SECTION 08 51 23

STEEL WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior steel projected, casement, pivoted, hung, fixed window, and combination window Work as indicated on Drawings and specified herein.

B. Removal of existing windows, accessories and adjacent construction as required to accommodate new Work.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

1.03 SUSTAINABILITY REQUIREMENTS

A. Sustainability requirements inlcuded in the Section are as follows:
   1. Documentation of material costs.

B. The Contractor shall implement practices and procedures to meet the Project's sustainable requirements. The Contractor shall ensure that the requirements related to these goals, as defined in Specification Section S01352, Sustainability Requirements, and as specified in this Section, are implemented to the fullest extent. Substitutions or other changes to the work shall not be proposed by the Contractor or their sub-contractors if such changes compromise the stated Sustainable Design Performance Criteria.

1.04 REFERENCE STANDARDS

A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.

B. American Society for Testing and Materials (ASTM).

C. Steel Window Institute (SWI).

D. National Fire Protection Association (NFPA)

E. American Architectural Manufacturers Association (AAMA)

F. American National Standards Institute (ANSI)

G. Underwriters Laboratories Inc. (UL)

1.05 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, finishes for steel windows, Catalog sheets, specifications, and installation instructions for each type of window unit.

B. Shop Drawings: Fabrication details and connections to adjacent construction. Shop drawings shall be based upon actual project field conditions. Show method of anchoring new windows to existing construction.

C. Structural Calculations
   1. Required mathematical calculations shall be prepared, signed and sealed by a Professional Engineer registered in New York State. Calculations required for:
      a. Design of mullions and other structural members.
      b. Window anchorage in accordance with Article 3.06.

D. Samples
   1. Corner sample of frame, ventilator or sash, and screen showing materials and construction.
   2. Hardware: Each item required.

3. Color samples for factory pre-finished windows: Manufacturer's standard or custom colors for specified finish. Project Architect will select colors.

E. Regulatory Requirements
1. Submit certification and listing by an Approved Agency in accordance with NYC Dept. of Buildings rules, indicating that the materials and assemblies as regulated by the NYC Building Code are acceptable for the intended use. When test methods are stipulated in the NYC Building Code, the tests utilized shall be stated in the certification. Prior MEA and BSA approvals are acceptable for materials conforming to current Code requirements.
2. Fire rated windows are regulated assemblies.

F. Quality Assurance
1. Test Reports: Certified air infiltration, water penetration, structural performance and thermal performance test reports for each type of window unit required. Test reports shall be not more than four years old unless approved otherwise by the Vice president of Architectural and Engineering.
2. Letter of certification by the window manufacturer that the windows proposed for use on the project are identical in every respect to the passing windows tested, including all modifications made to the specimen to achieve a passing result.
3. Certification by the Manufacturer that the installer is approved.

G. Contract Closeout Submittals
1. Certification by manufacturer of the installation.
2. Operation and Maintenance Data: Deliver 2 copies covering the installed products, including instructions for cleaning and touching-up finish to the Authority's Representative.
3. Extra Materials and as specified in Article 1.08.
4. Certification by the window manufacturer and contractor that the function check as specified in Article 3.08 has been satisfactorily completed.
5. The Contractor shall arrange for inspection of completed window installation by a representative of New York State Department of Labor and shall provide access for inspection by the New York State Department of Labor representative as may be required. Notify the Authority’s representative of the date and time of the Department of Labor inspection 2 business days prior to the scheduled inspection.

H. Warranties (per Article 1.07 of this Section)
1. Sample of each Guarantee or Warranty
2. Contractor’s 5-year written warranty.
3. Window Manufacturer’s 5-year written warranty.
4. Window Installer’s 5-year written warranty.
5. Window Manufacturer's 10-year written warranty for finishes.

I. Low Emitting Materials Compliance Submittals:
1. Provide documentation for each sealant to be used on site and within the weatherproofing/waterproof membrane (interior) of the building, indicating that the sealants comply with V.O.C. requirements as stated in Specification Section G01600.

J. Sustainability Submittals
1. Submit Contractor’s Sustainable Materials Form with complete information on recycled content for steel windows provided under the work of this section in accordance with Section S01352, Sustainability Requirements. Include cost of materials and percentage, by weight, of materials that have post-consumer or pre-consumer recycled content.

