



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
16 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0016

Paul R. LePage
GOVERNOR

David Bernhardt
COMMISSIONER

March 23, 2012
Subject: **Lewiston**
Federal Project No: AC-STP-1306(000)X
State PIN: 013060.00
Amendment No. 1

Dear Sir/Ms:

Make the following changes to the Bid Documents:

In the Bid Book (pages 4 thru 11) **REMOVE** the "SCHEDULE OF ITEMS" 8 pages dated 120309 and **REPLACE** with the attached new "SCHEDULE OF ITEMS" 8 pages dated 120323.

In the Bid Book (pages 96 thru 105) **REMOVE** "SPECIAL PROVISION, SECTION 635, PRECAST CONCRETE BLOCK GRAVITY WALL" 10 pages undated and **REPLACE** with the attached new "SPECIAL PROVISION, SECTION 635, WET CAST SMALL LANDSCAPE BLOCK WALL" 9 pages undated.

In the Plans, Sheet Number 4 of 38 "ESTIMATED QUANTITIES" **DELETE** item "635.31 PREFAB CONCRETE BLOCK GRAVITY WALL 390 SF" and **REPLACE** it with the following in pen and ink
"635.3 WET CAST SMALL LANDSCAPE BLOCK WALL 390 SF"

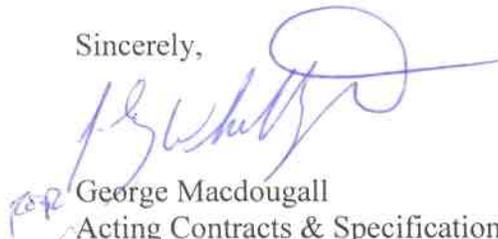
The following question has been received:

Question: Special Provision #635.31 is normally big block but the provision is asking for small block "redi-scape block", the rediscap is normally special provision 635.32. Is this job supposed to be small block or big block?

Response: Small block is correct, please see the above changes.

Consider this change and information prior to submitting your bid on April 4, 2012.

Sincerely,



George Macdougall
Acting Contracts & Specifications Engineer

PRINTED ON RECYCLED PAPER

SCHEDULE OF ITEMS

CONTRACT ID: 013060.00

PROJECT(S): STP-1306(0000X

CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
SECTION 0001 PROJECT ITEMS						
0010	201.23 REMOVING SINGLE TREE TOP ONLY	EA 13.000				
0020	201.24 REMOVING STUMP	EA 14.000				
0030	202.15 REMOVING MANHOLE OR CATCH BASIN	EA 2.000				
0040	202.202 REMOVING PAVEMENT SURFACE	SY 4930.000				
0050	203.20 COMMON EXCAVATION	CY 3160.000				
0060	203.25 GRANULAR BORROW	CY 20.000				
0070	206.061 STRUCTURAL EARTH EXCAVATION - DRAINAGE AND MINOR STRUCTURES, BELOW GRADE	CY 25.000				
0080	304.09 AGGREGATE BASE COURSE - CRUSHED	CY 2270.000				
0090	403.208 HOT MIX ASPHALT 12.5 MM HMA SURFACE	T 890.000				

SCHEDULE OF ITEMS

REVISED:

CONTRACT ID: 013060.00

PROJECT(S): STP-1306(0000X

CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0100	403.209 HOT MIX ASPHALT 9.5 MM (SIDEWALKS, DRIVES, INCIDENTALS)	T 112.000				
0110	403.211 HOT MIX ASPHALT (SHIMMING)	T 210.000				
0120	403.213 HOT MIX ASPHALT 12.5 MM BASE	T 520.000				
0130	409.15 BITUMINOUS TACK COAT - APPLIED	G 410.000				
0140	502.341 STRUCTURAL CONCRETE ROADWAY MEDIAN	CY 30.000				
0150	603.179 18 INCH CULVERT PIPE OPTION III	LF 135.000				
0160	604.072 CATCH BASIN TYPE A1-C	EA 5.000				
0170	604.18 ADJUSTING MANHOLE OR CATCH BASIN TO GRADE	EA 6.000				
0180	604.182 CLEAN EXISTING CATCH BASIN AND MANHOLE	EA 6.000				
0190	605.12 15 INCH UNDERDRAIN TYPE C	LF 362.000				
0200	605.13 18 INCH UNDERDRAIN TYPE C	LF 884.000				

