

# THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY

October 21, 2016

## DESIGN BULLETIN No. 16-02

### SUBJECT: Policy on the Selection of Retaining Walls

The following revisions to the Illinois Tollway Design Section Engineer's Manual, Illinois Tollway Structure Design Manual, Illinois Tollway Geotechnical Manual and the Illinois Tollway Performance Based Retaining Walls (With Moment Slab) Special Provision have been implemented to improve the design, constructability and consistency of retaining walls on the Illinois Tollway system.

The Illinois Tollway Design Section Engineer's Manual has been revised as follows:

- Page 42 Article 4.4.4.5.3 Retaining Walls, add the following bullet points:
  - Provide a recommendation on the use of performance based retaining wall specification considering permits, utility conflicts, MOT staging, right-of-way, Contractor accessibility, schedule, soil conditions, earthwork, and backfill material. The cost/benefit of a performance based retaining wall versus a designed wall shall be considered in the recommendation.
  - Assumptions as to the proposed wall type used for earthwork calculations shall be clearly indicated on the plans. The DSE shall coordinate these assumptions with adjacent contracts through their Illinois Tollway PM, and the corridor DCM (if applicable).
  - Include consideration as to the time of year in which the proposed retaining wall construction will occur in the schedule, earthwork, backfill material, winter protection, or other constructibility issues which may impact the cost or type of wall.
  - Provide adequate time in the construction progress schedule for the Contractor's design of the Performance Based Retaining Walls, including time for review and approval of shop drawings. “
- Page 42 Article 4.4.4.5.4 Subsurface Report, replace the paragraph with the following:

“Provide, where applicable, subsurface investigation and foundation reports for all structures and embankments, including embankment widening, in accordance with the Illinois Tollway Geotechnical Manual.”
- Page 75 Article 4.6.30 Soil Boring Logs, add the following as 1<sup>st</sup> sentence in the 1<sup>st</sup> paragraph:

“Soil boring locations shall be shown on the applicable plan sheets.”

- Page 89 Article 4.11 Construction Support Phase, add the following as 4<sup>th</sup> bullet:
  - “• The DSE may be requested to provide shop drawing reviews of Contractor’s submitted performance based retaining walls to ensure they are in conformance with the Plans and Specifications “

The Illinois Tollway Structure Design Manual has been revised as follows:

- Page 6-2 Article 6.2.4 Performance Based Retaining Walls, add the following item to the numbered list:
  - “ 10. Subsurface Data Profile Plot”
- Page 22-1 Article 22.1 Wall Types, add the following as the last bullet point:
  - “• The Designer shall also evaluate a performance based wall as a feasible wall type. The cost/benefit of a performance based wall versus a designed wall shall be considered in the selection process. If a performance based wall is determined to be the most cost effective retaining wall system, the Designer shall consider permits, Contractor accessibility, right-of-way, schedule, utilities, and MOT, as well as coordination with adjacent walls, sections, or stages and shall develop requirements for the interface in the contract requirements.“
- Page 22-1 Article 22.2 Retaining Wall Selection Process, add the following after the second paragraph:
 

“The entirety of the retaining wall shall be constructed within the Illinois Tollway right-of-way. The constructability of the retaining wall shall be considered in the selection, including that construction operations do not encroach on private property.

If a performance based retaining wall is recommended, any alternate retaining wall types not allowed shall be stated in the construction contract specifications.”

The Illinois Tollway Geotechnical Manual has been revised as follows:

- Page 11 Article 3.6.3.2 Retaining and Noise Abatement Walls, revise heading to be:
  - “3.6.3.2 Retaining, Noise Abatement and Performance Based Walls”
- Page 11 Article 3.6.3.2 Retaining, Noise Abatement and Performance Based Walls, revise the 1<sup>st</sup> sentence of the second paragraph to be:
  - “For retaining walls less than or equal to 20 feet in height, borings shall extend to a depth of twice the total height of wall below footing level, but not less than 20 feet deep.”

- Page 11 Article 3.6.3.2 Retaining, Noise Abatement and Performance Based Walls, add the following new sentences after the third paragraph:


“A boring plan, subsurface data profile plot and soil borings shall be included in the geotechnical report for all wall types.