1.06 QUALITY ASSURANCE

A. Manufacturer: Minimum of 10 years successful experience in manufacture of heavy intermediate steel windows. Waiver of this qualification shall be at the discretion of the Authority.

B. Installation: Minimum of 10 years experience in the installation of windows of the type described herein and certified as an approved installer by the Manufacturer.

C. Allowable Tolerances: Size dimensions + 1/16".

D. Testing Requirements
   1. Testing Agency: Air infiltration, water penetration, thermal and structural performance tests shall be performed by an AAMA accredited testing laboratory.
   2. Testing (Projected, Casement, Pivoted, and Fixed Windows)
      a. Air Infiltration Test (ASTM E283): Maximum air infiltration 0.3 CFM/ft2 of fenestration area when tested in accordance with AAMA/WDMA/CSA101/I.S2/A440 with static pressure of 6.24 PSF
      b. Water Penetration Test (ASTM E331): No water penetration for 15 minutes when window is subjected to rate of flow of 5 gal/hr/sq.ft., with differential pressure across window unit of 2.86 PSF
      c. Uniform Load Structural Test: Minimum exterior and interior uniform load of 1.5 times positive and negative design load of 40 psf shall be applied to entire outside surface of test unit. Test load shall be maintained for 10 seconds. Tests shall be performed in accordance with ASTM E330.
         1) At conclusion of tests, there shall be no glazing material breakage, permanent damage of fasteners, hardware parts, support arms, actuating mechanisms, or any other damage causing window to be inoperable (sash must open and close fully to be considered operable). There shall be no permanent deformation of any frame, sash member or muntin in excess of 0.2 percent of its span.
   3. Testing (Hung windows)
      a. Air Infiltration Test: Maximum air infiltration 0.3 CFM/ft2 of fenestration area when tested in accordance with AAMA/WDMA/CSA101/I.S/A440 with static pressure of 6.24 PSF.
      b. Water Penetration Test (ASTM E331): No water penetration for 15 minutes when window is subjected to rate of flow of 5 gal/hr/sq.ft., with differential pressure across window unit of 2.86 PSF
      c. Uniform Load Structural Test(ASTM E330): Minimum exterior and interior uniform load of 1.5 times positive and negative design load of 40 psf shall be applied to entire outside surface of test unit. Test load shall be maintained for 10 seconds.
         1) At conclusion of tests, there shall be no glazing material breakage, permanent damage of fasteners, hardware parts, support arms, actuating mechanisms, or any other damage causing window to be inoperable (sash must open and close fully to be considered operable). There shall be no permanent deformation of any frame, sash member or muntin in excess of 0.2 percent of its span.

E. Fire rated windows shall be of a type specifically approved for use in New York City as evidenced by certification, listing, and labeling by an Approved Agency in accordance with NYC Dept. of Buildings rules. Provide approved self-closing devices for operating sash and ventilators. Provide exposed hardware of type and material to comply with New York City approval of the assembly.

F. Field Tests
   1. Windows shall be field tested by an AAMA accredited testing laboratory in accordance with AAMA 502 "Voluntary Specification for Field Testing of Newly Installed Fenestration Products". Test windows for the following:
      a. Air infiltration: Conducted at a uniform static pressure of 6.2 psf. The allowable rate of air leakage shall not exceed 0.56 CFM per square foot of crack length.
      b. Water penetration: Conducted per ASTM E1105 at a static test pressure of 2.86 psf for a period of 15 minutes. No water shall be visible on any interior surface of the window frame, sash or glazing nor pass through any portion of frame joinery.
   2. Conditions:
      a. Chamber for testing shall be erected on the exterior face of the building.
      b. Field tests shall be performed without window guards in place.

c. Window installation shall be complete, including trim and mullion covers, before testing is performed.
d. The Authority will select windows to be tested. The Contractor shall remove interior trim and mullion covers of these windows prior to testing. Provide additional new trim and mullion covers for test windows if necessary to replace that which is bent, split, or otherwise damaged as a result of the testing.
e. If a window fails any part of the test, the Contractor shall remediate and re-test the same window until it passes. All other windows that have the same defect shall be remediated. The Contractor shall test 3 additional windows for each window that has failed.

