

CHAPTER 16

CONSTRUCTION SPECIFICATIONS

16.0 INTRODUCTION

This chapter defines Standard Specifications and Special Provisions. It provides details on the format and guidelines for writing Special Provisions, and describes the approval process for both Standard and Project Special Provisions.

16.1 SPECIFICATIONS - GENERAL

16.1.1 Definition

“Specifications” is a general term applying to all directions, provisions, and requirements pertaining to the performance of the work and payment for the work.

16.1.2 Importance and Characteristics of Well-Written Specifications

Well-written specifications are essential to the efficient construction of a successful project. Well-written specifications inform the Contractor of the work to be performed, the conditions and restrictions on performance of the work, the expected quality of the work, and the manner in which the work will be measured for payment.

With the increased complexity and specialization in modern construction and the need for the Project Engineer to focus on legal requirements and administration, use of the phrase “as directed by the Engineer” should be minimized. Work requirements must be clearly stated in the specifications.

Well-written specifications:

- are clear, concise, and technically correct.
- do not use ambiguous words that could lead to misinterpretation.
- are written using simple words in short, easy to understand sentences.
- use technically correct terms, not slang or “field” words.
- avoid conflicting requirements.
- do not repeat requirements stated elsewhere in the Contract.

- do not explain or provide reasons for a requirement.
- state construction requirements sequentially.
- avoid the use of awkward phrases such as “and/or” and “him/her.” Rewriting the sentence can eliminate such phrases.

Furthermore, the phrases “approved by the Engineer” or “accepted by the Engineer” should be avoided. These should be used only when the Engineer will actually accept or approve the work. In such phrases, “approved” and “accepted” are synonymous; there is no difference in the responsibility taken by the Engineer.

16.1.3 Basic Specification Policy

Some of CDOT’s established policies for the development and use of construction specifications are described below. These policies are based on Federal and State laws and regulations, CDOT Policy and Procedural Directives, directions from the Chief Engineer, and established CDOT practice.

16.1.3.1 Standards and Specifications Unit

The Standards and Specifications Unit in the CDOT Project Development Branch is charged with overseeing the development and implementation of construction specifications. This unit writes and revises the *CDOT Standard Specifications for Road and Bridge Construction (1)* (commonly called the *Standard Specifications*) and *CDOT Supplemental Specifications*, issues Standard Special Provisions, and prepares or reviews Project Special Provisions.

CDOT Procedural Directive 513.1 - *Construction Project Specifications (2)*, states that the Standards and Specifications Unit is to review and approve all new Project Special Provisions and newly revised Project Special Provisions that contain significant changes, and initiate a formal review process when necessary. The Standards and Specifications Unit should be given at least two weeks to review proposed Project Special Provisions before they are incorporated into the construction project documents for advertisement.

The Specification Committee [described in Procedural Directive 513.1 (2)] assists the Standards and Specifications Unit with the review and development of formal specification changes that may be controversial or have a significant impact on the highway construction industry.

16.1.3.2 Liquidated Damages, Penalties, and Incentives

Do not use specifications that assess penalties to the Contractor. The only deductions that can be made from monies due the Contractor are:

- Liquidated damages based on additional engineering costs to the Department.
- Incentives/disincentives based on either the quality of the work or incurred road user costs.
- Price adjustments based on the quality of the work.

In each case, the deduction amount included in the specification must be accurately calculated and documented in the project file. Remediation specified for non-specification work should not be harsh or punitive, but should accurately represent the actual loss of value to the Department or to the road user.

16.1.3.3 Uniformity

CDOT strives to achieve statewide uniformity in the use and application of specifications. Frequent changes to specifications and differences in specifications from project to project and Region to Region lead to misinterpretation, inconsistent enforcement, higher bid prices, and Contractor claims. As much as possible, the *Standard Specifications*(1), Standard Special Provisions and formally issued sample Project Special Provisions and Special Provision Work Sheets should not be changed.

