WINDOW SCOPING GUIDELINES

3.1 Introduction

Windows are a common source of water leakage in both new and existing buildings. They can be challenging to address since leaks may be coming from the actual window unit/product, the masonry or surrounding construction, leaks from windows on the floor above, or a combination of these factors. Selection of windows for performance and durability is critical, but should not overshadow the need for proper window detailing at perimeters to integrate the window with the rest of the building enclosure. This integration must take into account not just waterproofing, but insulation and airtightness as well.

Guidelines for new vs. existing buildings can be very different, given the challenges of properly integrating new window systems with existing walls, which may not have integral weather barriers making flashing details difficult. Understanding the construction of the subject building, specifically the exterior walls, will be critical to the success of the project.

- For discussion of Energy Code Compliance issues, refer to the Building Envelope Scoping Guidelines.

- See the Building Envelope Testing Scoping Guidelines for further discussion of testing strategies.

Current and planned energy codes are relatively strict when it comes to glazing, in which prescriptive requirements allow not more than 30% of the gross wall area to be glazed. U-factor and solar heat gain requirements make thermal breaks and high performance insulating glass (with low-e coatings) necessary just to meet minimum performance requirements. It is also important to consider the opening and locations of insulation when designing windows, as air/vapor barriers, waterproofing, flashing, and insulation must all align properly with the window itself.

3.2 Project Definition

The Window Capital Category may include some or all of the following components:

- *Windows*
- *Exterior Guards*
- *Interior Guards*
- *Shades*
- *Lintels*

Design Requirements: *Refer to Window Sections 4.3 and 5.7 and other relevant sections of the SCA Design Requirements for further design and technical requirements.*

3.3 Referred Items and Additional Items

Scope all Window items, using the BCAS report as a checklist of items and selected node(s) for guidance.

Using the selected Nodes and BCAS report as a guide, determine if full or partial window replacement is required. Study building history including original and previous completed projects at the school.

3.4 Investigation & Documentation of Findings

Report on the condition of existing windows. Include an introductory statements with description of the existing window types and locations (i.e. double hung, projecting (outward or inward type), fixed), glazing type(s), framing materials, configuration (e.g., single, ganged, triple, etc.), and if any obscured glazing, insect screens, etc. Also, indicate if there are any manual or motorized window operators. Survey and document any unique window treatments (i.e.: horizontal and vertical blinds, curtains, etc. that need to be removed and reinstalled or replaced. If there is existing window wall or curtain wall, indicate location(s) and a general description in the introduction, with detailed deficiencies in the findings. Indicate if there are window-mounted air conditioning (AC) units, where they generally occur and the condition of the perimeter system and sealants. Many retrofit AC units are undersized for the window opening, with clear plastic sheeting and sealant used to close off the opening around the unit. This is problematic not only due to the risk of water leakage and drafts/air leakage, but because leaks from these elements can often mask more significant leakage from the windows, and make it difficult to diagnose leaks from the windows themselves.

Indicate if any recent window replacement, or repair work such as reglazing and/or resealing has been completed recently. Identify previous DOE and SCA completed projects, including Design Number, approx. date of completion, etc.

When inspecting windows, it needs to be determined whether they can be repaired or if replacement is required. The condition of perimeter sealants at head, jamb and sill and source(s) of water infiltration must be carefully investigated. For wood windows, the condition of the wood framing members as well as exterior paint/coatings is critical. Pay close attention to the condition of stone windowsills, since deterioration and/or organic growth can often be a sign of back pitch directing water to pond on the windowsill. Also note any mis-aligned frames that may prevent the windows from properly closing, any instances of missing or broken window panes, or any other special conditions that may lead to water infiltration. Water infiltration that may appear to be attributable to the windows may actually be attributable to the surrounding masonry (including lintel flashing, etc.). The NDT investigation needs to be carefully coordinated with the investigation of exterior masonry and testing done systematically to check each item separately. This is especially true at window head leaks, which may be caused by leakage from window sills or other elements on the floor above (specifically in areas with band courses or other horizontal projections above that can catch water).

Typically, window replacement – not repair – is considered Capital-Eligible, *but conditions must be well documented to justify replacement.* Window deficiencies in limited locations do not justify total window replacement. *Recommendation for window replacement must be supported by documentation of the location, extent, and percentage of windows with deficiencies.* Replacement limited to specific locations by building facade (i.e. on the south-facing façade that is exposed to the sun more than other elevations) or by discrete building locations (i.e. floor level, area or wing, etc.) should also be considered where appropriate to avoid unnecessary expenditures.