3. Testing Quantity: The minimum number of field tests to be performed shall be 1 for each 100 or fraction thereof of the total number of Project windows, but in no case less than 2 windows.
   a. A window that fails the testing shall not be counted as one of the required number of field tests. Additional field testing due to failures, as required by Subpar. 2.,e., shall not be counted as one of the required number of field tests.
   b. The term "window(s)" used in Paragraph "F. Field Tests" shall mean the window masonry opening. Masonry opening shall include a maximum of 2 window units.
4. The testing of the windows shall be scheduled, at the percentage of completion of installation of total amount of windows specified for the Project, as follows:
   a. First field test: 5%
   b. Second field test: 50%
   c. Third field test if more than 2 tests are specified: 90%
   d. The date of the window testing will be determined by the Authority's Representative.
5. The selection of the testing laboratory will be by the Authority. The payment for initial testing for all windows selected to be tested will be by the Authority. The expense of all remediation and re-testing per Par. 2.e above shall be borne by the Contractor. The Contractor shall provide access and accommodations for the testing laboratory. The Contractor shall install scaffolding and furnish water at pressure and volume required to perform field tests.
6. The Authority's Representative shall obtain field test reports from the testing laboratory and submit to the Project Architect.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle windows as recommended by Manufacturer to prevent damage.

1.08 WARRANTY

A. Provide a 5-year written warranty, executed by Contractor, window Manufacturer, and window Installer covering materials and workmanship. Repair or replace windows, including glazing, for failures including, but not limited to, structural failures (including excessive deflection), excessive air or water infiltration, faulty operation of sash and hardware, and abnormal deterioration of metals, premature finish failure or deterioration and other materials. The period of the warranty shall start from date of substantial completion.

B. Provide a Window Manufacturer's 10-year written warranty for finishes. The period of the warranty shall start from date of substantial completion.

1.09 EXTRA MATERIAL STOCK

A. Contractor shall provide extra pieces of glazing cut to size, and sash hardware (4 bar hinges, cam locks) for _____ windows.
   1. Extra stock shall be new and identical to products specified and provided for the project.

B. At the completion of the Work, extra stock shall be turned over to the Authority for the use of the Custodian.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Projected, Fixed, Casement, Pivoted Windows
   1. Solid Steel Section Type
      a. Hope's Windows, Inc., Jamestown, NY 14702 (Jamestown series 175 for fire rated windows)
      b. A & S Window Associates, Inc., Glendale, NY 11385.
      c. Crittall North America, Orange, CT 06477
      d. Optimum Window Manufacturing Corp., Ellenville, NY 12428 (Series FR4700 for fire rated windows)
      e. Arcadia, Vernon CA 90058
   2. Cold-rolled Section Type (Option)
      a. Optimum Window Manufacturing Corp., Ellenville, NY 12428 (Series FR8600 for fire rated windows)
      b. Hope's Windows, Inc., Jamestown, NY 14702. (5000 series for fire rated windows)

B. Hung Windows
   1. Cold-rolled Section Type
   2. Optimum Window Manufacturing Corp., Ellenville, NY 12428.(series FR7650TDH or FR7650TSH for fire rated windows)
      a. Arcadia, Vernon CA 90058 (series STL 362 for fire rated windows)

2.02 MATERIALS - PROJECTED, CASEMENT, PIVOTED, FIXED (SOLID STEEL SECTIONS)

A. Windows and Frames: Solid shapes hot rolled from new billet steel. Combined weight of frame and ventilator section, 3.5 lbs per lineal foot. Minimum depth of frame, 15/16". Minimum depth of ventilator, 15/16". Minimum face width of tee shaped muntins, 3/4".
   1. Frame and ventilator sections shall have glazing rebate of 3/4" height. Muntins shall have glazing rebate of 5/8" height.

B. Glazing Beads: Unless otherwise shown or specified, provide 14 ga steel glazing beads for fire-rated window units.
   1. If exposed fasteners are used, provide Phillips flat-head machined screws that match finish of member or hardware being fastened, as appropriate.

