

STATE UNIVERSITY CONSTRUCTION FUND

PROGRAM DIRECTIVES

DIRECTIVE 7-1

Issue date: September 2016

ROOFING AND REROOFING

1. Introduction

The purpose of this Directive is to outline Fund procedures and requirements for the Consultants relative to design and specifications for roofing and re-roofing.

2. General Policies

a. System Design:

- 1) The Campus shall be consulted as to their preference for roofing systems.
- 2) Roofing system design shall be based upon recognized, non-proprietary roofing systems manufactured by national firms with ten years' experience in the manufacture and supply of waterproof membranes and roofing materials.
- 3) Roof assemblies shall have a UL Class A rating for exposure to external fire sources.
- 4) Roof-Ceiling assemblies required to have a fire resistance rating shall be shown with an appropriate assembly number from an appropriate testing agency.
- 5) Consider the visual impact of the roofing from adjacent public vantage points. Provide options for colors and textures.
- 6) Review the project specific design and specifications with the listed manufacturer prior to bidding.
- 7) When selecting the roof assembly and components, consider the frequency and amount of foot traffic across a roof and the potential for damage.
- 8) For new construction, do not slope roofs to shed water or snow onto walkways or roadways. Where roofs slope to shed water onto surfaces below, consider the impacts of sliding snow and its accumulation on the surface below. Where needed to mitigate the impact of sliding snow, provide sloped roofs with a continuous snow retention system that is compatible with roofing system.

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- b. Warranty: Specify a 2-year contractor guarantee and a manufacturer's 20-year full system warranty. The suggested wording for this requirement shown below in Part 18. Enhancements to this warranty may be proposed, subject to confirmation that it is desired by the Campus and the cost is within the available budget.
3. Design Phase Investigation for Re-Roofing Projects
- a. Determine whether existing roof system, deck and/or structural system varies at different areas of building. If so, the following procedures should be performed at a representative location for each different system.
 - b. Structural review: evaluate the existing structure to determine if it can support the proposed roofing system. Examine the roof deck to determine its condition and its ability to remain structurally sound during removal of existing roofing and installation of new roofing.
 - c. Existing Roof Conditions Investigation:
 - 1) If portions of the roof are to remain, perform an infrared scan of the entire roof area to determine the extent of moisture in the system. Review the results with proposed roofing system manufacturers to confirm the acceptability of allowing portions of the roof to remain.
 - 2) Cut open the existing roofing assembly to determine its materials, thickness, and condition of the structural deck. Open at least one area large enough to inspect the deck and additional smaller areas as needed to establish the range of existing conditions.
 - 3) If deck surface is gypsum, lightweight concrete or other poured fill, determine thickness to substrate below. If tectum or other plank, determine plank thickness.
 - 4) If accurate construction details are not available, or if existing blocking will be retained, remove representative section(s) of fascia, copings, flashings, etc. to determine type and condition of underlying blocking and other substrate materials.
 - 5) Determine the levelness/slope of the existing structural deck. Where ponding of water is visible, provide an elevation survey to determine if there is a structural cause for the ponding.
 - 6) Examine existing roof drains and leaders to determine their condition.

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d. Pullout Tests:

- 1) If the roofing system is to be mechanically attached to deck, perform pullout tests determine proper fastener specification. If underside of deck is exposed in public areas below, consider the visual effect of exposed screws. If underside of deck is covered by a suspended ceiling, review as-built documentation and examine the space above the ceiling in representative areas to determine if existing MEP systems might be damaged when fasteners are installed.
- 2) If existing roofing system is mechanically attached to deck, perform tests determine the feasibility of methods of removing fasteners.

e. Asbestos and Hazardous Material Testing:

- 1) Prior to submitting the Schematic Report, perform sampling and testing for asbestos in all existing roofing materials, including underlayment in multiple locations. Identify and test presumed asbestos materials on the building interior, such as sprayed-on fireproofing, roof leader insulation, etc. that may be disturbed by new roofing work. Refer to Directive 1D-6, Asbestos Abatement, for asbestos abatement policy.
- 2) Perform sampling and testing for lead if painted surfaces or other presumed lead containing materials will be disturbed during the work. Contact the Fund Coordinator for guidance on testing areas and materials downstream of lead surfaces. Refer to Directive [1D-5, Lead Remediation](#), for lead remediation policy.