For performance based retaining and noise abatement walls, the requirements listed above shall apply”

The Illinois Tollway GBSP “Performance Based Retaining Walls (With Moment Slab)” has been revised and a copy is attached. The key points of revisions include:

- The entirety of the retaining wall shall be constructed within the Illinois Tollway right-of-way shown on the Contract Plans. The Contractor shall take the appropriate measures to ensure construction operations do not encroach on private property. No additional right-of-way or easements will be provided for the construction of the retaining walls.
- Where the proposed wall abuts an existing or proposed structure or retaining wall, the design shall provide terminations, transitions, and interface with the existing and/or proposed adjacent walls.
- The retaining walls shall be designed so as to terminate with compatible expansion/contraction joints where the wall abuts with existing or proposed structures, including retaining walls. The Contractor shall coordinate with adjacent Contracts which are also providing performance based walls as indicated in the Plans, so that the retaining walls in both Contracts provide termination or expansion joints at the interface of the walls.
- The retaining wall design shall account for loads and connections of any proposed noise abatement walls which are to be supported by the retaining wall. The noise abatement wall will be measured and paid for separately.
- The work for each retaining wall as designed under this performance based special provision will not be measured.
- The work completely installed and accepted as described in this Special Provision and as shown on the Plans and accepted Working Drawings will be paid for at the contract lump sum price for PERFORMANCE BASED RETAINING WALL at specified location.

Design Section Engineers (DSE) are expected to incorporate this Design Bulletin into all contracts currently under design and future contracts.

  
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Paul D. Kovacs, P.E.  
Chief Engineer

10/25/16  
Date

**PERFORMANCE BASED RETAINING WALLS (Illinois Tollway GBSP)  
(WITH MOMENT SLAB)**

**Effective: April 2, 2007**

**Revised: October 21, 2016**

Description. This work shall consist of providing alternate designs for the walls at the locations shown on the plans by providing for the engineering services, additional subsurface investigations, furnishing of materials, construction and completion in every detail of the work described in this contract for the retaining walls.

**GENERAL REQUIREMENTS PERFORMANCE BASED OPTION**

1. This work shall consist of the complete design, submittal of design drawings (Working Drawings), furnishing the materials, and constructing retaining walls at the locations shown on the Contract Plans (Plans) and in accordance with the requirements of the Plans, the Special Provisions, the Standard Specifications, and the accepted Contractor prepared Working Drawings. The wall designs may be innovative, aesthetically pleasing with functions and characteristics of the facility including, but not limited to, service life, reliability, economy of operation, ease of maintenance, compatibility with adjacent structures, any necessary standardized features, desired appearance and required design standards. Various types of walls may be considered for design. Where the proposed wall abuts an existing or proposed structure or retaining wall, the design shall provide terminations, transitions, and interface with the existing and/or proposed adjacent walls. The entirety of the retaining wall shall be constructed within the Illinois Tollway right-of-way shown on the Contract Plans. The Contractor shall take the appropriate measures to ensure construction operations do not encroach on private property. No additional right-of-way or easements will be provided for the construction of the retaining walls. Types of alternate retaining wall that will not be allowed are:
  - a. Wire faced MSE walls.
  - b. Any non-faced reinforced retaining walls.
  - c. Timber retaining walls.
  
2. In order to meet the performance based retaining wall material and manpower procurements, the Contractor may submit a revised maintenance of traffic (MOT) plan and progress schedule. Any revisions to the MOT plans shall be the responsibility of the Contractor. The Contractor shall be responsible for developing the MOT plan that provides the motoring public with safe travel conditions on the Illinois Tollway, interchange ramps and local roadways during the work period. The MOT plan shall be developed using the same lane, shoulder and emergency pull-out area constraints as shown in the plans and maintaining the contract completion date as set forth in the Illinois Tollway's S.P. 103 Contract Completion Date. The MOT plan shall include all required temporary drainage and any additional temporary pavements, including grading, as required. All work shall be performed in accordance with the Contract's Maintenance of Traffic Special Provision.