SCHEDULE OF ITEMS

REVISED:

CONTRACT ID: 013060.00

PROJECT(S): STP-1306(0000X

CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0210	608.26 CURB RAMP DETECTABLE WARNING FIELD	4.000 SF				
0220	609.11 VERTICAL CURB TYPE 1	860.000 LF				
0230	609.111 SPECIAL GRANITE CURB - 24"	50.000 LF				
0240	609.12 VERTICAL CURB TYPE 1 - CIRCULAR	80.000 LF				
0250	609.237 TERMINAL CURB TYPE 1 - 7 FOOT	17.000 EA				
0260	609.2371 TERMINAL CURB TYPE 1- 7 FT - CIRCULAR	4.000 EA				
0270	609.31 CURB TYPE 3	74.000 LF				
0280	609.38 RESET CURB TYPE 1	180.000 LF				
0290	615.07 LOAM	180.000 CY				
0300	618.1301 SEEDING METHOD NUMBER 1 - PLAN QUANTITY	14.000 UN				
0310	619.1201 MULCH - PLAN QUANTITY	14.000 UN				

SCHEDULE OF ITEMS

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CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0320	620.54 STABILIZATION GEOTEXTILE	40.000 SY				
0330	621.037 EVERGREEN TREES (5 FOOT - 6 FOOT) GROUP A	3.000 EA				
0340	621.038 EVERGREEN TREES (5 FOOT - 6 FOOT) GROUP B	1.000 EA				
0350	621.267 LARGE DECIDUOUS TREE (1.75 INCH - 2 INCH CALIPER) GROUP A	3.000 EA				
0360	621.273 LARGE DECIDUOUS TREE (2 INCH - 2.50 INCH CALIPER) GROUP A	4.000 EA				
0370	621.389 DWARF EVERGREENS (15 INCH - 18 INCH) GROUP A	6.000 EA				
0380	621.396 DWARF EVERGREENS (18 INCH - 24 INCH) GROUP B	6.000 EA				
0390	621.541 DECIDUOUS SHRUBS (18 INCH - 24 INCH) GROUP B	12.000 EA				
0400	621.547 DECIDUOUS SHRUBS (2 FOOT - 3 FOOT) GROUP B	3.000 EA				
0410	621.71 HERBACEOUS PERENNIALS GROUP A	12.000 EA				
0420	621.80 ESTABLISHMENT PERIOD	LUMP	LUMP			

SCHEDULE OF ITEMS

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CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0430	626.11 PRECAST CONCRETE JUNCTION BOX	4.000 EA				
0440	626.21 METALLIC CONDUIT	100.000 LF				
0450	626.22 NON-METALLIC CONDUIT	1300.000 LF				
0460	626.31 18 INCH FOUNDATION	3.000 EA				
0470	626.331 36 INCH FOUNDATION	2.000 EA				
0480	626.35 CONTROLLER CABINET FOUNDATION	1.000 EA				
0490	627.733 4" WHITE OR YELLOW PAINTED PAVEMENT MARKING LINE	6190.000 LF				
0500	627.75 WHITE OR YELLOW PAVEMENT & CURB MARKING	200.000 SF				
0510	627.76 TEMPORARY PAVEMENT MARKING LINE, WHITE OR YELLOW	LUMP	LUMP			
0520	629.05 HAND LABOR, STRAIGHT TIME	10.000 HR				
0530	631.10 AIR COMPRESSOR (INCLUDING OPERATOR)	10.000 HR				