Test existing caulks for PCB content. Contact the Fund Coordinator for guidance on handling PCB caulk.

f. Field Verification of Existing Documentation

- 1) If “as-built” roof drawings exist, they should be used as a starting point for the examination and documentation of field conditions. If “as-built” drawings don’t exist or cannot be located, measure and document the existing conditions.
- 2) Field conditions requiring verification include the following: (NOTE: Roof should be broken into sub-sections based on physical attributes such as area dividers, expansion joints, level changes, etc. These should be distinguished by a labeling system, such as Area “A”, Area “B”, etc.):

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- i. Identify and measure overall dimensions of contract area and sub-sections.
 - ii. Identify and measure heights of roof areas relative to each other and to grade at staging area(s).
 - iii. Identify and measure all roof penetrations. Survey should include material identification, dimensions, diameters, heights, curb heights, etc. Measure and document vent pipes, roof drains, equipment curbs, exhaust fans, roof top HVAC units, skylights, structural supports, antennas, pitch pockets, electrical conduit, etc.
 - iv. Identify and measure perimeter conditions at roof areas including variations of roof edge and/or parapet profiles.
 - v. Identify and measure conditions and profiles at any doorways to stair towers or penthouses and windows to occupied areas.
 - vi. Identify and measure miscellaneous equipment, supports, mechanical piping, conduits, cabling, ladders, etc., mounted at vertical, horizontal or diagonal surfaces within the contract area.
 - vii. Identify and measure wall elevations particularly if roof project includes building mounted equipment and/or masonry or exterior envelope repair/ rebuilding.
 - viii. Identify and measure locations of any control joints in masonry walls above roof and flashings/weeps in wall systems at roof level.
- 3) All conditions and items should be documented via photography. Provide overall images of roof areas and close-up images of specific assemblies. Quantity of photographs should be appropriate to size and complexity of project. Where possible, close-up images should be taken with a ruler or rigid measuring tape pictured within the field of view to document relative size of pictured components.
- g. Field Verification of Existing Equipment and Systems.
- 1) Test operability of existing air handling equipment, refrigerant based split systems and other mechanical and/or electrical systems at the roof top level. Testing should be done by the Campus or a Campus approved firm.

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- 2) If rooftop located air handling equipment (air handling unit, exhaust fan) are to be removed and reinstalled, the equipment should have its air flow measured during the design process to establish a performance baseline to compare to when the equipment is reinstalled. These measurements should be taken at the air inlets and outlets of the equipment.
 - 3) If the rooftop located equipment are refrigerant based split systems and are planned to be removed and reinstalled, provide a description of the existing system so that the contractor understands refrigerant gas will need to be removed and replaced.
 - 4) Lightning Protection: Test system continuity and ground resistance. Perform a Code analysis to determine if the system must be maintained. Review the replacement in kind with Campus and obtain its approval prior to including a replacement lightning protection system in the project.
 - 5) Roof Drains: coordinate with Campus to have drains inspected and tested for flow capacity before the Contractor initiates work. Provide video inspection where feasible.
- h. Compensation for Field Testing: Unless included in the lump sum fee or the Schedule B of the Consultant's Agreement, the services and fees related to field testing, structural evaluation and surveyors required in this Directive may be provided through extra compensation when approved by the Fund. However, the effort required to identify and measure existing conditions is included in the basic design fee.
4. Construction Impact Investigation
1. Provide representative photo documentation of spaces immediately below the roof deck, including concealed spaces, where materials or debris could be dislodged. Note existing interior water damage due to roof leaks.
 2. Locate nearby HVAC air intakes, operable windows, and other points where fumes from roofing operations may impact Campus operations.
 3. Document construction access paths and staging areas for dumpsters, insulation, roofing, etc. Note impact to Campus operations and constraints that contractor will have when utilizing such paths and staging areas. Note that all construction debris chutes shall be constructed of fire resistive materials. See Directive [1D-4, Construction Site Requirements](#), for construction staging and access policies.

