DIVISION 7 - THERMAL AND MOISTURE PROTECTION

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07 10 00 DAMPPROOFING AND WATERPROOFING

(Includes 071200 Bituminous Waterproofing, 713000 Sheet Waterproofing, 071600 Cementitious and Reactive Waterproofing and 071700 Bentonite Waterproofing)

A. Design Considerations

1. Waterproofing of below grade spaces is required by the Building Code if the water table cannot be permanently maintained 6" below the bottom of the basement slab. Otherwise, underslab dampproofing is required using membranes conforming to ASTM E1745 Class A, B or C.

2. If a hydrostatic pressure (permanent or intermediate) exists, the basement slab and foundation walls must be designed to structurally resist it. A waterproofing membrane is required under the slab and on the positive (wet) side of the foundation walls.

3. Where positive side surfaces are inaccessible, such as at lot lines, a negative (dry) side system, consisting of metal oxides or crystalline conversion coatings can be applied to the inboard faces of the foundation or a membrane can be applied to the soil retention system. The latter is termed blindside and may be a bentonite clay membrane (sometimes modified with polymers) or a bituminous or thermoplastic single ply designed to adhere to the wet concrete cast against it.

4. Positive side membranes must be protected from damage. Protection boards or polystyrene insulation are commonly used.

5. Below grade foundation walls that are not waterproofed must be dampproofed and are frequently covered with a drainage composite terminating at a foundation drain. Alternately, 12" of graded gravel backfill can be used.

6. Basement waterproofing should not be confused with plaza waterproofing. Plaza waterproofing, specified in Sections 071200 Bituminous Waterproofing, 71300 Sheet Waterproofing, 071400 Fluid Applied Waterproofing, differs from Basement waterproofing in that it is not subject to hydrostatic pressure. Except for hot fluid-applied waterproofing, these systems are not suitable for use under intensive green roofs. Positive drainage is a critical component of the system.

    a. Plaza waterproofing substrates shall be sloped a minimum of 2% to ensure drainage. Lightweight (e.g. 110 pcf) concrete fill is preferred to obtain slope and mandatory over precast concrete.

b. Extruded polystyrene insulation should be installed over — not under— the membrane.

c. A water pervious medium such as gravel or a plastic drainage composite should be provided to permit water to drain.

d. Most membranes are moisture sensitive and must be applied to dry surfaces or the membrane manufacturer's special primer for green concrete should be used.

e. Hot fluid-applied rubberized asphalt and self-adhering rubberized asphalt are recommended over cold fluid-applied systems.

B. Special Documentation

1. Waterproofing should be indicated on the structural drawings **—** rather than the architectural—by a single heavy dashed line.

2. Details of penetrations should be indicated on a separate Point of Entry drawing on which all disciplines—structural, MEP and architectural are collected and dimensioned — and on which the penetration waterproofing details consolidated.

3. Details of penetrations, terminations at footings and at grade, plane transitions and the like should be drawn at not less than ¼ full size. On projects where waterproofing is extensive, consider preparing separate waterproofing drawings.

4. A pre-waterproofing meeting attended by the architect, general contractor, waterproofing contractor, waterproofing manufacturer and concrete subcontractor is mandatory.

C. Materials and Methods of Construction

1. The selection of an appropriate waterproofing system must begin with a review of the Geotechnical Report. This will establish the hydrostatic pressure that the waterproofing must withstand.

2. Of equal importance is a review of the soil chemistry. This will establish the requisite resistance to aggressive soil which may include sulphates, soil poisoners, fertilizers, leakage from abandoned fuel oil tanks, etc.
3. The geotechnical and soil chemistry report should be provided to the waterproofing manufacturer who should state, in writing, that his product will perform in the presence of the specified hydrostatic pressure and be unaffected by the chemicals in the soil.
4. The manufacturer should also state, in writing, that the form oil release and concrete curing agents will not affect the adhesion of his system.

