4.1 Design

4.1.1 Building Façade – New Buildings and Additions

Description/Design Approach:

A. General

1. The aesthetic, scale, proportion and detail of building facades shall manifest the educational, social, cultural and civic importance of a neighborhood school, its community, and be appropriate for the age of the student population as well as the context of the site.

2. As a general rule, Designers shall conform their façade designs to the SCA Design Requirements, and if there is a compelling need to vary from the Design Requirements, approval must be obtained from the SCA through the Façade Review Process**, which shall include maintenance and longevity information as well as a cost comparison of the proposed façade versus the other SCA accepted facades**.

3. The Façade Review Process is a series of meetings to be held with the same members as the Deviation Review Process, where the Designer will present their intended façade/elevation look and proposed materials. The materials will typically be selected based on the Façade Selection Matrix. Materials associated with a funded pilot program will also be discussed as part of this process. The intent is for members of the committee to discuss any potential issues they see with the designer's proposal to ensure it is consistent with the Authority's design intent and meets its sustainability goals. The Façade Process is to start as soon as possible and no later than the middle of design development documents (Phase 1C) so as not to affect the schedule.

4. **SCA schools are required to comply with Local Law 51/23 and the 2020 NYC Energy Conservation Code. School projects shall be designed to have a source EUI of 60 kBTU/SF/yr or below. Other use buildings (field houses, maintenance buildings, other accessory uses) shall be designed to have a source EUI of 38 kBTU/SF/yr or below, as they do not have kitchen loads. SCA standards have adopted a number of approved Energy Conservation Measures (ECMs) above the energy code. The following ECMs must be considered during the façade design process as minimum or maximum values.**

   a. **Wall R-value of 30.**

   b. **Foundation wall R-value of R-15.**

   c. **Window U-value of 0.25 BTU/h·ft²·°F.**

   d. **Thermal bridges must be accounted for in models and mitigated where practicable. This includes at roof parapets, slabs on grade, window installations, canopies, roof dunnage installations, brick shelf angles, rainscreen attachments, and any other significant compromise of insulation continuity.**

   e. **Air barrier continuity and rates of leakage are becoming more stringent with each new code. As per the 2020 NYC Energy Code, design teams must prepare**

an Air Barrier Continuity Plan and identify in the plans and sections the location of air barriers, and materials identified in details and specifications.

B. Materials

Choice of materials and wall selection is to be based on the Authority's "Façade Selection Matrix", which takes into account many factors such as material longevity **and availability,** building location, constructability and project duration, building aesthetic and cost.

The materials to be used in the design and construction of the school's exterior facades shall be limited to those materials that are specified in the Authority's Standard Specifications and the parameters established herein.

All materials and systems indicated as *"subject to approval by the Authority"* must be approved by the Authority through the **Façade Review** Process prior to final acceptance of **the** Design Development documents (Phase IC).

1. Backup wall structure

a. Cold-rolled steel stud construction with gypsum sheathing is the preferred option. Installation is rapid, and it accommodates higher insulation R values, and can be used with a variety of exterior wall finish materials – brick, terracotta, and UHPC.

b. Concrete Masonry Units (CMU) is a durable option and the preferred option for challenging acoustic environments. Construction is slower, and wall thicknesses increase significantly to achieve required R values.

2. Masonry

a. Brick

Brick has been the predominant material for exterior walls of buildings and will be the preferred option for ground floor where a rainscreen (terracotta or UHPC) is used above, or to meet a required aesthetic from SHPO. Exterior masonry walls shall be as described by Design Requirement 4.2.1-Exterior Masonry Walls.

1) Brick Bond Pattern:

a) Typical brick bond pattern/coursing shall be running bond.
b) Use of other brick patterns/coursing to enhance building elements as well as the overall building aesthetic is subject to approval by the Authority.

2) Brick type:

a) Brick type shall be that which is specified by DR 4.2.1 and the Authority's Standard Specifications.
b) Color and texture is subject to approval by the Authority.
c) Standard shapes and sizes are to be used **that** meet manufacturer's standard dimensions and angles. Special sizes and shapes are subject to approval by the Authority through the Façade Review process, as shapes other than manufacturer's standards increase cost and **delivery time**.

d) 100% solid units shall be used where unsupported projection of brick is 1.25" or more and brick **voids are** visible.
e) Mortar coloring - submit to the Authority for review and acceptance as part of the brick selection.
f) Glazed units are not permitted.

3) Concrete Masonry Units

Concrete masonry units **may** be used **for** back-up walls. Concrete Masonry Units, glazed or unglazed, **shall** not be permitted for use as an exterior wythe of masonry.

4) Ground Face Masonry Unit

Ground face masonry units require an initial plus periodic application of a field applied coating; which when not done right shows drips and runs and creates random color variations that appear like patches on the wall, are subject to chipping, and are not included in the SCA standard specifications. Use of ground face masonry units for exterior wythe of masonry shall not be permitted.

5) Calcium Silicate Masonry Unit (CSMU)

Use of calcium silicate masonry units will be permitted as a material for the building base when such masonry walls are part of the project.

b. Cast Stone

Cast Stone, as specified in the **Section 04720 of the Authority's Standard Specifications**, can typically be used to accent components and features of the exterior building elevations in conjunction with brick and block cavity wall construction, such as; coping stones, cornices, bands, fasciae, windowsills, window heads and water tables.

1) Cast stone used as material for the building base can be sized up to 24"x48".

2) Cast stone used as façade material other than the building base shall be 18"x24"x4" or any size that amounts to a maximum of one cubic foot, so that units can be installed without use of mechanical lifting devices.

3) Use of cast stone and/or pre-cast panels to emphasize massing and/or volume of a building façade is subject to approval by the Authority.

c. Exterior Cut Stone

Exterior cut stone, as specified in the Authority's Standard Specifications, is typically used on existing buildings to match features of the building's exterior, such as; coping stones, cornices, bands, fasciae, windowsills, window heads and water tables.

1) Possible use of exterior cut stone on Addition Projects, to match features of the existing building, is subject to approval by the Authority.

2) Use of exterior cut stone on stand-alone new building projects is typically not to be used **except at the base of a rainscreen façade** and use of such reviewed and accepted through the Façade Review Process.

d. Terra Cotta

Architectural terra cotta, as specified in Section 04250 of the Authority's Standard Specifications, is typically used on existing buildings to match exterior building elements. As it is a long lead item and there have been issues with proper installation and manufacturer, it is only used where alternate materials cannot be properly designed into the existing system. **Note that architectural terra cotta is distinct from terra cotta rainscreen materials as indicated in 3 below.**

1) The use of terra cotta in other forms besides ornamental shapes will not be permitted except as specifically indicated elsewhere.

2) Terra cotta historically was not used at grade level as it was not considered as abuse resistant as limestone or cast stone and its use as such should be limited to areas that are more than 10' above the adjacent grade level. Special sizes and shapes may require custom anchors and/or attachment details.

e. Glass Unit Masonry

Glass masonry units may be used in locations where diffused natural light is desired and ventilation, if required, is provided by operable windows or mechanical means. Clear glass masonry units may be provided at stairs and corridors. Stipple finish glass block may be provided at swimming pools and other locations where it would be advantageous to obscure the visibility from either side of the glass masonry unit. While the SCA's standard has been solid units and is preferred, they are typically no longer manufactured and abuse resistant hollow units are to be provided.

1) Note that Glass block has a 'U' value that is extremely high compared to that of a typical brick and block cavity wall, and is much higher than a typical aluminum window with insulating glazing and is thus to be limited in area.

f. Simulated Masonry

Authority's Standard Specifications include Glass Fiber Reinforced Concrete (GFRC), and Polymer modified Glass Fiber Reinforced Concrete (P-GFRC).

GFRC is typically used as a substitute for terra cotta or cut stone in existing buildings. It is not to be used on stand-alone new buildings. In existing buildings, it is typically used for large overhanging cornices where lighter weight may be an added value and the cornice can be hung from substrate. In rare instances on an addition project where matching an ornamental cornice feature is required, GFRC or P-GFRC may be used subject to approval by the Authority.

1) The use of simulated masonry in other forms besides ornamental shapes will not be permitted.

3. Rain Screen

Rain Screen systems may be utilized for portions of the façade, subject to approval by the Authority through the Façade Review Process, unless the system is selected as the best option for the entire façade through the Façade Selection Matrix. Rain screen system shall be comprised of structural steel stud with sheathing (or concrete or masonry if dictated by design of the building) back-up wall, vapor/air barrier, insulation, thermally isolated clip and framing grid and finish material meeting an overall assembly R-value of 30.

a. Ultra-high-performance concrete (UHPC) and terracotta panels are the accepted systems, with selection based on the aesthetic of the finish and panel size. Panel size and rail systems spacing for system selected shall take into account the economy and constructability economy of the selected system (i.e., UPHC systems are to use sizes in the 5'x12' range, with panels used for returns below 16" x 5' range being uneconomical**. T**erracotta units are typically most economical in 16" x 5' range to maximize effective panel economy as well as greater support system spacing.

1) Systems are to use concealed fasteners.

2) **The system** is to be kept a minimum of 2'-0" above grade to protect against snow and equipment and **flashing be detailed.** Both UHPC and terracotta **panels a**re resistant to damage, but a graffiti-resistant coating as required by DR 4.2.2 is to be provided.

