

500 STRUCTURES

ITEM 501 STRUCTURES—GENERAL

501.01 General

501.02 Verification of Dimensions

501.03 Notification of Fabricator

501.04 Shop Drawings

501.05 Submittal of Working Drawing and Calculations

501.06 Test Reports

501.01 General. This specification includes the general requirements for building the various items that constitute the completed structure.

Perform the work, including fabrication, erection, and construction, so that the entire structure and all its component parts will function as designed.

501.02 Verification of Dimensions. Verify that all dimensions established by the Engineer are correct.

501.03 Notification of Fabricator. When furnishing materials under Items 513, 515, 516, 517, and 518, select a fabricator from the Ohio Department of Transportation's pre-qualified fabricators list in effect the date of the Contract letting. Before or at the preconstruction conference, provide a written notification to the City of the selected steel fabricators and precast concrete fabricators.

501.04 Shop Drawings. Provide shop drawings detailing structural steel, metal structural elements, prestressed concrete members, precast concrete structural elements, and other similar materials requiring either shop or field fabrication according to the appropriate *AASHTO Standard Specifications for Highway Bridges* and Item 501.

A. Contractor Acceptance of Shop Drawings for Items 513 and 515. After preparing the shop drawings for Items 513 and 515, submit the drawings to the City at least 7 days before the pre-fabrication meeting, or before the start of fabrication on Item 513, UF Level. City approval of these shop drawings is not required.

For structures carrying railroad traffic, submit four copies of the prepared shop drawings at least 40 days prior to the pre fabrication meeting to each railroad company involved for review and approval. Resolve all railroad comments prior to supplying the letter of written acceptance to the City. The acceptance submission to the City shall include one set of shop drawings approved by each railroad company involved; copies of all documentation between the railroad(s) and the Contractor; and four sets of Contractor accepted shop drawings for each railroad company involved.

Include in the shop drawing submission a written acceptance letter and four copies of each drawing, unless additional copies are requested. For structures carrying railroad traffic, furnish 4 additional sets of shop drawings for each railroad company involved. Also, furnish the fabricator's quality control specialist with one additional set of these drawings before the pre-fabrication meeting.

Prepare the shop drawings by or under direct supervisory control of an Ohio Registered Engineer having personal professional knowledge of *AASHTO Standard*

501.05

Specifications for Highway Bridges, and Items 513 and 515. The Registered Engineer shall seal and date each drawing confirming that the drawings meet the intent of the plan, (as designed). Have all questions and comments addressed before submitting the shop drawings.

The Contractor's written acceptance letter shall document acceptance of the shop drawings including confirmation of field verification, as required, and descriptions of issues resolved between the Contractor, the fabricator, or the City.

By accepting these shop drawings, the Contractor represents to the City that all dimensions and elevations of existing conditions shown on the plans have been field measured and verified, and that these shop drawings comply with all the materials requirements, construction requirements, contract requirements, and performance criteria. The Contractor further represents that these drawings have been coordinated and verified with the details of the work to be performed by other fabricators and entities on the project. The City will not make any allowance for additional cost or delays to the Contractor for incorrect fabrication as a result of failure to coordinate or perform this acceptance.

If the City requests changes on these shop drawings, or the Contractor makes changes in addition to those expressly requested, ensure that the shop drawings are accepted as above with suitable revision marks to identify the changes.

Schedule the pre-fabrication meeting after the Engineer receives the drawings. Fabrication may begin after the pre-fabrication meeting is complete or after receipt of Item 513, UF Level drawings.

B. Fabricator Coordination of Shop Drawings for Items 516, 517, and 518. The Contractor and fabricator must coordinate these shop drawings. Ensure that shop drawings meet requirements for materials, field measurements, construction requirements, contract requirements, performance criteria, and similar data. The coordination must also include details of the work to be performed by other fabricators and entities on the project. The City will not make allowance for additional cost or delays to the Contractor for incorrect fabrication as a result of failure to coordinate or perform this coordination.

Submit two copies of the shop drawings to the Engineer with the materials delivered to the project. Do not incorporate material into the work until after submitting the drawings. City approval of these shop drawings is not required.

C. Shop Drawing General Requirements. Specific requirements are specified in Item 513, 515, 516, 517, or 518.

Make the prints from tracings, neatly and accurately drawn on 22 × 34-inch (559 × 864 mm) sheets.

After all fabrication is completed for Item 513 and 515, furnish, to the Engineer, a copy of each final Contractor accepted shop drawing on a digital media storage device according to City Supplement 1002, or as otherwise specified. For structures carrying railroad traffic, furnish an additional digital media storage device or, at the option of each railroad, furnish a set of full-size drawings.

501.05 Submittal of Working Drawings and Calculations. Design and perform all procedures as directed by the AASHTO STANDARD SPECIFICATIONS or the AASHTO LRFD BRIDGE except as modified below:

Perform daily inspections to ensure the work governed by the working drawing is functioning as designed. Report malfunctioning work to the Engineer immediately.