3. In addition to the complete design and preparation of Working Drawings for the retaining walls, this work shall include a supplemental soil exploration analysis and testing program as required for design refinement. A subsurface soil exploration and testing program has been conducted in the project area. In addition to the boring logs provided in the Contract Plans, the reports containing the investigations, findings, and recommendations are available for review at the Illinois Tollway on-line plan room. If the Contractor requires additional information, he/she is responsible for obtaining the information to satisfy the performance based design at no additional cost to the Illinois Tollway. All supplemental soil exploration and any soil remediation work (including any temporary earth retention system) required to construct the retaining walls shall be included in the wall cost.
4. This work shall also consist of all labor, materials, monitoring, and equipment necessary to construct the retaining walls. The retaining wall components include, but are not limited to, structure excavation, providing leveling pad, clearing and topsoil stripping, temporary excavation support, steel piles, metal shell piles, test piles, sheet piling, aggregate subbases or subgrades as identified on the retaining wall plans, mechanically stabilized earth (MSE), gravity types, soldier pile and lagging, ground anchors, tie backs, formliner, formliner mockup, concrete stain, reinforced concrete, geocomposite wall drain, porous granular backfill, structural sub-drain, backfill within the limits of the walls shown on the plans, moment slab and parapet or coping, anchorage for light standards, sign structure anchorage, expansion joints, any other methods or materials proposed by the Contractor. Noise abatement walls shall be considered in the proposed designs where shown on the plans. Other work associated with the retaining wall construction, such as the backfill outside the limits of the walls shown on the plans, top soil placement, light standards, lighting conduit, and sign structures are not included in this Special Provision but are paid for as specified elsewhere in this Contract.
5. The Contractor shall identify the Design Consulting Firm to perform the design of the retaining walls. If the Contractor proposes to utilize more than one firm to provide these services, the Contractor shall identify all proposed firms. The Design Consulting Firm(s) shall meet the following minimum qualifications:
  - a. Illinois Department of Transportation Prequalification Structures (Highway Bridges' Advanced Typical).
  - b. Sufficiently staffed and capable of performing the required structural design in accordance with the Contract documents.
  - c. Experience in Illinois Tollway structural design.
  - d. The Illinois Tollway's General Engineering Consultant (GEC), the Program Management Office (PMO), the Design Section Engineer (DSE), the Design Corridor manager (DCM), the Corridor Construction Manager (CCM), and the Construction Manager (CM) firms shall be excluded as the Design Consulting Firm.

- e. Engineering Professional Liability in accordance with Illinois Tollway S.P. 107.1.
6. Suppliers of proprietary retaining wall systems shall meet the following minimum qualifications:
- a. Sufficiently staffed and capable of performing the required structural design in accordance with the Contract documents.
  - b. The Illinois Tollway's General Engineering Consultant (GEC), the Program Management Office (PMO), the Design Section Engineer (DSE), the Design Corridor manager (DCM), the Corridor Construction Manager (CCM), and the Construction Manager (CM) firms shall be excluded as the responsible designer.
  - c. A satisfactory track record of experience can be demonstrated by describing three (3) successful similar projects constructed in the last ten (10) years for a State Department of Transportation, Toll Agency, or Railroad Agency.
  - d. The responsible designer is a structural engineer with three (3) years of retaining wall design experience and is a Licensed Structural Engineer registered in the State of Illinois.
  - e. Engineering Professional Liability in accordance with Illinois Tollway S. P. 107.1.
7. The retaining walls shall be designed to safely support all earth pressures, surcharges and lateral loads from roadway pavement, moment slab, parapet, parapet anchorage, noise abatement wall (NAW), sign structure, and light standards mounted onto the parapet as shown on the Plans, any construction loads, traffic surcharge and impact loads, wind loads on the noise abatement wall and parapet, and any other permanent loads.
8. The retaining walls shall be designed so as to terminate with compatible expansion/contraction joints where the wall abuts with existing or proposed structures, including retaining walls. The Contractor shall coordinate with adjacent Contracts which are also providing performance based walls as indicated in the Plans, so that the retaining walls in both Contracts provide termination or expansion joints at the interface of the walls.
9. The retaining walls shall be designed to accommodate the drainage shown on the plans.
10. It shall be the sole responsibility of the Contractor and the Design Consulting Firm(s) and/or Supplier to design, detail, supply and construct the retaining walls in accordance with the Contract, the Illinois Tollway Structure Design Manual, Standards, Illinois Tollway Design Bulletins, and generally accepted practices.
- a. The design shall be according to AASHTO LRFD Bridge Design Specifications except as modified herein. The wall supplier shall be