3) **For acoustically challenging sites,** a rainscreen with a **CMU backup wall may be recommended. An acoustic analysis must be performed.**

4) **Terracotta and UHPC rainscreen systems are open joint, meaning the joints between panels are not grouted, caulked or otherwise sealed. These systems typically employ metal trim pieces to close the joints to prevent UV penetration, direct precipitation, and pest infestation. Refer to manufacturer literature and details for guidance.**

b. The use of other panel materials **not in SCA standards**, such as porcelain tile, GFRC, etc. utilizing concealed fasteners shall be reviewed and accepted through the Façade Review **p**rocess.

c. Façade is to be designed to minimize field cuts for those systems not fabricated to exact sizes, as edges may fray in the future if the manufacturer's products and instructions to treat the edges are not carefully followed.

d. Colors are to be selected from the manufacturer's standard colors and be available from several manufacturers.

4. Architectural Precast Concrete Panels

Architectural Precast Wall Panels are an option for facades due to speed of construction and inherent thermal bridging reduction characteristics. Use of such depends on the availability to use a crane for installation. Precast concrete panels are not recommended for sites with limited outdoor space for cranes and staging. If proposed, the designer is to present proposed panel layouts early in the design to ensure economy and constructability. Besides durability, this type of façade will typically provide the required acoustic separation

from exterior noise sources. There are many things to consider in the design of the panels and the intent needs to be to minimize the number of joints while ensuring that the panels can be shipped, fabricated and installed economically, which includes minimizing the number of crane picks. There are also aesthetics to consider in the design. Designer is to keep in mind the following design considerations:

a. Designer to ensure that a minimum of 2" clearance is provided between the structure and the panels to allow for panel installation and firestopping.

b. Panel widths shall be selected to avoid a size that would require the use of a 10-foot-wide truck, allow for preferably 2 panels to a truck, and limit the shipping weight to 40,000 pounds. Two units typically 12 feet wide can be transported on the typical 8-foot-wide truck, while a single 15-foot unit can also be transported on such truck. During the design phase, the designer should verify that the proposed design and layout can be done by at least three manufacturers. Some precast manufacturers cannot prestress the members, which may limit the sizes available and make them less economical. The use of sizes that would require oversized trucking loads to facilitate certain design are to be discussed during the design to see if there is a cost benefit and if the site can physically receive the units.

c. Preferred location for tie-backs to the structure shall be from the top of the structural deck or from the bottom of the spandrel. Attaching to the spandrel typically requires kickers bracing the bottom flange or other means that must be shown on the drawings. Designer is to make clear the basis of design for the attachment on the structural drawings and show any required beam reinforcement for the attachment. At the roof deck, tiebacks shall be attached to the bottom of the beam as they must be accessible/allow movement and cannot be buried in the concrete fill or roof system. Designer to show any required kickers or plate stiffeners.

d. Precast panel design shall be based on what a Category AC PCI plant can produce. Category AC plants are certified produce panels that are flat with either one colored mixture and texture per panel, have a 3-D form surface with reveals and liners only and up to a single pour return. If a particular design requires a higher finish category (AA or AB), obtain acceptance through the Façade Review Process, as they will limit the amount of available plants, and revise category listed in the specification, if accepted.

e. Compositely designed insulated sandwich panels shall meet an R-value of 20. Insulation shall be shown continuous so that thermal bridging is minimized. Insulation of the sandwich panel shall be 4" with an additional 3.5" of mineral wool batt insulation within the interior stud framing cavity for an overall nominal R-value of 30. For staircase exterior walls without interior framing, 4 inches of XPS shall be provided for overall assembly R-value of 20. All panels to utilize a double-layer of sealant at all joints in the exterior wythe with preformed sealant used as the outer layer at copings. Provide a single layer of sealant at the interior side of the interior wythe.

f. Steel studs are to be used to create the interior finish, except for spaces where an interior precast look is desired. Note there will be a 2" gap between the inside of precast to the slab edge that must be considered as well as access to install firestopping in the space.

g. Fenestration in relation to the panel widths must be taken into account. A minimum of 18" is required from any edge of concrete, with 24" being preferred, to prevent concrete

from cracking at formed openings during shipping and erection or to require excess reinforcement and extra thickness of concrete that would jeopardize the edges of the panel from being insulated.

h. Load-bearing panels with bracing at each floor is the typical preference but is based on height of buildings and recommendations from the precast fabricators. Panels spanning between columns is an option where load-bearing panels will not work in the layout.

i. Panel finishes

1) Panels shall typically have a concrete or brick finish. If a typical coping or windowsill shape is desired, they shall be designed integral with the panel.

a) If panel finish is to be concrete, the typical concrete finish is a light sandblast. The use of an 'as-cast' finish is not permitted. Patterns in walls, if used, are to be repetitive to allow reuse of liners for multiple pieces.

b) If panel finish is to be brick, thin brick (0.75" max thickness) specifically fabricated for the purpose meeting PCI fabrication tolerances is to be used. Designer is to ensure the brick pattern meets typical brick coursing to avoid odd looking cuts (e.g. dimensions between windows to be 2'-7$^{5}/_{8}$", not 2'-6" which would result in odd length bricks).

2) The use of thin cut stone or terra cotta as a panel finish or for accent may be appropriate to provide a warmer feeling based on adjacent community and will need to be reviewed and accepted through the **Façade Review** Process.

j. The use of panels for a building, or the facades selected to receive panels, should only be considered if site logistics are such that a crane can effectively reach those locations.

k. Special loading/lifting consideration must be given to panels that need to be installed under an overhang or in an interior court.

l. An anti-graffiti coating applied to precast concrete will result in a slight change of appearance. Panels shall be designed to create a break at the point the coating is desired to end to avoid a change in color in the middle of a flat panel, either by being a point where a new panel starts or a reveal is installed.

5. Aluminum**-Framed Glass** Curtain Wall

Difficulties in detailing, construction and delivery, plus the initial and maintenance costs, generally preclude the use of curtain walls on additions and stand-alone new building projects as a major façade element. However, it may be used for accent locations such as over-height lobbies or to create **a s**eparation between an addition and the existing building if reviewed and accepted through the Façade Review Process. Due to constructability and scheduling concerns, the use of curtain wall/window walls in stairwells is not permitted. Layout and location of the curtain wall within the facade shall provide protection from the elements by being within a frame of the façade and shall never have an unprotected top. Note that the 'U' value of a curtain wall is higher than that of a typical brick and block cavity or precast facade wall.

a. A storefront effect with the use of curtain wall at the first floor and window wall within the allowed fenestration percentages is permitted. Storefront systems utilizing triple glazing is not available at this time for the windows to meet the target U-value of 0.25, and should only be used in a small area where it is impractical to specify curtain wall.

6. Metal Panels

In order to avoid delays in building façade enclosure, metal panels may be used in limited quantities as an accent component. It will be allowed as a cladding system only where appropriate for the aesthetics of the building. Sizes shall be such to avoid potential 'oil canning'.

7. Graffiti Control

Graffiti control shall be provided as per Design requirement 4.2.2.

C. Other Elements

1. Canopies

A canopy or a building overhang may be desired to provide a sheltered area immediately preceding the entrance doors. Such canopies, when provided, shall typically be an integral part of the building.

a. All canopy types, materials, sizes and locations are subject to approval by the Authority.

b. Canopy attachments to the building structure shall be thermally broken.

2. Windows

The arrangement and design of windows (fenestration) shall be in scale and proportion to the building's elevations, massing, and volume. The windows must be appropriate for the use of the space for which the windows are being provided.

All occupied spaces and corridors shall have windows (unless the spaces are below grade). Windows for new buildings shall typically be aluminum hopper/fixed windows (projecting inward). Additions/Adjacencies to SHPO and/or Landmark buildings may require windows other than hopper/fixed windows. Windows shall be provided as per Design Requirement 4.3.1 - Window Types.

a. Use of windows other than hopper/fixed windows for new buildings or additions must be approved by the Authority.

b. The maximum window to wall ratio shall be 20%, but as glazing has a much higher U-value than the walls and thus less energy efficient, the intent is to be effective with the glazing and not just maximize.

3. Shading Elements

   Proposed shading elements to address glare shall be discussed at the Green Schools Guide IDP meeting and included in the Façade Review Process package for review and acceptance by the Authority.

   a. Shading can have positive effects on overheating, glare, and annual energy balance. Energy and daylighting analysis must be performed to demonstrate the value of including them.

   b. Shading typically has the greatest effect on south facing elevations. East and west elevations benefit more from screening or vertical louvers. North elevations may benefit from vertical shading (to protect from morning and afternoon summer sun).

   c. Shading elements can be maintenance challenges. They can be resting places for pigeons, and adjacent to playgrounds can trap balls or be subject to damage.

4. Security Screens/Barriers/Guards

   Window/Security Screens/Barriers/Guards shall be provided as per Design Requirement 4.3.3 - Window Guards (Exterior).

5. Doors

   Exterior doors and frames shall be provided as per Design Requirement 4.6.1 - Exterior Doors.

6. Signage

   a. Building signage shall be provided on the exterior of building as per Design Requirement 1.3.1.4 - Signage.

   b. Building Cornerstone: Provide a cornerstone with the year of erection. The Architect is to determine the appropriate location, typically at the corner of the building on the front façade above the grade and obtain SCA concurrence. For masonry buildings, the cornerstone shall be a limestone block. For precast concrete facades, the cornerstone can be a either an inlaid limestone panel if it is brick faced or the date cast into the panel. For rain screen facades, which typically have masonry or concrete at the first floor, the cornerstone can be limestone or date cast into the concrete panel, or the Architect may propose another method for SCA concurrence.

