



# Illinois Department of Transportation

2300 South Dirksen Parkway / Springfield, Illinois / 62764

September 6, 2013

SUBJECT: FAU Route 291 (Division Street)  
Project BRM-9003(817)  
Section 10-00071-00-BR (Lockport)  
Will County  
Contract No. 63864  
Item No. 24, September 20, 2013 Letting  
Addendum A

## NOTICE TO PROSPECTIVE BIDDERS:

Attached is an addendum to the plans or proposal. This addendum involves revised and/or added material.

1. Revised the Index of Project Specific Special Provisions and the Guide Bridge Special Provision Index/Check Sheet
2. Corrected the contract number on page 1 of the Special Provisions
3. Revised the first sentence in the Special Provision Precast Modular Retaining Wall on page 7
4. Revised the Special Provision HMA Mixture Design Requirements (D-1) on pages 27-28B
5. Added the Special Provision for the I&M Canal Trail Detour on pages 31 and 31A
6. Added the Special Provision Coarse Aggregate for Backfill, Trench Backfill and Bedding (D-1) on page 31B
7. Deleted the Guide Bridge Special Provision Precast Modular Retaining Wall on pages 76-82

Prime contractors must utilize the enclosed material when preparing their bid and must include any Schedule of Prices changes in their bidding proposal.

Bidders using computer-generated bids are cautioned to reflect any and all Schedule of Prices changes, if involved, into their computer programs.

Very truly yours,

John Baranzelli, P.E.  
Acting Engineer of Design and Environment

A handwritten signature in black ink, appearing to read 'Ted B. Walschleger P.E.'.

By: Ted B. Walschleger, P. E.  
Engineer of Project Management

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revised 9/6/13

**GUIDE BRIDGE SPECIAL PROVISION INDEX/CHECK SHEET**

Effective as of the: September 20, 2013 Letting

Pg #	√	File Name	Title	Effective	Revised
		GBSP 4	Polymer Modified Portland Cement Mortar	June 7, 1994	July 26, 2013
		GBSP 12	Drainage System	June 10, 1994	Jan 1, 2007
		GBSP 13	High-Load Multi-Rotational Bearings	Oct 13, 1988	Oct 30, 2012
		GBSP 14	Jack and Remove Existing Bearings	April 20, 1994	Jan 1, 2007
		GBSP 15	Three Sided Precast Concrete Structure	July 12, 1994	Oct 15, 2011
		GBSP 16	Jacking Existing Superstructure	Jan 11, 1993	Jan 1, 2007
		GBSP 17	Bonded Preformed Joint Seal	July 12, 1994	Jan 1, 2007
		GBSP 18	Modular Expansion Joint	May 19, 1994	July 26, 2013
		GBSP 21	Cleaning and Painting Contact Surface Areas of Existing Steel Structures	June 30, 2003	May 18, 2011
		GBSP 25	Cleaning and Painting Existing Steel Structures	Oct 2, 2001	April 19, 2012
		GBSP 26	Containment and Disposal of Lead Paint Cleaning Residues	Oct 2, 2001	April 30, 2010
		GBSP 28	Deck Slab Repair	May 15, 1995	Oct 15, 2011
		GBSP 29	Bridge Deck Microsilica Concrete Overlay	May 15, 1995	Oct 30, 2012
		GBSP 30	Bridge Deck Latex Concrete Overlay	May 15, 1995	Jan 18, 2011
		GBSP 31	Bridge Deck High-Reactivity Metakaolin (HRM) Conc Overlay	Jan 21, 2000	Oct 30, 2012
		GBSP 32	Temporary Sheet Piling	Sept 2, 1994	Jan 31, 2012
		GBSP 33	Pedestrian Truss Superstructure	Jan 13, 1998	Aug 17, 2012
		GBSP 34	Concrete Wearing Surface	June 23, 1994	Feb 6, 2013
		GBSP 35	Silicone Bridge Joint Sealer	Aug 1, 1995	Oct 15, 2011
		GBSP 38	Mechanically Stabilized Earth Retaining Walls	Feb 3, 1999	July 26, 2013
		GBSP 42	Drilled Soldier Pile Retaining Wall	Sept 20, 2001	Aug 17, 2012
		GBSP 43	Driven Soldier Pile Retaining Wall	Nov 13, 2002	Aug 17, 2012
		GBSP 44	Temporary Soil Retention System	Dec 30, 2002	May 11, 2009
		GBSP 45	Bridge Deck Thin Polymer Overlay	May 7, 1997	Feb 6, 2013
		GBSP 46	Geotextile Retaining Walls	Sept 19, 2003	July 26, 2013
		GBSP 47	High Performance Concrete Structures	Aug 5, 2002	Jan 1, 2007
73	X	GBSP 51	Pipe Underdrain for Structures	May 17, 2000	Jan 22, 2010
		GBSP 53	Structural Repair of Concrete	Mar 15, 2006	July 26, 2013
		GBSP 55	Erection of Curved Steel Structures	June 1, 2007	
74	X	GBSP 56	Setting Piles in Rock	Nov 14, 1996	April 19, 2012
		GBSP 57	Temporary Mechanically Stabilized Earth Retaining Walls	Jan 6, 2003	July 26, 2013
		GBSP 59	Diamond Grinding and Surface Testing Bridge Sections	Dec 6, 2004	July 9, 2008
		GBSP 60	Containment and Disposal of Non-Lead Paint Cleaning Residues	Nov 25, 2004	Mar 6, 2009
		GBSP 61	Slipform Parapet	June 1, 2007	Aug 17, 2012
		GBSP 62	Concrete Deck Beams	June 13, 2008	Oct 9, 2009
		GBSP 64	Segmental Concrete Block Wall	Jan 7, 1999	Oct 30, 2012
		GBSP 65	Precast Modular Retaining Walls	Mar 19, 2001	Oct 30, 2012
		GBSP 66	Wave Equation Analysis of Piles	Nov 14, 2008	
		GBSP 67	Structural Assessment Reports for Contractor's Means and Methods	Mar 6, 2009	
		GBSP 70	Braced Excavation	Aug 9, 1995	May 18, 2011
		GBSP 71	Aggregate Column Ground Improvement	Jan 15, 2009	Oct 15, 2011

