Florida Department of Transportation

RON DESANTIS
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JARED W. PERDUE, P.E.
SECRETARY

August 27, 2026

Daniel Holt, PE, PTOE
Director, Project Delivery
Director, Technical Services
FHWA
400 West Washington Street, Suite 4200
Orlando, FL 32801

Re: State Specifications Office
Section: 936
Proposed Specification: **9360000 Components for Retaining Wall System**
Associated Revision: **5480100 Retaining Wall Systems**

Dear Mr. Holt:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

The changes are proposed by Rodrigo Herrera to address the requirements for manufacturers of wall components.

Please review and transmit your comments, if any, within two weeks (10 business days). Comments should be sent via email daniel.strickland@dot.state.fl.us.

If you have any questions relating to this specification change, please call me at (850) 414-4130.

Sincerely,

Signature on File

Daniel Strickland, P.E.
State Specifications Engineer

DS/am
Attachment
cc: Florida Transportation Builders' Assoc.
State Construction Engineer

COMPONENTS FOR RETAINING WALL SYSTEMS
(REV 6-9-26)

The following new section is added:

SECTION 936
COMPONENTS FOR RETAINING WALL SYSTEMS

936-1 Description.

This section specifies the requirements for components in permanent and temporary retaining wall systems in accordance with Section 548.

936-2 Approved Product List.

Wall suppliers seeking evaluation of products for inclusion on the APL shall submit an application in accordance Section 6 meeting the requirements of Table 936-1 and noted herein for evaluation of the retaining wall systems including the components of the system for inclusion on the Approved Product List (APL).

For retaining wall systems utilizing geosynthetic reinforcement, each geosynthetic reinforcement shall be approved for R-3 applications per Section 985.

Table 936-1
Documentation for Inclusion on the APL

Documentation	Requirements
Independently Certified Test Reports	Pullout test data (ASTM D6706), Mechanical Shear Connection Strength (ASTM D6916), Connection Capacity Testing (ASTM D6638).
AASHTO Product Evaluation & Audit Solutions: REGEO Audit Report	For walls utilizing geosynthetic reinforcement.
Calculations	In accordance with the latest edition of the AASHTO LRFD Bridge Design Specifications and Department's Structures Design Guidelines (SDG).
Drawings	In accordance with the latest edition of the AASHTO LRFD Bridge Design Specifications and Department's Structures Design Guidelines (SDG).
System Photos	Displays the significant features of the system as required in this section.
Field Construction Manual	Describes construction requirements and sequencing for the wall system.
Other	Any other information pertinent to the design and performance of the wall system.

936-2.1 Independently Certified Test Reports: Test reports shall be conducted by an independent testing laboratory or testing agency approved by the Department and signed and sealed by a Professional Engineer.

936-2.1.1 Pullout Testing: Provide results for pullout testing conducted in accordance with ASTM D6706 for the proposed wall/reinforcement connection, size, and type of

soil reinforcement for the wall system. Ensure test data is representative of the sizes and strength of the soil reinforcement to be utilized on Department projects. Conduct pullout tests up to a minimum normal stress of 14.5 psi. The soil used for pullout testing shall be cohesionless sand with a peak friction angle not exceeding 31 degrees and a gradation within the limits shown in Table 936-2 determined in accordance with AASHTO T 27 or ASTM C136. For soil reinforcement grids, include all various configurations and combinations of longitudinal and transverse wires.

Table 936-2
Gradation Limits

Sieve Size	Percent Passing
No. 10	100
No. 40	85-100
No. 60	45-90
No. 100	10-60
No. 200	0-12

936-2.1.2 Mechanical Shear Connection Strength: For Segmental Block Wall (SBW) systems utilizing backfill reinforcement, provide test results of the strength of mechanical shear connections for facing blocks. Conduct testing in accordance with ASTM D6916.

936-2.1.3 Connection Capacity: For SBW systems that use friction or semi-friction connections between geosynthetic reinforcement and the facing blocks, provide test results for the short-term ultimate connection strength reduction factor (CR_u) used to determine the long-term connection strength reduction factor (CR_{cr}). Conduct testing in accordance with ASTM D6638. Ensure test data is representative of the sizes and strength of the soil reinforcement to be utilized on Department projects.