responsible for all internal stability aspects of the wall design and shall supply the Engineer with computations for each designed wall section. The analysis of settlement, bearing capacity and overall slope stability will be the responsibility of the Contractor and their Design Consulting Firm(s) and/or Supplier.

11. The Contractor shall verify all existing utilities and structures and shall take all necessary precautions to perform the work in such a manner as to not damage existing utilities or structures located near or beneath the retaining walls. Any damage to existing utilities or structures shall be repaired at no cost to the Illinois Tollway.
12. Any adjustments to other work items shown in the Plans required due to the selection of the retaining wall design shall become the responsibility of the Contractor and their Design Consulting Engineering firm(s) and/or Supplier and shall be reviewed and accepted by the Engineer. The costs for these adjustments shall be the responsibility of the Contractor and shall be included in the bid price for each retaining wall. No cost adjustments will be allowed for any additional pay items where they may require adjustments due to the selection of the retaining wall design.
13. The Contractor shall submit all System Supplier's warranties for materials incorporated into the Work in accordance with Article 105.18 of the Illinois Tollway Supplemental Specifications except as modified herein. The warranty shall be in accordance with Article 109.08(d) Guaranty Against Defective Work of the Illinois Tollway Supplemental Specifications. A 3-year Contractor warranty period shall be provided. In the event any defects occur, the Contractor shall complete the repairs at no additional cost to the Illinois Tollway, within 60 days of written notification of such defects. The warranty shall be co-signed by a nationally registered bonding company and acceptable to the Illinois Tollway. A 5-year Manufacturer/System Supplier warranty period shall be provided. In the event the system fails to meet the 5-year warranty period, the Manufacturer/System Supplier shall complete the repairs at no additional cost to the Illinois Tollway within 60 days of written notification of such defects.

#### **PROPOSAL REQUIREMENTS AND DETERMINATION OF PERFORMANCE BASED RETAINING WALLS**

The Contractor shall submit a brief summary outlining the concept of the proposed performance based retaining walls to the Engineer for consideration prior to commencing with design. New methods will be allowed for consideration should it meet the specified requirements of this special provision. The proposal outline shall consist of the following:

1. The name(s) of the Design Consulting firm and / or the name(s) of proprietary retaining wall system supplier(s) that will perform the design of each retaining wall identified, together with their qualifications.
2. A complete description detailing the proposed performance based retaining wall system, including proposed materials for each component, and acceptance tolerances and/or criteria.

3. Plans showing the Type, Size and Location (TS&L) of the retaining wall.
4. Details of adjustments to other work items due to use of performance based retaining wall system.
5. A brief description of the three successful similar projects required under Item 6.c. in the General Requirements of this special provision. As a minimum the description shall include location, wall height and owner/agency.

The Engineer will review the Proposal submitted to determine whether it meets the requirements of the Standard Specifications, the Special Provisions, specifically this special provision, and all addenda. If the Engineer determines that all of these requirements have been met on a pass/fail basis, then the Proposal will be accepted.

Failure to achieve a "pass" rating on a "pass/fail" factor may result in the Proposal being rejected and disqualified. Failure to submit information in the manner, format, and detail specified may result in the Proposal receiving a "fail" rating and being declared rejected.

The Engineer reserves the right to request clarification of proposal content.

#### **SUBMITTALS**

Within 30 calendar days after the Contractor has achieved a "pass" rating per above Article, and after the award of the contract, the Contractor shall be required to make the submittals identified below. The Contractor may at their discretion include all or part of said documents identified in this section at time of bid.

##### **1. Qualifications**

The Contractor shall submit the Design Consulting Firm(s) and/or proprietary wall system Supplier's qualifications before any other submittal to verify that the firm is qualified to perform all work as specified in accordance with this Special Provision. Following approval from the Engineer of the submitted qualifications, the Design Consulting Firm(s) shall prepare and submit for review design drawings (Working Drawings).

##### **2. Design Quality Plan**

The Design Consulting firm (s) must submit a project specific Design Quality Plan to the Engineer for approval and allow 10 working days for review and approval. The Engineer may choose to audit the Designer's operation to be assured of conformance with the Approved Design Quality Plan.

##### **3. Construction Quality Control Plan**

The Contractor shall submit a Construction Quality Control Plan detailing the materials testing, inspection, and documentation procedures to be used in the fabrication and/or construction of the retaining walls. The Contractor's documented procedures for inspection and testing shall describe the scope of quality control services, frequency of sampling and testing, final wall acceptance



criteria and/or tolerances, the procedures to be followed, and the parties and qualifications of those providing such services. Include specific responsible personnel, pertinent materials and equipment, controlling documentation, and methods of process control.

#### 4. Working Drawings

The Working Drawings shall include a plan, elevation and sections for each wall along with all necessary geometric information and a sufficient number of details to clearly illustrate the work and sequence of construction. The details should include but not be limited to the following items:

- a. All structural details including reinforcement bar bend details. The details shall show all dimensions necessary to construct the elements and all reinforcing steel in the elements.
- b. All details for foundations, including details for steps in the footings, bearing levels for footings and piles, as well as allowable and actual maximum bearing pressures and pile loads.
- c. All details of connections and anchorages for light standards, overhead sign structures and future noise abatement walls.
- d. All termination details, including any interface/expansion joints at existing or proposed adjacent structures or retaining walls.
- e. All details for drainage adjacent to, in front or behind the wall.
- f. All details for transitions between retaining walls and concrete shoulder barrier transition, single face barrier wall, bridge approach.
- g. All geotechnical reports consisting of the subsurface investigation, laboratory testing, geotechnical evaluation and soils logs used to characterize the site soil and groundwater conditions to provide the foundation recommendations for the design of the wall.
- h. Connection details for fiber optics conduit (if required).
- i. Details for utility adjustments or relocations (if required).

The Working Drawings shall be signed, sealed and dated by a Structural Engineer licensed in the State of Illinois. Upon acceptance of these Working Drawings by the Engineer, these plans become part of the contract documents which the Contractor shall use to construct the retaining walls. Any required deviation from these accepted Working Drawings must be approved by the Contractor's Design Consulting Firm and then submitted to the Engineer for acceptance.

The Contractor shall submit five sets of 11" x 17" Working Drawings and two sets of design calculations sealed by a Licensed Structural Engineer registered in the State of Illinois to the Engineer for review and acceptance. One set of Working

Drawings will be returned to the Contractor with any required changes indicated. After acceptance the Contractor shall furnish the Engineer with eight sets of revised Working Drawings (one full size and seven 11"X17"s).

Any deviations from the original accepted construction plans or the Special Provision Design Criteria by the Contractor shall be submitted to the Engineer for review and acceptance prior to submitting the full Working Drawings and design calculations. Proposals containing the use of alternate methods and equipment may be presented for consideration.

The Engineer's review of the above submittals will be made for acceptance that the design has been performed to comply with the Plans, the Illinois Tollway Structure Design Manual and Standards, and this Special Provision. Review of the Working Drawings and methods of construction by the Engineer shall not be construed to relieve the Contractor in any way of their responsibility for the successful performance of the work. The Engineer will be the sole judge as to the acceptability of the proposal. The Contractor shall be responsible for any modification of the contract plans as part of the engineering proposal. The Contractor shall have no claim against the Illinois Tollway for any costs or delays resulting from the review process and/or any disapproval of any proposal, including but not limited to, development costs, anticipated profits, increased material costs and increased labor costs.

The Contractor shall submit Record Drawings, in Microstation and PDF format, and a final report, including any test results, to the Engineer upon completion of the retaining walls.