Revised 9/6/13

**STATE OF ILLINOIS**

**SPECIAL PROVISIONS**

The following Special Provisions supplement the "Standard Specifications for Road and Bridge Construction", Adopted January 1, 2012, the latest edition of the "Manual on Uniform Traffic Control Devices for Streets and Highways", and the "Manual of Test Procedures of Materials" in effect on the date of invitation of bids, and the Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included here in which apply to and govern the construction of

Section No. 10-00071-00-BR

Project No. BRM-9003(817)

Job No. C-91-496-11

Contract 63864

or parts, of said Specifications, the said Special Provisions shall take precedence and shall govern.

**CONTRACT NUMBER**

The contract number shall be 63864 for this project. All other references throughout the specifications shall be construed to be this number.

**LOCATION OF IMPROVEMENT**

The project is located on FAU 0291 Division Street, in City of Lockport, Will County, Illinois. The project begins at Station 12+85 and ends at Station 16+45 on FAU 0291 Division Street. The net and gross length of the project is 360 feet (0.068 miles).

**DESCRIPTION OF IMPROVEMENT**

The proposed improvement consists of complete bridge replacement along with approach slabs, approach pavement widening and resurfacing, concrete and modular block retaining walls, watermain and other appurtenant work at Division Street Bridge of the I&M Canal.

**COMPLETION DATE**

The Contractor shall complete the contract work on or before the completion date of August 22, 2014.

Under extenuating circumstances the Engineer may direct that certain items of work, not affecting the safe opening of the roadway to traffic, may be completed after the completion date. Temporary lane closures for this work may be allowed at the discretion of the Engineer.

## PRECAST MODULAR RETAINING WALL

**Description:** This work shall be done in accordance with Standard Specifications, details in the plans, and the following:

The PRECAST MODULAR RETAINING WALL shall be built on a concrete footing according to the detail located in the plans.

Description. This work shall consist of preparing the design, furnishing the materials, and constructing the precast modular retaining walls to the lines, grades and dimensions shown in the contract plans and as directed by the Engineer.

General. The precast modular wall shall consist of precast concrete modules, select fill and a leveling pad. The precast concrete modules shall be sized to have sufficient external stability resistance at each module course to satisfy the design criteria. The material, fabrication and construction shall comply with this Special Provision and the requirements specified by the supplier of the wall system selected by the Contractor for use on the project.

The precast modular retaining wall shall be one of the following pre-approved wall systems:

T-Wall The Neel Company  
Stepwall Prestress Engineering Corporation  
Doublewal Doublewal Corporation  
Stone Strong\* Stone Strong, LLC.  
Recon Wall System\* Recon Retaining Wall Systems, Inc  
Redi-Rock Wall\* Redi-Rock International, LLC

\* These systems may have designs utilizing/requiring soil reinforcement.

Submittals. The wall system supplier shall submit complete design calculations and shop drawings to the Engineer according to Article 1042.03(b) of the Standard Specifications no later than 90 days prior to beginning construction of the wall. No work or ordering of materials for the structure shall be done by the Contractor until the submittal has been approved in writing by the

Engineer. All submittals shall be sealed by a Illinois Licensed Structural Engineer and shall include all details, dimensions, quantities and cross sections necessary to construct the wall and shall include, but not be limited to, the following items:

(a) Plan, elevation and cross section sheet(s) for each wall showing the following:

- (1) A plan view of the wall indicating the offsets from the construction centerline to the face of the wall at all changes in horizontal alignment. The plan view shall show the limits of precast modules and stations where changes in length and/or size of modules occur. The centerline shall be shown for all drainage structures or pipes behind or passing through and/or under the wall.
- (2) An elevation view of the wall indicating the elevations of the top of the modules. These elevations shall be at or above the top of exposed module line shown on the contract plans. This view shall show the elevations of the top of the leveling pads, all steps in the leveling pads and the finished grade line shown in the contract plans. Each module type, size and embeded length shall be designated.
- (3) A listing of the summary of quantities shall be provided on the elevation sheet of each wall.
- (4) Typical cross section(s) showing the precast modules, select fill within the modules, porous granular backfill, leveling pad, right-of-way limits, including excavation cut slopes and elevation relationship between existing ground conditions and the finished grade line.
- (5) All general notes required for constructing the wall as well as the locations of lifting devices and/or support points in the precast modules shall be indicated.

