

FEDERAL LANDS HIGHWAY SPECIFICATION PROCEDURES



Pennsylvania Avenue at the White House



Washington State Route 123, Mt. Rainier National Park



**US Department of Transportation
Federal Highway Administration**

INTRODUCTION

Well-written specifications are important to ensure a project’s success. Specifications need to be clear, concise, complete, correct, and consistent.

See Subsection 104.04 of the FP for the relationship of specifications with other contract documents. Ensure the specifications do not conflict with the plans or other contract documents.

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CHAPTER 1 — SPECIFICATIONS TYPES

1.1 FLH SPECIFICATION TYPES

There are five types of FLH specifications:

- 1. Standard Specifications.** The *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects* which are approved by the Office of Federal Lands Highway (OFLH) for general application and repetitive use on FLH projects. This book is issued periodically and is designated as FP-XX (e.g., XX indicates the year of issuance).
- 2. FLH Supplemental Specifications.** FLH supplemental specifications are additions and revisions to the Standard Specifications that have been approved by the OFLH for use on all FLH projects.
- 3. Division Supplemental Specifications.** Division supplemental specifications are additions and revisions to the standard or FLH supplemental specifications that have been approved by a Division.
- 4. Unique Project Specifications.** Unique project specifications are additions and revisions to the standard specifications, FLH supplemental specifications, or division supplemental specifications that are developed and used on an individual project basis. Unique project specifications are written to address a unique requirement for a specific project.
- 5. Special Contract Requirements.** Special contract requirements (SCRs) consist of all the additions and revisions to the standard specifications applicable to an individual project. SCRs include FLH supplemental specifications, division supplemental specifications, and unique project specifications with no distinction made between the three.

The relationship of supplemental, unique project, and SCRs is shown in Figure 1-1.

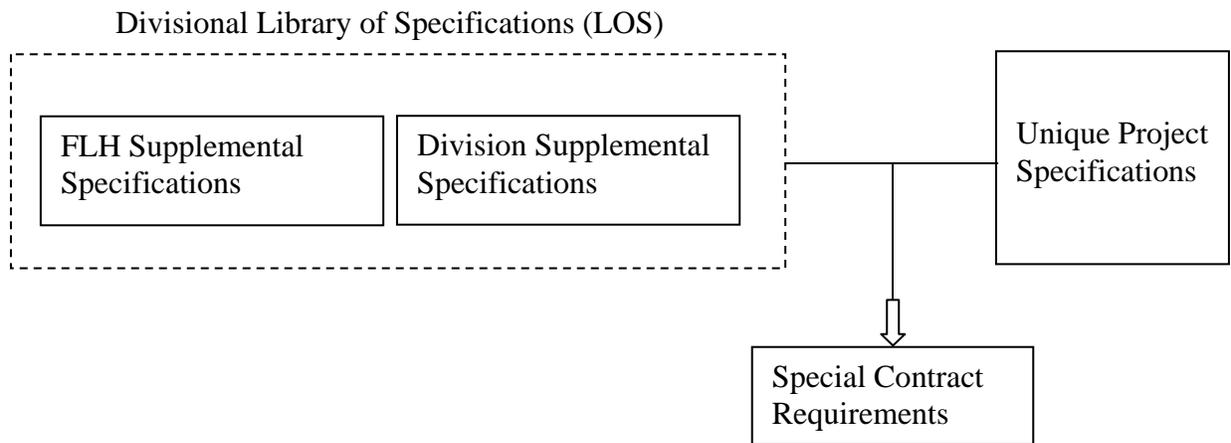


Figure 1-1
Relationship of Specifications to SCRs

1.2 NON-FLH (REFERENCED) SPECIFICATIONS.

FLH specifications may refer to a specification, standard or test method adopted by a recognized technical association, such as:

- American Association of State Highway and Transportation Officials (AASHTO),
- American National Standards Institute (ANSI);
- American Society for Testing and Materials (ASTM);
- American Wood Preservers Association (AWPA);
- American Welding Society (AWS); and
- American Water Works Association (AWWA).

Specifications may also refer to [State](#) transportation agency specifications. This can range from total use of State specifications to allowing some State-specified methods or products to be acceptable alternatives to FLH requirements.

The specification writer must ensure that the specifications incorporated by reference do not conflict with other contract documents.

CHAPTER 2 — DEVELOPMENT OF FP AND FLH SUPPLEMENTAL SPECIFICATIONS.

2.1 RESPONSIBILITY FOR DEVELOPMENT.

Responsibility for the FP and FLH supplemental specifications resides with the Specifications Coordination Group (SCG). The SCG consists of the OFLH Program Development's Construction Standards Engineer, and a representative from each FLH Division. The four-member SCG must reach a consensus on all decisions made.