5. Waterproofing warranties rarely exceed 10 years and do not include removal and replacement of overburden or costs to remediate leaks. Rather than depend on warranties specify that the applicator and/or the manufacturer shall be responsible for remediating leaking that may occur within one year including resin or bentonite grout injection, and/or the application of negative side waterproofing.

6. The following spread sheet should provide guidance for selecting an appropriate waterproofing system. Cementitious waterproofing is generally unsuitable for use on foundations because they often fail at construction joints. Systems and products should be selected for durability since they must perform for the life of the building. Note that there are a number of products that have a track record of less than 5 years. These should not be specified where the occupancy requires a high performance level.

07175 WATER REPELLENT COATINGS

1. Generally, water repellents shall not be used on exterior brick or masonry walls. Where required on existing buildings, silane based water repellents such as the following shall be used:

    a. Chem-Trete BSM 40 as manufactured by Huls Inc., Edison, New Jersey.

    b. SIL-ACT ATS-42 as manufactured by Advanced Chemical Technologies Co., Oklahoma City, OK.

    c. Stifel as manufactured by Nox-Crete Chemicals, Inc., Omaha, Nebraska.

    d. Klereseal 940-S as manufactured by Pecora Corporation, Harleysville, PA.

07220 ROOF INSULATION AND OVERLAY BOARDS

A. Design Considerations

1. Roof insulation, overlay boards and fasteners/adhesive are to be considered components of a total roof system assembly, and must be included in a "total system" warranty/guaranty issued by the roofing system manufacturer. In addition, insulation, overlay boards and fasteners/adhesive must be specifically listed as a component of a Factory Mutual (FM) tested and approved roof system assembly in the latest edition of the FM Approval Guide for Building Materials or other written approval or acceptance from Factory Mutual.

2. The design layout of tapered insulation board systems with internal drains should utilize "four-way" slope to the greatest extent possible. The use of "crickets" or "gussets" should be minimized

B. Special Documentation Requirements

1. Insulation material and fastener options must be specified by manufacturer and product name as listed in the FM Approval Guide for Building Materials, corresponding to the roof membrane system being specified.

2. Fastening requirements for all insulation and overlay boards must be illustrated and/or specified, including fastener density for the "field" and any required increases for perimeter and/or corner attachment. Fastening requirements specified shall be in accordance with Factory Mutual requirements. The specifications shall not rely solely on reference to FM requirements.

    a. Perimeter and corner areas are to be determined by the A/E, in accordance with Factory Mutual design guidelines, and are to be illustrated on a separate plan/diagram drawing, including written dimensions to define perimeter/corner widths. The separate plan/diagram drawing shall be at a scale not less than 1/16” = 1’-0”. The A/E shall also provide, in an area adjacent to the plan/diagram, a written summary of Factory Mutual wind uplift design criteria and a summary of minimum and specified FM wind uplift ratings for field, perimeters and corners. Drawing SK-7-1, located in Part IV of this Manual, is a sample drawing that complies with these requirements.

3. All Architects shall provide information on roof insulation materials and installation in a separate Section, not incorporated with roof membrane materials and installation.

07315 SLATE SHINGLES

A. Design Considerations

1. The A/E should consider that slate shingles are expected to provide a service life of at least 75 years, therefore, all related components, particularly those that are fully or partially concealed by the slate shingles (i.e. valley flashings, step flashings, built-in gutter flashings, etc.) should be designed using materials and installation methods which can be expected to provide equivalent longevity to the greatest extent possible.

B. Special Documentation Requirements

1. All details must clearly delineate all roof system components and their order of installation, including but not limited to “ice and water shield” membrane, metal components, cleats, eave cants, “ice and water shield” stripping plies, felt underlayment, rosin paper underlayment, slate starter course, slate shingles, finishing nailers, slate finishing course, hip/ridge nailers, hip/ridge flashing, hip/ridge slate, etc.

2. Specifications shall include specific sizes for slate shingles, starter slates, finishing slates, finishing nailers and hip/ridge nailers.

3. Specifications are to provide specific products and manufacturers for all roof system components, including but not limited to “ice and water shield” membrane, felt underlayment, plastic cement, etc.