C. Weatherstripping: Extruded EPDM, neoprene or silicoated rubber.

D. Glazing shall be in accordance with Article 2.08.

E. Sealing Mastic: Non-staining sealant material recommended by window manufacturer.

F. Hardware per article 2.09

G. Factory Finish as per Article 2.10.

2.03 MATERIALS - PORJECTED, CASEMENT, PIVOTED, FIXED (COLD-ROLLED STEEL SECTIONS)

A. Provide cold-rolled sections, ASTM A528, low carbon steel, galvanized or galvannealed, 20 gauge thickness. Depth of ventilator and supporting frame shall be 13/8" minimum. Muntins shall be of Tee-shaped face, 3/4" minimum.

B. Glazing Beads: Unless otherwise shown or specified, provide 14 ga steel glazing beads for fire-rated window units.
   1. If exposed fasteners are used, provide Phillips flat-head machined screws that match finish of member or hardware being fastened, as appropriate.

C. Weatherstripping: EPDM, neoprene or silicoated rubber.

D. Hardware
   1. As specified in Article 2.09

E. Accessories: Anchors, clips, fittings, and fasteners shall be stainless steel unless otherwise approved.

F. Factory Finish as per Article 2.10.

2.04 FABRICATION - PROJECTED, CASEMENT, PIVOTED, FIXED (SOLID STEEL SECTIONS)

A. Fabricate windows in accordance with approved Shop Drawings. Comply with testing requirements of Art. 1.05., herein.

B. Prior to fabrication, clean all hot rolled steel sections.

C. Corners of Frames and Ventilators: Mitered or coped, solidly welded. Exposed and contact surfaces shall be finished smooth flush with the adjacent surfaces.

D. Muntins: Tenon and weld muntins to perimeter frame. Weld intersections of muntins.

E. Metal-to-metal contacts between ventilators and frames: Meet requirements of SWI.

F. Weatherstripping: Continuous EPDM, neoprene or silicoated rubber weatherstripping applied to integral weatherstrip groove in interior contact surface of ventilator sections, on same plane around interior perimeter of ventilated area. Surface applied weatherstripping or weatherstripping which requires additional retainer or screws for application are not acceptable. Corners of all weatherstripping shall be miter cut to form a tight fit with edges buttered with compatible sealant.

G. Accessories: Anchors, clips fittings, and related fasteners shall be stainless steel, unless otherwise indicated.

H. Glazing shall be in accordance with Article 2.08

I. Factory Finish as per Article 2.10.

2.05 FABRICATION - PROJECTED, CASEMENT, PIVOTED, FIXED (COLD-ROLLED STEEL SECTIONS)

A. Frame and Ventilator Sections: Cold-formed, frame members mitered, and corners keyed and mechanically fastened. Comply with testing requirements of Art. 1.05., herein.

B. Hardware per article 2.09

C. Glazing shall be in accordance with Article 2.08

D. Factory Finish as per Article 2.10.

2.06 HUNG WINDOWS

A. Materials: Cold-rolled Section Type
   1. Window Units: Hot dip galvanized cold-rolled steel.
      a. Head, jambs, sash, muntins: 20 gage minimum.
         1) Sill: 18 gage minimum.
   2. Balances: Spiral balances, with self-closing devices for fire-rated windows.
   3. Weatherstrip: EPDM, neoprene or silicoated rubber.
   4. Limit Stops:
      a. Provide removable 18 ga. channel limit stops with rubber bumpers, installed in the frame jamb track at each jamb of all window frames, including windows with window guards. Stops shall limit the clear lower sash opening to 5". Channel stops shall be finished to match frames. Stops shall be fastened to frames with a minimum of two (2) stainless steel Rivnuts and stainless steel machine screws with tamper proof heads.
      b. Stops and fasteners shall be of sufficient strength to withstand abuse and impact resulting from sash initial breakaway force and attempts to override by occupants.
   5. Fabrication:
      a. Cope and form frame members accurately to their respective intersecting parts; stagger screw and weld. Provide anchors for proper installation. Sash members shall be of channel or tubular forms as indicated on approved Shop Drawings, flush-weld at corners and grind smooth. Stiles shall have double flanges, entering into and operating in deep weathering grooves of the frame stiles, with integral weathering. Provide inside glazing, using snap-in steel glazing beads and removable muntin

caps. Muntins shall be rigidly attached to sash and have accurately joined intersections. Minimum depth of frame shall be 35/8” and minimum depth of sash shall be 1¾".

