SECTION 07 54 16.10

GREEN VEGETATED ROOFING SYSTEMS

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\*\* NOTE TO SPECIFIER \*\* FiberTite, Seaman Corporation; roofing systems.
This section is based on the products of FiberTite Seaman Corporation, which is located at:

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Since 1979, FiberTite, a roofing system for commercial facilities, has demonstrated unmatched resistance to puncture, tear, UV rays and chemicals. Product options are numerous, including: FiberTite Hybrid (tm), combining single ply with modified bitumen technology for extreme performance and, FiberTite SMR, a simulated metal roof membrane system. Our membranes come in 36-mil, 45-mil, 50-mil, and 60-mil thicknesses, and we provide a full line of adhesives, components and accessories for diverse installations.
Herein the term FiberTite Technical Service is synonymous with FTS.

1. GENERAL
	1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* This specification may be utilized for membrane roofing and waterproofing for conventional roof deck applications involving extensive and intensive vegetated roofing systems. The FiberTite Green Vegetated Roof System is a single source integrated assembly utilizing FiberTite Roofing Systems and a FiberTite Green Vegetated Assembly. The FiberTite Green Vegetated Roof System may be loose laid, adhered or mechanically fastened as the project dictates and includes all roofing membrane, integral flashing, vegetated system components, engineered soil, plants, leak detection and related accessories as manufactured and supplied by Seaman Corporation. Delete items below not required for project.

* + 1. FiberTite Green Vegetative Roofing System. (FTR-VRS)
			1. FiberTite Roofing System shall be the core waterproofing assembly within the FiberTite Green Vegetated Roof System, including insulation, coverboard, integral flashing, protection layer, drainage medium, engineered growing medium, plants and components as required.
			2. The work may include, but is not necessarily limited to:
				1. Roofing Waterproofing System:

FiberTite membrane.

Insulation and coverboard.

Fasteners.

Membrane flashing.

Sealants and adhesives.

Metal flashing.

* + - * 1. Leak Monitoring System:

FiberTite Smartex EVM.

Stainless Steel ConDuct Grounding Mesh.

* + - * 1. Vegetated Overburden; FiberTite Green Multi-Layer System:

Protection layer when specified.

Drainage layer.

Filter layer.

Retention layer.

Engineered growing media.

Plants.

Metal edging and trim elements.

Irrigation system.

* + - * 1. Vegetated Overburden, FiberTite Green Tray System:

Double interlocking trays.

Connectors.

Engineered growing medial.

Metal edging and trim elements.

Integrated irrigation system.

* 1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 03 30 00 - Cast-in-Place Concrete.
		2. Section 03 51 13 - Cementitious Wood Fiber Decks.
		3. Section 03 52 00 - Lightweight Concrete Roof Insulation.
		4. Section 05 31 00 - Steel Decking.
		5. Section 05 36 00 - Composite Metal Decking.
		6. Section 06 10 00 - Rough Carpentry.
		7. Section 07 27 00 - Air Barriers.
		8. Section 07 26 00 - Vapor Retarders.
		9. Section 07 72 00 - Roof Accessories.
		10. Section 07 50 00 - Membrane Roofing.
		11. Section 07 54 16.20 - Induction Welded Roofing Systems. (FTR-IW)
		12. Section 07 54 16.30 - Multi-Ply Roofing Systems. (FTR-MP)
		13. Section 07 54 16.40 - Mechanically-Attached Roofing Over Metal Roofing. (FTR-MR)
		14. Section 07 54 16.50 - Mechanically-Attached Roofing Systems. (FTR-MA)
		15. Section 07 54 16.60 - Ballasted Roofing Systems. (FTR-BA)
		16. Section 07 54 16.70 - Adhered Roofing Systems. (FTR-AD)
		17. Section 07 54 16.80 - Simulated Metal Roofing Systems. (FTR-SMR)
		18. Section 07 62 00 - Sheet Metal Flashing and Trim.
		19. Section 07 70 00 - Roof and Wall Specialties and Accessories.
		20. Section 08 60 00 - Roof Windows and Skylights.
		21. Section 22 40 00 - Plumbing Fixtures.
	1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. ASTM International (ASTM):
			1. ASTM D6754 - Standard Specification for Ketone Ethylene Ester Based Sheet Roofing.
			2. ASTM D312 - Standard Specification for Asphalt Used in Roofing.
			3. ASTM D4601 - Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.
			4. ASTM D4897 - Standard Specification for Asphalt-Coated Glass-Fiber Venting Base Sheet Used in Roofing.
			5. ASTM D 7654 - Standard Specification for Asphalt Used in Roofing Measured by Dynamic Shear Rheometer.
			6. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
			7. ASTM C473 - Standard Test Methods for Physical Testing of Gypsum Panel Products.
			8. ASTM D6163 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
			9. ASTM D6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
		2. American Society of Civil Engineers (ASCE):
			1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
		3. FM Approvals (FM):
			1. FM Standard 4470 - Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction.
			2. Loss Prevention Data Sheets 1-28, 1-29.
		4. FBC - Florida Building Code.
		5. Miami-Dade Building Code Compliance - N.O.A. (Notice of Acceptance).
		6. UL - Fire Resistance Directory.
			1. UL-790 - Standard Test Method for Fire Tests of Roof Coverings.
	1. DEFINITIONS
		1. FiberTite Green Multilayer: System includes a drainage layer, filter layer and retention layer, regionally-engineered growing media, specified firewise and firesafe plants, stainless steel or aluminum trim elements. The low-profile multilayer system is designed to control flow of water and the drainage layer of the multilayer system is designed to keep the roof structure dry, while providing excellent airflow up through the system and while reducing wind uplift.
		2. FiberTite Green Tray System: Includes double interlocking trays, connectors, regionally-sourced engineered growing media, specified firewise and firesafe plants, stainless steel or aluminum edgers and integrated irrigation system. Growing media can be placed above level of interlocking trays for thicker beds because of interlocking design. Drainage system is designed to control flow of water and bottom of trays are designed to reduce wind uplift.
		3. Extensive Vegetated Roof Systems: Defined as low to no maintenance garden roof systems that incorporate a roofing and waterproofing membrane system that is covered with soil and vegetation in a growing medium that is less than 6 inches (152 mm) in depth. Extensive systems incorporate the following items within the assembly: deck and substrate, insulation, coverboard, roofing membrane, flashing membrane, sealant and adhesives, metal flashing, protection layer, drainage layer, filter fabric, water retention layer, growing medium, plants and vegetation.
		4. Growing Media: The engineered growth media and selection of appropriate vegetation is critical to the system's performance and must be properly engineered for each application. Seaman Corporation will arrange engineering for the vegetated system for a full-service, single-source system warranty.
		5. Phytoremediation: Use of green plants to extract pollutants, mineral elements, heavy metals, radioisotopes and other contaminants from soil and water environments.
		6. German FLL Greenroof Guidelines: Guidelines for the Planning, Execution and Upkeep of Green Roof Sites, Release 2002. Worldwide acknowledged state-of-the-art technology as scientific foundation for successful and thriving green roofs.
		7. Electronic Vector Mapping (required for all single-source warranties): EVM pinpoints breaches through a waterproofing membrane by creating a positive and negative electrical plate over and under the non-conductive waterproofing membrane. If there are any penetrations in the waterproofing, current will flow through the membrane and the exact location detected with the testing equipment.
	2. SUBMITTALS
		1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
		2. Product Data:
			1. Most recent published technical literature and guide specifications issued by FiberTite Technical Services (FTS).
			2. Authorized Applicator's approved copy of FiberTite Project Registration.
			3. Preparation instructions and recommendations.
			4. Storage and handling requirements and recommendations.
			5. Typical installation methods.
			6. Dimensioned shop drawings, including roof plan detailing perimeter enhancement, flashing methods, terminations and acceptance by FTS.
			7. Written approval from FTS confirming any accessories submitted, not manufactured or expressly approved in FiberTite literature are acceptable and compatible with the proposed FiberTite Roofing System.
			8. Safety Data Sheets (SDS) relating to all products, chemicals and solvents.
			9. Certification that the system specified complies with identifiable building code and insurance requirements.
			10. FiberTite roofing systems (FTR) References:
				1. FTR GS 01/21 FiberTite General Guide Specification.
				2. FiberTite Construction Details.
				3. FiberTite Green Construction Details.
				4. FiberTite Foreman's Manual.
				5. FiberTite Technical Bulletins.

\*\* NOTE TO SPECIFIER \*\* Delete if not applicable to product type.