7. Electrical and Low Voltage Items

   All electrical and low voltage items such as, but not limited to, horns, bells, cameras, speakers and alarms shall be located and coordinated with all building elements and features as inconspicuously as possible on exterior building elevations. Light fixture locations shall be per Design Requirement 7.2.5. - Exterior/Site/Security Lighting and coordinated with the window/door and other elements of exterior façade. Camera locations shall be per Design Requirement 7.3.11 - Video Surveillance System.

8. Louvers

   When necessary, required louvers shall be located as inconspicuously as possible on an exterior building elevation. Where possible, louvers may be coordinated and incorporated with the building's window fenestrations.

9. Wall hydrants

   Wall hydrants shall be provided on facades as per Design Requirement 6.1.7 - Wall Hydrant Requirements for Window Washing and General Maintenance.

The use of any materials and elements not identified **or in quantities above that intended** above are subject to approval by the Authority.

4.2 Walls

4.2.1 Exterior Masonry Wall

Description/Design Approach:

A. Construction

1. Typical exterior masonry wall construction shall be as follows, depending on decision during façade selection:

   a. A **brick veneer w/concrete back-up** cavity wall consisting of an exterior wythe of modular size face brick (4"x2$^{2}/_{3}$"x8" nominal) and 6" to 8" nominal concrete masonry unit back-up with a 5¼" nominal air cavity (6" actual) with 5" semi-rigid mineral wool insulation (R21.5) in the cavity over a spray/trowel applied air/vapor barrier applied to the block, and 3½" metal stud furring with 3½" mineral wool batt insulation (R13) with 1 layer(1) of 5/8" abuse-resistant gypsum board (ARGB) on the interior side. System shall be designed to incorporate thermal bridge mitigation to reduce the derating of the U-value to the largest practical extent possible, which the energy modeler is to take into account.

   b. A **brick veneer w/steel stud back-up** cavity wall consisting of an exterior wythe of modular size face brick (4"x2$^{2}/_{3}$"x8" nominal) and 6" thick metal stud back-up with a 5¼" nominal air cavity (6" actual) with 5" semi-rigid "mineral wool board insulation" (R21.5) in the cavity over a spray/trowel applied air/vapor barrier applied to the exterior gypsum board, and "mineral wool batt insulation" (for the stud thickness with 1 layer(1) of 5/8" abuse-resistant gypsum board (ARGB) on the interior side. System shall be designed to incorporate thermal bridge mitigation to reduce the derating of the U-value to the largest practical extent possible, which the energy modeler is to take into account.

   (1) Interior side of exterior walls facing circulation spaces i.e., Corridor, lobby, Vestibule shall receive double layer of 5/8" gypsum board, with outer layer being Impact Resistant board

2. The Designer is to carefully layout the brick bond patterns during the design to ensure that the patterns of the 4"x2$^{2}/_{3}$"x8" brick will be aesthetically acceptable. Note that SCA Standard details utilized for projects will need to be modified as they are currently developed around utility brick.

3. For program spaces that require exposed CMU on the interior face of the room without a metal stud furring, provide 5" semi-rigid insulation in the 5¼" nominal cavity (6" actual) cavity over a spray or trowel applied air/vapor barrier applied to the block/metal stud back-up. System shall be designed to incorporate thermal bridge mitigation to reduce the derating of the U-value to the largest practical extent possible, which the energy modeler is to take into account.

   These spaces typically include:
   a. Stairwells
   b. Gymnasiums

B. Brick Type

1. Type FBX brick has tighter tolerance requirements as compared to the type FBS brick. The specifications call for Type FBX brick for modular and utility brick due to the tighter tolerances on the size and face distortion of the individual brick. As indicated above, modular brick is to be used, unless otherwise approved by the Authority. Even being type FBX brick, the allowed dimensional and distortion tolerances permitted by ASTM C216 are exaggerated on the larger utility brick creating an undesired aesthetic look for many bricks. The designer is to carefully research the brick selected with the manufacturer to ensure that the brick selected meets the FBX requirements. If a utility brick is desired to be used, the designer must work with the manufacturer to select those that are dimensionally stable and uniform with a tighter tolerance and the use must be approved through the deviation approval process

2. Brick selected must have a wire cut face unless approved through the deviation approval process.

3. Certain bricks have a stone face or rustic appearance, which would fall in the FBA category. If the brick selected to meet a certain aesthetic is Type FBS or FBA, notify the SCA and if approved, modify the specification appropriately. Some FBS and FBA brick, depending on their qualities, may be acceptable to the SCA. This may be desirable when doing an addition project.

4. Hand molded brick, when mandated by SHPO requirements to match existing facades shall be type FBS or FBA. Use of hand molded brick must be approved through the deviation approval process.

5. If Iron spot, FBS or FBA brick is selected, provide a cost comparison between the wire cut FBX brick and the brick selected. Brick shall also be studied to ensure good laying characteristics and the verify mortar selection is appropriate for the brick.

6. Coursing shall be such that any projecting brick does not project more than 1/2” beyond the immediate course below it. Cores shall not be exposed.

C. Parapets

Parapets shall serve the purpose of being a “protective guard” at the roof and/or provide the required exterior wall fire-resistive rating. Parapets shall be provided if one or all of the following conditions are applicable.

1. Protective Guard

All new buildings greater than 22’-0” above average grade shall have a parapet that is a minimum 42” above the highest point of the finished roof at the perimeter of the building as per Section BC 1510.8 of the 2022 NYC Building Code. It is recommended to provide a 46” high parapet above adjacent finished roof to facilitate future energy code changes in insulation thickness but with a construction tolerance so not exceed the 48” max height allowed for FD roof access per FC 504.4.1 of the 2022 NYC Fire Code. Parapet construction shall consist of 4” face brick, a 5¼” nominal air cavity (5¾” actual) with 5” thick mineral wool semi-rigid board insulation (R21.5) with an 8” reinforced poured in place concrete back-up with a cast stone coping and through wall flashing. The designer is to carefully detail the

parapet and course out the brick and coping stone sizes to ensure that the minimum is met. Parapets for non-utilitarian type roofs such as; play roofs, green roofs roof terrace, or other roof areas that will be used by the building occupants, or setback roof parapets that are close to classroom or office windows shall include face brick at the interior face i.e., roof side of the parapet.

2. Fire Resistance

   A parapet is required when an exterior wall is required to provide an exterior fire-resistive rating in accordance with BC Table 602 and shall have the same fire rating as required for the supporting wall and shall be at least 30” above the point where the roof surface intersects with the wall and shall be in compliance with Section BC 705.11.1.

4.2 Walls

4.2.2 Graffiti Control

Description/Design Approach:

1. **A** graffiti-resistant coating is to be used on exposed exterior surfaces up to 10'-0" high.

2. For new construction: use clear, matte finish sacrificial coating. As the coating may discolor the basic material, the designer should provide a break in the facade such as a string course to define the area being coated.

3. For existing buildings graffiti should be removed and a sacrificial graffiti resistant coating applied. If the graffiti "shadow" cannot be removed without damage to the surface, the masonry walls should be painted and then the graffiti resistant coating should be applied.

4. For new construction, walls to receive graffiti resistant coatings should be cavity wall construction with the cavities properly vented at the bottom and at the top of area to receive coating. Vents at the top of the wall area should be below any relieving angles or other restriction to the flow of air in the cavity.

5. For existing buildings of solid masonry construction and buildings without weepholes, the bottom two brick courses should remain unpainted and uncoated to allow the wall to breathe.

4.2 NY State Historic Preservation Office (SHPO)

4.2.3 Masonry Restoration

Applicable to buildings Designated by SHPO as meeting the criteria for listing on the National Register of Historic Places and buildings classified as New York City Landmarks.

Description / Design Approach:

1. Mortar Removal

   Existing mortar is to be removed from historic masonry surfaces using hand held non-power tools for all joints or a combination of power tools/handheld-nonpower tools for horizontal joints & hand held non-power tools for vertical joints. Perimeters of brick replacement areas are to be cut in a similar manner prior to brick removal to ensure adjacent bricks to remain are not damaged. See NYCSCA Standard Specification Section 04520**A** - Masonry Restoration for specific requirements.

2. Repointing

   Repointing will be appropriate provided it occurs only where mortar is missing or deteriorated, and the new mortar matches the original in color, texture, tooling, size and profile of joint. It is most important to ensure that the work does not significantly alter the building's appearance by reversing or otherwise offsetting the visible mortar to brick ratio. This has been traditionally addressed by SHPO by limiting repointing only to areas where needed (at grade, downspouts, parapets etc.). However if total or extensive repointing is required to ensure a watertight envelope, the specifications must ensure the original appearance is maintained, and brick is not damaged.

   The original mortar should be tested to determine its composition. Historic Mortars are often soft because of their high lime content and lack of Portland Cement. New mortar should be soft enough to prevent damage to historic masonry materials. If a mortar analysis is not performed, a Type O Mortar may be used:

   - 1 part white Portland Cement
   - 2 parts Type S hydrated lime
   - 7 parts sand with no admixtures

   When repointing at parapets, at grade, or at other areas exposed to harsh weathering conditions, it may be appropriate to use a more durable new mortar. If a mortar analysis is not performed, the following mortar mix should be used:

   - 2 parts white Portland Cement
   - 3 parts Type S hydrated lime
   - 6 parts sand with no admixtures

3. Masonry Cleaning and Removal of Existing Coatings

   The goal of cleaning a historic structure is not to make it look entirely new. Removal of the last 15% of the grime or coatings will also remove masonry material.