The process by which the SCG reviews and adopts supplemental specifications, and, by extension, maintains and updates the current FP, is described below. This FLH specification process is also depicted graphically in Figure B2-1.

1. FLH supplemental specifications may originate as division supplemental specifications, legal requirements, or comments and suggestions from FLH functional disciple leaders, FHWA, FLH Divisions, contractors, industry representatives, or partner agencies (e.g., Forest Service, Bureau of Indian Services, National Parks Services, etc.).

2. The SCG reviews the proposed revisions and additions, coordinating with functional disciple leaders and their multidivisional teams (e.g., Materials Technology Team) as necessary to finalize specification language. To allow for informed decision-making, a proposed supplemental specification should be accompanied by the following supporting information and background.

a. Instructions for Use. A statement declaring when the proposed revision or addition to the FP is to be made.

Example:

When waterborne traffic paint is permitted, include the following:

b. Reference for Change. A statement that clearly defines what part of the FP is to be changed.

Example:

Delete the exist subsection and substitute the following:

c. Specification Wording. The proposed revision or addition is well-written specification language.

Example:

(g) Daylight reflectance. (Without glass beads)

*(1) White, ASTM E 1347 84% relative to magnesium
oxide standard*

*(2) Yellow, ASTM E 1347 55% relative to magnesium
oxide standard*

d. Reason for Change. The reason for the revision or addition including a simple explanation of why it is necessary, what it will accomplish, and any applicable background information.

Example:

{REASON: This corrects some typographical errors in Subsection 718.14(g) and also adopts CFL's 6/30/04 recommendation to delete the reference to "FTMS 141 method 6121" in ASTM E 1347.}

3. Each SCG member conducts a multi-disciplinary review of the proposed revision or charge within his office and consolidates and circulates comments to the other SCG members.
4. The SCG has three options when revisions and additions are proposed to the FP. It may:
 - a. Document minor issues related to editorial improvements as editorial quality improvements in a marked up copy of the FP maintained by the Construction Standards Engineer for future inclusion in the next published edition of the FP;
 - b. Recommend that the proposed revision or addition be issued as an FLH supplemental specification (see paragraphs 5 through 7); or
 - c. Decide that the proposed revision or addition NOT be issued as an FLH supplemental specification. These specifications may undergo further review by the Divisions. A Division may then decide to adopt the specification as a Division supplemental specification and incorporate it into its LOS.
5. In the case of option b above, the Director of the Office of Program Development will usually approve the revision or addition and issue it as an FLH supplemental specification in a transmittal sent to the Division Engineers. The transmittal typically contains multiple FLH supplemental specifications.
6. Divisions are responsible for incorporating the FLH supplemental specifications into their LOS.
7. Usually the FLH supplemental specifications will be included in the next published edition of the FP.

2.2 SUBMITTING PROPOSED SPECIFICATIONS FOR SCG CONSIDERATION

Proposed specification changes should first be submitted through Division's Specification Team. Proposed Supplemental Specification to change the FP may then be submitted to any member of the FLH Specification Coordination Group (SCG). In addition to the proposed specification and instruction to readers, a statement as to when the specification is to be used should be included.

Example:

Include the following in projects where Superpave hot asphalt concrete pavement design is required.

Also provide a statement describing why the revision is necessary and include any background information as appropriate.

Example:

REASON: At the May 2005 MTT meeting it was decided that the specifications for rotational viscosity and mass loss should be deleted and the specifications for bending beam rheometer and direct tension changed.

Example:

When slurry seals or micro-surfacing is required, include the following: (6/4/07)

Delete the first paragraph of Subsection 410.03 and substitute the following:

410.03 Composition of Mix (Job-Mix Formula). Furnish a slurry seal or micro-surfacing mixture of aggregate, water, emulsified asphalt, or polymer modified asphalt and additives according to ASTM D 3910, ISSA A 105, and ISSA A 143. Conform to the applicable aggregate gradation in Table 703-8 and the residual asphalt contents in Subsection 410.01.