Deficiencies limited to glazing, perimeter sealant, or hardware (including balance replacement, window latches, weather-stripping, etc.) should be referred to DSF (Department of School Facilities) as maintenance items. If windows are not a DOE-Referred item and perimeter sealant requires replacement, include with the work under Exterior Masonry. If the perimeter sealant is not the source of water infiltration and windows will require replacement in the near future and/or window perimeter

sealant will not be impacted by Exterior Masonry work, this work may be deferred or limited to selective repair and replacement in areas of leakage only.

Testing must determine whether leakage is due to window units, perimeter conditions, or a combination of the two. Window unit leaks can often be addressed by targeted repairs, such as "wet sealing" on the exterior of glazing perimeters, heel beads below glazing units, cleaning/addition of exterior weeps, or other exterior-applied sealant. It is important to note that some of these repairs will have limited effectiveness, requiring reapplication in 3-5 years, but it may also be sufficient to address immediate or severe leakage at relatively low cost – a reasonable "stop-gap" measure until more thorough repairs or replacement can be implemented.

It is important to indicate if there is any water or air infiltration due to window deficiencies, i.e. deficiencies with the window product itself. Document the extent of water and air infiltration (if any) through the windows or along the perimeter. Comment on the condition of perimeter sealant. Indicate locations of documented or observed leaks and other deficiencies on annotated sketches of Floor Plans and Exterior Elevations in the Scope Drawings in the Appendix and include quantities with the Recommendations. Infrared thermography is a valuable tool in identifying air leakage at window perimeter and any thermal bridging that may cause condensation at window perimeters. This technique can be used (weather pending; exterior temperatures below approximately 40°F are ideal, but below 50°F may still be sufficient) to qualitatively assess air leakage through a large number of windows relatively quickly, typically when combined with fan pressurization/depressurization of the interior spaces. See the Building Envelope Testing Scoping Guidelines for additional discussion of window and exterior wall testing.

Code requirements for Fire Department access should be evaluated per the latest NYC building code and the previous codes for which the project may be filed under. Windows and Window Guards must consider code requirements related to "Holding Areas" and "Areas of Rescue Assistance" per the latest DOE initiatives. Refer to the Building Code and SCA Design Requirements for further discussion of requirements.

Procurement of window AC units should not be included with Window Projects, as they are not typically capital eligible. If windows are being replaced, only existing window AC units should be removed and re-installed. The existing AC units should be located within the upper window sash in all possible locations and the electrical outlets be coordinated if the A/C units are being relocated to the top of the window. The size of the units and the new openings must be coordinated, since new openings are many times smaller in size than the existing. AC units must be served by electrical outlets on dedicated circuits only. If existing outlet(s) are not on a dedicated circuit, wiring modifications should be included. New AC units (if purchased by the school or funded by others) along with existing AC units to remain may/should be installed with Window Replacement projects. New aluminum window air conditioner unit brackets (finished to match the window framing), and required electrical power requirements should be provided and installed as part of the CIP work to support new and existing window AC units to remain.

- As discussed above, many installed AC units are "patchwork" installations using clear plastic sheets and sloppy perimeter sealants that are highly prone to water leakage. These elements must be replaced in a more reliable manner, including perimeter flashing and properly configured sealant joints. Further, for large units, clear plastic may be insufficient to resist wind loads and will require strengthening or replacement with other materials (metal panels, etc.). Be sure to avoid damaging window frames themselves for attachment; fastening too close to a glass edge can break glass, and fastening into some areas of the frame can block weeps or create leakage paths.

- Replace all clear plastic in-fill panels with new insulated metal panels for all AC units. The insulated metal panel color should match the window frame color.

Prepare “Existing Condition” or “Damage Mapping” drawings that record the location(s) and extent of deficiencies observed on annotated plans, elevations and other drawings as appropriate. Map out window damage locations on building elevations for all areas of the building. This step can be critical to identifying damage patterns, such as damage only below parapets or trim bands that are indicative of wall and perimeter leakage as opposed to leakage through the actual windows. Also, prepare corresponding “Recommended Work” drawings that graphically describe the recommendations. Refer to the Building Envelope Scoping Guidelines, Section 2.5 Investigation & Documentation of Findings for additional requirements.

