

MATERIALS MANUAL INTRODUCTION

I.1 PURPOSE

The Materials Manual contains instructions needed to complete Quality Assurance and Materials Acceptance for Florida Department of Transportation (Department) contracts. It is designed to give details to Department representatives and Industry representatives for administering items mandated in Florida Statutes, Rules and/or Contract Specifications and the successful completion of road and bridge contracts. The Materials Manual ensures consistency in carrying out Department policies to ensure that the quality of all materials and workmanship used in the completion of construction contracts are evaluated on a fair and equal basis.

The Director, Office of Materials will be responsible for final interpretation of the contents of the Materials Manual and should be consulted for clarification, as necessary.

I.2 AUTHORITY

Sections 20.23(3)(a), and 334.048(3), Florida Statutes (F.S.)

I.3 REFERENCE

Section 119.07, Florida Statutes (F.S)

Additional references for the Materials Manual will be cited in each section.

I.4 SCOPE

The Materials Manual will affect all offices of the Department, contractors, consultants, producers, and all others that are involved in the acceptance of materials or workmanship that are incorporated in Department projects.

I.5 DISTRIBUTION

The State Materials Office (SMO) maintains the Materials Manual which is available through the SMO Internet website at the below address. This website also serves as the Table of Contents for the Materials Manual.

<https://www.fdot.gov/materials/administration/resources/library/publications/materialsmanual/default.shtm>

I.6 ORGANIZATION

The Materials Manual will be divided into two volumes, Volume I and Volume II. Volume I will provide information and instructions for Department personnel, while Volume II will provide information and instructions for non-department personnel. Not all sections will necessarily have a Volume I and a Volume II.

Each section has "Purpose", "Authority", and "Scope" subsections. Optional "Background" and "Definitions" subsections may be included by the Originator.

Chapters and/or sections adopted in accordance with the instructions detailed in this document will be added to the Materials Manual as they are approved.

I.7 REVIEW

The Materials Manual is a dynamic document which requires annual review. Each section is reviewed by the SMO Technical Units within the 1st quarter of each year to confirm that it is current. However, individual sections are continuously revised, added, or deleted as needed.

Each potential revision will be conducted by the appropriate SMO technical expert. Separate files will be maintained on each chapter including original draft, final adopted copy, revisions, comments received, and history of any changes made to the chapter.

The Materials Manual/Specification Coordinator will route any comments received to the appropriate SMO technical expert. The technical expert will ensure that all comments received are reviewed, responded to and, if appropriate, incorporated into the section.

I.8 REVISIONS AND ADDITIONS

Many of the recommendations for changes to the Materials Manual will come from the users. Suggested comments should be emailed to the appropriate technical expert or the Materials Manual/Specification Coordinator. All suggested comments will be sent to the appropriate technical expert for review.

Proposals for new sections or section revisions must be accompanied by the list below:

- a) A completed Chief Engineer's questions. The list of Chief Engineer's questions is available through this link:

<https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/materials/administration/resources/library/publications/materialsmanual/documents/ce-questions.pdf>

- b) A completed Origination questions. The list of origination questions is available through this link:

<https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/materials/administration/resources/library/publications/materialsmanual/documents/origination-questions.pdf>

This is to maintain a history of changes for each section as well as to determine whether other Department publications will be affected.

Materials Manual sections will be given a date of either Effective, or Revised date.

- Effective dates will be for new sections and will reflect the date when the section is first published for use. For Volume II sections, this is the date of the Specification publication, or the appropriate fiscal year.
- Revised dates will be used when changes have been made to the section and reflect the date the section is published for use. For Volume II sections, this is the date of the Specification publication, or the appropriate fiscal year.

I.8.1 VOLUME I

New or revised Volume I sections will be drafted by the appropriate technical expert and presented to the Director, Office of Materials for preliminary evaluation. If approved to proceed to the review process, it will be shared with all known affected parties for comments and suggestions. Once any comments are received and addressed, the draft revision will be submitted to the SMO Materials Manual\Specification Coordinator.

The draft section will then be sent to the SMO Lead Staff, District Materials Research Engineers (DMREs) for review, after which time it will be sent to the Cross Functional Review team and then to the C-Team for further review.