4. Since slate shingles do come with standard manufacturer’s guarantees as is typical for low-slope and some other types of steep-slope roof systems, the documents are to include provisions for a Contractor’s five-year guarantee on all roofing and related work, including all sheet metal flashing and trim associated with the roof installation. This guarantee will be in addition to any other guarantees required by Contract. The Project Manual is to include a roofing-specific guarantee document, to be executed by the Contractor and submitted to Rutgers at project completion.

C. Materials and Methods of Construction

1. All slate shall be specified to meet the requirements of ASTM C 406, Grade S1.

2. “Ice and water shield” shall be polymer-modified bitumen sheet type. Sanded or granular surfaced materials are not acceptable in any condition where the material must be striped off with same material.

3. Underlayment shall be a minimum of one layer of 30# felt, meeting or exceeding the minimum physical property values listed in ASTM D 226, Type II, non-perforated.

4. With the exception of starter slates, all slates are to have nail holes punched from the back, providing a countersink on the front (beveled side) to receive the nail head. Starter slates are to be installed with front (beveled side) down, therefore, starter slates are to have nail holes punched from the front, creating a countersink on the back side to receive the nail heads.

5. Valleys are to be open, with “w-style” metal flashing and tapered. All valleys should have “ice and water shield” membrane installed, covered with rosin paper, before installation of the metal valley flashing. Closed valleys should be avoided unless required due to historic considerations, in which case the closed valley should utilize stepped metal flashing, not continuous metal flashing.

6. Metal crickets are to be used on the upslope side of all chimneys and curbs.

7. Hips are to be installed with slate or metal caps. Slate caps are to be installed in saddle hip fashion. Mitered hips, fantail hips and Boston hips should be avoided, unless required due to historic considerations. Slate hip caps are to be detailed to incorporate continuous “ice and water shield” underlayment along the hip, prior to installing the slate cap, and stepped metal flashing installed with each course of cap slate. When metal hip caps are used, they are to be detailed to incorporate continuous “ice and water shield” underlayment along the hip and must have all concealed fasteners/cleats.

8. Ridges are to be installed with slate or metal caps. Slate caps are to be installed in saddle ridge fashion. Strip ridges and comb ridges should be avoided, unless required due to historic considerations. Slate ridge caps are to be detailed to incorporate continuous “ice and water shield” underlayment along the ridge, prior to installing the ridge cap, and stepped “ice and water shield” flashing membrane installed with each course of cap slate. The ridge slate must be pointed with UV resistant adhesive to prevent degradation of the flashing membrane. When metal hip caps are used, they are to be detailed to incorporate continuous “ice and water shield” underlayment along the hip and must have all concealed fasteners/cleats.

07240 EXTERIOR INSULATION AND FINISH SYSTEMS

1. It is preferred that such systems be avoided. When required, only the "hardcoat" systems defined as Class PM, Type A, polymer modified protective finish coating, externally reinforced as developed by the Exterior Insulation Manufacturers Association (EIMA) may be used. Such systems require mechanical fastening of extruded polystyrene insulation and reinforcing mesh, and rigid acrylic modified cement plaster finish.

2. The A/E shall pay special attention to locations of crack control joints and details of flashing and sealing at penetrations to insure a properly designed and watertight installation.

07411 METAL ROOF PANELS

A. Design Considerations

1. This section applies to factory fabricated metal roof panel systems, not to field fabricated sheet metal roofing.

2. Metal roof systems are to be designed and specified to provide a twenty (20) year watertight guarantee and a twenty (20) year guarantee on all metal finishes.

3. The National Roofing Contractors Association (NRCA) provides metal roof system detailing and "enhancement" recommendations in the NRCA Roofing and Waterproofing Manual (Fifth Edition, Volume 2). The A/E must utilize the Manual for the design and specification of all metal roof systems, including incorporation of all recommended details and "enhancements". The A/E should note that NRCA's recommended details may differ from many metal roof system manufacturer's "standard" details. During the design phase, it is the responsibility of the A/E to detail in accordance with NRCA recommendations and bring any standard detailing differences to the attention of the manufacturer prior to listing the manufacturer in the specifications. Any problems with a manufacturer's unwillingness to accept and guarantee details designed in accordance with NRCA recommendations must be brought to the attention of the Office of University Planning and Development.