Requirement Applies to:	New Construction	✔	Major Modernizations	✔	Capital Improvement Projects

Harsh chemicals or high pressure washing can damage historic masonry. Cleaning should remove surface dirt using the gentlest methods possible. Work will be appropriate provided only non-ionic neutral pH detergents (not chemicals), non metallic, natural bristle brushes or scrapers, and water pressures no greater than 150 psi are used. Vortex systems have been approved only for use on limestone. If proposed for use on brick, testing (with before and after microscopic surveys) would be required.

Chemical paint removal systems, particularly “peel-away” systems where lead is an issue, are acceptable. Only approved “peel-away” systems may be used and only following a procedure recommended by its manufacturer and approved by the SCA’s IE&H Division. Adequate oversight to ensure proper and prompt removal of the blanket is critical to prevent drying of the material which would then necessitate scraping and the potential to damage the brick.

4. Masonry Coatings

Use of any masonry coating must be addressed to a specific problem and material.

Moisture trapped under masonry coatings can cause excessive damage in freeze-thaw cycles. These coatings prevent the natural passage of moisture from within the wall and aggravate many existing moisture problems. Acrylic sealers, cementitious paints, and other non-breathable coatings ***shall not*** be applied to historic masonry surfaces.

Although a more sacrificial coating is preferred by SHPO, a breathable coating may be approved if the proposal is supported by sufficient information concerning the reason for its use and its permeability.

4.2 Walls

4.2.4 Exterior Glass Block

Description/Design Approach:

Glass bock may be used in areas where diffuse sunlight is desirable and operable windows are not required for the interior space.

Glass block shall be solid glass block within a steel frame when used.

Stipple finish glass block to be provided at locations where it would be advantageous to obscure the visibility from either side of glass masonry unit.

Thermal values: For projects that must comply with the 2020 NYCECC using the ASHRAE 90.1-16 path for compliance, the values used must be actual values (as provided by the manufacturer) or the default values as listed below.

- **'U' factor 0.6**
- **SHGC 0.56**
- **VLT 56%**

For buildings that must comply with **the 2019** GSG rating system **and LL31/16,** the area of glass block must be limited to 5% of the fenestration area.

4.3 Windows

4.3.1 Window Types

Description/Design Approach:

A. New Construction

1. Window Types:

Aluminum Fixed/Hopper Windows (projected windows pivoting about bottom edge and projecting inward). Overall Window Size – width: 3’-0” to 4’-0”, height: 7’-4” to 9’-0”. Windows taller than 9’-0” may be provided if not limited by floor-ceiling heights, but will need project specific testing that must discussed with CM to account for in the project schedule. In specialty rooms, furniture layouts may require windows less than 7”-4” in height. Window shall typically consist of one large fixed light over the hopper. This may be adjusted where Fire Department access is required (non-sprinklered buildings) or more natural ventilation is required. Where Fire Department access is required, provide a lower light glazed with an insulating glass unit that has a minimum clear glazed opening of 24” wide by 36” high. (Note: A different configuration and glazing than the other building windows may be required for this window to satisfy this requirement). See Paragraph F. below for Fire Department Requirements.

2. Sill heights:

Coordinate with adjacent furniture and equipment heights. Typical sill height is 32" from finished floor to top of masonry at sill location.

B. Replacement Installations

1. Window Types

a. Option 1 – Hopper Windows (Preferred):

Hopper windows may be used where aesthetically appropriate or as a replacement in kind. Windows in non-air-conditioned buildings must provide adequate ventilation.

b. Option 2 - Aluminum Double Hung Windows:

Aluminum double hung windows may be used where aesthetically appropriate or as a replacement in kind.

1) Operable portion of double hung windows consisting of two sashes shall be limited to a maximum size of 3'-6" wide x 7'-0" high, or equivalent area except as noted below. The minimum size for a double hung window shall be 2’-0” wide x 4’-0” high. Where required by height of opening, window assembly shall be configured with a fixed, clear glazed transom panel above the two operable sashes. Where feasible, transom shall be large enough to accommodate new or reinstalled air conditioners (minimum 28” wide by 18" high clear glazed opening).

2) Windows for SHPO projects may require the operable portion to be larger than 3'-6" wide by 7'- 0" high.

3) Muntins: In general, the number of muntins for double hung windows shall be kept to a minimum. When matching the configuration of existing windows being replaced, sashes are to be divided by applied muntins. Minimum size of individual glazed lites divided by applied muntins shall be 13" by 15" clear vision dimensions. If required by the parameters listed below sashes are to be divided by true muntins. The maximum size of the individual glazed lights within the true muntins shall be governed by the most restrictive of the following requirements:

- Design wind load specified.
- Glazing manufacturer's recommendations.

2. Windows for NYS Office of Historic Preservation (SHPO) Eligible Buildings

a. Determination of eligibility will be made through the SCA liaison to SHPO.

b. Wood Windows: Due to the difficulty in procuring appropriate wood windows, replacement wood windows are not to be used unless only a small number of windows or windows in a specific discrete location are being replaced. In such case, the designer is to review the requirements with Technical Standards Unit for final determination.

c. Double-Hung Aluminum Windows with Applied Muntins and *Without* Fixed Transom Panels are to be used for window replacement projects if all the windows in the building are being replaced. Transom panels may be considered appropriate where the original windows had transom panels. Applied (false) muntin configurations, muntin size and profile should match those of the original windows when the building was constructed.

3. Holding Room Windows

In existing Holding Rooms, listed as approved in the SCA Life Safety Planning Design Requirement 1.3.3.1
and
In newly designated holding rooms in existing non-sprinklered buildings where permitted as per DR 1.3.3.1

The windows designated for evacuation of occupants by means of Fire Department tower ladder must maintain a minimum clear opening of 48" high x 32" wide, precluding the use of a projected window. These windows are typically in-swinging casements. Double hung windows are permitted only if they can provide the required clear opening for the lower sash. For window replacement projects, Holding Room evacuation windows should be designed to match the elevation of the typical replacement window.

a. In both Fire Department approved and newly designated Holding Rooms, when a window is designated for evacuation do not provide any limit stops that would limit the opening of the designated sash.

b. Holding Rooms approved and constructed prior to 1996 will be maintained as such.

c. Maximum sill height for Holding Room evacuation window is 36" above floor.

C. Both New Construction and Replacement Installations

1. Ventilation: Windows in existing non-air-conditioned buildings must provide adequate ventilation. Article 6 and 7 of subchapter 12 of the 1968 code or Section BC 1203.5 of the 2022 NYC Building Code must be complied with. These articles define the requirements for natural ventilation or a forced ventilation system. If projected windows are used, Hoppers at both the bottom and top of the window will enhance air flow if more than one operable vent is required for ventilation. When the top of a vent is 60 inches or higher above the finished floor, the vent shall be pole operated. Note that per the 2022 NYC Mechanical Code, mechanical ventilation is required to be provided.

2. Fire-Rated Steel Windows are to be used when a protected opening is required due to proximity to a lot line (as per NYC Building Code) or other code requirements.

3. Alternate Window types other than the double hung or hopper windows as described above will be considered only case-by-case for specific areas where double hung or hopper windows might not be practical due to height, aesthetic, functional or code considerations. Alternate windows types may be used when approved by the deviation process or when authorized in writing by the Vice President or a Director of Architecture and Engineering.

4. Non-operable windows with laminated safety glass or impact resistant glass are to be used at building entrance sidelights and transoms, depending if protected by window guards as per DR 4.6.1.

5. Limit stops

   Provide removable limit stops to restrict opening of vents or sashes to 4.5". This requirement applies only to lower sashes of double hung windows or vents where top of vent is within 78" of finish floor elevation for projected windows that do not have window guards or security barriers. Holding Room evacuation windows shall not be provided with limit stops.

6. Provisions for Cleaning Windows:

   Windows will be cleaned from the exterior by use of cherry picker, scaffolding or bosun's chair. Window cleaning anchors and bolts are not to be provided.

7. Insect Screens

   Provide insect screens on exterior face of windows with operable vents/sashes in all dining areas, kitchens and food preparation areas as well as classrooms where food preparation takes place, spaces that are accessory to food preparation area, 3K, pre-kindergarten classrooms and LYFE centers. Indicate locations on drawings.

8. Operable Vents

   a. In-swing hopper vents: Shall be designed such that the hopper vent is a minimum of 18" and a maximum of 36" high.
      - For buildings with mechanical ventilation, all vents shall have custodial locks.
      - For buildings with natural ventilation, vents shall have lock with handles.

b. Double hung windows: operating hardware for lower sash shall be a maximum 46” above finish floor at locations where fin tube radiators are located under the windowsill and 48” above finish floor at windows that do not have fin tube radiators under the windowsill.

D. Glazing

1. For aluminum projected/fixed windows for capacity projects and approved CIP projects:

   Type 1a: Glaze with sealed triple-glazed, argon-filled, Insulating Glass Units (IGU) with low-e coating: Size for each insulated glass unit within window members shall be 5 SF minimum and 20 SF maximum, with no dimension smaller than 12” or greater than 8’-0”.

2. For aluminum projected/fixed windows of any size and aluminum double hung windows with a maximum operable size of 3’-6" wide by 7'-0" high and transoms of CIP projects:

   Type 1b: Glaze with sealed dual-glazed Insulating Glass Units (IGU) with low-E coating: Size for each insulated glass unit within window members shall be 5 SF minimum and 20 SF maximum, with no dimension smaller than 12” or greater than 8’-0”.