SCHEDULE OF ITEMS

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CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0540	631.12 ALL PURPOSE EXCAVATOR (INCLUDING OPERATOR)	10.000 HR				
0550	631.172 TRUCK - LARGE (INCLUDING OPERATOR)	10.000 HR				
0560	631.18 CHAIN SAW RENTAL (INCLUDING OPERATOR)	5.000 HR				
0570	631.20 STUMP CHIPPER (INCLUDING OPERATOR)	5.000 HR				
0580	631.32 CULVERT CLEANER (INCLUDING OPERATOR)	5.000 HR				
0590	635.32 WET CAST SMALL LANDSCAPE BLOCK WALL	390.000 SF				
0600	639.18 FIELD OFFICE TYPE A	1.000 EA				
0610	642.17 CAST-IN-PLACE CONCRETE STEPS	3.000 CY				
0620	643.80 TRAFFIC SIGNALS AT	LUMP	LUMP			
0630	643.83 VIDEO DETECTION SYSTEM	LUMP	LUMP			
0640	643.90 INTERCONNECT WIRE BETWEEN	LUMP	LUMP			

SCHEDULE OF ITEMS

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0650	643.91 MAST ARM POLE W/35' AND 10' ARMS	1.000 EA				
0660	643.91 MAST ARM POLE W/40' AND 10' ARMS	1.000 EA				
0670	643.92 PEDESTAL POLE	3.000 EA				
0680	652.31 TYPE I BARRICADE	5.000 EA				
0690	652.33 DRUM	25.000 EA				
0700	652.34 CONE	75.000 EA				
0710	652.35 CONSTRUCTION SIGNS	400.000 SF				
0720	652.36 MAINTENANCE OF TRAFFIC CONTROL DEVICES	190.000 CD				
0730	652.38 FLAGGER	5000.000 HR				
0740	656.75 TEMPORARY SOIL EROSION AND WATER POLLUTION CONTROL	LUMP	LUMP			
0750	659.10 MOBILIZATION	LUMP	LUMP			
	SECTION 0001 TOTAL					

SCHEDULE OF ITEMS

CONTRACT ID: 013060.00

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CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
	TOTAL BID					

SPECIAL PROVISION
SECTION 635
WET CAST SMALL LANDSCAPE BLOCK WALL

The following replaces Section 635 in the Standard Specifications in its entirety:

635.01 Description The work under this item shall consist of the design, fabrication, furnishing and construction of a Wet Cast Small Landscape Block Wall in accordance with these specifications and in conformance with the lines and grades shown on the Plans, or established by the Resident. The Wet Cast Small Landscape Block Wall shall consist of blocks made of Structural Precast concrete made from Portland cement, water, chemical admixtures, and aggregates, supported on concrete leveling pads, and if required, geosynthetic reinforced backfill. The concrete blocks used in this system should have dimensions 18 inches or less wide and 6.5 inches high at the face, with a pattern to simulate small stones or cobbles.

Included in the scope of the wall construction are: geotechnical design of any wall with an exposed height greater than 2.5 ft or as specified on the Plans, all grading necessary for wall construction, compaction of the wall foundation soil, backfill, piped drainage, construction of leveling pads, and concrete wall unit installation. The top of the upper row of concrete wall units shall be at or above the top of the face elevation shown on the Plans.

635.02 Quality Assurance The wall system shall be one of the approved combinations of facing block and soil reinforcement systems noted in the Plans or on the Department's Qualified Products List (QPL). Alternate wall systems will not be considered for this item.

All design calculations and Shop Drawings shall be signed and sealed by a Professional Engineer licensed in the State of Maine.

The Contractor shall require the wall design-supplier to provide an on-site, qualified experienced technical representative to advise the Contractor concerning proper installation procedures. The technical representative shall be on-site during initial stages of installation and thereafter shall remain available for consultation as necessary for the Contractor or as required by the Resident.

635.03 Materials Materials for walls shall meet the requirements of the following sections of Division 700:

Gravel Borrow	703.20
Underdrain Backfill Type C	703.22
Underdrain Pipe	706.06 or 706.09
Reinforcing Steel	709.01
Structural Precast Concrete Units	712.061
Reinforcement Geotextile	722.01
Drainage Geosynthetic	722.02

The Contractor is cautioned that all of the materials listed are not required for every Wet Cast Small Landscape Block Wall. The Contractor shall furnish the Resident a Materials Certification Letter certifying that the applicable materials comply with this section of the specifications. Materials shall meet the following additional requirements:

635.031 Concrete Units The Materials Certification Letter described above shall contain the date of concrete casting, a lot identification number, compressive strength results, and entrained air results. All prefabricated concrete units shall conform to the requirements of 712.061 with the following exceptions:

A. Materials. Materials are modified as follows: the maximum water cement ratio shall be 0.42, use of calcium nitrite is not required, and the minimum 28 day compressive strength shall be 4600 psi.