## HMA MIXTURE DESIGN REQUIREMENTS (D-1)

Effective: January 1, 2013.

Revised: January 16, 2013

### 1) Design Composition and Volumetric Requirements

Revise Article 1030.04(a)(1) of the Standard Specifications to read.

“(1)High ESAL Mixtures. The Job Mix Formula (JMF) shall fall within the following limits.

High ESAL, MIXTURE COMPOSITION (% PASSING) <sup>1/</sup>										
Sieve Size	IL-25.0 mm		IL-19.0 mm		IL-12.5 mm		IL-9.5 mm		IL-4.75 mm	
	min	max	min	max	min	max	min	max	min	max
1 1/2 in. (37.5 mm)		100								
1 in. (25 mm)	90	100		100						
3/4 in. (19 mm)		90	82	100		100				
1/2 in. (12.5 mm)	45	75	50	85	90	100		100		100
3/8 in. (9.5 mm)						89	90	100		100
#4 (4.75 mm)	24	42 <sup>2/</sup>	24	50 <sup>2/</sup>	28	65	28	65	90	100
#8 (2.36 mm)	16	31	20	36	28	48 <sup>3/</sup>	32	52 <sup>3/</sup>	70	90
#16 (1.18 mm)	10	22	10	25	10	32	10	32	50	65
#50 (300 μm)	4	12	4	12	4	15	4	15	15	30
#100 (150 μm)	3	9	3	9	3	10	3	10	10	18
#200 (75 μm)	3	6	3	6	4	6	4	6	7	9
Ratio Dust/Asphalt Binder		1.0		1.0		1.0		1.0		1.0 <sup>4/</sup>

1/ Based on percent of total aggregate weight.

2/ The mixture composition shall not exceed 40 percent passing the #4 (4.75 mm) sieve for binder courses with Ndesign ≥ 90.

3/ The mixture composition shall not exceed 44 percent passing the #8 (2.36 mm) sieve for surface courses with Ndesign ≥ 90.

4/ Additional minus No. 200 (0.075 mm) material required by the mix design shall be mineral filler, unless otherwise approved by the Engineer.”

Delete Article 1030.04(a)(4) of the Standard Specifications.

Revise Article 1030.04(b)(1) of the Standard Specifications to read.

“(1) High ESAL Mixtures. The target value for the air voids of the HMA shall be 4.0 percent and for IL-4.75 it shall be 3.5 percent at the design number of gyrations. The VMA and VFA of the HMA design shall be based on the nominal maximum size of the aggregate in the mix, and shall conform to the following requirements.

VOLUMETRIC REQUIREMENTS High ESAL						
Ndesign	Voids in the Mineral Aggregate (VMA), % minimum					Voids Filled with Asphalt Binder (VFA), %
	IL-25.0	IL-19.0	IL-12.5	IL-9.5	IL-4.75 <sup>1/</sup>	
50	12.0	13.0	14.0	15	18.5	65 – 78 <sup>2/</sup>
70					65 - 75	
90						
105						

1/ Maximum Draindown for IL-4.75 shall be 0.3%

2/ VFA for IL-4.75 shall be 72-85%”

Delete Article 1030.04(b)(4) of the Standard Specifications.

Revise the Control Limits Table in Article 1030.05(d)(4) of the Standard Specifications to read.

“CONTROL LIMITS					
Parameter	High ESAL Low ESAL	High ESAL Low ESAL	All Other	IL-4.75	IL-4.75
	Individual Test	Moving Avg. of 4	Individual Test	Individual Test	Moving Avg. of 4
% Passing: <sup>1/</sup>					
1/2 in. (12.5 mm)	± 6 %	± 4 %	± 15 %		
No. 4 (4.75 mm)	± 5 %	± 4 %	± 10 %		
No. 8 (2.36 mm)	± 5 %	± 3 %			
No. 16 (1.18 mm)				± 4 %	± 3 %
No. 30 (600 µm)	± 4 %	± 2.5 %			
Total Dust Content No. 200 (75 µm)	± 1.5 %	± 1.0 %	± 2.5 %	± 1.5 %	± 1.0 %
Asphalt Binder Content	± 0.3 %	± 0.2 %	± 0.5 %	± 0.3 %	± 0.2 %
Voids	± 1.2 %	± 1.0 %	± 1.2 %	± 1.2 %	± 1.0 %
VMA	-0.7 % <sup>2/</sup>	-0.5 % <sup>2/</sup>		-0.7 % <sup>2/</sup>	-0.5 % <sup>2/</sup>

1/ Based on washed ignition oven

2/ Allowable limit below minimum design VMA requirement”

## 2) Design Verification and Production

Description. The following states the requirements for Hamburg Wheel and Tensile Strength testing for High ESAL, IL-4.75, and SMA hot mix asphalt (HMA) mixes during mix design verification and production.

