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## Design coordination of a design-build project

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### Abstract

The architectural and structural design is in a design-build project developed through all the different phases of the project. The conceptual design, where the general and functional requirements for the project are defined, is carried out by the Owner and his consultants. Pre-tender designs, tender design, basic design and detailed design are performed by the Contractor and his consultants, during the latter phases in close contact with the Owner.

This paper presents general aspects on the organization and coordination of the design work in the different phases being administrated by the Contractor. The conditions of the different types of contracts between the Contractor and his Design Consultants are also discussed.

### 1. Design phases

*Pre-tender phase.* In order to reach the primary goal (to win the contract) the Contractor and his tender project group should handle the tasks mentioned below at this stage. Even if the particulars of the project requirements are still unknown, getting familiar with the project is essential. The core of the future competitive design team is created here and introduced to the project.

Important tasks in this phase are to

- Collect as much information as possible of the future project
- Identify critical parts or areas, where special competence or experience will be needed
- Allocate best possible design and engineering resources (individuals) to the group
- Organize brainstorming meetings where alternative approaches and solutions are invented and scrutinized
- Select alternatives for detailed evaluation
- Prepare for a possible prequalification together with the chosen internal and external design consultants
- Estimate the need for design resources in the following phases (quality and quantity).

*Prequalification phase.* Prequalification of the Contractor together with his consultants is made based on the experiences from the pre-tender phase. Conditions of cooperation and



possible exclusivity for the tender phase is discussed, with regard to confidentiality or strategy.

*Tender phase.* The tender phase will to some extent contain the same activities as the pre-tender phase. Based on the knowledge of the Owner's requirements some alternatives can now be excluded from further investigation, while some might be added. The design resources are split up in different sub-project groups, each group working according to a time schedule. Sufficient time and resources for evaluation of new ideas and concepts popping up during the course of the work must be available.

In order to maintain the intentions given by the Owner special attention should be given to the esthetical appearance of the structures as well as to environmental issues and of course to matters related to quality, durability and maintenance.

Design work performed at this stage should aim at providing a winning concept to the Contractor. It should of course arrive at the correct quantities, to be maintained in the construction phase. Likewise important is that calculations and other documentation are prepared for immediate continuation in the construction phase.

At the end of this phase the conditions of the future design contracts should be negotiated with the different design consultants.

*Basic and Detailed design (Construction phase).* Based on the Contract with the Owner and the time schedule, as defined in the Contract, the Basic design and the Detailed design is performed in parallel with the construction work. Careful planning and cost control (follow-up on quantities of construction material as well as design costs) of the design activities are crucial to avoid delays as well as excessive construction and design costs. A considerable design effort has normally to be laid down in this phase in connection with change orders from the Owner and from the Contractor's engineering teams.

## 2. Design Contracts

The design contracts are normally concluded separately for the tender phase and the construction phase. The following types of agreements are discussed in the paper

- Fixed fee agreements
- Variable fee agreements based on specified costs
- Incitement and bonus agreements

## 3. Design coordination for the Öresund Bridges

The design organization set up by the Contractor (Sundlink) for design of the Öresund Bridges is described and some experiences of the actual design work are briefly given in the paper.