936-2.2 AASHTO Product Evaluation and Audit Solutions Report: For retaining wall systems utilizing geosynthetic reinforcement, provide the AASHTO Product Evaluation & Audit Solutions REGEO Audit Report for all geosynthetic reinforcements to be used in the retaining wall system.

936-2.3 Calculations: Submit retaining wall calculations meeting the latest edition of the AASHTO LRFD Bridge Design Specifications and the Department's SDG. Calculations shall be signed and sealed by a Professional Engineer registered in the State of Florida and show details, notes, materials, dimensions, sizes, and other information for a complete description of the retaining wall system. Calculations shall include the following:

1. Soil reinforcement durability and/or corrosion data;
2. Corrosion and durability design procedures for soil reinforcement elements;
3. Differential settlement the wall system can tolerate without exceeding normal stress range of the soil reinforcement and wall facing, or the construction tolerances in Section 548;
4. The effects of water flow;
5. Applicable environmental classifications as outlined in the SDG;
6. Design calculations. Design calculations may be either by hand or by a wall company program with hand calculations verifying the program output. Include sample hand calculations for a 20-foot-high wall for each soil condition.

936-2.4 Drawings: Provide 11-inch x17-inch drawings showing:

1. Notes specific to the wall system;
2. Panel sizes and reinforcing;
3. Facing block types and dimensions;
4. Soil reinforcement connection to wall facings;
5. Wall panel abutment interfacing;
6. Slip joints;
7. Steps in leveling pad;
8. Soil reinforcing details around all vertical obstructions;
9. Geotextile placement at panel joints and around all obstructions;
10. Details for skewing soil reinforcement (15 degrees maximum) without cutting;
11. Corner elements (required at all angle breaks greater than 5 degrees);
12. Bin wall details for acute corners (required at all acute corners where interior corner angle is less than 70 degrees);
13. Details showing how to accommodate long term (post construction) wall settlement in excess of four inches without attaching soil reinforcement to the abutment; and,
14. Details of how to ground the wall system.

936-3 Shop Drawings and Calculations.

Supply shop drawings and calculations in accordance with Section 5. Provide calculations and drawings showing details, notes, materials, dimensions, sizes and other information necessary for the complete fabrication and erection of the retaining wall system. As a minimum, provide the following:

1. Elevation view showing the finished graded surface and elevations of the top and bottom of wall at the beginning and end of wall, all breaks in vertical alignment and all whole stations and 25 feet station increments.
2. Sections showing the length, size, and designation of soil reinforcement.
3. Plan view showing the horizontal alignment and offsets from the horizontal control line to the exterior face of the wall; the location of utilities, drainage structures and other items that impact the wall; the limits of the reinforced soil volume; and the location of piles within the reinforced earth volume.
4. Details for construction around utilities, drainage structures, and other items that impact the wall; for placement of soil reinforcement at acute corners; for addressing conflicts between soil reinforcement and obstructions in the reinforced soil volume; for addressing different wall types intersecting and impacting each other.
5. General notes and design parameters including design soil characteristics; factored bearing resistance and factored bearing pressure for each wall height increment and other notes required for construction of the walls.
6. Design calculations for each wall height increment detailed in the shop drawings.
7. For SBW systems, include details for the placement of drainage aggregate, drainage pipes and separation geotextile. Drawings should be similar to details for Type II or Type III underdrains in Standard Plans, Index 440-001. Do not directly cover perforated drainage pipes with a geotextile (such as a filter sock).
8. When SBW systems use friction or semi-friction connections between geosynthetic reinforcement and the facing blocks, include connection capacity calculations meeting the requirements of 936-2.1.3.

936-4 Retaining Wall System Components.

936-4.1 Precast Components: Ensure that concrete utilized for all wall components is consistent with the concrete class, environmental classification, and admixture requirements for durability as stated in the Contract Documents.

936-4.1.1 Reinforced Retaining Wall Panels: Produce and supply concrete for all reinforced concrete wall components from a plant that is currently on the Department's Structural Concrete Production Facility Listing meeting the requirements of Section 105. Assume all responsibility for performance of all quality control testing and inspections required. Perform all quality control (QC) inspection and testing using Construction Training and Qualification Program (CTQP) qualified personnel. Perform compressive strength testing in a laboratory meeting and maintaining at all times the qualification requirements listed in Section 105.

936-4.1.1.1 Reinforcing Steel: Meet the requirements of Section 931 for steel reinforcing and Section 932 for FRP reinforcing, as identified in the Contract Documents and APL drawings.