B. Quality Control and Quality Assurance. Quality Control and Quality Assurance is modified as follows: delete the second and third paragraphs.

C. Construction. Construction requirements are modified as follows:

Delete the second paragraph and replace it with the following:

All units for a designated wall system, including end blocks, steps, caps and other wall units shall be manufactured from the same material sources of aggregates, brand and type of cement and color pigment.

Replace the first sentence in the paragraph which begins “The forms shall remain ...” with the following:

The forms shall remain in place until the concrete has gained sufficient strength such that removal of the forms and subsequent handling will not damage the units.

Replace the paragraph which begins “A minimum of 8” With the following:

The Contractor shall make and test at least one set of cylinders for every 50 yd³ of production concrete used to cast the concrete units.

Replace the paragraph which begins “At least once ...” with the following:

The Contractor shall make four cylinders for use by the Department for every 200 yd³.

Add the following paragraph at the end of the Construction section:

Face texture of the units shall be a formed finish on all exposed surfaces. Pigment shall be added during the casting process of the concrete unit to achieve a consistent shade of gray or other color as determined by the Resident.

D. Tolerances. Maximum dimensional deviation of formed unit dimensions shall not vary more than 1/8-inch or the manufacturer’s published tolerances, whichever is less. All units not meeting the specified tolerances will be rejected.

635.032 Geosynthetic Reinforcement Geosynthetic Reinforcement shall be as required by the proprietary wall system manufacturer or wall designer. Geosynthetic reinforcement shall consist of a geotextile or geogrid approved by the Geotechnical Engineer. Substitution of a geosynthetic other than that required by the proprietary wall system manufacturer shall not be allowed unless approved by the Geotechnical Engineer after submittal of shop drawings and pullout and interface friction test data.

A. Geotextiles and Thread for Sewing. Woven or nonwoven geotextiles shall consist of long chain polymeric filaments or yarns formed into a stable network such that the filaments or yarns retain their position relative to each other during handling, placement, and design life. At least 95 percent by weight of the long chain polymer shall be polyolefin or

polyester. The material shall be free of defects and tears. Geotextiles used for reinforcement shall conform as a minimum to the properties indicated for 722.01, Stabilization/Reinforcement Geotextile and shall meet the requirements of part D and E below. Geotextiles shall have a minimum permeability greater or equal to that shown on the Shop Drawings and the reinforced soil permeability.

- B. Geogrids. The geogrid shall be a regular network of integrally formed polymeric tensile elements with aperture geometry sufficient to permit significant mechanical interlock with the surrounding soil or rock. The geogrid structure shall be dimensionally stable and able to retain its geometry under manufacture, transport and installation. Geogrids shall conform as a minimum to the criteria specified in part D and E below.
- C. Required Properties. The specific geosynthetic materials shall be preapproved and shall have the ultimate tensile strength (T_{ult}) shown on the approved Shop Drawings for the geosynthetic specified and for the fill type shown. T_{ult} shall be determined from wide width tests specified in ASTM D 4595 for geotextiles and ASTM D 6637 or GRI:GG1 for geogrids. The ultimate tensile strength value is based on the minimum average roll values (MARV) for the product.
- D. The geosynthetic shall conform to the following criteria:
1. PP and HDPE: Min. retained strength of 70 percent after 150 hours, per ASTM D-4355.
 2. HDPE: Grade = E-4, E-5, E-8, E-9, E-10, E-11, J-3, J-4, or J-5, per ASTM D-1248.
 3. PET: Molecular weight (M_n) > 25,000, per GRI:GG8 and ASTM D-4603.
 4. PET: Carboxyl end group (CEG) \geq 15 mmol/kg, GRI:GG7.
 5. All polymers: Minimum Weight per Unit Area of 8 oz/yd², per ASTM D-5261.
 6. All Polymers: Maximum 0 percent post consumer recycled material by weight.
 7. A default total reduction factor for creep, durability, and installation damage of $RF = 7$ may be used in design, provided the criteria of 2 through 6 are satisfied and 1 is adjusted to 70 percent after 500 hours is satisfied.
- E. Manufacturer Quality Control. The geosynthetic reinforcements shall be manufactured with a high degree of quality control. The Manufacturer is responsible for establishing and maintaining a quality control program to ensure compliance with the requirements of the specification. The purpose of the QC testing program is to verify that the reinforcement geosynthetic being supplied to the project is representative of the material used for performance testing and approval. Conformance testing shall be performed as part of the manufacturing process and may vary for each type of product. As a minimum the following index tests shall be considered as applicable for an acceptable QA/QC program:

<u>Property</u>	<u>Test Procedure</u>
1. Specific Gravity (HDPE only)	ASTM D-1505
2. Ultimate Tensile Strength	ASTM D-4595 GRI:GG1
3. Melt Flow (HDPE and PP only)	ASTM D-1238
4. Intrinsic Viscosity (PET only)	ASTM D-4603
5. Carboxyl End Group (PET only)	ASTM D-2455

- F. Sampling Testing and Acceptance. Sampling and conformance testing shall be in accordance with ASTM D-4354. Conformance testing procedures are established above.

Geosynthetic product acceptance shall be based on ASTM D-4759. The quality control certificate shall include:

1. Roll numbers and identification
2. Sampling procedures
3. Results of quality control tests, including a description of test methods used.

G. Certification. The Contractor shall submit a manufacturer's certification that the geosynthetics supplied meet the respective index criteria set when the geosynthetic was approved, measured in full accordance with all test methods and standards specified, or referenced, in this specification.

The manufacturer's certificate shall state that the furnished geosynthetic meets the requirements of these specifications as evaluated by the manufacturer's quality control program. The values submitted shall be certified by a person having legal authority to bond the manufacturer. In case of dispute over validity of values, the Resident can require the Contractor to supply test data from an agency approved laboratory to support the values submitted, at the Contractor's cost.

635.033 Concrete Leveling Pad Concrete for leveling pads shall be Fill Concrete conforming to the requirements of Section 502 Structural Concrete. Unless otherwise specified, concrete for leveling pads shall be accepted under Method "C" requirements.

635.034 Drainage Stone Fill Concrete wall unit voids shall be filled with material that conforms to the requirements of Standard Specification 703.22, Underdrain Backfill Material, Type C. Compaction of the stone fill will be required before the block surfaces are cleaned to ensure good interface connection strength between geogrids and blocks.

635.035 Backfill Material Backfill material placed behind the concrete wall units shall meet the requirements of Section 703.20 Gravel Borrow, except that the backfill material shall only contain particles that will pass the 3-inch square mesh sieve. The contractor is required to submit a grain size distribution curve (ASTM D 422) and a moisture-density relationship curve (AASHTO T-180) for acceptance of the proposed backfill material and determination of the appropriate installation damage reduction factor (RF_D).

Walls with reinforced backfill also require that the backfill material be subjected to pH testing to determine the appropriate durability reduction factor (RF_D).

635.036 Materials Certificate Letter The Contractor, or the supplier as their agent, shall furnish the Resident a Materials Certificate Letter for the above materials, including the backfill material, in accordance with Section 700 of the Standard Specifications. A copy of all test results performed by the Contractor or their supplier necessary to assure contract compliance shall also be furnished to the Resident. The Resident will base acceptance upon the materials Certificate Letter, accompanying test reports, and visual inspection.

635.04 Design Requirements The wall shall be designed with a service life of not less than 75 years. The Wet Cast Small Landscape Block Wall shall be designed and sealed by a Professional Engineer licensed in the State of Maine. The wall shall be designed in accordance with the following:

1. AASHTO LRFD Bridge Design Specifications, current edition, herein referred to as LRFD
2. FHWA-NHI-10-024 and FHWA-NHI-10-025 Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, Volumes 1 and 2, 2019
3. FHWA-NHI-09-087 Corrosion/Degradation of Soil Reinforcements for Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, 2009
4. The Contract Plans
5. The requirements specified herein
6. The manufacturer's requirements

Where conflicting requirements occur, the more stringent requirements shall govern.