* + 1. Verification Samples: Two representative units of each type, size, pattern and color.
		2. Shop Drawings: Include details of materials, construction and finish. Include relationship with adjacent construction.
		3. For Project Registration and Warranty Acceptance: FTS will review the following.
			1. Complete copy of project architectural specifications or Applicator's proposal outlining design parameters.
			2. Complete list of accessories or materials not manufactured or expressly authorized for use in FiberTite literature.
			3. Dimensioned outline of the roof indicating all FTR-Detail references.
			4. Dimensioned shop drawings illustrating non-FiberTite details. Details that do not conform with standard FiberTite details shall be returned with appropriate recommendations.
			5. Acceptance of the structural loading by a qualified engineer or design professional.
		4. FiberTite Green Vegetated Roof System:
			1. Submit shop drawings indicating plan layout and details at critical terminations of garden roof system with adjacent construction. Include planter system, pavers and building systems.
			2. Product data.
			3. Components, growing media type and planting types with descriptive published data indicating characteristics and limitations.
			4. Standard details, system components and proposals for plant types and characteristics.
			5. Maintenance Instructions for Owner maintenance of planting media as needed for long-term propagation and health of vegetation. Include special provisions as applicable for specific plant media and climate zone.
	1. QUALITY ASSURANCE
		1. FiberTite Green Vegetated Roofing System, inclusive of the vegetated overburden shall be installed only by an Applicator, authorized by Seaman Corporation to install FiberTite Roofing Systems prior to bid or contract award. Herein, the term Authorized FiberTite Applicator is synonymous with Applicator.
		2. Primary materials for FiberTite Green Vegetated Roofing System shall be obtained from Seaman Corporation and be FiberTite Brand.
		3. Vegetated System components shall be FiberTite Green and obtained from Seaman Corporation.
		4. Applicator's key personnel shall have received specialized training in the installation of FiberTite Roofing System.
		5. FiberTite Roofing System shall be installed in accordance with the most current guide specifications and details as amended and or authorized by FTS for specific project requirements.
		6. There shall be no deviations from approved contract specifications or shop drawings without prior written approval by the Owner or Owner's Representative and FTS.
		7. Unauthorized deviations may subject the roof system to warranty ineligibility.
		8. Installation of FiberTite membrane, insulation, integral flashing, FiberTite Green multi-layer or tray vegetated components shall be the responsibility of the Applicator to ensure undivided responsibility.
		9. Any and all work found to be substandard or in violation of the contract documents or manufacturer's specifications shall be subject to rejection including complete removal and replacement with new materials at the expense of the Applicator.
		10. A quality assurance inspection of the roof system shall be performed by FTS for acceptance and approval. This inspection shall be performed upon completion and certification by the Applicator that the FiberTite Roofing System has reached 100 percent completion, a quality installation has been completed in accordance with the approved contract specifications, and all field welds have been probed and inspected.
		11. The Quality Assurance Inspection must be coordinated prior to the installation of the above membrane vegetated system components and all field seams shall be visible and available to FTS at the time of final inspection.
		12. Flood Test: Conduct 24-hour flood test of the completed membrane roof system prior to installation of FiberTite Green components.
		13. Electronic Vector Mapping (EVM) Leak Detection Testing of the completed FiberTite Roofing System is required for all single source material and labor warranties. The testing must be accomplished in the presence of FTS or an authorized representative appointed by Seaman Corporation. Written confirmation and acceptance of the test results by all parties shall follow the testing.

\*\* NOTE TO SPECIFIER \*\* Include mock-up if the project size or quality warrant the expense. The following is one example of how a mock-up on might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.

* + 1. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
			1. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
			2. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
			3. Retain mock-up during construction as a standard for comparison with completed work.
			4. Do not alter or remove mock-up until work is completed or removal is authorized.
	1. COORDINATION
		1. Prior to installation of materials, a pre-roofing conference shall be held with the Applicator, and Owner or Owner's Representatives to discuss the specified roofing system, coordinate its proper application and the expectations of all parties involved. The Authorized Applicator and the Owner or Owner's Representative shall notify all parties a minimum of fourteen days prior to the meeting.
		2. Plan and coordinate the installation of the roofing system with other trades in such a manner to avoid membrane damage, keeping the complete installation weather tight and in accordance with all approved details and warranty requirements.
		3. FTS shall be available to make recommendations necessary to ensure compliance with project specifications and specification alternatives due to unforeseen job conditions.
		4. Field services are provided at the discretion of Seaman Corporation. A minimum two weeks' notice is required to evaluate and coordinate any request for onsite technical assistance.
	2. DELIVERY, STORAGE, AND HANDLING
		1. Deliver materials to the job site in manufacturer's original, unopened containers, with legible labels and in sufficient quantity to allow for continuity of work.
		2. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
			1. Store rolls of membrane lying down, elevated above the roof deck and completely protected from moisture with tarpaulins. Manufacturer's packaging is not considered adequate for outdoor storage.
			2. Elevate Insulation and cover board materials on pallets and fully protect from moisture with tarpaulins. Manufacturer's packaging is not considered adequate protection from moisture.
			3. Store adhesives and sealants between 50 and 80 degrees F (10 and 26.7 degrees C) prior to use.
			4. Store flammable materials in cool dry areas away from sparks and open flames.
			5. Follow precautions as outlined in manufacturer's material safety data sheets.
		3. Protect from damage due to weather, excessive temperature, and construction operations.
		4. Vegetated Garden System:
			1. Maintain health of plant media as recommended by nursery guidelines prior to rooftop installation.
			2. Take measures to locate and spread loads in manner to not exceed load bearing capacity of the roof deck.
			3. Store vegetated planters and materials over plywood panels or protective sheeting and do not allow products, growing medial, grit, debris and pedestrian traffic on unprotected roofing membrane.
			4. Provide water source of irrigation and maintenance of plants until permanent drip irrigation system is in place.
		5. Materials, having been determined by the Owner or Owner's Representative to be damaged, shall be immediately removed from the construction site and replaced at no cost to the Owner.
	3. JOB CONDITIONS
		1. Safety:
			1. Take necessary precautions regarding worker health and safety when using solvents, adhesives or hot asphalt.
			2. Worker safety is paramount.
			3. FiberTite is slippery when wet, exhibits dew, frost, ice or other form of moisture.
			4. Comply with OSHA requirements for roof construction and fall protection.
			5. Store flammable liquid and materials away from open sparks, flames and extreme heat.
			6. Take necessary precautions when using solvents and adhesives.
			7. Daily site cleanup to minimize debris and hazardous congestion.
		2. Protection:
			1. Schedule installation sequence to limit access and utilization of installed membrane for material storage, construction staging, mechanical and excessive foot traffic.
			2. Provide proper protection on newly completed roofing.
			3. Minimize traffic on freshly laid roofing.
			4. Protect walls, rooftop units, windows and other components during installation.
		3. Additional Precautions:
			1. Adverse weather conditions, e.g. extreme temperature, high winds, high humidity and moisture, could have a detrimental effect on adhesives, general production efforts and the quality of the finished installation.
			2. Daily production schedules shall be limited to what can be made 100 percent watertight at the end of each day, including flashing and night seals.
			3. All surfaces to receive the new roof system, including insulation and flashing, shall be free from all dirt, debris and be thoroughly dry.
			4. Comply with local EPA requirements as published by local, state and federal authorities.
			5. During the construction process temporary ballast, especially in the perimeter and corner areas may be required to provide protection against high winds.
	4. DESIGN CONDITIONS
		1. This specification is applicable to only those building roofs that have decking of sufficient structural integrity, capable of supporting the loads associated with this type of installation according to the guidelines set forth herein, and specific system addenda included by reference in Section 1.2.
		2. Applications and project specifications require review by FiberTite Technical Services (FTS) for acceptance prior to commitment to provide a commercial warranty.
		3. Seaman Corporation FiberTite Project Registration must be completed, signed by an Authorized Applicator, submitted to and approved by FTS before any consideration for warranty and or the release of any materials can be authorized.
		4. Special Design Considerations:
			1. The building Owner shall submit an engineering study or Statement of Sound Roof Structure to FTS, indicating that the structure is able to accommodate additional live or dead loads including vegetated overburden, snow and water retention.
			2. Moisture conditions in existing roofs, new structural concrete or new lightweight insulating concrete that would impair or prohibit the desired performance of the new roof system.
			3. Positive slope to promote adequate drainage to avoid the potential damage to the substrate or components.
			4. Roof areas subject to heavy or excessive mechanical traffic shall be designed with proper access paths.
			5. All FiberTite Green Vegetated Roof Systems require an Authorized coverboard over the roof system insulation, directly beneath the vegetated overburden.
			6. This specification does not provide building code or jurisdiction acceptance as to wind, fire, etc. as they relate to a Vegetated Roof System.
			7. Supply rooftop water source for irrigation system.
			8. Conform to project landscape design requirements, recommendations of local horticulturists where possible and requirements of authorities having jurisdiction, including Fire Marshal for specific recommendations and regulations.

\*\* NOTE TO SPECIFIER \*\* Delete design requirements from the list below that are not actually required by the text of the edited section.

* + 1. Exterior Fire Test Exposure: Roof system shall achieve a FM or UL Class rating for roof slopes indicated as follows:
			1. Factory Mutual Class A Rating.
			2. Underwriters Laboratory Class A Rating.
		2. Design Requirements:
			1. Uniform Wind Uplift Load Capacity
				1. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with the following criteria.

Design Code: ASCE 7, Method 2 for Components and Cladding.

Importance Category:

I.

II.

III.