A clean version and a strikethrough version of the new or revised section will then be uploaded to the Procedural Document Library (PDL) website for at least 14 days for review, and appropriate personnel will be notified via email of the review period, including FHWA. If the FHWA representative and the originator cannot come to an agreement concerning the revision, the Materials Manual Resolution Process will be followed.

The final draft will be reviewed and approved by the Chief Engineer. The flowchart outlining this process is located at the end of this document. Once the review period is complete, the revised section will be published on the Materials Manual website.

I.8.2 VOLUME II

New or revised Volume II sections will be drafted by the appropriate technical expert and presented to the Director, Office of Materials for preliminary evaluation. If approved to proceed to the review process, it will be shared with all known affected parties for comments and suggestions. Once any comments are received and addressed, the draft revision will be submitted to the SMO Materials Manual/Specification Coordinator.

The draft section will then be sent to the SMO Lead Staff and DMREs for review, after which time it will be sent to the Cross Functional Review team and then to the C-Team for further review. When possible, this process should be completed prior to June 1st of each year to ensure there is enough time for proposed changes to complete the Specifications Office review process outlined below.

Finally, the draft section is then sent to the Specifications Office to be sent out for a one-week Internal Review. After Internal Review comments are reconciled, the draft is then posted on the Industry Review website for thirty (30) days. The Specifications Office will provide any comments received during the review period to the originator for review and response. Responses shall be sent back to the Specifications Office for publishing on the Specifications Office website.

New or revised sections are sent to FHWA for final approval. New or revised sections will be linked directly in the next publication of the Specifications and published to the Materials Manual website.

If the FHWA representative and the originator cannot reach an agreement on the revision, then the Materials Manual Resolution Process will be followed. This process involves escalating the revision until consensus can be reached between the FDOT and the FHWA. The flowchart outlining this process is located at the end of this document.

Note: The same process is used for Specification revisions initiated by the SMO.

I.8.3 MATERIALS BULLETIN

Materials Bulletins may be issued by the Director, Office of Materials. This action should only be used when immediate implementation is needed, i.e., such as to implement a mandatory legislative change, FHWA directive, judicial court ruling, Department policy, or other sensitive issue.

A Materials Bulletin shall have temporary authority. A Materials Bulletin shall expire one year after the date of issuance unless extended or rescinded by the Director, Office of Materials or otherwise stated.

Materials Bulletins will be sequentially numbered, preceded by the last two digits of the year issued, (i.e., -20-10, -20-11, 20-12 etc.). The sequential numbering will restart each calendar year.

Materials Bulletins will be posted on the SMO internet website and distributed to all DMREs. The DMREs will copy and distribute the Materials Bulletin as needed to ensure that their areas of responsibility are in compliance.

I.9 TERMINOLOGY AND ABBREVIATIONS

Whenever the following terms or abbreviations are used, they are to be construed the same as the respective expressions.

Aggregate - A granular construction material such as sand, limerock, limestone, gravel, shell, slag, and crushed stone; manufactured materials such as expanded shales, slates, and clays; and recycled materials such as crushed concrete, used as a component of mortars, concrete, or bituminous mixtures, or used alone as a base or sub-base courses, as a stabilizing material for base or subgrade, or as a loose assemblage for drainage, foundation, shore protection, bank protection, water barrier, filter material, bedding purposes, or for other construction materials and uses not yet developed, but which may have potential usage by the Department.

Asphalt Bound Material - A material produced by blending, compacting, and curing a mixture of granular materials, asphalt and possibly chemical or mineral admixtures to form a material with specific engineering properties.

Assay – Chemical tests performed by the manufacturer that measures the retention and composition of the preservatives within the timber.

Cement Bound Material - A material produced by blending, compacting, and curing a mixture of granular materials, portland cement, possibly chemical or mineral admixtures, and water to form a material with specific engineering properties.

Closeout - A meeting at the end of an inspection, or at the end of a substantial portion of an unusually lengthy inspection, at which the inspection team discloses all the inspection findings to be reported.

Commercial/Consultant Laboratory - A material testing laboratory neither owned nor operated by FDOT.

Deficiency - Non-compliance with documented authority such as test methods, specifications, directives, manuals, procedures, etc.

Density Log Book - A record system consisting of graphs and log sheets designed specifically for maintaining records of density test results and test locations of soils used in roadway construction.

Department - The Florida Department of Transportation.