Forty-five days prior to beginning construction of the wall, the design computations shall be submitted to the Resident for review by the Geotechnical Engineer. Any additional design or costs arising as a result of rejection of a wall design by the Geotechnical Engineer shall be borne by the Contractor.

Design calculations that consist of computer program generated output shall be supplemented with at least one hand calculation and graphic demonstrating the design methodology used. Design calculations shall provide thorough documentation of the sources of equations used and material properties. The design by the wall system supplier shall consider the stability of the wall as outlined below and in the Contract Documents:

- A. Failure Plane The theoretical failure plane within the reinforced soil mass shall be determined in accordance with LRFD Article 11 and be analyzed so that the soil stabilizing components extend sufficiently beyond the failure plane within the reinforced soil mass to stabilize the material.
- B. External Loads External loads which affect the internal and external stability such as those applied through traffic loadings, impact on traffic barrier posts, slope surcharge, hydrostatic, and seismic loads shall be accounted for in the design. Traffic surcharge and traffic impact loads shall be calculated and applied in compliance with LRFD Section 11.
- C. External Stability Loads and load combinations selected for design shall be consistent with LRFD. Application of load factors shall be taken as specified in LRFD Section 11. Sliding resistance factors and bearing resistance factors shall be consistent with LRFD. Overturning and sliding provisions of LRFD shall apply.
- D. Internal Stability Evaluation of reinforcement pullout, reinforcement rupture and reinforcement/block connection pullout or rupture shall be consistent with LRFD Section 11, and checked at each level. Loads, load combinations and load factors shall be as specified in LRFD Section 11. Resistance factors for internal design are specified in LRFD Section 11. Maximum reinforcement loads shall be calculated using the Simplified Method approach. Calculations for factored stresses and resistances shall be based upon assumed conditions at the end of the design life.
 - a. Geosynthetic Reinforcement Design Tensile Resistance The nominal long term reinforcement design strength (T_{al}) shall be determined by reducing T_{ult} by reduction factors (RF) in accordance with the documents referenced above. The designer shall procure and use the manufacturers tested and certified geosynthetic reinforcement reduction factors for creep (RF_{CR}), durability

(RF_D), and installation damage (RF_{ID}) to determine T_{al} . In absence of manufacturers tested and certified reduction factors, a combined default reduction factor $RF = 7$ shall be used in accordance with the referenced documents. For RF_{ID} , the installation damage reduction factor shall be checked in accordance with LRFD and FHWA-NHI-00-044.

b. Reinforcement/Facing Connection Design Strength The nominal long-term connection strength between the geosynthetic reinforcement and the concrete blocks shall be checked in accordance with LRFD and FHWA-NHI-10-024 and FHWA-NHI-10-025, Volumes 1 and 2.

c. Reinforcement Pullout The pullout resistance factor, (F^*), and scale effect correction factor (α) used in pullout design, shall be determined from project specific pullout tests using the proposed geosynthetic in the specified project backfill material or equivalent soil. The pullout resistance factors shall be determined in accordance with LRFD and FHWA-NHI-10-024 and FHWA-NHI-10-025, Volumes 1 and 2. In the absence of test data, empirical relationships may be used to determine the pullout resistance factors, any empirical relationships used in design shall be referenced in the design calculations.

