
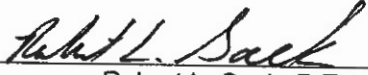


To:  <b>SUPERSEDED BY EI 10-031</b> <b>EFFECTIVE 5/5/11</b>		New York State Department of Transportation <b>ENGINEERING</b> <b>INSTRUCTION</b>	<b>EI</b> <b>08-020</b>
<b>Title: SECTION 632 – PRECAST MODULAR WALLS</b>			
Distribution: <input checked="" type="checkbox"/> Manufacturers (18) <input type="checkbox"/> Surveyors (33) <input checked="" type="checkbox"/> Local Govt. (31) <input checked="" type="checkbox"/> Consultants (34) <input checked="" type="checkbox"/> Agencies (32) <input checked="" type="checkbox"/> Contractors (39) <input type="checkbox"/> _____ ( )	Approved:  Robert L. Sack, P.E. Deputy Chief Engineer (Research) <span style="float: right;">           5-June-08            Date         </span>		

**ADMINISTRATIVE INFORMATION:**

- This Engineering Instruction (EI) is effective beginning with projects submitted for the letting of January 8, 2009.
- Superseded issuance(s): This EI does not supersede any previous issuances.
- Disposition of issued materials: The information transmitted by this issuance will be incorporated into a future revision to the Standard Specifications.

**PURPOSE:** The purpose of this EI is to revise the Standard Specifications Section 632.

**TECHNICAL INFORMATION:**

- Revised Standard Sheets M632-1R1 and M632-2R1 are being issued concurrently via EB 08-020.
- Updates regarding precast modular walls to Chapter 9 of the Highway Design Manual are being issued concurrently via EI 08-019.
- New special specifications for precast concrete cribbing (stretcher & header type) retaining walls and metal bin-type retaining walls are being issued concurrently via EI 08-021.
- The new Section 632 emulates the procedures defined in Section 554 for approving a wall system, as it refers to the Approved List for acceptable wall system designer/suppliers and outlines a submittal process for approving the Shop Drawings of a particular job specific wall system design.
- The Approved List will be revised to identify approved designer/suppliers of Precast Modular Walls. For designer/suppliers who are interested in gaining acceptance onto the Approved List, submission instructions are available in the Department's Highway Design Manual, <https://www.nysdot.gov/portal/page/portal/divisions/engineering/design/dqab/hdm>, in Appendix A of Chapter 9.
- A precast modular wall shall be defined as a system comprised of precast concrete elements equal to or greater than 0.55 m<sup>2</sup> wall face area.

**IMPLEMENTATION:**

- The Main Office Design Quality Assurance Bureau will insert these standard specification shelf notes beginning with projects submitted for the letting of January 8, 2009.
- The following special specifications are disapproved:
  - Item 632.16----17: Concrete Crib Type Retaining Wall "T-Wall"
  - Item 632.17----17: Backfill for Concrete Crib Type Retaining Wall "T-Wall"
  - Item 632.20----17: Precast Reinforced Concrete Cribwall (Evergreen Wall System)
- The following standard specifications are disapproved:
  - Item 632.0101: Concrete Cribbing (Stretcher & Header Type)
  - Item 632.0102: Concrete Cribbing (Precast Concrete Wall Unit Type)
  - Item 632.02: Metal Bin-Type Retaining Wall
  - Item 632.0501: Excavation for Concrete Cribbing (Stretcher & Header Type)

Item 632.0502: Excavation for Concrete Cribbing (Precast Concrete Wall Unit Type)

Item 632.0503: Excavation for Metal Bin-Type Retaining Wall

Item 632.0601: Backfill for Concrete Cribbing (Stretcher & Header Type)

Item 632.0602: Backfill for Concrete Cribbing (Precast Concrete Wall Unit Type)

Item 632.0603: Backfill for Metal Bin-Type Retaining Wall

● The following standard specifications are approved:

Item 632.1001: Precast Modular Wall, No Color, Plain Concrete Surface

Item 632.1002: Precast Modular Wall, No Color, Textured Surface (hand tooled, raked, etc.)

Item 632.1003: Precast Modular Wall, No Color, Exposed Aggregate Surface

Item 632.1004: Precast Modular Wall, No Color, Architectural Pattern (form liner or stamped)

Item 632.1005: Precast Modular Wall, No Color, As Shown on Plans

Item 632.1101: Precast Modular Wall, Integral Color, Plain Concrete Surface

Item 632.1102: Precast Modular Wall, Integral Color, Textured Surface (hand tooled, raked, etc.)