16.1.3.4 Warranties and Guaranties

Warranty provisions for specific construction products or features are allowed contingent upon the FHWA Division Administrator's advance approval [23 CFR Part 635.413 (3)]. CDOT has experimented with short-term warranties on pavements and continues to work toward development of warranty specifications.

Unless approved by the FHWA Division Administrator, federal funds cannot be used for warranties that extend beyond standard manufacturers' warranties. When an extended warranty is used without FHWA approval, a non-federal aid pay item should be created for the cost of the warranty.

16.1.3.5 Proprietary Items

Federal regulations prohibit specifying a proprietary (brand name) product unless justified through a Finding in the Public Interest (FIPI) 23 CFR Part 635.411 (3). A FIPI must be obtained if there are fewer than three products available that will fulfill the Contract requirements. Brand-name products approved in a FIPI can be specified with or without the phrase “or approved equal.” Project and corridor specific FIPIs must be approved by the Resident Engineer on CDOT oversight projects and by the FHWA Operations Engineer on FHWA oversight projects (i.e. projects on the Interstate Highway System). Regionwide and statewide FIPIs must be approved by the FHWA Division Administrator.

The FIPI shall be retained in the project file.

A FIPI is not required if at least three brand-name products and the phrase “or approved equal” are listed.

For additional information see Design Bulletin 2004-2 (4).

16.1.3.6 Materials-Methods Vs. End-Result Specifications

Materials-methods and end-result are the two basic types of construction specifications. Materials-methods specifications describe in detail the materials, workmanship, and processes the Contractor is to use during construction. Materials-methods specifications restrain contractor innovation and obligate the owner to accept the work if the specified materials and processes are used. End-result specifications describe the desired result or quality of the final product to be achieved. End-result specifications encourage contractor innovation and allow the owner to accept or reject the final product. Current CDOT specifications include both types and, in some cases, a combination thereof. End-result specifications are preferred.

Quality Control/Quality Assurance (QC/QA) is a type of end-result specification. QC/QA specifications require the Contractor to perform all testing necessary for control of production while the owner (CDOT) performs the testing necessary to determine acceptance, rejection, or price adjustment of the product. Acceptance/rejection/price adjustment is usually based on a statistical analysis of the test results. CDOT currently uses QC/QA specifications for pavements.

16.1.3.7 Pay Items

The specifications establish the pay items under which the Department will pay the Contractor for work completed. Readily identifiable and measurable items of work should not be made subsidiary to other items, but should be paid for under separate pay items. Use of lump sum pay items should be minimized. Pay items with subsidiary items and lump sum pay items are difficult for contractors to bid and difficult for the Project Engineer to administer during construction, especially in cases of changed conditions or changed quantities.

Payment for work by force account should be minimized. Force account work involves additional paperwork and often has a higher cost than if the work had been paid for under a bid item.

16.1.3.8 Reference Specifications

AASHTO (American Association of State Highway and Transportation Officials) is the preferred reference for citations. Other national standard references such as ASTM (American Society for Testing and Materials) may be used when there is no AASHTO specification available.

16.1.3.9 Laws, Statutes, and Regulations

Subsection 107.01 of the *Standard Specifications (1)* requires the Contractor to be fully informed of, and comply with, all applicable laws and regulations. Generally, specifications that apply, interpret, or enforce laws and regulations should not be used.

16.1.3.10 Specifications for Innovative Contracting Practices

CDOT has experimented with innovative contracting practices such as design-build projects and warranties (see section 16.1.3.4). Other innovative contracting practices that have gained acceptance on appropriate CDOT projects are cost-plus time bidding and lane rental specifications, which are designed to encourage the Contractor to minimize road-user impacts during construction. Samples of these specifications are available on the CDOT Design and Construction Project Support website and should be used only upon approval of the Innovative Contracting Unit.

