June 1, 2001

BASES AND SUBBASES QUALITY CONTROL/QUALITY ASSURANCE

DESCRIPTION: 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

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 <u>BY CONTRACTOR</u>: 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 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
		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 <u>BY ENGINEER</u>: 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 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
		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
		SC-T- (2-5) 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 Frequency and Location as outlined in SCDOT Construction Manual.		

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/ Type	TESTING BY	TEST PROCEDURES PERFORMED	FREQUENCY **	LOCATION OF TEST
302/ Soil Aggregate Subbase 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 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 <u>BY ENGINEER</u>: 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
302/ Soil Aggregate Subbase 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 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 2000 tons of aggregate	Random as determined from SC-T-100
	ENGINEER (Department Record)	Record Testing Frequency and Location as outlined in SCDOT Construction Manual.		

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/ 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 <u>BY ENGINEER</u>: 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
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 Frequency and Location as outlined in SCDOT Construction Manual.		

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/ Type	TESTING BY	TEST PROCEDURES PERFORMED	FREQUENCY **	LOCATION OF TEST
304/ Coquina Shell Base Course	**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. 304.04(**SS**).	Each 1000' per 2 lanes, each layer, sample per (**CM)7-35**	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 <u>BY ENGINEER</u>: 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
304/ Coquina Shell Base Course	**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. 304.04(**SS**).	Each 4000' per 2 lanes, each layer, sample per (**CM)7-35**	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 Frequency and Location as outlined in SCDOT Construction Manual.		

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/ Type	TESTING BY	TEST PROCEDURES PERFORMED	FREQUENCY **	LOCATION OF TEST
305/ Graded 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, sample per 305.13(**SS)**	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 <u>BY ENGINEER</u>: 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
305/ Graded 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, sample per 305.13(**SS)**	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 Frequency and Location as outlined in SCDOT Construction Manual.		

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/TYPE	TESTING BY	TEST PROCEDURES PERFORMED	FREQUENCY **	LOCATION OF TEST
307/ Cement Stabilized Earth Base	**CONTRACTOR** (QUALITY CONTROL)	**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-33 FIELD DENSITY	Each 1000' per 2 lanes, each layer	Random within 1000' section as determined from SC-T-100
		SC-T- (2-5) Gradation & requirements of sect. 307& 303.02(**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 <u>BY ENGINEER</u>: 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
307/ Cement Stabilized Earth Base	**ENGINEER** (Quality Assurance)	**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
		SC-T-33 FIELD DENSITY	Each 4000' per 2 lanes, each layer	Random within 4000' section as determined from SC-T-100
		SC-T- (2-5) Gradation & requirements of sect. 307& 303.02(**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 Frequency and Location as outlined in SCDOT Construction Manual.		

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/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 <u>BY ENGINEER</u>: 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 Frequency and Location as outlined in SCDOT Construction Manual.		

**** <u>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.</u>**

Quality Assurance Testing: The Engineer shall perform Quality Assurance Testing generally at a rate of 1/4th the frequency as established in the Quality Control Testing table above or at a minimum rate of one per day or when material conditions change. 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.