Item 632.1103: Precast Modular Wall, Integral Color, Exposed Aggregate Surface

Item 632.1104: Precast Modular Wall, Integral Color, Architectural Pattern (form liner or stamped)

Item 632.1105: Precast Modular Wall, Integral Color, As Shown on Plans

**TRANSMITTED MATERIALS:**

- Metric version of the Standard Specification shelf note of revised *Section 632 Precast Modular Walls*.
- Metric version of the Standard Specification shelf note of revised *Section 704-06 Precast Modular Walls and Precast Concrete Cribbing*.
- US Customary version of the Standard Specification shelf notes of revised *Section 632 Precast Modular Walls*.
- US Customary version of the Standard Specification shelf notes of revised *Section 704-06 Precast Modular Walls and Precast Concrete Cribbing*.

**BACKGROUND:** Standard Specification Section 632 and Standard Sheets M632-1 thru 4 are outdated. The existing Standard Specification Section 632 provides a choice between precast headers & stretchers, precast concrete cribbing fabricated to conform to the shape and size shown on the Standard Sheets (Sta-Wall), or a metal bin-type retaining wall. The precast headers & stretchers and the metal bin-type retaining walls are no longer specified and only have a rare occasion for use by Maintenance Forces. The fabrication of the precast concrete cribbing wall (Sta-Wall) is waning as Precasters are being licensed by a system designer to produce a certain wall system and each seems to supply a particular territory. Therefore, Contractors have been continually using the option in the Standard Specifications which states "Other types of cribbing not shown on the standard sheets may be furnished and placed, if approved by the D.C.E.S.".

Although this statement allows a Contractor to choose a wall system, other than one of the Department's standards, there is no assurance at the time of bidding that their selection will be approved by the Department for the proposed application. In addition, the time required to review a new or unfamiliar wall system during the construction phase of a project can result in delays getting the product produced and supplied to the project. The creation of an Approved List of Precast Modular Walls will provide Contractors with a selection of wall systems of which the design methodology has already been evaluated by the Department and will also identify approved precast manufacturers who provide the wall systems.

**CONTACT:** Questions or comments regarding this issuance should be directed to Randall J. Romer, P.E., of the Geotechnical Engineering Bureau at (518) 457-4714, [rromer@dot.state.ny.us](mailto:rromer@dot.state.ny.us).

# PRECAST MODULAR WALLS

Make the following changes to the Standard Specifications dated May 4, 2006:

delete Section 632- Cribbing entirely and **replace** it with the following:

## SECTION 632 - PRECAST MODULAR WALLS

### 632-1 DESCRIPTION

**632-1.01 General.** This work shall consist of furnishing and installing a precast modular wall at the location(s) and to the elevation(s) shown in the contract documents.

A Precast Modular Wall is comprised of prefabricated concrete elements including leveling pads, unit infill, earth backfill, joint filler material and geotextile, and a subsurface drainage system to reduce hydrostatic pressure on the wall system.

Obtain all necessary materials, except unit infill, earth backfill and subsurface drainage system, from the approved wall system designer-supplier. Approved designers-suppliers wall systems appear on the Department's Approved List, available on the Department's web site.

**632-1.02 Definitions.** The following general definitions shall be used in conjunction with this section:

1. **Unit/Module.** A precast concrete element, with greater than or equal to 0.55 m<sup>2</sup> wall face area, that are able to be arranged, stacked, placed, combined, or interchanged easily into an assembled wall system.
2. **Bin.** Any volumetric space which is designated to be infilled, as defined in this section, and is encompassed within the dimensions of the wall unit/modules.
3. **Wall.** A series of unit/modules assembled to form bins connected in unbroken sequence so that, when infilled with backfill material, they will act as a single entity (i.e., a retaining wall).
4. **Leveling Pad.** An un-reinforced cast-in-place, or precast, concrete pad which serves as a flat surface for placing the initial course of precast unit/modules.
5. **Joint Filler.** Materials necessary to occupy the joints required for unit/module separation.
6. **Joint Geotextile.** A filter fabric installed to prevent infill and/or backfill material from releasing through the joints.
7. **Unit Infill.** Fill material placed within the bin.
8. **Backfill.** Fill material placed directly behind and/or above the bins in conjunction with the wall assembly to the limits shown in the contract documents.
9. **Subsurface Drainage System.** A system for removing water from behind the wall and channeling it to a point of positive drainage.