A. Projects with Railroad Involvement. Prepare and provide working drawings listed in this section as follows:

Have an Ohio Registered Engineer prepare, sign, seal and date each working drawing. Submit working drawings to all involved railway companies at least 50 days before construction begins. Obtain acceptance from all involved railroad companies. Furnish the Engineer copies of all correspondence with the railroad, documentation of railroad acceptance and the working drawings accepted by the railroad. City acceptance is not required.

Perform all work in accordance with the accepted working drawings. Immediately cease all operations that deviate from the accepted working drawings. If a deviation is necessary, furnish the Engineer a copy of a revised working drawing including documentation of acceptance from all involved railroad companies as least 24 hours before construction on deviated work begins. The revised working drawing shall be sealed and dated by an Ohio Registered Engineer. City acceptance of revised working drawings is not required. The City will consider delays resulting from working drawing deviations as non-excusable in accordance with 108.06.E.

This section applies to working drawings for the following:

1. Bracing adjacent to the railroad tracks. Perform work according to 501.05.B.1.
2. Demolition of structures over or within 14 feet of railroad tracks. Perform work according to 501.05.B.2.
3. Erection of structural members over or within 14 feet of railroad tracks. Perform work according to 501.05.B.4.

B. Projects without Railroad Involvement. Prepare and provide working drawings listed in this section as follows:

Have an Ohio Registered Engineer prepare, sign, seal and date each working drawing. Have a second Ohio Registered Engineer check, sign, seal and date each working drawing. The preparer and checker shall be two different Engineers.

Submit the working drawing to the Engineer at least 7 days before construction begins. City acceptance is not required.

Perform all work in accordance with the prepared working drawings. Immediately cease all operations that deviate from the prepared working drawings. If a deviation is necessary, furnish the Engineer a copy of a revised working drawing at least 24 hours before construction on the deviated work begins. The revised working drawing shall be signed, sealed and dated by an Ohio Registered Engineer and checked, signed and sealed and dated by a Second Ohio Registered Engineer. City acceptance of revised working drawings is not required. The City will consider delays resulting from working drawings deviations as non-excusable in accordance with 108.06.E.

501.05

This section applies to working drawings for the following:

1. Excavation Bracing , adjacent to active traffic, except when a complete design is already shown in the plans. Perform all work as specified below:

- a. Locate Excavation Bracing per contract, if shown.
- b. Maintain temporary horizontal and vertical clearances per contract.
- c. Include the effects of AASHTO live and dead load surcharges as necessary.
- d. Design Excavation Bracing in accordance with the latest AASHTO Guide Design Specifications for Bridge Temporary Works, Section 4

2. Demolition of structures over or adjacent to active traffic. Perform all work as specified below:

a. Provide temporary devices or structures necessary to protect traffic during all demolition activities. Provide traffic protection when demolition is located less than 12' horizontally from active traffic on structures of less than 25' vertical clearance. Increase the 12' minimum horizontal distance 1 foot for each 2 feet of additional height greater than 25'.

b. Never lift the portions of structure being removed over active traffic. Before releasing traffic make the remaining structure stable.

c. Design traffic protection devices or structures for a minimum load of 50 pounds per square foot plus the weight of equipment, debris and any other load to be carried. Include any portion of the deck that cantilevers beyond the fascia beams or girders.

d. In lieu of temporary devices or structures required in “a” above, provide a vertical barrier. Design the vertical barrier with rigid or flexible materials specifically designed for demolition containment. Extend the enclosure up to the bottom of the deck and down to the ground. Maintain all materials free of tears, cuts and holes.

e. Maintain temporary horizontal and vertical clearances per contract.

f. Locate structural members to be reused before performing any removal operations.

g. Do not damage structural members being reused during any removal operation.

h. Perform work so that all members are stable during all operation and loading conditions.

i. Perform work per 501.05.B.6.

3. Falsework for cast-in-place concrete slab bridges . Perform all work per 508 and as specified below:

a. Provide a camber table to account for the deflection of the falsework loaded with its self weight and the weight of wet concrete. Also include in the table, the specified camber to compensate for slab deflection after the falsework is released.

b. Maintain temporary horizontal and vertical clearances per contract.

c. As a minimum design falsework over waterways for a five year flood or with 75% of the effective waterway opening of the proposed structure. The Contractor is responsible for any damages caused by upstream flooding due to insufficient temporary structure size or the accumulation of debris or sediment in the channel.

d. Support falsework foundations located within the ten year flood limits on rock, shale or piles driven to a minimum depth of 15 feet, and to sufficient penetration to carry superimposed loads or until refusal on rock.

e. The incorporation of structural steel shapes, used as temporary support members, into a finished concrete slab superstructure is prohibited.

f. Design falsework in accordance with the latest AASHTO Guide Design Specifications for Bridge Temporary Works, Section 2.