IV

Importance Factor of:

0.77

1.0

1.15

2.0

Wind Speed: \_\_\_ mph.

Ultimate Pullout Value: \_\_\_ pounds per each of the fastener

Exposure Category:

B.

C.

D.

Design Roof Height: \_\_\_ feet.

Minimum Building Width: \_\_\_ feet.

Roof Pitch: \_\_\_ : 12.

Roof Area Design Uplift Pressure:

Zone 1 - Field of roof \_\_\_ psf.

Zone 2 - Eaves, ridges, hips and rakes \_\_\_ psf.

Zone 3 - Corners \_\_\_ psf.

* + - 1. Snow Load: \_\_\_ psf.
			2. Live Load: 20 psf, or not to exceed original building design.
			3. Dead Load:
				1. installation of new roofing materials shall not exceed the dead load capacity of the existing roof structure.

\*\* NOTE TO SPECIFIER \*\* Edit the following paragraphs as required and as appropriate to Code, and the Owner's, or Owner's Insurance Underwriter requirements. Delete paragraphs that are inapplicable.

* + 1. Roof system shall have been tested in compliance with the following codes and test requirements:
			1. Florida FBC (For use outside Miami-Dade and Broward Counties):
				1. Membrane Systems FL\_4930\_\_\_
			2. Miami-Dade County:
				1. Membrane Systems Over:

Concrete Decks N.O.A. 20041411.

Lightweight Concrete Decks N.O.A. 20041408.

Recover Decks N.O.A. 20041409.

Steel Decks N.O.A. 20041410.

Wood Decks N.O.A. 20041407.

Cementitious Wood Fiber Decks N.O.A 20041412.

* + - 1. Cool Roof Rating Council:
				1. CRRC Directory CRRC \_0634\_\_\_.
			2. Underwriters Laboratories:
				1. Certification TGFU.R\_10117\_\_\_\_\_\_\_.
			3. FM Approvals:
				1. RoofNav Website: RoofNav Assembly #: \_\_\_\_\_\_\_\_\_\_\_\_.
		1. Environmental Considerations:
			1. Severe environmental exposure e.g. coastal or high wind areas.
			2. Chemical discharge not listed on the Seaman Corporation and FiberTite chemical resistance publication.
			3. Environmental conditions such as fog, dew, rain or snow and freezing temperatures can have a detrimental effect on the application and performance of adhesives.
			4. Compliance with EPA and OSHA requirements as published by local, state and federal authorities.
			5. Adhesives can be described as temperamental. The Applicator must be aware of potential environmental variables when installing adhered roofing systems.
			6. Pay particular attention to and follow adhesive storage and application precautions and guidelines.
			7. Do not apply waterborne adhesives (FTR-490 or FTR-390) if the ambient air temperature is expected to drop below 32 degrees F (0 degrees C) within 72 hours of application.
			8. Ambient Air Temperature: Install plant materials in the FiberTite Green Vegetated Roofing System preferably between April 1 and November 1 at temperatures between 40 and 95 degrees F (4.4 and 35 degrees C) at northern latitudes. Do not install if extended freezing temperatures are expected or if ambient soil temperature is expected to remain below 50 degrees F (10 degrees C).
	1. WARRANTY

\*\* NOTE TO SPECIFIER \*\* Available Warranties:
Material: Protection against repairing defects in membrane only. Offered at no cost to Owner.
Standard: Protection against repairing leaks as a result of membrane defects or workmanship involved in its installation for a 10 year period. Nominal premium.
Extended Warranty: Protection against repairing leaks as a result of membrane defects or workmanship involved in its installation beyond ten years. Additional premium.

* + 1. Upon Inspection and Acceptance by a FiberTite Technical Service Representative: Seaman Corporation will issue the preauthorized warranty, subject to the terms and conditions of the sample warranty and contract documents.

\*\* NOTE TO SPECIFIER \*\* Delete warranty type options not required.

* + - 1. Warranty Type:
				1. Material Warranty Only.
				2. Material and Labor Warranty.
			2. Time Period:
				1. 5 year warranty.
				2. 10 year warranty.
				3. 15 year warranty.
				4. 20 year warranty.
			3. Maintenance Requirements: A set of instructions included detailing preventative maintenance requirements on the part of the building Owner and noting a list of harmful substances that may damage the FiberTite membrane.
		1. Single Source Warranty:
			1. Seaman Corporation offers a Single Source Warranty inclusive of the membrane roofing system and overburden removal of the FiberTite Green Garden Roof under the following:
				1. Vegetated Garden Roof shall be FiberTite Green as supplied by Seaman Corporation.
				2. Membrane roof system shall incorporate an EVM Leak Monitoring System as supplied by Seaman Corporation.
		2. Accessibility:
			1. It shall be the responsibility of the Owner to remove and replace the overburden (garden system and all related components) to expose the membrane roofing system for any and all warranty services.
1. PRODUCTS
	1. MANUFACTURERS
		1. Acceptable Manufacturer: FiberTite, Seaman Corporation, which is located at: 1000 Venture Boulevard; Wooster, OH 44691-9360; ASD Toll Free Tel: 800-927-8578; Tel: 330-262-1111; Fax: 800-649-2737; Email: afrank@seamancorp.com; Web: https://www.fibertite.com.

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
		2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.
	1. GENERAL
		1. Products and components for the FiberTite Green Roofing System shall be supplied by Seaman Corporation.
		2. Components other than those manufactured and supplied by Seaman Corporation shall be submitted for review, prior to ordering. Any products not specifically authorized in writing for the project by Seaman Corporation, shall be considered unacceptable and their performance excluded from the warranty.
		3. FiberTite Green Roofing System may be installed over or directly to pre-authorized insulation, cover board or composites thereof. Contact FTS for additional information regarding compatible substrates.
	2. MEMBRANE
		1. Standards Compliance: ASTM D 6754 - 15 Standard Specification for Ketone Ethylene Ester (KEE) Based Sheet Roofing.
		2. Physical Properties: See associated data sheets.
		3. Acceptable Substrates:
			1. Authorized rigid insulation or cover board.
			2. Structural concrete, insulated or not insulated.
			3. Insulated steel decking.
			4. Cellular, lightweight insulating concrete.
		4. Field Membrane:

\*\* NOTE TO SPECIFIER \*\* Delete field membrane types not required.

* + - 1. FiberTite 36-mil Membrane: Nominal 36 mil (0.91 mm) ketone ethylene ester (KEE) membrane reinforced with 5.0 oz per sq. yd (169.5 grams per sq m) knitted polyester fabric.
			2. FiberTite 36-mil FB (Fleece-back) Membrane: Nominal 36 mil (0.91 mm) ketone ethylene ester (KEE) membrane reinforced with 5.0 oz per sq. yd (169.5 grams per sq m) knitted polyester fabric and heat bonded 4 oz (113.4 grams) polyester backing.
			3. FiberTite-SM 45-mil Membrane: Nominal 45 mil (1.14 mm) ketone ethylene ester (KEE) membrane reinforced with 5.0 oz per sq yd (169.5 grams per sq m) knitted polyester fabric.
			4. FiberTite 45-mil FB (Fleece-back) Membrane: Nominal 45 mil (1.14 mm) ketone ethylene ester (KEE) membrane reinforced with 5.0 oz per sq yd (169.5 grams per sq m) knitted polyester fabric and heat bonded 4 oz (113.4 grams) polyester backing.
			5. FiberTite-XT 50-mil Membrane: Nominal 50 mil (1.27 mm) ketone ethylene ester (KEE) membrane reinforced with 6.5 oz per sq yd (220.4 grams per sq m) knitted polyester fabric.
			6. FiberTite 50-mil FB (Fleece-back) Membrane: Nominal 50 mil (1.27 mm) ketone ethylene ester (KEE) membrane reinforced with 6.5 oz per sq yd (220.4 grams per sq m) knitted polyester fabric and heat bonded 4 oz (113.4 grams) polyester backing.
			7. FiberTite-SM 60-mil Membrane: Nominal 60 mil (1.5 mm) ketone ethylene ester (KEE) membrane reinforced with 5.0 oz per sq yd (220.4 grams per sq m) knitted polyester fabric.
			8. FiberTite-SM 60-mil FB (Fleece-back) Membrane: Nominal 60 mil (1.5 mm) ketone ethylene ester (KEE) membrane reinforced with 5.0 oz per sq yd (220.4 grams per sq m) knitted polyester fabric and heat bonded 4 oz (113.4 grams) polyester backing.
			9. FiberTite-XT 60-mil Membrane: Nominal 60 mil (1.5 mm) ketone ethylene ester (KEE) membrane reinforced with 6.5 oz per sq yd (220.4 grams per sq m) knitted polyester fabric.
			10. FiberTite-XT 60-mil FB (Fleece-back) Membrane: Nominal 60 mil (1.5 mm) ketone ethylene ester (KEE) membrane reinforced with 6.5 oz per sq yd (220.4 grams per sq m) knitted polyester fabric and heat bonded 4 oz (113.4 grams) polyester backing.
			11. FiberTite-XTreme 60-mil Membrane: Nominal 60 mil (1.5 mm) ketone ethylene ester (KEE), reinforced with 12.5 oz per sq yd (423.8 grams per sq m) woven polyester mat.
			12. FiberTite-XTreme 60-mil FB (Fleece-back) Membrane: Nominal 60 mil (1.5 mm) ketone ethylene ester (KEE), reinforced with 12.5 oz per sq yd (423.8 grams per sq m) woven polyester mat and heat bonded 4 oz (113.4 grams) polyester backing.
		1. Flashing Membrane:

\*\* NOTE TO SPECIFIER \*\* Delete roofing systems not required.