- E. Backfill and Foundation Soils Parameters The friction angle of the backfill used in the reinforced fill zone for internal stability design shall be assumed have a friction angle of 34 degrees unless specific project select backfill is tested for frictional strength. The friction angle of the foundation soils and random backfill shall be assumed to be 30 degrees unless otherwise shown on the plans.
- F. Reinforcement Length The soil reinforcement shall be the same length from the bottom to the top of each wall section. The reinforcement length defining the width of the entire reinforced soil mass may vary with wall height. The minimum length of the soil reinforcement shall be 5 ft, but shall not be less than 70 percent of the wall height, H , for walls with level surcharges, or 70 percent of H_1 for walls with a sloped surcharge. Reinforcement length will be determined by the geotechnical wall designer. The mechanical wall height, H or H_1 , shall be the vertical difference between the top of the leveling footing and the elevation at which the failure surface, as described above, intercepts the ground surface supported by the wall.
- G. Bearing Resistance The factored bearing pressures under the Wet Cast Small Landscape Block Wall shall be clearly indicated on the Shop Drawings. Walls shall be dimensioned so that the factored bearing resistance of the foundation soils, as noted on the Plans, is not exceeded.
- H. Facing Stability Stability calculations for the concrete facing blocks shall be in accordance with LRFD, and shall include an evaluation of the maximum vertical spacing between reinforcement layers.
- I. Stability During Construction Walls shall be designed to resist failure by instability of temporary construction slope. Passive pressure in front of the wall mass shall be assumed to be zero for design purposes.

- J. Design Life The wall design life shall be a minimum of 75 years.
- K. Depth of Embedment The depth of embedment for frost protection and stability shall be at or below the elevation shown on the Plans and the approved Shop Drawings.
- L. Drainage System Piped drainage shall be designed to collect and dispose of water from the base of the reinforced soil zone and backfill soil. This shall outlet into surrounding drainage systems or ditches.

635.05 Submittals. The Contractor shall supply wall design computations, wall details, dimensions, quantities, and cross sections necessary to construct the wall. A sample hand calculation including all equations, parameter values used, units, theory, free-body diagram, comparison to design requirements, etc. shall be provided. Spreadsheet calculations alone are not acceptable.

Forty-five (45) days prior to beginning construction of the wall, four (4) sets of the wall design computations and Shop Drawings shall be submitted to the Resident for review by the Geotechnical Engineer. Mix design information shall be submitted at the same time, including aggregate source, current gradation, aggregate quality information and concrete unit weight.

The contractor shall also submit backfill material test results as part of the wall submittal package. Backfill material test results shall include grain size distribution curve, moisture-density relationship curve, and pH test results required for reinforced backfill only.

If geotechnical design is required, the fully detailed plans shall be prepared in conformance with Section 105 and shall include, but not be limited to the following items:

- A. A plan and elevation sheet or sheets for each wall, containing the following: elevations at the top of leveling pads, the distance along the face of the wall to all steps in the leveling pads, the location of the original and final ground line.
- B. All details for foundations and leveling pads, including details for steps in the leveling pads, as well as allowable and actual maximum bearing pressures shall be provided.
- C. Details for the barriers, posts, curbs, steps and facing as required by the project conditions.
- D. Design computations prepared and sealed by a licensed Professional Engineer.
- E. Prior to the beginning of construction, the contractor shall supply the Resident with two copies of the design-supplier's Installation Manual. In addition, the Contractor shall have two copies of the Installation Manual on the project site.

635.06 Construction Requirements The Wet Cast Small Landscape Block Wall shall have the following construction requirements:

- A. Excavation. The excavation and use as fill of all excavated material shall meet the requirements of Section 203 - Excavation and Embankment, except as modified herein.
- B. Foundation. The area upon which the Wet Cast Small Landscape Block Wall structure is to rest, and within the limits shown on the submitted plans, shall be graded for a width

equal to, or exceeding, the length of the blocks. Prior to wall and leveling pad construction, this foundation material shall be compacted to at least 95 percent of maximum laboratory dry density (AASHTO T-180 Method C or D). Frozen and unsuitable soil shall be removed and replaced with gravel borrow compacted to 95 percent of AASHTO T-180, or as shown on the plans.

A concrete leveling pad shall be constructed a minimum width of 6 inches beyond the front and back of the concrete wall units, or as indicated on the plans. Dimensions may be modified per the wall supplier's recommendations, with written approval of the Geotechnical Engineer. The leveling pad shall be cast to the design elevations as shown on the plans, or as required by the wall supplier upon written approval of the Geotechnical Engineer.

The allowable elevation tolerances from the design elevations are +0.01 ft and -0.02 ft. Leveling pads which do not meet this requirement shall be repaired or replaced as directed by the Resident at no additional cost to the Department. Placement of wall units may begin after the strength of the concrete leveling pad reaches 1000 psi or is adequate to support the proposed loads. Contractor may begin placement of concrete block units after 12 hours at their own risk.