4. Metal roof panels vary in configuration, including seam style and height, pan stiffening (i.e. ribs, striations, etc.) and metal type (i.e. aluminum, galvanized or galvalume coated steel) and metal thickness. During the design phase, it is the responsibility of the A/E to confirm that potential metal roof panels can be installed in accordance with the details developed using NRCA recommendations. As an example, if details require a panel end to be "hemmed", the A/E may need to request a "hemmed" panel sample from the manufacturer, confirming that the potential panel profile can be "hemmed" without detrimental effect to the panel and/or is aesthetically acceptable.

5. All metal roof systems shall incorporate snow guards at all roof eaves. Snow guards are be continuous bar type, with non-penetrating brackets mounted on raised metal panel seams.

B. Special Documentation Requirements

1. All details must clearly delineate all roof system components and their order of installation, including but not limited to, "ice and water shield" membrane, fastening clips, cleats, metal flashing components, "ice and water shield" stripping plies, felt underlayment, rosin paper underlayment, metal closures, metal caps, sealant locations, etc.

2. Specifications are to provide specific products and manufacturers for all roof system

components, including but not limited to metal panels, “ice and water shield” membrane, snow guards, etc.

C. Materials and Methods of Construction

1. All metal roof systems are to utilize structural-type panels with minimum two inch (2”) high machine-seamed standing seams, incorporating factory-applied seam sealant.

2. Panels are to be maximum 18” wide, with stiffening ribs or striations to minimize “oil-canning” and shall be minimum 24 gauge galvanized or galvalume coated steel with fluoropolymer finish.

3. “Ice and water shield” shall be polymer-modified bitumen sheet type. Sanded or granular surfaced materials are not acceptable in any condition where the material must be striped off with same material.

4. Underlayment shall be a minimum of one layer of 30# felt, meeting or exceeding the minimum physical property values listed in ASTM D 226, Type II, non-perforated.

5. Metal valley flashings are to have 1” raised center rib, continuous intermediate “S” bend to receive hemmed edge of roof panels and continuous hemmed edge to receive fastening cleats, similar to NRCA Manual Figure 4.13C. All valleys should have “ice and water shield” membrane installed, covered with rosin paper, before installation of the metal valley flashing. Metal panels are to be hemmed onto valley flashing and shall not utilize exposed fasteners.

6. Metal crickets are to be used on the upslope side of all chimneys and curbs.

07500 ROOFING - GENERAL

This Section applies generally to all roofing work. Additional requirements for specific roof system types are located in separate specification sections.

A. Design Considerations

1. All proposed roof systems shall be included in the Schematic Design Phase for review and approval by the University.

2. Low-slope roof systems are to be designed with 1/4" per foot (min.) slope to drains, but not greater than the recommended limits of the specified system. There shall be no exception to this requirement for new construction or additions where the structural roof deck is new. It is preferred that "four-way" slope be incorporated in the design to the greatest extent possible, with the use of "crickets" or "gussets" minimized. It is further preferred that slope be provided by the structural framing/deck system where possible.

3. For replacement of roofs on existing buildings only, it is the responsibility of the A/E to

evaluate the design and construction cost implications of compliance with Item #A.2 above and present the information with the Schematic Design. Typical implications to be addressed include, but are not limited to: 1) existing through-wall flashing heights and need/cost to raise, 2) heights of major mechanical equipment and need to temporarily or permanently raise, 3) new roof surface heights at roof edges and possible aesthetic considerations. Based on the information provided by the A/E, the University will determine if exceptions to Item #A.2 above will be granted and to what extent. When exceptions to Item #A.2 above are authorized by the University, the following requirements shall apply:

a. The roof system shall be designed with at least 1/8" per foot slope to drains to the greatest extent possible.

b. The roof system selection must be appropriate for locations where ponding water is likely to occur, and the system manufacturer must provide a written warranty/guaranty that does not have exclusions for damage relating to ponding water.

c. When the exception(s) encompasses a significant portion of the total roof area, only coal tar pitch and single-ply PVC membrane roof systems are considered appropriate choices. Actual roof system selection will be determined based on specific building/project parameters.