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4. Document other special conditions which could impact the re-roofing, such as noise limitations (required by the Campus and local ordinances, if any, where the project is adjacent to off Campus neighbors), quiet times, operating fume hoods, vibration limitations and other constraints required by Campus operations.
5. Evaluate the existing conditions of skylights, hatches, vents, ventilators, exhaust fans, etc. and include the cost for their full replacement with new in the schematic report.
5. Removal of existing roofing:
 - a. Normally all existing roofing materials are removed to the deck prior to re-roofing. Do not “encapsulate” asbestos-containing materials.
 - b. Remove existing wood blocking, cants, and curbs and all associated accessories, hardware and fasteners.
 - c. Remove existing metal roof edges and copings. In historic buildings, copper work in good condition may be carefully removed and re-installed. Copper contaminated with ACM mastic shall be removed. Re-secure copper with new fasteners. See Directive [1C-9, Historic Preservation](#), for policies regarding work on buildings that are more than fifty (50) years old.
6. Vapor retarders:
 - a. Vapor retarders are preferred in most roofing assemblies, and are required at high humidity interior building conditions.
 - b. Typical construction shall be single ply adhered vapor retarder. Show remedial work on the deck, if any, recommended by the manufacturer to prepare the deck to receive the vapor retarder. Use adhesives, fasteners and/or fastening methods appropriate to substrate and required uplift rating.
 - c. In the case of recovering an existing roof system, a repaired well-adhered asbestos-free existing BUR may be able to serve as a vapor retarder. Ensure primers and adhesives used to adhere to an existing BUR are compatible with the existing BUR bitumen type.
 - d. Design the overall system to avoid penetrating the vapor retarder with fasteners.

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- e. If the vapor retarder will serve as a temporary roof during construction, require that drains be reset as required for positive drainage or temporary pumps with standby power and operators be provided to evacuate ponded water.
 - f. Turn adhered vapor retarder ply up and extend onto horizontal surfaces of interior curbs. For other vertical elements, turn up a minimum of four inches at penetrations and vertical transitions and seal with compatible mastic secured with metal clamps and termination bars.
7. Attachment of roofing system:
- a. Wind design: Design roof systems for Code compliance and, if possible, a Factory Mutual design classification. At a minimum, roof design shall meet requirements for FM Class IA-90 or as required by the Building Code of NYS, whichever is more stringent. Local conditions and/or building height may dictate design requirements. Note: The Campus is not FM insured and may opt for a design that does not meet FM requirements, such as a UL approved roofing assembly.
 - b. Where deck construction allows, non-penetrating insulation attachment systems, such as low rise insulation adhesive and other approved adhesives, are preferred for securing insulation in lieu of mechanical fasteners. Select adhesive in consultation with the specified roofing manufacturers.
 - c. Ballasted roof systems (Not recommended)
 - 1) Provide a justification for not using a fully adhered system and obtain approval from the Campus and Fund.
 - 2) Before a ballasted roof design is finalized, consideration must be given to anticipated wind velocities at the building location, height of roof surface above grade, and exposure of building to prevailing winds.
 - 3) Due to limited availability of sound, river-rounded stone for ballast, consider a washed crushed stone of NYS DOT gradation item 3A for ballast applications. Place ballast on a protective sheet on top of the membrane. Stone type and color should be considered at locations where roof top is visible from adjacent vantage points.
 - 4) Roof edging, roof drain assemblies and scuppers should be designed accordingly (i.e. stone grates, etc.).

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- 5) Existing structure shall be evaluated to verify that it can support the weight of ballast during placement and in final coverage.
8. Parapets and Roof Edges:
- a. Extend the roof flashing membrane up and over the curb or parapet. Install Dens-deck (or other non-combustible sheathing acceptable to roofing manufacturer) to masonry prior to adhering membrane.
 - b. Do not cover over existing weep holes in masonry.
 - c. In consultation with the Fund, consider destructive testing of masonry parapets and masonry to determine the type and quality of the masonry construction. Determine if existing parapets are of sufficient quality to accept new work, or if they un-reinforced, if bracing may be required per the Existing Building Code of New York for the building's Seismic Design Category. Determine the Seismic Design Category.
 - d. Metal Fascia / Copings: Provide metal edge and copings to meet ANSI/SPRI ES-1 wind uplift requirements. A pre-manufactured system tested for wind resistance is preferred. For custom made units, comply with appropriate reference standards (ie. SMACNA) for design requirements as minimum standard. Select material, weight and profile to minimize oil canning.
 - e. Stone / precast copings: Stone / precast copings are not preferred. Terminate membrane at top of inside face of parapet wall. Top of wall shall be capped with metal thru-wall flashing with soldered joints and caps at dowel extensions. Extend flashing to form ½" drip at outside edge, and interlock with separate counterflashing at inside edge.
 - f. Review colors of exposed fascias, gravel stops, and other metal visible to the public, with the Campus and the Fund. See Directive 1C-3, [Material and Color Selections](#), for guidance on color selections.
 - g. If roof scuppers are existing, verify condition and replace if needed. Where icing occurs, provide protective systems to safeguard areas below scuppers.
9. Expansion Joints:
- a. As recommended by NRCA, install area divider curbs at critical changes in shape/size of roof areas or to separate maximum areas of open roofing.

