#### BASES AND SUBBASES QUALITY CONTROL/QUALITY ASSURANCE

<u>DESCRIPTION</u>: The Contractor is advised that the Quality Control Testing of Base and Subbase Compaction and other requirements defined in the tables below shall be performed by the Contractor as outlined in this provision and related documents. The Engineer will perform Quality Assurance Testing and other testing as required below. Except as revised in this provision, Contractor Base and Subbase Quality Control shall be performed in accordance with the procedures outlined in the Standard Specifications and Construction Manual. Other construction and testing requirements of this Proposal, the Standard Specifications (**SS**) and the Construction Manual (**CM**) shall remain unchanged.

Related test procedures are listed below:

SC-T- (1-5)	Methods of Sampling and Analyzing Aggregates
SC-T-21	Method of Sampling Soil Pits
SC-T-22	Determining Moisture Content of Soils By Carbide Gas Method
SC-T-25	Field Method of Determining Moisture/Density Relationships of Soils
SC-T-29	Field Determination of Maximum Dry Density and Optimum Moisture Content
	of Soils by One-Point Proctor Method
SC-T-33	Field Determination of Density and Moisture Content of Soils and Aggregate
	Bases by the use of the Troxler 3401 Series Nuclear Gauge
SC-T-100	Random Method of Sampling
AASHTO T 99	Moisture- Density Relations of Soils Using a 5.5-Lb Rammer
AASHTO T134	Moisture- Density Relations of Soil Cement Mixtures
AASHTO T180D	Moisture- Density Relations of Soils Using a 10-Lb Rammer
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**Equipment:** The Nuclear Density Gauge used shall be provided and operated by the Contractor and shall be of the Troxler 3400 series or equivalent. All equipment and personnel necessary to perform these tests shall be approved by the Department's Research and Materials Laboratory. The Contractor's off-site testing facilities shall be AASHTO certified for each testing procedure.

**Documentation:** Lab Form 229 and other reports as required shall be completed by the Contractor and submitted to the Resident Engineer on a daily basis. Subsequent placement of material shall not proceed until the reports are received.

**Deficient Areas:** Deficient Areas as determined by the Contractor's or the Engineer's testing, shall be retested following corrective actions. Retested areas shall be indicated by an asterisk next to the Station Number certification and the description as a "Retest" in the remarks section of the form. Areas which do not attain required compaction and other defined requirements may be required to be reworked or removed and replaced at the discretion of the Engineer at no additional cost to the Department.

**Required Testing of Bases and Subbases BY CONTRACTOR:** Quality Control Testing of Bases and Subbases shall be performed in accordance with the following table:

Section/ Type	TESTING BY	TEST PROCEDURES PERFORMED	FREQUENCY **	LOCATION OF TEST
301/ Cement Modified	CONTRACTOR (QUALITY CONTROL)	SC-T-33 FIELD DENSITY	Each 1000' per 2 lanes, each layer	Random within 1000' section as determined from SC-T-100
Subbase		AASHTO T 134 SC-T-25 SC-T-29 Maximum Density	Min. of 2 per day or when soil conditions change	Material sampled shall be obtained within area of days work and representative of material placed
		SC-T- (2-5) Gradation & requirements of sect. 301.09(SS)	2x daily	Random as determined from SC-T-100
		Core Samples - Remolded Compressive Strength	Set of 2 Cores- 2x day (Samples to be submitted to SCDOT Research & Materials Lab)	Random as determined from SC-T-100
		Depth/ Thickness	Staggered- each 500' per two lanes	Random within 500' section as determined from SC-T-100

**Concurrent Quality Assurance Testing of Bases and Subbases BY ENGINEER**: Quality Assurance Testing of Bases and Subbases shall be performed in accordance with the following table:

SECTION/ TYPE	TESTING BY	TEST PROCEDURES PERFORMED	FREQUENCY **	LOCATION OF TEST
301/ Cement Modified	ENGINEER (Quality Assurance)	SC-T-33 FIELD DENSITY	Each 4000' per 2 lanes, each layer	Random within 4000' section as determined from SC-T-100
Subbase		AASHTO T 134 SC-T-25 SC-T-29 Maximum Density	Min. of 1 per day or when soil conditions change	Material sampled shall be obtained within area of days work and representative of material placed
		Gradation & requirements of sect. 301.09(SS)	1x daily	Random as determined from SC-T-100
		Core Samples - Remolded Compressive Strength	Observation and Documentation of the Contractor's core sampling procedure	Random as determined from SC-T-100
		Depth/ Thickness	Staggered- each 2000' per two lanes	Random within 2000' section as determined from SC-T-100
	ENGINEER (Department Record)	Record Testing F Construction Manua	•	as outlined in SCDOT