4. Steep-slope roof systems shall be not less than 4:12 pitch.

5. All roof systems shall be designed to be eligible for a 20-year "total system" warranty/guaranty from the roofing material manufacturer. The "total system" shall include roof membrane, membrane flashings, insulation, insulation fasteners/adhesive and accessory products supplied or approved for use by the manufacturer. The warranty/guarantee shall provide for the following:

   a. The warranty/guaranty shall be issued by the manufacturer of the primary roof membrane system.

   b. The warranty/guaranty shall have no dollar limit (NDL) and be non-prorated for the entire term.

6. All roof system assemblies, including roof membrane plies, insulation layers and fasteners/adhesive, must be "approved" or "accepted" for use by Factory Mutual Research Corporation. "Approved" roof assemblies must be listed in the most recent edition of the FM Approval Guide for Building Materials or the A/E shall submit other documentation from FM as evidence of approval. Where use of an "accepted" roof assembly is intended, it is the responsibility of the A/E to obtain and submit written evidence of acceptance from FM prior to preparation of construction documents. All roof systems shall be designed and specified to meet Factory Mutual recommendations and requirements, except as follows:

   a. Where building location and characteristics permit FM 1-60 uplift classification, the field fastening shall be increased to meet FM 1-90 recommendations. Recommended increases at perimeters and corners shall remain as if the field were designed to meet FM 1-60 recommendations (1-90 and 1-135 respectively when using FM Option b).

7. The following roof systems are not acceptable, unless specific written permission is provided by the University:

   a. Ballasted loose-laid roof systems.

b. Inverted/protected roofing and waterproofing membrane assemblies (IRMA/PRMA). Consequently, areas such as exterior plaza decks and terraces over occupied interior spaces shall be avoided in building design.

c. Sprayed polyurethane foam roofing, regardless of surfacing/coating type.

8. All roof systems are to be designed, detailed and specified in general accordance with recommendations provided by the NRCA Roofing and Waterproofing Manual (Fifth Edition), published by the National Roofing Contractors Association.

9. For roof replacement projects on whole or portions of existing buildings, the A/E shall be required to perform the following tasks during the Schematic Design Phase, in order to properly evaluate existing conditions and provide appropriate recommendations to the University:

a. Review available existing construction documents and other historical data related to the existing roof and building construction. The University will provide the A/E with access to microfilm and drawing records, if available. The A/E shall review the records and determine all pertinent drawings. Rutgers University will provide the A/E with copies of all requested drawings.

b. Perform on-site survey of all roof areas to confirm all roof area dimensions and locations of all associated roof elements, including, but not limited to, roof drains, scuppers, vent pipes, chimneys/flues, curbs, mechanical equipment, conduit and miscellaneous roof penetrations.

c. Perform on-site survey of all detail conditions effecting the design and installation of the new roof system, including, but not limited to, perimeter edges, parapet walls, rising wall, flashing and counter-flashing heights, coping conditions, drainage components and related building components impacting the watertight integrity of the roof system.

d. Verify existing deck slopes and evaluate the existing drainage components' conditions and capacity, as required to determine conformance with building code and Rutgers University Design Standards.

e. Perform destructive testing (roof cuts/core samples) on each roof area as required to determine existing roof composition and subsurface conditions effecting the design and installation of the new roof system. Repair all test areas with compatible materials, in accordance with standard practice.

B. Special Documentation Requirements

1. Drawings, including roof plans, sections, details and others as required, shall fully depict the extent of work and methods of construction. Shop drawings shall be used only for verification that the A/E's intentions are understood and are not to relieve the A/E from design responsibility.