3.5 Window Element Work

3.5.1 Windows

Where existing wood windows are being replaced with new aluminum windows, remove all existing window framing and blocking. SCA has experienced problems with moisture and rotting of existing wood framing and blocking left in place and covered with panning only. New windows should be anchored into solid substrates only.

Minimize the use of wood blocking & panning on window replacement projects unless required to maintain existing window profiles on SHPO Eligible projects to maximize window day-lighting. Provide plastic shims and blocking in lieu of wood where possible. If wood is necessary, it must be preservative treated (regardless of size).

Cover new wood blocking and the substrate of window openings with a self-adhering rubberized asphalt membrane such as Grace "Perm-A-Barrier" or equal to protect the wood blocking from moisture and provide a secondary protection against water infiltration at the window perimeter. At the sill, the membrane shall be formed to act as a flashing.

Provide a window attachment design that avoids fastening windows through the sill flashing, which can reduce its effectiveness. Fastening through the back of the window with perimeter angles can achieve this.

Where window replacement coincides with lintel or exterior masonry work, it is best practice to provide through-wall metal flashing above the lintel and extended 3 in. minimum on either end of the lintel to divert water. Provide end dams at flashing terminations on each side. Lap the wall waterproofing membrane onto the flashing.

Document conditions at existing window sills/stools and adjacent radiators, convectors, unit ventilators and covers. Determine if these elements will be impacted by the window work and include work to remove and reinstall or remove and replace window sills/stools, radiator or convector covers in the scope description and estimate as required.

Identify and address any adjacencies and/or penetrations of ductwork, pipes, electrical conduit, etc. through existing windows to be replaced and include the necessary work within the Window scope description and estimate. Penetrations through windows should be avoided. Relocate electrical conduit and other penetrations to more suitable locations.

Identify location(s) and condition of louvers within existing windows. Louvers sometimes are provided at bulkhead windows, areaways, and other locations. If windows require

replacement, examine the functional requirements and include louver replacement and associated MEP work in the Window scope of work as applicable. It is recommended that the new louvers match the color of the window frames. Drawings and specifications should be edited to indicate if the louvers will require a non-standard color.

Identify location(s) of existing insect screens. Refer to SCA Design Requirements for locations where Insect Screens are required.

In the scope of window work, include any masonry work and interior repairs related to the window removal and replacement. If there is interior damage due to the existing window deficiencies, also include these repairs with the Window Work.

In the request for IEH investigation, request PCB investigation of sealants. In Scope Estimates, assume PCB and ACM containing materials pending IEH confirmation. Also, identify if lead paint is suspected.

3.5.2 Exterior Guards

In Window replacement projects, the location and condition of existing exterior window guards should be evaluated. Also identify the types of guard(s) at the project; i.e. wire, expanded metal guard, and/or security barrier type.

Refer to SCA Design Requirements for locations where exterior window guards are required. Window guards should only be reinstalled/replaced/provided if they are in areas susceptible to intrusion, breakage or as requested by the school for site-specific security reasons. Review proposed locations with the School Principal(s). If deviation to the SCA Design Requirements is requested, submit a deviation request to the DPM/DM for A&E Approval.

Window guards will need to be removed to install windows. They may also need to be removed even if there is no window replacement in order to facilitate exterior masonry work around the windows. Only those guards less than 10 years old should be considered for reinstallation, and only if they only require spot paint repair. If they are aged, damaged, or require complete refinishing due to rusting, they need to be replaced.

If it is determined that replacement of the exterior window guards is justified and/or more cost effective than refurbishment, consider replacing the existing window guards with the “Security Barrier” type, typically used in new construction. Submit a deviation request to the DPM/DM for A&E Approval prior to incorporating security screens in an existing building. If A&E approves Deviation Request, provide information on Security Barrier type guards to school representatives and explain how they differ from their existing window guards. Encourage school representatives to visit one or more recent installation of the Security Barrier type guards, and obtain the School Principal’s approval in writing.

Carefully review available width and anchoring detail(s) at jambs of masonry openings for new and existing exterior guard installations. Masonry units spall and break when window guards are installed too close to masonry corners. Preferred location of fasteners for Exterior Guards is along the inside jambs of the masonry opening, rather than mounted to the outside face of wall. Utilize stainless steel chemical adhesive anchors for installation of new and existing Window Guards, and favor installation through mortar joints as opposed to through the masonry.

Include masonry repair or replacement where existing exterior guards are removed. If the project is for windows only, include these masonry repairs with the Window Work.

