

Shop Drawing Review and Other Contractor Submittals

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Outline

- Evolution of Shop Drawings (Steel)
- Shop Drawings – Contract Language
- Other Contractor Initiated Submittals
- Case Studies in Liability





Sunshine Skyway Bridge - 1963



Original Sunshine Skyway Bridge



Evolution of Shop Drawings



Evolution of Shop Drawings - Steel

Early 20th Century

- Engineers designed everything
- Steel connections used rivets



Evolution of Shop Drawings - Steel

Post-War Era

- Development of bolting (Friction, bearing, HS)
- New welding techniques



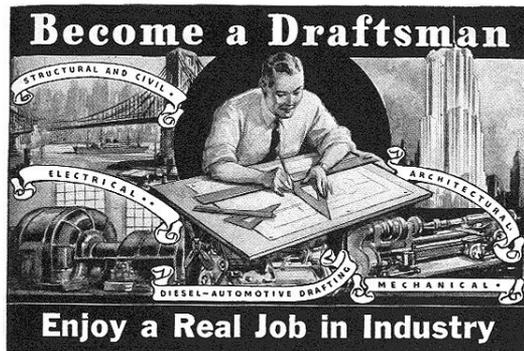
Evolution of Shop Drawings - Steel

- Fabricators developed preferred connection methods
- Fabricators requested designs from Engineers that favored their preferred methods
- Fabricators began requesting authority to design connections



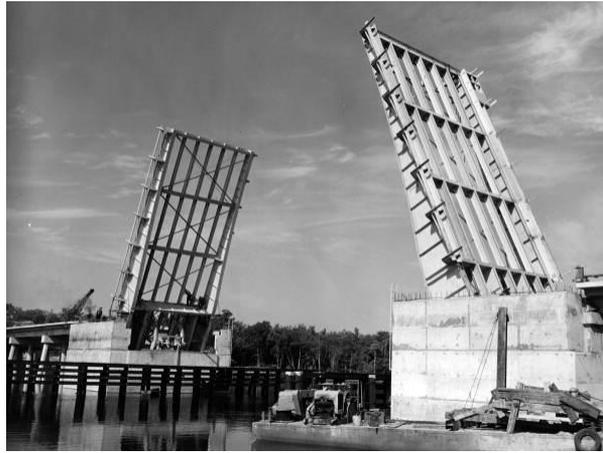
Evolution of Shop Drawings - Steel

- Assuming connections were sound, Engineers capitulated
- Fabricators became more competitive
- Owners saved money



Hathaway Bridge – Panama City (1961)



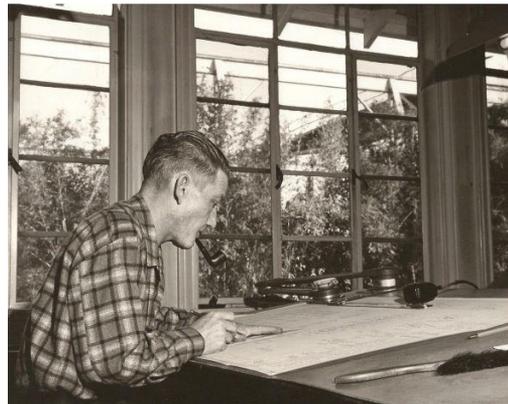


Crows Bluff Bridge – Lake County (1955)



Evolution of Shop Drawings - Steel

- AISC Manual, 1st Published in 1927
- Tool for fabricators to develop connections based on member capacities, not actual forces



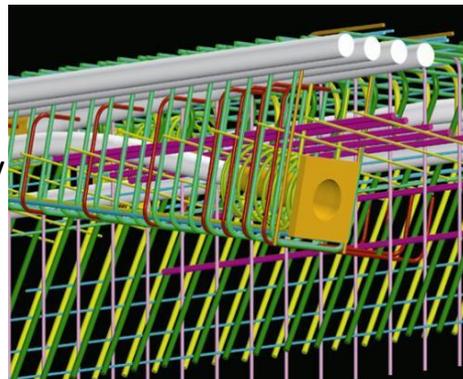
Evolution of Shop Drawings - Steel

- Trend continued until 1980's, when connection design began to shift back to designers
- More refined designs resulted from advances in computer technology
- 1st LRFD AISC Manual, 1986



Shop Drawings - Now

- Longer spans, increasing material costs make designs more refined
- EOR's produce detailed structural steel, reinforced concrete and post-tensioning drawings
- Shop drawings focus more on detailed geometry than design for strength





Canal Point – Palm Beach County (1953)



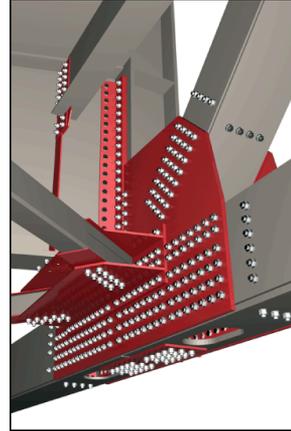
SE 1st Avenue Bridge – Hialeah (1955)



Shop Drawings – Contract Language

5-1.4.2 Work Items Requiring Shop Drawings: In general, the Department requires shop drawings for items of work not fully detailed in the plans which require additional drawings and coordination prior to constructing the item, including but not limited to:

- (a) Bridge components not fully detailed in the plans, i.e. segments, steel girder details, post-tensioning details, handrails, etc.
- (b) Retaining Wall Systems
- (c) Precast Box Culverts
- (d) Non-standard lighting, signalization and signing structures and components
- (e) Building structures
- (f) Drainage structures, attenuators, and other nonstructural items
- (g) Design and structural details furnished by the Contractor in compliance with the Contract
- (h) Temporary Works affecting public safety



Shop Drawings – Contract Language

5-1.4.6.1 Contractor Responsibility for Accuracy and Coordination of Shop Drawings:

Schedule the submission of shop drawings to allow for a 45 day review period. The review period commences upon the Engineer of Record's receipt of the valid submittal or valid re-submittal and terminates upon the transmittal of the submittal back to the Contractor. A valid submittal includes all the minimum requirements outlined in 5-1.4.4



Shop Drawings – Contract Language

5-1.4.6.2 Scope of Review by Engineer:

The Engineer of Record's review of the shop drawings is for conformity to the Contract Documents and to the intent of the design. The Engineer of Record's review of shop drawings which include means, methods, techniques, sequences, and construction procedures are limited to the effects on the permanent works. The Engineer of Record's review of submittals which include means, methods, techniques, sequences, and construction procedures does not include an in-depth check for the ability to perform the work in a safe or efficient manner. Review by the Engineer of Record does not relieve the Contractor of responsibility for dimensional accuracy to ensure field fit and for conformity of the various components and details.



100 Millionth Vehicle – Miami Airport Expressway (1967)



Shop Drawings – Contract Language

5-1.4.6.3 Special Review by Engineer of Shop Drawings for Construction Affecting Public Safety:

For Construction Affecting Public Safety, the Engineer of Record, or other Engineer as the Department appoints for this purpose, will make an independent review of all relevant shop drawings and similar documents. Do not proceed with construction of the permanent works until receiving the Engineer of Record's approval. The review of these shop drawings is for overall structural adequacy of the item to support the imposed loads and does not include a check for economy, efficiency or ease of construction.





Myrtle Avenue Overpass – Jacksonville (1958)



Lutén Bridge – Pinellas County (1955)



Shop Drawings – Contract Language

5-1.4.7 Other Requirements for Shop Drawings for Bridges:

5-1.4.7.1 Shop Drawings for Structural Steel and Miscellaneous Metals:

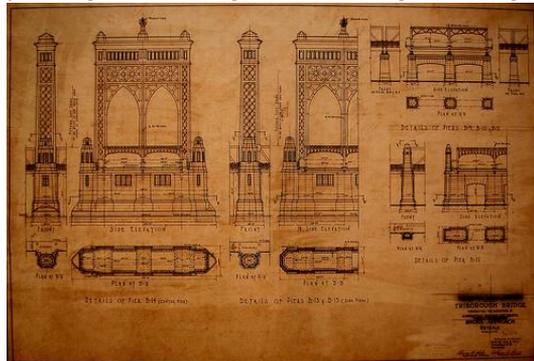
Furnish shop drawings for structural steel and miscellaneous metals. Shop drawings shall consist of working, shop, and erection drawings, welding procedures, and other working plans, showing details, dimensions, sizes of material, and other information necessary for the complete fabrication and erection of the metal work.



Shop Drawings – Contract Language

5-1.4.7 Other Requirements for Shop Drawings for Bridges:

5-1.4.7.2 Shop Drawings for Concrete Structures: Furnish shop drawings for concrete components that are not cast-in-place and are not otherwise exempted from submittal requirements. Also, furnish shop drawings for all details that are required for the effective prosecution of the concrete work and are not included in the Contract Documents such as: special erection equipment, masonry layout diagrams, and diagrams for bending reinforcing steel, in addition to any details required for concrete components for the permanent work.



Shop Drawings – Contract Language

5-1.4.8 Modifications for

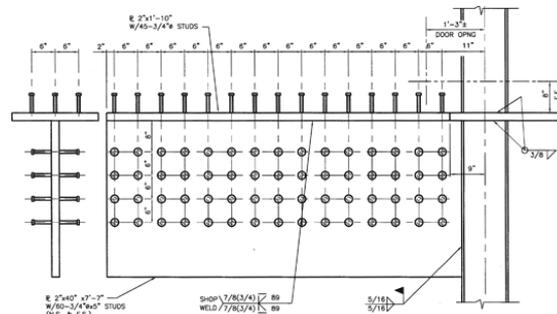
Construction: Where the Engineer allows the Contractor to make modifications to the permanent works for the purposes of expediting the Contractor's chosen construction methods, the Contractor shall submit proposals to the Engineer of Record for review and approval prior to modifying the works. Submit proposals for minor modifications under the shop drawing process. Indicate on all drawings the deviations from the Contract Documents and itemize all deviations in the letter of transmittal. The Department will require additional submittals and/or submittal under a Cost Savings Initiative Proposal for major modifications.



Shop Drawings – Contract Language

5-1.4.8 (Continued)

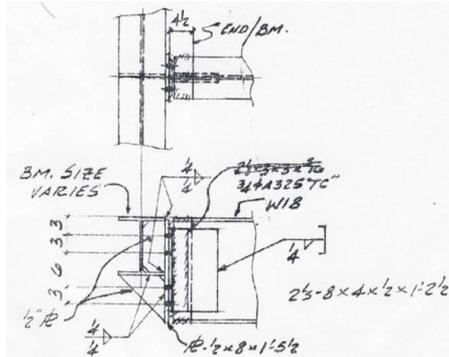
Minor modifications are those items that, in the opinion of the Engineer, do not significantly affect the quantity of measured work, or the integrity or maintainability of the structure or its components. (For example, adjusting concrete dimensions, substituting steel plate sizes, changing reinforcing bar size and spacing, etc., all within the acceptable limits of the design.)



Shop Drawings – Contract Language

5-1.4.8 (Continued)

Major modifications are any modifications that, in the opinion of the Engineer, significantly affect the quantity of measured work, or the integrity or maintainability of the structure or its' components. (For example, substituting alternative beam sizes and spacings, changing material strength or type, and the like.)

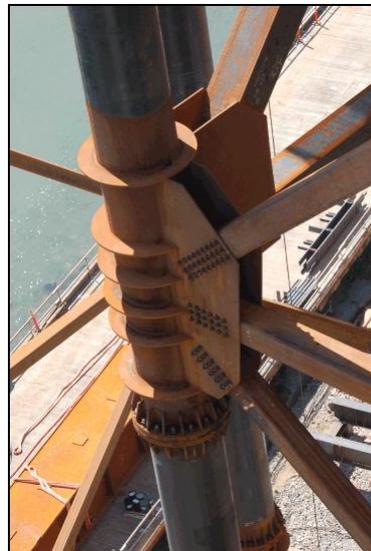


Shop Drawings – Contract Language

5-1.4.8 (Continued)

Provide signed and sealed revised sheets to the Engineer for any required revisions to the Contract plans prior to submitting shop drawings.

The Engineer's decision on the delineation between a minor and a major modification and the disposition of a proposal is final.



Shop Drawings - Summary

They are:

- Avenue for Contractor to design specialty or proprietary components
- Detailed installation drawings for field crews
- Required for temporary works affecting public safety
- Avenue for Contractor to submit minor modifications to facilitate construction
- An opportunity for junior designers to learn design details

They are not:

- A chance for Contractor to alter major aspects of design
- A chance for designers to complete or QC the design process
- An opportunity for junior designers to learn design details



SR 700 – Highlands County (1953)





Moore Haven (1956)



Gilmore Street Bridge - Jacksonville



Other Contractor Initiated Submittals

CPAM 8.11

Implemented 2 years ago

- RFI – Request for Information
- RFM – Request for Modification
- RFC – Request for Correction
- CSI - Cost Saving Initiative Proposal



