

PASCO COUNTY
ENGINEERING SERVICES DEPARTMENT
TESTING SPECIFICATIONS
FOR
CONSTRUCTION OF ROADS, STORM
DRAINAGE, AND UTILITIES



OCTOBER 2006

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INTRODUCTION

It is to be understood that all roadways shall be designed and constructed in accordance with the applicable sections of the latest edition of the following:

1. Florida Department of Transportation, *Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways*.
2. Florida Department of Transportation, *Standard Specifications for Road and Bridge Construction* (reference abbreviation, FDOTSS).
3. Florida Department of Transportation, *Flexible Pavement Design Manual*.
4. Florida Department of Transportation, *Roadway and Traffic Design Standards* (reference abbreviation (FDOTDS)).

However, in no instance shall the roadway standards be less than those required by the Pasco County Land Development Code.

Testing methods shown in this manual are referenced to the Florida Department of Transportation, *Manual of Florida Sampling and Testing Methods*, latest edition (reference abbreviation, FM).

EXCAVATION AND EMBANKMENT

<u>ITEM</u>	<u>TEST</u>	<u>METHOD</u>	<u>MINIMUM STANDARD</u>	<u>FREQUENCY OF TEST</u>	<u>REMARKS</u>
Field density	Nuclear or drive cylinder	FM1-T238 Method-A FM1-T204	98% of FM5-521 (T180).	Each layer consisting of not more than 12" compacted thickness. Tests shall be at intervals of not greater than 500 L.F.	FDOTSS, Section 120.
Soil classification	Sieve Analysis	FM1-T027 (T27)	15% Maximum Passing No. 200 Sieve	Tests shall be at intervals of one (1) per 500 L.F. and any material change.	FDOTDS, Index 505 and AASHTO M145.
Subsoil excavation	*Remove organic and plastic materials to the required limits and backfill with suitable material. * 24" Below base if subgrade is unstabilized, or 24" below subgrade if subgrade is stabilized.				FDOTDS, Index 500 and AASHTO M145.
	Liquid Limit	FM1-T089 (T89)	40% Maximum		
	Plasticity Index	FM1-T090 (T90)	10% Maximum		
	Organic Content	FM1-T267 (T267)	4% Maximum		

<u>ITEM</u>	<u>TEST</u>	<u>METHOD</u>	<u>MINIMUM STANDARD</u>	<u>FREQUENCY OF TEST</u>	<u>REMARKS</u>
<u>STABILIZED SUBGRADE - TYPE B</u>					
Material	Limerock bearing ratio	FM5-515	LBR 40	Under pavement or pavement with curb; one (1) test per 500 L.F. randomly selected left, right, and centerline. One (1) per street minimum.	FDOTSS, Section 160.
	Liquid limit	FM1-T089	40 Maximum.	One (1) test per type of material.	Materials used for stabilizing are to be tested for liquid limit and plasticity before being blended. FDOTSS, Section 914.
	Plasticity index	FM1-T090	10 Maximum	One (1) test per type of material.	Materials used for stabilizing are to be tested for liquid limit and plasticity before being blended. FDOTSS, Section 914.
Lab density	Modified proctor	FM5-521		One (1) per material or soil type.	The County Engineer may request additional samples to evaluate the material. FDOTSS, Section 160.

<u>ITEM</u>	<u>TEST</u>	<u>METHOD</u>	<u>MINIMUM STANDARD</u>	<u>FREQUENCY OF TEST</u>	<u>REMARKS</u>
Field density	Nuclear or drive cylinder	FM1-T238 Method-A FM1-T204	98% of FM5-521	Under pavement, one (1) per 300 L.F. randomly selected left, right, and centerline. Under curb or shoulder, one (1) per 300 L.F. each side. One (1) per street minimum.	FDOTSS, Section 160. Drive cylinder must be checked against nuclear meter for first three (3) tests. If correlation is within two (2) percentage points, the nuclear meter may be used for the balance of tests.
Thickness			As per approved plan. If not specified, assumed thickness 12".	One (1) at each density.	FDOTSS Section 160. Subgrade may be stabilized deeper than shown on plans, but with no credit given for additional structural number value. Thickness tolerance shall be ± 1 ".