{REASON: In response to an 4/6/06 format question from Wade Johnson, Brad Neitzke reviewed the specification references in Subsection 410.03 and determined that the reference to ISSA T 114 should be changed to ISSA A 105 and A 143 as described in his 4/10/06 e-mail. This change implements Brad's recommendation.}

(FP-03 Metric version, p. 277)

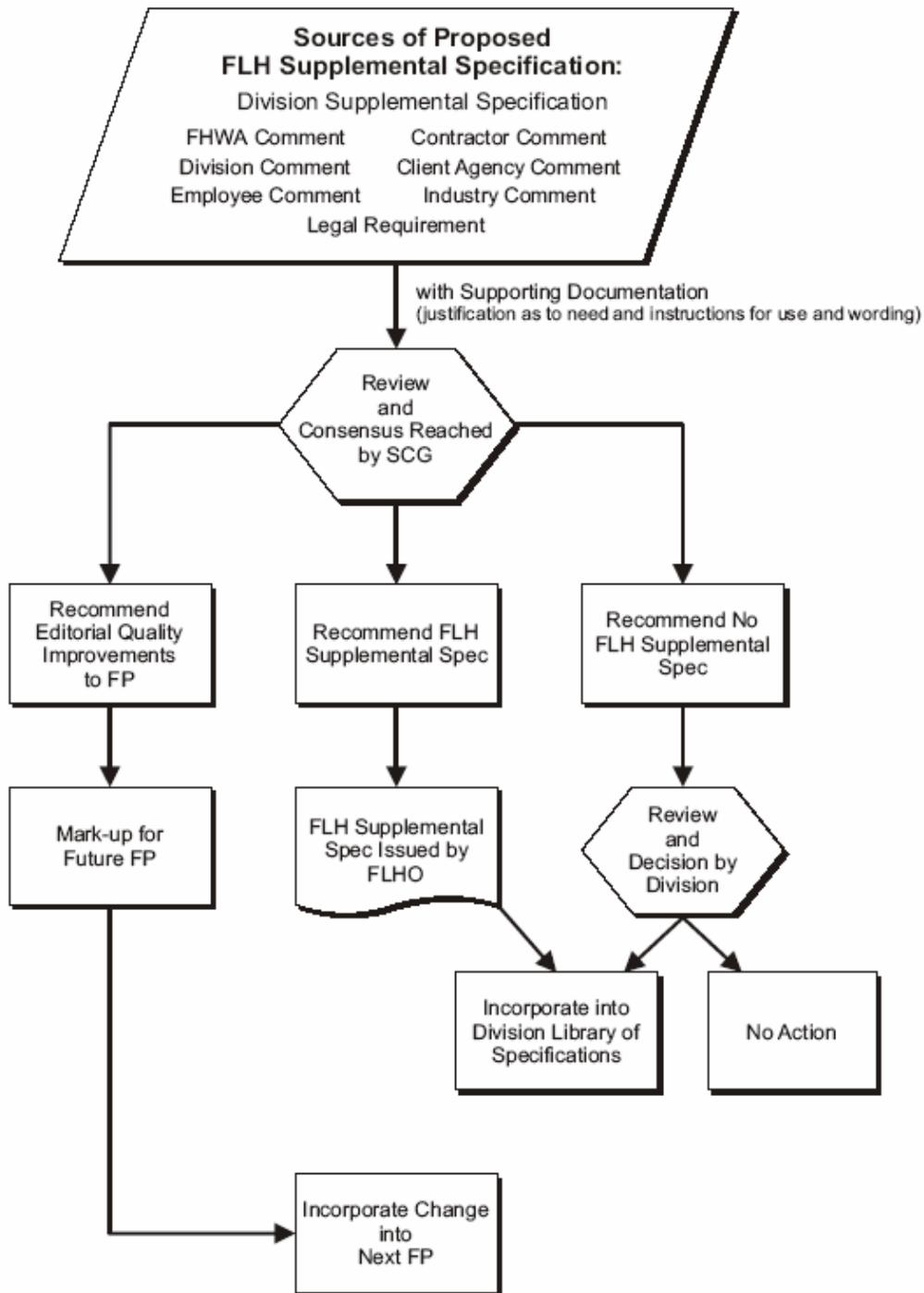


Figure 2-2
Specification Development Process

CHAPTER 3 — RESEARCHING AND GATHERING INFORMATION

The first step in developing a specification is researching the related topic area. The following describes resources for gathering information related to both technical topic areas and specification writing in general.

3.1 LIBRARY OF SPECIFICATIONS (LOS).

To develop specifications, writers should first consult the LOS maintained by their Division. If the information they are seeking is not available, the LOS content of other Divisions should also be consulted.

3.2 OTHER SOURCES OF INFORMATION.

Consider communicating directly with counterparts at other Divisions. It is possible that the other Divisions may have developed unique project specifications or have other information that could be adapted to meet the needs of the current project. Consult applicable functional discipline leader (e.g., materials, geotech, bridge, etc.) to identify any ongoing agency-wide initiatives to develop or revise relevant specifications. Field engineers and inspectors can also provide insight based on their experience in interpreting and administrating existing specification language.

