

# **MINNESOTA'S DIRECT STEEL BIDDING PROCESS**



Thomas E. Merritt, P.E.

## **BIOGRAPHY**

Tom Merritt holds the position of Fabrication Methods Engineer with the Bridge Office of the Minnesota Department of Transportation, a position he has held since 1990. His responsibilities include the review of shop drawings, providing technical advice on steel design, fabrication and erection. He also provides structural design support to the Office of Traffic Engineering. Prior to joining Mn/DOT in 1986, he worked for 10 years at American Hoist and Derrick in Saint Paul, MN, in crane design, project management, and fabrication support. Tom holds Bachelor degrees in Civil Engineering and Physics from the University of Minnesota.

## **SUMMARY**

Minnesota Department of Transportation (Mn/DOT) has successfully used a contract practice in which the steel bridge superstructure is let separately from, and in advance of, the rest of the construction contract. This is referred to as a direct steel bid, since the Fabricator supplies directly to the state, which acts as Owner and Contractor for this phase of the project. In the subsequent construction contract, the state furnishes the completed steel components to the erector. Typically, the direct steel contract is let two to six months ahead of the erection contract. This effectively removes the steel fabrication from the critical path of the construction contract.

The direct steel bid process is used selectively in projects with accelerated completion schedules, and when early completion of individual bridges within a large project is advantageous for traffic control.

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By  
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## **INTRODUCTION**

In today's construction climate, with a combination of fluctuating transportation funding and public demand for accelerated completion of construction, states are seeking strategies to keep within budget, both in time and dollars. Minnesota Department of Transportation has developed and successfully employed a contract practice in which the steel bridge superstructure is let separately from, and in advance of, the rest of the construction contract. This process is used on selected projects and on selected bridges within a project, to remove the steel fabrication from the critical path. Over the past six construction seasons, Minnesota has let 20% of its steel bridges with the direct steel bid process, and has received very positive feedback from all of the participant parties.

## **CONVENTIONAL BID VS DIRECT BID**

In a conventionally let project, the construction contractors bid on a comprehensive package that includes all of the materials, labor, and procedures necessary to complete the work. This includes excavation, roadway, utilities, traffic control, landscaping, concrete substructures, steel fabrication and erection, landscaping, paving, etc. The steel fabricator prepares a bid and submits it to one or more contractors. Each contractor adds to the fabricator's bid for erection costs, and incorporates the total in the final bid. In some instances, the apparent low bidder holds a second round of bidding among the fabricators. The successful fabricator then fabricates and delivers to the prime contractor, at the jobsite, the completed girders and diaphragms.

In a direct steel bid contract (which we usually designate Contract "A"), the fabrication and prime painting of the steel superstructure is let with a separate steel-only bridge design plan, with the fabricators submitting their bids directly to the state. Upon award of the contract, the successful fabricator then purchases, fabricates and delivers the completed steel to the state, at a location and time specified in the plan and provisions. The direct steel contract is typically let two to six months before the construction contract is let.

The subsequent construction contract (usually designated Contract "B") has pay items for erection and finish painting of the structural steel, which is furnished to the contractor at a place and time specified in the plan and provisions. The bridge design plan for the construction contract includes the steel superstructure sheets only for reference, but has the standard level of detail for the substructures, slab, rail, etc.

## **WHEN TO USE DIRECT BID**

Various factors are considered when direct steel bids are contemplated. Most of Minnesota's direct bid projects involve critical high-traffic roadways, where the process can help to minimize the duration of traffic disruption. The process is also valuable in large multi-year projects, where individual bridges need to be completed early for traffic staging. In this case, our practice is to let only those critical bridges in the direct-bid fashion, using the conventional process on the rest. The current volatility in cost and delivery of steel is a consideration as well. The decision whether to use the direct steel bidding process may be made at almost any stage of the project planning, if adequate time is provided for plan preparation and advertising of the contract.

## IMPACT ON PARTICIPANTS

All of the parties involved in a bridge construction project are potentially impacted by the method of letting the contract. The feedback that we have received regarding the effect of the direct steel bid process on each party's effort has been primarily positive or neutral.

The designer has a minimal increase in work, preparing two design plans and sets of provisions. A steel-only plan is an excerpt of the full bridge plan, though, and doesn't represent additional design, but only an early release of part of the design. The Contract "A" plan contains the framing plan, and the girder, diaphragm, and bearing details, with sufficient reference information to permit shop drawings to be prepared. Typically, this includes the general plan, elevation, and transverse sections, with structure depths and bridge seat elevations at every bearing. The special provisions for the "A" contract are also greatly reduced compared to a full construction contract, focusing on framing steel, bearings and prime painting, plus specific information on scheduling and delivery. After the "A" contract is let, the designer must take care to avoid last-minute changes on the "B" contract that affect the "A" contract, exposing the owner to supplemental claims by the fabricator.

The fabricator is the party most significantly impacted by the direct steel bidding process. First, the contract documents on which the bid is based are streamlined, since their content is specific to furnishing the fabricated steel at a specified time and place. Second, when the bids are opened, the low bid takes the contract; there is no post-letting process of "shopping" for a lower price that can jeopardize the fabricators' profitability. Third, the fabricator can rely on a specified payment



**Figure 1: Railroad Bridge Girders on Site of Vehicular Bridge**



**Figure 2: Assembly of Railroad Through Girders**

schedule. Fourth, the completion date and place of delivery are a matter of contract, including payment for storage of the completed steel in case of delayed erection schedule. Fifth, the fabricator is exposed only to liquidated damages, not to liquidated and consequential damages. On the negative side, the fabricator must keep a “sharp pencil” in the bid preparation, since there is no second chance to land the contract in a post-letting price adjustment. Also, there is a loss of potential for Value Engineering on a direct steel contract, due to the lack of communication between fabricator and contractor. Bonding requirements may be an issue with some fabricators. Finally, the fabricator may need increased storage capacity, since the contract usually requires full completion of the work by a specific date, rather than a staged completion based on erection requirements by the contractor.

