

Proposals for Improving Concrete Construction Productivity While Ensuring Quality

Publication of Concrete Library 148

It is pointed that the productivity in the construction industry , especially earthwork and concrete construction, have improved little since 30 years ago for . In such situation, the Concrete Committee established a committee aimed at compiling a solution for improving concrete construction productivity at October 2015. As the result, "Proposals for Improving Concrete Construction Productivity While Ensuring Quality" were published as JSCE Concrete Library Vol. 148 in December 2016.

The proposals were based on discussion considering the following points, that is, (1) to propose for matters concerning the contract, (2) to show to change the contents in specifications concretely (3) to extract technical issues for improving productivity not only for the present but also for future.

Factors to prevent productivity and focus points to improve productivity

The following six points were picked up as factors to prevent productivity. (1) Contents of information delivered from design to construction, (2) Budget estimation method, (3) Prevention of utilization of precast concrete, unitization. (4) Evils caused by the construction fluctuation between busy times and off-times period due to single-year budget system, (5) Non-reflection of technology for improving productivity to budget, (6) Size of order lot.

Regarding point (1), for example, construction on site is conducted based on information delivered from the design as shown in Figure 1. In most cases, the information is accompanied by instructions based on specifications of orderer , JSCE concrete standard specifications and so on. Therefore, to improve productivity, it is important to reduce reexamining by appropriate contents of the instructions.

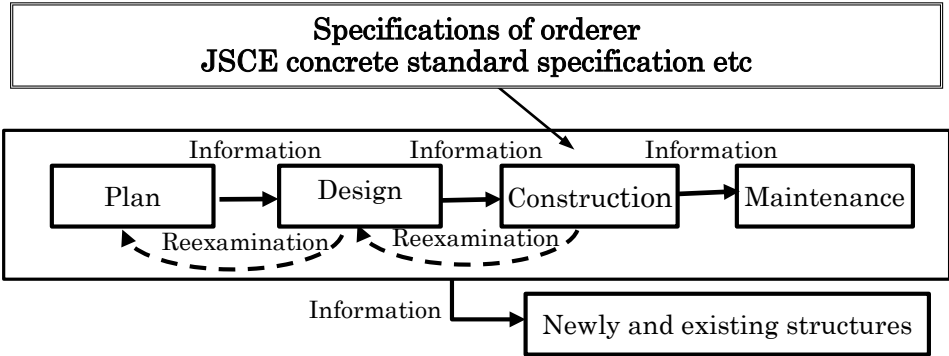


Figure 1 Flow of information at plan, design, construction, maintenance

On the other hand, the focus points for improving productivity were divided into the following five. (1) securing the degree of freedom of construction and ensuring quality through inspection, (2) high-density rebar arrangement, (3) different specifications for each orderer, (4) utilization of precast concrete, (5) utilization of new technologies, contract order system.

Regarding high-density rebar arrangement, for example, measures for improving productivity improvement are confirmation of rebar overlapping by the three-dimensional model in Fig. 2, securement of concrete placing port, utilization of mechanical anchors and so on. Figure 3 shows the utilization of mechanical anchor. It is difficult to arrange semicircle hook at high density rebar area and it require much time for arrangement.

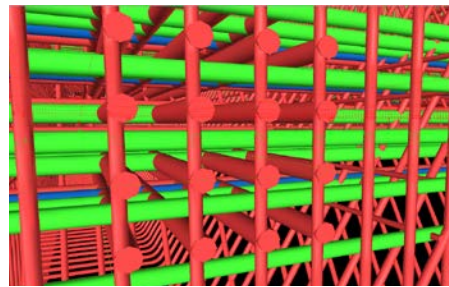
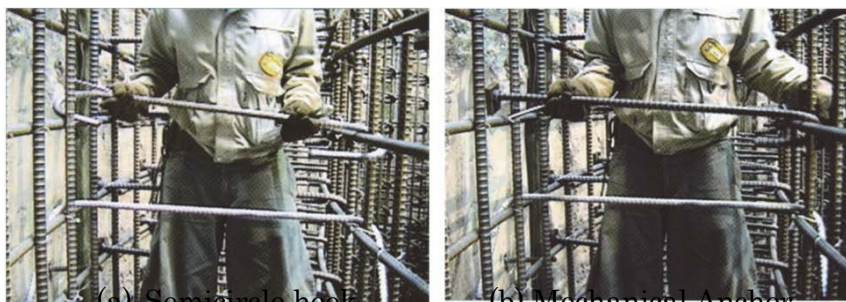


Figure 2 Example of confirmation of rebar overlapping by the three-dimensional model



(a) Semicircle hook (b) Mechanical Anchor
Figure 3 Utilization of mechanical anchor

Outline Concrete Library

Figure 4 shows the contents of the Library.

Part I is a general overview, which the circumstances and objectives to publish the Library, the status of efforts for improving productivity at the government and academic societies, the definition of productivity improvement and the factors to prevent productivity and focus points to improve productivity are described.

In Part II, specific proposals for improving productivity are described for each issue. There are a total of 63 proposals, 28 for design, 13 for construction, 15 for recast concrete, and seven for orders and contracts.

In the proposal, in order to clarify the object to reflect of proposal for each issue, the proposals are described dividing into "proposal to research and development", "proposal to JSCE concrete standard specifications" and "proposal to contract specification", respectively.

In the appendix, Appendix 1 is summarized the information of the basis for the proposals in Part II that were investigated and collected by the Committee and used for discussion. Appendix 2 is examples of precast concrete, which has already been used effectively and

the effectiveness are organized. The document annex 2 can be download at http://www.jsce.or.jp/committee/concrete/download/CL148_pp345-406.pdf . It can be used as a reference when utilization of precast concrete is considered.

Part I General Overview

Chap.1 Purpose and structure of Library

Chap.2 Efforts for improving productivity at the government, organizations and academic societies

Chap3. Focus points to improve productivity while ensuring quality

Part II Issues and proposals

Chap.1 Design

1.1 Verify the possibility of reinforcement arrangement in 3 dimensions at design stage

1.2 Decide the reinforcement arrangement considering workability at the design stage

1.3 simplify rebar / formwork assembly, concrete construction due to rational member shape

1.4 Develop an environment that utilizes new materials / new construction methods

1.5 Develop rational structural details in specifications

Chap.2 Construction

2.1 Increase degree of freedom for selection of concrete type

2.2 Increase degree of freedom for rules of placing

2.3 Increase degree of freedom for assembly of reinforcements

2.4 Develop an environment of the new inspection method and inspection system

Chapter 3 Precast Concrete

3.1 Improve productivity by standardizing the shape of precast concrete

3.2 Develop and investigate rule to reduce spacers used for factory products

3.3 Clarify design method of precast concrete

3.4 Expand option of materials used for precast concrete

3.5 Establish chapter of precast concrete in JSCE standard specifications and organize the terms

3.6 Clarify construction method and quality control method of precast concrete

3.7 Clarify points of attention in the construction planning and inspection standards of precast concrete

Chap 4 Order, Contract and Others

4.1 Take over verification conditions of design to construction side

4.2 Establish a system of facility planning considering design

4.3 Add specifications to clearly indicate the scope of design verifications and modifications

4.4 Consider a system to promote utilization of precast concrete

4.5 Level the construction period by reducing construction with deadline at the end of the year due to ordering in a single year

Appendix 1 Reference documents of issues and proposals in Part II

Appendix 2 Examples of utilization of precast concrete

Fig.4 Contents of Concrete Library