* + - 1. Requirements to match field membrane and warranty expectations selected for roofing system.
				1. Basis of Design: FiberTite Nominal 36 mil (0.91 mm).
				2. Basis of Design: FiberTite-SM Nominal 45 mil (1.14 mm).
				3. Basis of Design: FiberTite-XT Nominal 50 mil (1.27 mm).
	1. ANCILLARY MATERlALS

\*\* NOTE TO SPECIFIER \*\* Supply the following products and materials from the Seaman Corporation. All ancillary materials are required. No items are optional unless the final Authorized design dictates otherwise.

* + 1. Field Adhesives:

\*\* NOTE TO SPECIFIER \*\* Seaman Corporation supplied adhesives are formulated for FiberTite Roofing Systems. Solvent borne adhesives are not compatible with polystyrene insulation. Application technique and coverage rates will vary according to substrate and environmental conditions. Delete adhesive types not required. Refer to FiberTite Adhesives Guide and Compatibility Chart for product coverages. Use of FTR-190e adhesive and Alpha-Tite adhesive is only permitted on smooth back (non-fleece-back) membranes. If a fleece-back membrane is selected in 2.3 D then 190e or Alpha-Tite should not appear as a selectable option. If a smooth-back membrane is selected in 2.3 D then 190e and Alpha-Tite should be the only selectable options.

* + - 1. FTR-190e: VOC compliant solvent borne, contact (two-sided) bonding adhesive, for bonding smooth-back FiberTite membranes to properly prepared and preauthorized horizontal and vertical substrates.
			2. Alpha-Tite: VOC compliant solvent borne, contact (two-sided) bonding adhesive for bonding smooth-back FiberTite membranes to properly prepared and preauthorized horizontal and vertical substrates.
			3. FTR-290: VOC compliant solvent borne adhesive, one side application (substrate only), designed for bonding FiberTite-FB (fleece-back) membranes to properly prepared and preauthorized horizontal substrates.
			4. FTR-390: Rubberized asphalt water borne emulsion adhesive, VOC compliant, one side application (substrate only), designed for bonding FiberTite-FB (fleece-back) membranes to properly prepared and pre-authorized horizontal substrates.
			5. FTR-490: Polymeric water borne, VOC compliant adhesive, one side application (substrate only), designed for bonding FiberTite-FB (fleece-back) membranes to properly prepared and pre-authorized horizontal substrates.
			6. FTR-201 Mastic: Trowel grade elastomeric adhesive and sealant used to adhere FiberTite flashing membranes to pre-Authorized vertical substrates.
			7. Polyset CR-20: Dual component elastomeric polyurethane froth adhesive designed for bonding FiberTite-FB (fleece-back) membranes (spatter application) to properly prepared and preauthorized horizontal and vertical substrates.
			8. FTR-601: Dual component, low pressure spray applied (spatter) urethane adhesive. Adhesive is a non-solvent, elastomeric, urethane adhesive, specifically designed for bonding FiberTite-FB (fleece-back) membranes to preauthorized horizontal substrates.
		1. Flashing Adhesive:

\*\* NOTE TO SPECIFIER \*\* Delete flashing adhesive type not required.

* + - 1. FTR-190e: VOC compliant solvent borne, (two-sided) bonding adhesive, for bonding smooth-back FiberTite membranes to properly prepared and preauthorized horizontal and vertical substrates.
			2. Alpha-Tite: VOC compliant solvent borne, contact (two-sided) bonding adhesive for bonding smooth-back FiberTite membranes to properly prepared and preauthorized horizontal and vertical substrates.
			3. FTR-201 Mastic: Trowel grade elastomeric adhesive and sealant used to adhere FiberTite flashing membranes to pre-Authorized vertical substrates.
		1. Fasteners:

\*\* NOTE TO SPECIFIER \*\* Delete fastener types not required.

* + - 1. Securing membranes to steel, wood and structural concrete decks.
				1. FiberTite MAGNUM Series: No. 15-13, buttress threaded, No. 3 Phillips head fastener constructed of case-hardened carbon steel with a reduced diameter drill point and corrosion resistant coating.
			2. Securing insulation to steel, wood and structural concrete decks.
				1. FiberTite-HD: No. 14-13, heavy duty threaded steel No. 3 Phillips truss, self-tapping corrosion resistant fastener.
		1. FTR Stress Plates: Used to anchor membranes.

\*\* NOTE TO SPECIFIER \*\* Delete stress plate types not required.

* + - 1. FTR Magnum Plus: 1.5 x 2.75 inch (38 x 70 mm) Barbed Rectangular Stress Plate with radial corners; 8 gauge AZ-50 galvalume steel.
			2. FTR Magnum R275: 2.75 inch (70 mm) Barbed Round Stress Plate; 20 gauge galvanized steel.
			3. FTR Magnum 2S: 2.375 inch (60 mm) Barbed Round Stress Plate; 20 gauge galvanized steel.
			4. FTR 3 inch (76 mm) Metal Round Insulation Stress Plates: Finish: AZ-50 galvalume. Flat and flush profile for use on rigid board surfaces.
		1. EVM Leak Detection:
			1. ConDuct Stainless Steel Mesh: Open Net, 304 Stainless, 0.75 inch (19 mm) nominal mesh opening.
			2. Boundary Cable: Conductive loop that forms the test area and is attached to and powered by the impulse generator. The cable can be manufactured from several conductive materials.
		2. Additional Components:
			1. FTR Protection Layer: 12 oz per cu yard (445 grams per cu m) needle-punched polyester geotextile separation sheet.
			2. Flashing Terminations Sealant: FTR-101. Single-component gun-grade polyether.
			3. Fabricated Metal Flashing: FiberClad Metal. 48 x 120 inch (1219 x 3048 mm) sheets.
				1. Steel: 24 gauge hot dipped G-90.
				2. Aluminum 300H14: 0.040 inch (1.02 mm) thick laminated with a 0.02 mil (0.0005 mm) polymeric coating.
			4. FTR Premolded Flashings: Injection molded vent stack, split Wrapid Flash and inside and outside corner flashing using FiberTite vinyl compound.
			5. FTR Non-Reinforced Membrane: Field fabrication membrane, 60 mil (1.5 mm) non-reinforced vinyl membrane.
			6. FTR SA Primer: A blend of synthetic polymers, solvents and resins, low VOC primer for VaporTite self-adhered vapor retarder.
			7. FTR SBS Adhesive: A cold process low-VOC, low odor and solvent free SBS modified adhesive for bonding FiberTite SBS Base Sheets to approved substrates.
			8. Forti-Lock: A rapid-curing, proprietary formulation of polymethyl-methacrylate (PMMA) liquid flashing resin. Forti-Lock is combined with Forti-Lock Primer and Forti-Lock Fleece reinforcing fabric to form a flexible and monolithic, reinforced membrane used in aberrant FiberTite flashing and detail applications.
			9. Forti-Lock Metal Primer: An acrylic primer used with various metal substrates to promote adhesion of Forti-Lock waterproofing and surfacing components.
			10. Forti-Lock Fleece: a proprietary non-woven polyester reinforcement used in Forti-Lock liquid flashing applications.
			11. Walkway and Protection Pads: FTR-Tuff Track. High grade walkway and protection material with slip-resistant design.
			12. FTR-Termination Bar: Membrane flashings restraint and termination seals. 0.125 x 1 x 120 inch (3 x 25 x 3048 mm) 6060-T5 extruded aluminum bar with pre-punched slots, 8 inches (203 mm) on center.
			13. FiberTite Metal Fascia System: Two piece "Snap-on" pre-formed, architectural Kynar metal edge systems.
			14. FTR-Value Insulation: Polyisocyanurate and extruded polystyrene flat or tapered insulation.
			15. FTR-601 and FTR-601 PG: Dual component, single bead (ribbon applied) urethane insulation adhesive. Non-solvent, elastomeric, urethane specifically designed for bonding single or multiple layers of roof insulation and insulation composites or cover boards to structural roof decks and base sheets.
			16. FiberTite Seam Cleaner: FiberTite Seam Cleaner is to be used with clean white cotton cloths or rags to clean contamination from the seam areas of the membrane prior to welding.
			17. FTR T Joint Covers: Pre-cut 4 x 4 inch (102 x 102 mm) 60 mil (1.5 mm) non-reinforced membrane to reinforce areas where three overlapping sheets of membrane intersect.
	1. VAPOR RETARDER

\*\* NOTE TO SPECIFIER \*\* Delete one of the two following paragraphs.