Personnel from other highway and partner agencies (e.g., Forest Service, National Parks Service, etc.) can also provide insight into materials and practices that have worked well under certain conditions or at certain locales.

As an additional resource for specifications, the National Highway Specifications Website, accessible at <http://www.specs.fhwa.dot.gov>, contains the standard specifications from all 50 state highway agencies and the District of Columbia in one electronically searchable library of construction specifications. The website also contains pages dedicated to new and emerging technical specifications and innovative contracting provisions.

Industry and manufacturer's groups are a likely source of information related to technological advancements in materials and equipment. Such developments may require revisions to existing specification language.

Before citing a reference standard in a specification, refer to the issuing organization's website, a current printed copy of the cited standard, or publication to ensure that it is current and appropriate for the project.

The following table provides a list of organizations that issue standards cited in the FLH specifications.

Table 3-1
Standards Organizations

Organization (acronym)	Website
American Association of State Highway and Transportation Officials (AASHTO)	http://www.transportation.org/
American Concrete Institute (ACI)	http://concrete.org/
American Institute of Timber Construction (AITC)	http://www.aitc-glulam.org/
American National Standards Institute (ANSI)	http://www.ansi.org/
American Society for Testing and Materials (ASTM)	http://www.astm.org
American Welding Society (AWS)	http://www.aws.org/catalogs/
Federal Acquisition Regulations (FAR)	http://acquisition.gov/far/index.html
International Slurry Surfacing Association (ISSA)	http://www.slurry.org/publications.html
Master Painters Institute (MPI)	http://www.paintinfo.com/mpi/guide/index.htm
National Electrical Manufacturers Association (NEMA)	http://www.nema.org/stds/
Underwriters Laboratories	http://ulstandardsinonet.ul.com
U.S. Code	http://uscode.house.gov/search/criteria.shtml
U.S. General Services Administration (Federal Specifications)	http://apps.fss.gsa.gov/pub/fedspeccs/index.cfm

CHAPTER 4 — TYPES OF SPECIFICATIONS

Specifications developed for FLH projects fall into three types. Each type has its own advantages that the specification writer should consider when developing project-specific requirements.

4.1 PERFORMANCE OR END-RESULT SPECIFICATIONS.

The contractor is responsible for supplying an item or a product for construction that meets the stated objectives or standards. The specification generally places no restrictions on the materials used or the methods of incorporating them into the completed work.

Example:

Provide concrete that can withstand a 3,000 pounds per square inch load.

This example shifts all performance risk for meeting the concrete strength requirement onto the contractor.

Performance specifying is suitable for use when:

- the end product is measurable;
- a quick method of testing is available and economical; and
- potential deficiencies could be corrected by reprocessing or reworking.

End-result specifications encourage contractor innovation. The contractor may use non-standard designs or new technology that could lead to higher quality, or cost or schedule savings. End-result specifications also allow some technical responsibility to be shifted to the contractor. This could be useful if the Government lacks the specialized expertise in a particular area to fully specify a product using method specifications.

4.2 RESTRICTED PERFORMANCE SPECIFICATIONS.

Specifications prepared for FLH projects are primarily restricted-performance specifications. These allow the contractor the fullest possible latitude in obtaining the specified end result. However, they contain certain restrictions to ensure an acceptable level of quality and to prevent the construction or production of a large quantity of defective work. In most cases, restrictions on a performance specification do not relieve a contractor of all responsibility.

Restricted performance specifications ensure a minimum acceptable quality, while also providing the contracting officer with some basis on which to administer the contract and accept the work.

4.3 MATERIALS AND METHODS SPECIFICATIONS.

Materials and methods specifications (also know as “prescriptive specifications”) specify the exact materials and means and methods a contractor must use to construct the work. The specification provides detailed descriptions of the materials, equipment, and workmanship required. Proprietary names are typically not used.

Typically, method specifications base acceptance on “reasonable conformance” or “substantial compliance” of the work with specified requirements, as established by the Government’s supervision and inspection. Pure method specifications do not establish a range of quality levels and therefore do not include procedures for price adjustments.

Example:

Provide a concrete mix of four parts coarse aggregate, two parts fine aggregate, and one part cement with a 0.5 water cement ratio.

Implied in this example is that the design mix will provide a performance strength of 3,000 pounds per square inch after 28 days. If concrete conforming to this mix design were supplied, but could not withstand a 3,000 pounds per square inch load, the contractor would not be held responsible. The specifier assumes the burden of performance when method specifications are used.