Design documents produced by the Contractor will become the property of the Illinois Tollway at the completion of the project.

Revisions to the MOT plans shall be developed in accordance with the Manual on Uniform Traffic Control Devices, Illinois Tollway, State, and if applicable with County and Local design criteria, specifications and standards. This plan shall include the following:

1. Plan sheets (22-inch by 34-inch, scale 1-inch equals 50 feet) that show the entire length of the MOT influence for each retaining wall section where modifications are proposed.
2. Plan sheets for each substage.
3. All plan sheets should include locations of required temporary drainage and temporary pavements, types and spacing of all traffic control devices such as pavement markings and drums where the work will vary from the relevant Contract Drawings.
4. Typical sections showing traffic lane widths (center of stripe to center of stripe), clear zones, temporary pavement and the retaining wall work areas.

5. The proposed MOT shall be coordinated to match adjacent contracts. The Contractor shall coordinate with any adjacent contractor to develop a unified MOT plan that will provide continuous lanes of traffic from section to section.
6. The unified MOT plan shall be developed ensuring that the restrictions in the special provisions for Maintenance of Traffic are met.
7. The Contractor shall submit five copies (one full size, four 11"X17"s) of the MOT plan and progress schedule to the Engineer and Construction Manager (CM) for their review and acceptance prior to implementation of the MOT.

If any work is proposed by the Contractor during the winter months, the Contractor shall coordinate with the Illinois Tollway's Maintenance Department regarding requirements for snow removal and storage and any other maintenance related issues. The Illinois Tollway may require plowing or stockpiling of snow, from the roadway, in the work zone. It shall be the Contractor's responsibility to remove any snow from the work zone. No additional compensation will be given to the Contractor for snow removal from within the work zone.

#### **PERFORMANCE BASED OPTION DESIGN CRITERIA**

The retaining walls shall be designed in accordance with the latest edition of the following documents:

- AASHTO LRFD Bridge Design Specifications
- Illinois Tollway Structure Design Manual
- Illinois Tollway Geotechnical Manual
- Illinois Tollway Design Bulletins
- Illinois Tollway Standard Drawings.

The retaining walls shall be designed for a service life in accordance with the Illinois Tollway Structure Design Manual. The entire wall system shall take into account the effects of corrosion and/or adequate protection against corrosion.

Any changes to the offset from edge of pavement and /or grades as compared to the lines and grades shown on the plans, must be approved by the Engineer prior to the submittal of the proposal.

External vertical and lateral surcharge loads, such as those specified in Design Criteria Section 1 and 2 below, shall be accounted for in the wall design. The presence of all appurtenances behind, in front of, mounted upon, or passing through the wall such as drainage structures, utilities, noise abatement wall and other structure foundation elements or other items shall also be accounted for in the stability design of the wall.

#### **1. Vertical Loads**

In addition to the retained earth loads and hydrostatic loads, the following loads shall be applied as vertical surcharge loads behind the retaining wall:

- Roadway Pavement or Shoulder

- Moment Slab, parapet and parapet anchorage (where applicable)
- Traffic Live Load

The following loads shall be applied as vertical loads on the retaining walls:

- Parapet
- Noise Abatement Wall (NAW)
- Light Standards with standard support (no NAW)
- Light Standards with support and NAW

## 2. Lateral Loads

In addition to lateral earth pressures, the following loads shall be applied as lateral loads on the retaining walls in accordance with Article 5.1 and applicable portions of Section 22 of the Illinois Tollway Structure Design Manual:

- Traffic impact load.
- Wind load on parapet.

A moment slab or parapet anchorage may be required to transfer the lateral loads into the soil mass behind the retaining wall facing through friction between the underside of the moment slab or parapet anchorage and the supporting soils. Moment slabs, parapets or parapet anchorages shall be considered as an element of the retaining wall.