3. For aluminum double hung windows with an operable size larger than 3'-6" wide by 7'-0" high:

   Type 2a: Single glaze with laminated glass. Laminated glass: 1/8" annealed glass, 60 mil PVB interlayer and 1/8" annealed glass. Maximum size for each laminated glass unit within window members shall be no greater than 36 SF with a maximum dimension no greater than 8’-0”.

4. Toilet rooms, locker rooms and medical rooms shall be provided with translucent glazing, regardless of glazing material.

5 For Fire Department requirements for glazing, see paragraph G below.

6. For CIP projects that must comply with the 2020 NYCECC, the total fenestration area shall be limited to a maximum of 40% to meet the prescriptive requirements of the Code

E. U Values

1. Capacity Projects and selected Deep Energy Retrofit CIP Projects

   a. Whole window assembly (frame, sash, glazing) U value for projected/fixed windows with Insulating Glass Units as in glazing type 1a in Par. D.1 above shall be no greater than 0.25. For any given configuration of fixed/hopper, the overall area of operable portion of window may not exceed 60% of the window area to meet the required 0.25

   b. Whole window assembly (frame, sash, glazing) U value for replicated double-hung window look projected window with Insulating Glass Units as in glazing type 1a in Par. D.1 above shall be no greater than 0.34 for projects that have to comply with the 2020 NYCECC Green Schools Rating System and LL **51/23**, if sizes are such that the replicated double-hung windows can be fabricated.

2. CIP and leased 3K/UPK Projects - 2020 NYCECC Compliance

   Whole window assembly (frame, sash, glazing) U value for projected/fixed and double hung windows with Insulating Glass Units as in glazing type 1b in Par. D.1 above shall be no greater than 0.40 for operable windows and 0.30 for fixed windows or a weighted U-factor calculated based on the proportions of fixed and operable portion of windows for all other projects to be in compliance with the 2020 NYCECC for prescriptive compliance.

3. For any given project, weighted average U value for all windows shall be calculated based on the amount of fixed and operable areas of the windows and not exceed the maximum allowable 'U' values to meet the 2020 NYC Energy Conservation Code requirement for prescriptive compliance.

F. Bird Friendly Glazing

1. All glazing in windows that are located within 75' above grade, as well as windows adjacent to green roofs at any building height, shall meet a Threat Factor of 25 of less as per the American Bird Conservancy's Tunnel Testing Protocol to comply with the requirements of BC 1403.8 as implemented by LL15/20. Exceptions to the requirement are provided in Section BC 1403.8. Refer to Buildings Bulletin 2020-022 and https://www1.nyc.gov/assets/buildings/bldgs_bulletins/bird_friendly_guidance_document.pdf for further guidance.

2. In accordance with Section BC 107, Construction Documents, applicants are required to submit architectural plans that depict the location and type of exterior material and glazing. In order to show compliance with LL15/20 and Section BC 1403.8, such architectural plans shall delineate all locations in which bird friendly materials are required to be installed. Additionally, to assist the Department to verify compliance with the provisions of LL15/20, such plans shall include the following additional items: a material location threat factor table in which the Threat Factor for all exterior materials and glazing proposed for installation are noted, and a note on the architectural plans that states the following:
   All exterior materials and glazing have been evaluated for compliance with Section BC 1403.8. Where Exterior Wall Envelope, Bird Hazard Installations, Fly-Through Conditions, or Adjacencies to Green Roofs are present in the design, Bird Friendly Materials with a Threat Factor rating of 25 or less have been specified as indicated in the Material Location Threat Factor Table.

G. Building Code and Fire Department Requirements

1. Building Code

   a. The Fire Depart Access requirements listed below pertain only to buildings constructed under the 1968 NYC Building Code and that are not sprinklered.

   b. Buildings protected by an automatic sprinkler system are exempted from the Fire Department access requirements of Section 27-292(e) of the 1968 code or Section BC 903.2.11 of the 2022 code. Similarly, the provisions described below for window evacuation from first floor levels shall be considered as not applicable to sprinklered buildings. However, refer to item d below with regards to smoke purge.

   c. Buildings constructed under a code predating the 1938 code or the 1938 Code (Building Code effective until Dec. 6, 1968) are not required to provide Fire Department access or evacuation

at windows. When replacing windows in such buildings, follow the requirements outlined herein to the extent possible based on the spacing and location of existing windows.

d. If a mechanical smoke purge is not provided, smoke purge must be provided by breakable windows, as spaces must be within 100 feet of natural ventilation with 5% openable area. Thus windows need to be specified to be of tempered glazing only.

2. Fire Department Access:

a. Each story above the first floor

For non-sprinklered buildings, Fire Department access from the exterior is required for each 50 feet of horizontal length of wall that fronts on a street or frontage space at each story above the first floor. This can typically be achieved by providing at one window, per Section 27-292(a) of the 1968 code or Section BC 903.2.11.2 of the **2022** code in each classroom, at a maximum of 50 feet apart, with glazing of glass in the lower light that can be broken from the interior and exterior. For purposes of Fire Department access, laminated glass is not considered breakable. Glass in lower sash of window that can be broken for Fire Department Access must be non-laminated tempered glass.

b. Basement or Cellar

For non-sprinklered buildings, Fire Department access from the exterior is required for the basement or cellar for each 100 feet of horizontal length of wall that fronts on a street or frontage space. This access may be achieved by providing at least one window per Section 27-292(b) of the 1968 code or Section BC 903.2.11.3 of the 2022 code at a maximum of 100 feet apart, with glazing of glass in the lower light that can be broken from the interior and exterior. Glass in lower sash of window that can be broken for Fire Department Access must be non-laminated tempered glass.

c. If the typical window glazing is polycarbonate, laminated glass or insulated laminated glass and these access windows have non-laminated breakable glazing for the purpose of access, they shall be marked with an applied label no greater than 36 in^2 which reads “FD ACCESS”. Locate labels in lower left hand corner of access windows. Labels should not be obscured by the frames of window guards. Polycarbonate glazing is considered breakable for Fire Dept. access only when it is used in conjunction with true muntins in a double hung window.

d. The clear opening size when glazing is removed from an access window sash shall be 24 inches by 36 inches per Sections BC 903.2.11.2.1 and BC 903.2.11.3.1. If some windows of a room are less than the required minimum access dimensions, then the designated conforming access opening (window and gate) shall be identified on the interior and exterior faces with labels which read - "FD ACCESS". Locate labels in lower left hand corner of access windows. Labels should not be obscured by the frames of window guards. Window guards for the FD access windows shall be openable from both the inside and the outside and minimum size of opening shall be 32 inches wide by 48 inches high per Section BC 903.2.11.2.1.

e. Maximum sill height above floor is 36” for Fire Department access. If windowsills are higher that 36” above floor, other means of access will have to be provided (door, access panel or window with lower sill).

f. Fixed, locked, and/or unbreakable windows are acceptable for areas not normally used for access, such as Auditoriums, Gymnasiums, Kitchens, Toilet Rooms, Locker Rooms, Mechanical Rooms, Storage, Utility and Service Spaces, Stairs, Corridors, etc., but the 100-foot requirement still applies.

3. Fire Department Evacuation

a. First Floor

For non-sprinklered buildings, Fire Department evacuation to the exterior shall be provided for the first floor for each 50 feet of horizontal length of wall that fronts on a street or frontage space. This can typically be achieved by providing at one window, in each classroom, at a maximum of 50 feet apart, glazing of glass in the lower light that can be broken from the interior and exterior. For purposes of Fire Department access, laminated glass is not considered breakable. The glass in the lower sash of window must be non-laminated tempered glass so that it can be broken for Fire Department Access.
If the typical window glazing is polycarbonate, laminated glass, or laminated insulated glass and these evacuation windows have non-laminated breakable glazing for the purpose of evacuation, they shall be marked with an applied label which reads “FD ACCESS”. Locate labels in lower left hand corner of evacuation windows. Labels should not be obscured by the frames of window guards. Polycarbonate glazing is considered breakable for Fire Dept. evacuation only when it is used in conjunction with true muntins in a double hung window.

The opening size when glazing is removed from an evacuation window sash shall be at least 24 inches by 36 inches.

The evacuation window shall be marked on the interior and exterior faces with labels that read - “FD ACCESS”. Locate labels in lower left hand corner of evacuation windows. Labels should not be obscured by the frames of window guards. If the window is covered by a security gate, then the gate shall also be marked with a label which reads “FD ACCESS”.

b. Maximum sill height above floor is 36” for Fire Department evacuation. If windowsills are higher than 36” above floor, other means of evacuation will have to be provided (door, access panel or window with lower sill).

c. Fixed, locked, and/or unbreakable windows are acceptable for areas not normally used for access or evacuation, such as Auditoriums, Gymnasiums, Kitchens, Toilet Rooms, Locker Rooms, Mechanical Rooms, Storage, Utility and Service Spaces, Stairs, Corridors, etc., but the 100-foot requirement still applies.

H. Acoustic Requirement

Windows with Type 1a (sealed Insulating Glass Units 1” to 1½” thick as described in para D) achieve an Outdoor Indoor Transmission Class – (OITC) rating of 28. Windows with OITC rating of 28 or greater are required for all projects that must comply with NYC Green School Rating System. A higher OITC rating is required to mitigate noise from air traffic or vehicular traffic from highways or railroad noise. Such condition will apply to projects that are in flight path or in close proximity to a highway or train tracks or for zoning lots that require a *City Environmental Quality Review (*‘E’ designated Zoning Districts).

