \* Visualizing

### Punctuation

- **Period** tells you when it's the end of a sentence  
Luciano like brain? Dem also like it
- ? **Question Mark** end of a sentence that asks  
Dees Aries like fishing? What happened Rye?
- ! **Exclamation Point** ends a sentence with strong feeling  
Fiddlesticks! It's a PlayStation!
- **Comma**
  - \* in dialogue "Oh no," she said
  - \* in between sentences with a conjunction  
Nomi likes cookies, but Alton doesn't like Hobnobles
  - \* listing 2+ items  
Tina loves sushi, ice cream, faves, and pizza
- **Quotation Marks**
  - \* dialogue "I am!"
  - \* titles "The Great Gatsby"
  - \* titles "The Great Gatsby"
- **Apostrophe**
  - \* contractions  
won't, can't, I'm
  - \* ownership  
Rex's, but I am, I'm







Possessive Nouns  
Shows ownership

- ① singular noun → add 's' at end
- ② Plural noun → add apostrophe at end
- ③ Irregular noun → add 's' at end
  - ① woman → women's
  - ② kids → kids'
  - ③ children → children's

Subject, object, and Possessive Pronouns

|          |          |              |        |
|----------|----------|--------------|--------|
| I        | Me       | My/Mine      |        |
| You      | You      | Your/Yours   |        |
| He       | Him      | His          | plural |
| She      | Her      | Hers/Hers    | and    |
| It       | It       | Its          |        |
| Us       | Us       | Ours/ours    |        |
| Them     | Them     | Their/Theirs |        |
| Who/Whom | Who/Whom | Whose        |        |

PROGRESSIVE TENSE

was  
were  
am  
is  
are  
will be

+ action verb = Progressive Tense Verb  
-ing

Our class was sorting microfossils.

Our class is sorting microfossils.

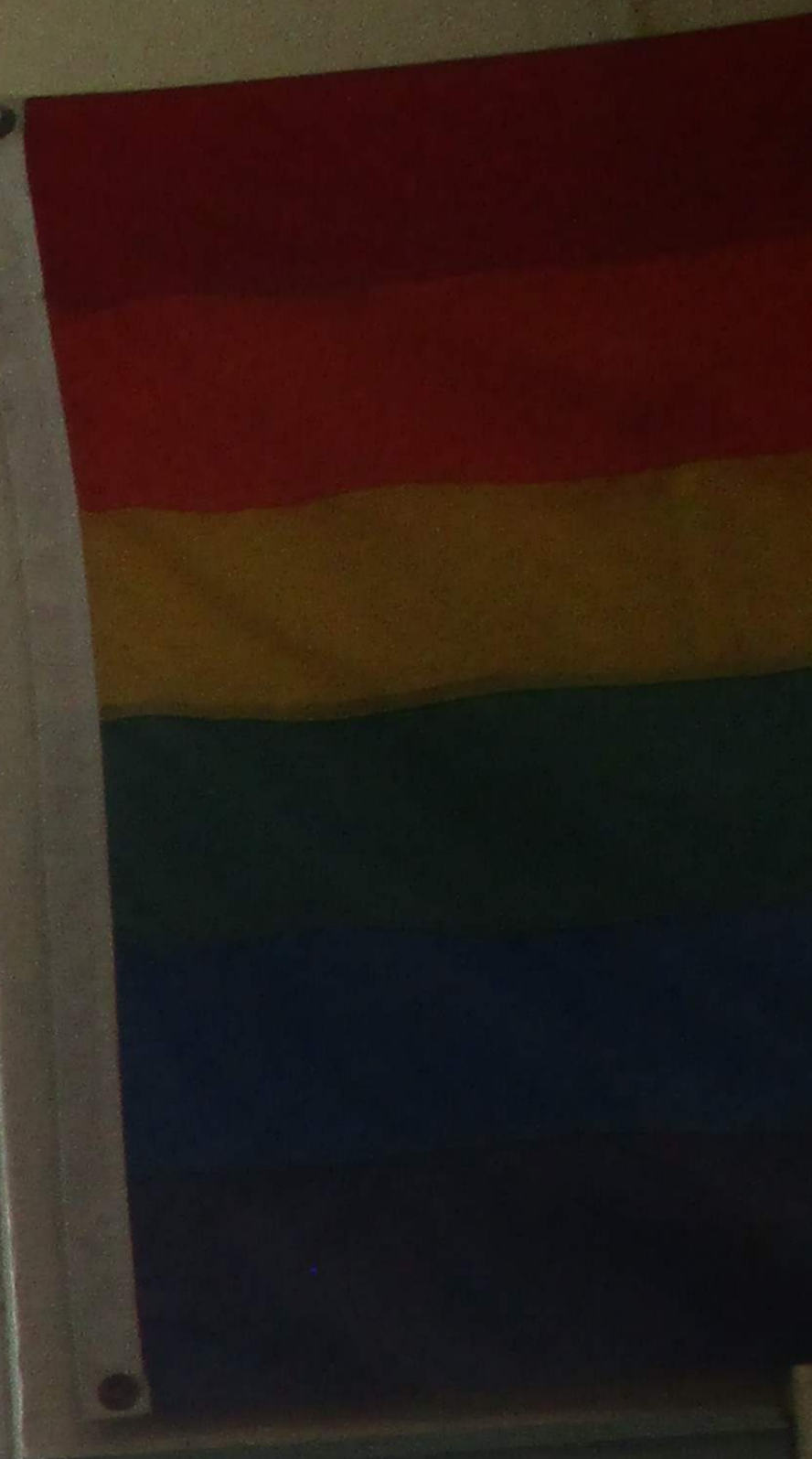
Our class will be sorting microfossils.