* + 1. Vapor Retarders: Not required.
		2. Vapor Retarders:
			1. Preapproved vapor retarders shall be installed, where specified or required, to meet project design requirements and provide a suitable surface for installation of the FiberTite Roofing System.
			2. Acceptable products must be preapproved or approved in writing by Seaman Corporation.

\*\* NOTE TO SPECIFIER \*\* Delete the characteristics and classifications options options not required.

* + - * 1. ASTM D4601, Type II Asphalt Coated Glass-Fiber Base Sheet.
				2. ASTM D4897, Type II Asphalt Coated Glass-Fiber Venting Base Sheet.
				3. ASTM D6163, Type I, Grade S, FTR SBS modified membrane
				4. ASTM D6164 , Type I, Grade S, FTR SBS modified membrane

\*\* NOTE TO SPECIFIER \*\* Delete preAuthorized product options not required or delete entire paragraph.

* + - 1. Pre-Authorized Products:
				1. VaporTite.
				2. FiberTite SBS Base Sheets as provided by Seaman Corporation.
				3. Minimum: 6-mil Polyethylene.
	1. RELATED MATERlALS
		1. Wood Nailers: No. 2 or better construction grade lumber.
			1. Installation of other types of treated lumber should be verified with a design professional.

\*\* NOTE TO SPECIFIER \*\* Delete wood treatment options not required.

* + - 1. Wood treatment: Borate.
			2. Wood Treatment: \_\_\_\_\_\_\_.
			3. Wood Treatment: As designated on the Drawings.
			4. Wood Treatment: As determined by the Architect.
			5. Creosote or asphaltic type preservatives are not acceptable.
			6. Top Nailer Thickness: 1.5 inches (38 mm) minimum.
	1. INSULATION

\*\* NOTE TO SPECIFIER \*\* For the purpose of this guide specification, unless explicitly defined otherwise, the term insulation is used interchangeably to refer to rigid insulation materials, in single or multiple layers of tapered or flat, cover board, thermal barriers and or multilayered composites.

* + 1. Insulation shall be installed, where specified or required to provide a suitable surface for the FiberTite Roofing Systems and meet desired thermal values.
		2. Products must be pre-authorized in writing by Seaman Corporation and comply with minimal characteristics and classification listed for the products below:

\*\* NOTE TO SPECIFIER \*\* Delete polyisocyanurate insulation not required.

* + - 1. Polyisocyanurate Rigid Insulation (ASTM C1289):
				1. FTR-Value III Polyisocyanurate Rigid Insulation.
				2. FTR-Value H Polyisocyanurate Rigid Insulation.
				3. FTR-Value A Polyisocyanurate Rigid Insulation.

\*\* NOTE TO SPECIFIER \*\* Delete paragraph below if no XPS insulation.

* + - 1. XPS Rigid Insulation (ASTM D1621):
				1. FTR-Value XPS Rigid Insulation

\*\* NOTE TO SPECIFIER \*\* Delete cover boards from below that are not required. A Coverboard is required for Green Vegetative Roofing Systems.

* + - 1. Gypsum Core Cover Board (ASTM C473):
				1. National Gypsum DEXcell.
				2. Georgia-Pacific Gypsum LLC DensDeck Prime.
				3. United States Gypsum Company SECUROCK.
		1. Adhesives for Insulation Attachment: Preauthorized by Seaman Corporation.
			1. Listed and approved by Factory Mutual Research in conjunction with specified insulation and substrate.
			2. Meet minimum roofing system design requirements, evidenced by testing in conjunction with the proposed substrate and or composite.
				1. Testing to be performed under FM-Global requirements or acceptable third-party laboratory.
			3. Provide written specifications regarding the safe handling, storage and surface preparation for a quality application of the product.
			4. Insulation Adhesives:

\*\* NOTE TO SPECIFIER \*\* Edit paragraph below if to indicate which insulation adhesive is being used. Select none if insulation is being mechanically fastened or loose laid.

* + - * 1. None: Insulation was mechanically fastened or loose laid.
				2. Polyurethane Adhesive: Either a dual or single component polyurethane, dispensed from a portable pressurized container or traditional foam equipment.

Pre-authorized Products:

FTR-601.

FTR-601 PG.

Polyset CR-20.

* + - * 1. Hot Asphalt: Type III or Type IV steep asphalt, according to ASTM D 312.

Applied within 250 degrees F (121 degrees C) of the asphalt manufacturer's recommended Equiviscous Temperature (EVT). If the manufacturer does not supply the EVT Seaman Corporation recommends a temperature range of 425 degrees F (218 degrees C) for mopping and 450 degrees F (232 degrees C) for mechanical spreaders. Asphalt applied within 25 degrees F (minus 3.9 degrees C) of the EVT, under normal environmental conditions; will provide a nominal 23 to 25 lbs per 100 cu ft (10.433 to 11.334 grams per 2.832 cu m) of asphalt.

The roofing Applicator is responsible for maintaining the temperature tolerances at the kettle as well as the rooftop at all times.

Cold weather application can cause significant drops in the temperature of the asphalt during transport to the roof and points of application. Insulated equipment is recommended during cold weather applications.

Projects utilizing hot asphalt for insulation securement require written authorization, prior to the bidding process, by Seaman Corporation.

\*\* NOTE TO SPECIFIER \*\* Delete hardscape options not required.

* + 1. Hardscape:
			1. Concrete Pavers: minimum 24 x 24 x 2 inch (610 x 610 x 51 mm) freeze and thaw resistant, pre-cast, concrete paver blocks for pathways and retention of growing medium.
			2. Stone Ballast: nominal 2.5 (63.5 mm) diameter No. 2 river-washed, stone conforming to ASTM D448. Used for membrane ballast and or drainage.
			3. Pre-cast stone, wood timbers and other landscape items as necessary and appropriate to create transitions between the rooftop garden and other roof area.
	1. VEGETATED SYSTEM COMPONENTS
		1. Vegetated System Components:

\*\* NOTE TO SPECIFIER \*\* Delete systems not required.

* + - 1. FiberTite Green Multilayer System:
				1. Protection Layer (when required): Minimum 12 oz per sq yard (407 grams per sq meter) needle-punched polyester geotextile.
				2. Drainage Layer: 0.375 (9.5 mm) thick composed of extruded polyester woven into an entangled cuspate geometric patterned matrix with heat-welded junctions forming a resilient structure specifically designed to promote proper drainage and ventilation of growing media.
				3. Non-woven polypropylene filter layer attached to drainage layer.
				4. Water Retention Layer: 0.5 (13 mm) thick high-loft, non-woven geotextile consisting of durable thermal-bonded polyester fibers treated with insoluble polymer resins to form an evenly distributed, three-dimensional blanket matrix specifically intended for water retention, drainage and anchorage points for promoting solid root structures for plants.
				5. Mill-Finished Aluminum Edge and Trim: 0.125 (3 mm) to frame and connect walkway systems, material changes, and adjacent building components.
			2. FiberTite Green Tray System:
				1. Protection Layer (when required): Minimum 12 oz per sq yard (423.82 grams per sq m) needle-punched polyester geotextile.
				2. Trays: 24 inch (610 mm) square x 4.625 inch (117.5 mm) deep interlocking trays.
				3. Injection molded, 100 mil (2.5 mm) polypropylene.
				4. Plastic tray pins.
				5. Hook and plastic tray pins for drip irrigation system.
				6. Metal Edger: 26-gauge stainless steel or 18-gauge mill-finished aluminum metal trays and walkways to frame, connect and tie tray and walkway systems into each other and adjacent building components.
				7. Irrigation system.
			3. Growing Media:
				1. Growing media; based on German FLL Greenroof Guidelines.
				2. Produced from organic recycled material and inorganic by-products for use as a lightweight growing media for hardy, long-lasting succulent or phytoremediation plants that are beneficial in a green roof environment.
				3. Pre-blended regionally and delivered to site for application in:

Bulk: 1.5 cu yard (1.15 cu m) or 2 cu yard (1.53 cu m) totes.

Bulk: 1.5 cu ft (0.042 cu m) bag.

* + - 1. Plants:
				1. Mix of firewise and firesafe, hardy, long-lasting fibrous succulents, capable of thriving in a limited irrigated rooftop environment for project location.
				2. Selections conforming to USDA hardiness zone classification and regional horticulturists recommendation and as accepted by designer.
				3. Plants and Planting Method:

Sedum tiles (pre-planted).

Sedum mats (pre-planted).

Plugs; minimum 1.5 (38 mm) wide plugs.

Unrooted cuttings (sedum cuttings).