4. Erection of steel or precast concrete structural members as specified below:

a. Never lift structural members over active traffic. Before releasing traffic make structural members stable.

b. Supply any temporary supports or braces necessary to maintain structural stability and prevent lateral movement until completion of all construction activities.

c. Perform work per 501.05.B.6, 513 or 515.

d. Do not field weld temporary members to permanent steel members.

e. Maintain temporary horizontal and vertical clearances per contract.

f. Provide drawings with at least the following information:

i. Site Plan of the work area showing permanent support structures (piers and abutments); roads; railroad tracks; waterways; overhead and underground utilities; and other information pertinent to erection.

ii. Erection sequence for all members, noting any temporary support conditions, such as holding crane positions, temporary supports, falsework etc. Member reference marks, when reflected on the erection plans, should be the same used on the shop drawings.

iii. Primary member delivery location and orientation.

iv. Maintenance of Traffic during erection operations.

v. Location of each crane for each primary member pick, showing radius and crane support (barges, mats, etc.).

vi. Capacity chart for each crane configuration and boom length used in the work.

vii. Center of gravity locations for primary member.

viii. Rigging weights, capacity and arrangement for primary member picks.

501.05

ix. Lifting weight of primary member picks, including all rigging and pre-attached elements.

x. Details of any temporary lifting devices to be bolted or welded to permanent members, including method and time (shop or field) of attachment; capacity; and method, time, and responsibility for removal.

xi. Blocking details for bridge bearings.

g. Provide calculations for the following:

i. Load capacity and stability of temporary supports and crane(s) for each pick and release.

ii. Structural adequacy and stability of members for each step of erection.

iii. Capacity of fabricated rigging, such as lift beams, welded lugs, spreader beams, beam clamps, etc. Submit manufacturers' certifications of catalog cuts for pre-engineered devices.

5. Jacking and support of existing structures as specified below:

a. Support the structure on temporary supports and brace as necessary to maintain structural stability and prevent lateral movement until completion of the permanent supports. Do not use jacks alone to support the structure except during the actual jacking operation. Remove all temporary supports upon completion of the jacking procedure.

b. Maintain a maximum differential jacking height of 1/4 inch between any adjacent beam lines.

c. Maintain a maximum differential jacking height of 1 inch between any adjacent abutments or piers.

d. Place jacks and any load plates at least 2 inches from the edges of any concrete substructure seats.

e. Do not field weld temporary members to permanent steel members.

f. Maintain temporary horizontal and vertical clearances per contract.

6. When the total load applied to a structure during construction, (new or structure being rehabilitated), exceeds 75 % of the legal limit, (The Legal Limit is 80,000pounds or percentage thereof if posted), analyze the load effects on the structure based on the operating level calculated by the Load Factor Rating Method as given in the AASHTO Manual for Bridge Evaluation.

7. Structures for maintaining traffic in accordance with Item 502.

a. For structures located over or within 14 feet of railroad tracks, submit plans in accordance with 501.05.A.

b. Perform work per 501.05.B.6.

C. Welded Attachments. Prepare and provide a detailed request showing weld size, length, type and location for welding permanent or temporary attachments to main structural members not shown or permitted by contract. Submit a request to the Engineer

for acceptance at least 20 days before construction begins. Perform work per 501.05.B.6 and 513.

D. Corrective Work. Unless otherwise noted, before performing corrective work on structure items, 507,511,513,515,516,517 and 524,prepare a Corrective Work Plan (CWP) including supporting calculations. Submit three copies of the CWP to the Engineer for acceptance at least 30 days before construction begins. Have an Ohio Registered Engineer prepare, sign, seal and date each CWP. Obtain City acceptance before beginning corrective work.

Perform all work in accordance with the accepted CWP. Immediately cease all operations that deviated from the accepted CWP. If a deviation is necessary, furnish the Engineer three copies of a revised CWP. The revised CWP shall be signed, sealed and dated by an Ohio Registered Engineer. Obtain City acceptance of revised CWP prior to performing corrective work.

Perform all corrective work, including the preparation of the CWP and revisions at no expense to the City. The Contractor shall reimburse the City for all CWP review costs of the Designer of Record. The City will consider delays resulting from all corrective work as non-excusable in accordance with 108.06.E.

501.06 Test Reports.

A. Contractor Acceptance of Materials for Item 513. Submit certified test data to the Engineer showing compliance with the requirements of Item 711. Accompany all certified test data with copies of mill shipping notices or invoices showing the quantity and size of material being accepted.

Check this material data and provide a letter of written acceptance. Submit the material data and letter of written acceptance to the Engineer so that the Engineer receives them at least 7 days before final shop inspection Item 513, Levels 1 through 6 or before final shop inspection Item 513, UF Level.

Submit a single copy of this material data for each structure, except where the structure carries railway traffic. Submit one additional copy to each railway company involved.

Additionally for Item 513, Levels 1 through 6 structural steel members, submit one copy of main material, certified test data with a letter documenting the QCFS acceptance to the QA shop inspector before the material passes check point one.

The City will not accept materials for final inspection at the fabrication shop until the Engineer receives the Contractor accepted material data.

B. Fabricator Certification of Materials for Items 516, 517, and 518. Ensure that a letter of certification accompanies the fabricated material shipped to the job site, in a format approved by the Engineer, stating all materials conform to contract requirements. For these materials, the fabricator must retain certified test data, copies of mill shipping notices, or invoices showing the quantity and size of material being accepted. This data shall provide complete traceability to the producing mill and proof of domestic origin, as required by ORC 153.011.

Do not deliver materials to the project without the certification letter.