Perfect Tense Verbs

had + past participle = Past Perfect  
They arrived, Logan had already left the door.

have + past participle = Present Perfect  
Has Egypt for several years heard from Dr. David?

will + have + past participle = Future Perfect  
Friday, we will have gone to



Reading Comprehension Strategies

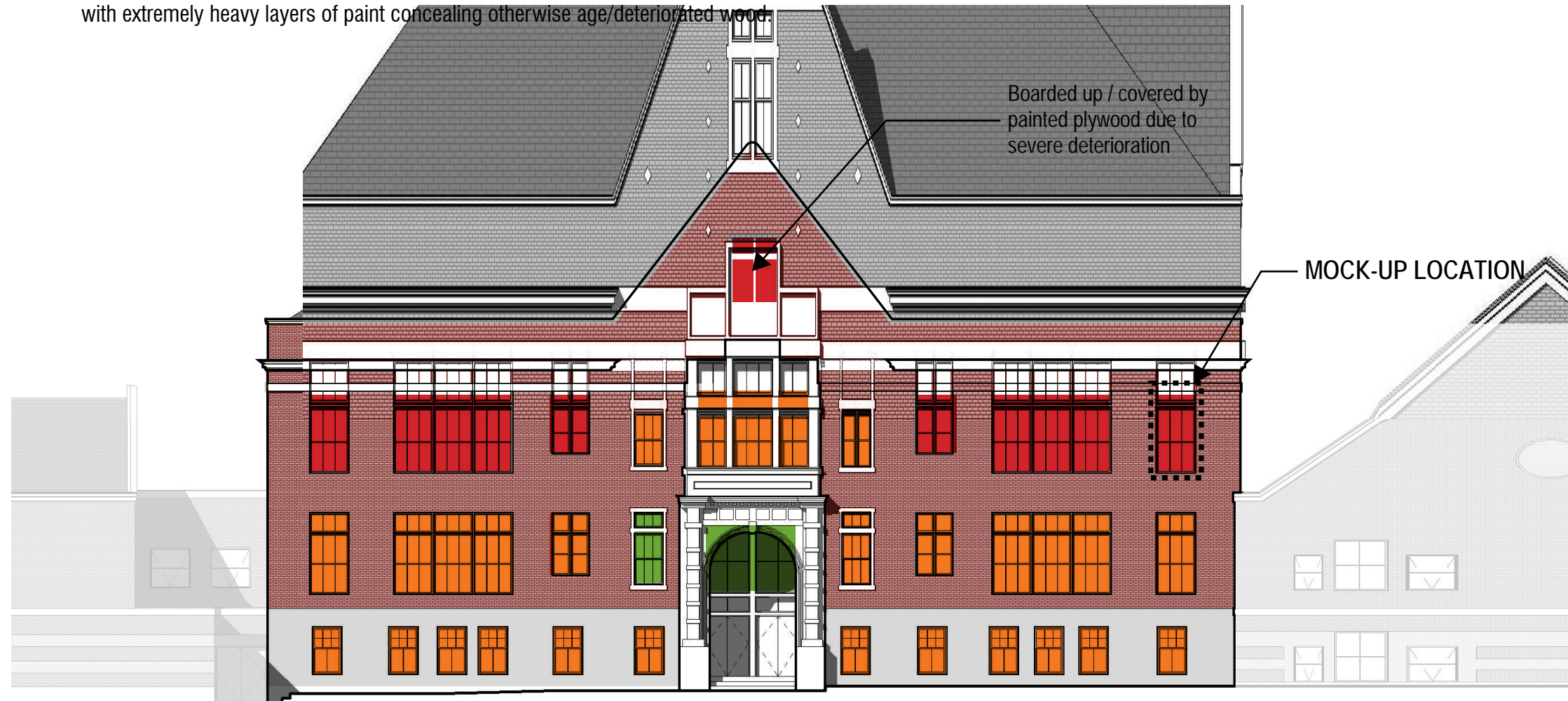
- \* Rereading
- \* Asking questions
- \* Make inferences
- \* Making predictions
- \* Visualizing

