

# Chapter 12

## Construction

12.1	Introduction.....	12-1
12.2	Objectives.....	12-2
12.3	Control of the Work.....	12-3
12.3.1	Plans and Contract Documents .....	12-3
12.3.2	Coordination of Plans, Specifications, and Special Provisions .....	12-4
12.3.3	Conformity of Work with Plans.....	12-4
12.3.4	Conformity of Work Shown in Regulatory Permits .....	12-5
12.3.5	Authority of the Construction Engineer .....	12-5
12.3.6	Engineering and Layout.....	12-5
12.3.7	Contractor's Supervision.....	12-6
12.3.8	General Inspection Requirements .....	12-6
12.3.9	Final Construction Inspection Maintenance until Final Acceptance .....	12-7
12.4	Control of Materials .....	12-8
12.4.1	Source of Supply and Quality Requirements .....	12-8
12.4.2	Inspection and Tests at Source of Supply .....	12-8
12.4.3	Control by Samples and Tests .....	12-8
12.4.4	Quality Control System .....	12-9

## 12 Construction

### 12.1 Introduction

The purpose of this chapter is to establish guidelines for field procedures, as they pertain to control of construction projects, supervision, and contract administration. All construction projects require an inspection process to administer the contract, to certify the project has been constructed within reasonable conformance with the plans/specifications, and the materials which were incorporated into the project were properly tested/certified.

All construction projects require:

- An inspection procedure to administer the contract
- Certification

The Engineer of Record (EOR) is a Professional Engineer registered in the State of Florida that develops the criteria and concept for the project, performs the analysis, and is responsible for the preparation of the Plans and Specifications. The Maintaining Authority's Engineer of Record may be in-house staff or a consultant.

The Construction Engineer (CE) is a Professional Engineer registered in the State of Florida that supervises the construction of the project. The Maintaining Authority's Construction Engineer or Designee may assign in-house staff or a consultant to act on their behalf.

## 12.2 Objectives

Construction of street and highway facilities is the result of the effort of the engineer, the contractor, and the owner. Minimum construction standards shall be followed to provide for proper implementation of the design. The following general objectives for roadway construction should be followed to ensure proper construction:

- All construction performed and all materials utilized shall be in reasonably close conformity with the construction plans and contract documents.
- The responsibilities and obligations of the owner, engineer, and contractor should be clearly defined.
- A safe working environment shall be provided in accordance with **Chapter 11 – Work Zone Safety and Mobility**.
- Adequate procedures through established methods of sampling and testing shall be implemented to provide for the control and placement of materials.

## **12.3 Control of the Work**

### **12.3.1 Plans and Contract Documents**

The Contractor will be furnished an appropriate number of copies of the plans and special provisions as required for the particular project. The Contractor shall have available at the work site, at all times, one copy each of the plans (including relevant Design Standards), Specifications, and Special Provisions.

#### **12.3.1.1 Plans**

The plans furnished consist of general drawings showing such details which are necessary to give a comprehensive idea of the construction contemplated. Roadway plans will show, in general, alignment, profile grades, typical cross sections, and general cross sections as necessary. Structure plans, in general, will show in detail all dimensions of the work contemplated.

#### **12.3.1.2 Alterations in Plans**

No changes shall be made on any plan or drawing after it is approved by the EOR, except as authorized in writing by the EOR. Minor changes may be approved by the Construction Engineer in consultation with the EOR.

All authorized alterations affecting the requirements and information given on the approved plans shall be in writing.

#### **12.3.1.3 Working Drawings (for Structures)**

##### **12.3.1.3.1 General**

The Contractor shall furnish such working, shop, and erection drawings, as may be required, to complete the structure in compliance with the design shown on the plans.

##### **12.3.1.3.2 Submission of Working, Shop, and Erection Drawings**

All working, shop, and erection drawings prepared by the Contractor or his agents (subcontractor, fabricator, supplier, etc.) shall be reviewed, dated, stamped, approved, and signed by the Contractor prior to submission to the EOR for review. The Contractor's signed approval of drawings submitted shall confirm he/she has verified the work requirements, field measurements, construction criteria, sequence of assembly and erection, access and clearances, catalog numbers, and other similar data. Each series of drawings shall indicate the specification section and page or drawing number of the contract plans to which the

submission applies. The Contractor shall indicate on the working, shop, and erections drawings all deviations from the contract drawings and shall itemize all deviations in his letter of transmittal.