I. Exterior Sun Shading Devices

Vertical fins or horizontal Brise Soleil may be provided when mechanically attached to the window and supplied by the window manufacturer.

J. Mechanical Opening Devices

For openable vents 10'-6" or more above the floor (typical of a Gymnasium, Gymatorium), provide an electrically operated mechanical means of opening the windows, similar to Soon Industrial Co.

K. Related Information

1. See Design Requirement 4.3.3 – Window Guards (Exterior), Security Barrier and Security Screens for Fire Department requirements regarding access and evacuation windows. The window guards, security barriers and security screens must be coordinated with the window installation.

2. See Specification Section 10400 – Identifying Devices for label requirements for Holding Room and Fire Department access and evacuation windows.

4.3 Windows

4.3.2 Window Insect Screens

Description/Design Approach:

A. Insect Screens

Provide insect screens on exterior face of windows in all dining areas, kitchens, food preparation areas including classrooms and shops where food preparation takes place, and spaces that are accessory to food preparation area. Indicate locations on drawings.

4.3 Windows

4.3.3 Window Guards (Exterior)

Description/Design Approach:

A. Window Guards:

1. Provide hinged exterior window guards: Expanded Metal Window Guards in an angle frame, Perforated Steel Security Barriers, Security Screens or Wire Mesh Guards at all windows susceptible to intrusion or breakage, such as:

   - those on grade
   - facing playgrounds
   - facing low or accessible roofs
   - facing canopies.

a. Application:

Type of Window Guard	Type of Construction		
	Existing Buildings	Building Additions (1)	New Buildings
Wire Mesh (2)	X	X	X
Expanded Metal	X	X	
Security Barrier	X(1)	X	X
Security Screen (3)		X	X
Notes:	(1) Match existing. (2) Only at second floor or higher not susceptible to intrusion but susceptible to breakage. (locations facing playground) (3) Security Screens may be used in lieu of Security Barriers provided the Designer performs a security analysis in conjunction with the school Principal and District. The Principal and District must approve the substitution in writing to the Authority.		

b. Notes:

1) For window replacement projects, existing window guards may be reinstalled (if in good condition and if they will fit the opening with the new window and panning in place and if they are the proper types). They should only be reinstalled or replaced if they are in areas susceptible to intrusion or breakage**.**

Requirement Applies to: ✔ **New Construction** ✔ **Major Modernizations** ✔ **Capital Improvement Projects**

2) If a window guard is provided at a Fire Department access window above the first floor, the guard shall be readily operable from the outside without the use of tools. The guard shall be identified on the outside with a sign that reads “FD Access. At locations other than the ground floor and low roofs, provide a hand hole in expanded metal window guards for Fire Department access to the release mechanism from the outside. Provide a quick release mechanism accessible from outside for perforated metal security barriers.

3) If a window guard is provided at a Fire Department evacuation window at the basement, first floor, or low roof, the guard shall be readily operable from inside without the use of tools. The guard shall be identified with a sign that reads. “FD Access”.

4) Even if polycarbonate is used as the exterior glazing material, window guards will be required at windows subject to intrusion.

4.4 Roofs

4.4.1 Roof Types

4.4.1.1 Flat Roofs

Description/Design Approach:

A. General

1. For roofs in new construction, use a hot fluid-applied rubberized asphalt, fabric reinforced roofing system in a protected membrane configuration.

2. For replacement roofs in existing construction, generally use a cold-applied SBS-modified bitumen roofing system in a built-up (membrane on top) configuration. Other types of roofs may be used upon consultation with the SCA if more appropriate for the building structure/existing conditions. This may include utilizing a protected membrane assembly or using a cold fluid-applied resin membrane (reinforced urethane/PMMA type material).

3. Minimum roof covering classification to be Class A or B per BC Table 1505.1 of the 2022 NYC Building Code.

B. New Construction

1. For new construction, roof storm water detention is typically not required. The roof is to be pitched to drain for positive roof drainage, typically 1/8" per foot. If roof detention is required, the roof is to pitch approximately 2" across the length of the roof.

2. The desired slope is to be achieved by sloping structural lightweight concrete placed on a level roof deck slab. Construct crickets behind curbs that interfere with flow towards the drain using structural repair mortar.

3. Fluid-applied protected membrane roofing system shall include:

   a. Membrane – rubberized asphalt, fully adhered to deck, minimum thickness 215 mils, including fabric reinforcing sheet. Flashings are to be cold fluid-applied membrane to a minimum of 8" above surface, with the remaining portion above modified bitumen cap sheets or uncured membrane as recommended by the manufacturer. For normal height parapets, flashing shall be brought to the top of the parapet.

   b. Separation/Protection sheet – Reinforced rubberized asphalt, minimum thickness 40 mils.

   c. Drainage Mat

   d. Insulation – Extruded polystyrene. R=40, or greater if directed by the Authority for low-energy building design.

   e. Filter fabric.

   f. Drainage Mat (If pavers loose laid on the insulation)

g. Precast pavers, 2" thick minimum to provide wind uplift resistance, of reflectance required to meet NYC Green Schools Guide credit for Heat-Island Affect – Roof and the 2022 NYC Building Code. Provide more pavers if subject to water detention based on insulation manufacturer recommendation depending on insulation thickness.

h. As an alternate to reduce weight if a ballasted PV system is being placed on the roof, tongue and groove cement bonded insulation shall be used.

4. Concrete deck shall be tested for moisture content prior to membrane installation to ensure proper adhesion **using the relative humidity test, ASTM F2170**. **Use of surface moisture meters will not provide a true indication and is not permitted.**

C. Existing Construction - Roof Replacements

1. For replacement roofs, a pitch of 1/8" per foot is desirable; if the roof is sloped below this pitch and adding concrete repair mortar to increase the pitch will increase the weight on the roof too much or cause the parapet to fall below the minimum clear height, the existing pitch may remain. In this case as long as there is a pitch to drain and low spots can be filled in with repair mortar to provide a uniform slope, the pitch may remain. If the pitch is flat or very slight and a built-up roof is to be installed, tapered insulation can be used to create a pitch. Ensure that parapet heights are adjusted to maintain code required minimum heights. All existing roofing materials are to be removed down to a clean deck; new roofing is not to be applied over existing roofing without approval of one of the Directors of SCA Dept. of Architecture and Engineering.

2. Preferred built-up roof is a cold-applied SBS-modified system

a. Vapor barrier – One ply of SBS-modified base sheet set in cold adhesive **or torched down** – Mechanically vented base sheet is to be included as an allowance to account for wet deck. Mechanically fastened at perimeter to parapets and other vertical surfaces up to cap flashing, spot mopped elsewhere. Seal all side laps and head laps with modified roofing cement.

b. Insulation – Two to three layers of polyisocyanurate and composite board with an R=**40** set in cold adhesive. If there are issues with the parapet **or mechanical equipment** heights t**hat would require them to be raised or other additional cost items**, the insulation R-value may be reduced if the overall assembly of the roof meets the **NYCECC minimum requirement of** R=33. **If installation of a roof with an R=33 insulation will still require additional cost impacts from raising parapets, etc., then R=40 is to be used.** For locations where sills and doors can't be raised **or equipment will not have to be raised if a thinner insulation can be used**, vacuum-sealed insulation (R=50/inch) for **the** majority of **the** roof in combination with polyisocyanurate may be used. Use of vacuum-sealed insulation requires approval by a director of A&E **or TSS**.

c. Membrane – One ply of SBS-modified bitumen base sheet and one ply of granule-surfaced SBS-modified bitumen cap sheet of reflectance provided in specification to meet the 2022 Building Code.

d. Walkway pads - Provide walkway pads from bulkhead doors to and all around major mechanical equipment requiring periodic maintenance; e.g., Cooling Towers, Chillers, A/C Units, Condenser, Generators.

3. Previous standard - Hot-applied asphalt: May be used for substantial repair to an existing hot-asphalt roof

    a. Vapor barrier - Two plies asphalt fiberglass felt – Mechanically vented base sheet in lieu on one ply of the vapor barrier is to be included as an allowance to account for wet deck. Mechanically fastened at perimeter to parapets and other vertical surfaces up to cap flashing, spot mopped elsewhere. Seal all side laps and head laps with modified roofing cement or hot asphalt.

    b. Insulation – Two to three layers of polyisocyanurate and composite board with an R=**40** set in cold adhesive. If there are issues with the parapet **or mechanical equipment** heights t**hat would require them to be raised or other additional cost items**, the insulation R-value may be reduced if the overall assembly of the roof meets the **code minimum requirement of** R=33. **If installation of a roof with an R=33 insulation will still require additional cost impacts from raising parapets, etc., then R=40 is to be used.** For locations where sills and doors can't be raised **or equipment will not have to be raised if thinner insulation**, vacuum-sealed insulation (R=50/inch) for **the** majority of **the** roof in combination with polyisocyanurate may be used. Use of vacuum-sealed insulation requires approval by a director of A&E **or TSS**.

    c. Membrane – Three plies asphalt fiberglass felt and a granule surfaced SBS modified bitumen cap sheet of reflectance provided in specification to meet the 2022 Building Code.

    d. Walkway pads - Provide walkway pads from bulkhead doors to and all around major mechanical equipment requiring periodic maintenance; e.g., Cooling Towers, Chillers, A/C Units, Condenser, Generators.