The contractor for the final construction contract takes delivery of the completed superstructure steel directly from the owner. Thus, the contractor

bids only on erection of the steel. During the bid preparation, the contractor knows with certainty which fabricator is supplying the steel, and can apply knowledge of previous experience with that fabricator to optimize the erection bid. The owner is responsible for having the steel available at the completion date and place specified in the steel only contract, giving the contractor a level of confidence in determining the critical path for the contract. Since the direct steel contract is let two to six months in advance, the contractor is selected typically during the period shortly after the fabricator has placed the mill order for steel, prior to steel delivery. Shop drawings may still be in preparation or review, or fabrication is still in its earliest stages. This allows the contractor to offer advice that may improve constructability (example: whether or not to build field splices that are listed in the plan as “permissible”), although there is not a direct contractual relationship between erector and fabricator.

The owner benefits in having a process that can advance completion of a project, or can expedite the completion of individual critical bridges within a larger project. Minnesota’s Contract Management and Project Management personnel find that there is no significant administrative increase in the direct bidding process. Shop drawing review and fabrication inspection, two functions that Minnesota retains in its support of construction oversight, are not affected by the

direct bidding process. Project costs do not increase and it appears there is a small savings in the steel portion of the contract compared with a conventionally bid project. Keeping the cost control of steel and erection directly in the hands of the responsible parties allows the owner to better determine the true cost of each.

## **RECENT CASE HISTORIES**

Minnesota Department of Transportation has used the direct steel bidding process occasionally for at least 15 years, but the large majority of our direct steel bridges have been built just since 1998. Since that time, a full 20% of our steel bridges have been built in this fashion. A few projects warrant a brief discussion:

Mn/DOT had a project on I-494 in the Minneapolis Metro area, in which two of the three bridges needed to be completed during the 2003 construction season. The earliest possible letting on the construction contract was late February 2003. The two critical bridges were separated from the rest of the contract and were let in a direct steel contract in November 2002. The additional four months gained in the process were sufficient to allow the two bridges to be opened to traffic on schedule. The third bridge, which was let in the conventional manner, was erected during the winter months and was decked in June 2004. (The photographs in this paper were taken during the erection of the two direct steel bridges.)

A bridge widening project on I-94 on the east side of Saint Paul was let in three phases, to stage the work optimally. The first phase was the steel-only contract, let in July 2004. The second contract covered the construction of the widening piers and was let two months later. The erection contract was let in October 2004. The bridges were decked in late spring of this year, and were opened to traffic during the summer.

In September 2004, we let two bridges by direct steel bidding, out of a project containing nine bridges. The two bridges will carry diverted traffic during the remaining construction. The



**Figure 3: Girder Assembly and Erection of Vehicular Bridge**

project, named “Unweave the Weave”, separates I-35E from I-694 on the north side of Saint Paul, improving a hazardous bottleneck. Due to the failure of Congress to pass a funding bill, the contract was not awarded. The “A” contract was let again in April of this year, with a September letting for the rest of the contract.

Two bridges are being let by direct steel bidding in the fall 2005 schedules. One is a deck girder railroad bridge that must be opened in the fall of 2006; the construction contract will not be let until February, five months after the steel-only contract. The other is a multi-span rolled beam bridge over a flood relief channel, which is being let four months in advance of the erection contract. Again the bridge must be opened in the fall of 2006.

### ***STEEL BRIDGE NEWS ARTICLE FEEDBACK***

The October 2004 edition of NSBA’s *Steel Bridge News*, featured an article that discussed Minnesota’s experience in using the direct steel bidding process. We were contacted by several state DOT’s and consultants as well as two fabricators. The questions and feedback that they offered added valuable insight, and suggested extended uses for the process. One owner had concern that the relatively small cost of a steel-only contract raised the possibility that a fabricator could supply foreign steel if the cost savings were 25% of the contract total. We concluded that the potential was there, but would require that the foreign steel cost was less than half the domestic cost. If that were a real likelihood, Minnesota would reluctantly accept the change. A consultant was investigating the direct-bid process for prestressed concrete beams on a mega-project in which a new beam section was being introduced. The early bid process would give extra time for beam manufacturers to change forms. The fabricators responded with a thorough list of pro’s and con’s that are listed above.



**Figure 4: Assembling a Field Splice**

## **CONCLUSION**

Minnesota's direct steel bidding process has proven to be a useful tool when it is applied to the proper projects and bridges. It adds flexibility, when needed, to release particular bridges earlier than would be possible if they had to wait until all portions of the construction project were completed. Several lessons have been learned in the course of our frequent use of the practice. We have learned that it is necessary to include bearings in the early steel, especially on larger, long-span bridges where pot bearings are used. We have also learned the need for full information on structure depth and bridge seat elevations at each bearing location. It is essential to include all geometric information, deflections, and other data that will permit the detailer to recreate the camber diagram if necessary. With the minor adjustments that our experience has shown to be necessary, we have become comfortable with the direct steel bidding process, and we do not hesitate to use it when it is needed.