Method specifications are most appropriate for the following situations:

- End product performance is not easily defined or is not easily or economically measured and verified.
- No quick method of acceptance testing is available.
- It would be impractical to remove and replace defective work.

Method specifications are typically based on methods that have historically provided satisfactory results; therefore, they eliminate the risk associated with newer, less proven methods and the risk associated with varying contractor performance. The Government has greater control over the work.

CHAPTER 5 — WRITING SPECIFICATIONS

Specifications are a compilation of directions, provisions, and requirements pertaining to the performance of the work. Adherence to the principles described in this guide will help writers develop well-written specifications that:

- are clear, concise, and technically correct;
- do not use ambiguous words or phrasing that could lead to misinterpretation;
- clearly define roles and responsibilities;
- are written using simple words in short, easy to understand sentences and paragraphs;
- do not repeat requirements stated elsewhere in the contract; and
- are consistent in terminology, usage, format, and organization.

Well-written conveying the writer's exact meaning, leaving no room for other interpretation. Composing specifications requires consistent attention to language, organization, format, and grammar to ensure specifications provide for fair and equal consideration, with requirements conveyed in a clear, concise, correct, complete, and consistent manner.

Develop specifications that that consider the following:

1. General formatting. Use short sections which break up material into easily understood segments that allow the introduction of headings and white space into otherwise dense material.

Have paragraphs, to the extent possible, limited to one issue. By presenting only one issue in each paragraph, writers can use informative headings to reflect the issue conveyed in the paragraph.

Use short sentences that break up information into smaller, easier-to-process units to convey complex information. Long, complicated sentences filled with dependent clauses and exceptions can confuse the reader and obscure the main point. Break up complex sentences into a list or individual sentences.

Clean concise tables or outlines are usually preferable to written specifications.

2. Proprietary specifications. Be careful when using direct references to proprietary specifications of national, regional, or local trade associations (Western Pine Association, etc.). Proprietary specifications are subject to change without notice to, or acceptance by, FHWA.

3. Risk and responsibility. Clearly state the contractor's obligations and known risk. No specification should try to get something for nothing from a contractor by concealing its intent. Specifications should clearly indicate the responsibility and authority of both the contractor and Government (Contracting Officer (CO)).

Do not specify impossibilities or near impossibilities, or contain unenforceable requirements. If ideal conditions cannot be obtained, specify tolerances to allow acceptable variations in the work.

Specifications should not place all the risk of construction on the contractor. To do so will, in all probability, result in high bid prices. Omissions, ambiguities, or inconsistencies in the plans or specifications are not the responsibility of the contractor.

The specification should describe the work with clarity and precision to prevent different interpretations by the contractor and the CO. Never include anything in the specification that is not expected to be enforced.

4. Brand Name or Equal specifications. Avoid the use of brand (trade) names in specifications and on plans. If possible, write specifications in terms of the desired results to ensure full competition among equivalent materials, equipment, and methods. The Federal Acquisition Regulations (FARs) do not allow reference in specifications and on plans to single trade name materials (also refer to 23 CFR 635.411). In exceptional cases, however, the use of trade name designations is acceptable. These cases require a listing of all, or at least a reasonable number of, acceptable salient characteristics, materials, or products.

A project may require a specific material or product, even though other acceptable materials and products exist. This is an acceptable procedure if a CO approves the choice as being in the public interest.

5. Incentive and disincentive requirements. Incentive and disincentive requirements may be required in order to achieve desired results. They may effect all the contract or the contract in part such as in interim completion dates. Incentive and disincentive requirements should be coordinated through the CO.

6. Undefined requirements. The inclusion of requirements beyond what can be measured equally by both the contractor and Government can lead to disputes. Requirements that involve the “opinion of the CO” cannot be realistically bid as the quality requirements are left undefined.

7. Ambiguous wording. Terms, such as “clean,” are similarly subjective. Instead of stating “The concrete surface must be clean,” consider “Broom clean the concrete surface” or “Provide a concrete surface free of dirt, grease, oil, or other foreign material.”

CHAPTER 6 — SPECIFICATION ORGANIZATION

6.1 DIVISIONS

The Standard Specifications are organized into ten divisions, as follows:

- Division 100 - General Requirements
- Division 150 - Project Requirements
- Division 200 - Earthwork
- Division 250 - Slope Reinforcement and Retaining Walls
- Division 300 - Aggregate Courses
- Division 400 - Asphalt Pavements and Surface Treatment
- Division 500 - Rigid Pavements
- Division 550 - Bridge Construction
- Division 600 - Incidental Construction
- Division 700 - Material

Each Division has numerous Sections.

6.2 SECTIONS.

Sections in the FP are established by the SCG. Added Sections, those not found in the FP, but determined to be in the best interest of FLH are established by the FLH Engineers Estimate, Bidding, Award, and Construction system (EEBACs) team to coincide with pay items. Proposed added sections must be coordinated with Divisional and FLH teams before including in a project.

With the exception of Division 100 (which consists of general contract requirements for which no direct payment is made) and Division 700 (which contains material requirements for which no direct payment is made), Sections are organized into the five major headings:

6.2.1 Description. Contains a concise statement of the work required in the Section.

Example:

Description
204.01 This work consists of excavating material and constructing embankments. This includes furnishing, hauling, stockpiling, placing, disposing, sloping, shaping, compacting, and finishing earthen and rocky material.

It may also include a list of designations, which may then be specified in the pay items.

Example:

Description
<p>207.01 This work consists of furnishing and placing a geotextile as a permeable separator, stabilizer, or permanent erosion control measure.</p> <p>Geotextile types are designated as shown in Subsection 714.01.</p>

Occasionally it may also be used to define terminology specific to the work.

Example:

Description
<p>202.01 This work consists of clearing and grubbing outside the clearing limits specified in Section 201. It includes scalloping clearing lines, clearing vistas, thinning vegetation, special clearing and grubbing, and the removal of individual trees and stumps.</p>
<p>202.02 Definitions.</p>
<p>(a) Selective clearing. Clearing where some trees and vegetation is designated to remain.</p>
<p>(b) Selective clearing and grubbing. Clearing and grubbing where some trees and vegetation is designated to remain.</p>
<p>(c) Special clearing and grubbing. Clearing and grubbing where all trees and vegetation are removed.</p>
<p>(d) Removal of individual trees or stumps. Removing individual trees or stumps outside the clearing limits designated in Section 201 or outside areas designated in (a) through (c) above.</p>

6.2.2 Material. Identifies and describes materials to be use to accomplish the work. Usually consists of an alphabetical listing of materials and references in tabular form. References are usually made to other sections or subsections within the contract specifications, or to applicable specifications for materials published by AASHTO, ASTM, and other standards organizations.

Example:

Material	
255.02 Conform to the following Section and Subsections:	
Concrete leveling pad	601
Geotextile type IV	714.01
Mechanically-stabilized earth wall material	720.01
Select granular backfill	704.10
Structural backfill	704.04

Include the method(s) of sampling and testing and applicable acceptance procedures in the acceptance subsection under Construction Requirements, not with the Material requirements.

6.2.3 Construction Requirements. Describes how work is to be accomplished. Use the following guidelines when developing requirements:

Describes the construction operations, special equipment, controls, limitations, tolerances, and acceptance criteria in sequential order.

Provides sufficient specification requirements to ensure quality of workmanship and satisfactory completion of the work.

To the extent possible, minimizes specific requirements about methods and equipment to encourage contractors to apply new and innovative ideas and methods in construction. If specifying using performance requirements, describe the required end product.

Specify allowable tolerances and applied penalties, if any, for exceeding specified tolerances.

Do not duplicate information already on the plans.

The last subsection is always used to describe how the work will be accepted. The Acceptance Subsection references to one or more of the following four methods of acceptance:

- Subsection 106.02, Visual Inspection;
- Subsection 106.03, Certification;
- Subsection 106.04, Measured or Tested Conformance; or
- Subsection 106.05, Statistical Evaluation of Work and Determination of Pay Factor (Value of Work).

Example:

502.12 Acceptance. See Table 502-1 for sampling and testing requirements.

Material for rigid concrete pavement restoration will be evaluated under Subsections 106.02 and 106.03. Furnish a production certification for the hydraulic cement.

The concrete mixture's slump, air content, unit mass, and temperature will be evaluated under Subsections 106.02 and 106.04.

The concrete compressive strength will be evaluated under Subsection 106.04. The lower specification limit is the minimum required compressive strength at 28 days (f_c') specified in Table 501-1. A single compressive strength test result is the average result from two cylinders cast from the same load and tested at 28 days...

Most Sections summarize sampling and testing requirements in a table.

Example:

**Table 301-1
Sampling and Testing Requirements**

Material or Product	Type of Acceptance (Subsection)	Characteristic	Category	Test Methods Specifications	Sampling Frequency	Point of Sampling	Split Sample	Reporting Time
Aggregate source quality 703.05(a)	Measured and tested for conformance (106.04 & 105)	LA abrasion (coarse)	—	AASHTO T 96	1 per type & source of material	Source of material	Yes, when required	Before using in work
		Sodium sulfate soundness loss (coarse & fine)	—	AASHTO T 104	"	"	"	"
		Durability index (coarse & fine)	—	AASHTO T 210	"	"	"	"
		Fractured faces	—	ASTM D 5821	"	"	"	"
Subbase courses grading A & B	Statistical (106.05)	Gradation		AASHTO T 27 & T 11	1 per 1000 tons	From windrow or road bed after processing	Yes	4 hours
		No. 4	I					
		No. 200	I					
		Other specified sieves	II					

6.2.4 Measurement. Describes how items of work are to be measured. Include the standard language:

Measure the Section XXX items listed in the bid schedule according to Subsection 109.02.

Example:

<p>Measurement</p> <p>260.09 Measure the Section 260 items listed in the bid schedule according to Subsection 109.02.</p>

If there are additions or exceptions to the measurement terms and definitions used in Subsection 109.02, use the standard language:

Measure the Section XXX items listed in the bid schedule according to Subsection 109.02 and the following as applicable.

Example:

Measurement

308.07 Measure the Section 308 items listed in the bid schedule according to Subsection 109.02 and the following as applicable.

Measure crushed aggregate by the cubic yard in the hauling vehicle.

Measure square yard width horizontally to include the top of aggregate width including designed widenings. Measure the square yard length horizontally along the centerline of the roadway.

6.2.5 Payment. Describes how the Government will pay for measured items. Include the standard language:

The accepted quantities will be paid at the contract price per unit of measurement for the Section XXX pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

Specify pay items with unit bid prices that are subject to adjustment under Subsection 106.05 as exceptions in the above paragraph. The subsection may also need to describe the method for adjusting the contract unit bid price.

Example:

Payment

401.19 The accepted quantities will be paid at the contract price per unit of measurement for the Section 401 pay items listed in the bid schedule except the Superpave hot asphalt concrete pavement contract unit bid price will be adjusted according to Subsections 106.05 and 401.16. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

Payment for Superpave hot asphalt concrete pavement will be made at a price determined by multiplying the contract unit bid price by the material pay factor. The material pay factor is calculated as follows...

Subsection 109.05, Scope of Payment, includes the general rules for measurement and payment of work. There is no need to restate these rules in each individual Section. However, all exceptions or needed clarifications of these rules should be stated in the Measurement or Payment subsections of the individual section.

CHAPTER 7 — DEVELOPING SPECIAL CONTRACT REQUIREMENTS (SCRs)

Assembly of SCRs is usually the responsibility of the Designer. Consider the following when developing SCRs:

1. Review LOS for applicable SCRs. The LOS has instructions for when to use many of the specifications for a particular project. Begin developing SCRs by selecting all specifications applicable to a given project in the LOS.
2. Review the SCRs for similar past projects. Often there have been past projects with similar work. The SCRs for these projects should be reviewed for any unique project specifications that are also applicable to the new project. If your division has not done a similar project in the past, other FLH Divisions or other highway agencies may have projects that can be reviewed.
3. Develop unique project specifications. Occasionally there is work on a project that is unique to that project. In this case a unique project specification will need to be developed and inserted into the SCRs. Do not develop new or “Added Section” without first coordinating with your divisional EEBACS representative. Check the EEBACS pay item table to see if work fits within items already established in a Section. Unique project specifications should be well-written according to the principals presented in this PDDM chapter and the Specifications Writer’s Guide. Assistance maybe required or entire specification written by technical specialist (e.g. Hydraulic, Geotechnical or Materials engineers).
4. Review pay items to ensure work is described, accepted, measured, and pay for under the standard specifications and SCRs.
5. Review the SCRs and Referenced Specifications. Once complete, SCRs need to be thoroughly reviewed to ensure coordination with the plans, standard specifications, and referenced specifications.

CHAPTER 8 — COORDINATION OF PLAN NOTES AND SPECIFICATIONS

In preparing plans and specifications, the question often arises as to whether a particular instruction should be placed in the specifications, shown in the form of notes on the plans, or both.

Information should *not* be included in *both* the specifications and the plans. Covering requirements in multiple places could lead to ambiguities or conflicts, especially if information is changed in one location but not the other.

Plan notes should be used when it is necessary to communicate and clarify information that cannot be shown by a particular plan or detail alone. This is often the case if the instructions apply to only one particular item. For example, if only one connection requires a high strength bolt, a note to that effect should be placed beside the detail for that connection. If instead, *all* field connections are to be high-strength bolts tightened to a specific tension, this information would be better suited to a specification, as it would then be unnecessary to repeat this information on all affected plans.