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**Required Testing of Bases and Subbases** <u>BY CONTRACTOR</u>: Quality Control Testing of Bases and Subbases shall be performed in accordance with the following table:

Section/	TESTING	TEST PROCEDURES	FREQUENCY **	LOCATION OF TEST
Туре	BY	PERFORMED		
302/ Soil Aggregate Subbase	CONTRACTOR (QUALITY CONTROL)	SC-T-33 FIELD DENSITY	Each 1000' per 2 lanes, each layer	Random within 1000' section as determined from SC-T-100
Course		AASHTO T 180D Maximum Density	Min. of 1 per source or when material conditions change. (For projects <2000 tons use SCDOT historical data - if available.)	Material sampled shall be obtained within area of days work and representative of material placed
		SC-T- (1-5) Gradation & requirements of sect. 302.02(SS)	Each 500 tons of aggregate	Random as determined from SC-T-100

Concurrent Quality Assurance Testing of Bases and Subbases BY ENGINEER: Quality Assurance

Testing of Bases and Subbases shall be performed in accordance with the following table:

SECTION/	TESTING	TEST PROCEDURES	FREQUENCY **	LOCATION OF TEST
TYPE	BY	PERFORMED		
302/ Soil Aggregate Subbase	ENGINEER (Quality Assurance)	SC-T-33 FIELD DENSITY	Each 4000' per 2 lanes, each layer	Random within 4000' section as determined from SC-T-100
Course		AASHTO T 180D Maximum Density	Min. of 1 per source or when material conditions change. (For projects <2000 tons use SCDOT historical data — if available.)	obtained within area of days work and
		SC-T- (1-5) Gradation & requirements of sect. 302.02(SS)	Each 2000 tons of aggregate	Random as determined from SC-T-100
	ENGINEER (Department Record)	Record Testing F Construction Manua		as outlined in SCDOT

Required Testing of Bases and Subbases BY CONTRACTOR: Quality Control Testing of Bases and

Subbases shall be performed in accordance with the following table:

Section/ Type	TESTING BY	TEST PROCEDURES PERFORMED	FREQUENCY **	LOCATION OF TEST
303/ Sand- Clay Base Course	CONTRACTOR (QUALITY CONTROL)	SC-T-33 FIELD DENSITY	Each 1000' per 2 lanes, each layer	Random within 1000' section as determined from SC-T-100
		AASHTO T 99 SC-T-25 SC-T-29 Maximum Density	Min. of 2 per day or when soil conditions change	Material sampled shall be obtained within area of days work and representative of material placed
		(Pit) SC-T-21 SC-T-(2-5) Gradation & requirements of sect. 303.02(SS)	See SC-T-21	See SC-T-21
		(Roadway) SC-T- (2-5) Gradation & requirements of sect. 303.02(SS)	Each 1000' per 2 lanes, each layer, sample per (CM)7-61	Random within 1000' section as determined from SC-T-100
		Depth/Thickness	Staggered – each 250' per two lanes	Random within 250' section as determined from SC-T-100

Concurrent Quality Assurance Testing of Bases and Subbases BY ENGINEER: Quality Assurance

Testing of Bases and Subbases shall be performed in accordance with the following table:

SECTION/	TESTING	TEST PROCEDURES	FREQUENCY **	LOCATION OF TEST
TYPE	BY	PERFORMED		
303/ Sand- Clay Base Course	ENGINEER (Quality Assurance)	SC-T-33 FIELD DENSITY	Each 4000' per 2 lanes, each layer	Random within 4000' section as determined from SC-T-100
		AASHTO T 99 SC-T-25 SC-T-29 Maximum Density	Min. of 1 per day or when soil conditions change	Material sampled shall be obtained within area of days work and representative of material placed
		(Pit) SC-T-21 SC-T-(2-5) Gradation & requirements of sect. 303.02(SS)	Observation and Documentation of the Contractor's sampling procedure.	See SC-T-21
		(Roadway) SC-T-(2-5) Gradation & requirements of sect. 303.02(SS)	Each 4000' per 2 lanes, each layer, sample per (CM)7-61	Random within 4000' section as determined from SC-T-100
		Depth/Thickness	Staggered – each 1000' per two lanes	Random within 1000' section as determined from SC-T-100
	ENGINEER (Department Record)	Record Testing F Construction Manua		as outlined in SCDOT

**Required Testing of Bases and Subbases BY CONTRACTOR:** Quality Control Testing of Bases and Subbases shall be performed in accordance with the following table:

Section/	TESTING	TEST PROCEDURES	FREQUENCY **	LOCATION OF TEST
Туре	BY	PERFORMED		
304/	CONTRACTOR	AASHTO T 180D	Min. of 1 per source or	Material sampled shall be
Coquina	(QUALITY	Maximum Density	when material	obtained within area of
Shell Base	CONTROL)		conditions change.	days work and
Course	·		(For projects <2000	representative of material
			tons use SCDOT	placed
			historical data - if	•
			available.)	
		SC-T-33	Each 1000' per 2	Random within 1000'
		FIELD DENSITY	lanes, each layer	section as determined
			-	from SC-T-100
		SC-T- (1-5)	Each 1000' per 2	Random within 1000'
		Gradation &	lanes, each layer,	section as determined
		requirements of	sample per (CM)7-35	from SC-T-100
		sect. 304.04( <b>SS</b> ).		
		Depth/ Thickness	Staggered – each 250'	Random within 250'
			per two lanes	section as determined
				from SC-T-100

**Concurrent Quality Assurance Testing of Bases and Subbases BY ENGINEER:** Quality Assurance Testing of Bases and Subbases shall be performed in accordance with the following table:

SECTION/	TESTING	TEST PROCEDURES	FREQUENCY **	LOCATION OF TEST
TYPE	BY	PERFORMED		
304/ Coquina	ENGINEER (Quality	AASHTO T 180D Maximum Density	Min. of 1 per source or when material	•
Shell Base Course	Assurance)	·	conditions change. (For projects <2000 tons use SCDOT historical data – if available.)	days work and representative of material placed
		SC-T-33 FIELD DENSITY	Each 4000' per 2 lanes, each layer	Random within 4000' section as determined from SC-T-100
		SC-T- (1-5) Gradation & requirements of sect. 304.04(SS).	Each 4000' per 2 lanes, each layer, sample per (CM)7-35	
		Depth/ Thickness	Staggered – each 1000' per two lanes	Random within 1000' section as determined from SC-T-100
	ENGINEER (Department Record)	Record Testing F Construction Manua		as outlined in SCDOT

**Required Testing of Bases and Subbases BY CONTRACTOR:** Quality Control Testing of Bases and Subbases shall be performed in accordance with the following table:

Section/	TESTING	TEST PROCEDURES	FREQUENCY **	LOCATION OF TEST
Type	BY	PERFORMED		
305/	CONTRACTOR	AASHTO T 180D	Min. of 1 per source or	Material sampled shall be
	(QUALITY	Maximum Density	when material	obtained within area of
Aggregate	CONTROL)		conditions change.	days work and
Base			(For projects <2000	•
			tons use SCDOT	placed
			historical data – if	
			available.)	
		SC-T-33	Each 1000' per 2	
		FIELD DENSITY	lanes, each layer	section as determined
				from SC-T-100
		SC-T- (1-5)	Each 1000' per 2	
		Gradation &	lanes, each layer,	
		requirements of	sample per	from SC-T-100
		sect. 305.05( <b>SS</b> )	305.13( <b>SS</b> )	Dandan Milia 0501
		Depth/ Thickness	Staggered – each 250'	Random within 250'
			per two lanes	section as determined
				from SC-T-100

**Concurrent Quality Assurance Testing of Bases and Subbases BY ENGINEER:** Quality Assurance Testing of Bases and Subbases shall be performed in accordance with the following table:

SECTION/	TESTING	TEST PROCEDURES	FREQUENCY **	LOCATION OF TEST
TYPE	BY	PERFORMED		
305/	ENGINEER	AASHTO T 180D	Min. of 1 per source or	·
Graded	(Quality	Maximum Density	when material	
Aggregate	Assurance)		conditions change.	days work and
Base			(For projects <2000	•
			tons use SCDOT	placed
			historical data – if available.)	
		SC-T-33	Each 4000' per 2	Random within 4000'
		FIELD DENSITY	lanes, each layer	section as determined
				from SC-T-100
		SC-T- (1-5)	Each 4000' per 2	
		Gradation &	lanes, each layer,	
		requirements of	sample per	from SC-T-100
		sect. 305.05( <b>SS</b> )	305.13( <b>SS</b> )	D 1 311 10001
		Depth/ Thickness	Staggered – each	
			1000' per two lanes	section as determined from SC-T-100
	ENGINEER	Record Testing F	requency and Location	as outlined in SCDOT
	(Department	Construction Manua	ıl.	
	Record)			
	<u>l</u>	<u>l</u>		

Required Testing of Bases and Subbases BY CONTRACTOR: Quality Control Testing of Bases and

Subbases shall be performed in accordance with the following table:

SECTION/TYPE	TESTING	TEST	FREQUENCY **	LOCATION OF TEST
	BY	PROCEDURES		
		PERFORMED		
307/ Cement	CONTRACTOR	AASHTO T 134	Min. of 2 per day or	Material sampled shall
Stabilized	(QUALITY	SC-T-25	when soil conditions	be obtained within area
Earth Base	CONTROL)	SC-T-29	change	of days work and
		Maximum		representative of
		Density		material placed
		SC-T-33	Each 1000' per 2	Random within 1000'
		FIELD	lanes, each layer	section as determined
		DENSITY		from SC-T-100
		SC-T- (2-5)	Each 1000' per 2	Random within 1000'
		Gradation &	lanes, each layer	section as determined
		requirements of		from SC-T-100
		sect. 307&		
		303.02( <b>SS</b> )		
		Depth/	Staggered – each	Random within 250'
		Thickness	250' per two lanes	section as determined
				from SC-T-100

Concurrent Quality Assurance Testing of Bases and Subbases BY ENGINEER: Quality Assurance

Testing of Bases and Subbases shall be performed in accordance with the following table:

SECTION/TYPE	TESTING	TEST	FREQUENCY **	LOCATION OF TEST
	BY	PROCEDURES PERFORMED		
307/ Cement	ENGINEER	AASHTO T 134	Min. of 1 per day or	Material sampled shall
Stabilized	(Quality	SC-T-25	when soil conditions	be obtained within area
Earth Base	Assurance)	SC-T-29	change	of days work and
		Maximum		representative of
		Density		material placed
		SC-T-33	Each 4000' per 2	Random within 4000'
		FIELD	lanes, each layer	section as determined
		DENSITY	-	from SC-T-100
		SC-T- (2-5)	Each 4000' per 2	Random within 4000'
		Gradation &	lanes, each layer	section as determined
		requirements of	-	from SC-T-100
		sect. 307&		
		303.02( <b>SS</b> )		
		Depth/	Staggered – each	Random within 1000'
		Thickness	1000' per two lanes	section as determined
				from SC-T-100
	ENGINEER (Department Record)	Record Testing Frequency and Location as outlined in SCDOT Construction Manual.		
	1100014)			

Required Testing of Bases and Subbases BY CONTRACTOR: Quality Control Testing of Bases and

Subbases shall be performed in accordance with the following table:

SECTION/TYPE	TESTING BY	TEST PROCEDURES PERFORMED	FREQUENCY **	LOCATION OF TEST
308/ Cement Stabilized Aggregate Base	CONTRACTOR (QUALITY CONTROL)	AASHTO T-180D Maximum Density	Min. of 1 per source or when material conditions change. (For projects <2000 tons use SCDOT historical data – if available.)	Material sampled shall be obtained within area of days work and representative of material placed
		SC-T-33 FIELD DENSITY	Each 1000' per 2 lanes, each layer	Random within 1000' section as determined from SC-T-100
		SC-T- (1-5) Gradation & requirements of sect. 305.05(SS)	Each 1000' per 2 lanes, each layer	Random within 1000' section as determined from SC-T-100
		Depth/ Thickness	Staggered – each 250' per two lanes	Random within 250' section as determined from SC-T-100

Concurrent Quality Assurance Testing of Bases and Subbases BY ENGINEER: Quality Assurance

Testing of Bases and Subbases shall be performed in accordance with the following table:

SECTION/TYPE	TESTING BY	TEST PROCEDURES PERFORMED	FREQUENCY **	LOCATION OF TEST
308/ Cement Stabilized Aggregate Base	ENGINEER (Quality Assurance)	AASHTO T-180D Maximum Density	Min. of 1 per source or when material conditions change. (For projects <2000 tons use SCDOT historical data – if available.)	Material sampled shall be obtained within area of days work and representative of material placed
		SC-T-33 FIELD DENSITY	Each 4000' per 2 lanes, each layer	Random within 4000' section as determined from SC-T-100
		SC-T- (1-5) Gradation & requirements of sect. 305.05(SS)	Each 4000' per 2 lanes, each layer	Random within 4000' section as determined from SC-T-100
		Depth/ Thickness	Staggered – each 1000' per two lanes	Random within 1000' section as determined from SC-T-100
	ENGINEER (Department Record)	Record Testing Free Construction Manua	uency and Location as l.	s outlined in SCDOT

<sup>\*\*</sup> More frequent testing may be required if placing materials in confined areas. The Engineer reserves the right to alter or increase the Department's testing frequency to insure adequate assurance of the Contractor's Quality Control program.

**Quality Assurance Testing:** The Engineer shall perform Quality Assurance Testing generally at a rate of 1/4<sup>th</sup> the frequency as established in the Quality Control Testing table above or at a minimum rate of <u>one per day or when material conditions change</u>. The Engineer reserves the right to alter or increase its testing frequency to insure adequate assurance of the Contractor's Quality Control program. Quality Control and Quality Assurance Testing results should correlate with each other. If the results do not correlate, revisions to the Contractor's Quality Control methods should be investigated if deemed necessary by the Engineer.

**Record Testing:** Department personnel shall perform Record Testing as required by the SCDOT Construction Manual procedures.