OHIO DEPARTMENT OF TRANSPORTATION

Office of Geotechnical Engineering

1980 W. Broad Street, Columbus, OH 43223

ATTACHMENT J

SUBMITTAL REQUIREMENTS FOR APPROVAL OF PREFABRICATED MODULAR RETAINING WALL SYSTEMS

Revised
April 11, 2018
Submittal Requirements for Approval of Prefabricated Modular Retaining Wall Systems

The wall system submittal should include the following sections, with section contents explained on the next pages in addition to the requirements addressed in Section 4.0 of the Prefabricated Retaining Wall System Approval Process document. Please note that some items addressed under Section 1.0 (SYSTEM) are repetitive to information requested in the Letter of Intent.

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1.0 SYSTEM

1.1 Description of System and Components

- Summarize what the system consists of and what is not included, but necessary, to construct the wall.
- Summarize external materials and variables which will influence the design, construction and performance of the system.
- List each component of the system.
- List material requirements for each component.

1.2 History, Performance, and Maintenance

- Summarize the history of development and application of the system.
- Summarize refinements made to the system, since inception.
- Summarize performance (with photos, where available) of completed structures, including:
  - Oldest
  - Tallest
  - Projects experiencing maximum measured settlement (total and differential)
  - Measurements of lateral movement / tilt
  - Demonstrated aesthetics
  - Project photos
  - Maintenance and performance history, including improvements that have been made based on the experience with the system.
- Summarize any incidents where approval was revoked by a government agency for the system or any component of the system during the past five years. List these incidents if any, and describe the relationship between the rejected or revoked product component and the system being evaluated in this report. Where applicable, include a description of any predecessor product component or system.

1.3 Ohio or other State Applications

- Summarize the history of application of the system.
- Summarize the history of application of the system on Ohio projects.
- Summarize design issues specific to Ohio applications.
- Summarize construction issues specific to Ohio applications.
- Provide a list of non-ODOT users, including a contact person for each user with their telephone number, email address and a summary of all projects where the system has been used.

1.4 System Warranties

Provide a copy of any system warranties.
1.5 Designated Responsible Parties
Summarize responsibilities for:
- System performance
- Material performance
- Project-specific design and construction details

1.6 Insurance Coverage for Responsible Party
List insurance coverage types (e.g., professional liability, product liability, performance), limits, and basis (i.e., per occurrence, claims made) provided by each responsible party.

2.0 DESIGN

2.1 Summary of Design Parameters and Design Approach
Provide a summary of the following, and note applicable standard and/or test method used to quantify value:
- Wall elements materials properties
- Connection between modular units (friction, passive, or combinations)
- Wall soil interaction parameters
- Wall restraints and design lateral earth pressures (active and at-rest) and minimum design lateral pressure
- Direct shear interaction coefficient between modular units
- Direct shear interactions at base of wall
- Foundation bearing resistance or strength parameters
- Pre-stressing steel or reinforcing steel
- Connection materials and requirements for composite or multi-part connected walls (laterally and vertically)

2.2 Design Responsibility
- State designated responsible party for project-specific design.
- List professional liability insurance coverage limits and basis (i.e., per occurrence, claims made) provided by the design responsible party.
- Detail the system designer's Quality Control / Quality Assurance programs for project designs.
- List those items of a project design that you understand, or assume, are the responsibility of ODOT.

2.3 Summary of Design Procedures
- Summarize all deviations from the most current ODOT design specifications or requirements and the American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications, along with theoretical or empirical information which support such deviations.
- Summarize wall shape and size requirements.
- Summarize when and how external stability (global stability, bearing resistance, sliding resistance, and limiting eccentricity) is assessed.
• Summarize when and how internal stability is assessed.
• Summarize seismic design considerations.
• Detailed design for connectors between wall elements, if applicable.
• Detail design modification for tiered structures.
• Detail design modification for acute corners.
• Detail design to overcome obstructions (e.g., drainage structures, deep foundations, etc.) in backfill zones.

2.4 Summary of Example Calculations
• Provide detailed calculations for the external stability of the wall.
• Provide detailed calculations for the internal stability of the wall material and connectors, if any.
• Provide detailed calculations for stability at the interface between modular units, with respect to sliding and overturning failure modes.

2.5 Limitations
List all design limitations, including seismic loading; environmental restraints; wall height; external loading; foundation bearing resistance, settlement, differential settlement; impact/crash loads, and others.