4. The roof deck is to be tested for moisture content using **the relative humidity test, ASTM F2170 to determine if a vent base sheet is required**. **Use of surface moisture meters will not provide a true indication and is not permitted. If hot asphalt is used,** the N.R.C.A. Deck Dryness Test may be used given the possibility of excessive moisture that would make installation of a vent base sheet with either cold-adhesive or asphalt infeasible, the designer is to specify alternative means to mechanically fasten the Vented Base Sheet to the roof deck, in consultation with a structural engineer to verify the structural integrity of the deck.

5. A cold fluid-applied resin system may also be appropriate where difficult flashing details and numerous penetrations are prevalent **and use of such is to be discussed with TSS.**

D. Green Roofs

1. Typically required in new construction to meet NYC DEP Green Infrastructure requirements or when approved for pedological requirements.

2. Refer to DR 8.2.1 for detailed requirements and discussion, but typically consists of

a. Membrane - rubberized asphalt, fully adhered to deck, minimum thickness 215 mils, including fabric reinforcing sheet.

b. Separation/Protection sheet - Reinforced rubberized asphalt, minimum thickness 40 mils.

c. Drainage Mat

d. Root barrier

e. Insulation - extruded polystyrene with R=40.

f. Drainage and water retention egg-crate type mat**, if used**

g. System filter

h. 6-8" thick substrate growing medium **or combination growing medium and needle punched mineral wool**

i. A 24" wide "vegetation-free" zone is required at the roof perimeter and at all penetrations. The vegetation-free zone to be surfaced with precast pavers. **Paver elevation to be at same level as vegetation so as not to be a tripping hazard.**

3. Green roofs installed in existing buildings requires analysis of the structural loading and then determination of what roofing system is required based on the roof slab construction

4.4 Roofs

4.4.1 Roof Types

4.4.1.2 Roof-top Play Area

Description/Design Approach:

Play area for outdoor activities is recommended for children of all ages. An accessible roof-top play area shall be incorporated in the design of the building when necessary due to on-grade site restrictions or scarcity of on-grade open area.

A. Location

1. The roof-top play area shall be accessible through the building only.

2. The roof-top play area is to be located on a lower level roof accessible from the building or on the main roof of the building where feasible.

3. The roof-top play area shall be fully accessible and connected to the building's stairs and elevators via a corridor or lobby.

4. The roof-top play area shall be located away from any roof-top mechanical equipment and separated from the mechanical equipment by a visual and/or sound barrier.

5. The roof-top play area shall be located such to avoid, if possible, the classroom windows facing the roof-top play area. Alternatively sills for windows facing the roof-top play area shall be a minimum of 96" above the surface of the play area. Doors or windows of Kindergarten/Pre-Kindergarten rooms may face Early Childhood roof-top play area if roof-top play area is used by those rooms only.

6. It is preferred that the roof-top play area be located away from adjacent properties. In a rare situation where the roof-top play area is in vicinity of the adjacent properties, it shall be separated from the adjacent property by a visual and sound barrier.

B. Safety and egress

1. Roof-top play area is an occupied space and in terms of building height is considered as one of the stories of the building. Top of the overhead enclosure to be included in the height of the building. Egress requirements shall comply with NYC building code. Exit to grade shall be provided through the building or via dedicated enclosed stairs where required due to building configuration/site constraints.

2. The roof-top play area shall have a minimum of 42" high parapet, an enclosure overhead and on all sides.

C. Construction

1. Support system for the enclosure shall be designed to comply with NYC building code.

2. The clear height between the surface of the play area and the underside of the overhead enclosure support system shall be a minimum of 16’ for a primary school and 24’ for an intermediate school.

3. Overhead enclosure shall be designed to withstand snow loads as per NYC building code.

4. Surface of enclosure shall be wire mesh, chain link fence or similar non-combustible material with a minimum open area of 90%. Unobstructed area between enclosure components shall be a maximum of four (4) square inches.

5. Finish material for the play area shall be concrete pavers.
For roof-top play area used as Early Childhood play area; safety surface shall be provided in addition to the concrete pavers.

6. Initial Solar reflectance of pavers shall be **.33**.

7. Flashing and roof membrane on the vertical surfaces shall be protected.

D. Electrical

1. Emergency lighting shall be per design requirement 7.2.3.

2. Exterior/security lighting shall be as per Design requirements 7.2.5.

3. Exit lighting shall be per electrical design requirement 7.2.4.

4. Fire Alarm requirements shall comply with NYC building code.

5. The roof-top play area is treated as an outdoor space and no additional lighting is required.

E. HVAC

1. The roof-top play area is treated as an outdoor space and no weather protection, heating or cooling is required.

4.4 Roofs

4.4.2 Roof Equipment and Accessories

4.4.2.2 Roof Equipment Service Access

Description / Design Approach:

The roof top heating and cooling units' (RTU's) serviceable elements that require maintenance must be accessible for maintenance and service.
Safe access and walking surface to maintain and service RTU's shall be detailed and shown on drawings as follows:

A. For locations that have a service vestibule within the RTU and the service vestibule can be accessed via a full height door and:

1. the door sill is less than 18" above adjacent roof surface:

   a) Access to panels/doors shall be provided via walkway pavers. Such paved walkway shall be minimum 24" wide. For roofs designed for roof top water retention, pavers shall be installed such that the walking surface, i.e. the top of pavers, is above the maximum permissible water level or a minimum 3" above the top of adjacent roof surface.
   b) At locations where access panel/door swings into the walkway, the width of the walkway shall be such that it is at least 20" in width beyond the swing of the panel/door.

2. the door sill is more than 18" above adjacent roof surface:

   Path to the RTU vestibule shall be as described in A.1.a above. Access to the vestibule shall be via a metal platform as described in B.2 below and an OSHA compliant ladder.

The service vestibule(s) in a RTU may not provide access to all serviceable elements of the RTU; for serviceable elements that are not accessible via the service vestibule, the following requirements shall apply:

B. Where serviceable elements are accessible thru access panels/doors and:

1. the sill of access panel/door is less than 18" above the adjacent roof surface and/or the top of access panels/doors is less than **7'-0"** above the adjacent roof surface:

   Access to panels/doors shall be provided as described in para A.1.above.

2. where sill of access panel/door is more than 18" above the adjacent roof surface and top of access panels/doors is more than **7'-0"** above the adjacent roof surface:

   Path to the RTU shall be provided via walkway pavers as described in para A.1.a. above. Access to panels/doors shall be provided via a metal platform. This metal platform shall be minimum 24" wide. Length of the platform shall be sufficient to serve one or multiple access panels. At locations where access panel/door swings into the platform, the width of the platform shall be such that it is at least 20" in width beyond the swing of the panel/door. Surface of the metal platform shall be non-skid with open grates. Platform shall have an OSHA compliant ladder. Platform shall be located at sill level or such that the relative height between the platform and top of access panel/door is no more than **7'-0"**. All platforms to have a 3'6" high railing system at all open sides. For platforms greater than 4' above adjacent roof, provide toe board along all open sides i.e. sides that are not against the RTU.

C. Where the top of the unit has items that must be serviced, provide an OSHA compliant ladder **to access the top of the unit**.

The platform and ladder structure shall be constructed such that it can be removed to facilitate roofing and flashing during roof replacement or any other related work that requires re-roofing.

4.4 Roofs

4.4.2 Roof Equipment and Accessories

4.4.2.3 Protection at Roof Equipment

Description/Design Approach:

A. Where roof hatch openings, mechanical equipment, fans and appliances that require service are located within 10’ (ten feet) of a roof edge or open side of a walking surface and such edge or open side is located more than 30” above the floor or roof below, 3’-6” high guards shall be provided per Section BC **1015.6** of the **2022** NYC Building Code. Such guards shall extend a minimum of 30” beyond each end of mechanical equipment, fan or appliance.

B. At exterior wall locations where a 3’-6” high parapet is provided, such guards are not required.

4.4 Roofs

4.4.2 Roof Equipment and Accessories

4.4.2.4 Green/Play Roof Equipment Storage

Description / Design Approach:

A. When incorporated in the design of a building, a roof top play area and/or a Green roof will require maintenance. A grounds equipment room, janitor closet or a similar custodial storage space can be used to store such custodial cleaning and maintanence material if they are on the same level and in the vicinity of the roof.

B For Green roofs and/or play roofs that are not located on a floor that has such storage facility, a play/green roof equipment storage room shall be provided to house the materials and equipment required for the maintanence of the roof top play area and/or green roof.

1 Location

a. The equipment storage room shall be on the same level as the roof top play area/green roof.
b. The preferred location for the roof equipment storage room is adjacent to the roof top play area/green roof with direct access to that roof.

2 Construction

a. Construction of the equipment storage room shall be similar to that of the base building and shall comply with NYC building code.
b. Interior walls shall be painted. Floor shall be finished concrete with a clear sealant or hardener.
c. Shelving and wall mounted hooks for brooms etc. shall be provided.

3 Electrical

a. Fire Alarm requirements shall comply with NYC building code.
b. Provide interior lighting as per design requirement 7.2.01.
c. Provide one 20 AMP duplex outlet within the storage room.

4 HVAC

a. The equipment storage room shall be less than 75 SF and if located on a floor that has no other program or mechanical space, it shall be treated as an unoccupied outdoor space without any heating or cooling requirements and shall be naturally ventilated.
b. Equipment storage room shall not be used to store materials that give off noxious vapors or pose a fire hazard.

5 Plumbing and Drainage

a. No plumbing shall be provided in the roof top equipment storage area.

C. A frost proof wall hydrant facing the play area/green roof shall be provided. Piping for the wall hydrant to be frost proofed if routed through a non-heated space.