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- b. Install roof system expansion joints at building expansion joints.
 - c. Use preformed expansion joints compatible with roofing system manufacturer.
10. Roof curbs, equipment supports and penetrations:
- a. The height of base flashings should be a minimum 12" above the roof membrane. Verify that elevations of existing curbs, counterflashing, cavity wall weeps, and vents will permit this height, especially where tapered insulation is installed. Consider the thickness of insulation when specifying the height of new curbs. For example, to provide a minimum of 12 inches of base flashing when there is 4 inches of adjacent insulation, a 16" curb or next available taller size curb should be specified.
 - b. Skylights:
 - 1) Consider replacement of leak prone skylights with deck and roofing as part of a re-roofing project. However, skylights shall not be removed from an architectural significant building without approval by the Campus and the Fund.
 - 2) If existing skylight curbs will not be at least 12" above a new roof system, consider replacement of complete unit (curb, frame and glazing) with new. Replace any single lens with double insulating type (review options with Campus and Fund at concept phase). For new skylights, provide curb height as noted above in "Roof curbs, equipment supports and penetrations".
 - 3) Protection of existing and new skylights to be reviewed with Campus and shall comply with the BCNYS.
 - c. Structural penetrations, such as supports/platforms for roof-mounted mechanical equipment, etc.:
 - 1) Provide 24" minimum clear height from underside of support beams (dunnage) to the top of the new roof surface to allow a person full access to the roof surface and all flashings under this equipment.
 - 2) Support posts shall be formed from round structural tubing or pipe to provide favorable flashing termination conditions. Avoid use of non-round posts that require labor intensive flashing or sealant poured into flashing pans. Do not use wide flange steel members at locations that need flashing. If wide flange

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vertical support members are present, provide closure plates for space between flanges fabricated and welded in place per NRCA details. This will simplify flashing and be a less maintenance intensive assembly thereby less subject to leaks.

- d. If mechanical equipment must be removed to provide access to replace an existing roof system, raise the supports and extend mechanical/electrical connections to required heights before replacing the equipment.

11. Drainage:

- a. All roof areas shall have positive drainage to internal roof drains. For new construction, a minimum of 1/4" per foot pitch in the structural roof deck shall be used. For reroofing, a 1/4" per foot pitch is preferable, but not less than 1/8" per foot is to be used. Where tapered insulation will be used, consult with a tapered insulation manufacturer prior to bidding and show a layout that provides for the optimal use of materials.
- b. Include crickets between drains and other places where required to provide positive drainage of all roof areas. Crickets should be pitched a minimum of 1/4" per foot net slope.
- c. Roof drains shall be sized according to Code. However, provide 4" minimum leader size in new construction even if the Code permits using a 2" or 3" leader. Evaluate the existing roof drainage for adequate capacity; this is particularly important when increasing the pitch of the roof surface. Wherever feasible, select drainage patterns that locate roof drains more than ten (10) feet from the roof edge.
- d. Roof leaders arranged to discharge on another roof level shall have pre-cast crack resistant concrete splash block at the discharge point.
- e. Scuppers should not be used in the primary drainage design of new buildings.
- f. See Directive 15H-5, Refrigeration Systems, for cooling tower drain requirements.

12. Roof access:

- a. Provide access to all roof levels not accessible by hatch, stair or door.
- b. Roof ladders shall be wall mounted; do not support ladders from roof surfaces. Insure adequate structural support at anchoring points.