6. Operating Force: 35 lbs. after the sash is in motion.

2.07 FIRE-RATED WINDOWS (REFER TO ABOVE ARTICLES FOR MATERIALS AND FABRICATION)

A. Certified, listed and labeled windows require the following Unless otherwise permitted per Approved Agency’s certification of the assembly:
   1. Projected, Casement, Pivoted, Fixed (Solid Steel Section type)
      a. Size limitations:
         1) Maximum window size 55 sq ft., maximum height 10’-11” and maximum width 8’-3”. Maximum dimension for casement vent 36”x60”.
         2) Individual light areas limited to 4164 sq.in. or as recommended by glazing manufacturer.
         3) Factory-installed self-closing device.
         4) Mullions: Per certification by an Approved Agency.
   2. Projected, Casement, Pivoted, Fixed (Cold Rolled Section type)
      a. Size limitations:
         1) Maximum window size 55 sq ft. maximum height 10’-6” and maximum width 5’-6”. Maximum dimension for projected vent 66”x48”.
         2) Individual light areas limited to 4164 sq.in. or as recommended by glazing manufacturer.
         3) Factory-installed self-closing device.
         4) Mullions: Per certification by an Approved Agency.
   3. Hung Windows
      a. Size limitations:
         1) 3’-6” wide and 6'-0" high for Single Hung windows, 4’-8” wide x 10’-0” high for Double hung Window
         2) Individual light areas limited to 1296 sq.in.
         3) Muntins: Minimum 11/8" wide.
         4) Factory-installed self-closing device for operable vents.
         5) Sash Lock: Malleable steel, plated to match other hardware finish.
         6) Mullions: Per certification by an Approved Agency.
   4. Glazing shall be in accordance with Article 2.08.
   5. Hardware as per Article 2.09
   6. Factory finish as per Article 2.10.

2.08 GLAZING

A. Windows shall be factory-glazed.

B. Glazing Beads: Inside snap-in steel, of type to suit glazing units. Inside Screw on steel beads to suit fire rated units.

C. Glass for non-rated windows:
   1. Laminated glass complying with ASTM C1172. Consisting of two sheets of Type I, Class 1 clear annealed float glass 1/8” thick with 60 mil thick clear polyvinyl butyral (PVB) interlayer (unless indicated otherwise). 60 mil thick PVB interlayer Saflex as manufactured by Solutia Inc., Butacite as manufactured by DuPont or equal.
   2. Preassembled Insulating Glass Units: 1” - 1¼” thick preassembled units consisting of sealed lites of laminated glass separated by a dehydrated air filled interspace, and complying with ASTM E2190. Manufacturer's standard edge construction of spacers and sealants permanently bonded to glass surfaces. Insulating glass units shall be Certified by (IGCC) and shall be fabricated of the following glass.
      a. Exterior Glass: 1/8” annealed glass, 60 mil polyvinyl Butyral (PVB) interlayer, 1/8” annealed glass with low-e coating on the interior surface.

b. Interior Glass: 1/8” annealed glass, 60 mil PVB interlayer, 1/8” annealed glass. Where indicated: 60 mil PVB translucent white interlayer
c. Sealing System: Dual seal with manufacturer's primary and secondary sealants that are compatible with glazing materials and aluminum finish.
d. Corner construction: Manufacturer's standard corner construction.

D. Glass for fire-rated windows: Min. 1/4" thick. Provide wired glass (Georgian pattern), laminated glass with intumescent interlayer, ceramic glazing or other safety glazing that complies with New York City approval of the assembly and has been tested to meet the requirements of Underwriter's Laboratories (UL) classification marking for fire resistance.
1. Glazing Performance: Provide glass with the following minimum performance requirements:
a. U Value: less than or equal to 0.30
b. Visible Light Transmittance: >68%
c. Solar Heat Gain Coefficient: less than or equal to 0.39

2.09 HARDWARE

A. Hardware: Unless otherwise shown or specified, exposed hardware shall be solid white bronze, lacquered. Fasteners shall be of non-corrosive stainless steel. Provide mechanical operators where indicated on Drawings.