Requests for Information (RFI's)

A written document initiated by the Contractor that is submitted to the PA for coordination with the Department and others on a response to any of the following issues:

- Interpretation of a contract document provision, the meaning of which, is not clear to the Contractor
- Errors, omissions or conflicts in the contract documents that are identified by the Contractor
- Pay adjustment or entitlement



Requests for Information (RFI's)

Contract Document Interpretation:

- RFI sent to PA for interpretation
- Spec interpretations should be resolved by PA, not EOR (exceptions are MSP's or TSP's)
- Structural issues will involve the EOR and/or State Construction Structures Engineer (design or non-design related)
- If Contractor disagrees with response, additional cycles may be required
- May lead to supplemental agreement, Disputes Review Board or Certified Claim



Requests for Information (RFI's)

Contractor Identified Errors, Omissions of Conflicts:

- RFI sent to PA for resolution
- PA will consult with appropriate parties may or may not include EOR
- Department may or may not agree with claim
- May or may not lead to premium costs



Requests for Information (RFI's)

Pay Adjustment or Entitlement:

- RFI sent to PA for resolution
- May be handled by PA alone
- May consult with District Estimates
- May not involve EOR



Cortez Bridge – Manatee County (1955)





SR 7 - Broward County (1953)



Requests for Modification(RFM's)

Change to contract documents to provide a benefit to the Contractor **without diminishing the performance or durability of the finished work:**

- For complex design related issues, the EOR is consulted to see if idea is worth pursuing
- Subsequent submittal cycles may be submitted to EOR for review along with FDOT personnel



Requests for Correction (RFC's)

For the correction of non-elemental material issues not in compliance with contract documents:

- Excessively cracked precast concrete elements
- Damage during erection
- Incomplete PT grouting
- Steel fabrication errors
- Dented or gouged materials
- Misaligned piles



Requests for Correction (RFC's)

- Contractor's accompanying documentation should include supporting information describing fix
- May require involvement of Specialty Engineer
- Complex structural design issues will be submitted to EOR
- Prompt reviews prevent excessive Non-conformance damages



Cost Savings Initiative Proposal (CSIP)

An RFM submitted by the Contractor to change the contract documents resulting in a reduction of project costs that are shared by the Department and Contractor

- Formerly called “VECP”
- EOR involved in initial CSI workshop
- EOR reviews proposal
- For complex structures, EOR not typically utilized for peer review of redesign



Case Studies in Liability

- Gross v. Kenton Structural and Ornamental Ironworkers, Inc., 581 F.Supp 390 (7th Cir. 1984)
- Hansam v. Victor Gruen & Associates, 86 Ill.App.3d 1145 408 N.E.2d 1051 (1980)
- Denhert v. Arrow Sprinklers, Inc., 705 P.2d 846 (1985)
- Samual J. Creswell I.Wks. V. Housing Authority of Camden, New Jersey, 449 F.2d 557 (1971)
- Iowa Electric & Light Power Co. v. Hopp, 221 Iowa 680, 266 N.W. 512 (1936)



Case Studies in Liability

- Waggoner v. W&W Steel Company, 657 P.2d 147 (OK 1983)
- Jaeger v. Henningson, Durham & Richardson, 714 F.2d 773 (8th Cir. 1983)
- Henningson, Durham & Richardson v. Swift Bros. Const. Co., 739 F.2d 1341 (8th Cir. 1984)
- Willis v. Black & West, Architects, 344 P.2d 581 (OK 1959)
- John Grace & Co. v. State U. Const. Fund, 472 N.Y.S.2d 757 (A.D. 3 Dept 1984)
- Fauss Construction v. City of Hooper, 197 Neb. 398, 249 N.W.2d 478 (1977)





Fuller Warren Bridge - Jacksonville



Kissimmee River Bridge – Okeechobee County (1953)





Trout River Bridge – Duval County (1956)



SR 814 – Pompano Beach (1953)





Zolfo Springs – Hardee County (1951)



Arlington Bridge – Jacksonville (1952)



