

Chapter 6 Coordination Between Design and Field Activities

6-1. Bidability, Constructibility, and Operability Review

a. General. The requirements for bidability, constructibility, and operability (BCO) reviews are outlined in ER 415-1-11, "Bidability, Constructibility, and Operability." BCO reviews are to be performed first during the review period for the concrete materials DM and again at least 30 days before formal advertisement for bids of a construction contract. When concrete construction is involved, it is important to assure that qualified personnel from the area office or resident office are included in this review process.

b. Review guidance. Some of the areas that the personnel in the area or resident office provide important input for concrete construction to the designers are:

(1) Recommend location of aggregate production or handling facilities on or near the project site to avoid conflict with future project construction activities.

(2) Recommend location of batch plant on, or near, the project site for maximum efficiency and ease of concrete delivery and placement.

(3) Recommend types of placing equipment to be and not to be used.

(4) Present special forming and staging requirements.

(5) Recommend potential water sources.

(6) Recommend location of construction joints.

(7) Clarify bidding documents.

(8) Identify potential placement problem areas related to the structural shapes, size, and location of reinforcement, location of embedded items, conduits, blockouts, etc.

(9) Submit effects of proposed architectural requirements upon constructibility.

(10) Submit effects on the construction schedule of insulation requirements, concrete mixtures which develop strength slowly, or other unusual design requirements.

6-2. Engineering Considerations and Instructions for Construction Field Personnel

a. General. Subsequent to the award of any construction which involves concrete features, a report should be prepared by the designer outlining all special engineering considerations and design assumptions and providing instructions to aid the field personnel in the supervision and quality verification of the construction contract. The information provided will, for the most part, summarize the data contained in the DM's and include all required formal discussions on why specific aggregate sources, plant locations, structural designs, etc. were selected so that the construction personnel in the field will be provided the necessary insight and background needed to perform reviews of the Contractor's various submittal proposals and to resolve construction conflicts without compromising the intent of the design. This information must not conflict with the project specifications and must not contain any request to change these requirements. In all cases, the contract specification will govern.

b. Content. A typical outline for the concrete construction part of the report is provided as an aid in preparing the engineering considerations and instruction for construction field personnel:

I. Introduction

A. Purpose

B. Scope

II. Cementitious Materials Requirements or Properties

A. General

B. Availability

III. Aggregate Requirements or Properties

A. General

B. Basis for selection of listed requirements

C. Possible processing requirements

D. Quality assurance testing

IV. Other Materials

- A. Chemical admixtures
- B. Water
 - (1) Mixing
 - (2) Curing
- V. Concrete Qualities Required at Various Locations Within the Structures
- VI. Concrete Temperature-Control Requirements
- VII. Cold-Weather Concrete Requirements
 - A. Insulation
 - B. Time length of protection
- VIII. Hot-Weather Concrete Requirements
- IX. Contractor Quality Control and Government Quality Assurance
- X. Critical Concrete Placement Requirements
- XI. Architectural Requirements
- XII. Finish Requirements

c. Discussion by outline heading.

(1) Introduction. The purpose of the report will be stated here and will also contain a statement on the scope of the engineering considerations and instructions for construction field personnel. Types of concrete and the areas each type is to be placed are to be discussed.

(2) Cementitious materials requirements or properties. All those cementitious materials that have been included as options in the project should be discussed. If any type or types of cementitious material may not be used, the basis for the exclusion must be discussed to provide the construction personnel on the site the information required to correctly comment on the Contractor's submittals and proposed substitution of an unacceptable cementitious material. All quality assurance testing requirements should be discussed, including the required or desired frequency of onsite sampling.

(3) Aggregate requirements or properties. All the important characteristics of the selected aggregate sources

are to be summarized along with the basis for rejection of any nearby aggregate sources that were investigated and found to be unsuitable. Other helpful information to be included would be an assessment of potential processing requirements. Potential processing requirements that are to be discussed are requirements for spray bars and sand classifiers, requirements to make up a naturally deficient fine or coarse aggregate size, removal of organic material, and processing because of an excess of elongated particles by a roll crusher should be noted if the processibility studies have revealed such. The range of aggregate quantity parameters derived from testing of the listed sources must be provided to the field so that the results of the quality assurance and quality control tests during construction can be compared to the assumed design values. It is especially important to note the qualities that are critical and those qualities that are marginal for acceptability of any source. A list of the quality assurance tests to be performed by the Government and the desired frequency of testing is to be included.

