

SECTION 29 – SHOP DRAWINGS, FALSEWORK PLANS, AND MSE WALL DESIGN

29.1 GENERAL *(Rev. 06-29-22)*

To make the review process more efficient, the Department encourages the Contractor to submit electronic copies of shop drawings and design calculations for approval in lieu of printed copies. Every submittal must include the contract number, Contractor's name, and the contact person with their contact information. All drawings and calculations should be submitted in the units used for the contract. Regardless of the submittal process described below, Contractors shall communicate directly with the PEMS to keep them informed of the status of submittals.

29.2 SHOP DRAWING AND FALSEWORK PLAN REVIEW *(Rev. 01-09-23)*

29.2.1 LPA Contracts

For LPA contracts, the review of all shop drawings and other items listed in 29.2.3 State Contracts are the responsibility of the LPA or their designated representative. Contractors on LPA projects are to submit shop drawings and falsework plans as directed by the LPA. Questions about LPA procedures should be directed to the District Local Projects Administrator.

a. Structural Members and Items

Shop drawings for structural members and components are to be submitted to the LPA or their designated representative for review and approval. Since the Department is responsible for fabrication inspection of structural members, upon completion of the shop drawing review, the LPA or their representative should forward an electronic copy of the approved shop drawings to the Department's Office of Bridge Design, at BridgeDesignOffice@indot.IN.gov.

b. Approval of Pile Driving Equipment

The Contractor shall submit to the LPA or designated representative, a completed pile and driving equipment data form at least 15 calendar days prior to driving piles. The Engineer of Record (EOR) shall review the pile and driving equipment data form for acceptance. The pile and driving equipment data form is available on the Department's website at: <https://erms12c.indot.in.gov/fcrdocuments/>. The Contractor will be notified by the LPA or designated representative, of the acceptance of the proposed pile driving system within 15 calendar days of the receipt of the pile and driving equipment data form. Acceptance of pile and driving equipment does not relieve the Contractor of the responsibility to provide equipment suitable for driving the specified piling to the required bearing without damage. The LPA or designated representative shall notify GS, at geotech@indot.in.gov, and the Engineer of the acceptance of the proposed pile driving system.

29.2.2 Design-Build Contracts

Responsibilities and procedures for shop drawing review and approval is typically described in the design-build contract documents. If not described, the procedures or portions described in 29.2.3 State Contracts are to be followed.

Structural Members and Components

Once the shop drawings for structural members and components are approved by the responsible party designated in the contract documents, the Contractor must submit the drawings directly to Burgess & Niple, Inc. at shopplanreview@burgessniple.com for contract document management and archival within ERMS.

Depending on the design-build contract documents, either the Department or the Contractor will be responsible for fabrication inspection of structural members and components. If inspection is the responsibility of the Department, the Contractor must email StructuralMemberQAInspection@indot.in.gov prior to shop drawing approval. This will ensure inspection services are coordinated and available, as fabrication cannot begin without them

29.2.3 State Contracts

The following procedures have been implemented for submittal and review of shop drawings, falsework plans, and related items as described below. If the DO has any concerns about the structural integrity of any shop drawings submitted with a Professional Engineer's stamp, they should contact their Construction Management FE for further assistance.

a. Structural Members and Items

Shop drawings for the following items are to be submitted by the fabricator or supplier directly to Burgess & Niple, Inc. for review and approval. Shop drawings must be in accordance with the applicable specifications. These items do not require a Professional Engineer's stamp for submittal. Any Request for Information (RFI) correspondence between the fabricator/supplier and EOR that occurred post bid must be submitted with the shop drawings.

- Structural steel & structural concrete members
- Modular expansion joints
- S-S joints
- Elastomeric bearings.

Shop drawings must include the following:

- Contract number with prefix
- DES/Project number and lead DES number
- Bridge file number
- County
- State
- Location description.

Shop drawings are to be sent to Burgess & Niple at shopplanreview@burgessniple.com. Their office phone number is (317) 237-2760. Burgess & Niple will send approved shop drawings to the Department's Division of Bridges at: BridgeDesignOffice@indot.IN.gov for distribution to the District Construction office.

b. Mechanically Stabilized Earth (MSE) Retaining Walls

Shop drawings and design calculations for MSE retaining walls must be stamped by a Professional Engineer and submitted by the Contractor electronically to GS at MSEWallShopDrawings@indot.in.gov and the EOR for review and approval. The contract number shall be part of the subject line.