When the options of Warm Mix Asphalt, Reclaimed Asphalt Shingles, or Reclaimed Asphalt Pavement are used by the Contractor, the Hamburg Wheel and tensile strength requirements in this special provision will be superseded by the special provisions for Warm Mix Asphalt, Reclaimed Asphalt Shingles, or Reclaimed Asphalt Pavement as applicable.

Mix Design Testing. Add the following to Article 1030.04 of the Standard Specifications:

“(d) Verification Testing. High ESAL, IL-4.75, and SMA mix designs submitted for verification will be tested to ensure that the resulting mix designs will pass the required criteria for the Hamburg Wheel Test (IL mod AASHTO T-324) and the Tensile Strength Test (IL mod AASHTO T-283). The Department will perform a verification test on gyratory specimens compacted by the Contractor. If the mix fails the Department’s verification test, the Contractor shall make the necessary changes to the mix and resubmit compacted specimens to the Department for verification. If the mix fails again, the mix design will be rejected.

All new and renewal mix designs will be required to be tested, prior to submittal for Department verification meeting the following requirements:

(1) Hamburg Wheel Test criteria.

Asphalt Binder Grade	# Repetitions	Max Rut Depth (mm)
PG 760 -XX (or higher)	20,000	12.5
PG 64 -XX (or lower)	10,000	12.5

Note: For SMA Designs (N-80) the maximum rut depth is 6.0 mm at 20,000 repetitions. For IL 4.75mm Designs (N-50) the maximum rut depth is 9.0mm at 15,000 repetitions.

(2) Tensile Strength Criteria. The minimum allowable conditioned tensile strength shall be 415 kPa (60 psi) for non-polymer modified performance graded (PG) asphalt binder and 550 kPa (80 psi) for polymer modified PG asphalt binder. The maximum allowable unconditioned tensile strength shall be 1380 kPa (200 psi).”

Production Testing. Add the following to Article 1030.06 of the Standard Specifications:

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revised 2/4/13



“(c) Hamburg Wheel Test. All HMA mixtures shall be sampled within the first 500 tons (450 metric tons) on the first day of production or during start up with a split reserved for the Department. The mix sample shall be tested according to the Illinois Modified AASHTO T 324 and shall meet the requirements specified herein. Mix production shall not exceed 1500 tons (1350 metric tons) or one day’s production, whichever comes first, until the testing is completed and the mixture is found to be in conformance. The requirement to cease mix production may be waived if the plant produced mixture demonstrates conformance prior to start of mix production for a contract. The Department may conduct additional Hamburg Wheel Tests on production material as determined by the Engineer. If the mixture fails to meet the Hamburg Wheel criteria, no further mixture will be accepted until the Contractor takes such action as is necessary to furnish a mixture meeting the criteria”

Basis of Payment. Revise the seventh paragraph of Article 406.14 of the Standard Specifications to read:

“For all mixes designed and verified under the Hamburg Wheel criteria, the cost of furnishing and introducing anti-stripping additives in the HMA will not be paid for separately, but shall be considered as included in the contract unit price of the HMA item involved.

No additional compensation will be awarded to the Contractor because of reduced production rates associated with the addition of the anti-stripping additive.”

Graduate Special Provision. Accordingly, the Contractor shall make every effort to enroll TPGs by recruitment through the IDOT Illinois Community College Program to the extent such persons are available within a reasonable area of recruitment. The Contractor will be responsible for demonstrating the steps that it has taken in pursuance thereof, prior to a determination as to whether the Contractor is in compliance and entitled to the Training Program Graduate TPG Special Provision \$10.00 an hour incentive.

The Contractor or subcontractor shall provide each TPG with a certification showing the type and length of training satisfactorily completed.