FHWA Headquarters' Special Experimental Projects (SEP-14) approval is necessary for any non-traditional construction contracting technique that deviates from the competitive bidding provisions in 23 USC 112 (5). Any contract that utilizes a method of award other than the lowest responsive bid [or force account as defined in 23 CFR 635.104(b) (3)] should be evaluated under SEP-14.

For additional information see the CDOT Innovative Program Delivery Manual (6) and CDOT's sample special provisions on innovative contracting (7).

16.2 STANDARD SPECIFICATIONS

Work on CDOT construction projects is controlled by the *Standard Specifications* (1). The 1999 *Standard Specifications* contained both metric (SI) and English units of measure. Except where necessary when citing reference specifications (see section 16.1.3.8), the 2005 *Standard Specifications* contain only English units of measure. See section 16.6.

16.2.1 Organization and Format

The *Standard Specifications* (1) are organized into numbered Sections. Sections 101 through 109 contain General Provisions dealing with contracting procedures, general and legal responsibilities of the Contractor, prosecution of the work, control of work and materials, and measurement and payment for the work. Sections 201 through 630 contain construction details, and Sections 701 through 717 contain materials details.

16.2.1.1 Five-Part Format

Each Section of the construction details, Sections 201 through 630, is organized into the following five parts, in the following order:

DESCRIPTION

This part consists of short, succinct statements summarizing the work covered by this Section of the *Standard Specifications* (1). The Description should not contain details, materials or construction requirements, or explanations of measurement and payment.

MATERIALS

This part either specifies the materials requirements the work of this section must meet or refers to subsections in the Materials Details Sections (701 through 717) that contain those requirements.

CONSTRUCTION REQUIREMENTS

This part consists of the required construction procedures or end results of the work to be performed under this Section of the *Standard Specifications (1)*. Specific construction details are specified in this part.

METHOD OF MEASUREMENT

This part describes the methods and the units by which the work under this Section of the *Standard Specifications (1)* will be measured for payment to the Contractor.

BASIS OF PAYMENT

This part establishes the pay items for work accomplished under this Section of the *Standard Specifications (1)* and, when necessary, explains what is included in the payment for those pay items.