## 3. Design Soil Properties

Reference may be made to the boring logs and subsurface data profile plots provided in the plan sheets, which indicate subsurface stratigraphy and soil descriptions, results of field and laboratory tests, as well as water level observations. The provided geotechnical report was prepared by a Illinois licensed Professional Engineer specializing in geotechnical work for the retaining wall structures and provides some additional test data and discussion regarding soil properties appropriate for design. However, the contractor shall be responsible for using soil properties that are consistent with available test data and are appropriate for the chosen methods of analysis and design. In addition any and all supplementary geotechnical investigations shall be the responsibility of the contractor and at their cost.

## 4. Stud Shear Connectors

Stud type shear connectors welded to sheet piles, shall be designed in accordance with the latest edition of AASHTO to transfer all the lateral and vertical loads from the cast-in-place concrete retaining wall facing to the supporting elements.

## 5. Work Not Covered by Standard Specifications

Proposed construction and any contractual requirements not covered by the Standard Specifications may be covered by Contract plan notes or by Special Provisions and all requirements of such Contract plan notes and Special Provisions shall be considered as a part of the Contract.

## **MATERIALS**

The materials used in the construction of the retaining walls shall conform to Section 522 of the Standard Specifications and as described below:

- a. The concrete used in cast-in-place retaining wall sections shall be Portland cement Class SI concrete according to Section 1020 of the Standard Specifications.
- b. The concrete used for cast-in-place concrete facing shall be Portland cement Class SI concrete according to Section 1020 of the Standard Specifications.
- c. The concrete used for parapet and barrier transitions shall be Portland cement Class BS concrete according to Section 1020 of the Standard Specifications.
- d. The concrete used for moment slabs shall be in accordance with the Illinois Tollway Special Provision "High Performance Concrete Moment Slab Structures."
- e. The formliner treatment and concrete stain shall be provided in accordance with the Illinois Tollway Special Provision "Form Liner Simulated Limestone Surface and Form Liner Mockup."
- f. Concrete sealant shall be in accordance with Section 1026 of the Standard Specifications.

Materials used in the submitted design that are not covered by this special provision shall be submitted to the Engineer for review and acceptance. Performance based specifications that show that the materials used meet the Design Criteria shall be submitted for each item not covered by this special provision.

## **CONSTRUCTION REQUIREMENTS**

Construction requirements for the retaining walls shall conform to Section 522 of the Standard Specifications, except as modified herein:

Replace the first paragraph of Article 522.09(a) of the Standard Specifications with the following:

Design Criteria. Design computations and shop drawings shall be submitted according to Article 522.05 of the Standard Specifications. The Contractor shall be responsible for all internal stability aspects and settlement, bearing capacity and overall slope stability of the wall design, and shall submit to the Engineer computations for each designed wall section. The wall shall not be designed for seismic loading unless noted on the plans.

Replace the first paragraph of Article 522.09(a)(1) of the Standard Specifications with the following:

MSE Walls. The reduced section of the soil reinforcing system shall be sized to allowable stress levels at the end of a 75-year design life. For walls in front of bridge abutments, a 100-year design life is required. The design life for epoxy and aluminizing shall be assumed to be 16 years. The corrosion protection for the balance of the design life shall be provided using a sacrificial steel thickness computed for all surfaces.

Replace the fourth paragraph of Article 522.09(b)(1) of the Standard Specifications with the following:

When pile sleeves are specified they are to reduce skin friction between the select fill and pile. The pile sleeve material, shape, and wall thickness shall be submitted to the Engineer for approval. It shall have adequate strength to withstand the select fill pressures without collapse until after the completion of the wall settlement. The sleeve size shall be as specified on the plans. If the sleeve size is not specified on the plans, the annulus between the pile and the sleeve shall be as small as possible while still allowing it to be filled with loose, dry sand after wall erection.

Replace the first paragraph of Article 522.10(a) of the Standard Specifications with the following:

Design Criteria. Design computations and shop drawings shall be submitted according to Article 522.05 of the Standard Specifications. The design shall be according to AASHTO LRFD Bridge Design Specifications for Prefabricated Modular Walls, expect modified herein. The Contractor shall be responsible for internal and external stability aspects of the wall design, (including sliding, overturning and bearing pressure) and analyses of settlement and overall slope stability.