### 632-2 MATERIALS

**632-2.01 Unit/Module Materials.** Materials shall meet the requirements specified in the following subsections of Section 700:

Precast Modular Walls and Precast Concrete Cribbing	§704-06
Premoulded Resilient Joint Filler	§705-07
Joint Geotextile (Geotextile Drainage)	§737-01 C.

**632-2.02 Backfill.** Backfill material shall conform to the material requirements as specified in §203-2.01 and §203-2.02 C. Select Structural Fill.

# PRECAST MODULAR WALLS

**632-2.03 Unit Infill.** Unit infill material shall conform to the material requirements as specified in §203-2.01 and §203-2.02 C. Select Structural Fill.

Based on designer-supplier's recommendations, unit infill may be modified to allow a coarser gradation. If dissimilar material is to be used for unit infill, submit the material requirements with the Precast Modular Wall design package for approval.

For systems which allow plantings to integrate the structure into the surrounding environment, the front pocket of the unit shall be filled with a minimum of 200 mm of topsoil conforming to the material requirements as specified in §713-01.

**632-2.04 Subsurface Drainage.** Material incorporated into the subsurface drainage system, not limited to the following, shall conform to the material requirements for:

Optional Underdrain Pipe	§605-2.01
Underdrain Filter, Type I	§605-2.02
Prefabricated Composite Structural Drain	§737-04

## 632-3 CONSTRUCTION DETAILS

**632-3.01 Submittal.** Obtain from the designer-supplier a Precast Modular Wall design stamped and signed by a Professional Engineer licensed and registered to practice in New York State. Include in the Precast Modular Wall design package the following:

- A.** working drawings of the wall design,
- B.** design calculations,
- C.** fabrication drawings for precast unit/modules,
- D.** modified gradation for unit infill (if applicable), and
- E.** the designer-supplier's Installation Manual.

Submit the Precast Modular Wall design package to the Department for approval in accordance with the requirements for Drawing in §704-03 Precast Concrete – General. Begin work only after receiving the Materials Bureau written approval.

### 632-3.02 Precast Modular Wall.

**A. Excavation.** Excavation shall be conducted in accordance with the applicable requirements of Section 206, Trench, Culvert and Structure Excavation, and the details specified in the contract documents.

**B. Foundation.** Prior to erection of the wall system, the foundation shall be inspected and approved by the Engineer. Grade the area under the Precast Modular Wall level for the width shown in the contract documents. A minimum of 90% of Standard Proctor Maximum Density will be required.

**C. Subsurface Drainage System.** Install the subsurface drainage system simultaneously with the erection and infill/backfill of the unit/modules to ensure a continuous, uninterrupted system to serve to prevent the accumulation of destabilizing water pressure on the wall. In all cases, the subsurface drainage system will be installed to drain all intercepted water to a point of positive drainage.

**D. Erection.** All unit/modules shall be assembled and handled in accordance with the designer-supplier's instructions and the contract documents.

During erection, any unit/modules damaged beyond repair shall be removed and replaced, by the Contractor, with approved unit/modules at no additional cost to the State.

# PRECAST MODULAR WALLS

The Contractor shall use precast or cast-in-place leveling pads to set the base unit/modules. The wall system shall be constructed to meet the line and grade shown in the contract documents.

**E. Infill and Backfill.** Immediately prior to backfilling, the Engineer shall inspect unit/modules for damage. Unit/Modules, which are damaged beyond repair as specified in §704-03 will be rejected.

Infilling the bins and backfilling behind the wall shall progress simultaneously with the erection of the unit/modules and the material shall be placed as specified in §203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables.

**F. Contractor Responsibility.** Movement of construction equipment and all other vehicles and loads over and adjacent to walls shall be done at the Contractor's risk. Any damage to bins and unit/modules from any cause shall be repaired or replaced by the Contractor at no additional cost to the State.

## 632-4 METHOD OF MEASUREMENT

**632-4.01 Precast Modular Wall.** A Precast Modular Wall will be measured by the number of square meters of the front wall face computed between the payment lines shown on the plans.

**632-4.02 Backfill and Infill for Precast Modular Wall.** Backfill and Unit Infill will be measured under a separate item. Deductions for the volume of the precast concrete element will be made in accordance with the Approved List drawings.

## 632-5 BASIS OF PAYMENT

**632-5.01 Precast Modular Wall.** The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work including leveling pads required to set the precast concrete wall unit/modules.