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<u>LIMEROCK BASE</u>					
Material	Limerock bearing ratio	FM5-515	Minimum LBR 100.	One (1) per 500 L.F.	FDOTSS, Section 911.
Lab density	Modified proctor	FM5-521	One (1) per LBR test.	The test lab shall supply a current lab density at the beginning of base work in the project.	Additional lab densities may be required by the County Engineer to evaluate the material source. FDOTSS, Section 200.
Field density	Nuclear	FM1-T238 Method-A	98% of FM5-521	One (1) per 300 L.F. randomly selected left, right, and centerline. One (1) per street minimum.	FDOTSS, Section 200.
Thickness		Minimum 3" core	Per approved plans.	One (1) at each density. One (1) per street minimum.	FDOTSS, Section 285. Thickness tolerance shall be $\pm 1/2$ ".

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<u>SOIL CEMENT BASE</u>					
Mix design					Mix design submittal and work to be in accordance to FDOTSS, Section 270.
Material	Compressive strength	FM5-520	60%-120% of design strength at age of seven (7) days.	<u>Field-mix</u> - Minimum one (1) test each change of material, but not less than one (1) per 500 L.F. randomly selected locations left, right, and centerline. <u>Plant mix</u> - One (1) test per day per mix design. Two (2) tests per street minimum for either field or plant mix.	FDOTSS, Section 270. NOTE: Excessive shrinkage cracking of ¼" or more in width may require repair.
Lab density	Standard proctor	FM1-T134		One (1) per mix design for plant mix. One (1) per day's processing for field mix.	FDOTSS, Section 270.

<u>ITEM</u>	<u>TEST</u>	<u>METHOD</u>	<u>MINIMUM STANDARD</u>	<u>FREQUENCY OF TEST</u>	<u>REMARKS</u>
Field density	Nuclear	FM1-T238 Method-A	97% of lab density.	One (1) per 300 L.F. at randomly selected locations right, left, and centerline. One (1) per street minimum.	FDOTSS, Section 270.
Thickness		Minimum 3" core	Per approved plan.	One (1) each density. One (1) per street minimum.	The acceptable tolerance is $\pm 1/2$ " not to change the asphalt thickness.
Curing			Seven (7) day period.		FDOTSS, Section 270.

ASPHALTIC CONCRETE

Laboratory density		FM1-T166		Minimum of one (1) per day per mix design.	FM1-T168 Method A sampling and testing at place of manufacture.
Mix design	Mix temperature		Master range is the mix temperature $\pm 30^{\circ}\text{F}$.		Per FDOTSS, Section 330.
Field density	Core density	FM1-T166	95% of the lab density per mix design.	Every 300 L.F. with a minimum of two (2) each street, or as approved by the County Engineer; additional test as requested by the County Engineer.	FM1-T168 Method B sampling from roadway.

<u>ITEM</u>	<u>TEST</u>	<u>METHOD</u>	<u>MINIMUM STANDARD</u>	<u>FREQUENCY OF TEST</u>	<u>REMARKS</u>
Field density	Nuclear density	FM1-T238 Method B	95% of the lab density per mix design.	Every 300 L.F. with a minimum of two (2) each street, or as approved by the County Engineer; additional test as required by the County Engineer.	May be substituted interchangeably with core density above, as approved by the County Engineer, after the initial four (4) cores.
Stability and flow	Marshall	FM5-511	FDOTTS, Section 331, Table 331-2.	Minimum of one (1) test per day per mix design.	In no case shall the mixture be reheated.
Gradation	Sieve analysis of extracted aggregate	FM1-T030	Per mix design $\pm 7.0\%$ 1" to No. 4; $\pm 5.5\%$ No. 10; $\pm 4.5\%$ No. 40*; $\pm 3.0\%$ No. 80*; $\pm 2.0\%$ No. 200.	One (1) per day per mix design.	
Extraction		FM1-T164	Per mix design $\pm 0.55\%$ (one [1] test) see Table 331-5, FDOTSS.	One (1) per day per mix design.	
Thickness	Core	Core borings	Minimum acceptable thickness shall be the specified minimum in the Land Development Code, but not less than the thickness approved in the plan's typical cross section.	One (1) each 300 L.F. at randomly selected locations left, right, and centerline; two (2) per street minimum.	Core diameter shall be 2" or greater. Measurements may be taken from core samples obtained for other tests but must meet frequency requirements. No under tolerance.
Smoothness and texture	Straightedge	15' rolling straightedge or 15' straightedge, as applicable.	3/16" per 15' for rolling straightedge. 3/8" per 15' for fixed straightedge.	Per FDOTSS, Section 330-13.	As required by the County Engineer.