Replace the first paragraph of Article 522.12 (a) of the Standard Specifications with the following:

Design Criteria. Design computations and shop drawings shall be submitted according to Article 522.05 of the Standard Specifications. The design shall be according to AASHTO LRFD Bridge Design Specifications for Prefabricated Modular Walls, expect modified herein. The Contractor shall be responsible for internal and external stability aspects of the segmental concrete block wall design, (including sliding, overturning and bearing pressure) and analyses of settlement, bearing capacity and overall slope stability.

Additional construction requirements for the retaining walls shall be as shown on the plans and as described herein:

Excavation below clearing and topsoil stripping required for the retaining walls shall be performed in accordance with Section 502 of the Standard Specifications and will be included for payment in this work. Except as allowed for differing site conditions under the Illinois Tollway Supplemental Specifications, Article 104.03, no increases will be made to the earthwork pay items if the alternate retaining wall changes the required excavation and/or embankment limits as shown on the Plans.

Any temporary excavation support required to support the faces of excavation during construction shall not be paid for separately, but will be included for payment in this work.

For each retaining wall requiring pile support, at least two (2) test piles shall be driven. The Contractor shall furnish and drive test piles at locations shown on the accepted Working Drawings in accordance with Article 512.15 of the Standard Specifications.

Cast-in-place concrete work shall be performed according to the applicable portions of Section 503 and Section 1020 of the Standard Specifications for concrete placement. All reinforcement designed by either the Contractor or Illinois Tollway Design Consulting Firm and specified in the accepted Working Drawings shall be furnished and installed in accordance with Section 508 of the Standard Specifications.

Reinforced concrete moment slabs shall be installed in accordance with the Illinois Tollway Special Provision "High Performance Concrete Moment Slab Structures."

The formliner treatment and concrete stain shall be installed in accordance with the Illinois Tollway Special Provision "Form Liner Simulated Limestone Surface and Form Liner Mockup."

Concrete sealant shall be applied to the face of any wall within 25 feet of the edge of pavement in accordance with Article 587.03 of the Standard Specifications.

Protective Coat shall be applied to the moment slab system in accordance with 503.19 of the Standard Specifications.

If additional construction specifications are required to incorporate the Contractor designed retaining wall(s), they shall be produced by the Contractor's Designer and be submitted to the Engineer for review in the same manner as drawings.

#### **MAINTENANCE OF TRAFFIC**

The maintenance of traffic shall be in accordance with the Maintenance of Traffic plans and Section 701 of the Illinois Tollway Supplemental Specifications. In case of conflict in what is shown in the Maintenance of Traffic plans and what is described in Section 701 of the Illinois Tollway Supplemental Specifications, the work as described in the Maintenance of Traffic Special Provision shall govern. The work area speed limit shall be in accordance with contract requirements and the Illinois Tollway's Roadway Traffic Control and Communications Manual.

**Method of Measurement.** This work for each retaining wall as designed under this performance based special provision will not be measured.

All components required to construct the retaining wall shall be considered as part of the work in the contract's unit price for the retaining wall and will not be measured separately.

The retaining wall components include, but are not limited to the items described herein, and any other methods or materials proposed by the Contractor.

The retaining wall design shall account for loads and connections of any proposed noise abatement walls which are to be supported by the retaining wall. The noise abatement wall will be measured and paid for separately.

The contractor shall coordinate with the Engineer the connection and exact configuration of any noise abatement wall shown in the Contract documents that is to be installed by others.

Revisions to the maintenance of traffic, including the design, will not be paid for separately but will be considered as part of each retaining wall location.

**Basis of Payment.** This work completely installed and accepted as described in this Special Provision and as shown on the Plans and accepted Working Drawings will be paid for at the contract lump sum price for PERFORMANCE BASED RETAINING WALL at specified location.

Revisions to the maintenance of traffic, including the design, will not be paid for separately but will be considered as part of each retaining wall location.

Pay Item Number	Designation	Unit of Measure
JT570P51	PERFORMANCE BASED RETAINING WALL, LOCATION 1	L SUM
JT570P52	PERFORMANCE BASED RETAINING WALL, LOCATION 2	L SUM