**632-5.02 Backfill and Infill for Precast Modular Wall.** The combination of backfill and unit infill shall be paid for jointly under a separate item irrespective of an infill's gradation change or topsoil substitution in the front pocket of a unit. The cost of adding water for compaction of backfill and unit infill shall be included in the price bid for the separate item unless the item "Applying Water" is included in the proposal.

**Payment will be made under:**

Item No.	Item	Pay Unit
632.10XX	Precast Modular Wall, No Color	Square Meter
632.11XX	Precast Modular Wall, Integral Color	Square Meter
	<u>XX</u>	
	<u>Surface</u>	
	01	Plain Concrete Surface
	02	Textured Surface (hand tooled, raked, etc.)
	03	Exposed Aggregate Surface
	04	Architectural Pattern (form liner or stamped)
	05	As Shown on Plans

# **PRECAST MODULAR WALLS AND PRECAST CONCRETE CRIBBING**

Make the following changes to the Standard Specifications dated May 4, 2006:

**delete** the Title and Scope of Section 704-06 and **replace** it with the following:

## **SECTION 704-06    PRECAST MODULAR WALLS AND PRECAST CONCRETE CRIBBING**

**SCOPE.** This specification covers the material and fabrication requirements for precast modular walls and precast concrete cribbing.

# PRECAST MODULAR WALLS

Make the following changes to the Standard Specifications dated May 4, 2006:

**delete** Section 632- Cribbing entirely and **replace** it with the following:

## SECTION 632 - PRECAST MODULAR WALLS

### 632-1 DESCRIPTION

**632-1.01 General.** This work shall consist of furnishing and installing a precast modular wall at the location(s) and to the elevation(s) shown in the contract documents.

A Precast Modular Wall is comprised of prefabricated concrete elements including leveling pads, unit infill, earth backfill, joint filler material and geotextile, and a subsurface drainage system to reduce hydrostatic pressure on the wall system.

Obtain all necessary materials, except unit infill, earth backfill and subsurface drainage system, from the approved wall system designer-supplier. Approved designers-suppliers wall systems appear on the Department's Approved List, available on the Department's web site.

**632-1.02 Definitions.** The following general definitions shall be used in conjunction with this section:

1. **Unit/Module.** A precast concrete element, with greater than or equal to 6 ft<sup>2</sup> wall face area, that are able to be arranged, stacked, placed, combined, or interchanged easily into an assembled wall system.
2. **Bin.** Any volumetric space which is designated to be infilled, as defined in this section, and is encompassed within the dimensions of the wall unit/modules.
3. **Wall.** A series of unit/modules assembled to form bins connected in unbroken sequence so that, when infilled with backfill material, they will act as a single entity (i.e., a retaining wall).
4. **Leveling Pad.** An un-reinforced cast-in-place, or precast, concrete pad which serves as a flat surface for placing the initial course of precast unit/modules.
5. **Joint Filler.** Materials necessary to occupy the joints required for unit/module separation.
6. **Joint Geotextile.** A filter fabric installed to prevent infill and/or backfill material from releasing through the joints.
7. **Unit Infill.** Fill material placed within the bin.
8. **Backfill.** Fill material placed directly behind and/or above the bins in conjunction with the wall assembly to the limits shown in the contract documents.
9. **Subsurface Drainage System.** A system for removing water from behind the wall and channeling it to a point of positive drainage.

### 632-2 MATERIALS

**632-2.01 Unit/Module Materials.** Materials shall meet the requirements specified in the following subsections of Section 700:

Precast Modular Walls and Precast Concrete Cribbing	§704-06
Premoulded Resilient Joint Filler	§705-07
Joint Geotextile (Geotextile Drainage)	§737-01 C.

**632-2.02 Backfill.** Backfill material shall conform to the material requirements as specified in §203-2.01 and §203-2.02 C. Select Structural Fill.

# PRECAST MODULAR WALLS

**632-2.03 Unit Infill.** Unit infill material shall conform to the material requirements as specified in §203-2.01 and §203-2.02 C. Select Structural Fill.

Based on designer-supplier's recommendations, unit infill may be modified to allow a coarser gradation. If dissimilar material is to be used for unit infill, submit the material requirements with the Precast Modular Wall design package for approval.

For systems which allow plantings to integrate the structure into the surrounding environment, the front pocket of the unit shall be filled with a minimum of 8 inches of topsoil conforming to the material requirements as specified in §713-01.