1. EXECUTION
	1. GENERAL
		1. Authorized Applicator: Ensure strict compliance with FTR GRS01/21; General Guide Specifications for Installation of FiberTite Roofing Systems.
			1. Provide suitable substrate surface for proper installation of roofing system, roof insulation and specified components.
			2. Coordinate installation ensuring system remains watertight at end of each working day.
		2. Application of Seaman Corporation and FiberTite materials constitutes an agreement that Applicator inspected and found the substrate suitable for installation of roofing system.
	2. SUBSTRATE PREPARATION
		1. Applicator: Verify the deck condition or existing roof construction is suitable for the specified installation.
		2. Seaman Corporation requires fastener withdrawal values (pull out tests) on roofing projects to verify suitability of decking to accept a mechanically fastened insulation or membrane roof system.
		3. Examine surfaces for inadequate anchorage, low areas that will not drain properly, foreign material, ice, wet insulation, unevenness or any other defect which would prevent the proper execution and quality application roofing system as specified.
		4. Prepared substrate shall be smooth, dry, and free of debris and any other irregularities which would interfere with proper installation.
		5. The application of adhesives directly to structural concrete, gypsum or Tectum may require sealing or priming with an appropriate elastomeric or asphalt primer prior to application.
		6. Adhesives will not bond to wet structural concrete.
		7. Do not proceed with any part of the application until all defects and preparation work have been corrected and complete.
	3. SUBSTRATE PREPARATION (NEW CONSTRUCTION)
		1. Confirm substrate suitability as specified and required in FTR GS01-21
	4. SUBSTRATE PREPARATION (REROOFING)
		1. Confirm substrate suitability as specified and required in FTR GS 01/21.
	5. WOOD NAILERS
		1. Install treated lumber at same heights as insulation layer or adjacent construction plus or minus 0.25 inch (6 mm). Install continuous treated wood nailers at all perimeters, around roof projections and penetrations as shown in approved details.
		2. Wood Nailers Installed Directly on the Substrate: Carefully examine substrates to confirm the entire area provides a suitable fastening surface. Repair defects by appropriate trades prior to installation.
		3. Nailers (WxH): 3.5 x 1.5 inches (89 x 38 mm). Installed and anchored in such a manner to resist a force of 250 lbs per linear foot (2.919 kN per m) of wood blocking in any direction.
		4. Nailers along parapets, curbs and expansion joints are recommended for insulated decking. Consult FiberTite Construction Details or FiberTite Technical Services for optional and alternate membrane termination and securement methods.

\*\* NOTE TO SPECIFIER \*\* Delete article if vapor retarder is not being used or edit paragraphs in article based on type of vapor retarder specified.