### I&M CANAL TRAIL DETOUR

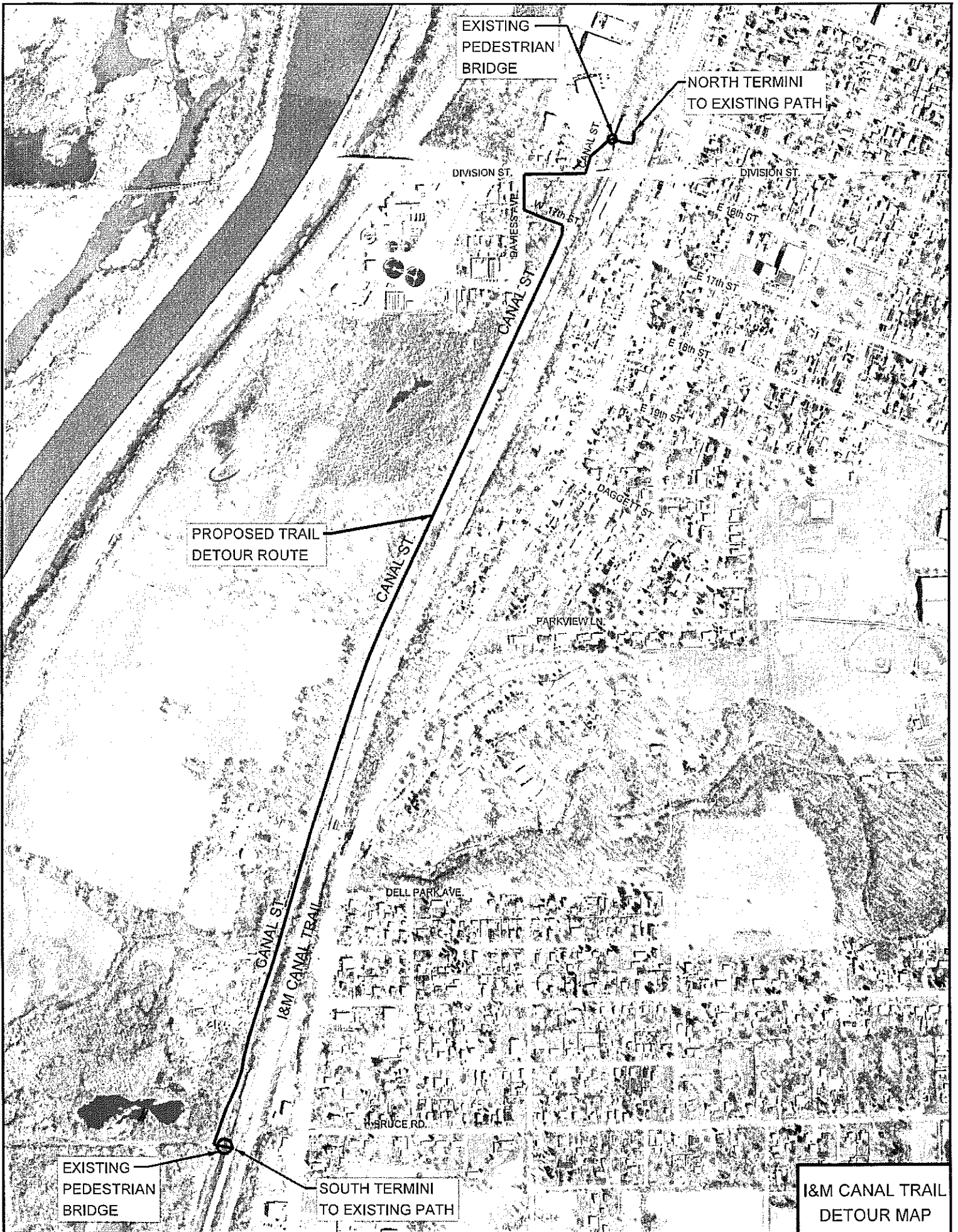
**Description.** The Contractor shall furnish, erect, maintain and remove all signs, lights and other devices required for the detour of pedestrian and bicycle traffic along the I&M Canal Trail throughout the duration of the trail closure as described herein.

**Trail Detour Requirements.** The trail cannot be closed to public use until a safe detour is provided. The detour from the south shall utilize the existing trail bridge south of Division Street to travel west over the I&M Canal to a gravel road, proceeding north along this gravel road to Division Street where it becomes Canal Road. The detour shall cross Division Street and continue on Canal Road to the trail bridge by the stone shelter, crossing back east to the I&M Canal Trail. See the attached detour map for route.

The Contractor shall be responsible for installing and maintaining detour signage at the four turns, in addition to Division Street. The Contractor shall also be responsible for barricading the trail at two locations and the installation of a 3 ft. opening adjacent to the gate blocking the gravel road. The Contractor shall maintain safe passage for pedestrians and bicyclists across Division Street as they cross at Canal Road. Barricades, gravel, and ramps shall be utilized to provide a clear and safe route across the construction zone. Signage shall also be provided along the gravel and Canal roads to alert users that the road is to be shared by pedestrian, bicycle, and motorized vehicles (i.e. "slow, share the road" signs with international symbols). The Contractor shall schedule the work to minimize the time the trail is detoured.

**Permit.** The I&M Canal Trail south of Division Street is managed by the Forest Preserve District of Will County. Prior to any work on the trail the Contractor shall obtain a Special Use Permit (\$50) from the Forest Preserve District of Will County (815) 727-8700. [krinke@fpdwc.org](mailto:krinke@fpdwc.org). This permit will require proof of insurance and communication regarding scheduling of work impacting the trail. Additionally, prior to installing the detour, the Contractor shall obtain permission from the Lockport Township Park District for placement of signage on their property and any work associated with developing clear passage for trail users.

**Basis of Payment.** This work will not be paid for separately but shall be included in the cost of TRAFFIC CONTROL & PROTECTION.