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- c. Where roof drains cannot be located more than ten (10) feet from the roof edge, provide edge protection railings as required by current applicable Building Code.

13. Special considerations:

- a. Membrane seams: Keep seams at least three (3) feet away from roof drains.
- b. Kitchen exhaust: provide protection of roofing at exhaust of grease-laden vapors, as recommended by the manufacturer.
- c. No pipe or conduit shall lie directly on the roof membrane.
- d. Atraised sills of door and window openings onto roof areas, if the existing elevation will not provide base flashing of at least 8", consider replacement of door and windows.
- e. Protect insulation with an overlay of 3/8" Dens-Deck (or other non-compressible material recommended by the membrane manufacturer) prior to installation of the membrane.
- f. Roof edge fall protection shall be reviewed with Campus to determine type of OSHA approved system to be used.
- g. Snow retention system layout and type shall be designed for anticipated snow fall, its maximum potential sliding force and the size and type of roof on which it is installed. Provide snow retention system on metal roofing systems that does not penetrate metal panels.

14. Green Roof Systems:

- a. Discuss with Campus and Fund the types of green roof systems available. System information to be reviewed shall include initial cost, maintenance, weight, planting mediums, etc.
- b. For existing buildings verify weight of desired green roofing system and ability of existing structure to accommodate increased loading. Modify the existing drainage system to reflect the green roofing system.
- c. Coordinate Green roofing system with the proposed roofing type to verify compatibility and not to void warrantee.

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- d. Provide electronic leak detection system, electric field vector mapping or similar, beneath all green roof systems
- e. If desired by the Campus, enhance the warranty to include an “overburden” warranty in which the manufacturer is responsible for the removal and replacement of the green system due to leak investigation and/or repair

15. Specifications

- a. Specify proper storage and protection of roofing and insulation materials at the site, and require that any materials exposed to the elements in any way will be rejected and removed from the site (Campus). Any damaged materials will also be removed. Storage of removed or new materials on the roof shall not be permitted.
- b. List a minimum of 3 roofing manufacturers acceptable to the Consultant, indicating their system specification numbers or product names for the required roofing application.
- c. Avoid specifying carbon steel unless it can be specially coated to prevent rust, such as by hot dip galvanizing after fabrication.
- d. Acceptable Roofing Systems: SBS-Modified Bitumen (cold applied), Built-up Roofing (cold applied), 90-mil fire-retardant non-reinforced EPDM and polyester-reinforced EIP/KEE where applicable. Selection of roofing system type and thickness is subject to Campus approval.
- e. Insulation: Roof insulation selected shall be compatible to the roofing and structural deck. The insulating value of the total roof system shall be a minimum average R-value (LTTR value) of 24. R-values for insulation calculations shall be industry-accepted standards for "aged" insulation. For polyisocyanurate, use $R = 5.6$ per inch of thickness to calculate total "R" value. Polyisocyanurate roof insulation, both flat and tapered under an adhered membrane, shall have a minimum of 25 psi compressive strength unless protected with Dens deck (or other non-compressible material recommended by the membrane manufacturer), where 20 psi may be used.
- f. Blocking: wood used for blocking, roof curbs, or edge conditions shall be selected based on the risk of decay due to moisture. Where risk is high, use pressure-treated lumber with any cuts made after treatment to be coated with the same treatment solution. All fasteners in pressure treated material shall be stainless steel to limit galvanic action. Copper fasteners to be used at all areas where copper

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- flashings are used. A separation sheet (ice and water shield) shall be used between any pressure treated blocking and metal decking.
- g. Cover Board: Per NRCA recommendations, all roofing insulation is to be protected with an adhered cover board on all single ply, SBS-modified or built-up roofing systems. Cover board materials to be ½” thick Dens Deck Prime (or other non-compressible material recommended by the membrane manufacturer). ½” thick asphalt-coated high density fiberboard may be used in areas with limited maintenance related traffic.
- h. Pre-Roofing Conference: The following paragraph is to be included in the roofing specifications:
- (i) *"Prior to the beginning of the roofing work, a pre-roofing conference is to be held, attended by the Consultant, the Contractor, the Roofing Installer, a technical representative of the Roofing Manufacturer, the Mechanical Installer, the Campus, and the Fund Coordinator. The purpose of this conference is to review the specifications, drawings, details, application requirements, staging areas, crane set-up locations, storage areas, protection and safety precautions, and what work is to be completed before the roofing operation begins."*
- i. The results of this conference are to be submitted to the Fund, in writing, by the Consultant. See the Agenda in Directive 7-2.
- j. The specification should define the qualifications and role of the manufacturer's technical representative:

Manufacturer's Technical Representative: For each system installed, provide on-site services of the manufacturer's technical representative (not a sales representative who has at least five (5) years' experience with the manufacturer's products) to:

- 1. Observe first two (2) days of installation, and*
- 2. Observe two (2) other non-sequential full days of installation selected by the Consultant; and*
- 3. If work of other trades may occur after roofing is installed, review the temporary protective coverings for compliance with manufacturer's recommendations, guidelines for best practices;*
- 4. Inspect completed installations and provide written acceptance for each completed installation; and*
- 5. Review the post completion infrared scan of the completed roof areas and*

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make a written recommendation on the impact (if any) of the results on the Warranty.

6. *Inspect the work during the acceptance walk of this project with the Contractor, Installer, Campus, Consultant and the Fund.*
 7. *In addition, after an inspected portion of the system is worked upon in this Contract by other trades or otherwise exposed to damage from the work of other trades, the advisor shall inspect the system again, upon request of the Consultant.*
 8. *All of the above inspections shall be performed and completed prior to issuing any Warranty.*
- .
- k. Do not permit any more existing roofing to be removed than can be replaced and made watertight the same day. The building is not to be left "open" overnight.
 - l. Noxious vapor control: Prior to installing roofing components that create significant odors, it would be prudent to shut down ventilation systems adjacent to the work area and seal air intakes with 6-mil polyethylene sheet and battens to prevent intake of vapors. Coordinate shut down requirements with Campus personnel and add project specific restrictions to the General Requirements.
 - m. Roof insulation should always be specified to be applied in multiple layers. All joints in each layer are to be staggered. When the insulation is to be mechanically fastened to the roof deck, fasteners shall be installed through the flat bottom layer, not through tapered insulation.
 - n. Pull out tests of fasteners installed in the project roof deck are to be required in the specifications. Specify the spacing of fasteners as required for an FM IA-90 rating of the completed roof system. In consultation with the manufacturer's technical representative, consider the need to reduce the spacing of fasteners to allow for workmanship omissions that may occur and be concealed before corrective action can be ordered.
 - o. The documents shall state that no roofing work is to be done during inclement weather. Temperature shall be 40°F and rising. No roofing work will be done unless roof deck is completely dry, free from any water, dew, frost, ice or snow.
 - p. For re-roofing projects, specify cleaning of all clamping surfaces, drain bowls, and tailpieces of all existing roof drains. Replace missing or broken drain parts. Replace and lubricate all clamping bolts. Where replacement parts are not available, replace entire drain assembly.

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- q. Specify the flush out all drain lines with water. After completion of all work on roof, the contractor shall demonstrate to the Fund/College that the roof drains are functional.
- r. In projects where the work of other trades is not under the direction of the roofing installer, specify a minimum level of protective covering at the work areas of the other trades and along the access routes to such work areas. Example:
 - (i) "After completion of the roofing work and prior to allowing the work of other trades to begin, install protective coverings at the work areas of the other trades and along the access routes to such work areas and extending at least five (5) feet beyond the outer limit of the work areas and access routes. Protective coverings shall be approved by the Consultant and meet the following performance requirements:
 - 1) Be able to prevent penetration of the new roof i) by fasteners, metal debris and other hard materials when stepped on by workers; ii) by equipment or tools moved over the roof or dropped upon the roof, or iii) by other impacts caused by the means and methods employed during the work of other trades.
 - 2) Be able to prevent other damages that may be caused by the means and methods employed during the work of other trades, such as damage due to hot work, incompatible fluids or materials, etc.
 - 3) Be continuous and without gaps, holes, seams or other openings that may allow penetrating materials or hazards an alternative route to the roofing work.
 - 4) be able to remain in place during anticipated environmental conditions, working conditions and other conditions that may cause the coverings to shift from their installed locations.
- s. Consider limiting the amount of patching, which may be required due to damage from other trades after the roofing is installed or due to poor workmanship. Although patching may be watertight, it adds seams and more seams increases the risk of future leaks. See Section 01 73 29, Cutting and Patching, of the Fund's boilerplate General Requirements and modify Part 3 of the roofing specifications to inform the roofing installer that significant roof patching shall be replaced with new work.
- t. Prior to the acceptance walk through with the Campus, require an infra-red inspection similar to that described in the Fund's General Requirements Section 01 32 33 30, Roof Inspection.