* 1. VAPOR RETARDERS
		1. General:
			1. Approved vapor retarder, when required or specified, shall be applied only to properly prepared and pre-authorized substrates.
			2. Install no more than can be covered or made 100 percent water tight during the same working day.
			3. Vapor retarders shall be installed starting at the low point of the roof deck.
			4. Vapor retarder shall be side lapped, a minimum of 3 inches (75 mm), and properly shingled to shed water.
		2. VaporTite: Install one ply sheet over the entire prepared substrate. Shingle in direction of slope of roof to shed water on each area of roof.
		3. 6-mil Polyethylene: Loose lay polyethylene according to specifications and construction drawings. Lap polyethylene sheet minimum 3-in and tape laps.
		4. Hot Applied Vapor Retarder: Install one ply sheet in 25 lbs. per square (11.3 kg) of ASTM D 312 Type III bitumen over the entire prepared substrate. Shingle in direction of slope of roof to shed water on each area of roof.
		5. Torch Applied Vapor Retarder: Install one ply FTR SBS Torch Grade Base Sheet using a suitable heat source adhere one ply to the entire surface. Shingle in direction of slope of roof to shed water on each area of roof.
		6. Cold Applied Vapor Retarder: Install one ply FTR SBS Base Sheet in FiberTite cold applied FTR-SBS Adhesive over the entire prepared substrate. Shingle in direction of slope of roof to shed water on each area of roof.
		7. Two Ply Fiberglass Vapor Retarder: Install two fiberglass ply sheets in 25 lbs. per square (11.3 kg) of ASTM D 312 Type III bitumen shingled uniformly to achieve two plies over the entire prepared substrate. Shingle in direction of slope of roof to shed water on each area of roof.
	2. ROOF INSULATION
		1. General:
			1. Install roof insulation according to and in complete conformance with project specifications.
			2. Roof Insulation: Installed where by the long dimension of the boards run in parallel alignment and the short dimensions are staggered.
			3. Install insulation with minimum joint dimensions and tightly butted where possible.
				1. Maximum Joint Widths: 3/8 inch (9.5 mm).
				2. Damaged Corners: Cut out and replaced with an insulation piece a minimum of 12 x 12 inches (305 x 305 mm). Pieces that are cut from larger panels and are smaller than one square foot are not acceptable.
			4. Install no more than can be covered during the same working day.
			5. Taper roof insulation to drain sumps using tapered edge strips.
				1. If insulation layer is 1.5 inches (38 mm) or less, taper 12 inches (305 mm) from drain bowl.
				2. If insulation thickness exceeds 1.5 inches (38 mm), taper 18 inches (457 mm) from drain bowl.
				3. Taper boards or pieces must be adhered or mechanically fastened with a minimum of two fasteners per board.
			6. At the end of each working day, provide a watertight cover on all unused insulation as to avoid moisture penetration and damage.
	3. ELECTRONIC VECTOR MAPPING (EVM) LEAK DETECTION
		1. As required for single source.
	4. VEGETATED ROOF SYSTEM WARRANTY)
		1. The ConDuct grounding screen is used to provide grounding for manual electronic leak detection tests.
		2. The grounding screen shall be installed over the roof insulation and or directly below the Authorized cover board for FiberTite Green Vegetated Roof Systems utilizing adhered roofing membranes.
		3. For mechanically fastened membranes utilizing FiberTite Green Vegetated Roofing Systems the grounding screen may be installed directly over the coverboard prior to mechanically fastening the membrane.
		4. Unroll grounding screen over substrate.
		5. Overlap adjacent runs of grounding screen a minimum of 3 inch (76 mm). Positive contact between adjacent runs of screen is required at both side and end laps.
		6. Tape adjacent layers together using duct tape or aluminum tape spaced between 5 and 10 ft (1524 and 3048 mm) to prevent shifting.
		7. Connect the grounding screen to conductive part of the structure (i.e. metal deck, metal curb, metal vent stack or metal drain body) at several separate locations.
		8. Do not ground the screen mesh to lightening protection.
	5. COVER BOARD INSTALLATION
		1. For mechanically fastened membranes, loose lay the coverboard directly over the insulation and then mechanically fasten the coverboard through the mesh per preliminary securement requirements for the coverboard.
		2. For adhered cover board installation over a grounding screen, install FTR 601 Insulation Adhesive directly over loose laid grounding mesh. Space adhesive ribbons according to project specifications and as required for specified uplift resistance.
		3. Place the cover board directly over the screen and ribbons of adhesive and walk-in to assure good contact. The insulation adhesive will bond the cover board to the insulation through the grounding mesh.
	6. INSTALLATION OF MEMBRANES
		1. Quality Control:
			1. It is the responsibility of the Authorized Applicator to initiate and maintain a Quality Control program to govern all aspects of the installation.
			2. The project foreman and or supervisor will be responsible for the daily execution of the Quality Control program which will include but is not limited to the supervision, inspection and probing of all heat welded seams incorporated within roofing system.
			3. If inconsistencies in quality of the application of the composite, membrane or welds are found, work shall cease until corrective actions are taken to ensure the continuity the installation.
		2. General:
			1. Coordinate work ensuring that sequencing of installation promotes a 100 percent watertight installation at the end of each day.
			2. Roofing systems to be designed utilizing and determined to be in compliance with the procedures outlined within the current publication of ASCE 7. Alternative designs may be determined using the criteria within Factory Mutual Research Loss Prevention Data.
			3. Roofing systems shall utilize conventional roll goods.
			4. Restrictions regarding outside ambient air temperature are relative only to the exposure limits of the workers and adhesives when necessary.
			5. When using adhesives outside ambient air temperature shall be above 40 degrees F (4.4 degrees C). Curing or drying time of the adhesive will be affected by ambient temperatures and must be taken into consideration when determining flashing lengths.
			6. Humidity can affect the drying time of solvent borne adhesives and cause condensation to form on the newly applied adhesive.
			7. No moisture may be present on the adhesives prior to mating or application of membranes.
			8. Roofing systems shall only be installed over properly prepared and sound substrates, free from excessive surface roughness, dirt, debris and moisture.
		3. Membrane Installation:
			1. Refer to and follow Seaman Corporation Guide Specifications 01/21 as referenced in Sec. 1.2 for the Installation of FiberTite Roofing Systems and specific membrane system application methods as dictated by project specifications.
		4. T-Joint Cover Installation:
			1. Installation of T-joint covers is mandatory on all FiberTite Green Vegetated Roof Systems.
			2. Install T-joint covers, centered and aligned so edges are parallel to roof system seams.
			3. The T-joint cover shall be 100 percent welded.
		5. Welding:
			1. General:
				1. Field seams exceeding 10 feet (3.05 m) in length shall be welded with an approved automatic welder.
				2. Field seams must be clean and dry prior to initiating any field welding.
				3. Remove foreign materials from the seams (dirt, oils, etc.) with acetone or authorized alternative.
				4. Use Clean white cotton cloths and allow approximately five minutes for solvents to dissipate before initiating the automatic welder. Do not use denim or synthetic rags for cleaning.
				5. Contaminated areas within a membrane seam will inhibit proper welding and will require a membrane patch.
				6. Membrane T-Joints Covers shall receive a minimum 3 x 3 inch (76 x 76 mm) cover.
				7. Welding shall be performed only by qualified personnel to ensure the quality and continuity of the weld.
			2. Hot Air Hand Welding:
				1. The lap or seam area of the membrane may be intermittently tack welded to hold the membrane in place.
				2. The back interior edge of the membrane shall be welded first, with a thin, continuous weld to concentrate heat along the exterior edge of the lap during the final welding pass.
				3. The nozzle of the hand held hot air welder shall be inserted into the lap at a 45 degree angle to the lap. Once the polymer on the material begins to flow, a hand roller shall be used to apply pressure at a right angle to the tip of the hand welder. Properly welded seams shall utilize a 1.5 inch (38 mm) wide nozzle, to create a homogeneous weld, a minimum of 1.5 inch (38 mm) in width.
				4. Smaller nozzles may be used for corners, and other field detailing, maintaining a minimum 1 inch (25 mm) weld.
			3. Automatic Hot Air Machine Welding:
				1. Proper welding of the FiberTite Membrane can be achieved with a variety of automatic welding equipment. Contact FTS for specific recommendations.
				2. Follow manufacturers' instructions for safe operation of the automatic welder.
				3. Follow local code requirements for electric supply, grounding and surge protection.
				4. The use of a dedicated, portable generator is highly recommended to ensure a consistent electrical supply, without fluctuations that can interfere with weld consistency.
				5. Properly welded seams shall utilize a 1.5 inch (38 mm) wide nozzle, to create a homogeneous weld, a minimum of 1.5 inch (38 mm) in width.
		6. Membrane System Inspection
			1. The job foreman or supervisor shall initiate daily inspections of completed work, which shall include, but is not limited to the probing of field welding with a dull pointed instrument to assure the quality of the application and ensure that any equipment or operator deficiencies are immediately resolved.
			2. Ensure all aspects of installation (sheet layout, attachment, welding, flashing details, etc.) are in strict accordance with the most current FiberTite Membrane Roofing System Specifications and Details.
			3. Excessive patching of field seams because of inexperienced or poor workmanship will not be accepted at time of final inspection for warranty acceptance.
			4. Any deviation from pre-approved specifications and details requires written authorization from the FTS prior to application to avoid any warranty disqualification.
			5. It is the responsibility of the Applicator, job foreman, supervisor or quality control personnel to perform a final self-inspection on all seams prior to requesting the inspection for warranty issuance by the FTS.
	7. FLASHING
		1. Clean vents, pipes, conduits, tubes, walls, and stacks to bare metal. Protrusions must be properly secured to roof deck with Authorized fasteners. Remove and discard lead, pipes and drain flashing. Flash penetrations according to Authorized details.
		2. Remove loose or deteriorated cant strips and flashings.
		3. Flash curbs, parapets and interior walls in strict accordance with approved FiberTite details.
		4. All flashing shall be adhered to properly prepared, approved substrates with FTR-190e adhesive, Alpha-Tite adhesive or FTR-201 mastic applied in sufficient quantity to ensure total adhesion.
		5. The base flange of all membrane flashing shall extend out on to the plane of the deck, beyond the wood nailers to a maximum width of 8 inches (203 mm).
		6. Vertical flashing shall be terminated no less than 8 inches (203 mm) above the plane of the deck with Authorized termination bar and counter-flashing or metal cap flashing.
		7. When using FTR-201 as the adhesive, vertical wall flashing termination shall not exceed 40 inches (1016 mm) without supplemental mechanical attachment of the flashing between the deck and the termination point of the flashing.
		8. Complete all inside and outside corner flashing details with FiberTite preformed corners or an Authorized field fabrication detail.
		9. Probe all seams with a dull, pointed probe to ensure the weld has created a homogeneous bond.
		10. Install penetration accessories in strict accordance with Authorized details. Ensure penetration accessories have not impeded in any way the working specification. Refer to the related trade for the technical specification.
	8. METAL FLASHING
		1. All perimeter edge details are to be fabricated from FiberClad Metal or utilize a prefabricated FiberTite Fascia System.
		2. Ensure all fascias extend a minimum of 2 inches (51 mm) lower than the bottom of the wood nailers.
		3. Fasten all metal flashing to wood nailers or Authorized substrate with Authorized fasteners 8 inches on center.
		4. Break and install FiberClad metal in accordance with Authorized details, ensuring proper attachment, maintaining 1 and 2 inch (13 mm) expansion joints and the installation of a minimum 2 inch bond breaker tape prior to sealing the joint.
		5. Solidly weld FiberClad expansion joints with a 6 inch (152 mm) strip of FiberTite membrane welded to the Fiber Clad, covering the bond breaker tape (cover plates are optional).
		6. Roof Drains:
			1. Flash all roof drains in accordance with FiberTite roof drain details.
			2. Replace all worn or broken parts that may cut the FiberTite membrane or prevent a watertight seal. This includes the clamping ring and strainer basket.
			3. Replace all drain bolts or clamps used to hold the drain compression ring to the drain bowl.
			4. FiberTite non-reinforced 60 mil (1.52 mm) membrane shall be used for flashing the drain assembly. Drain assemblies and basins or sumps must be free of any asphalt or coal tar pitch residue prior to installation.
			5. The drain target sheet should be sized and installed to provide for a minimum of 12 inches (203 mm) of exposed 60 mil (1.52 mm) on all sides of the drain.
		7. Forti-Lock Liquid Flashing
			1. For aberrant penetrations and pitch pan avoidance, follow FiberTite Forti-Lock guidelines and details for substrate preparation and installation of Forti-Lock liquid flashing on pre-authorized aberrant penetrations.
				1. Forti-Lock Metal Primer: is required for all metal tie-ins and applications with high mechanical stresses, on detail work with small contact areas, metal components with large linear thermal expansion or edge metal terminations.