B. Projected Windows
1. Hardware having exposed component parts shall be of aluminum, stainless steel or non-corrosive materials compatible with steel. Cadmium or zinc-plated steel where used shall be in compliance with ASTM Specification A165 or A164.
2. Ventilators shall be balanced on a pair of Anderberg 301 SS 4-bar hinges or equal by Advantage Manufacturing Corp.
3. Limit Devices: On ventilators where the top of the ventilator is 78 inches or less above finished floor provide limit devices to restrict clear opening of the ventilator to 5 (five) inches. Provide two limit devices per ventilator. Limit devices shall have a releasable arm by means of a tamper proof screw which is integral to the limit device mounting bracket. The limit device shall incorporate a load pin which is integral to the releasable arm. Limit device components shall be manufactured from Type 300 Series stainless steel and contain a solid brass sliding shoe with friction adjustments. Limit device shall have an adjustable stop inside the track component for adjusting the amount of clear opening of the vent. Unless otherwise directed, limit devices should be set to limit openings below 68” above finished floor to 5” Limit device shall be as manufactured by Advantage Manufacturing Corp. or approved equal.
4. Limit devices shall have the ability to open to 45 degrees for washing of the windows from the inside of the building once the limit device has been released.
5. Locking Devices: Primary locking devices shall be white bronze cam action lever locks with pole ring as manufactured by Bronzecraft #158 Series (pole operated) for ventilators 60" or more above finished floor and Bronzecraft #156 Series (hand operated) for ventilators below 60" above finished floor. or approved equal. Two such locking devices shall be required when ventilator height exceeds 30" or ventilator width exceeds 42". Cam lock handles on projected units shall be “handed" to facilitate operation. Left lock to sweep left, right lock to sweep right.
6. Provide custodial keyed locks at windows in stairs, toilets, and other unsupervised student areas. Keys shall be removable from either the locked or unlocked position.
7. On ventilators where the top of the ventilator is 60 inches or higher above the finished floor, provide a white bronze pole operated spring latch and keeper located at the center of the ventilator as manufactured by Bronzecraft #273 Series or approved equal.

C. Mechanical Operators
1. Casement Windows

a. Ventilators shall be balanced on 2 Anderberg 301 SS 4-bar hinges. Provide one cam lock Bronzecraft #156 Series (hand operated) for each ventilator; provide 2 cam locks for ventilator exceeding 5'-6" in height.

2. Pivoted windows
   a. Vertical Pivoted: Revolve 90o, supported at head and sill by 2 pivots attached to frame. Provide locking device at both jambs, 2 locking devices each jamb for ventilators exceeding 4-8" in height.
   b. Horizontal Pivoted: Revolve 90o, supported at jambs by 2 pivots attached to frame. Provide locking device at both sill and head, 2 locking devices at sill and 2 at head for ventilators exceeding 4'-8" in width.
3. Hung Windows
   a. For Fire Rated Windows: Provide exposed hardware of type and material to comply with the Approved Agency certification of the assembly.
   b. Locks, Lifts: Solid white bronze. Provide pole-operated type for windows as required. One sweep lock for windows up to 36” wide. One lift handle for windows up to 36” wide.
4. Provide custodial keyed locks at windows in stairs, toilets, and other unsupervised student areas. Keys shall be removable from either the locked or unlocked position.
5. Pressed Metal Cover (for window mechanical operator)
   a. Pressed metal covers shall be formed to dimensions, profiles, and gauges (16 ga. minimum) as indicated on approved shop drawings.
   b. Neatly butt jamb and mullion covers to sill covers.

2.10 FACTORY FINISH

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Surface Preparation: Clean surfaces of dirt, oil, grease, scale, and other contaminants; follow with a zinc phosphate pretreatment applied according to window manufacturer's written recommendations.