**632-2.04 Subsurface Drainage.** Material incorporated into the subsurface drainage system, not limited to the following, shall conform to the material requirements for:

Optional Underdrain Pipe	§605-2.01
Underdrain Filter, Type I	§605-2.02
Prefabricated Composite Structural Drain	§737-04

## 632-3 CONSTRUCTION DETAILS

**632-3.01 Submittal.** Obtain from the designer-supplier a Precast Modular Wall design stamped and signed by a Professional Engineer licensed and registered to practice in New York State. Include in the Precast Modular Wall design package the following:

- A. working drawings of the wall design,
- B. design calculations,
- C. fabrication drawings for precast unit/modules, and
- D. modified gradation for unit infill (if applicable), and
- E. the designer-supplier's Installation Manual.

Submit the Precast Modular Wall design package to the Department for approval in accordance with the requirements for Drawing in §704-03 Precast Concrete – General. Begin work only after receiving the Materials Bureau written approval.

### 632-3.02 Precast Modular Wall.

**A. Excavation.** Excavation shall be conducted in accordance with the applicable requirements of Section 206, Trench, Culvert and Structure Excavation, and the details specified in the contract documents.

**B. Foundation.** Prior to erection of the wall system, the foundation shall be inspected and approved by the Engineer. Grade the area under the Precast Modular Wall level for the width shown in the contract documents. A minimum of 90% of Standard Proctor Maximum Density will be required.

**C. Subsurface Drainage System.** Install the subsurface drainage system simultaneously with the erection and infill/backfill of the unit/modules to ensure a continuous, uninterrupted system to serve to prevent the accumulation of destabilizing water pressure on the wall. In all cases, the subsurface drainage system will be installed to drain all intercepted water to a point of positive drainage.

**D. Erection.** All unit/modules shall be assembled and handled in accordance with the designer-supplier's instructions and the contract documents.

During erection, any unit/modules damaged beyond repair shall be removed and replaced, by the Contractor, with approved unit/modules at no additional cost to the State.

# PRECAST MODULAR WALLS

The Contractor shall use precast or cast-in-place leveling pads to set the base unit/modules. The wall system shall be constructed to meet the line and grade shown in the contract documents.

**E. Infill and Backfill.** Immediately prior to backfilling, the Engineer shall inspect unit/modules for damage. Unit/Modules, which are damaged beyond repair as specified in §704-03 will be rejected.

Infilling the bins and backfilling behind the wall shall progress simultaneously with the erection of the unit/modules and the material shall be placed as specified in §203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables.

**F. Contractor Responsibility.** Movement of construction equipment and all other vehicles and loads over and adjacent to walls shall be done at the Contractor's risk. Any damage to bins and unit/modules from any cause shall be repaired or replaced by the Contractor at no additional cost to the State.

## 632-4 METHOD OF MEASUREMENT

**632-4.01 Precast Modular Wall.** A Precast Modular Wall will be measured by the number of square feet of the front wall face computed between the payment lines shown on the plans.

**632-4.02 Backfill and Infill for Precast Modular Wall.** Backfill and Unit Infill will be measured under a separate item. Deductions for the volume of the precast concrete element will be made in accordance with the Approved List drawings.

## 632-5 BASIS OF PAYMENT

**632-5.01 Precast Modular Wall.** The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work including leveling pads required to set the precast concrete wall unit/modules.

**632-5.02 Backfill and Infill for Precast Modular Wall.** The combination of backfill and unit infill shall be paid for jointly under a separate item irrespective of an infill's gradation change or topsoil substitution in the front pocket of a unit. The cost of adding water for compaction of backfill and unit infill shall be included in the price bid for the separate item unless the item "Applying Water" is included in the proposal.

### *Payment will be made under:*

Item No.	Item	Pay Unit
632.10XX	Precast Modular Wall, No Color	Square Feet
632.11XX	Precast Modular Wall, Integral Color	Square Feet
	<u>XX</u>	
	<u>Surface</u>	
	01 Plain Concrete Surface	
	02 Textured Surface (hand tooled, raked, etc.)	
	03 Exposed Aggregate Surface	
	04 Architectural Pattern (form liner or stamped)	
	05 As Shown on Plans	

# **PRECAST MODULAR WALLS AND PRECAST CONCRETE CRIBBING**

Make the following changes to the Standard Specifications dated May 4, 2006:

**delete** the Title and Scope of Section 704-06 and **replace** it with the following:

## **SECTION 704-06      PRECAST MODULAR WALLS AND PRECAST CONCRETE CRIBBING**

**SCOPE.** This specification covers the material and fabrication requirements for precast modular walls and precast concrete cribbing.