- C. Method and Equipment. Prior to erection of the wall, the Contractor shall furnish the Resident with detailed information concerning the proposed construction method and equipment to be used. The erection procedure shall be in accordance with the manufacturer's instructions. Any units that are damaged due to handling will be replaced at the Contractor's expense.
- D. Installation of Concrete Wall Units. A field representative from the wall system being used shall be available, as needed, during the erection of the wall. The services of the representative shall be at no additional cost to the project.

The contractor shall place the first course of wall units directly on the leveling pad and check for level and alignment. Adjacent units should be in contact. The prefabricated concrete wall units shall be installed to a tolerance of plus or minus 3/4 inch in 10 ft in vertical and horizontal alignment.

Fill all voids between and within the wall units with drainage stone as described in this specification. Stone infill shall be compacted by hand tamping with a rod. The drainage stone fill shall extend a minimum of 6 in behind the tails of the wall units unless a geotextile filter is placed over the inside joint at the back of adjacent wall units. If used, the drainage geotextile shall conform to the requirements of Section 722.02.

The top course of blocks and all coping units shall be installed using adhesive or other method of permanent attachment as recommended by the manufacturer.

- E. Backfill Placement. Backfill placement shall closely follow the erection of each row of prefabricated wall units. The maximum lift thickness shall be 8 inches loose. The Contractor shall decrease the lift thickness if necessary to obtain the specified density. The backfill shall be compacted in accordance with Section 203.12 except that the minimum required compaction shall be at least 92 percent of maximum density as determined by AASHTO T-180 Method C or D. Backfill compaction shall be accomplished without

disturbance or displacement of the concrete wall units. Sheepsfoot rollers will not be allowed. Whenever a compaction test fails, no additional backfill shall be placed over the area until the lift is recompacted and a passing test achieved.

The moisture content of the backfill material prior to and during compaction shall be uniform throughout each layer. Backfill material shall have a placement moisture content less than or equal to the optimum moisture content. Backfill material with placement moisture content in excess of the optimum moisture content shall be removed and reworked until the moisture content is uniform and acceptable throughout the entire lift. The optimum moisture content shall be determined in accordance with AASHTO T-180, Method C or D. At the end of the day's operations, the Contractor shall shape the last level of backfill so as to direct runoff of rainwater away from the wall face.

F. Construction Certification Letter. The Contractor shall furnish the Resident a Construction Certification Letter describing how adequate compaction of the block infill material was accomplished and what QA/QC procedures were followed to ensure that this effort was continued throughout construction of the wall.

635.07 Method of Measurement Wet Cast Small Landscape Block Wall will be measured by the square foot of front surface not to exceed the dimensions shown on the Contract Plans unless authorized by the Resident. Vertical and horizontal dimensions will be from the edges of the blocks. No field measurements for computations will be made unless the Resident specifies, in writing, a change in the limits indicated on the Plans.

635.08 Basis of Payment The accepted quantity of Wet Cast Small Landscape Block Wall will be paid for at the contract unit price per square foot complete in place. Payment shall be full compensation for furnishing geotechnical design as required, all labor, equipment and materials including all precast concrete units, aggregate fill, hardware, joint fillers, geosynthetic, drainage pipe, and technical field representative. Excavation, foundation material and backfill material will all be incidental to the Wet Cast Small Landscape Block Wall.

Cost of cast-in-place concrete for leveling pad will not be paid for separately, but will be considered incidental to the Wet Cast Small Landscape Block Wall.

There will be no allowance for excavating and backfilling for the Wet Cast Small Landscape Block Wall beyond the limits shown on the approved submitted plans, except for excavation required to remove unsuitable subsoil in preparation for the foundation. Payment for excavating unsuitable subsoil shall be full compensation for all costs of pumping, drainage, sheeting, bracing and incidentals for proper execution of the work, and will be paid as common excavation in accordance with Section 203.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
635.32 Wet Cast Small Landscape Block Wall	Square Foot