C. Powder-Coat Finish
   1. Provide manufacturer's powder-coat finish, Color and Gloss:
      a. Standard color Bronze or White
      b. Custom color from full range of industry colors and color densities.
      c. As selected by Architect

2.11 SEALANTS

A. Unless otherwise indicated, for sealants required within fabricated window units, provide elastomeric type as recommended by window manufacturer for joint size and movement, to remain permanently elastic, non-shrinking and non-migrating.

2.12 INSECT SCREENS

A. Removable type.

B. Frame: Electro-galvanized or galvannealed steel, 0.032" thick, or extruded 6063-T5 aluminum alloy, 0.040" thick, finished to match windows.

C. Retainer Spline: Vinyl plastic.

D. Screen Cloth: Aluminum wire, 0.011" diameter, 18 x 16 mesh.

2.13 PANNING, CLOSURES, TRIM, SILLS, STOOLS

A. Provide 16 gauge panning, closures and trim.

B. Sills: Provide as indicated on Drawings.

2.14 WINDOW POLES

A. For each room or space containing windows requiring poles for proper operation, provide one pole as follows:

1. Pole Hook: Cast bronze, manufacturer's standard pattern ferrule 17/8" deep inside of socket. Weight: 4½ ounces min. Two screws.
2. Pole Shaft: Clear hickory, 1" diameter. with satin finish polyurethane coating. Provide cemented rubber tip at end of shaft.
3. Length of Pole: Distance from top of upper sash pole ring to a point 4'-0" above floor.
4. Pole Hanger: Solid cast bronze slotted plate, 23/8" x 13/16", raised 7/16", recessed back, round ends. Weight 1¼ ounces min. Two (2) 1¼" screws.

PART 3 EXECUTION

3.01 INSPECTION

A. Window openings shall conform with details, dimensions and tolerances shown on approved Shop Drawings.

B. Conditions adversely affecting the window installation shall be brought to the attention of the Authority before installation commences.

C. After delivery of windows to Site and before installation, the Authority reserves the right to select at random one window of each type and remove them to the office of the Authority for examination and inspection.

D. If, after the examination and inspection it is found that any window does not comply with requirements of Specifications, all windows of the type shall be inspected and defects corrected. If it is not possible to correct the defects at Site, the defective windows shall be removed from Site and all costs involved shall be borne by the Contractor.

E. If, after the examination and inspection it is found that the windows comply with requirements of Specifications, Contractor shall proceed with installation of windows including those examined and inspected by the Authority. The Authority will pay the cost to repair or replace windows damaged during the examination and inspection.

3.02 PROCEDURES FOR WINDOW REPLACEMENT WHEN DISTURBING LOOSE PAINT

A. The following procedures shall be followed when existing window putty and caulking around window frames do not contain asbestos:
   1. Work must be in compliance with OSHA Construction Standard (29 CFR 1926.62) which includes provisions for respiratory protection and personal air monitoring of workers for lead exposure when work involves the disturbance of paint with an unknown lead content.
   2. Provide precautions against PCB contamination when caulking materials are removed in accordance with Section S01900 - Existing Premises Work.
   3. The line of windows directly below the work area and the line of windows adjacent to and below the work area shall be closed. The windows in these lines shall also be closed one floor above the work area.
   4. Provide tarps on the outside of the building, on the sidewalk, and sidewalk bridges to catch all dust, debris and paint chips. The tarps shall extend 10 feet from the exterior base of the building and ten feet from either side of the work area, providing that barriers such as fencing or adjacent structures or walkways/ streets do not prevent this. Work must be stopped if high winds carry debris beyond the tarps.
   5. Floor surfaces along the length of the window extending three (3) feet on both sides and six (6) feet in front will constitute the work area (staging area). The work area shall be covered with one layer of six mil plastic. If floors are carpeted, the work area shall be covered with two layers of six (6) mil plastic.
   6. All air vents in the work area shall be closed and/or shut off and sealed with one layer of six (6) mil plastic. All other air vents in the room must be closed and/or shut off.
   7. Contractors shall provide labor for continuous cleanup on the interior and the exterior of the building as necessary. Any visible debris shall be removed prior to the completion of the work on a daily basis. Only wet cleaning methods and/or HEPA vacuuming shall be used to clean.