The EOR, as part of review, should complete the MSE Wall Shop Drawing Review Checklist. An editable copy of the MSE Wall Shop Drawing Review Checklist is available from the Department's [Editable Documents webpage](#), under Geotechnical. The MSE Wall Shop Drawing Review Checklist is optional for submittals made prior to May 1, 2021.

The EOR will attach a cover letter and send a copy of approved shop drawings to the Contractor/submitter and to the District Construction office for further distribution.

c. Sound Barrier Systems

Shop drawings and calculations for sound barrier systems are to be submitted by the Contractor or fabricator directly to the EOR for review and approval. The plans and calculations must be stamped by a Professional Engineer. The designer will attach a cover letter and send a copy of approved plans and calculations to the submitter and to the District Construction office for further distribution.

d. Precast Concrete 3-Sided Structures and Box Culverts

Shop drawings and design calculations are to be submitted for all precast concrete 3-sided structures and for precast concrete box culverts that have a dimension or design earth cover not listed in Table 1 of ASTM C1577. Shop drawings and design calculations must be stamped by a Professional Engineer. Shop drawings for 3-sided structures must include details to provide sufficient horizontal restraint (prior to backfill being placed) unless the design demonstrates such restraint is not required. Load rating calculations must be included for structures whose span measured along the centerline exceeds 20 ft, except where the height of cover is greater than 8 ft and exceeds the perpendicular span length.

Plans and calculations should be submitted by the Contractor to the PEMS. The PEMS should send the shop drawings directly to the EOR for review and approval. After review, the EOR should return the shop drawings back to the PEMS.

For structures requiring load rating, the Contractor should copy the EOR on the submittal to the PEMS. The EOR should also submit a New Design request in the Load Rating Request Application (LRRRA) through ITAP. The EOR should upload the shop drawings, load rating calculations, and load rating summary (*see* RPD 700-B-301d) with the New Design LRRRA request. An automated email notification will be sent from LRRRA to the EOR when the load rating review has been completed. If the EOR's review requires revisions to the shop drawings that affect the load rating, a resubmittal within LRRRA is required.

e. **Welded Wire Reinforcement**

Shop drawings must be stamped by a Professional Engineer. Shop drawings and design calculations are to be submitted to the PEMS for locations where the Contractor proposes to substitute welded wire reinforcement in lieu of the reinforcing bars shown on the plans.

The PEMS should send the drawings and calculations directly to the EOR for review and approval and copy the Office of Bridge Design Manager at BridgeDesignOffice@indot.IN.gov. The EOR will send approved shop drawings to the PEMS for distribution to the Contractor.

f. **Traffic Items**

Shop drawings for Signing, Signals, and Lighting will be reviewed and approved by the Department's Office of Traffic Design and Review. These items typically include all overhead sign structures, signal strain poles and cantilevers, high mast lighting, luminaries, and light poles. Plans and calculations should be submitted by the Contractor to the PEMS and forwarded to the Office of Traffic Design Manager at TrafficDesignReview@indot.IN.gov for review and approval.

The Office will distribute approved shop drawings to the PEMS for distribution to the Contractor.

g. **Falsework Plans and Temporary Bridge Drawings**

Falsework plans for the following items are to be submitted to the PEMS. Each sheet must include the contract number, Contractor's name and must be stamped by a Professional Engineer.

- Cofferdams
- Deck Falsework - temporary

- Coping falsework
- Falsework for reinforced concrete slab superstructures
- Falsework for hammerhead pier caps
- Designs for temporary bridges for runarounds.

Temporary bridge design submittals must also include design calculations.

The PEMS will review drawings for compliance with the specifications and the specific job conditions only. Questions should be directed thru the Area Engineer and District Construction office.

h. Permanent Metal Deck Forms

Shop drawings submitted by the Contractor must be stamped by a Professional Engineer. Shop drawings for permanent metal deck forms are to be submitted by the Contractor to the PEMS for review for compliance with the specifications and the specific job conditions only. The Division of Construction Management and District Support maintains a deck form calculation spreadsheet that can assist in review of metal deck forms if concerns arise. Reference can be made to Section 5.9 of these instructions.

i. Foundation Seals and Deck Pour Sequences

Requests for use of foundation seals not shown in the plans are to be submitted to the Department's Geotechnical Services Division at geotech@indot.in.gov for review and approval. The submittal must include the contract number, Contractor's name and indicate the location and dimensions of the seal. The Office will distribute approved requests.

Planned deck pour sequences are to be submitted by the Contractor to the PEMS. The PEMS should send the deck pour sequence directly to the EOR for review and approval and copy the Office of Bridge Design at BridgeDesignOffice@indot.IN.gov.

The EOR will distribute approved requests.

j. Approval of Pile Driving Equipment

The Contractor shall submit a completed electronic pile and driving equipment data form at least 15 calendar days prior to driving piles to GS. A copy shall also be furnished to the Engineer. The pile and driving equipment data form is available on the Department's website at <https://erms12c.indot.in.gov/fcrdocuments/>. The Contractor will be notified of the acceptance of the proposed pile driving system within 15 calendar days of the receipt of the pile and driving equipment data form. Acceptance of pile and driving equipment does not relieve the Contractor of the responsibility to provide equipment suitable for

driving the specified piling to the required bearing without damage.

k. Stream Crossings and Work Bridges

Proposals for stream crossings and work bridges for construction traffic are to be submitted to the District Construction office for review and approval. If the proposal varies from any of the contract's waterway permit conditions, the Contractor must obtain approval for the change from the appropriate agency.

l. Miscellaneous

Shop drawing submittals for miscellaneous items not covered by the above (post tensioning plans, non-standard manholes, etc.), should be submitted thru the PEMS. The PEMS should work thru the District Construction office and CM to determine the approval process for these items.

29.3 MECHANICALLY REINFORCED EARTH (MSE) WALL INSTALLATION

(Rev. 03-01-22)

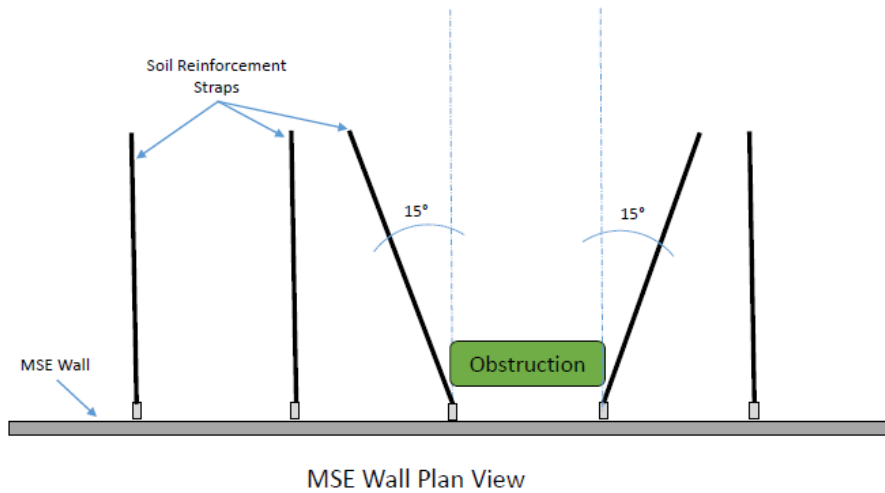
29.3.1 Design Components

Internal, external, and compound stability design components are the responsibility of the Contractor. The Contractor shall submit working drawings and design calculations. The design factors used shall be current and acceptable to the Department. The design will be approved prior to the construction of the wall in accordance with 29.2.3 of these instructions. Questions on wall design information, including working drawings and design calculations should be directed to the EOR and to GS.

The top of the leveling pad elevation is required to be a minimum of 1.0 ft above the ordinary high water mark, OHWM, or groundwater table elevation, whichever is higher. The leveling pad dimensions are required to be 12 in. wide and 6 in. thick and shown on the shop drawings.

29.3.2 Reinforcing Straps

Reinforcement straps should be straight and level when placed. There should not be vertical gaps between the wall connection and its strap end. Straps should be the correct length for the location. Contractor supplied shop drawings and working drawings should be checked for information concerning the reinforcement strap location, type, and length. Soil reinforcement should splay no more than 15° from a line perpendicular to the wall face. This angling of soil reinforcement is typically used to avoid obstructions, such as drainage structures, which may be located just inside the MSE wall structure. Field changes to reinforcement to avoid obstructions should not be made unless shown on the approved drawings. The figure below illustrates the concept.



Grading around and backfilling of the wall should be carefully inspected to ensure proper, uniform, and level lift placement. Improper grading around the wall can cause component failures. Careless placement and improper compaction methods used in constructing the backfill can cause undesirable wall deflections and reduce overall retaining capacity.

A comprehensive instructional presentation of MSE installation is located at <http://www.in.gov/dot/div/contracts/tutorial/MSEWall.pptx>