## Appendix-A, Gatewood Elementary Wood Window Condition Survey

### SOUTH ELEVATION - OVERALL NOTES:

Although some repairs have been performed recently, the windows on this elevation are generally in the worst condition. On the 3rd floor, the majority of the windows are no longer safe to operate due to complete deterioration of lower sash bottom rails. Wood deterioration is concentrated, but limited to, skyward facing horizontal elements and the base of vertical elements that are in contact with glazing. *Note: The attic window directly above the schools south main entry is currently boarded up due to wood deterioration.*

Exterior wood casings all appear/are believed to be original circa 1910, and are generally covered in multiple layers of paint coatings but in serviceable condition with areas of spot deterioration along the base of vertical casing pieces. Exterior sills and sub sills also appear/are believed to be original circa 1910 but are covered with extremely heavy layers of paint concealing otherwise age/deteriorated wood.



### \*GENERAL NOTES\*

- All windows lack Gaskets, Seals, Window glazing puddy & Sealants.
- All windows will require refurbished hardware.
- All Windows are single-paned and fall beneath current energy code requirements and acoustic standards.

### WINDOWS COMPLETELY FAILING

Complete Paint Failure, i.e. current condition will not accept paint repairs  
Significant Wood Deterioration.

Windows with a significant amount of wood components that cannot be repaired by any means short of full wood component replacement. Mock-up repairs indicate all bottom rails of all lower sashes will require replacement, some vertical stiles will require replacement, and most if not all vertical muntins will require replacement. Most of these windows are currently inoperable due to deterioration.

### EXTENSIVE DAMAGE

Complete Paint Failure, i.e. current condition will not accept paint repairs  
Extensive Wood Deterioration.

Windows with a significant amount of wood components that have extensive rot at least 1/4-inch deep or greater, black water staining, and other wood damage. Some bottom rails, vertical stiles and vertical muntins may require replacement.

### HEAVY DAMAGE

Area Paint Failure, i.e. current condition will accept paint repairs  
Heavy-to-Moderate Wood Deterioration in spot locations

Windows with some damaged components, age-related deterioration, and/or failing paint coatings, spot locations of rotted wood, but without any wood components that likely require replacement.

### MINOR DAMAGE

Paint is intact / recently refurbished  
Minor Damage

Windows with intact paint and some minor damage in spot locations. These windows have been repaired or refurbished within the last 1-5 years

## Appendix-A, Gatewood Elementary Wood Window Condition Survey

### NORTH ELEVATION - OVERALL NOTES:

The majority of recent repairs have been performed on this elevation. As a less weathered facing elevation these windows are generally in better condition. Wood deterioration is concentrated along skyward facing horizontal elements and the base of vertical elements that are in contact with glazing. The two (2) attic windows on this elevation are currently boarded up due to wood deterioration

Exterior wood casings all appear/are believed to be original circa 1910, and are generally covered in multiple layers of paint coatings but in serviceable condition with areas of spot deterioration along the base of vertical casing pieces. Exterior sills and sub sills also appear/are believed to be original circa 1910 but are covered with extremely heavy layers of paint concealing otherwise age/deteriorated wood.



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Can not be repaired or etc

### HEAVY DAMAGE

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Heavy-to-Moderate Wood Deterioration in spot locations

Windows with some damaged components, age-related deterioration, and/or failing paint coatings, spot locations of rotted wood, but without any wood components that likely require replacement.

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## Appendix-A, Gatewood Elementary Wood Window Condition Survey

### WEST ELEVATION - OVERALL NOTES:

These 3rd floor windows were repaired around 2013 and were repainted along with their exterior casings in 2018. Wood deterioration is isolated to the lower operable sashes and concentrated along skyward facing horizontal elements and the base of vertical elements that are in contact with glazing. Exterior sills and sub sills also appear/are believed to be original circa 1910 and although experiencing coating failure, appear generally serviceable.



### \*GENERAL NOTES\*

- All windows lack Gaskets, Seals, Window glazing putty & Sealants.
- All windows will require refurbished hardware.
- All Windows are single-paned and fall beneath current energy code requirements and acoustic standards.

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Significant Wood Deterioration.

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### EAST ELEVATION - OVERALL NOTES:

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