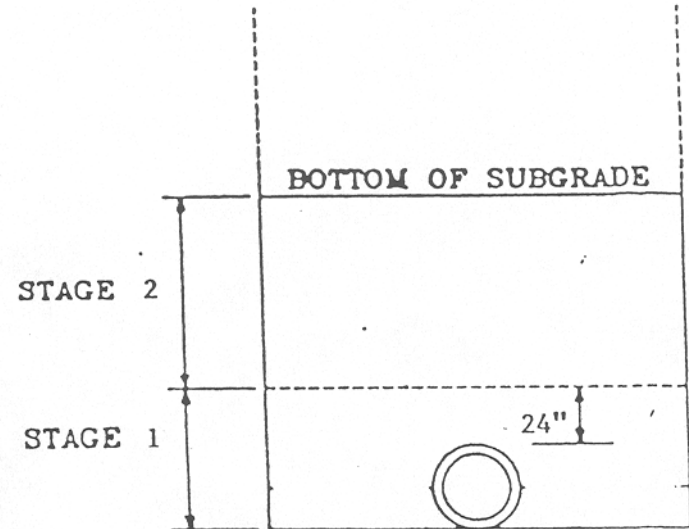
<u>ITEM</u>	<u>TEST</u>	<u>METHOD</u>	<u>MINIMUM STANDARD</u>	<u>FREQUENCY OF TEST</u>	<u>REMARKS</u>
Smoothness and texture					<p><u>NOTE:</u> Texture of the finished surface of paving layers: The finished surface shall be of uniform texture and compaction. The surface shall have no pulled, torn, or loosened portions and shall be free of segregation, sand streaks, sand spots, or ripples. Any area of the surface which does not meet the foregoing requirements shall be corrected in accordance with FDOTSS, Section 330-13.4</p>
					FDOTSS, Section 334.
					<p>*NOTE: Where Type S asphaltic concrete is specified, the equivalent fine Type Superpave (SP) Asphaltic Concrete may be substituted as follows:</p> <p style="padding-left: 40px;">Type S-I.....Type SP-12.5 Type S-II.....Type SP-19.0 Type S-III.....Type SP-9.5</p>

<u>ITEM</u>	<u>TEST</u>	<u>METHOD</u>	<u>MINIMUM STANDARD</u>	<u>FREQUENCY OF TEST</u>	<u>REMARKS</u>
<u>BACKFILL</u>					
Backfill for roadbed including 8' shoulder area from edge of pavement or back of curb.					
Material					All material used for backfill shall be free from large lumps, clay, wood, or other extraneous material. FDOTSS, Section 125-8.
Method					Backfilling shall be done according to the illustration shown on Page 8. Hydraulic method of backfill is not acceptable. Backfilling under wet conditions shall conform to FDOTSS, Section 125-8.
Lab density	Modified proctor	FM5-521 (T180)		One (1) per material of same source.	
Field density	Nuclear or drive cylinder	FM1-T238 Method A FM1-T204	98% of lab density.	First test at 2' over top of pipe. Test every 1' thereafter up to bottom of subgrade. Tests shall be at intervals no greater than 300 L.F.	Backfilling outside the shoulder area in all stages shall be to a firmness equal to that of the soil adjacent to the trench.

<u>ITEM</u>	<u>TEST</u>	<u>METHOD</u>	<u>MINIMUM STANDARD</u>	<u>FREQUENCY OF TEST</u>	<u>REMARKS</u>
				One (1) set of tests per every 4 th utility lateral crossing, with a minimum of one (1) set of tests between each pair of utility structures.	

BACKFILL STAGES

Sanitary Sewer, Water Distribution, and Reclaimed Water Lines



STAGE 1 - THE BEDDING OF THE PIPE SHALL COMPLY WITH STANDARDS FOR DESIGN AND CONSTRUCTION OF WATER AND WASTEWATER FACILITIES, SECTION B.I.3.3. IN THE FIRST STAGE, THE CONTRACTOR SHALL PROVIDE ADEQUATE COMPACTED FILL BENEATH THE HAUNCHES OF THE PIPE TO TWO (2) FEET OVER THE TOP OF THE PIPE TO CONTAIN AND CONTROL THE PIPE TO PROPER LINE AND GRADE, AND PROVIDE ADEQUATE SUPPORT FOR THE REMAINDER OF THE BACKFILL AND ROADWAY OR OTHER STRUCTURES PLACED THEREON.

DENSITY TESTING REQUIRED IN THE TOP TWELVE (12) INCHES.

STAGE 2 - IN THE SECOND STAGE, THE REMAINDER OF THE TRENCH SHALL BE BACKFILLED WITH SUITABLE MATERIAL IN LAYERS NOT TO EXCEED ONE (1) FOOT IN THICKNESS COMPACTED.

DENSITY TESTS WILL BE TAKEN AT ONE (1) FOOT INTERVALS IN STAGE 2 UP TO THE BOTTOM OF THE SUBGRADE.

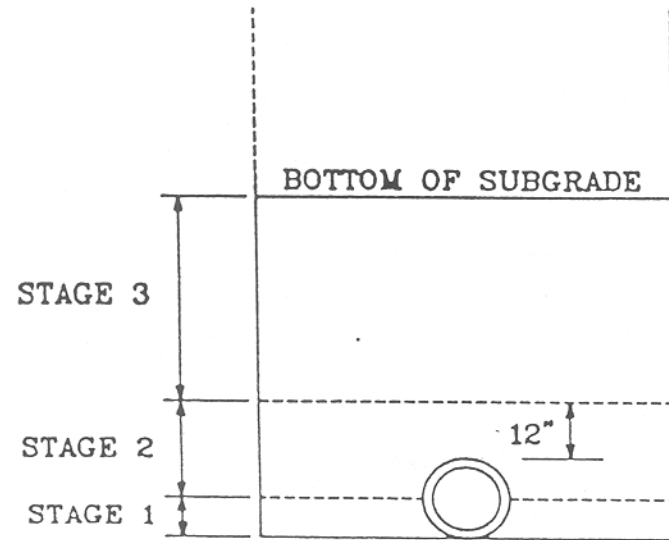
BACKFILL

Storm Sewer and Pipe Culverts

<u>ITEM</u>	<u>TEST</u>	<u>METHOD</u>	<u>MINIMUM STANDARD</u>	<u>FREQUENCY OF TEST</u>	<u>REMARKS</u>
Material					All material used for backfill shall be free from large lumps, clay, wood, or other extraneous material. FDOTSS, Section 125-8.
Method					Backfilling shall be redone according to FDOTSS, Section 125-8.3.1. Hydraulic method of backfill is not acceptable. Backfilling under wet conditions shall conform to FDOTSS, Section 125-8.
Lab density	Modified proctor	FM5-521 (T180)		One (1) per material of same source.	
Field density	Nuclear or drive cylinder	FM1-T238 Method A FM1-T204	98% of lab density.	One (1) set of tests per crossing, with a minimum of one (1) set of tests between each pair of structures. Tests shall be made at intervals no greater than 400 L.F. In Stages 1 and 2 of backfill, each 6" layer of compacted thickness, and in Stage 3, each 12" layer of compacted thickness, shall be tested. See illustration, Pg. 10. Backfilling outside the shoulder in <u>all stages</u> shall be to a firmness equal to that of the soil adjacent to the pipe trench.	FDOTSS, Section 125-8.

BACKFILL STAGES

Storm Sewers and Pipe Culverts



STAGE 1 - THE MATERIAL BENEATH THE HAUNCHES OF THE PIPE AND ABOVE ANY BEDDING REQUIRED SHALL BE PLACED IN SIX (6) INCH LAYERS (COMPACTED THICKNESS) AND COMPACTED WITH MECHANICAL TAMPERS.