Draft Report - The preliminary inspection report distributed to affected parties for review and response prior to issuance of the report. Sometimes referred to as the "draft".

Earthwork Records System (ERS) - A group of electronic or manual logbooks with pertinent field data put together for earthwork construction. These data provide as-built records of the pavement substructure including graphical representation of the materials used to build the earthwork layers and densities achieved for each construction type.

Fabrication - The act of manufacturing a product.

Granular Material - A unbound material which may be suitable for use in a flexible pavement base.

Independent Assurance (IA) Inspector - An inspector responsible for evaluating qualified sampling and testing personnel and testing equipment.

Independent Assurance (IA) – Project based: sampling and testing by the Department personnel or designated representatives of the Department who do

not normally have direct responsibilities for Quality Control or Quality Assurance sampling and testing. They are used for the purpose of making independent checks on the reliability of the QC-QA data and are not used for determining the quality and acceptability of materials.

System based: evaluation of qualified sampling and testing personnel, and the testing equipment by the Department personnel or its designee(s).

Independent Verification (IV) – An unbiased sampling and testing performed at the Department's option.

Inspection - The act of examining the materials and construction control processes to determine the degree of compliance with established standards.

Inspection-In-Depth Report - The final written summary of the Inspection-In-Depth (IID) issued by the State Materials Engineer after affected parties have been given an opportunity to review and respond to the draft report.

Instructions For Computer Coding of Aggregate Test Data - The Department's manual of directions for completing standardized forms for the recording of aggregate test data and listing of the Department's aggregate codes, which is incorporated herein.

Layer Coefficient (a1, a2, a3) - The empirical relationship between structural number (SN) and layer thickness which expresses the relative ability of a material to function as a structural component of the pavement.

LBR - Limerock Bearing Ratio, a laboratory strength test for base, sub-base, and subgrade materials.

LOT - An isolated quantity of a specified product produced from a single source in a single operation.

Lot-size - A quantity of a specified material produced in a specified time period. For purposes of determining QC sampling frequencies, the database lot-size shall be the most recent 30 test results available, but not to include results more than one calendar year old.

- For purposes of assigning QC sampling frequencies, the basic lot-size for which frequencies will be assigned is one calendar week. However, for materials which exceed minimum specification requirements consistently, the lot-size may be increased in increments to a maximum of one calendar

month.

- For purposes of material acceptance, a lot-size shall consist of all materials of a specific grade or type produced during one calendar week (Monday through Friday).

Manufacturer - The person or persons responsible for the manufacturing of the materials used in the production of metal or plastic drainage products.

May - A permissive condition. Where **may** is used, it is considered to denote permission.

Modulus Value - The ratio of the applied load in psi on a 12-inch diameter rigid plate to the recoverable strain.

Must – A word of obligation. It imposes a legal obligation about a mandatory rule.

Note - An item of concern or potential problem meant to inform all responsible parties.

Order - The amount of material produced by one plant for one job for one day.

Point of Production - Any physical operation, not including redistribution terminals, involved with removing and processing material from the earth or involved with processing material for use as aggregate and shall be described as a mine.

Point of Use - The point of incorporation of a material aggregate product into an end use application that will become a part of a project. This may be at the project site or an off-site processing facility such as an asphalt plant or concrete plant.

Producer - Any business or individual seeking to supply material to the Department or contractors of the Department.

Product - A type, grade, or Department code of material from a single process.

Quality Assurance (QA) - All those planned and systematic actions necessary to provide confidence that a product or service will satisfy given requirements for quality.

Quality Assurance (QA) Inspector – An inspector performing acceptance density tests at the project level. Responsible for determining the quality and acceptability of materials being incorporated into the project.

Quality Control (QC) - All Contractor/Vendor operational techniques and activities that are performed or conducted to fulfill the contract requirements in accordance with the quality control program.

Quality Control Program (QCP) - The overall system developed and used by a producer that ensures that a product will meet specified quality standards, including documentation describing the system and supporting its effectiveness.

Random Sample - A sample drawn from a lot in which each increment in the lot has an equal probability of being chosen.

Recycled Material Processing Site - Any physical operation involved with processing previously used or manufactured material for reuse as aggregate, not to include recycled asphalt pavement (RAP) and is treated as a mine by the Department.

Redistribution Terminal - A physical operation at a fixed location, not including the point-of-production, where aggregates are from one or more approved sources, recombined from discrete haul units into common storage units, then redistributed for resale to more than one point of use.