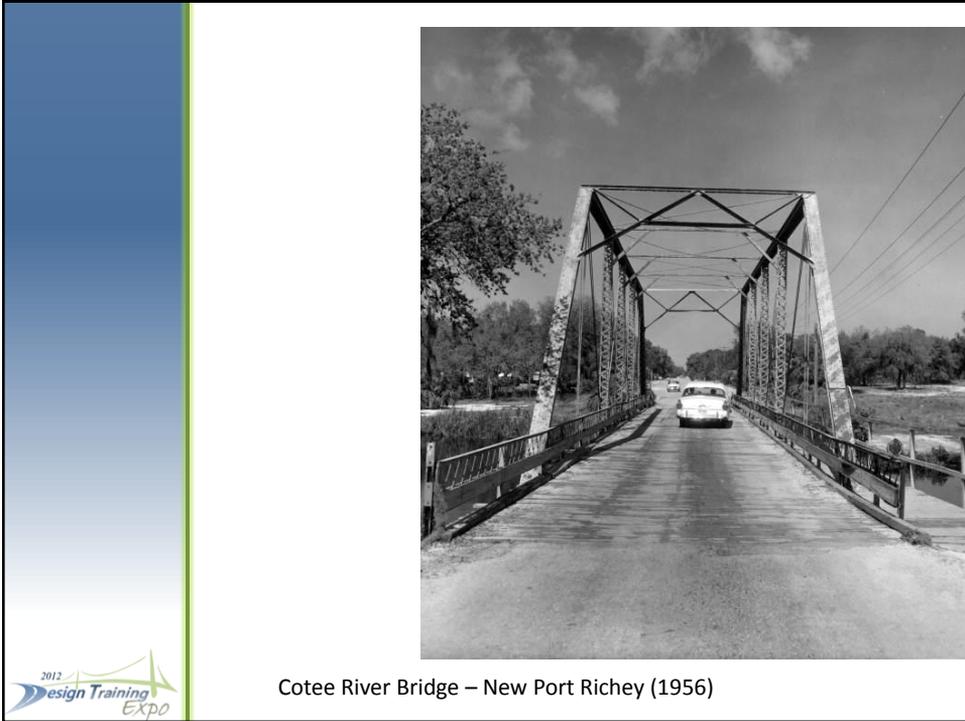


Stock Island Bridge – Key West (1953)

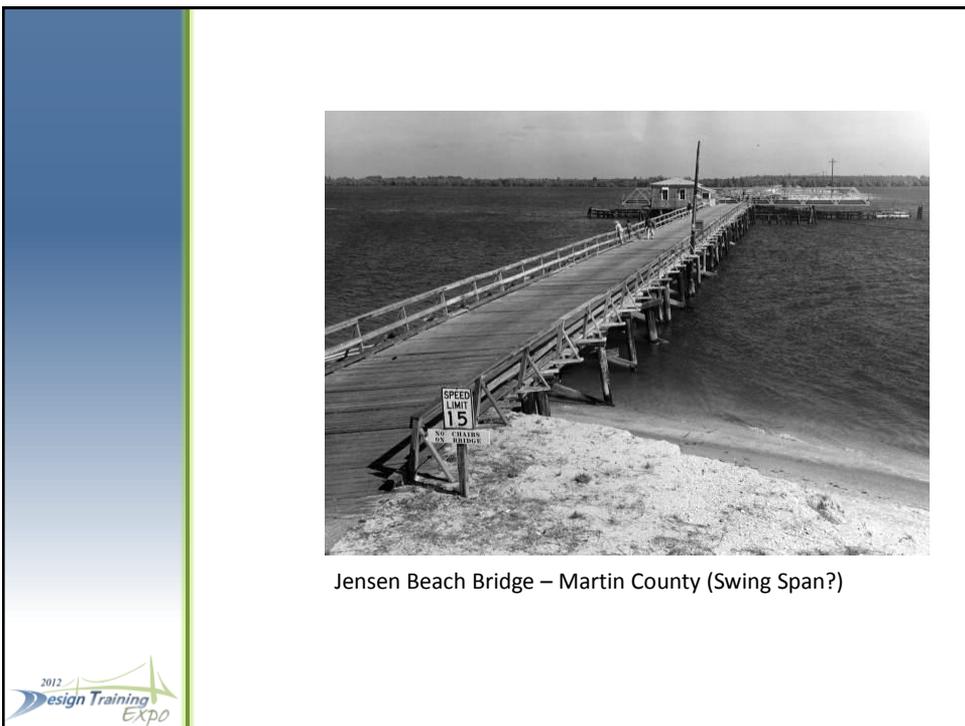


Escambia River Bridge – Escambia County





Cotee River Bridge – New Port Richey (1956)



Jensen Beach Bridge – Martin County (Swing Span?)

Thank you!