936-4.1.1.2 Panel Construction: Construct reinforced precast wall panels meeting the requirements of Sections 346 and 400. Cure reinforced concrete panels in accordance with Section 400. The minimum time for form removal is 12 hours.

Unless otherwise indicated in the Contract, apply a Class 3 finish to the concrete surface for the front face and roughly screed the rear face to eliminate open pockets of aggregate and surface distortions in excess of 1/4 inch.

936-4.1.1.3 Panel Tolerances: The precast component dimensions shall be within $3/16^{th}$ inch of the specified dimension with the lateral position of the soil reinforcement attachment devices within 1 inch of the specified location. The angular distortion of the component must not exceed 0.2 inches per 5-foot increment. Surface defects on smooth formed surfaces measured on a length of 5 feet must not exceed 0.1 inches. Surface defects on textured finished surfaces measured on a length of 5 feet must not exceed 5/16 inch.

936-4.1.1.4 Panel Markings: Permanently and legibly mark the following information on the back of each reinforced precast wall panel by etching: the panel number or type, piece mark, project number (if applicable), date cast and Precast Manufacturers Production Facility Quality Control Stamp.

936-4.1.1.5 Rejection of Panels: The Department will reject all precast concrete wall components not meeting the quality standard in the Contract Documents. Additionally, defects specified in 548-6.1 will be sufficient cause for rejection of any reinforced wall panel by the Department.

936-4.1.2 Unreinforced Concrete Retaining Wall Facing Blocks: All SBW systems must be comprised of unreinforced dry-cast masonry facing blocks in a running bond pattern meeting the requirements of this Section.

936-4.1.2.1 Facing Block Construction: Cast unreinforced concrete SBW facing blocks with concrete having a minimum compressive strength of 4,000 psi at 28 days and a maximum absorption of 6.5% in accordance with ASTM C140. Units must have a normal weight density classification meeting the requirements of ASTM C1372, except as modified in this Section.

For SBW systems utilizing backfill reinforcement, blocks shall include a mechanical shear connection to lock adjacent blocks together horizontally or vertically.

936-4.1.2.2 Facing Blocks Tolerances: Length, width, and height of each individual block must be within 1/16 inch of the specified dimension. Hollow units must have a minimum wall thickness of 1-1/4 inches.

All units must be free of defects that would interfere with proper placing of the unit or impair the integrity of the wall construction. Minor cracks with a width less than 1/32 inch and a length less than 25% of the unit height may be acceptable. Exposed facing blocks must be split face texture with a uniform wheat or tan color, unless shown otherwise in the Plans.

936-4.1.2.3 Facing Blocks Marking: Label each pallet of unreinforced concrete SBW facing blocks with the component identification number or type, project number (if applicable), LOT number, date cast, and the manufacturer's name or symbol. Labels must be clearly legible until the component is installed.

936-4.1.2.4 Rejection of Facing Blocks: The Department will reject all precast concrete wall components not meeting the quality standard in the Contract Documents. Additionally, defects specified in 548-6.2 will be sufficient cause for rejection of SBW facing blocks by the Department.

936-4.2 Backfill Reinforcement: For walls utilizing backfill reinforcement, reinforcement shall consist of steel wire mesh, metallic strips, or structural geosynthetics as required for the wall system. Backfill reinforcement shall be of the same length from top to bottom of wall at any section. For tiered walls, backfill reinforcement shall be of the same length within the height of each tier at any section.

936-4.2.1 Steel Wire Mesh and Metallic Strips: Plain steel wire mesh and embedded loops shall be shop fabricated from cold drawn steel wire and welded into the finished mesh fabric meeting the requirements of ASTM A1064. Longitudinal and transverse wires of equal and constant diameter shall be used within a given piece of mesh reinforcement. Provide hot rolled metallic strips from steel bars to the required shape and dimensions with physical and mechanical properties meeting ASTM A572 Grade 65 or as required for the wall system. Shop-fabricated hot rolled steel tie straps shall be used meeting the minimum requirements of ASTM A1011/A1011 M, Grade 50, or as shown in the Contract.

Ensure that steel reinforcing strips, tie strips, reinforcing mesh and connectors used in permanent walls are galvanized in accordance with ASTM A123 or ASTM A153, as applicable. For typical applications, punch or drill holes in metal items before galvanizing.