2. Specifications for roof system manufacturers and materials shall be non-proprietary, unless specifically approved by the University. Specifications shall not be "performance" based, but instead shall provide three (3) acceptable manufacturers, unless fewer are approved by the University, and shall provide specific and comparable products, by name, for each specified manufacturer. Single-source specifications with provisions for "or equals" are not acceptable, unless authorized in writing by the University.

3. Since several manufacturers are to be specified, and the manufacturer's "typical" details may vary, it is the responsibility of the A/E to select the methods of construction judged to be in the best interest of the University, and provide construction documents that reflect those methods as the minimum acceptable project standard.

4. Walkway protection pads shall be specified and indicated on the roof plan, leading from roof access points to and/or around all serviceable mechanical equipment and appurtenances.

5. The specifications shall include language stipulating that the roofing contractor or sub-contractor must be pre-qualified by Rutgers University, prior to submitting a bid, in the specific roof system category or categories appropriate for the project. The appropriate roof system category designation will be provided by the Office of Facilities Design through the Project Manager.

6. The specifications for all roofing projects utilizing heated bitumen and/or torch-applied roofing materials must incorporate Article 1.1 and/or Article 1.2 provided in "Rutgers Fire Safety Precautions", located in Part IV of this Manual, without modification of content. The specifications should also include all other language the A/E feels appropriate and necessary for the project.

C. Materials and Methods of Construction

1. For all low-slope insulated roof systems, the Contractor shall be required to have an infrared roof moisture survey performed after installation is complete, and before final acceptance by the University. The contractor shall be responsible for permanent repair of all required invasive test locations. The contractor shall be responsible for removal and replacement of all moisture-containing insulation, including all necessary roofing and related work required. The roof moisture survey shall be ground-based, walk-over type, and performed in accordance with ASTM C-1153; Standard Practice for the Location of Wet Insulation in Roofing Systems Using Infrared Imaging, with the following additional requirements:

    a. The entire survey shall be recorded on VHS videotape, one copy of which shall be provided to the University with the report. In addition, the report shall include thermograms of all suspect areas and corresponding daytime photos of the same locations.

    b. The survey shall be performed by a firm specializing in infrared thermography

services for at least ten (10) years.

c. The inspection shall be conducted by an NDT test technician certified to at least Level 2 in the Thermal/Infrared test method in accordance with American Society for Nondestructive Testing Recommended Practice SNT-TC-1A and having at least five (5) years experience in providing infrared inspection services on commercial roofing systems.

d. The contractor must submit written documentation indicating conformance with all above requirements before proceeding with the moisture survey.

2. Existing materials being removed shall be recycled to the greatest extent possible, with the exception of asbestos containing roofing materials (see Section 02072 -B.2).-

07620 METAL FASCIAE AND COPINGS

1. Metal coping shall be used. Cast Stone, brick, and concrete copings are prohibited.

07800 ROOF ACCESS

1. Access to the roof from both the interior and exterior of a building shall be restricted. If interior roof hatches are used, they must be padlocked and located in areas restricted to the general public and accessible only by authorized personnel.

2. All roof areas must be easily accessible by Rutgers personnel and promote routine roof system maintenance and mechanical equipment service, without the need for portable ladders.

    a. All roof areas must be accessible vial stairs and/or full size doors, except as otherwise noted in these Standards.

    b. Roof level changes of less than one story in height may have exterior stairs, fabricated from aluminum or hot-dipped galvanized steel, to provide access between roof areas. Stair and/or door access will only be required to one of the roof areas, provided there are no obstructions between the roof access point and the exterior stair location.

c. Stair tower and elevator penthouse roofs may be accessed via interior “ships ladder” and roof hatch.

d. Stair tower and elevator penthouse roofs without serviceable equipment may be accessed via exterior metal stairs, exterior “ships ladder” or fixed vertical ladders, provided height from roof surface to top vertical ladder platform does not exceed 12’-0”. Exterior vertical ladder must be aluminum or hot-dipped galvanized steel and are to be fabricated with a top platform, platform handrails on both sides.