Plan sheets are also often the most appropriate place to highlight information (e.g., references to existing underground utilities, dimensional clarifications, work zone limitations related to noise or dust, locations of suitable soil, etc.) that could otherwise go unnoticed if buried in a specification.

Permitting agencies may also require the inclusion of certain notes on the plans. For example, agencies issuing NPDES permits often require the plans to include such items as the total area of disturbance, characteristics of the in situ soil, and the design capacity and associated maintenance schedule for erosion and sedimentation control measures. In this case, it would be important to verify that the associated soil erosion control specification does not duplicate or conflict with the requirements already shown on the plans.

Plan notes should not be used to revise the standard specifications. Revisions to the FP should instead be handled through SCRs.

CHAPTER 9 — SPECIFICATION REVIEW AND EVALUATION PROCESS

In addition to technical accuracy and applicability to the project, specification reviewers should also evaluate the overall readability and clarity of a specification.

1. Continuity of Thought and Logic. Check continuity of information and thought throughout each section of the specification. Ensure that the information is presented in a logical, step-by-step manner, with sentences and paragraphs limited to single ideas.

2. Method of Presentation and Overall Organization. Review and evaluate the sequence of the information and requirements to ensure clarity and continuity of thought. Ensure that the information is arranged and presented in a manner that makes locating information easy.

3. Clarity of Measurement Procedures. Provide a clear description of what is to be measured for payment and the method of measurement.

If a method of measurement cannot be defined, the need for measurement should be questioned. Without a definitive method, the possibility for multiple interpretations could lead to conflicts over the measurements taken.

The specification should also clearly address where and when the measurement is to be made. If sequential measurement and approval actions will be necessary, the sequence should be clearly identified.

To the extent necessary, the specification should also describe responsibilities regarding removal and replacement of defective work or acceptance of reduced payment.

4. Coordinating Information and Requirements. To ensure that requirements do not create conflicts or ambiguities, review the specifications with the following questions in mind:

- Are specifications current and applicable to the specific project?
- Will the contractor understand the language?
- Do requirements conflict with existing language in the FP?
- Do requirements duplicate or conflict with information shown on the plans?
- Do specifications satisfy all state, county, and local requirements and permit conditions (e.g., NPDES permits)
- Are requirements consistent with FLH policies?

To ensure total coordination of work-related technical requirements with administrative requirements, the specification writers and reviewers should become thoroughly familiar with the General Requirements (Division 100 of the FP).

5. Obtain Feedback. A good guide for determining the success of an existing specification is to review the bid tabulations for the item in question. When the range of bidding is close, it indicates that all contractors are reading the specification in the same

context. Conversely, a wide range of bidding may indicate confusion and ambiguity in the specification that calls for a rewrite.

Similarly, if a specification generates numerous requests for information, change orders, or claims on a particular project, a revision may also be necessary.

CHAPTER 10 — ADDITIONAL RESOURCES

The information included in this document constitutes the FLH's approved guidelines for matters of writing style, organization, format, terminology and phrasing, and related drafting conventions for specifications. Additional resources are available as follows:

10.1 STYLE GUIDES. For authoritative general information, including format, style, and word and number usage.

- *The Chicago Manual of Style 15th Edition*. Chicago: University of Chicago Press, 2003;
- *Federal Lands Highway Style and Operational Guide for PDDM, A&E, and other Technical Manuals*. Washington: Federal Highway Administration, 2006;
- *United States Government Printing Office Style Manual 2000*, 29th edition. Washington: U.S. Government Printing Office (GPO), 2000. <http://www.gpoaccess.gov/stylemanual> ;
- *FHWA Publications and Printing Handbook*. Washington: Federal Highway Administration, 2004; and
- *FHWA Communications Reference Guide*. Washington: Federal Highway Administration, 2004. <http://www.tfhr.gov/qkref/qrgmain.htm>

10.2 TECHNICAL WRITING RESOURCES. For general guidance on technical writing consult:

- <http://www.plainlanguage.gov>
- Garner, Bryan A. *A Dictionary of Modern American Usage*. New York: Oxford University Press, 1998.
- *The Elements of Style*. Strunk, William Jr., and E.B. White. 4th ed. Boston: Allyn & Bacon, 2000

10.3 SPECIFICATION WRITING RESOURCES. For guidance specific to writing highway construction specifications, the National Highway Institute (NHI) offers a course on the *Principles of Writing Highway Construction Specifications*. In addition, FHWA has published Technical Advisory T5080.16 – *Development and Review of Specifications*.