For SBW systems utilizing metallic reinforcement, reinforcement shall be placed in full length without splices normal to the facing blocks and spaced laterally and vertically not more than every other block or 30 inches, whichever is less, with a positive mechanical or shear connection to the facing blocks.

936-4.2.2 Geosynthetics: Geosynthetic reinforcement shall be made of polypropylene, select high density polyethylene, or high-tenacity polyester (PET) fibers having cross-sections sufficient to permit significant mechanical interlock with the backfill. Geosynthetics shall have a high tensile modulus in relation to the backfill and high resistance to deformation under sustained long term design load while in service and resistant to ultraviolet degradation, to damage under normal construction practices, and to all forms of biological or chemical degradation normally encountered in the material being reinforced. Reinforcements of uncoated PET or weakened or damaged by high pH environments are not allowed within any portion of the wall utilizing flowable fill, below the flood elevation, or other controlling water elevation.

For SBW systems utilizing geosynthetic reinforcement, reinforcement shall be placed in full length sheets without splices normal to the facing blocks and laterally without horizontal gaps, and with a vertical spacing of not more than every other course of blocks or 30 inches, whichever is less.

936-4.3 Horizontal Joint Pads: Supply elastomeric or polymeric pads in all horizontal joints between precast components of sufficient size and hardness to limit vertical stresses on the pad and concrete surface and to prevent concrete to concrete contact at the joints.

936-4.4 Joint Covers: Provide geotextile to cover wall joints meeting the requirements of Section 514 based on the backfill soil utilized for the wall and any structures supported by the wall.

936-4.5 Alignment Pins: Pins for aligning the precast components during construction shall be of the size, shape, and material required for the wall system.

936-5 Handling, Storage, and Shipping.

Handle, store, and ship all components in a manner that prevents chipping, cracks, fractures, excessive bending stresses, mud, dirt and debris. Support precast panel wall and counterfort components in storage on firm blocking located immediately adjacent to the attachment device.

Do not ship precast concrete wall components to the project site prior to the completion of the 72-hour curing period and attainment of the required 28-day strength. The Contractor is permitted to verify the shipping strength, before 28 days, by testing compressive strength cylinders that are cured under the conditions similar to the product or by testing temperature-match-cured cylinders. The shipping strength test is the average compressive strength of two test cylinders. Do not ship reinforced concrete products until accepted and stamped by the QC Manager or the inspectors under the direct observation of the QC Manager.

Store the geosynthetics at temperatures above 20ºF and below 140ºF. Prevent mud, wet cement, epoxy, and similar materials from coming into contact with and affixing to the geosynthetic material. Rolled geosynthetic may be laid flat or stood on end for storage. Cover the geosynthetic and protect from sunlight prior to shipment.

936-6 Supplier Certification.

Include with each shipment a signed or stamped delivery ticket per the Materials Manual Section 8.2 Volume II.

Furnish a signed written certification confirming that each wall system component complies with all applicable requirements of this section and supply all required test reports to the Contractor.

For SBW systems facing blocks, provide all certified test reports.

936-7 Supplier Support.

The Supplier shall provide fully detailed shop drawings, technical instructions, guidance in preconstruction activities and on-site technical assistance during construction.

COMPONENTS FOR RETAINING WALL SYSTEMS
(REV 6-9-26)

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Calculations	In accordance with the latest edition of the AASHTO LRFD Bridge Design Specifications and Department's Structures Design Guidelines (SDG).
Drawings	In accordance with the latest edition of the AASHTO LRFD Bridge Design Specifications and Department's Structures Design Guidelines (SDG).
System Photos	Displays the significant features of the system as required in this section.
Field Construction Manual	Describes construction requirements and sequencing for the wall system.
Other	Any other information pertinent to the design and performance of the wall system.

936-2.1 Independently Certified Test Reports: Test reports shall be conducted by an independent testing laboratory or testing agency approved by the Department and signed and sealed by a Professional Engineer.

936-2.1.1 Pullout Testing: Provide results for pullout testing conducted in accordance with ASTM D6706 for the proposed wall/reinforcement connection, size, and type of

soil reinforcement for the wall system. Ensure test data is representative of the sizes and strength of the soil reinforcement to be utilized on Department projects. Conduct pullout tests up to a minimum normal stress of 14.5 psi. The soil used for pullout testing shall be cohesionless sand with a peak friction angle not exceeding 31 degrees and a gradation within the limits shown in Table 936-2 determined in accordance with AASHTO T 27 or ASTM C136. For soil reinforcement grids, include all various configurations and combinations of longitudinal and transverse wires.