#### **12.3.1.3.3 Responsibility for Accuracy of Working Drawings**

It is understood that approval by the EOR of the Contractor's working drawings does not relieve the Contractor of any responsibility for accuracy of dimensions and details, or for conformity of dimensions and details. The Contractor shall be responsible for agreement and conformity of his working drawings with the approved plans and specifications.

#### **12.3.2 Coordination of Plans, Specifications, and Special Provisions**

The specifications, plans, special provisions, and all supplemental documents are integral parts of the contract, and a requirement occurring in one is as binding as though occurring in all. They are to be complementary and to describe and provide for a complete work.

In cases of discrepancy, the governing order of the documents shall be as follows:

- Special Provisions
- Plans
- Standard Drawings
- Specifications

#### **12.3.3 Conformity of Work with Plans**

All work performed and all materials furnished shall be in reasonably close conformity with the lines, grades, cross sections, dimensions, and material requirements, including tolerances, shown on the plans or indicated in the specifications.

In the event the CE finds the materials or the finished product in which the materials are used not within reasonably close conformity with the plans and specifications, but reasonably acceptable work has been produced, he/she shall then make a determination if the work shall be accepted and remain in place. In this event, the CE will document the basis of acceptance by contract modification which will provide for an appropriate adjustment in the contract price for such work or materials as he deems necessary to conform to his determination based on engineering judgment.

In the event the CE finds the materials, or the finished product in which the materials are used, or the work performed, are not in reasonably close conformity with the plans and specifications

and have resulted in an inferior or unsatisfactory product, the work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor.

#### **12.3.4 Conformity of Work Shown in Regulatory Permits**

All work shall be accomplished in accordance with special conditions of the regulatory permits.

#### **12.3.5 Authority of the Construction Engineer**

All work shall be performed to the satisfaction of the CE.

#### **12.3.6 Engineering and Layout**

##### **12.3.6.1 Control Points Furnished**

Horizontal and vertical control points are required at appropriate intervals along the line of the project to facilitate the proper layout of the work. The Contractor shall preserve all control points furnished.

##### **12.3.6.2 Layout of Work**

Utilizing the control points furnished, all horizontal and vertical controls shall be established as necessary to construct the work in conformance with the plans and specifications. The work shall include performing all calculations required and setting all stakes needed, such as grade stakes, offset stakes, reference point stakes, slope stakes, and other reference marks or points necessary to provide lines and grades for construction of all roadway, bridge, and miscellaneous items.

##### **12.3.6.3 Personnel, Equipment, and Record Requirements**

The Contractor shall employ only competent personnel and utilize only suitable equipment in performing layout work.

Adequate field notes and records shall be kept as layout work is accomplished. These field notes and records shall be available for review by the CE as the work progresses and copies shall be furnished to the CE at the time of completion of the project. Any inspection or checking of the Contractor's field notes or layout work by the CE, and the acceptance of all or any part thereof, shall not relieve the Contractor of his responsibility to achieve the lines, grades, and dimensions shown in the plans and specifications.

### **12.3.7 Contractor's Supervision**

#### **12.3.7.1 Prosecution of Work**

The Contractor shall give the work the constant attention necessary to assure the scheduled progress and shall cooperate fully with the CE and with other contractors at work in the vicinity.

#### **12.3.7.2 Contractor's Superintendent**

The Contractor shall at all times have on the work site, as his/her agent, a competent superintendent capable of thoroughly interpreting the plans and specifications and thoroughly experienced in the type of work being performed, and who shall receive the instructions from the CE or his/her authorized representatives. The superintendent shall have full authority to execute the orders or directions of the CE and to supply promptly any materials, tools, equipment, labor, and incidentals which may be required. Such superintendence shall be furnished regardless of the amount of work sublet.

#### **12.3.7.3 Supervision for Emergencies**

The Contractor shall have a responsible person available at or reasonably near the work site on a twenty-four hour basis, seven days a week, in order that he/she may be contacted in emergencies and in cases where immediate action must be taken to maintain traffic or to handle any other problems that might arise. The Contractor shall be responsible for initiating, installing, and maintaining all traffic control devices as described in **Chapter 11 – Work Zone Safety and Mobility** and in the plans.