3.5.3 Interior Guards

Indicate the location and condition of interior guards. Identity the type of guard(s); and whether hinged or non-hinged.

Refer to SCA Design Requirements for requirements and locations where interior window guards are required, which are typically at stairways, corridors, toilets and gymnasiums.

Within stairways, identify and address railings, stair supports, and other components that need to be addressed for interior guard scope of work and include the necessary work within the Window scope description and estimate.

If feasible, remove and reinstall existing interior window guards. Interior window guards at interior windows must be placed so that there is sufficient clearance to operate the window (allowing room for operation of the window.)

3.5.4 Shades

Include replacement of shades with window replacement projects only.

If there are deficiencies with window shades at existing windows to remain, recommendations to repair or replace window shades should be referred to DSF as maintenance items.

3.5.3 Lintels

Inspect the condition of lintels over existing windows. Indicate if repair or replacement is required. Typically, lintel replacement if required should be scoped with Exterior Masonry Work, since it requires brick removal and replacement, new lintel flashing, etc. Excessive corrosion/section loss, flaking of corrosion product or visible deflection of the lintel, or cracking masonry are common indications that remediation is required. Preferably during the scoping phase, probes need to be done to verify the condition of the lintels and the back-up to which it is to be attached.

If the DOE-Referred work is for Windows only and there is no exterior masonry work required for the project other than that affected by the lintels and window installation, include lintel replacement for severely deteriorated lintels where known and Provisions for additional lintel replacement that may be discovered during construction.

Include rust removal, preparation and painting of lintels under Window and/or Masonry projects. If windows are replaced, treat all exposed lintel surfaces following removal of existing windows. If window replacement is not part of the final scope, prepare and paint all visible lintel surfaces as part of Masonry work.

If lintels are replaced or repaired, and masonry removal is included, new through-wall flashing must be installed at the lintel, extending 3-inch minimum past the lintel ends and ending in end dams. Damage to lintels is typically caused by excessive moisture in the masonry above, which will not be addressed by lintel replacement alone. The addition of flashing is primarily a material cost at this point, since the new steel and labor to remove and replace masonry represents the bulk of the cost.

Review the location of the existing window lintels to ensure that the new window panning will not block water draining from above the lintel.

3.6 Related Items

3.6.1 Interior Finishes

Survey and document any interior finishes damaged due to water infiltration at windows. Include patching and painting and other necessary work within the Window scope description and estimate.

3.6.2 HVAC

The Window Work above may require the removal and reinstallation of existing (or replacement with new) mechanical equipment, unit ventilators, convector covers, ductwork, piping, etc. to access the window area for window removal and installation. If there are existing HVAC items (ducts, piping, etc.) that penetrate the existing windows and will be impacted by the work, the work and expense to remove, reinstall or replace should be included in the Window project. As discussed above, avoid using clear plastic sheets as surround panels and allowing fasteners into existing window frames. Provide insulated metal panels or other more durable elements for infill panels.

3.6.3 Plumbing

Plumbing is rarely affected by Window Work. If there are existing plumbing items that penetrate the existing windows and will be impacted by the work, the work and expense to remove, reinstall or replace should be included in the Window project. Plumbing lines shall be relocated to more appropriate locations, if required.

3.6.4 Electrical

The Window Work above may impact existing electrical items. If there are existing electrical items that penetrate the existing windows and will be impacted by the work, the work and expense to remove, reinstall or replace should be included in the Window project. Any electrical items penetrating windows must be removed. Use dedicated wall openings for any electrical penetrations.

Existing window AC units should be installed in the upper portion of windows and may require relocation of electrical outlets to serve these units. AC units must be served by dedicated circuits properly sized for the anticipated loads. Outlet and switch locations should comply with the latest SCA Standard Details.

3.7 Design Considerations

Proposed Building Envelope Modifications shall be designed to meet or exceed Energy Code Requirements. Refer to the Building Envelope Scoping Guidelines for discussion of Energy Code Compliance. Confirm that window specifications and details meet or exceed performance requirements.

Each different window and window guard conditions should be detailed on the Drawings. Many times there are numerous different conditions which must be detailed. Indicate any reinforcement or frame replacement details that are required.

The window designations should clearly be shown either on the elevations or on a floor plan. A Window Schedule in the SCA Standard Details has been used very effectively on previous projects.

End of Window Scoping Guidelines