07810 SKYLIGHTS

1. Skylights shall be avoided. Special permission for the use of skylights must be obtained from the University Architect and generally will not be granted without extremely strong reasons.

07900 SEALANTS

1. The A/E shall pay special attention to the use and misuse of the word "caulk". Such materials are generally no longer used in modern construction and consist of oil-based materials used to glaze windows. "Caulk" is not used as a sealant in masonry joints or other exterior wall joints.

2. The use of 2-part polysulfide, 2-part polyurethane or silicone-synthetic rubber type sealant is preferable. The A/E shall determine which particular sealant type is best applicable to each individual design. Specify pourable urethane base sealants for construction joints in traffic bearing locations such as concrete walks, patios, steps and similar locations.

RUTGERS									
SECTION	**CATEGORY**		**PRODUCT**			**UNDERSLAB/**			
			MFGR	**NAME**	**FDN**	**BLINDSIDE**	**PLAZA**	**REMARKS**
71300	**Modified Bituminous Sheet**							
	Waterproofing							
	Neoprene-Asphalt Sheet		Laurenco	N-1 & V-1				
	Waterproofing							
	SBS Modifed Bitumen		Siplast	Teranap				
	Heat Fused		Soprema	Sopralene Flam 180				
	Rubberized Asphalt Sheet		Protecto Wrap Co.	Jiffy Seal 140/60				
	Waterproofing, Fabric Reinforced		Royston Labs.	Royal-Gard				
			Hyload Roof Sys.	CTEM Coal tar				
				Elastomeric Memb.				
	Composite Panel Waterproofing		WR Meadows Inc.	Mel-Gard				
	HDPE Sheet Waterproofing		WR Grace & Co.	Preprufe 160R (Vert)				
				Preprufe 300R (Horz)				
71326	**Self-Adhering Sheet Waterproofing**		American Hydrotech	VM 75				
			American Permaquik	PQ 7100				
	Rubberized-Asphalt Sheet		Carlisle Coatings	CCW MiraDri 860/861				
	Waterproofing		Cetco	Envirosheet				
			WR Grace & Co.	Bituthene, 3000, 4000				
			WR Meadows, Inc.	Mel-Rol				
			Henry Co.	Blueskin WP200				
			Pecora Corp.	Duramem 700-SM				
			Polyguard Products	Polyguard 650 Underseal				

					Hyload Roofing Sys.	CTEM Coal Tar				
						Elastomeric Membrane				
					Tamko Roofing Prod.	TW-60				
71353		**Elastomeric Sheet Waterproofing**			Carlisle Coatings	Sure-Seal Butyl				
71354		**Thermoplastic Sheet Waterproofing**			Sarnafil Wpfg.	System 1000, 2000, 3000				
					Carlisle	Miraply				
71613		**Polymer, Modified Cement Wpfg.**			Aquafin, Inc.	Aquafin-1K				
					Gemite Products	Cem-Kote Plus,				
						Cem-Kote Flex ST				
					MBT Protection	Masterseal 510,				
						Masterseal 550i				
					Metalcrete Indus.	Blokcoat				
					Sika Corporation	Sika Top Seal 107				
					Sonnenborn	Sonnoblock				
					Tamms Industries	Tamoseal				
					Thoro	Foundation Coating				
						with Acryl 60				
					Thoroseal	with Acryl 60				
					ThoRoc, Systems	Brushbond				
					Vandex, Int., Ltd.	Vandex BB 75				
					Vexcon Chemicals	Certi-Vex Envio,				
						Cement Coating				
		Polymer Admixture for Modified			Anti-Hydro Int.	Anti-Hydro				
		Portland Cement-Based								
		Waterproofing								