**COARSE AGGREGATE FOR BACKFILL, TRENCH BACKFILL AND BEDDING (D-1)**

Effective: November 1, 2011

This work shall be according to Section 1004.05 of the Standard Specifications except for the following:

Reclaimed Asphalt Pavement (RAP) maybe blended with gravel, crushed gravel, crushed stone crushed concrete, crushed slag, chats, crushed sand stone or wet bottom boiler slag. The RAP materials shall be crushed and screened. Unprocessed RAP grindings will not be permitted. The RAP shall be uniformly graded and shall pass the 1.0 in. (25 mm) screen. When RAP is blended with any of the coarse aggregate listed above, the blending shall be done mechanically with calibrated feeders. The feeders shall have an accuracy of  $\pm 2.0$  percent of the actual quantity of material delivered. The final blended product shall not contain more than 40 percent by weight RAP.

The coarse aggregate listed above shall meet CA 6 and CA 10 gradations prior to being blended with the processed and uniformly graded RAP.

.....31.B

Added 9/6/13

## **PRECAST MODULAR RETAINING WALL**

Effective: March 19, 2001

Revised: October 30, 2012

Description. This work shall consist of preparing the design, furnishing the materials, and constructing the precast modular retaining walls to the lines, grades and dimensions shown in the contract plans and as directed by the Engineer.

General. The precast modular wall shall consist of precast concrete modules, select fill and a leveling pad. The precast concrete modules shall be sized to have sufficient external stability resistance at each module course to satisfy the design criteria. The material, fabrication and construction shall comply with this Special Provision and the requirements specified by the supplier of the wall system selected by the Contractor for use on the project.

The precast modular retaining wall shall be one of the following pre-approved wall systems:

T-Wall      The Neal Company  
Stepwall    Prestress Engineering Corporation  
Doublewal   Doublewal Corporation  
Stone Strong\*   Stone Strong, LLC.  
Recon Wall System\*   Recon Retaining Wall Systems, Inc  
Redi-Rock Wall\*   Redi-Rock International, LLC

\* These systems may have designs utilizing/requiring soil reinforcement.

Submittals. The wall system supplier shall submit complete design calculations and shop drawings to the Engineer according to Article 1042.03(b) of the Standard Specifications no later than 90 days prior to beginning construction of the wall. No work or ordering of materials for the structure shall be done by the Contractor until the submittal has been approved in writing by the Engineer. All submittals shall be sealed by a Illinois Licensed Structural Engineer and shall include all details, dimensions, quantities and cross sections necessary to construct the wall and shall include, but not be limited to, the following items:

- (a) Plan, elevation and cross section sheet(s) for each wall showing the following:
- (1) A plan view of the wall indicating the offsets from the construction centerline to the face of the wall at all changes in horizontal alignment. The plan view shall show the limits of precast modules and stations where changes in length and/or size of modules occur. The centerline shall be shown for all drainage structures or pipes behind or passing through and/or under the wall.
  - (2) An elevation view of the wall indicating the elevations of the top of the modules. These elevations shall be at or above the top of exposed module line shown on the contract plans. This view shall show the elevations of the top of the leveling pads, all steps in the leveling pads and the finished grade line shown in the contract plans. Each module type, size and embeded length shall be designated.

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- (3) A listing of the summary of quantities shall be provided on the elevation sheet of each wall.
- (4) Typical cross section(s) showing the precast modules, select fill within the modules, porous granular backfill, leveling pad, right-of-way limits, including excavation cut slopes and elevation relationship between existing ground conditions and the finished grade line.
- (5) All general notes required for constructing the wall as well as the locations of lifting devices and/or support points in the precast modules shall be indicated.
- (b) The leveling pads may be precast or cast in place concrete, or compacted coarse aggregate. All details for the leveling pads, including the steps, shall be shown. The top of the leveling pad shall be located at or below the theoretical top of the leveling pad line shown on the contract plans. The theoretical top of leveling pad line shall be 3.5 ft. (1.1 m) below finished grade line at the front face of the wall, unless otherwise shown on the contract plans.
- (c) Where concrete coping or barrier is specified, the modules shall extend up into the coping or barrier a minimum of 2 in. (50 mm). The top of the modules may be level or sloped to satisfy the top of module line shown on the contract plans. Cast-in-place concrete will not be an acceptable replacement for module areas below the top of module line. Precast coping may be substituted for the CIP coping if approved by the Engineer.
- (d) All module types shall be detailed. The details shall show all dimensions necessary to cast and construct each type of module, all reinforcing steel in the module, and the location of any shear key or connection devices.
- (e) All details of the wall module placement around all appurtenances located behind, on top of, or passing through the wall modules and select fill such as traffic barriers, coping, foundations, and utilities etc. shall be clearly indicated. Any modifications to the design of these appurtenances to accommodate a particular system shall also be submitted.
- (f) When specified on the contract plans, all details of architectural treatment for the exposed surfaces of the module, including color, texture and form liners shall be shown.
- (g) The details of bearing pads, joint filler or other materials used to prevent concrete to concrete contact on the front face as well as any pins, groves or other alignment mechanisms shall be indicated.