Table 936-2
Gradation Limits

Sieve Size	Percent Passing
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No. 60	45-90
No. 100	10-60
No. 200	0-12

936-2.1.2 Mechanical Shear Connection Strength: For Segmental Block Wall (SBW) systems utilizing backfill reinforcement, provide test results of the strength of mechanical shear connections for facing blocks. Conduct testing in accordance with ASTM D6916.

936-2.1.3 Connection Capacity: For SBW systems that use friction or semi-friction connections between geosynthetic reinforcement and the facing blocks, provide test results for the short-term ultimate connection strength reduction factor (CR_u) used to determine the long-term connection strength reduction factor (CR_{cr}). Conduct testing in accordance with ASTM D6638. Ensure test data is representative of the sizes and strength of the soil reinforcement to be utilized on Department projects.

936-2.2 AASHTO Product Evaluation and Audit Solutions Report: For retaining wall systems utilizing geosynthetic reinforcement, provide the AASHTO Product Evaluation & Audit Solutions REGEO Audit Report for all geosynthetic reinforcements to be used in the retaining wall system.

936-2.3 Calculations: Submit retaining wall calculations meeting the latest edition of the AASHTO LRFD Bridge Design Specifications and the Department's SDG. Calculations shall be signed and sealed by a Professional Engineer registered in the State of Florida and show details, notes, materials, dimensions, sizes, and other information for a complete description of the retaining wall system. Calculations shall include the following:

1. Soil reinforcement durability and/or corrosion data;
2. Corrosion and durability design procedures for soil reinforcement elements;
3. Differential settlement the wall system can tolerate without exceeding normal stress range of the soil reinforcement and wall facing, or the construction tolerances in Section 548;
4. The effects of water flow;
5. Applicable environmental classifications as outlined in the SDG;
6. Design calculations. Design calculations may be either by hand or by a wall company program with hand calculations verifying the program output. Include sample hand calculations for a 20-foot-high wall for each soil condition.

936-2.4 Drawings: Provide 11-inch x17-inch drawings showing:

1. Notes specific to the wall system;
2. Panel sizes and reinforcing;
3. Facing block types and dimensions;
4. Soil reinforcement connection to wall facings;
5. Wall panel abutment interfacing;
6. Slip joints;
7. Steps in leveling pad;
8. Soil reinforcing details around all vertical obstructions;
9. Geotextile placement at panel joints and around all obstructions;
10. Details for skewing soil reinforcement (15 degrees maximum) without cutting;
11. Corner elements (required at all angle breaks greater than 5 degrees);
12. Bin wall details for acute corners (required at all acute corners where interior corner angle is less than 70 degrees);
13. Details showing how to accommodate long term (post construction) wall settlement in excess of four inches without attaching soil reinforcement to the abutment; and,
14. Details of how to ground the wall system.

936-3 Shop Drawings and Calculations.

Supply shop drawings and calculations in accordance with Section 5. Provide calculations and drawings showing details, notes, materials, dimensions, sizes and other information necessary for the complete fabrication and erection of the retaining wall system. As a minimum, provide the following:

1. Elevation view showing the finished graded surface and elevations of the top and bottom of wall at the beginning and end of wall, all breaks in vertical alignment and all whole stations and 25 feet station increments.
2. Sections showing the length, size, and designation of soil reinforcement.
3. Plan view showing the horizontal alignment and offsets from the horizontal control line to the exterior face of the wall; the location of utilities, drainage structures and other items that impact the wall; the limits of the reinforced soil volume; and the location of piles within the reinforced earth volume.
4. Details for construction around utilities, drainage structures, and other items that impact the wall; for placement of soil reinforcement at acute corners; for addressing conflicts between soil reinforcement and obstructions in the reinforced soil volume; for addressing different wall types intersecting and impacting each other.
5. General notes and design parameters including design soil characteristics; factored bearing resistance and factored bearing pressure for each wall height increment and other notes required for construction of the walls.
6. Design calculations for each wall height increment detailed in the shop drawings.
7. For SBW systems, include details for the placement of drainage aggregate, drainage pipes and separation geotextile. Drawings should be similar to details for Type II or Type III underdrains in Standard Plans, Index 440-001. Do not directly cover perforated drainage pipes with a geotextile (such as a filter sock).
8. When SBW systems use friction or semi-friction connections between geosynthetic reinforcement and the facing blocks, include connection capacity calculations meeting the requirements of 936-2.1.3.