16.2.1.2 Subsections

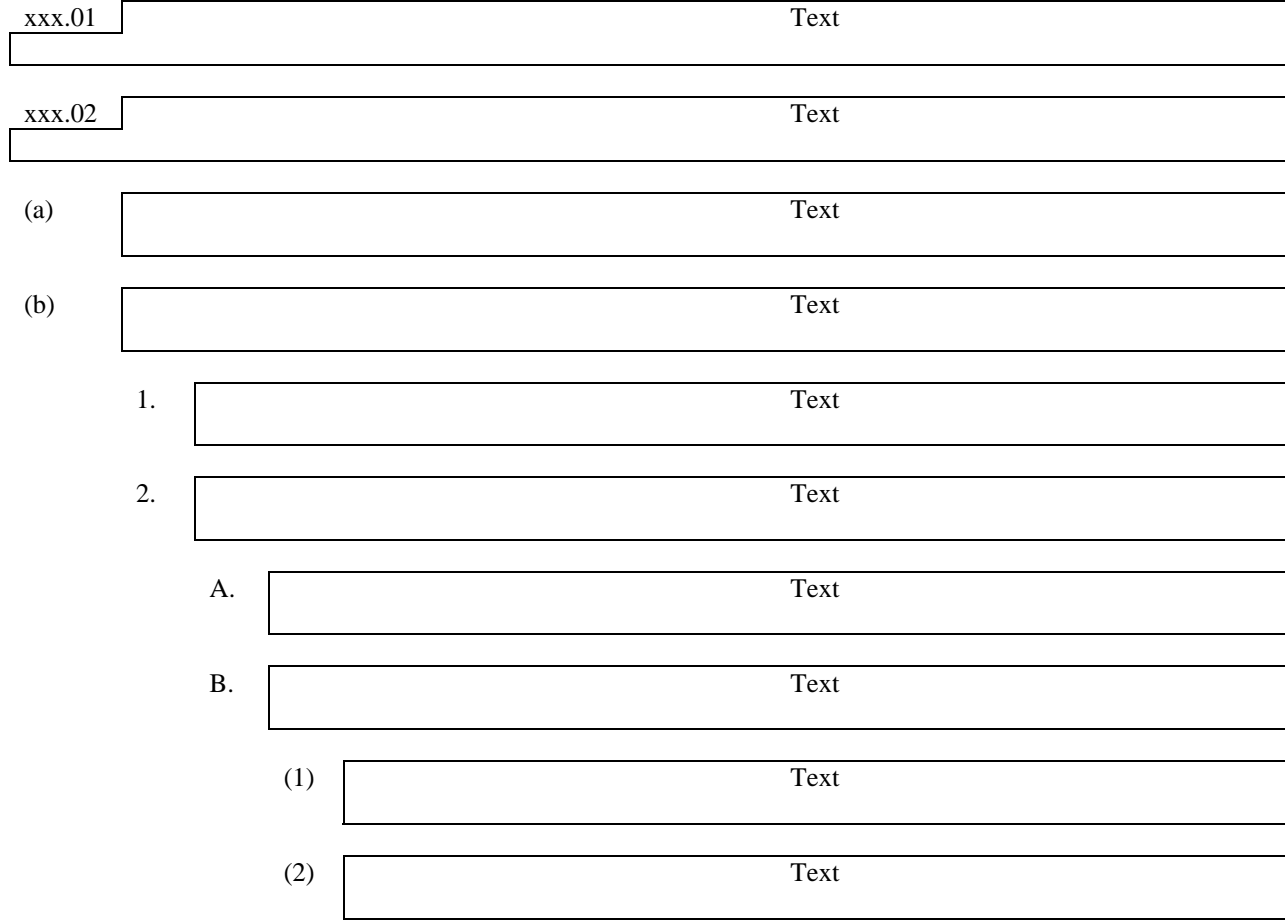


Figure 16-1 Subsection Organization

The text of the *Standard Specifications* (1) is organized into decimal subsections running consecutively through each Section (the parts are listed in 16.2.1.1). The first subsection is xxx.01, the second xxx.02, etc., where xxx is the Section number.

Subsections are broken into smaller parts ordered by consecutive numerical or alphabetical characters and indented as shown in Figure 16-1.

Numbers in parentheses are also used to identify items in a list, regardless of the placement of the list within the subsection.

16.3 SUPPLEMENTAL SPECIFICATIONS

Supplemental Specifications are additions and revisions to the *Standard Specifications (1)* that are formally adopted subsequent to the issuance of the printed book. Supplemental Specifications apply to all CDOT construction projects in the same manner as the *Standard Specifications*. The Contract will clearly identify when Supplemental Specifications are in effect.

16.4 SPECIAL PROVISIONS

Special provisions are additions and revisions to the *Standard* and *Supplemental Specifications* covering conditions unique to an individual project or group of projects. Special provisions apply to a particular construction project only when included in the Contract for that project. Special provisions fall into one of two categories: Standard Special Provisions or Project Special Provisions. Special provisions are developed and implemented according to Procedural Directive 513.1 (2).

16.4.1 Organization of Text

The revised or added specification text should be organized under each heading according to the conventions used in the *Standard Specifications (1)*.

16.4.2 Margins

The margins used in Special Provisions are 0.75 inch for left and right and 0.5 inch for top and bottom.

16.4.3 Text

Bold and italicized characters should not be used in the body of the text to emphasize or draw attention to a particular requirement. Underlining is not used in the *Standard Specifications (1)* and should not be used in Special Provisions.

Titles preceded by (a), (b), etc. should be italicized (see Figure 16-1).

Text should be bold where it would be in the *Standard Specifications (1)*. Such locations include section headings, subsection numbers, subsection titles, and table headings.

