

## **The Nature of Rebar Detailing**

Written by Dick Birley 2002

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The following is a quotation from the reinforcing steel specifications for a proposed new stadium:

*“Contractor will be required to have engineering such as submittals, shop drawings, and samples submitted for approval within one hundred (100) calendar days from written engineering notice to proceed.”*

This of course includes the rebar detailing. This request is indicative of a deep misunderstanding of the rebar detailing process, and how it relates to a project in general. It is a request that is not possible to comply with in a meaningful manner and does nothing to enhance the project. Throughout North America, and indeed the world, rebar detailing is in a crisis. There are many stories about the poor quality of detailing and the inability of detailers to meet schedules. In this environment, it is understandable that the specification writer might feel that he somehow can solve these problems by inserting the above item into his document. Unfortunately this is not the case.

Besides shop drawings (detailing) for rebar, there are many other domains on a project that require shop drawings, such as structural steel, pre-cast concrete, miscellaneous metal, mechanical, electrical, door, and windows. There is a fundamental difference between all of these domains and rebar. Except for relatively minor embedded pieces, all these items are installed after concrete is cast. In contrast, rebar is installed as part of the concrete casting process. There are two reasons why these other domains need to have shop drawings prepared as quickly as possible after the project begins. Most important is that there is a very long delivery time for all of these manufactured goods. They must be ordered without delay to ensure that they arrive on site at the proper time. In addition, concrete cannot be cast until elevations for structural steel and pre-cast concrete are known, anchor bolts and embeds are detailed, and mechanical openings, doors and windows are dimensioned and located. Preparing these shop drawings in a short time span is not really problematic since these items have relatively little interdependence with each other or with casting the concrete, and detailing them does not require a steady flow of data from each other. They are dependent only upon themselves for the data needed for detailing.

Rebar, however, is an entirely different matter. First of all, delivery is not an issue. There is ample time for delivery if rebar shop drawings are prepared and approved even just two weeks before steel is needed in the field. For this reason, there is no compelling need to prepare shop drawings *“within one hundred (100) calendar days from engineering notice to proceed.”* But more importantly, doing so is impossible. This has to do with the fact that rebar is installed as part of the concrete casting process. As mentioned earlier, concrete cannot be cast until elevations for structural and pre-cast concrete are known, anchor bolts and embeds

are detailed, and mechanical openings, doors and windows are dimensioned and located. Likewise, detailing of rebar cannot take place until that same information is available to the detailer. Basically, the detailer cannot start producing shop drawings until all of the other trades have completed their shop drawings.

Furthermore, he still cannot complete shop drawings for many parts of the structure, especially slabs and walls, until the concrete contractor has defined all the relevant pour breaks. In addition, there are always many RFI's that will be issued and have to be answered before he can complete shop drawings for the areas in question. And finally, because of the foregoing, the detailer will be left with very little lead-time before steel is needed. As a result, he will have to know in considerable detail the precise construction sequence so that he deals with the most urgent items first. The construction sequence is also necessary so the detailer can properly arrange for necessary dowel projections from the current pour into succeeding pours. To complete his job properly the detailer must have at hand a great deal of data that often doesn't come until it becomes crucial, i.e. until the detailer's lead time is gone and he is in danger of not completing his work in time for a pour.

If a project is detailed in a hundred days (or simply ahead of available data), it is an absolute certainty that a great deal of that detailing will have to be revised. A detailer details on the basis of a unit price per ton, which is included in the estimated price. Revising detailing is done on an hourly rate and is extra-to-contract. The cost for re-detailing in such a situation is enormous and can be as much or more than the cost of the original detailing. This is a significant and needless cost to be passed on to the owner. Anyone who is aware of all these things could not reasonably request that the detailing be completed in a hundred days. The issue at hand is to try to get all the necessary information to the rebar detailer quickly enough that he can keep ahead of construction. Assuming that everyone involved is working diligently to gather this information, it generally takes at least two months into the job for the rebar detailer to "catch up", and another month to pull ahead. After that, if the information continues to be forthcoming in a timely manner, he should be able to keep comfortably ahead. It's a rare job indeed where a flow of information is such that the rebar detailing can be completed months in advance.