8. All window components and debris shall be sealed in one layer of six mil sheeting or disposable bags and disposed of properly in accordance with Federal, State and Local Regulations. No components or debris shall leave the work area unless sealed.
9. After removal and installation is complete, the entire area (including window frames, ledges, and floor area) shall be HEPA vacuumed and wet wiped. All hallways used by Contractors shall be mopped with a detergent solution.
10. A visual inspection shall be performed in all rooms upon completion of the cleanup. All surfaces in the room shall be inspected for evidence of construction dust or debris. If such evidence is observed a re-cleaning shall be performed.
11. The Authority will conduct dust wipe sampling in all LYFE Centers, Pre-Kindergarten, Kindergarten, 1st grade, Pregnant Student Program areas and designated special education rooms one hour after completion of the work. If the applicable levels are exceeded, all similar components (window sills, floors, etc.) in the room shall be re-cleaned and retested.

3.03 PROCEDURES FOR WINDOW REPLACEMENT WHEN WINDOWS CONTAIN ASBESTOS

A. Existing asbestos containing window glazing putty and window caulking around window frames shall be abated in accordance with the procedures specified in Section 02081 - Asbestos Abatement. Provide precautions against PCB contamination as described in Section S01900 - Existing Premises Work.

B. Removal of existing windows and installation of new windows shall not be done until existing asbestos in windows and window frames is abated.

C. New panning or casing shall not enclose existing asbestos containing caulking.

3.04 REMOVALS AND REPAIRS

A. Do not remove existing windows until new replacement windows are on site and ready for installation. Do not leave any openings unprotected at end of work day or during periods of excessive cold weather or precipitation.

B. Remove existing windows and accessories as indicated on the Drawings and as specified herein, without causing damage to adjacent materials and surfaces.

C. Remove existing windows and debris created by removal of windows from site.

3.05 INSTALLATION

A. Comply with manufacturer's specifications and recommendations for installation of window units, hardware operators and other components of Work.

B. Seal watertight exterior joints between sash, trim and mullions.

C. Repair any damaged areas of factory applied finish.

D. Re-install mullion cover plates removed to accommodate new work.

E. Install sill, stool and trim (which are part of window assembly as recommended by the manufacturer and as shown on Drawings).

F. Provide protection for window finish to prevent damage during the course of other construction and remove finish protection before final inspection of windows.

3.06 SETTING AND ANCHORING

A. Anchor windows frames at jambs, head, and sill, as recommended by the window manufacturer, and as required to ensure a structurally adequate installation, as determined by approved structural calculations. Comply with the requirements of the N.Y.C. Building Code and this Specification Section.
1. Window manufacturer shall submit anchorage design and structural calculations prepared, signed and sealed by a N.Y. State Professional Engineer to the Authority for review. Calculations must include design of the fasteners which takes into account the type of substrate the windows are fastened to and minimum embedment of the fastener.

B. Set windows plumb, level and true to line without warp or rack of frames.

3.07 ADJUSTING AND CLEANING

A. Adjust operating sash and hardware to provide tight fit at contact points and at weatherstripping, for smooth operation and weather tight closure. Lubricants may only be used on hardware. Lubricants shall not be used to remediate defective parts or installation that prevent proper operation.

B. Touch-up damaged finish.

C. Clean glazing as recommended by glazing material manufacturer, promptly after installation of windows. Remove glazing sealant compound, dirt and other substances.

D. Provide protection and other precautions required to ensure that window units will be without damage or deterioration (other than normal weathering) at time of acceptance.

E. Deliver to the Custodian and Authority's representative written recommendations and instructions for maintenance, repair, cleaning (including glazing) adjustment and protection of windows, after acceptance. Instruct the Custodian in methods of maintenance, adjustment and protection.

3.08 MAINTENANCE MANUAL AND INSTRUCTION

A. Deliver to the Authority for use by the Custodian 3 copies of a Maintenance Manual which includes written recommendations and instructions for maintenance, repair, cleaning (including glazing) and adjustment of windows after acceptance. Provide instruction to the Custodian in methods of maintenance, adjustment, repair, re-glazing and protection.

END OF SECTION