### **12.3.8 General Inspection Requirements**

#### **12.3.8.1 Cooperation by Contractor**

No work shall be done nor materials used without suitable supervision or inspection by the CE. The Contractor shall furnish the CE with every reasonable facility for ascertaining whether the work performed and materials used are in accordance with the requirements and intent of the plans and specifications.

#### **12.3.8.2 Failure of Construction Engineer to Reject Work During Construction**

If, during or prior to construction operations, the CE should fail to reject defective work or materials, whether from lack of discovery of such defect or for any reason, such initial failure to reject shall in no way prevent his/her later rejection when such defect is discovered.

### 12.3.8.3 Qualifications for Services for FDOT Administered Projects

For projects administered by a local government that are wholly or partially funded by the FDOT, there are limitations on who may perform design, and Construction Engineering and Inspection services (CEI). See **F.S. 337.14 (7) Application for qualification; certificate of qualification; restrictions, request for hearing** for more information.

### 12.3.9 Final Construction Inspection Maintenance until Final Acceptance

The Contractor shall maintain all work in first-class condition until it has been completed as a whole and has been accepted by the CE. When all materials have been furnished, all work has been performed, and the construction contemplated by the contract has been satisfactorily completed, the CE will make the final inspection.



## **12.4 Control of Materials**

### **12.4.1 Source of Supply and Quality Requirements**

#### **12.4.1.1 Only Approved Materials to be Used**

Only materials conforming to the requirements of the specifications and approved by the Engineer shall be used in the work. Any materials proposed for use may be inspected or tested at any time during their preparation and use. No material which, after approval, has in any way become unfit for use, shall be used in the work.

### **12.4.2 Inspection and Tests at Source of Supply**

#### **12.4.2.1 General**

The CE may undertake the inspection of materials at the source of supply.

#### **12.4.2.2 Cooperation by Contractor**

The Contractor shall assure the CE has free entry at all times to such parts of the plant as concern the manufacture or production of the materials ordered, and shall bear all costs incurred in providing all reasonable facilities to assist in determining whether the material furnished complies with the requirements of the specifications.

### **12.4.3 Control by Samples and Tests**

#### **12.4.3.1 Materials to be Tested, Samples**

The CE may require any or all materials to be subjected to tests by means of samples or otherwise, at production points, after delivery, or both, as he/she may determine.

#### **12.4.3.2 Applicable Standards**

Methods of sampling and testing materials shall conform to the CE's requirements and should be in accordance with Florida Sampling and Testing Methods (FSTM) so far as covered therein. Otherwise, they should be in accordance with Standards of AASHTO, ASTM, or other criteria as specifically designated by the CE. Where an AASHTO, ASTM, or other non-Florida Method is designated, but a Florida Method which is similar exists, sampling and testing should be in accordance with the Florida Method.

Whenever in these Specifications, FSTM, AASHTO, ASTM, or other standards are referenced without identification of the specific time of issuance, the reference should be construed to mean the most current issuance, including interims or addendums thereto, at the time of advertisement for bids for a project.

## **12.4.4 Quality Control System**

### **12.4.4.1 General Requirements**

The Contractor shall furnish and maintain a quality control system that will provide reasonable assurance that all materials and products submitted for acceptance conform to the contract requirements, whether manufactured or processed by the Contractor or procured from suppliers or subcontractors. The Contractor shall perform or have performed the inspection and tests required to substantiate product conformance to contract requirements and shall also perform or have performed all inspections and tests otherwise required by the contract.

### **12.4.4.2 Documentation**

The Contractor shall maintain adequate records of all inspections and tests. The records shall indicate the nature and number of tests made, the number and type of deficiencies found, the quantities approved and rejected, and the nature of corrective action taken, as appropriate.

### **12.4.4.3 Corrective Actions**

The Contractor shall take prompt action to correct any errors, equipment malfunctions, process changes, or other assignable causes which have resulted or could result in the submission of materials, products, and completed construction which do not conform to the requirements of the specifications.