3.0 MATERIALS
Provide material specifications describing the material type, quality, certifications, lab and field testing, and acceptance and rejection criteria, along with support information (and where noted, a sample of the material) for each of the following material items. Include representative test results (lab and field) clearly referencing the date, source, and method of test, and where required, the method and detailed explanation of interpretation and extrapolation. Note the source of the supplied information, include a listing of facilities normally used for testing (e.g., in-house and independent). Clearly identify the materials listed below that do not apply to the product being submitted.

3.1 Modular Unit
• Standard dimensions and tolerances
• Reinforcing steel details
• Joint sizes and details
• Modular unit material requirements
  ○ Concrete strength (minimum)
  ○ Concrete % air (range)
  ○ Freeze thaw durability
  ○ Galvanization requirements (bin wall steel shall be galvanized according to CMS 610.03B)
• Bearing pads (joints)
• Spacers (pins, etc.)
• Joint filter requirements: geotextile or graded granular
• Aesthetic choices (texture, relief, color, graffiti treatment)
• Other facing materials
3.2 Backfill
- Soil classification
- Gradation range
- Unit weight (design and representative measured)
- Friction angle (design and representative measured)

3.3 Leveling Pad
- Material type (cast-in-place/precast/granular)
- Size requirements
- Concrete strength, minimum, if applicable
- Gradation range and compaction requirements (for granular leveling pads)

3.4 Drainage Elements
- Drainage fill classification and gradation range
- Surface drainage components
- Subsurface drainage components

3.5 Coping
- Precast concrete coping
- Cast-in-place coping
- Precast and cast-in-place combination
- Installation/attachment method and details

3.6 Traffic Railing / Barrier

3.7 Connections to Appurtenances

3.8 Other Materials
- Corner elements
- Slip-joint elements

3.9 Quality Control / Quality Assurance of Materials
- Material suppliers
  - Modular units
  - Foundation or leveling pad
  - Connectors between modular units
  - Backfill
  - Wall drainage elements
- Fabricator(s)
- Test facilities (internal and external)

4.0 DETAILS

4.1 Standard Details
Provide detailed drawings of the following standard details; electronic copy in pdf
and Microstation v8i format, SS3 or later version):

- Leveling pad
- Modular unit sizes and dimensions
- Erection details of modular units including temporary bracing, batter, joint spacing, etc.
- Inter-unit connections
- Top of wall coping
- Top of wall traffic barrier
- Bottom of wall traffic barrier
- Top of wall membrane protection for areas where deicing salts are used
- Construction of cast-in-place traffic barriers
- Joint drainage details
- Surface drainage or weep holes, if needed
- Subsurface drainage
- Subsurface drain outlets
- Overhead light standard incorporated into the wall facing
- Slip joint detail
- End of wall
- Connection to appurtenances (e.g., box inlets and large obstructions)
- Fill placement procedures
- Architectural face finish options

4.2 Example Details

Provide detailed drawings illustrating typical examples of the following details:

- Wall drainage system
- Stepping of leveling pad with existing and final grades
- Stepping of top of wall with final grade

5.0 SPECIFICATIONS, CONSTRUCTION, AND MAINTENANCE

Provide the following information related to construction of the system:

5.1 Fabrication of Precast Modular Units

- Curing times
- Form removal
- Concrete surface finish requirements

5.2 Fabrication of Bin Wall Steel Components

- Bolting requirements
- Joint sealing requirements
- Requirements for wall construction on a curve (if applicable)
5.3 Field Construction Manual

Provide a documented field construction manual describing in detail, with illustrations as necessary, the step-by-step construction sequence, including requirements for:

- Foundation preparation
- Special tools required
- Leveling pad
- Wall erection
- Wall batter for alignment
- Steps to maintain horizontal and vertical alignment
- Backfill placement / compaction
- Erosion mitigation
- All equipment requirements

5.4 Construction Specifications

Include sample construction specifications which address:

- Materials requirements
- Field sampling, testing, and acceptance / rejection requirements
- Installation requirements
- Maintenance requirements
- Aesthetics compliance, including texture, color, graffiti treatment, and durability of aesthetic features

5.5 Contractor or Subcontractor Prequalification Requirements

List any contractor or subcontractor prequalifications

5.6 Quality Control / Quality Assurance of Construction

Detail the quality control and quality assurance measurements required during construction to assure consistency in meeting performance requirements, and responsible parties for each

5.7 Construction / In-Service Structure Problems

Provide case histories of structures where problems have been encountered, including an explanation of the problems and methods of repair

5.8 Maintenance

Provide a listing of maintenance requirements to maintain performance and repair damage. If available, provide a maintenance manual