(4) Other materials.

(a) Chemical admixtures. The reasons for allowing or disallowing the use of retarding, accelerating, water-reducing, high-range water-reducing, or any other commonly used chemical admixture must be stated.

(b) Water. It must be noted if the concrete materials investigations have shown any problems with the available sources of mixing and curing water, such as a tendency to stain the concrete or seasonable variations that would be objectionable.

(5) Concrete qualities required at various locations within the structures. The most important objective of the report is to provide to the construction personnel in the field the quality (type) of concrete required for each structure or specific portion of a structure. Depending upon the nature of the construction project, this information could be presented in tabular form or by color coding the appropriate project drawings. The quality should be designated by maximum w/c, nominal maximum aggregate size, strength requirement, and purpose, such as interior mass, exterior mass, interior structural, exterior structural, backfill, architectural, etc. It should be noted that for isolated congested areas the nominal maximum aggregate size must be reduced. The basis for the quality requirements, i.e. strength, durability, appearance, etc., is to be stated for each one listed. The age at which the compressive strength, f'_c , is to be attained should be noted. Other mixture proportioning requirements which are to be listed are the nominal maximum size aggregate, air content, and the slump

range. It should be noted that the concrete should be sampled and tested for air, slump, and compressive strength during plant shakedown so that any necessary adjustments to the laboratory mixture proportions can be made before concrete is placed in the structure. It should also be noted that sampling for mixture proportioning should be observed by project office personnel to assure that quality and grading meet the specifications.

(6) Concrete temperature-control requirements. If temperature-control requirements are a part of the project specifications, they are to be explained in the report. To the maximum extent possible, this discussion should describe the effects of any changes in the proportioned mixtures upon the thermal control measures for the project as well as the results of any changes from the anticipated construction schedule. If more extensive temperature-control measures are specified, such as postcooling or postwarming, they are to be described in sufficient detail to allow for timely review of the Contractor's submittals for these systems. The most common methods of temperature control involve specified maximum or minimum placing temperature, followed by the use of insulation. Some possible methods that the Contractor may submit to achieve the specified placing temperatures are to be discussed along with any known methods that have been unsuccessful in the past.

(7) Cold-weather concrete requirements. Assumed methods of achieving the specified results during cold weather are to be discussed in this report. Any specified concretes in the project that require cold-weather protection in excess of that to ensure freedom from damage of early freezing is to be explained. The use of any specific accelerators, the keeping of temperature records, heating of materials, foundation preparation, protective insulating coverings, heated enclosures, curing, and form removal are to be discussed.

(8) Hot-weather concrete requirements. The assumed methods of achieving the specified results during periods of hot weather are to be discussed in this report.

(9) Contractor quality control and government quality assurance. Contractor quality control (CQC) requirements are specified in the specification. Government quality assurance (GQA) sampling and testing requirements should be discussed. These may include, but not be limited to, sampling and testing frequency, sampling size and procedures, testing methods, and analysis of test results for cementitious materials, aggregate grading, aggregate moisture, aggregate quality, slump, air content, concrete temperature, and compressive strength.

(10) Critical concrete placement requirements. All areas of the project that the designer feels require special measures during placement, consolidation, finishing, or curing are to be discussed in this report. Some examples are the placement of trunion girders, tunnel linings, bridge decks, and areas subjected to high-velocity flows of water.

(11) Architectural requirements. All areas where the specified architectural requirements will affect the concrete placement are to be discussed in this report. This will include all areas where the location of construction joints is mandatory for the desired aesthetic results or where exposed aggregate or form linings are required. The report should supplement the project specifications by providing information on possible techniques to achieve the desired surface textures and explaining the effects the architect wants in the facility.

(12) Finish requirements. The type of finish, as detailed on the drawing for each portion of the structure, is to be discussed.