936-4 Retaining Wall System Components.

936-4.1 Precast Components: Ensure that concrete utilized for all wall components is consistent with the concrete class, environmental classification, and admixture requirements for durability as stated in the Contract Documents.

936-4.1.1 Reinforced Retaining Wall Panels: Produce and supply concrete for all reinforced concrete wall components from a plant that is currently on the Department's Structural Concrete Production Facility Listing meeting the requirements of Section 105. Assume all responsibility for performance of all quality control testing and inspections required. Perform all quality control (QC) inspection and testing using Construction Training and Qualification Program (CTQP) qualified personnel. Perform compressive strength testing in a laboratory meeting and maintaining at all times the qualification requirements listed in Section 105.

936-4.1.1.1 Reinforcing Steel: Meet the requirements of Section 931 for steel reinforcing and Section 932 for FRP reinforcing, as identified in the Contract Documents and APL drawings.

936-4.1.1.2 Panel Construction: Construct reinforced precast wall panels meeting the requirements of Sections 346 and 400. Cure reinforced concrete panels in accordance with Section 400. The minimum time for form removal is 12 hours.

Unless otherwise indicated in the Contract, apply a Class 3 finish to the concrete surface for the front face and roughly screed the rear face to eliminate open pockets of aggregate and surface distortions in excess of 1/4 inch.

936-4.1.1.3 Panel Tolerances: The precast component dimensions shall be within $3/16^{th}$ inch of the specified dimension with the lateral position of the soil reinforcement attachment devices within 1 inch of the specified location. The angular distortion of the component must not exceed 0.2 inches per 5-foot increment. Surface defects on smooth formed surfaces measured on a length of 5 feet must not exceed 0.1 inches. Surface defects on textured finished surfaces measured on a length of 5 feet must not exceed 5/16 inch.

936-4.1.1.4 Panel Markings: Permanently and legibly mark the following information on the back of each reinforced precast wall panel by etching: the panel number or type, piece mark, project number (if applicable), date cast and Precast Manufacturers Production Facility Quality Control Stamp.

936-4.1.1.5 Rejection of Panels: The Department will reject all precast concrete wall components not meeting the quality standard in the Contract Documents. Additionally, defects specified in 548-6.1 will be sufficient cause for rejection of any reinforced wall panel by the Department.

936-4.1.2 Unreinforced Concrete Retaining Wall Facing Blocks: All SBW systems must be comprised of unreinforced dry-cast masonry facing blocks in a running bond pattern meeting the requirements of this Section.

936-4.1.2.1 Facing Block Construction: Cast unreinforced concrete SBW facing blocks with concrete having a minimum compressive strength of 4,000 psi at 28 days and a maximum absorption of 6.5% in accordance with ASTM C140. Units must have a normal weight density classification meeting the requirements of ASTM C1372, except as modified in this Section.

For SBW systems utilizing backfill reinforcement, blocks shall include a mechanical shear connection to lock adjacent blocks together horizontally or vertically.

936-4.1.2.2 Facing Blocks Tolerances: Length, width, and height of each individual block must be within 1/16 inch of the specified dimension. Hollow units must have a minimum wall thickness of 1-1/4 inches.

All units must be free of defects that would interfere with proper placing of the unit or impair the integrity of the wall construction. Minor cracks with a width less than 1/32 inch and a length less than 25% of the unit height may be acceptable. Exposed facing blocks must be split face texture with a uniform wheat or tan color, unless shown otherwise in the Plans.

936-4.1.2.3 Facing Blocks Marking: Label each pallet of unreinforced concrete SBW facing blocks with the component identification number or type, project number (if applicable), LOT number, date cast, and the manufacturer's name or symbol. Labels must be clearly legible until the component is installed.

936-4.1.2.4 Rejection of Facing Blocks: The Department will reject all precast concrete wall components not meeting the quality standard in the Contract Documents. Additionally, defects specified in 548-6.2 will be sufficient cause for rejection of SBW facing blocks by the Department.