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- u. If desired by the Campus, consider adding a physical plaque on the roof memorializing the final roof warranty provided by the manufacturer. Example: Warranty Plaque: The manufacturer shall provide copies of the roof warranty plaque for mounting on the wall beside the roof access hatch. Plaque shall contain the name of the manufacturer, serial number of the warranty, date of issue, length of warranty. The plaque shall be laminated watertight and attached to the wall adjacent to each roof access point. Provide one plaque per roof access door and/or hatch.

16. Drawings

1. Refer to SUCF Directive 1A-1 and 1A-2 for additional information.
2. Provide roof plans at not less than 1/8" per foot scale. Show direction and rate of slope to roof drains. Show insulation thickness. Show all rooftop-mounted equipment, penetrations, skylights, and other features that interrupt the roof membrane. Include relative elevations of roof levels and ground level. Show on roof or site plan where the Contractor is to access the roof. Show Contractor's Staging Area and Contract Limit Line. Show overall dimensions of contract areas and of sub-sections. Identify all roof penetrations and locations where flashing or roof specialties will be required. Include size and geometry info (i.e., plumbing vents, roof drains, equipment curbs, exhaust fans, roof top units, skylights, mechanical lines or conduit supports, antennas, etc.).
3. Show walkway pads at points of repeated traffic/wear. Among these, at doorways, around 3 open sides of roof scuttles, top and bottom of ladders between roof levels, pathways of repeated traffic, and around roof-level mechanical equipment requiring monthly (or more often) visits or heavy maintenance.
4. Provide complete details for flashings required at all locations of vertical intersections with the roofing system, such as exterior walls, parapet walls, roof edge fascia conditions, gravel stops, skylights, smoke vents, expansion joints, roof drains, etc.
5. Detail drawings should show the above conditions in a scale not less than 1-1/2" = 1'-0", preferably 3" scale.
6. For reroofing projects, include separately drawn details of existing conditions showing extent of removals.
7. Indicate by detail or other means, fastening patterns, requirements and materials for blocking and/or board materials where applicable.

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17. References

- a. Factory Mutual Loss Prevention Data Sheet 1-28 (Wind Design) and Factory Mutual Loss Prevention Data Sheet 1-49 (Perimeter Flashings).
- b. Factory Mutual Loss Prevention Data Sheets 1-29 (Above-Deck Roof Components and 1-49 (Perimeter Flashings).
- c. SPRI Wind Load Design Guide
- d. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual, most current edition.
- e. Sheet Metal and Air-Conditioning Contractors' National Association (SMACNA) Architectural Sheet Metal Manual, most current edition.
- f. Brick Institute of America Technical Notes (masonry parapet flashings).
- g. See Directive 1B-1 for applicable Building Codes.
- h. ASTM E2397-11 & E2400-06 for green roof systems
- i. ASCE-7 minimum design loads for structures.

18. Guarantee / Warranty: The Contractor's Guarantee / Manufacturer's Warranty shown below shall be part of the roof membrane section of the specifications. To provide added emphasis, specify as Part 4 to the standard CSI format:

PART 4 - ROOFING GUARANTEE AND WARRANTY

1. Guarantee: The Contractor shall guarantee the roof system for 2 years and provide a Manufacturer's 20-year full System Warranty, starting on or after the date of Owner's acceptance of the completed construction work. Guarantee and Warranty shall not be issued until all inspections have been witnessed and signed off by the Consultant
 - a. Contractor's Guarantee
 - 1) The Contractor guarantees that the total roofing installation, together with all related composition flashings, plastic flashings, metal flashings, roof insulation, cover boards, substrate boards, any vapor seal, cants, blocking, adhesives and seals installed in connection with same, will be watertight and free from defects as to materials, installation, and/or workmanship, for

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a period of two (2) years from the date of acceptance of the completed project. Except as otherwise expressly provided herein, provisions of Section 2.25 of Article II of the Agreement apply to this guarantee.