		Positive-Side, Prepackaged,			ChemMasters	Chemseal Foundation				
		Modified Cement Waterproofing				Gray with Cretolox				
					Conproco Corp.	Fdn. Coat with				
						Colored K-88				
					Wall Firma, Inc.	Wall Dri Fdn. Coating				
		Negative-Side, Prepackaged,			AQUAFIN, Inc.	Aquafin-2K/M				
		Modified Cement Waterproofing			ChemMasters	Chemseal Trowel &				
						Spray with Cretolox				
					Conproco Corp.	Seal with K-88				
					Sonnenborn	Flextight				
71616		**CRYSTALLINE WATERPROOFING**			American Permaquik	Super 200				
					Anti-Hydro, Int.	Hydro Cap				
					AQUAFIN, Inc.	Aquafin-1C				
					Conproco Corp.	Super Seal				
					Gemite Products, Inc.	Cem-Kote CW Plus				
					ICS Penetron Intl.	Penetron Addmix				
					IPA Systems, Inc.	Drycon				
					Euclid Chemical Co.	Hey'Di K-11				
					ThoRoc	Tegraproof				
					Vandex Int.	Vandex Super				
					Xypex Chem. Corp.	Xypex				
71619		**METAL-OXIDE WATERPROOFING**			Anti-Hydro Int.	A-H Metallic Wpfg.				
					Euclid Chemical Co.	Iron Waterpeller Prod.				
					Metalcrete Indus.	Metalcrete Wpfg.				
71700		**BENTONITE WATERPROOFING**			CETCO	Voltex				
					Carlisle Coatings	CCW Clay Mat				
					CETCO	Volclay BPA Type-T				
					CETCO	Voltex CR				

		Composite HDPE/Bentonite			CETCO	Swelltite				
					Tremco	Paraseal				
					Tremco	Deckseal				
		Composite Geotextile-HDPE/Bentonite			CETCO	Voltex DS				
					CETCO	Coreflex				
					Tremco	Paraseal LG				
7100		**PLAZA WATERPROOFING**			**(See Notes ???)**	**(???)**				
71418		**COLD FLUID-APPLIED WATERPROOFING**								
		Single-Component Modified Polyurethane								
		Waterproofing			Anti-Hydro Intl.	A-H Seamless Memb.				
					Carlisle Corp Coatngs	CCW-525				
					CETCO	LDC 60				
					Karnak Corp.	One-Kote System				
					LBI Technologies	Liquid-Boot				
					Neogard-Div of Jones	Neogard 7403/7405				
					Blair					
					Pacific Polymers, Inc.	Elasto-Deck B.T.				
					Pecorn Corp.	Duramem 500				
					Sonnenborn	HLM 5000				
					United Coatings	Elastall 1000				
		Two-Component, Modified			Futura Coatings, Inc.	Futura-Flex 518				
		Polyurethane Waterproofing			Gaco Western Inc.	LM-60				
					Mar-Flex Systems Inc.	Mar-Kote 5000				

		Single-Component, Unmodified			Neogard Div of Jones	Permagard 7410				
		Polyurethane Waterproofing			Blair					
					3M Construction	Scotch Clad 5893/5864				
					Liquid Plastics, Inc.	Decothane EC				
		Two-Component, Unmodified			Carlisle Coatings	CCW 703 Liquidseal				
		Polyurethane Waterproofing			Kemper	2K-PUR				
					Lymtal International	Isoflex 550 SP				
					Mameco Intl.	Vulkem 102				
					3M Construction	FC 100				
		Two Component, Unmodified			Rubber Polymer Corp.	Rub-R-Wall				
		Latex-Rubber Waterproofing			WR Grace & Co.	Procor				
		Two-Component, Polyester			Kemper Systems, Inc.	Kemperol BR & V-210				
		Waterproofing								
		Two-Component PMMA								
		Waterproofing			Siplast	Parapro Roof Mem Sys				
					Soprema	Alsan RS				
7143		**HOT FLUID APPLIED WATERPROOFING**			American Hydrotech	Monolithic Membrane 6125				
					American Permaquik	Permaquik 6100				
					Barrett Company	Ram-Tough 250				
					Carlisle Coatings	CCW-500				
					Protecto Wrap Co.	HM625B				
					Soprema	Colphene H				
					Tremco	Temproof 150				

					Henry Co.	790-11				