936-4.2 Backfill Reinforcement: For walls utilizing backfill reinforcement, reinforcement shall consist of steel wire mesh, metallic strips, or structural geosynthetics as required for the wall system. Backfill reinforcement shall be of the same length from top to bottom of wall at any section. For tiered walls, backfill reinforcement shall be of the same length within the height of each tier at any section.

936-4.2.1 Steel Wire Mesh and Metallic Strips: Plain steel wire mesh and embedded loops shall be shop fabricated from cold drawn steel wire and welded into the finished mesh fabric meeting the requirements of ASTM A1064. Longitudinal and transverse wires of equal and constant diameter shall be used within a given piece of mesh reinforcement. Provide hot rolled metallic strips from steel bars to the required shape and dimensions with physical and mechanical properties meeting ASTM A572 Grade 65 or as required for the wall system. Shop-fabricated hot rolled steel tie straps shall be used meeting the minimum requirements of ASTM A1011/A1011 M, Grade 50, or as shown in the Contract.

Ensure that steel reinforcing strips, tie strips, reinforcing mesh and connectors used in permanent walls are galvanized in accordance with ASTM A123 or ASTM A153, as applicable. For typical applications, punch or drill holes in metal items before galvanizing.

For SBW systems utilizing metallic reinforcement, reinforcement shall be placed in full length without splices normal to the facing blocks and spaced laterally and vertically not more than every other block or 30 inches, whichever is less, with a positive mechanical or shear connection to the facing blocks.

936-4.2.2 Geosynthetics: Geosynthetic reinforcement shall be made of polypropylene, select high density polyethylene, or high-tenacity polyester (PET) fibers having cross-sections sufficient to permit significant mechanical interlock with the backfill. Geosynthetics shall have a high tensile modulus in relation to the backfill and high resistance to deformation under sustained long term design load while in service and resistant to ultraviolet degradation, to damage under normal construction practices, and to all forms of biological or chemical degradation normally encountered in the material being reinforced. Reinforcements of uncoated PET or weakened or damaged by high pH environments are not allowed within any portion of the wall utilizing flowable fill, below the flood elevation, or other controlling water elevation.

For SBW systems utilizing geosynthetic reinforcement, reinforcement shall be placed in full length sheets without splices normal to the facing blocks and laterally without horizontal gaps, and with a vertical spacing of not more than every other course of blocks or 30 inches, whichever is less.

936-4.3 Horizontal Joint Pads: Supply elastomeric or polymeric pads in all horizontal joints between precast components of sufficient size and hardness to limit vertical stresses on the pad and concrete surface and to prevent concrete to concrete contact at the joints.

936-4.4 Joint Covers: Provide geotextile to cover wall joints meeting the requirements of Section 514 based on the backfill soil utilized for the wall and any structures supported by the wall.

936-4.5 Alignment Pins: Pins for aligning the precast components during construction shall be of the size, shape, and material required for the wall system.

936-5 Handling, Storage, and Shipping.

Handle, store, and ship all components in a manner that prevents chipping, cracks, fractures, excessive bending stresses, mud, dirt and debris. Support precast panel wall and counterfort components in storage on firm blocking located immediately adjacent to the attachment device.

Do not ship precast concrete wall components to the project site prior to the completion of the 72-hour curing period and attainment of the required 28-day strength. The Contractor is permitted to verify the shipping strength, before 28 days, by testing compressive strength cylinders that are cured under the conditions similar to the product or by testing temperature-match-cured cylinders. The shipping strength test is the average compressive strength of two test cylinders. Do not ship reinforced concrete products until accepted and stamped by the QC Manager or the inspectors under the direct observation of the QC Manager.

Store the geosynthetics at temperatures above 20ºF and below 140ºF. Prevent mud, wet cement, epoxy, and similar materials from coming into contact with and affixing to the geosynthetic material. Rolled geosynthetic may be laid flat or stood on end for storage. Cover the geosynthetic and protect from sunlight prior to shipment.

936-6 Supplier Certification.

Include with each shipment a signed or stamped delivery ticket per the Materials Manual Section 8.2 Volume II.

Furnish a signed written certification confirming that each wall system component complies with all applicable requirements of this section and supply all required test reports to the Contractor.

For SBW systems facing blocks, provide all certified test reports.

936-7 Supplier Support.

The Supplier shall provide fully detailed shop drawings, technical instructions, guidance in preconstruction activities and on-site technical assistance during construction.