Response - A written reply to an inspection report addressing the probable cause of the deficiency and the proposed corrective action that has been or will be taken to prevent recurrence.

Roadway earthwork - The controlled placement of soil material within the limits of construction. This includes all areas requiring density control: embankment, subgrade, base, sidewalk, curb, shoulder, pipe, mechanically stabilized earth (MSE) wall, and structure backfill.

Shall - A mandatory condition. Where certain requirements are described with the **shall** stipulation, it is mandatory that these requirements be met.

Should - An advisory condition. Where **should** is used, it is considered to be advisable, recommended but not mandatory.

Soil Support (S) - An index number which expresses the relative ability of a soil

or aggregate mixture to support traffic loads through a flexible pavement structure.

Source - A physical location including mines, recycled material processing sites, and redistribution terminals, which has aggregate.

Structural Layer Coefficient (SLC) – A coefficient representing the relative strength of different pavement materials in Florida.

Structural Number (SN) - An index number derived from an analysis of traffic, roadbed soil conditions, and regional factors which may be converted to thickness of flexible pavement layers through the use of suitable layer coefficients related to the type of material being used in each layer of the pavement structure.

Test Method - A technical procedure to determine one or more specified characteristics of a material or product.

Test Pit - An 8' x 12' or 8' x 24' open pit in which compacted materials under evaluation are subjected to repeated load cycles under different moisture conditions.

Verification (V) – An unbiased sampling and testing to validate the quality of the product.

AASHTO American Association of State Highway and Transportation Officials

AMRL AASHTO Materials Reference Laboratory

ASTM American Society for Testing and Materials

AWPA American Wood Preservers Association

CCGP Calcium Carbide Gas Pressure

CCRL
cm Cement and Concrete Reference Laboratory
centimeter

cu.ft. cubic foot

cu.yd. cubic yard

cwt. Hundred weight

dia.	diameter
FDOT# FHWA	Florida Department of Transportation form number Federal Highway Administration
ft ²	square foot
ft ³	cubic foot
g	gram
IA	Independent Assurance
IPCEA	Insulated Power Cable Engineers Association
IV	Independent Verification
k	kilo
kg	kilogram
kg/m ²	kilogram per square meter
kg/m ³	kilogram per cubic meter
km	kilometer
kPa	kilopascals
l	liter
lbs	pounds
lbs/ft ²	pounds per square foot
lbs/ft ³	pounds per cubic foot
Lin.	lineal
LL	Liquid Limit

m	meter
m ²	square meter
m ³	cubic meter
max.	maximum
ml	milliliter
mm	millimeter
min	minimum
MPa	Megapascals
mton(tonne)	metric ton
NEMA	National Electrical Manufacturers Association
no.	number
NP	Non Plastic
oz.	Ounces
Pa	Pascals
PCC	Portland Cement Concrete
pcf	Pounds per cubic foot
psf	Pounds per square foot
pH	The hydrogen ion concentration expressed in units
PI	Plasticity Index
ppm	parts per million
QA	Quality Assurance

QC	Quality Control
qt. rpm	Quart revolutions per minute
UL	Underwriters Laboratory
V	Verification
WAP	Water Asphalt Preferential
wt.	weight

I.10 TRAINING

None required. See training subsection of individual sections.

I.11 FORMS

None required. See Forms subsection of individual sections.

The flowchart illustrates the Resolution Process for Drafting and Reviewing a Section of the Materials Manual/Spec. The process begins with TU developing a draft of a new or revised section and sharing it with CO/District counterparts. The draft is then sent to the QS group for review. TU shares the initial draft with the SME and Director of Materials for preliminary review. A decision point 'Okay to proceed?' follows. If 'No', the process stops. If 'Yes', TU shares the preliminary draft with the SMO Leadstaff and DMREs for review. TU then revises the draft (as needed) and sends the redlined preliminary draft together with completed CE questions and Origination questions to SC for processing. The process continues through several review cycles involving MM/SC, CFR, and SO, with decision points for 'MM Volume 1?', 'MM Volume 2 only?', 'MM Volume 2 and Spec?', and 'Spec only?'. The process concludes with FHWA approval and publication on the MM website, or a path for disagreement resolution.

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graph TD
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Materials Manual Resolution Process