STAGE 2 - THE MATERIAL ALONG THE SIDE OF THIS PIPE AND TO A POINT AT LEAST ONE (1) FOOT ABOVE THE PIPE SHALL BE PLACED IN SIX (6) INCH LAYERS (COMPACTED THICKNESS) AND COMPACTED WITH APPROPRIATE EQUIPMENT.

STAGE 3 - THE MATERIAL FROM THE TOP OF STAGE 2 TO THE BOTTOM OF THE SUBGRADE OR FINISHED SURFACE OF THE EMBANKMENT SHALL BE PLACED IN LAYERS NOT TO EXCEED TWELVE (12) INCHES IN THICKNESS AND COMPACTED WITH APPROPRIATE EQUIPMENT.

BACKFILL

Structures Other Than Storm Sewers, Pipe Culverts, Sanitary Sewer, Water Distribution, and Reclaimed Water Lines

<u>ITEM</u>	<u>TEST</u>	<u>METHOD</u>	<u>MINIMUM STANDARD</u>	<u>FREQUENCY OF TEST</u>	<u>REMARKS</u>
Material					All material used for backfill shall be free from large lumps, clay, wood, or other extraneous material
Method				Backfill constructed in 12" lifts require each lift to be tested for density. Backfill may be constructed in 36" lifts using granular materials with density tests taken every 12".	Hydraulic method of backfill is not acceptable.
Lab density	Modified proctor	FM5-521 (T180)		One (1) per material of same source.	
Field density	Nuclear or drive cylinder	FM1-T238 Method A F141-T204	98% of lab density.	One (1) every 12" of backfill.	

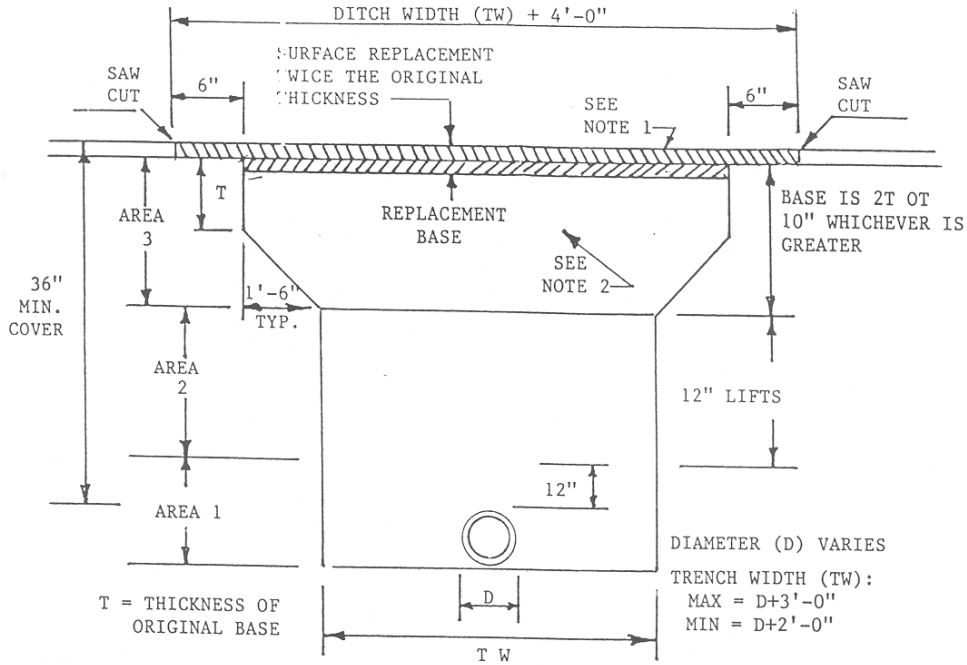
BACKFILL

Pavement Open Cuts for Storm Sewers, Pipe Culverts, Sanitary Sewer, Water Distribution, and Reclaimed Water Lines

<u>ITEM</u>	<u>TEST</u>	<u>METHOD</u>	<u>MINIMUM STANDARD</u>	<u>FREQUENCY OF TEST</u>	<u>REMARKS</u>
Material					All material used for backfilling shall be free from large lumps, wood, or other extraneous material. FDOTSS, Section 125-8. Base material will be new material, not reused from excavation.
Method			Restoration of open cut shall be done as shown in diagram on Page 14.		
Asphalt tests	Marshall stability	FM5-511	Per FDOT for specified mix. "S" mixes shall not be less than 1,500 lbs.	One (1) per day per mix design.	
	Field Density	FM1-T238 Method B	95% of lab density per mix design.	One (1) per crossing or every 300 L.F.	
	Sieve analysis of extracted aggregate	FM1-T030	Per mix design.	One (1) per day per mix design.	
	Extraction Thickness	FM1-T164 Core borings	Per mix design. Twice the thickness of original asphalt.	One (1) per day per mix design. One (1) per crossing cut or every 300 L.F.	
Limerock base	Limerock bearing ratio	FM5-515	LBR 100	One (1) per crossing cut or 500 L.F.	
	Lab density, modified proctor	FM5-521		One (1) per material source.	

<u>ITEM</u>	<u>TEST</u>	<u>METHOD</u>	<u>MINIMUM STANDARD</u>	<u>FREQUENCY OF TEST</u>	<u>REMARKS</u>
	Field density	FM1-T238 Method A	98% of lab density.	One (1) per crossing cut or one (1) per 300 L.F.	
Limerock base	Thickness	Core boring - Minimum 3" core	Twice the original base thickness or 10", which ever is greater.	One (1) per crossing cut or one (1) per 500 L.F.	
Trench cut or shoulder backfill	Lab density, standard proctor	FM5-525		One (1) per uniform material.	
	Field density nuclear or drive cylinder	FM1-T238 Method A FM1-T204	98% of FM5-521 (T180).	One (1) each 12" compacted lift in crossing cut or each 12" compacted lift at 300 L.F.	

OPEN CUT RESTORATION



GENERAL NOTES:

1. REPLACEMENT ASPHALT SHALL BE TWICE THE ORIGINAL PAVEMENT THICKNESS WITH A MINIMUM OF TWO (2) INCHES AND SHALL BE TYPE S-1 OR S-3 ASPHALT.
2. REPLACEMENT BASE SHALL BE NEW MATERIAL NOT REUSED FROM EXCAVATION. ACCEPTABLE BASE ALTERNATIVE SHALL BE TYPE ABC OR BETTER ASPHALT PLACED AT A TOTAL THICKNESS OF SIX (6) INCHES.
3. AREA 1 - BACKFILL SHALL BE PLACED IN SIX (6) INCH LIFT WITH EACH LIFT COMPACTED TO 100% OF FM1-T238 USING MECHANICAL TAMPERS.
4. AREA 2 - BACKFILL SHALL BE PLACED IN TWELVE (12) INCHES LIFTS WITH EACH LIFT COMPACTED TO 100% OF FM1-T238, USING APPROPRIATE COMPACTING EQUIPMENT.
5. AREA 3 - LIMEROCK (LBR 100) BASE SHALL BE CONSTRUCTED IN LIFTS NOT GREATER THAN SIX (6) INCHES COMPACTED THICKNESS, AND HAVE A DENSITY EQUAL TO 100% OF FM1-T238, METHOD A.
6. FLOWABLE FILL MAY BE PLACED ABOVE AREA 1 UP TO THE BOTTOM OF THE RESTORED BASE. MIX DESIGN SHALL CONFORM TO FDOTSS, SECTION 121.

CONCRETE

<u>ITEM</u>	<u>TEST</u>	<u>METHOD</u>	<u>MINIMUM STANDARD</u>	<u>FREQUENCY OF TEST</u>	<u>REMARKS</u>
Material	Compressive strength (twenty-eight [28] days)	FM1-T022 and FM1-T023	Minimum 3,000 psi or per design.	Set of three (3) cylinders per each day's placement or each 50 c.y. ³	FDOTSS, Section 346.

*Note: Total cementitious materials shall be minimum 508 lb/yd³ or per design. Water/cementitious materials ratio shall be maximum 0.50 lb/lb or per design.