The initial submittal shall include three sets of shop drawings and one set of calculations. One set of drawings will be returned to the Contractor with any corrections indicated. After approval, the Contractor shall furnish the Engineer with eight sets of corrected prints and one mylar set for

distribution by the Department. No work or ordering of materials for the structure shall be done until the submittal has been approved by the Engineer.

Materials. The precast modular retaining walls shall conform to the supplier's standards as previously approved by the Department, AASHTO Specifications for prefabricated modular walls and the following:

- (a) Steel connection hardware shall be galvanized according to AASHTO M 232 or AASHTO M 111 as applicable.
- (b) All precast modules shall be manufactured with Class PC concrete according to Section 504, Article 1042.02, Article 1042.03, and the following requirements:
  - (1) The minimum panel thickness shall be 3 1/2 in. (90 mm).
  - (2) The minimum reinforcement bar cover shall be 1 1/2 in. (38 mm).
  - (3) The panel reinforcement shall be epoxy coated according to Article 1006.10 (a)(2).
  - (4) All dimensions shall be within 3/16 in. (5 mm).
  - (5) Angular distortion with regard to the height of the panel shall not exceed 0.2 in. (5 mm) in 5 ft. (1.5 m).
  - (6) Surface defects on formed surfaces measured on a length of 5 ft. (1.5 m) shall not be more than 0.1 in. (2.5 mm).

Concrete surfaces exposed to view in the completed wall shall be finished according to Article 503.15(a) of the Standard Specifications.

- (c) Reinforcing steel shall be according to Article 1006.10(a). Welded steel wire fabric for concrete reinforcement shall be according to Article 1006.10(b)(1).
- (d) Soil Reinforcement: If soil reinforcement is required by the approved design, the Contractor shall submit a manufacturer's certification for the soil reinforcement properties which equals or exceeds those required in the design computations. The soil reinforcement shall be manufactured from high density polyethylene (HDPE) uniaxial or polypropylene biaxial resins or high tenacity polyester fibers with a PVC coating, stored between -20 and 140° F (-29 and 60° C). The following standards shall be used in determining and demonstrating the soil reinforcement capacities:

ASTM D638 Test Method for Tensile Properties of Plastic  
ASTM D1248 Specification for Polyethylene Plastics Molding and Extrusion Materials  
ASTM D4218 Test Method for Carbon Black Content in Polyethylene Compounds

ASTM D5262 Test Method for Evaluating the Unconfined Tension Creep Behavior of Geosynthetics

GG1-Standard Test Method for Geogrid Rib Tensile Strength

GG2-Standard Test Method for Geogrid Junction Strength

GG4-Standard Practice for Determination of the Long Term Design Strength of Geogrid

GG5-Standard Practice for Evaluating Geogrid Pullout Behavior

- (e) The select fill, defined as the material placed in the reinforced volume behind the wall, shall be according to Sections 1003 and 1004 of the Standard Specifications and the following:
- (1) Select Fill Gradation. Either a coarse aggregate or a fine aggregate may be used. For coarse aggregate, gradations CA 6 thru CA 16 may be used. For fine aggregate, gradations FA 1, FA 2, or FA 20 may be used.
  - (2) Select Fill Quality. The coarse or fine aggregate shall have a maximum sodium sulfate ( $\text{Na}_2\text{SO}_4$ ) loss of 15 percent according to Illinois Modified AASHTO T 104.
  - (3) Select Fill Internal Friction Angle. The effective internal friction angle for the coarse or fine aggregate shall be a minimum 34 degrees according to AASHTO T 236 on samples compacted to 95 percent density according to Illinois Modified AASHTO T 99. The AASHTO T 296 test with pore pressure measurement may be used in lieu of AASHTO T 236. If the vendor's design uses a friction angle higher than 34 degrees, as indicated on the approved shop drawings, this higher value shall be taken as the minimum required.
  - (4) Select Fill and Geosynthetic Reinforcing. When geosynthetic reinforcing is used, the select fill pH shall be 4.5 to 9.0 according to Illinois Modified AASHTO T 289.
  - (5) Test Frequency. Prior to start of construction, the Contractor shall provide an internal friction angle and pH test results to show the select fill material meets the specification requirement. However, the pH will be required only when geosynthetic reinforcing is used. This test result shall be no more than 12 months old. In addition, a sample of select fill material will be obtained for testing and approval by the Department. Thereafter, the minimum frequency of sampling and testing at the jobsite will be one per 40,000 tons (36,300 metric tons) of select fill. Testing to verify the internal friction angle will be required when the wall design utilizes a minimum effective internal friction angle greater than 34 degrees, or when crushed coarse aggregate is not used.
- (f) The porous granular embankment, behind the precast modules, shall be according to Section 207 of the Standard Specifications.
- (g) The geotextile filter material used across the module joints shall be either a non-woven needle punch polyester or polypropylene or a woven monofilament polypropylene.
- (h) The bearing pads shall be rubber, neoprene, polyvinyl chloride, or polyethylene material of the type and grade as recommended by the wall supplier. Other material recommended by the wall supplier may be used if approved by the Engineer.