		8. Pitch Pans:
			1. Every reasonable effort shall be made to eliminate the need for pitch pans including the removal of existing pans. Contact FTS for specific design alternatives and recommendations.
			2. In the event of no alternative, fabricate pitch pans from FiberClad metal, installed in accordance with FiberTite details, ensuring proper attachment, maintaining a minimum of 2 inch (51 mm) clearance around the penetration.
			3. Pitch Pans shall be filled with non-shrinking grout to within 1 inch (25 mm) of the top of the pan. Allow the grout to dry and fill remainder of the pan with FTR-SLS pourable sealant.
			4. Pitch Pans and the sealant will require periodic maintenance by the building Owner's maintenance personnel.
	9. EXPANSION JOINTS
		1. Flash all expansion joints in accordance with authorized details. Fasten all expansion joint material according to FiberTite specifications. Ensure the expansion material has sufficient material to expand to the widest point in expansion without causing undue stress on the expansion joint material.
		2. If the expansion joint is a preformed system, the manufacturer, description and a drawing illustrating the method of installation must be included when the (FTR-PIN) is submitted.
	10. SEALANTS
		1. Apply authorized sealants to all surface mounted reglets and per project requirements. Sealants are to shed water. Follow all manufacturer's instructions and installation guides.
		2. Use primer when recommended by the manufacturer.
		3. Sealants will require periodic maintenance by the building Owner's maintenance personnel.
	11. TEMPORARY SEALS
		1. At the end of each working day or at the sign of rain, install temporary, 100 percent watertight seals where the completed new roofing adjoins the uncovered deck or existing roof surface.
		2. The Authorized Applicator shall create and maintain the temporary seal in such a manner to prevent water from traveling beneath the new or existing roof system.
		3. The use of plastic roofing cement is permissible when sealing to an existing built up roof.
		4. If water is allowed to enter beneath the newly completed roofing, the affected areas shall be removed and replaced at no additional expense to the building Owner.
		5. Prior to the commencement of work, cut out and remove all contaminated membrane, insulation, roof cement or sealant and properly dispose of offsite.
	12. QUALITY ASSURANCE TESTING
		1. Prior to the installation of the vegetation roof system components, an interim inspection for warranty acceptance of the membrane system shall be coordinated with FTS.
			1. Upon completion of the FiberTite Membrane System, the Authorized Applicator shall notify FiberTite Technical Services of Project Completion.
			2. Upon receipt of the notice of completion, a FTS representative will schedule an inspection with a representative of the Authorized Applicator to thoroughly review the installation and verify compliance with Seaman Corporation specifications and authorize the continuation of Quality Assurance Testing by either a water test or EVM testing per project requirements.
			3. Do not proceed with the installation of the vegetated garden roof components until all Quality Assurance Testing has been completed and the membrane roof system accepted by Seaman Corporation.
		2. Water tests are required on ALL projects requiring a standard FiberTite Commercial Roofing Warranty. FTS must be present at all water tests.
			1. Plug all drains and flood the associated area to a minimum depth of 2 inch (51 mm). Let water stand for 24 hours.
			2. Remove all water from the test area and thoroughly inspect all the area for leaks or signs of water entry below the membrane roofing system. This shall include both and above and below the surface examination.
			3. The Applicator shall be prepared to provide test cuts and the associated repairs if and when FTS or the Owner's representative request them.
			4. Any areas found to be wet or areas of water entry shall be opened, dried, repaired to Seaman Corporation standards, and retested as described in this section.
		3. EVM Testing is required for ALL FiberTite Green Single Source Warranties.
		4. Coordinate FiberTite Smartex electronic leak detection before installing the vegetated overburden and associated components.
		5. Ensure an Applicator's representative is present and available to make immediate repairs in the event a breach in the membrane roof system is detected.
		6. Install the boundary cable directly on the FiberTite membrane 4 to 6 inch (102 to 152 mm) from the perimeter of the roof areas to be tested. The EVM Technician will determine the size and shape of the areas.
		7. Secure the boundary cable with duct tape to prevent movement or damage to the cable and so as not to create a tripping hazard.
		8. Wet the entire roofing membrane test are with water prior to the start of each test and maintain the wet condition for the duration of the testing. Ponding water is not necessary.
		9. Allow the testing technician to inspect the roof area. If a breach is detected the technician will report to the Applicator immediately.
		10. Defects found shall be immediately repaired by the Applicator and retested by the technician.
		11. The technician shall provide a test report documenting the initial status of the roofing membrane, testing procedures, daily activity and a schematic drawing indicating the location of defects and the stationary boundary cable.
		12. Restrict construction traffic on the newly tested and accepted membrane system to only that which may be required to install the vegetated overburden components.
	13. PROTECTION LAYER
		1. Inspect and verify that roofing membrane and components are complete and ready prior to installing the protection layer.
		2. Sweep the roof area with a broom and then blow remaining dust and debris from the membrane area to receive FiberTite Green Vegetated Roofing System components.
		3. The Applicator shall loose lay the membrane protection layer over the finished membrane roofing system.
		4. All seams in the protection layer must be shingled and overlapped a minimum of 4 inch (102 mm).
	14. INSTALLATION OF VEGETATED GARDEN ROOF COMPONENTS
		1. The Applicator shall limit traffic over the completed membrane roofing system.
		2. The Applicator shall protect the completed membrane roofing system during the transport of rooftop garden components and growth medium.
		3. Install vegetated rooftop garden components in proper sequence and methodology as specified.
		4. FiberTite Green Multi-Layer System:
			1. Place multilayer system directly over protection layer (if required).
			2. Place drainage layer with attached filter layer parallel to roof slope.
			3. Butt seams and overlap with provided filter layer extension.
			4. Place retention layer over the drainage and filter layer composite perpendicular to roof slope.
			5. Promptly after placing multilayer on the roof, install growth media or ballast as necessary to prevent movement of multilayer due to weather and construction activities.
		5. FiberTite Green Tray System:
			1. Place trays directly over protection layer.
			2. Position bottom troughs of trays perpendicular to roof slope, except at minor crickets.
			3. Orient and overlap edges to interlock and hold trays in place.
			4. Attach trays in place with standard plastic tray pin through the aligned holes in tray sidewalls.
			5. Secure trays together with plastic tray pin fasteners and install metal edger in place.
			6. If integral irrigation is being used, place hooks concurrently with trap pin in parallel direction of drip tube.
			7. Promptly after placing trays on roof, install growth medium or ballast as necessary to prevent movement of trays due to weather or construction activities.
			8. Irrigation System Placement:
				1. Layout and secure irrigation lines to trays using irrigation hook and plastic tray pin fastener system.
				2. Install poly-header at tray perimeter.
				3. Connect drip tube to poly-header with supplied barb fittings.
				4. Connect poly-header to water supply, including sub-mains, valves, and backflow prevention systems.
		6. Metal Edge:
			1. For Multilayer System:
				1. Follow FiberTite Green Details for installation of metal trim.
				2. Install trim flashing to conceal multilayer sides and to lock into metal counter flashing at building perimeter flashing systems as specified.
				3. Install interlocking metal anchor flashing at openings between multilayer and perimeter roof edges to anchor multilayer, building perimeter flashing and counter flashing together.
			2. Tray System:
				1. Follow FiberTite Green details for interconnection of metal edge system.
				2. Install metal edge to conceal tray sides.
				3. When using integrated irrigation system; place irrigation polyheader within irrigation edger.
				4. Install interlocking metal edger at openings between trays and perimeter roof edges to anchor drays, building perimeter flashing and counter flashing together.
		7. Growing Media:
			1. Transport bulk growing media to roof using stabilized hoisting equipment, blower truck or cranes.
			2. Remove any and all debris within trays or on top of multilayer composite.
			3. Distribute growing media evenly throughout tray system or across multilayer system.
			4. Maintain a consistent finish grade.
			5. Place media at required depth according to project specifications.
		8. Planting:
			1. Install planting (plugs, tiles, mats, unrooted cuttings) conforming to landscape design and other requirements as specified.
			2. Distribute differing plant species evenly for overall uniform appearance of overall installation.
			3. Following installation of plant media, irrigate using potable water that is free of substances harmful to plant growth. Provide hoses in lengths reaching from water supply source to all plant material.
	15. WALKWAYS
		1. FiberTite walkways and protection pads shall be installed at staging areas for rooftop equipment maintenance or areas subject to regular foot traffic.
		2. Walkway Installation:
			1. Roofing membrane to receive walkway material shall be clean and dry.
			2. Cut and position the FiberTite walkway material as directed by the specifications or agreement.
			3. Hot air weld the entire perimeter of the walk way to the previously cleaned FiberTite roofing membrane. Avoid excessive heating of the walk way material to prevent scorching the underlying roofing membrane.
		3. Hardscape Installation
			1. Install Hardscape (ballast, pavers etc.) walkways and borders according to project drawings and FiberTite Green details.
		4. Protection Pad Installation:
			1. Roofing membrane to receive protection pad material shall be clean and dry.
			2. Prior to installing the FiberTite protection pads, 0.25 x 24 x 48 inch (6 x 610 x 1219 mm), weld a 6 x 6 inch (152 x 152 mm) strip of FiberTite membrane to each of the four corners of the back side of the pad. Position the strips in such a way that they overhang the edge of the pad a minimum of 2 inches (51 mm) around the 90 degree corner.
			3. Position the FiberTite protection pads as directed by the specifications or agreement and weld the visible portion of the previously applied stripping to the FiberTite roofing membrane.
	16. LIGHTNING PROTECTION
		1. The installation of lightning protection must be coordinated with the Authorized FiberTite Applicator, certified lightning contractor and the building Owner.
		2. The lightning protection must be installed in such a manner that base plates, air terminals and cables do not penetrate the roofing membrane without the use of pre-approved flashing details.
		3. Cables and air terminals may be attached to the membrane using base plates and an approved construction adhesive. Contact FTS for specific adhesive recommendations.
		4. Recommendations regarding the selection of adhesives or alternative affixing of lightning protection systems to the FiberTite membrane does not in any way imply a warranty covering their performance or ability of the adhesives to remain affixed to the FiberTite membrane.
	17. COMPLETION
		1. Remove any and all debris, excess materials and scrap of any kind from the roof and surrounding premises prior to demobilization.
		2. Inspect all field welds, detailing and terminations to ensure a 100 percent the watertight installation.
	18. FINAL INSPECTION FOR WARRANTY
		1. Coordinate the final inspection of the completed FiberTite Green Vegetated Roof System with Owner, architect, Applicator and FTS.
		2. Make adjustments and alignments of garden roof system components as necessary to give a uniform and finished appearance.
		3. Replace plant media that appears to be stressed or damaged.
		4. Any corrections or modifications necessary for compliance with the specifications and acceptance for warranty (punch list) will be noted on the Final Inspection for Warranty Form.
		5. Upon completion of all punch list items and final acceptance of the installation, a warranty as authorized by the Seaman Corporation FiberTite Project Registration.
	19. VEGETATED GARDEN ROOF MAINTENANCE
		1. Maintain a uniform stand of succulent plants by watering and maintain vegetated system for a minimum period of 90 days following installation and through substantial completion and occupancy by Owner.
			1. Include watering, spot weeding, fertilization and other measures as necessary to maintain health and propagation of plant materials and as necessary for stabilization.
			2. Instruct Owner and furnish written maintenance instructions, following maintenance period, as necessary for planting materials to develop complete root structure and to become stabilized.
			3. Provide periodic hydration as needed, depending on precipitation.
			4. Follow horticultural and nursery recommended plant maintenance procedures.
		2. Annual Maintenance Agreement:
			1. Following initial construction maintenance, consult with Owner to negotiate for the continuance of the maintenance of vegetated garden system as offered by Applicator.
				1. Include watering for first year after installation to ensure proper root development.
				2. Continued watering should be done on an as needed basis.

END OF SECTION