

PREFACE

P1.1 PURPOSE:

This Materials Manual has been prepared for the purpose of standardizing the Department's use and acceptance of materials. Use of the standardized sampling and testing procedures will provide assurance that the materials and workmanship incorporated into each construction project will meet the reasonably expected close conformity to the requirements of the plans and specifications.

The State Materials Engineer will be responsible for final interpretation of the contents of this manual and should be consulted for clarification as necessary.

The sampling and testing procedures authorized by the Department are:

- (1) Tests that follow the national standard without modification.
- (2) Tests which have been modified by the State Materials Office which contain portions of a national standard.
- (3) Tests developed and/or approved by the State Materials Office for which no national standard exists.

P1.2 SAMPLING AND TESTING PROGRAM:

P1.2.1 Minimum Sample and Test requirements:

P1.2.1.1 The job sampling and testing reporting guide represents the minimum requirements for sampling and testing for each project. The sample and test requirements are stated in quantitative units and shall be considered to be followed by the words (or a portion thereof).

Good engineering practice may necessitate more frequent or additional testing to assure adequate control of materials and workmanship. At the beginning of the project, when a low volume of work is performed over a long

period of time and whenever borderline or questionable material is encountered are examples of circumstances that could alter the frequency of testing.

P1.2.1.2 When project quantities are too small to justify sampling and testing costs, or when small quantities used will not have a significant influence on performance, strength or durability of major items of construction, or when large quantities of material of known satisfactory history are used, a request may be made to the State Materials Engineer, through the District Materials Engineer, for permission to reduce or eliminate the minimum sample and test requirements.

P1.2.1.3 Acceptance of small quantities of miscellaneous materials or materials from the State Estimates Office's Qualified Product List may be made on the basis of the manufacturer's material certification or as directed by the State Materials Engineer.

P1.3 LABORATORIES AND PERSONNEL

All sampling and testing utilized in the acceptance or verification of material quality shall be performed by qualified laboratories and personnel under the Department's qualification and training programs.

P1.4 LOCATION FOR OBTAINING SAMPLES AND TESTS

Samples and tests for Acceptance and Verification shall be taken as soon as the material is available on the project; from the completed work, if practicable; or from the point nearest the finished product, prior to or following blending, that representative specimens of the specified material can be obtained; or as stated on the plans.

P1.5 TERMINOLOGY AND ABBREVIATIONS

Titles having a masculine gender, such as he, his, him, are utilized for the sake of brevity and are intended to refer to persons of either sex.

Whenever the following terms or abbreviations are used, they are to be construed the

same as the respective expressions.

Aggregate - A granular mineral material such as sand, limerock, limestone, gravel, shell, slag, crushed stone or crushed concrete used as a component of mortars, concrete bituminous mixtures or alone as a base or sub-base courses, 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 other construction materials and uses not yet developed and 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.

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 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".

Fabrication: The act of putting together the parts that make a product.

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

Independent Assurance (IA) Inspector - An inspector who does not have direct

responsibility for acceptance tests or inspection but is responsible for making independent checks on the reliability of acceptance activities and evaluation of the qualified sampling and testing personnel, and testing equipment.

Independent Assurance (IA) –

Project based: is a biased 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 program, and are not used for determining the quality and acceptability of materials.

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

Independent Verification (IV) – is a biased sampling and testing 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 strength test for base and sub- base 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 data base 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).

Manual of Florida Sampling and Testing Methods (FDOT Document No. 675-050-027 Fourth_Edition) - The Department's Manual of standardized methods of sampling and testing.

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.

Mineral Aggregate Handbook for Quality Assurance - The Department's guide and listing of Quality Assurance limits and processes.

Mineral Aggregate Manual (February 1992 Edition) - The Department's manual outlining the limits and frequencies for Quality Control sampling and testing of mineral aggregates and material quality criteria for Department approval levels.

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

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. The person or persons responsible for the fabrication of

metal or plastic drainage products.

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 - A construction inspector performing acceptance density tests at the project level. Responsible for determining the quality and acceptability of materials which are 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.

Quality Control Program (QCP) - The over-all system developed and used by a producer that ensures that a product will meet specified quality standards, including documentation 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 received from approved mines for redistribution for use on Department projects.

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

Limerock Bearing Ratio (LBR) - the ratio of the load in psi on a 3.0 square inch piston to penetrate 0.1 inch of the soaked compacted material to the standard value of 800 psi expressed in percent.

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

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) – is 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	Cement and Concrete Reference Laboratory
cm	centimeter
cu.ft.	cubic foot
cu.yd.	cubic yard

cwt.	Hundred weight
dia.	diameter
FDOT#	Florida Department of Transportation form number
FHWA	Federal Highway Administration
ft ²	square foot
ft ³	cubic foot
g	gram
IA	Independent Assurance
IPCEA	Insulated Power Cable Engineer=s 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.	Quart
rpm	revolutions per minute
UL	Underwriters Laboratory
V	Verification
WAP	Water Asphalt Preferential
wt.	weight

P1.6 FDOT Procedures Replaced

The following procedures are superceded and replaced by this manual. The listing includes the old procedure number, title and section of manual replacing the procedure.

<u>Procedure Number</u>	<u>Title</u>	<u>Manual Section</u>
675-000-004	Structural Layer Coefficients for Flexible Pavement Base Materials	2.1
675-000-006	Inspection in Depth	5.1
675-020-001	Quality Assurance Monitoring of Mineral Aggregate Sources	1.1
675-020-012	Soils and Foundation Manual	2.2

675-020-013	Density Log Book	2.3
675-020-014	Use of Independent Assurance Program to Initiate Mitigation of Road Base Material Problems	1.2
675-020-020	Use of Independent Assurance Program to Initiate Mitigation of Course and Fine Aggregate Material Problems	1.3
675-030-001	Asphalt Plant Technician Manual	3.1
675-030-002	Asphalt Paving Technician Manual	3.2
675-030-003	Independent Assurance Procedure For Asphalt Construction	3.3
675-030-005	Pavement Coring and Evaluation Procedure	3.4
675-040-001	Inspection of Metal and Plastic Drainage Products	6.1
675-040-002	Inspection of Timber Products	7.1
675-050-031	Sampling, Testing and Reporting Guide	5.2
675-050-035	Notification of Failing Test Result	5.3
675-060-001	Procedure for Requesting Friction Tests	4.1
675-060-002	Flexible and Rigid Pavement Condition	

Survey

4.1