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- (i) Leveling pad: The material shall be either Class SI concrete according to Article 1020.04 or compacted coarse aggregate according to Articles 1004.04, (a) and (b). The compacted coarse aggregate gradation shall be CA 6 or CA 10.

Design Criteria. The design shall be according to the AASHTO Design Specifications for Prefabricated Modular Walls except as modified herein. The wall supplier shall be responsible for all external stability aspects of the wall design (including sliding, overturning, bearing pressure and stability of temporary construction slopes). The analyses of settlement and overall slope stability will be the responsibility of the Department.

Typical design procedures and details, once accepted by the Department, shall be followed. All wall system changes shall be submitted in advance to the Department for approval.

External loads, such as those applied through structure foundations, from traffic or railroads, slope surcharge etc., shall be accounted for in the external stability design. The presence of all appurtenances behind, in front of, mounted upon, or passing through the wall volume such as drainage structures, utilities, structure foundation elements or other items shall be accounted for in the external stability design of the wall.

Coulomb's lateral earth pressure theory shall be used to calculate the vertical and horizontal forces acting on the rear face of the precast modules.

The overturning calculations shall assume no more than 80 percent of the soil dead load within the precast modules available to resist overturning forces. Sliding calculations shall consider sliding both across the base and of the base across the foundation soils. The factors of safety against sliding and overturning must be no less than 1.5 and 2.0, respectively, and the computations shall confirm these factors of safety occur at each module level.

The maximum applied equivalent uniform bearing pressure under each module width shall be clearly indicated on the shop drawings submitted and shall be less than the allowable bearing pressure of the soil shown on the contract plans. Footings or other treatments to satisfy the bearing pressure requirements will be designed by the wall supplier and included in the wall bid price.

If the wall supplier needs additional information to complete the design, the Contractor shall be responsible for obtaining the information at no additional cost to the Department.

Construction Requirements. The Contractor shall obtain technical assistance from the supplier during wall erection to demonstrate proper construction procedures and shall include any costs related to this technical assistance in the unit price bid for this item.

The foundation soils for the structure shall be graded for a width equal to or exceeding the module width. Prior to wall construction, the foundation shall be compacted with a smooth wheel vibratory roller. Any foundation soils found to be unsuitable shall be removed and

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replaced, as directed by the Engineer, and shall be paid for separately according to Section 202 of the Standard Specifications.

The modules may not be loaded or shipped to the project site until they have obtained a minimum compressive strength of 3500 psi (24 MPa) and no sooner than seven days after casting. Precast modules shall be lifted and supported at the points indicated on the shop plans. They shall be stored off the ground. Stacked modules shall be separated by battens across the full width of each bearing point as recommended by the supplier to prevent concrete to concrete contact.

The first course of modules must be erected with particular care and adjustment as required to in correct the vertical, horizontal and transverse alignment. Poor alignment of the base course will magnify tolerance problems in upper modules and require dismantling and re-erection of the wall. A 1/4 in. (6 mm) minimum and 3/4 in. (18 mm) maximum joint separation shall be provided between adjacent modules at the face to prevent direct concrete to concrete contact. Vertical tolerances and horizontal alignment tolerances shall not exceed 3/4 in. (19 mm) when measured along a 10 ft. (3 m) straight edge. The overall vertical tolerance of the wall, (plumbness from top to bottom) shall not exceed 1/2 in. per 10 ft. (13 mm per 3 m) of wall height.

The rear face of all vertical and horizontal module joints shall be covered by a geotextile filter fabric, attached to the modules with a suitable adhesive. No adhesive will be allowed on this material directly over the joints to maintain fabric permeability. The minimum fabric width shall be 12 in. (300 mm) and where laps must be used, a non-sewn lap of 6 in. (150 mm) shall be used as a minimum.

The select fill and porous granular embankment placement shall closely follow the erection of each lift of modules. The maximum lift thickness shall be placed according to the supplier's recommended procedures except, the lifts shall not exceed 10 in. (255 mm) loose measurement or as approved by the Engineer.

At the end of each day's operations, the Contractor shall shape the last level of select fill to permit runoff of rainwater away from the wall face. Select fill shall be compacted according to the project specifications for embankment except the minimum required compaction shall be 95 percent of maximum density as determined by AASHTO T 99. The Engineer will perform one density test per 5000 cu yd (3800 cu m) and not less than one test per 2 ft (0.6 m) of lift.

Method of Measurement. Precast Modular Retaining Wall will be measured for payment in square feet (square meters). The retaining wall will be measured from the "top of exposed module line" to the theoretical top of leveling pad line for the length of the wall as shown on the contract plans.

~~Basis of Payment. This work, including furnishing and placement of the precast modules, select fill, joint separation material, geotextile and other accessories will be paid for at the contract unit price per square foot (square meter) for PRECAST MODULAR RETAINING WALL.~~

Porous Granular Embankment placed outside of the select fill volume will be measured and paid for according to Section 207 of the Standard Specifications.

Concrete coping when specified on the contract plans will not be included for payment in this work but shall be included for payment as specified elsewhere in this contract.