4.4 Roofs

4.4.2 Roof Equipment and Accessories

4.4.2.5 Roof Equipment Installation

Description/Design Approach:

Roof top mechanical equipment shall be mounted on **steel dunnage**, concrete curb, **or** specialty prefabricated seismic/vibration isolation curbs. The criteria for mounting are as follows:

Preference **for RTUs and AHUs is steel dunnage. Steel dunnage reduces the chances for condensate leaks from units entering the building and also allows more space to place silencers and other items to meet acoustic requirements.**

- The height of the dunnage is to be such that the roof can be replaced in the future. The table below is based on the, "Guidelines for Roof Mounted Outdoor Air-Conditioner Installations", by ARI/SMACNA June 1997. The table presents guidelines for the clearances necessary to accomplish roof maintenance/replacement. However, for units 60" and wider the actual width of units and clearances around the units should be discussed with roofing manufacturers for determining the required clearance above roof surface. **For reroofing applications, 20" minimum clearance is typically sufficient to allow reroofing as long as penetrations are reachable from the side to be flashed.**

Width of Equipment	Height Above Roof Surface to Bottom of Dunnage
Up to 24"	14"
25" to 36"	22"
37" to 48"	28"
49" to 60"	36"
61" and Wider	48"

Designer shall specify on the Drawings the minimum height of the bottom of the unit relative to the finished roof. Greater heights may be utilized for acoustic reasons

- **Concrete curbs shall be used at duct penetrations.**
- **Appropriate raised walkways are to be provided.**

For small units such as fans, or if project requirements limit height of units above the roof, curb mounted equipment is to be used such that the height of the curb is 12" to 18" above the finished surface of the roof (top of paver in a protected membrane assembly).

- For air handling equipment without compressors (including units installed over occupied spaces) and for rooftop equipment with compressors over corridor and unoccupied spaces, provide concrete curb and units with internal vibration isolators.
- For rooftop units with compressors over occupied spaces, provide specialty prefabricated seismic/vibration isolation curbs and units with or without internal isolation.

- The project acoustic consultant is to determine the appropriate design. Acoustic consultant must verify that units installed as defined above do not exceed the maximum noise criteria in the occupied spaces as defined in HVAC Design Requirement 6.2.25.

For service access to the equipment, refer to DR 4.4.2.2.

4.4 Roofs

4.4.3 Roof Access

4.4.3.1 Roof Access

Description/Design Approach:

Roof access shall be provided for all new buildings and building additions to allow for maintenance and as required by code.

Access shall be provided for flat roofs and roofs that have a slope of 20° or less.

A. New Buildings

1. Access to a one story building with roof top HVAC unit (RTU) shall be provided via an enclosed stair.

2. Access to main roof for buildings that are two or more stories shall be provided via a code compliant enclosed stair.

3. Access to setback roof areas that are 4 or more stories or more than 40 feet in height above grade shall be provided by one of the following:

   a Access to setback roof areas that include a stair terminating at the level of the setback shall provide access to the setback roof area via stair as per Section BC **1011.12** of the **2022** NYC Building Code.

   b Access to setback roof areas that do not include a stair terminating at the level of the setback shall be provided by

      1) Door from a corridor or a non-instructional space

      2) At roof areas without RTU unit: Access through a casement or double hung window if the clear opening of the sash is at least 24”x36” and where the window sill is no more than 36” above the adjacent roof or floor level

4. Access to setback roof areas that are less than 40 feet in height above grade shall be provided by one of the following

   a. Roof areas that have RTU units shall be provided by a door as described in 3.b.**1** above.

   b. Roof areas without RTU units shall be provided by a door as described in 3.b.**1** above or through a casement or double hung window as described in 3.b.**2** above.

5. Access to small setback roof areas (750 SF or less in area) less than 40 feet in height above grade and without RTU units shall be provided by one of the following (listed in order of preference):

    a. Door from a corridor or a non-instructional space

    b. Access through a casement or double hung window as described in 3.b.**2** above

    c. Ladder from an adjacent accessible roof where the height difference between the two roofs that are connected by the ladder is less than 20'.

    d. Through an access hatch and ladder.

B Additions

1. For additions that include a stair and roof of the addition is same height or higher than roof of the main building, access to roof of addition shall be provided via a code compliant enclosed stair.

2. Where there is a setback roof(s) or if the roof of the addition is lower than the existing and is 4 or more stories or more than 40 feet in height above grade, access to the roof(s) of addition shall be provided as described in A.3 above.

3. Where there is a setback roof(s) or roof of the addition is less than 40 feet in height above grade, access to the roof(s) of addition shall be provided as described in A.4 above.

4. Access to small setback roof areas (750 SF or less in area) less than 40 feet in height above grade and without RTU units shall be provided as described in A.5 above.

4.5 Bulkheads

4.5.1 Stair Roof Bulkhead

Description/Design Approach:

A. The design of a new building shall provide for an enclosed weather resistant enclosure for the code required stair access to the roof of the building. The exterior walls of the stair bulkhead shall be of masonry construction. The preferred composition is brick veneer over concrete masonry units (CMU). Appropriate cavity wall insulation, flashing and parapets shall be provided.

B. The selection of the exterior masonry material for the stair roof bulkhead shall be made prior to completion of preliminary design (30% Design Submission).

C. The roof substrate of the stair bulkhead shall be a metal roof, or concrete on metal deck. The roof shall be pitched to roof drains, minimum 1/4" per foot, or to a scupper/leader to the main roof. Provide a splash block at the main roof, if the stair bulkhead leaders are designed to splash onto the main roof.

D. The roofing membrane for the stair roof bulkhead shall be same roofing membrane as specified on the building's main roof. Appropriate roofing insulation shall be provided meeting the energy code requirements. If a metal roof is provided, the metal roof shall be pitched. Appropriate drainage shall be provided with appropriate pitch to gutters, roof scuppers and leaders to interior drainage.

E. Other design considerations:

1. Provide one 8" step down from the stair roof bulkhead, (top of slab-TOS) to the top of finish of the roofing membrane.

2. If the 8" step down cannot be provided, provide an 8" high (minimum) concrete curb around the entire perimeter of the stair roof bulkhead, integrating appropriate waterproofing.

3. Provide appropriate fire rating for the exterior walls of the roof bulkhead per code.

4. Provide hollow metal doors to the roof, fire rated if needed, with appropriate hardware. Provide weather stripping all around the edges of the doors.

5. Provide an exterior access ladder to the stair roof bulkhead for maintenance and inspections. Provide a smoke hatch connected to a smoke detector or window if required to meet smoke vent requirements per Section BC **713.12.1** of the **2022** NYC Building Code. Refer to DR 6.2.10.

6. Where the stair roof bulkhead is less than 1000 square feet in floor area, provide appropriate gravel stop-curb/cap flashing at the edges the stair roof bulkhead and its exterior walls. For this type of stair roof bulkhead (edge condition), the roof bulkhead must be a minimum of 10' from any of the main roof's parapets below.

4.6 Exterior Doors

4.6.1 Exterior Doors and Frames

Description/Design Approach:

A. Main entrance to the school building or main entrance to individual schools within a complex.

The design intent is to create a friendly, welcoming entranceway while providing a measure of security. The doors should have vision lights as large as possible above and below a center bar that will permit the installation of exit devices. Side lights and transoms should be provided.

1. Construction

a. Doors with vision lights: Material shall be one of the following

i. Fiberglass reinforced polyester (FRP) flush doors - anodized or with fluoropolymer coating
ii. 14 gage galvannealed steel - painted
iii. 0.125 thick Aluminum - anodized or with fluoropolymer coating
iv. Stainless steel - satin finish

b. Frames: Doors, Sidelights and Transoms- finish to match doors

0.125" thick Tubular aluminum framing with aluminum glazing stops
or
12 gage steel, galvannealed or stainless steel to match door

c. Glazing: Vision Lights, Sidelights and Transoms

Vision Lights, Sidelights and Transoms shall be glazed with 1/4"-thick laminated glass, **impact** resistant glass **or insulated glass.**

d. Security Screens

Security screens when provided shall be placed on exterior side of glazing

i. Perforated galvanized 12 gage steel with 48% to 63% open area and a powder coat finish.
or
ii. Stainless steel woven rod and cable or woven wire mesh in pattern with 46% to 74% open area.
Minimum weight 1.5 lbs per square foot.

Security screens are not required if **impact** resistant glass is used for Vision Lights, Sidelights or Transoms.

The proposed entrance design, including door and frame material, vision panel material and size, and the type of security screen shall be finalized for the Authority's approval before the 60% submission. The entrance details shall be included in the 60% submission.

Requirement Applies to: ✔ **New Construction** ✔ **Major Modernizations** ✔ **Capital Improvement Projects**

The SCA Design Manager shall obtain the concurrence of the Division of School Facilities Director of Program Management or the designated representative from the district for the proposed entrance design.

B. Stair exit doors and all other doors

1. Construction

a. Doors:
14 gage galvannealed face sheets - painted
b. Frames:
12 gage galvannealed steel, reinforced – painted. Knock-down frames are *not* acceptable
c. Vision panels, if provided, shall be of glazing meeting the safety impact requirements of CPSC 16 CFR 1201. Provide fire resistance rated safety glazing where required for rated doors.
d. No vision panels shall be provided for doors to mechanical and/or storage spaces.

C. For kitchen service entry door, refer to Design requirement 1.3.6.3 – Delivery Areas - Kitchens.

D. All exterior door frames shall be installed such that the exterior face of the door is inset a minimum 4" from the face of the adjacent exterior wall.