- 2) During the 2-year guarantee period, the Contractor agrees that within 24 hours of receipt of notice from the Fund, he will inspect and make immediate emergency repairs to defects or to leaks in roof system, and that within a reasonable time, he will restore the affected items to the standard of the original specifications.
 - 3) All emergency and permanent work during the life of the Contractor's guarantee will be done without cost to the Fund, except in the event it is determined that such leaks were caused by abuse, lightning, hurricane, tornado, hail storm, other unusual climatic phenomena of the elements, or failure of adjacent or related work previously installed by others.
 - 4) Any work completed under the contractor's guarantee period shall be coordinated with roofing system manufacturer warranty so as not to void manufacturers warranty.
- b. Manufacturer's Warranty
- 1) In addition to the Contractor's guarantee, the Contractor shall provide the roofing manufacturer's continuous 20 year warranty that the roofing installation will be watertight and free from defects as to materials, installation, and/or workmanship. This warranty shall include vapor barriers, roof insulation, tapered insulation, crickets, substrate boards, cover boards mechanical fasteners, adhesives, roofing plies, mastic, membrane flashings, all metal flashings, wood blocking, cants, and edge strips provided under this Contract. The roofing and insulation shall withstand extended peak gust wind speed coverage up to 90 MPH. This warranty shall be for 20 years for all roofing work, with no requirements for renewal during the 20-year period. Manufacturer shall be required to inspect the roofing system at years 2 (two), 5 (five), ten (ten) and fifteen (15) of the warranty period, and report conditions to the Owner. Such warranty shall commence with the Fund's final acceptance of all work covered under the Contract or at such other date or dates as the Fund may specify in writing prior to that time. The warranty shall not be limited to any dollar value.

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- 2) Four (4) copies of manufacturer's warranty shall be provided to the Fund at the time it accepts completion of the project. The form and content of such warranty shall be in accordance with the foregoing and shall be subject to the approval of the Fund. Prior issuing any warranty,
 - a. all field inspections must be completed and signed off in writing by the manufacturer's technical representative, and
 - b. the manufacturer's technical representative must inspect the work during the acceptance walk of this project with the Contractor, Installer, Campus, Consultant and the Fund.

2. Final Payment: Final Payment will not be made until receipt of properly executed and approved Manufacturer's Warranty.

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ROOF PROJECT CHECKLIST

Here is a short list of issues to consider when reviewing the design submission:

- Asbestos
- PCB caulk
- Lead coated copper
- Lead paint on steel components

- Code Review
- Compliance with FCNYS chapter 14
- Fire Code / NFPA 241

- Core testing
- Curbs and doorways
- Davit Requirement (tie-back)
- Drain capacity and condition
- Do roof field conditions match existing plans?

- Flashing
- Guardrails (roof edge and skylights)
- Height of mechanicals above roof
- Height of roof above grade
- Historic nature of roof
- Lightning Protection (pre-/post-installation)
- Load Capacity
- Maintenance Pads
- Metal Coping
- No Flashing above Existing Weepholes
- Parapet Repair and Reinforcement
- PSI of insulation
- Replacement of Roof Equipment
- Roof Color

- Roof Hatch Dimensions
- Roof Type including green roof
- Seismic Bracing
- Smells/Odors Mitigation
- Staging and Access Areas
- Temporary Covers
- Time of Year
- Underside of Deck Verification
 - for asbestos
 - for lead paint
 - for conduit and J-boxes that might be hit with screws
 - for other existing conditions that might be damaged by work above.
 - can occupants below remain in place during the work?

- PESH / OSHA required rails
- Vapor Barrier presence / need
- Presence/need for below roof deck ventilation
- Deck - pull out test / venting
- Structural slope / ponding 24 hours after last rain event?
- Tapered insulation height impact
- Local wind uplift conditions
- Blocking securement
- Energy Code R-Value
- Roof top electrical conduit / fixtures
- Assess MEP equipment conditions
- Warrantee information

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