16.4.4 Standard Special Provisions

Standard Special Provisions are additions and revisions to the Standard and Supplemental Specifications, which are unique to a selected group of projects or are intended for temporary use. Standard Special Provisions are dated and formally issued by the CDOT Project Development Branch with specific instructions for their use. They are to be used without modification. The Standards and Specifications Unit of the Project Development Branch should be contacted if a project has special circumstances that may require modification of a Standard Special Provision.

16.4.4.1 Fonts

The font used for Standard Special Provisions is 10-point Arial.

16.4.5 Project Special Provisions

Project Special Provisions are additions and revisions to the *Standard Specifications (1)* and Supplemental Specifications unique to a particular project. The writing style used for Project Special Provisions should be consistent and uniform.

16.4.5.1 Criteria

- Write a Project Special Provision only if the subject has not been adequately covered in the plans, *Standard Specifications (1)*, or Standard Special Provisions.
- Write clear, enforceable requirements that will be interpreted the same way by both the Engineer and the Contractor.
- State the correct pay items. The name of the pay item must be consistent throughout the plans, specifications and estimate. If the bid item is not listed in the current CDOT Item Book, the Project Manager should contact the Engineering Estimates and Market Analysis Unit and the Standards and Specifications Unit.
- Make sure that Project Special Provisions do not conflict with other parts of the plans and specifications.

- Use end-result rather than materials-methods requirements where possible.
- Specify a requirement; don't make a suggestion or give an explanation.
- Use the verb "will" when stating actions that will be taken by CDOT and "shall" when the action is to be taken by the Contractor. For example, see the following statements in subsection 108.03 of the *Standard Specifications (1)* regarding the project schedule: (i) "The schedule shall show all work completed within the contract time." [Contractor's responsibility] (ii) "The Engineer's review of the schedule will not exceed two working days." [Engineer's responsibility] OR in subsection 601.05: (i) "Except for class BZ concrete, the maximum slump of the delivered concrete shall be the slump of the approved concrete mix plus 1 ½ inch." [Contractor's responsibility] (ii) "Acceptance will be based solely on the test results of concrete placed on the project." [Engineer's responsibility]
- Use the appropriate Standard Special Provisions as written; don't write a Project Special Provision that covers the same issue without consulting the Standards and Specifications Unit.
- Don't use Project Special Provisions with guaranty or warranty clauses unless they fall within the guidelines described in 23 CFR Part 635.413 (3) . Check with the Standards and Specifications Unit to ascertain if policies and procedures have been implemented pertaining to the use of the warranty provision.
- Don't use proprietary items except as outlined in section 16.1.3.5.

16.4.5.2 Format and Style

Project Special Provisions should conform to the conventions used in the *Standard Specifications (1)*. See the examples at the end of this chapter.

16.4.5.3 Fonts

The font used for Project Special Provisions is 11-point Times New Roman.

16.4.5.4 Titles

The title, capitalized and centered at the top of the page, should identify the section of the *Standard Specifications (1)* being revised and the subject of the revision. On multiple page special provisions the page number pertaining to the special provision should be centered on the first line of the title, on every page. Following is an example:

1
REVISION OF SECTION 105
CONTROL OF WORK

16.4.5.5 Headings

Use the following headings, or a variation thereof, for the appropriate type of special provision (xxx represents the section number).

- **Type 1 - Revision of Various Subsections.**

Begin a special provision that revises one or more subsections with the following heading:

Section xxx of the Standard Specifications is hereby revised for this project as follows:

Follow that statement with the appropriate one or more of the following headings, or variation thereof:

Delete subsection xxx.01 and replace with the following:

In subsection xxx.01, _th paragraph, delete the _th sentence and replace with the following:

In subsection xxx.01 delete the _th paragraph.

In subsection xxx.01, _th paragraph, delete the _th sentence.

Subsection xxx.01 shall include the following:

Subsection xxx.01, _th paragraph shall include the following:

Subsection xxx.01 shall include the following paragraph between the _th and _th paragraphs: